



Fire Prevention Plan

Plan version: V1.2

Date of plan: May 2025

Reason for Review / Notes

"Updated in support of permit variation application following withdrawal of Exemption S2; operational context updated to reflect scheduled minor site repairs."

Site details

Site name: Robert Hodge Centre

Site address: Stanley Way, Skelmersdale, WN8 8EE

Operator name: West Lancashire Borough Council

This plan is for: -

Operational Staff, Fire officers/marshals, the fire authority, site managers and relevant contractors working on site.

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Scope

This Fire Prevention Plan has been reviewed and updated in support of a permit variation following the revocation of certain waste exemptions, including Exemption S2, which previously allowed for the secure storage of certain hazardous wastes without a permit. As a result, this FPP now includes measures for the safe storage and handling of additional combustible hazardous waste types (e.g. WEEE, aerosols, batteries, paint tins), in line with updated EA requirements and the site's expanded permitted activities

Types of combustible materials

Combustible waste

We have the following combustible waste materials on site within the transfer station building, full details can be found in table 1 waste storage –

- Cardboard paper
- Co-mingled/dry mixed recyclate (plastic/cans/glass)
- Bulky & fly tipped waste
- Green waste
- Residual mixed waste
- Street sweepings (dewatering)
- Metal
- WEEE
- Paints
- Aerosols
- Batteries

We have the following combustible waste materials on site external to the transfer station building -

- Gas cage (orphaned cylinders)
- Tyres

Other combustible materials

We have the following combustible materials on site external to the transfer station building - Diesel (high flashpoint) - 2 tanks (Tank 1 - 27,262 litres and Tank 2 – 4,000 litres) these double bunded tanks are used for fuelling vehicles and plant.

The vehicle maintenance building (externally operated but within permit boundary) has oils and other lubricants, the building is located away from the transfer station and forms part of the office blocks for the site.

Using this fire prevention plan

Where the plan is kept and how staff know how to use it

This Fire Prevention and Mitigation (FPM) Plan is developed to support the Accident Management Plan and Management System for the Waste Transfer Station operated by West Lancashire Borough Council under Environmental Permit number EP3291CS.

A hard copy of the plan will be retained in the site weighbridge office and site managers office with an electronic copy being held on the management system which can be accessed by all relevant staff. All electronic systems are backed up to the cloud by the IT department and are recoverable.

Testing the plan and staff training

All new starters and contractors undergo a site-specific induction which explains emergency procedures, what to do in the event of a fire and where to locate in the event of a fire evacuation. Employee's, whose role will include fire warden, will undergo appropriate training to ensure that they can carry out this task competently. Site management and supervisors directly involved in the implementation of the plan are trained in line with its contents and regular timed fire drills/scenarios are undertaken to monitor the evacuation process ensure efficacy.

Fire prevention plan contents

Activities at the site

The site is a waste transfer station that collects domestic waste & recyclables, street sweepings, green waste, bulky collections and fly tipping. The site depot also incorporates other services such as clean and green although these are separate activities to the waste operations which are undertaken within the waste transfer station building.

Wastes enter site over the in weighbridge where they are weighed and a description of the waste is taken.

Residual domestic waste arrives on site in rear end loaders and is deposited in the transfer station, once the waste has been deposited the lorry leaves the site and periodically a loading shovel will be used to push up the waste. Once a sufficient quantity has been accumulated a bulk lorry will arrive at site and is loaded with the loading shovel, once loaded the bulk lorry will then leave the site via the out weighbridge. There are numerous collections of residual waste throughout the day and we attempt as far as is reasonably practicable to keep an empty floor by then end of the working day.

Mixed recyclate and paper/card wastes arrive on site in split rear end loaders and are deposited in the transfer station, once the waste has been deposited in the correct bay the lorry leaves the site

and periodically an inspection of the waste is undertaken and any easily visible non-conforming items are removed and placed in either quarantine or an appropriate bay. The loading shovel will be used to push up the waste, and once a sufficient quantity has been accumulated, a bulk lorry will arrive at site and will be loaded with the loading shovel. These collections are on an as needs basis and once loaded the bulk lorry will then leave the site via the out weighbridge.

Bulky waste, green waste and fly tip collections arrive on site in caged tippers and are deposited in the transfer station. Once the waste has been deposited in the correct bay the tipper leaves the site. The waste in the bay is inspected frequently and items such as trolleys, white goods, tyres, gas bottles, paints and other non-conforming wastes are removed from the bay and quarantined in appropriate container/bay. Periodically a loading shovel will be used to push up the waste and, once a sufficient quantity has been accumulated, a bulk lorry will arrive at site and is loaded with the loading shovel. These collections are on an as needs basis and once loaded the bulk lorry will then leave the site via the out weighbridge.

Street sweepings arrive on site via a street sweeper and these are in the appropriate bay for dewatering. When a sufficient quantity has been accumulated a bulk lorry will arrive at site and is loaded with the loading shovel. These collections are on an as needs basis and once loaded the bulk lorry will then leave the site via the out weighbridge.

Site plan

The site plan can be viewed in appendix 1 and block plan can be viewed in appendix 5.

Plan of sensitive receptors near the site

The sensitive receptors plan for the site can be viewed in appendix 2.

Manage common causes of fire

Arson

The site is surrounded by 2 metre palisade fence and a gated entrance which is locked outside of operational hours. The transfer station building is locked outside of operational hours along with all fuels and nonconforming wastes such as gas canisters.

The site is manned during operational hours and out of hours the site is monitored with CCTV cameras that are located on the outside of the Transfer Station and at other points across the site, this is supported with an intruder alarm system.

Plant and equipment

The site has a loading shovel operating within the building which is used for pushing up deposited waste and for the loading of waste bulk vehicles leaving the site. The loading shovel is not used in the last half hour of working day and is left to cool and is stored in the building overnight away from the waste piles.

The site is cleaned by a street sweeper which operates twice a day.

There is a preventative maintenance regime in place for all plant and equipment and a maintenance crew is on call to deal with any reactive maintenance.

There is a strict daily cleaning regime across the site to minimise the build-up of loose fibres/dust & materials. At periodic intervals we also have a full site deep clean.

All site plant/vehicles have fire extinguishers and have preventative maintenance undertaken on them to replace filters etc.

Electrical faults including damaged or exposed electrical cables

Electrics certification

The site is managed through the estates/property section who undertake all statutory testing in line with the appropriate legal timeframes and as/when any electrical issues are raised.

All lights in the transfer station are on the roof and over 6m from any combustible items, these are cleaned on an as needs basis to remove dust/dirt and to maintain optimum visual levels.

Electrical equipment maintenance arrangements

All on site electrical equipment is tested in line with statutory requirements and this is primarily managed through the estates/property section, daily site and equipment checks are in place.

Maintenance agreements are in place for equipment such as the de-odouriser/dust suppressor, fire suppression system and annual inspections take place for items such as the electric roller shutter doors.

All relevant items are part of the authorities pat testing schedule.

Discarded smoking materials

Smoking on site policies

The site operates a no smoking policy within the curtilage of the site. A smoking shelter is in place outside the front entrance to the site. All staff are informed of the no smoking policy at induction and there is signage on site.

No material of any kind shall be burned within the boundaries of the site.

Hot works safe working practices

There are no hot works undertaken within or adjacent to the main waste transfer station building. Hot works take place within the controlled environment of the vehicle service workshops which are located on site, away from the waste operation, and are run by a 3rd party contractor.

Industrial heaters

Use of industrial heaters

Industrial heaters are not used in the transfer station building or surrounds.

Hot exhausts and engine parts

Fire watch procedures

No hot works take place within the transfer station building or immediate surrounds. The loading shovel is parked away from the wastes during the operating day and the operative is present, either within the vehicle or undertaking other tasks within the transfer station and visual checks of the vehicle are undertaken during this period.

Ignition sources

There are no naked flames or other sources of ignition, besides hot exhausts, in the transfer station building or surrounds.

The only vehicle permanently used in the transfer station building is the loading shovel and this is not used in the final 30 minutes up to closing and is parked in the centre of the transfer station and away from all combustible materials.

The loading shovel also undergoes daily defect checks and is part of a preventative maintenance regime.

Build-up of loose combustible waste, dust and fluff

The transfer station building and external yard has a twice daily clean from the street sweeper to minimise the build-up of dust. The internal mist/deodoriser system is on an automated system which disperses a fine mist at regular intervals throughout the day.

There are jet wash facilities within the building and these are used to clean the walls of the transfer station. The lights within the building are being changed to LED bulbs and are cleaned by the property services department within the authority.

Reactions between wastes

All wastes are segregated into the relevant types and stored within their respective bays or containers.

All non-conforming wastes are removed from any waste piles and put in appropriate storage away from the combustible waste.

Deposited hot loads

No hot loads will be deposited within the building waste piles or adjacent to any combustible waste. Where identified before tipping, a hot load will be emptied in the quarantine area and a judgement made by the management as to whether the waste can be dampened down/extinguished or whether the emergency services should be called.

If an unnoticed hot load is deposited within the transfer station building it will immediately be removed to a quarantine area using the loading shovel.

Prevent self-combustion

General self-combustion measures

All waste is kept on site for the shortest amount of time possible, as outlined in table 1.

All waste brought to site is for bulking purposes without any treatment, and in the main, removed from site within 24 hours of deposit and therefore has little time to generate heat/combust.

The waste on site is kept to a minimal amount, is non-hazardous (except for fridges and quarantine items) and amounts to a daily input of circa 200 tonnes.

A fire risk assessment has been undertaken and this is reviewed at regular intervals.

Manage storage time

The majority of the waste that is accepted on site is from the daily collection rounds of the authority. Due to the volume of waste collected, the waste is deposited in bays throughout the day and is generally disposed of on the same day.

Where circumstances do not allow this daily pick up, wastes are kept on site no longer than 72 hours. The circumstances that would cause these delays could be ice/heavy snow, waste deposited on a Friday afternoon which is stored until Monday, Christmas/boxing day and break down of the loading shovel, although there is a service agreement/replacement available next day.

Metal waste, trolleys, fly tipped WEEE, tyres and quarantine waste are kept on site to enable a viable collection amount to be attained or within 3 months/whichever is the sooner.

Method used to record and manage the storage of all waste on site

Wastes arriving on site are given an individual code and then are allocated a bay for deposit. The loading shovel and weighbridge operators have a working 'real time' knowledge of the waste as they watch it being deposited by CCTV. Due to the length of time the operation has been undertaken, a pattern has emerged of waste collected and subsequently when waste needs to be removed from site. To facilitate the removal of waste, vehicles are prebooked in advance and extra pickups can be ordered on an as needs basis. All wastes are also given a respective code and the quarterly returns provide an additional opportunity to review these wastes.

Stock rotation policy

This section is not applicable due to the short duration that waste is kept on site.

Monitor and control temperature

This section is not applicable as waste is on site for a limited time, no treatment takes place and wastes are stored within the transfer station out of direct sunlight/elements.

Reduce the exposed metal content and proportion of 'fines'

This section is not applicable as the waste types collected do not include fines. Metals are collected as large items, are kept untreated and dry inside the building, they are contained within a 40 cubic yard container away from combustible waste and are kept for less than 3 months, thus minimising oxidation.

Monitoring temperature

This section is not applicable due to the short duration that waste is kept on site.

Controlling temperature

This section is not applicable due to the short duration that waste is kept on site.

Dealing with hot weather and heating from sunlight

This section is not applicable due to the short duration that waste is kept on site and all wastes that could be combustible are also stored within the building and are not in direct sunlight. The dust/odour suppression system used within the building also creates a fine mist and as a by-product of this also cools the building.

Waste bale storage

This section is not applicable as there are no waste bales, all waste is kept loose and stored for limited time.

Manage waste piles

All of the wastes stored on site fall within the pile size limits outlined in section 9.1 of the fire prevention plans guidance.

Maximum pile sizes for the waste on your site

Table 1 below outlines the waste locations we have on site, volumes of waste and storage times & Appendix 5 has a simple block layout of these locations.

Waste stream	Location	How it is stored	Max. length / m	Max. width / m	Max. height / m	Volume / m3	Max. time it will be stored
Cardboard paper	In bay in transfer station	Loose in bays	9	10.5	2.5	236.25	72 hours

Waste stream	Location	How it is stored	Max. length / m	Max. width / m	Max. height / m	Volume / m3	Max. time it will be stored
Co mingled/Dry Mixed recycle Plastic/cans/glass	In bay in transfer station	Loose in bays	9	13	2.5	292.5	72 hours
Bulky & Fly tipped waste	In bay in transfer station	Loose in bays	9	7	2.5	157.5	72 hours
Green waste	In bay in transfer station	Loose in bays	15	7	2.5	262.5	72 hours
Residual mixed waste	In bay in transfer station	Loose in bays	12	12	2.5	360	72 hours
Street Sweepings (dewatering)	In bay in transfer station	Loose in bays	9	8	2	144	72 hours
Metal	In skip in transfer station	Enclosed in 40cuyd skip	6.07	2.23	2.69	30.58	3 months
Tyres	Segregated in Container	Loose internal	5	5	2	50	3 months
WEEE	Segregated in Skip transfer station	Loose segregated	8	4	2	64	3 months
Paints	Container	Contained within	1.2	1.2	1.2	1000 litres	3 months

Waste stream	Location	How it is stored	Max. length / m	Max. width / m	Max. height / m	Volume / m3	Max. time it will be stored
Aerosols	Container	Contained within	0.6	0.6	0.8	205 litres	3 months
Batteries	Container	Contained within	1	1	0.75	600litres	3 months
Gas cage	Cage	Contained within	2	1.5	2	6	3 months

Table 1 – Waste storage

Storing waste materials in their largest form

All wastes that arrive at site are left in their original state and are not treated before removal.

Wastes that require quarantine such as paints/aerosols etc and fly tipped/bulky wastes such as fridges are removed from any piles and are segregated/put into quarantine.

Waste stored in containers

Types of containers you are using

We have one 40cuyd container that is used for the storage of mixed metals.

We have 3 containers for the storage of quarantine waste (aerosols, batteries and paints).

Accessibility of containers

The metal container is stored within the transfer station building and is accessible in the event of a fire.

The quarantine containers are stored away from the main combustible wastes and are adjacent to one of the Alpha frame fire break walls.

Moving containers in a fire

The metal waste container is stored away from all other wastes. In the event of an emergency it is able to be moved/positioned through the use of the loading shovel.

The smaller quarantine containers can be moved by shovel if heavy or by hand if safe to do so and is within manual handling criteria.

Prevent fire spreading

Separation distances

Fire walls construction standards

The transfer station has an internal concrete wall that runs throughout building and this is used as a push wall which is constructed of solid concrete to 3.5m high and 0.25m thick and runs the length of the building.

Each waste bay is created with alpha block dividers which are 3m high, the frames are concrete in construction with a sealed joint and an external metal covering over the joint. They are constructed to resist fire for a minimum period of 3.75 hours at their narrowest point and 5.9 hours at their thickest point. Fire test and construction technical descriptions can be found in appendix 3.

Storing waste in bays

All combustible waste stored in bays is subject to frequent stock rotation within 8 hours and up to a maximum of 72 hours. The waste in/out is monitored at the weighbridge and by operational staff, and where deemed necessary, extra bulk vehicles are ordered to take waste away.

The wastes in bays are dry recyclables, large items, residual waste and wet street sweepings which will not be in situ for a long enough period to create any heat.

All materials are pushed up into bays to keep materials between the bay walls and segregated from the other waste types thus reducing the chance of brands or lighted material moving outside the bay walls and igniting other wastes.

All bays are emptied routinely and before they reach 75% capacity. This leaves a freeboard space at the top of each wall.

The limited quantity of waste and quick turnaround time ensures that any fires can be quickly dealt with. Materials can easily be moved using the loading shovel and be placed in the quarantine area. Where possible the loading shovel will be used to submerge burning material in pools of fire water. If deemed necessary, where there are adjacent stores of material that may be affected, these will be moved away from the fire and where they cannot be moved they will be sprayed to reduce the chances of combustion.

Quarantine area

Quarantine area location and size

There are a number of quarantine areas that could be used in the event of a fire. We have allocated an area on the main floor within the building that is central to all of the bays (see simple block diagram in appendix 5). The area we have designated is 15m wide by 60m long and we estimate that waste could be stored to a height of 1.5 m giving us a total area of 1350m³, with our largest pile being 360m³.

Due to the large space within the transfer station, limited quantities of waste and limited sizes of the bays, we have sufficient space within the building to move any wastes or burnt materials as and where needs.

We have kept the quarantine areas flexible so that we can deal with any prospective issues in real time and move to any part of the quarantine that is 6m away from any waste pile and deemed to be the safest place during a real time incident after undertaking a visual risk assessment. The designated quarantine area is kept free from obstructions at all times to ensure immediate availability in the event of a fire.

How to use the quarantine area if there is a fire

The initial response would be triggered by our sprinkler system and from there we would be able to establish the best course of action once a visual assessment has taken place.

All materials can easily be removed from the bays and placed on the floor in the quarantine area, either to remove materials away from the seat of the fire, or alternatively to remove burning material to the main floor where it can be extinguished/placed in fire water. The respective response will be determined by management in real time in event of a fire.

This flexibility would allow fire fighters to have access to all sides of any burning piles and would also allow the pile to be spread out so that there is no 'burrowing' of the fire into the deeper parts of the piles.

Procedure to remove material stored temporarily if there is a fire

As we are a waste collection authority, the waste we have on site is only with us for bulking up purposes. Therefore, we would be able to move the limited amount of unaffected wastes we have on site to the disposal authority via bulk containers, which would be loaded on site with our loading shovel.

Any burned/extinguished materials within the quarantine area would be kept on an impermeable surface with drainage leading to the foul water system, the material will be tested for hazardous properties and disposed of through the appropriate channels.

Detecting fires

Detection systems in use

The sprinkler system that we have in place also acts as the automatic fire detection system throughout the transfer station and automatically sets off the alarm in the event of fire. This trip takes place at the same time that the sprinklers go off. There are also a number of manual call points located at the exit points of the building and these are linked to the site general alarm system which is maintained through our property services department and is monitored by an external provider Sefton Arc who undertake weekly fire alarm checks and all other maintenance such as extinguisher servicing.

The system was installed by a UKAS accredited contractor and full details of the system and the certifications are shown in appendix 4

Certification for the systems

The system was installed by Pyro Protection Ltd a UKAS accredited contractor and full details of the system and the certifications are shown in appendix 4.

Suppressing fires

Suppression systems in use

The sprinkler system at the roof within the transfer station is designed to BS EN12845: 2004, incorporating all relevant technical bulletins. As the building is unheated the sprinkler protection is a 'dry' sprinkler system. The system is fed from an aboveground LPCB approved water storage tank comprising of a total effective capacity of 163m³. The main electric pump set is connected to the main water storage tank with a suction pipe the pump operates under positive head conditions.

The sprinkler system within the transfer station area is served by one dry installation control valve which is permanently charged with compressed air. This is located in the GRP pumproom located adjacent to the Waste Transfer Building. The installation control valve is located within the GRP pumphouse adjacent to the building and has an electrical pressure alarm switch to provide a 'fire' signal to the fire alarm.

In the event of the operation of the system, water would only be discharged in the area of the fire where the individual sprinkler heads have been activated. The operation of a sprinkler head will operate the main fire pump and activate the relevant control valve station, which in turn will activate a fire alarm on the Sprinkler Remote Alarm Panel located in the Weighbridge.

Certification for the systems

The sprinkler system at the roof within the transfer station is designed to BS EN12845: 2004, and was installed by Pyro Protection Ltd a UKAS accredited contractor. Full details of the system and the certifications are shown in appendix 4.

Firefighting techniques

Active firefighting

The main way in which we would control and extinguish a fire is through our sprinkler system which has been designed to specifically to meet the site's needs. The system is dry and activated by the fire detection system which provides a targeted continuous spray at the fire. We also have additional of measures in place to fight fire, including:

- In the event of fire, a supervisor/manager will assess the fire and decide whether to attempt to fight it and whether the emergency services should be contacted.
- In the event of the emergency services being called, firefighting equipment will be utilised, where it is deemed safe to tackle, until the services arrive on site. A senior manager will then hand over to the emergency services and give a full description of the incident including wastes present etc.
- A wide range of firefighting equipment on site in the form of extinguishers. To ensure there are enough/ suitable extinguishers a fire company was employed to identify and supply the extinguishers required, which are under contract/maintenance agreement. All extinguishers are replaced/refilled after use and are inspected on a daily basis.
- Trained fire marshals are in place to coordinate evacuations etc. and are trained in the use of fire extinguishers. All staff are provided with fire awareness training.
- Fire fighters will use sprays and mists where possible to reduce the amount of water used.
- Where there are adjacent stores of material that may be affected and cannot be moved, they will be sprayed to reduce the chances of combustion.
- Where possible, machinery such as the loading shovel will be used to submerge burning material in pools of fire water.

Water supplies

Available water supply

We have a dry sprinkler system on site which is fed initially from the main 163,000 litre water tank. The system has been designed to actively target the seat of the fire and not deluge the building as a whole. Details of the system can be found in appendix 4.

We have a fire hydrant immediately adjacent to our site, which the fire brigade will connect to and will complement our system as and where necessary.

Where possible we would also block/reduce the flow to the drainage outlets to create a pool of firewater which we would recycle/use for immersing material.

The calculation of water supply needed and water available is shown below.

Show the calculation for your required water supply

Maximum pile volume in cubic metres	Water supply needed in litres per minute	Overall water supply needed over 3 hours in litres	Total water available on site in litres
360	2,401.2	432,216	Sprinklers fed from 163,000 litre storage tank @ 2650 litres per min @ 1.9 bar & then mains fed Fire hydrant adjacent to site 4500 litres per min Total sprinkler = 477,000 Total hydrant = 810,000 Grand total = 1,287,000 litres for 180 mins use

Managing fire water

Containing the run-off from fire water

The water in the transfer station is linked to the foul water system for the site and we have a discharge consent in place for this. A drainage plan for the site with flows can be viewed in Appendix 6.

The Transfer station has been constructed so that the internal floor falls towards the ACO drain located in the centre of the transfer station, which in the event of a fire we are able to block if necessary and recycle the water where appropriate.

The equipment within our spill response kits can be used to create extra bunding for the transfer station entrances and as the local authority we are also able to access sand/soil/stone/sandbags at short notice to use as bunding or to contain/smother any burning materials where appropriate.

During and after an incident

Dealing with issues during a fire

As we are the waste collection part of the authority, during a fire we would redirect waste directly to other suitable waste disposal authority facilities such as landfill and waste processing plants.

Due to the limited amount of waste on site we would be able to segregate and remove materials offsite directly to the waste disposal authority if/where necessary.

Notifying residents and businesses

If deemed necessary, we have a list of the businesses, sensitive receptors, local residents and amenities that we can contact. As the local authority we would also use our resources (manpower and communication network) to notify as and where necessary.

Clearing and decontamination after a fire

All contaminated material will be transferred to the quarantine area prior to disposal at a suitably permitted facility.

Where any contaminated water runoff is collected it will be tested, transferred to a suitable container(s) and a suitable contractor will be employed, based on its hazardous/non-hazardous properties, to handle/dispose of the water at a suitably permitted facility.

Our in house street sweeper will be used to clean the building and surrounds and any materials collected will be bulked in the quarantine area prior to disposal at a suitably permitted facility.

Making the site operational after a fire

After the event, as part of the management system, an incident investigation will take place using available CCTV, staff interviews and documentation to establish the underlying causes and root cause of the incident. This process will allow any deficiencies to be identified and suitable corrective actions to be raised.

Once the investigation and clean-up operations are complete, the site firefighting systems will be serviced and recharged by the installation contractor and an assessment will take place of the infrastructure.

All quarantined wastes will be removed from site to a suitable licensed disposal facility.

Once the site has been readied wastes will then be accepted at the site.

This Fire Prevention and Mitigation Plan will be reviewed annually, or as soon as practicable after an incident or where changes are made to the site operations or infrastructure (whichever is earlier). Any appropriate changes will be made to the plan and systems will be updated in line with these.

Appendix 1

Site plan

Appendix 2

Sensitive receptors plan

Appendix 3

Fire wall specification

Appendix 4

Sprinkler system specification

Appendix 5

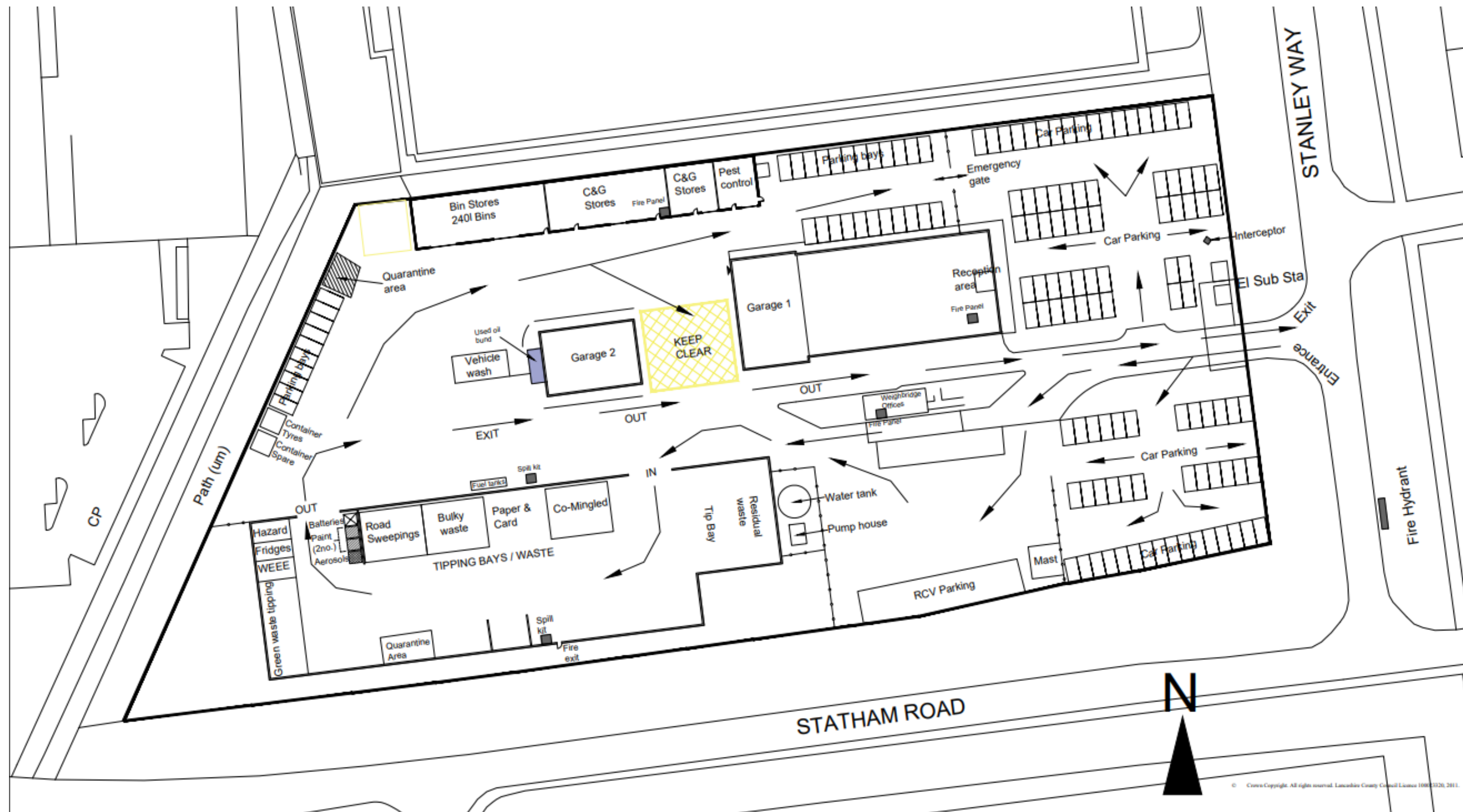
Block drawing

Appendix 6

Drainage plan

Appendix 1

Site plan



Drawing revised 12.05.25 as requested by Steve Machin



Scale: 1:500@A2
Date: 26.11.2020

Project Site: Robert Hodge centre

Drawn by: SG
Checked by: SB

Drawing title: Site layout and waste transfer detail

DO NOT SCALE - USE FIGURED DIMENSIONS ONLY.
This drawing is confidential and is the property of West Lancashire Borough Council.
It must not be copied or disclosed to any third party without prior consent.
The contractor is to check all dimensions on site prior to

Cp

Path (um)

Parking bays

OUT

Road Sweepings

Bulky waste

Paper & Card

TIPPING BAYS / WASTE

Quarantine area

Bin Stores
240l Bins

bund

EXIT

Fuel tanks

Spill kit

C

yout and waste
transfer detail

Appendix 2

Sensitive receptors plan

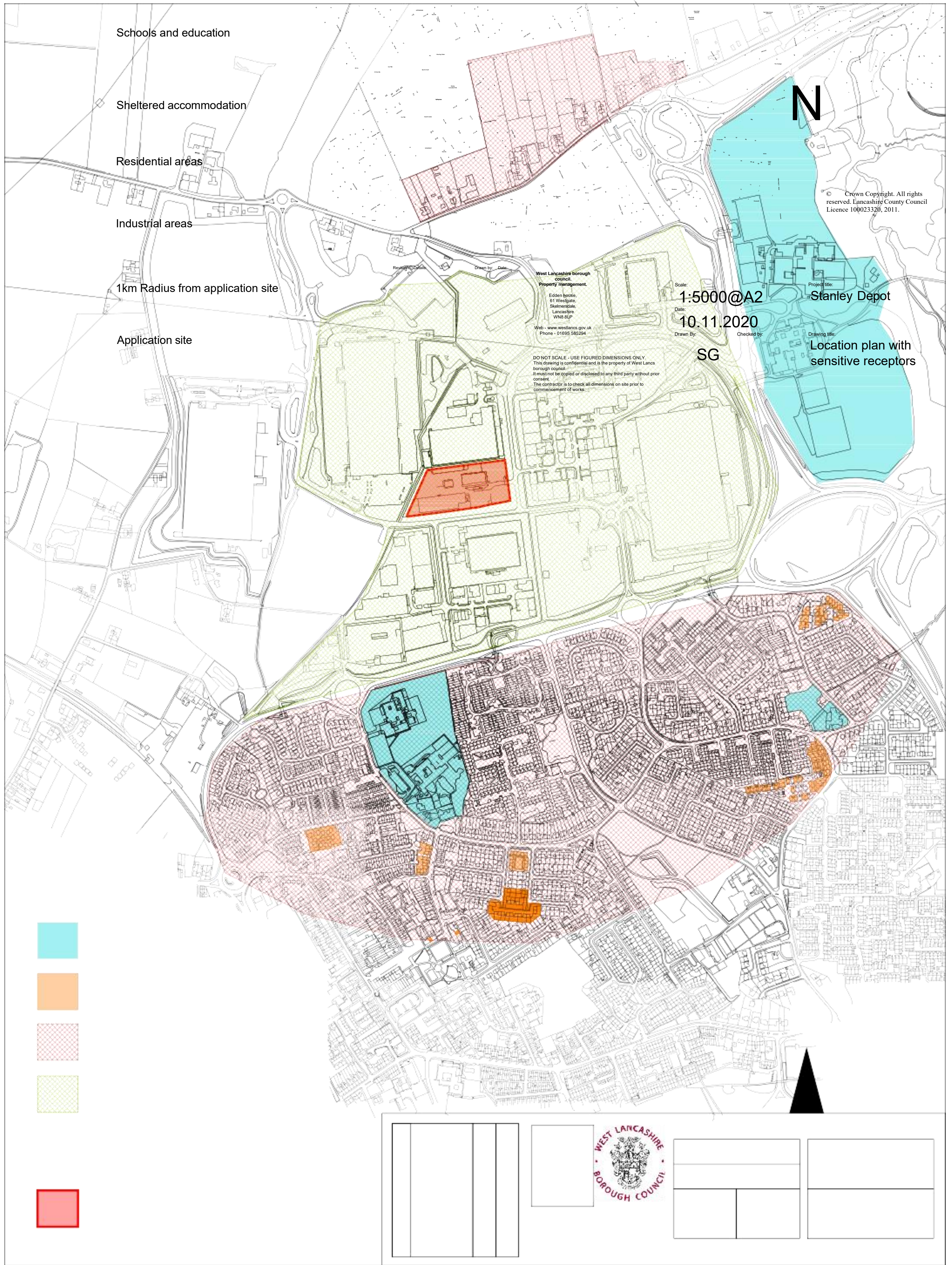
Our Lady Queen of Peace
Catholic High School

Lathom High School :

West Lancashire
Community High School

Crow Orchard
Primary School

Brookfield Park
Primary School



Appendix 3

Fire wall specification



Fire Protection Rating

Codes Included:

NFPA 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations 2070

NFPA 227 Standards for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls 2006

ACI 276.7-97/TMS 0276.7-97 Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies

Fire Resistance of Individual Layers per Fig. 2.2

Alphabloc is comprised of Concrete produced with Carbonate Aggregate.

Panel Thickness = 6.5"

Fire Resistance of Individual Layer (R_n) = 3.75 hours

Panel Thickness = 4"

Fire Resistance of Individual Layer (R_n) = 1.5 hours

Alphabloc has a 6.5" minimum thickness for individual layer thickness.

Alphabloc has a 4" minimum thickness for a 2 layer thickness with more than 3.5" between layers. Therefore per Section 2.2.5.3:

$$R = (R1_{0.59} + R2_{0.59} + A1)^{1.1}$$

R1 = R2 = 1.5 hours for 4" thickness
A1 = 0.30 for single continuous air factor

$$R = (1.5_{0.59} + 1.5_{0.59} + 0.30)^{1.1}$$

$$R = 5.9 \text{ hours}$$

Therefore the minimum Fire Protection Rating of the Alphabloc is at its thinnest individual layer thickness of 6.5" and has a fire resistance of 3.75 hours.

$$R_{min} = 3.75 \text{ hours}$$

1

LOADING

NEFO:fi:O IAU,
 101111 - Cat<ki S.
 IOI... Ti.Ow.S

1
 α:EUFRHOM
 ISIS*RCRW-TU
 VII&...

granular
 MATERIAL

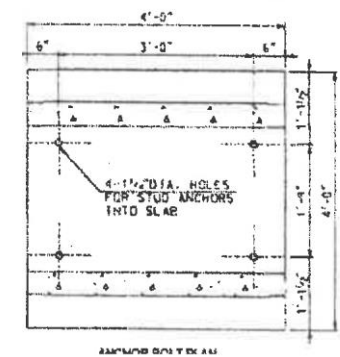
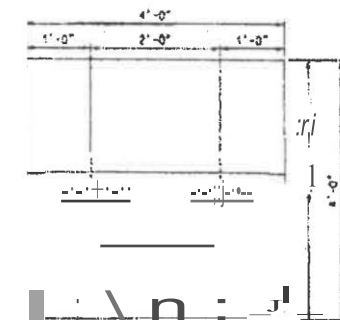
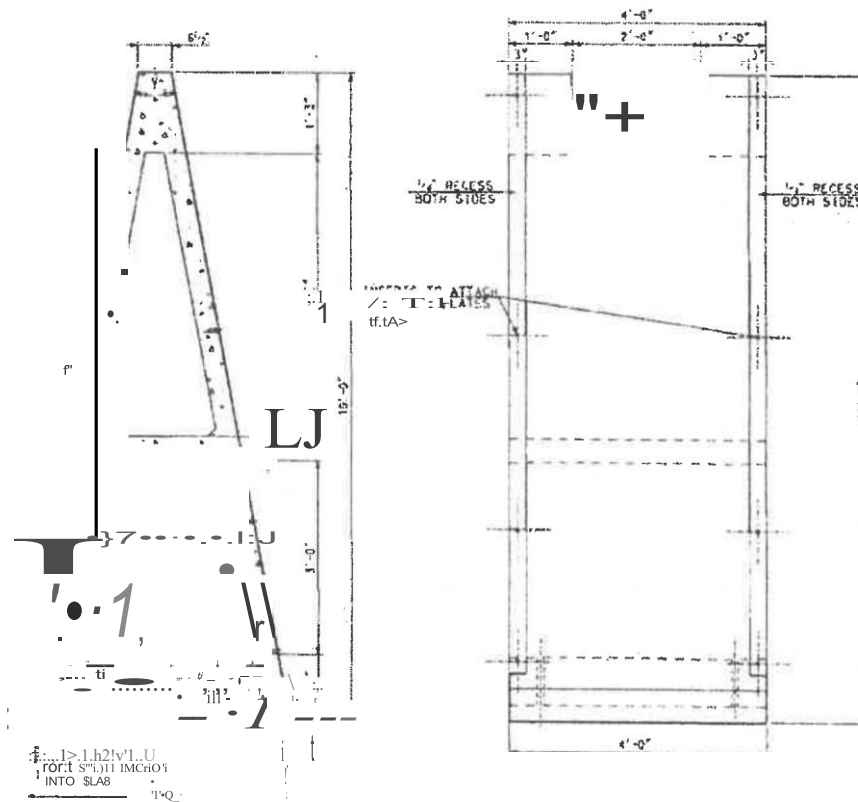
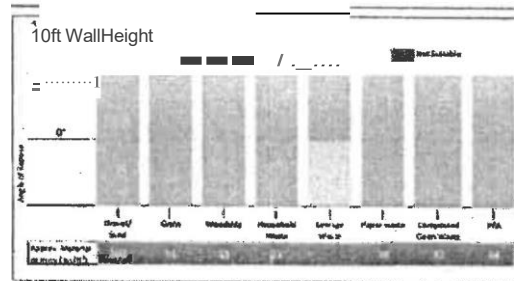
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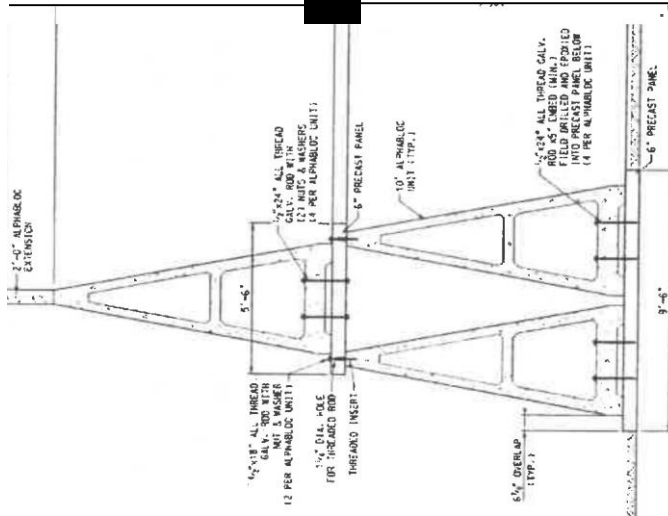
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PROJECT NO. 11-11

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NFPA® 850.

**Recommended Practice
for Fire Protection for
Electric Generating Plants
and High Voltage Direct
-current Converter Stations**

2010 Edition



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0-450 when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 123, *Test for Surface Burning Characteristics of Building Materials*. Includes any material with a flame spread index of 25 or less and with a smoke developed index of 450 or less when any element thereof, when tested, does not continue to propagate fire.

3.3.17.2 Class B Interior Finish. Materials having a flame spread index of 26-75, and a smoke developed index of 0-450 when tested in accordance with ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Test for Surface Burning Characteristics of Building Materials*. Includes any material with a flame spread index of 26 or more but not more than 75 and with a smoke developed index of 450 or less.

3.3.18 Limited Combustible. A building construction material not complying with the definition of noncombustible material that, in the form in which it is used, has a potential heat release rate not exceeding 8141 kJ/kg (3500 Btu/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, and complies with (a) or (b): (a) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 3.2 mm (0.127 in.) that has a flame spread index not greater than 50; and (b) materials, in the form and thickness used, other than as described in (a), having neither a flame spread index greater than 25 nor evidence of continued progressive combustion and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion. (Materials subject to increase in combustibility or flame spread index beyond the limits herein established through the effects of age, moisture, or other atmospheric condition shall be considered combustible.)

3.3.19 Liquid.

3.3.19.1 Combustible Liquid. Any liquid that has a closed-cup flash point at or above 100°F (37.8°C). (See NFPA 30, *Flammable and Combustible Liquids Code*.)

3.3.19.2 Flammable Liquid. A liquid that has a closed-cup flash point that is below 100°F (37.8°C) and a maximum vapor pressure of 10 psia (2068 mm Hg) at 100°F (37.8°C).

3.3.19.3 High Fire Point Liquid. A combustible dielectric liquid listed as having a fire point of not less than 572°F (300°C).

3.3.19.4 Low Fire Point Liquid. A combustible dielectric liquid listed as having a fire point of not less than 572°F (300°C).

3.3.20 Mass Burn. A process in which municipal solid waste is hauled directly to a tipping floor or storage pile and then is used as a boiler fuel without any special processing.

3.3.21 Municipal Solid Waste (MSW). Solid waste materials consisting of commonly occurring residential and light commercial waste.

3.3.22 Noncombustible. A material that, in the form in which it is used under the conditions anticipated, will not aid combustion or add appreciable heat to an ambient fire. Materials when tested in accordance with ASTM E 136, *Standard Test Method for Fire Resistance of Building Materials in a Horizontal Furnace*

750°F, and conforming to the criteria contained in Section 7 of the referenced standard are considered noncombustible.

3.3.23 Rating.

3.3.23.1 Fire Protection Rating. The time, in minutes or hours, that materials and assemblies used as opening protection have withstood a fire exposure as established in accordance with test procedures of NFPA 212, *Standard Method of Fire Test of Door Assemblies*, and NFPA 211, *Standard on Fire Test of Fire Window and Glass Block Assemblies*, as applicable.

3.3.23.2 Fire Resistance Rating. The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as established in accordance with the test procedures of NFPA 251, *Standard Methods of Test of Fire Resistance of Building Materials*, [220, 2009]

3.3.24 Refuse Derived Fuel (RDF). A boiler fuel manufactured by means of a process that includes storing, shredding, classifying, and conveying of municipal solid waste.

3.3.25 Stakeholder. An individual, a group of individuals, or an organization that is perceived to affect or be affected by the fire hazards associated with the facility being evaluated. Stakeholders include all those who have a financial, personnel safety, public safety, or regulatory interest in the fire risk, such as the public (e.g., neighbors, community groups, first responders), employees, owner/investor(s), operator, insurer, regulator(s), and design team.

Chapter 4 Fire Protection Design Process

4.1 General.

4.1.1 The fire protection design process should be initiated under the direction of someone experienced in the area of fire protection engineering and having extensive knowledge and experience in power plant operation of the type of plant under consideration.

4.1.2 The creation of the fire protection design basis should be initiated as early in the plant design process as practical to ensure that fire prevention and fire protection recommendations as described in this document have been evaluated in view of the plant's specific consideration regarding design, layout, and anticipated operating requirement.

4.1.3 Applicable process safety management (PSM) techniques should be considered.

4.1.4 The purpose of the Fire Protection Design Basis Document (DBD) is to provide a record of the decision-making process in determining the fire prevention and fire protection for specific hazards.

4.1.5 The DBD should be a living document that will continue to evolve, as the plant design is refined and it will be maintained and revised for the life of the plant.

4.2 Stakeholders.

4.2.1 The stakeholders with an interest in the scope and applicability of the fire protection design should be identified early in the process.

4.2.2 Stakeholders establish goals and objectives and evaluate whether the recommendations of NFPA 850 are adequate to meet those goals and objectives. The criteria for acceptability

NFPA 221

Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls

2006 Edition



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3.3.6 Hrestop. Aspl-cific sysr.cm. dt., ct*, or omstruction consisting of the materials that fill the openings around pe,wtrating items such as cahles, cable trays, conduit,, duct , pipes, and their means of support through the wall or fllOQropenings to pn,wnt the sp,ead of fire. [5000, 2006]

3.3.7 Footing. Part of the foundation of ,t st.ructure that spreads and transmits the load dir ct to the soil or tr, piles. [5000_ 2006]

3.3.8 High Hazard Materials. Materials that are combustible or flamm,able liquids, flammabl,r gas,'s, and combustible dusts.

3.3.9 Penetration.

3.3.9.1 * Membmne Penetration. An opening for penetrations made through one side of a fire resistance-rated assembly. [5000, 2006]

3.3.9.2 * Through-Penetration. An opt"ning for penetrtions that pass through both sides of a vertical or horizontal fire resistance-rated assembly, [5000, 2006]

3.3.10 Smoke Barrier. A continuous membrane, or a mem-lmme with discont:inuities createrl by protected openings, where snch membrane is design<"d and constructed to rest,ict the movement of smoke. [5000, 2006]

3.3.11 Structural Frame. Frame composed of individual membt'rs of a building or sructure required to transmit loads to the ground. [5000, 2006]

3.3.12 Wall.

3.3.12.1 Angle Jflll. An exterior wall that intersects with a high challenge fire wall at an angle of 135 degrees or lt:ss at the end of the high challenge fire wall. (Sre Figure 5.16.J. I).

3.3.12.2 Bearing Wall Any wall meetinR either of the following classifications: (1) any metal l)r wood stud wall that supports more than 100 lb/linear ft (J.-100 N/linear m) of \Vertical load in addition to iL own weight or (2) any concrete or masomy wall that supports more than 200 lb/linear ft (2800 N/linear .m) of vt"rtical load in addition to its own weight. [ASCE/SEI 7, 2005J

3.3.12.3 Bearing Wall System. Astmctural system with bearing walls providing support for all o1-111.\jor portions of the vt"rtical loads. Shear walb or braced frames prOvide seismic force resistance. [ASCE/SEI 7, 2005J

3.3.12.4 End Wall. An exterior wall that intersect with a high challenge fire wall at an exterior angle of more than 1 'H degrees at the end of the high chalknge fire wall. (See Figure 5.16.2.I(f), Figw-e 5. 16.2. I(h), amt hgur, 5.16.2.3.)

3.3.12.5 Fire Barrier Wall. A wall, other than a fire wall, having a fire resistance rating.

3.3.12.6 * Fire Wall. A wall separating buildings or subdividing a building to prevent the spread nf fire and having a fire resistance rating and struc:tural stability.

3.3.12.7 High Challenge Fire Wall. Aw,ill used to separate buildings or subdivide a building with high fire challenge ocn,paucies, h,wing enharn:ed fire resistance ratings and enhancecd appmtenance protection to prnent the spread of fit'e, and having strnctlll tl stability.

3.3.12.8 Nonbearing Wall. Any wall that i, not a bt'aring wall. [ASCE/SEI 'I, 2005]

Chapter 4 General Requirements

4.1 Scope. Tiu, prm-isions of this Chapter apply to high challenge (I IC) fire walls, fire walls, and fire barrier walls unless modified by prcnisions ofChaptt*rs 5, 6, or 7, respectively, and shall hereafter in this chaplt*r be ref't'rrcd to a, wall .

4.2 * Design Load'i. All walls anrl their .support shall be de-signe-d for loads in accordance with ASCE/SEI 7 and to "ith-stand a minimum tmifoml load of 5 lb/ft² (0.2.1 kPa) from either direction applied perpendicular to the face of the wall.

4.3 1-"ire Resistance Ratings.

4.3.1 The fire resistance rating of assemblies shall be determined in accordance with NFPA 25 I, ASTM E JI 9, or ANSI/UL 263, or other appnw<-d test methods or analytical methods in accordance with 4.3.2.

4.3.2 Analytical Methods. [5000:8.2.3]

4.3.2.1 General. Analytical methods utilized lo detenninc the fire re-sistance rating of building ao;st'mblics shall comply with

4.3.2.2 or 4.3.2.3. [5000:8.2.3.1]

4.3.2.2 * Calculations. [5000:8.2.3.2]

4.3.2.2.1 V-.11cre calculations are med to establish the fire resistance raHng of stmctural element, or as.,embles, they shall be pcmitted to be performed in accordance with ASCE/SFPE 29. (5000:8.2.3.2.1).

4.3.2.2.2 Where calculations are uscd to establish the fire n'-sistance rating of concrete or masonry element or assemblies, l.he prrmisnns of ACI 216.1/TMS 0216.1 shall be permitted to be used. [5000:il.2.3.2.2)

4.3.2.3 Methods. [5000:8.2.3.3]

4.3.2.3.1 Except for the method specified in 4.3.2.2, analytical methncls used to calculate the fire resistance rating of building assemblies or stmctural elements shall be approved. [5000:8.2.3.3.1J

4.3.2.3.2 'Where an approved analytical method is utilized to establish the fire resistance rnting of a structural element or building assembly, the calculati>ns shall be based on the fire exposure and acceptance critetia specified in NFPA 251. [5000:8.2.3.,1.2]

4.4 Ducts and Air-TransFer Openings. [5000:8.8.8]

4.4.1 General. The provisions of Section 4.1 shall govern the materials and method's of constntction used to protect duct anrl air-Lransfr openings in wall.5. [5000:8.8.8. 1]

4.4.2 * Fire Damper Requirements. Fire dampers shall be installed to protect ducts and air-transfer openings that pen- etrate walls as required by other sections of the applicable building code. [5000:8.8.8.2]

4.4.2.1 Fire dampers shall be designed and tested in accordance with the requirements of UL 55;:, and shall have the minimum fire protection rating specified in Table 4.-1.2.1 for the raring nf the assembly penetrted. [5000:8.8.8.2.1)

4.4.2.2 In systems where fans continue to operate in the emergency mode, dynamic fire dampers shall be required. [5000:8.8.8.2.2]

Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies

Reported by ACI/TMS Committee 216

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Michael P. Gillen	Tung D. Lin	F. R. Vollert
Tibor Z. Harmathy	lloward R. May	

• Immediate past chairman

FOREWORD

Fire resistance (building element), is an important consideration in building design. Where structural design considerations for concrete and masonry ut

amhien{ femperawre crmditions arc addressed by ,ACI 318 and AC/ 530/ ASCE 5/TMS 401, respecriv, 1•, these codes do not consider the impact of fire on t:mu:rc te and masonry l'Onstruction. The standard por/io11 of Jbis doc.:11- lne111 contains such design anti analytical prucedurts }Or determining the fire resistance of conl rele und mu.wnr}, members a11cl building assemblies. Where d(O'erenfes occur in .,:pecijlr design requiremels between this slClnard und the! above ref'renced codes, as in the case f>f covt•I' protection t { .iti?el rein- fvrcement, the more rlrng,111 ufthe r<q11irements shall apply.

Keywords: beams (supports); columns (supports); compressive strength; concrete slabs; fire ratings; fire endurance; fire resistance; fire tests; masonry walls; modulus of elasticity; pre-stressed concrete; prestressing steels; reinforced concrete; reinforcing steel; structural design; temperature distribution; thermal properties; walls.

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Reference to this document shall not be made in contract documents. If items found in this document are desired by the Architect/Engineer to be a part of the contract documents, they shall be restated in mandatory language for incorporation by the Architect/Engineer.

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ACI 216.1-97 became effective September 1, 1997.

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- x_2 = distance between reinforcement points for a continuous span (Chapter 2)
- p = ratio of total reinforcement area to cross sectional area of column
- t = subscript denoting change of parameter due to elevated temperature
- $p =$ reinforcement ratio
- ρ_r = reinforcement index for concrete beam reinforced with prestressing steel
- ρ_{rt} = reinforcement index for concrete beam at elevated temperature
- ρ_{rn} = reinforcement index for concrete beam reinforced with non prestressed steel

1.5-Fire resistance determinations

1.5.1 Qualification by testing—Materials and assemblies of materials of construction tested in accordance with the requirements set forth in ASTM E 119 shall be rated for fire resistance in accordance with the results and conditions of such tests.

1.5.2 Calculated fire resistance—The fire resistance associated with an element or assembly shall be deemed acceptable when established by the calculation procedures in this standard or when established in accordance with 1.2-Alternative Methods.

1.5.3 Approval through past performance—The provisions of this standard are not intended to prevent the application of fire ratings to elements and assemblies that have been applied in the past and have been proven through performance.

1.5.4 Engineered analysis—The provisions of this standard are not intended to prevent the application of new and emerging technology for predicting the life safety and property protection implications of buildings and structures.

CHAPTER 2-CONCRETE

2.1-General

The fire resistance of concrete members and assemblies designed in accordance with ACI 318 for reinforced and plain structural concrete shall be determined based on the provisions of this chapter. Concrete walls, floors, and roofs shall meet minimum thickness requirements for purposes of barrier fire resistance. Concrete containing steel reinforcement shall additionally meet cover protection requirements in this chapter for purposes of maintaining structural fire resistance.

In some cases distinctions are made between normal weight concretes made with carbonate and siliceous aggregates. If the type of aggregate is not known, the value for the aggregate resulting in the greatest required member thickness or cover to the reinforcement shall be used.

2.2- Concrete walls, floors and roofs

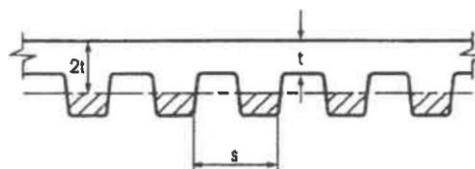
Plain and reinforced concrete bearing or nonbearing walls and floor and roof slabs required to provide fire resistance ratings of 1 to 4 hr shall comply with the minimum equivalent thickness values in Table 2.1. For solid walls and slabs with flat surfaces, the equivalent thickness shall be determined in accordance with 2.2.1. The equivalent thickness of hollow-core walls or of walls or slabs, or of barrier elements with surfaces that are not flat shall be determined in accordance with 2.2.2 through 2.2.4. Provisions for cover protection of steel reinforcement are contained in 2.2.1

Table 2.1-Fire resistance of singular layer concrete walls, floors and roofs

Aggregate type	Minimum equivalent thickness for fire resistance rating, m.				
	1 hr	1 1/2 hr	2 hr	3 hr	4 hr
Siliceous	3.5	4.3	5.0	6.2	7.0
Carbonate	3.2	4.0	4.6	5.7	6.6
Semi-lightweight	2.7	3.3	3.8	4.6	5.4
Lightweight	2.5	3.1	3.6	4.4	5.1

Determine thickness here

$$C_{eff} = \frac{A_g}{A_{eff}} \quad L \text{ 2 or } 6 \cdot (152 \text{ mm}) \text{ whichever is less}$$



Neglect shaded area in calculation of equivalent thickness

$$k = \frac{I}{J}$$

Fig. 2.0-Equivalent thickness of flanged, ribbed, and hollow-core panels

2.2.1 Solid walls and slabs with flat surfaces—For solid walls and slabs with flat surfaces, the actual thickness shall be the equivalent thickness.

2.2.2 Hollow-core concrete walls and slabs—For walls and slabs constructed with precast concrete hollow-core panels with constant core cross section throughout their length, calculate the equivalent thickness by dividing the net cross-sectional area by the panel width. Where all of the core spaces are filled with grout or loose fill material, such as perlite, vermiculite, sand or expanded clay, shale, slag or slate, the fire resistance of the wall or slab shall be the same as that of a solid wall or slab of the same type of concrete.

2.2.3 Flanged panels—For flanged walls, and floor and roof panels where the flanges taper, the equivalent thickness shall be determined at the location of the lesser distance of two times the minimum thickness, or 6 in. from the point of the minimum thickness of the flange (see Fig. 2.0).

2.2.4 Ribbed or undulating panels—Determine the equivalent thickness of elements consisting of panels with ribbed or undulating surfaces as follows:

A. Where the center-to-center spacing of ribs or undulations is not less than four times the minimum thickness, the equivalent thickness is the minimum thickness of the panel.

B. Where the center-to-center spacing of ribs or undulations is equal to or less than two times the minimum thickness, calculate the equivalent thickness by dividing the net cross-sectional area by the panel width; The maximum thickness used to calculate the net cross-sectional area shall not exceed two times the minimum thickness.

C. Where the center-to-center spacing of ribs or undulations exceeds two times the minimum thickness but is less than four times the minimum thickness, calculate the equivalent thickness from the following equation:

$$\text{Equivalent thickness} = t_{m,n} + [(4t_n/n) - 1](t_e - t_{m,n}) \quad (2-1)$$

where:

s = spacing of ribs or undulations, in.

$t_{m,n}$ = minimum thickness, in.

t_e = equivalent thickness, in., calculated in accordance with Item B in 2.2.4

2.2.5 Multiple-layer walls, floors, and roofs; or walls,

floors, and roofs consisting of two or more layers of different types of concrete, masonry, or both, determine the fire resistance in accordance with the graphical or numerical solutions in 2.2.5.1, 2.2.5.2, or 2.2.5.3. The fire resistance of insulated concrete floors and roofs shall be determined in accordance with 2.2.6.

2.2.5.1 Graphical and analytical solutions—For solid

walls, floors, and roofs consisting of two layers of different types of concrete, fire resistance shall be determined through the use of Fig. 2.1 or from Eq. (2-2) or (2-3). Perform separate fire resistance calculations assuming each side of the element is the fire-exposed side. The fire resistance shall be the lower of the two resulting calculations unless otherwise permitted by the building code. Exception: In the cases of floors and roofs, the bottom surface shall be assumed to be exposed to fire.

2.2.5.2 Numerical solution—For floor and roof slabs and walls made of one layer of normalweight concrete and one layer of semi-lightweight or lightweight concrete, where each layer is 1 in. or greater in thickness, the combined fire resistance of the assembly shall be permitted to be determined using the following expressions:

(a) When the fire-exposed layer is of normalweight concrete,

$$R = 0.057(2t_{tot}^2 - d_f t_{tot} + 6/t_{tot}) \quad (2-2)$$

(b) When the fire-exposed layer is of lightweight or semi-lightweight concrete,

$$R = 0.063(1.1t_{tot} + 2d_f t_{tot} - d_f + 4/t_{tot}) \quad (2-3)$$

where

R = fire resistance, hr

t_{tot} = total thickness of slab, in.

d_f = thickness of fire-exposed layer, in.

2.2.5.3 Alternative numerical solution—For walls, floors and roofs not meeting the criteria of 2.2.5.1, and consisting of two or more layers of different types of concrete, or of lay-

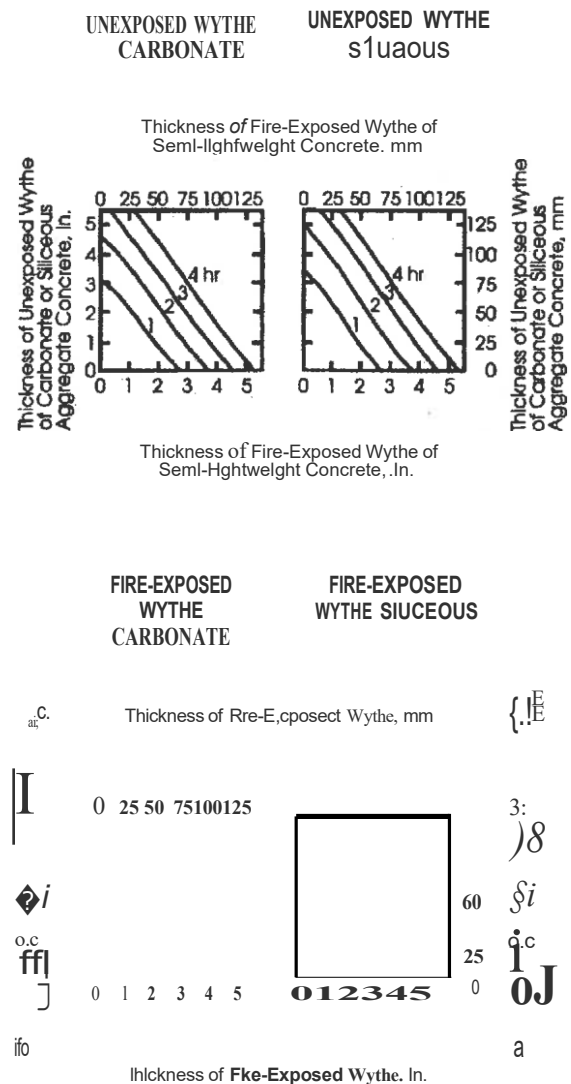


Fig. 2.1—Fire resistance of two-layer concrete walls, floors and roofs.

ers of concrete, concrete masonry and/or clay masonry, determine the fire resistance from Eq. (2-4):

$$R = (R_1/59 + R_2/59 + \dots + R_n/59 + A_1 + A_2 + \dots + A_n) \cdot 1.7 \quad (2-4)$$

where

R = fire resistance of assembly, hr

R_1, R_2 and R_n = fire resistance of individual layers, hr

A_1, A_2 and A_n = 0.30; the air factor for each continuous air space having a distance of 1/2 in. to 3/4 in. between layers

Obtain values of R_i for individual layers for use in Eq. (2-4) from Table 2.1 or Fig. 2.2 for concrete materials, from Table 3.1 for concrete masonry, and Table 4.1 for clay masonry. Interpolation between values in the tables shall be permitted. Note: Eq. (2-4) does not consider which layer is being exposed to the fire.

2.2.5.4 Sandwich panels—Determine the fire resistance of precast concrete wall panels consisting of a layer of foam plastic sandwiched between two layers of concrete by using Eq. (2-4). For foam plastic with a thickness not less than 1 in., use $R_i/59 = 0.22$ hr in Eq. (2-4). For foam plastic with a total thickness less than 1 in., the fire resistance contribution

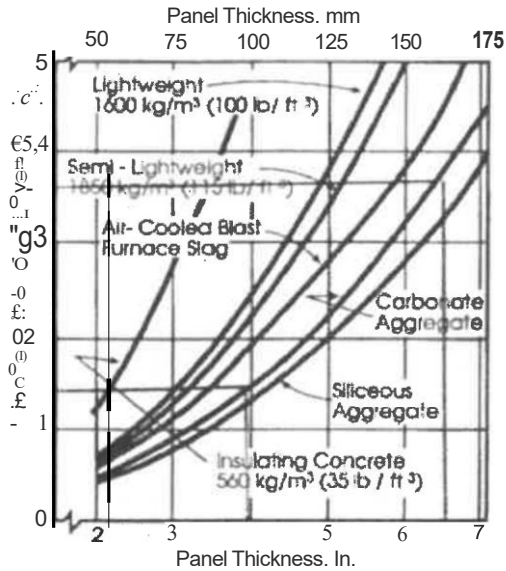


Fig. 2.2—Effect of slab thickness and aggregate type on fire resistance of concrete slabs based on 250 deg F (139 deg C) rise in temperature of unexposed surface

of the plastic shall be zero. Foam plastic shall be protected on both sides with not less than 1 in. of concrete.

2.2.6 Insulated floors and roofs—Use Fig. 2.3 (a), (b) and (c) or Fig. 2.3.1 (a) and (b) to determine the fire resistance of floors and roofs consisting of a base slab of concrete with a topping (overlay) of cellular, perlite or vermiculite concrete, or insulation boards and built-up roof. Where a 3-ply built-up roof is installed over a lightweight insulating, or semi-lightweight concrete topping, it shall be permitted to add 10 min to the fire resistance determined from Fig. 2.3 (a), (b), (c) or 2.4.

2.2.7 Protection of joints between precast concrete wall panels and slabs—When joints between precast concrete wall panels are required to be insulated by 2.2.7.1, this shall be done in accordance with 2.2.7.2. Joints between precast concrete slabs shall be in accordance with 2.2.7.3.

2.2.7.1 Joints in walls required to be insulated—Where openings are not permitted or where openings are required to be protected, use the provisions of 2.2.7.2 to determine the required thickness of joint insulation. Joints between concrete wall panels that are not insulated as prescribed in 2.2.7.2 shall be considered unprotected openings. Where the percentage of unprotected openings is limited in exterior walls, include uninsulated joints in exterior walls with other unprotected openings. Insulated joints that comply with 2.2.7.2 shall not be considered openings for purposes of determining allowable percentage of openings.

2.2.7.2 Thickness of insulation—The thickness of ceramic fiber blanket insulation required to insulate joints of $\frac{3}{8}$ and 1 in. in width between concrete wall panels to maintain fire resistance ratings of 1 hr to 4 hr shall be in accordance with Fig. 2.5. For joint widths between $\frac{3}{8}$ and 1 in., determine the thickness of insulation by interpolation. Other approved joint

treatment systems that maintain the required fire resistance shall be permitted.

2.2.7.3 Joints between precast slabs—It shall be permitted to ignore joints between adjacent precast concrete slabs when calculating the equivalent slab thickness, provided that a concrete topping not less than 1 in. thick is used. Where a concrete topping is not used, joints grouted to a depth of at least one-third the slab thickness at the joint, but not less than 1 in., the minimum cover used in the calculation shall be one-half the actual value. The actual cover for any individual bar shall be not less than one-half the value shown in Table 2.4 or $\frac{1}{4}$ in., whichever is greater.

2.2.8 Effects of finish materials on fire resistance—The use of finish materials to increase the fire resistance rating shall be permitted. The effects of the finish materials, whether on the fire-exposed side or the non fire-exposed side, shall be evaluated in accordance with the provisions of Chap. 5.

2.3—Concrete cover protection of steel reinforcement

Cover protection determinations in this section are based

on the structural end-point. Assemblies required to perform as fire barriers shall additionally meet the heat transmission end-point and comply with the provisions in 2.2.

2.3.1 General—Determine minimum concrete cover over positive moment reinforcement for floor and roof slabs and beams using methods described in 2.3.1.1 through 2.3.1.3. Concrete cover shall not be less than required by ACI 318. For purposes of determining minimum concrete cover, classify slabs and beams as restrained or unrestrained in accordance with Table 2.2.

2.3.1.1 Cover for slab reinforcement—The minimum thickness of concrete cover to positive moment reinforcement (bottom steel) for different types of concrete floor and roof slabs required to provide fire resistance of 1 to 4 hr shall conform to values given in Table 2.3. Table 2.3 is applicable to one-way or two-way cast-in-place beam/slab systems or precast solid or hollow-core slabs with flat under-surfaces.

2.3.1.2 Cover for non-prestressed flexural reinforcement in beam—The minimum thickness of concrete cover to non-prestressed positive moment reinforcement (bottom steel) for restrained and unrestrained beams of different widths required to provide fire resistance of 1 to 4 hr shall conform to values given in Table 2.4. Values in Table 2.4 for restrained beams apply to beams spaced more than 4 ft apart on center. For restrained beams and joists spaced 4 ft or less on center, $\frac{1}{2}$ -in. cover shall be permitted to meet fire resistance requirements of 4 hr or less. Determine cover for intermediate beam widths by linear interpolation.

The concrete cover for an individual bar is the minimum thickness of concrete between the surface of the bar and the fire-exposed surface of the beam. For beams in which several bars are used, the cover, for the purposes of Table 2.4, is the average of the minimum cover of the individual bars. For corner bars (that is, bars equidistant from the bottom and side), the minimum cover used in the calculation shall be one-half the actual value. The actual cover for any individual bar shall be not less than one-half the value shown in Table 2.4 or $\frac{1}{4}$ in., whichever is greater.

To: Valerie Campos; John McKay
Subject: RE: A few questions

The Banier must be 3 hour fire rated and meet below. See attached Section 5.1.4

X: Minimum separation distance from Table 5.1.4.3.

Appendix 4

Sprinkler system specification

**AUTOMATIC FIRE SUPPRESSION SYSTEM
OPERATING MANUAL
FOR
SKELMERSDALE WASTE TRANSFER STATION
STANLEY WAY
SKELMERSDALE
WN8 8EE**

Contract Number: C3250

Date: JUNE 2010

Revision: 0

Author: C. Kelly



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FOREWORD

The information contained in this instruction manual is intended for the interest and use of personnel responsible for the safe and efficient operation of the equipment supplied by Pyro Protection Limited. This manual should be studied by plant personnel and be available for reference.

Pyro Protection Limited recommends that wherever possible all maintenance procedures/actions be carried out between 9.00am and 5.00pm. It is recommended that copies of all Inspection and Test Reports be left in the safe keeping of the property owner and the owner's insurance company.

In a case where there is any doubt as to the functioning or adjustment of any parts of the plant, or in the event of any trouble which cannot be remedied by reference to the information contained in this book, Pyro Protection Limited, Service Division should be consulted immediately at the following address:

Pyro Protection Limited
Saddleworth Business Centre
Huddersfield Road
Delph
Oldham
OL3 5DF

Telephone 01457 879222

In communication with Pyro Protection Limited the contract reference number should always be quoted **(C3250)**

Whilst every care is taken in the preparation of these instructions every detail cannot be covered. Pyro Protection Limited therefore cannot accept liability for direct or consequential damage that may arise from non-observance of good engineering practices. The instructions are written on the understanding that site safety instructions are to be observed at all times; if any instruction in this manual is found to be at variance with the site safety instructions, then the safety officer must be consulted for a ruling on the procedure to be adopted. Where safety regulations do not exist, or are not clearly defined for the tasks to be performed, then the person performing the tasks must maintain vigilance at all times in order to avoid injury to himself and/or to other people; no part of this manual may be taken to be an instruction to perform a task which even given due vigilance, could result in injury.

Operating and Maintenance Instructions Prepared By:

Pyro Protection Limited
Saddleworth Business Centre
Huddersfield Road
Delph
Oldham
OL3 5DF
Telephone 01457 879222

SECTION ONE Systems Description

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1 INTRODUCTION

Sprinkler equipment is selected for its reliability and installations are proved systematically before being handed over. Relatively little active maintenance is required but the results of a single functional failure could be so serious that the maintenance routines recommended must be carried out meticulously by personnel appointed by the owners. Such personnel must fully understand the principles and detail of the systems for which they are responsible.

Pyro Protection Limited operates a Service and Maintenance Department and will be happy to provide details on application.

These instructions, in addition to giving details of maintenance, deal with the objects and principles of sprinkler installations, as supplied by Pyro Protection Limited.

Section 1 describes the types of system and outlines components incorporated in it.

The insurance companies, by making concessions for those installations which meet their recommendations, have encouraged the development of sprinklers and investment in them.

It will be seen that most of the maintenance arises from the need to ensure that there is a good water supply at all times and that any alarms associated with the sprinkler system function satisfactorily. The equipment concerned with the supply and control of water and hydraulic alarms.

1.1 Automatic Sprinklers: The Principles

Sprinkler systems have grown both in size and complexity around the simple concept of introducing water to the seat of a fire through pipes installed in anticipation of the possible occurrences. Fig1.1 refers.

If the action of the fire itself results in the release of water without human intervention, the sprinkler system can be regarded as automatic.

In a modern system attached to arrays of pipes are carefully designed heads, through which the water passes on its way to the fire and to ceilings and other structures requiring protection.

The automatic release mechanism, thermally operated, may be incorporated in the head itself the head then being described as 'sealed'. Where no release mechanism is incorporated in the head it is described as 'open'. When open heads are used they are usually installed on pipework controlled by a common valve which may be brought into action by a thermal release mechanism or other detector system but which, in some cases, may be manually operated.

The automatic sprinkler installation is designed to detect and control a fire in its early stages.

The automatic opening or fusing at a pre-determined temperature of any one or more of the sprinkler heads allows a water spray to be discharged on to the seat of a fire. The water discharge from each sprinkler can cover 12m² of floor area for Ordinary Hazard systems and 9m² for High Hazard systems. The system designed is Ordinary Hazard.

The Automatic Sprinkler System is in accordance with BS EN 12845 or NFPA or Factory Mutual Global together with all amendments up to time of tender, and would be for the protection against fire for all the areas indicated on the enclosed Block Plan (see section 1.10).

The wet system is permanently charged with water throughout the year, and it is necessary to ensure that suitable precautions are taken to prevent freezing.

The grading or classification of a sprinkler installation depends principally upon the water supply, which should provide ample water flow and pressure for a specified length of time.

Standard sprinkler heads throw relatively large droplets over an area of approximately 9 or 12 square metres, depending on the type of hazard category, but Pyro Protection Limited can also provide medium and high velocity spray heads which produce finer droplets and various spray patterns.

Medium velocity sprayers are used for cooling the surface of highly volatile liquids, such as petrol, when ignited or threatened by fire. With such liquids it is generally desirable to control but not put out the fire because of the danger of producing explosive fuel-air mixtures. High velocity sprays are used to extinguish fire in less volatile fuels. Specialised open heads for producing fire stopping water curtains and for cooling walls and other structural features are classed as 'drenchers' by Pyro Protection Limited.

Note:

The effectiveness of water as a coolant is taken as axiomatic, as are certain secondary effects by which the release of water can help the extinguishing processes in certain conditions, e.g. air displacement, steam production and surface emulsification.

1.2 Alarm

An effective alarm system is always associated with sprinkler systems. In addition to the water motor alarm gong, the sounding which alerts people in the vicinity, ancillary alarms can be provided. These include to remote manned centers, such as a fire station or on site fire alarm or BMS system.

1.3 Types of Systems (Fig 1.1 Refers)

The original simple sprinkler concept has been elaborated over the years to prevent ice formation in pipework and to deal with hazards arising from greater

concentrations of industry and development of industrial processes. The following paragraphs outline the systems available but full requirements are set out in the Loss Prevention Council (BS EN 12845) publication 'Rules for Automatic Sprinkler Installation', or NFPA and Factory Mutual Global Standards.

(a) **Wet Pipe System**

The standard type installed in heated premises where temperatures remain above freezing point.

In the wet system the pipework is always filled with water. When a fire breaks out the hot gases produced cause the nearest sprinklers to operate as soon as their operating temperature is reached. Water is released immediately to extinguish or control the fire, simultaneously an alarm is sounded outside the building. An electrical signal can also be provided to alert local security and/or off site to automatically alert the Fire Brigade for example.

(b) **Dry Type Systems**

These systems are installed where temperatures in a building may fall below freezing point.

The dry system is charged with compressed air throughout the year thus mitigating the effects of freezing conditions. However it is crucial that suitable precautions are taken to prevent freezing to those areas of the main control valveset/s that are charged with water.

(c) **Tail End Air Valve Systems**

This system is used where there is a relatively small area of the building which may be subject to frost or where ambient temperatures are very high.

This is a variation of the two systems described previously. An air valve is connected to the installation pipework of a standard wet pipe system and the pipework above the air valve is charged with compressed air. Particularly useful to protect external canopies and/or local cold areas within a building that is otherwise generally heated.

(d) **Deluge Systems**

Utilised on risks requiring total or zonal coverage with water. In this instance the installation pipework is not pressurised and all the discharge nozzles are open. The system is triggered pneumatically or electrically by heat-sensitive detectors connected to an air line or separate electrical heat/smoke/optical detection. In the event of fire, a control valve opens allowing water to discharge simultaneously from all the nozzles.

Deluge sprinkler systems protect unusual and often critical facilities that are not suitable for protection by other types of sprinkler systems. They are used where severe, fast spreading fire is expected that could propagate at a velocity greater than the response capabilities of wet or dry-pipe sprinkler systems with standard thermally activated closed sprinklers. These high hazard areas contain a severe fuel hazard with a high heat release rate thus requiring an immediate application of water (or foam / water solution) over the entire hazard. Examples of these hazards include: flammable liquids handling and storage areas; aircraft hangars; woodworking shops; cooling towers; explosives or ordnance plants; oil refineries; chemical plants; conveyors and dip tanks; electrical transformers and switch gear.

For small areas **Pyro Protection Limited** can install Multiple Controls which are valves containing their own detector element. Once triggered, these supply water to a small number of open nozzles. Multiple Controls are available in 20, 25, 32, 40 or 50mm sizes.

(e) **Pre-Action Systems**

For hazards requiring a prior warning of system discharge or where accidental discharge from the sprinklers or pipe due to damage would be unacceptable.

In this type of system the pipework is filled with air at low pressure. Water is held back by an automatic valve which is triggered by a separate signal provided via electrical detectors located at strategic points around the risk.

In the event of fire, response from the detectors is very rapid and causes the control valve to open admitting water into the sprinkler pipework and sounding an alarm. After a short time lag one or more sprinklers will open, releasing water onto the fire in the normal way.

These systems are generally used in areas where high value equipment / goods are stored to reduce or even eradicate the risk of an accidentally damaged sprinkler discharging water because it requires the simultaneous operation of the electrical detection system before water is allowed to enter the system.

1.4 Installation Pipework

Pipework includes the following items:

- (a) One or more sprinkler arrays, incorporating range pipes, to which the sprinkler heads are attached, either directly or through short pipe lengths.
- (b) Distribution pipes feeding the range pipes.
- (c) Main vertical risers linking pipework at different levels.
- (d) Drain and test pipework adjacent to valve sets.

- (e) Subsidiary drain valves and plugs, fitted on any pipework where water trapping can occur.

1.5 Orifice Plates

Where necessary, orifice plates are fitted to assist in hydraulically balancing a system.

1.6 Pressure Switches

An alarm pressure switch, capable of initiating an electrical signal to a remote manned centre, eg a central station or a fire station, has been incorporated in Pyro Protection Limited main control valve sets. This switch may be used in conjunction with control equipment capable of providing system state monitoring arrangements. In complex installations, additional pressure switches may be incorporated for other purposes.

1.7 Intermediate Level Protection

The development of very high piled storage in warehouses has necessitated intermediate level sprinkler protection in addition to that provided in the ceiling. The precise recommendations in this matter vary according to the nature and height of the pallet piles or racks. These recommendations are catered for in the design stage Loss Prevention Council (BS EN 12845) Rules refer.

1.8 Systems Installed On This Site

The sprinkler system at the roof within the warehouse is designed to BS EN12845: 2004 incorporating all relevant technical bulletins.

In line with information advised to us the building will be unheated and will therefore require the sprinkler protection to be a 'dry' sprinkler system.

We have also provided one aboveground LPCB approved water storage tank comprising of a total effective capacity of approximately 160m³.

The main electric pumpset is connected to the main water storage tank with a suction pipe the pump operates under positive head conditions.

The sprinkler system within the warehouse area is served by one dry installation control valve which will be permanently charged with compressed air. This is located in the GRP pumproom located adjacent to the Waste Transfer Building.

The installation control valve is located within the GRP pumphouse adjacent to the building and will be provided with an electrical pressure alarm switch to provide a 'fire' signal to the fire alarm (wired by others).

The system at the roof will be designed to Ordinary Hazard Group III standards to comply with the LPC rules incorporating BS EN12845: 2003 and the technical bulletins and will deliver a water density of discharge of 5mm/min over an area of 260m². We would respectfully draw your attention to section 2.2 risk

classification, as an authority having jurisdiction would undoubtedly require input into the design and classification of the sprinkler system.

Air sampling is not considered to be required as the sprinkler system activation is controlled by the individual sprinkler heads, and therefore the only activation possible outside of fire conditions is that caused by direct accidental/malicious damage to the pipework or sprinkler heads. Therefore reliability and potential false alarms will not be an issue.

1.9 Water Supplies

We have provided one off aboveground LPCB approved water storage tank with total effective water storage capacity of 160m³ with a 63mm water supply brought also brought to the pumphouse by others.

The motive power is provided by one electric driven LPCB approved fire pumpset.

The overall pre-calculated tank capacity for a sprinkler system of this hazard category is 163m³ which has enough stored capacity to cover the risk without the infill rate.

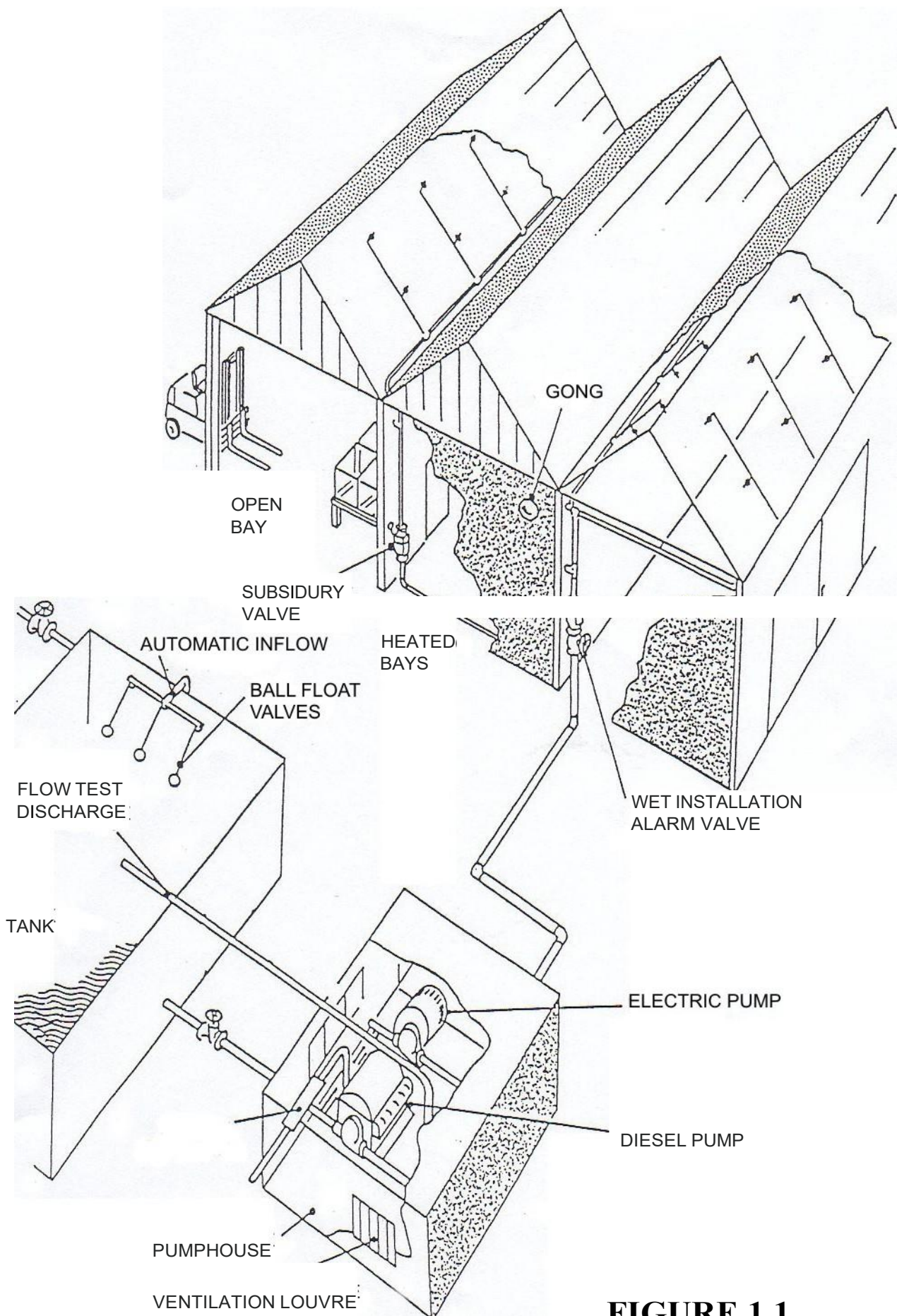
A GRP pumphouse has been provided for installation on a base provided by others.

Approved flow test equipment is provided within the pumphouse for the sprinkler pumpset.

The fire pump is designed to operate automatically on sensing a pressure drop within the system pipework and once operated the fire pump will need to be stopped manually.

A small jockey pump is connected to the system pipework which is fully automatic and set to maintain the system pressure above that at which the main fire pump will operate. In the event of a sprinkler head being activated the loss of water and consequent drop in pressure is greater than the jockey pump duty and the main fire pump is called into action.

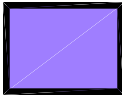
In the event of the operation of the system, water would only be discharged in the area of the fire where the individual sprinkler heads have been activated. The operation of a sprinkler head will operate the main fire pump and activate the relevant control valve station which in turn will activate a fire alarm on the Sprinkler Remote Alarm Panel located in the Weighbridge.



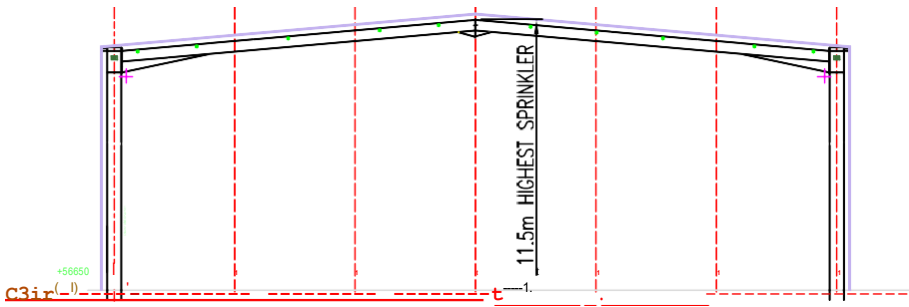
**FIGURE 1.1
TYPICAL TWO PUMP
WAREHOUSE
INSTALLATION**

1.10 Sprinkler Block Plan

PROTECTION KEY:



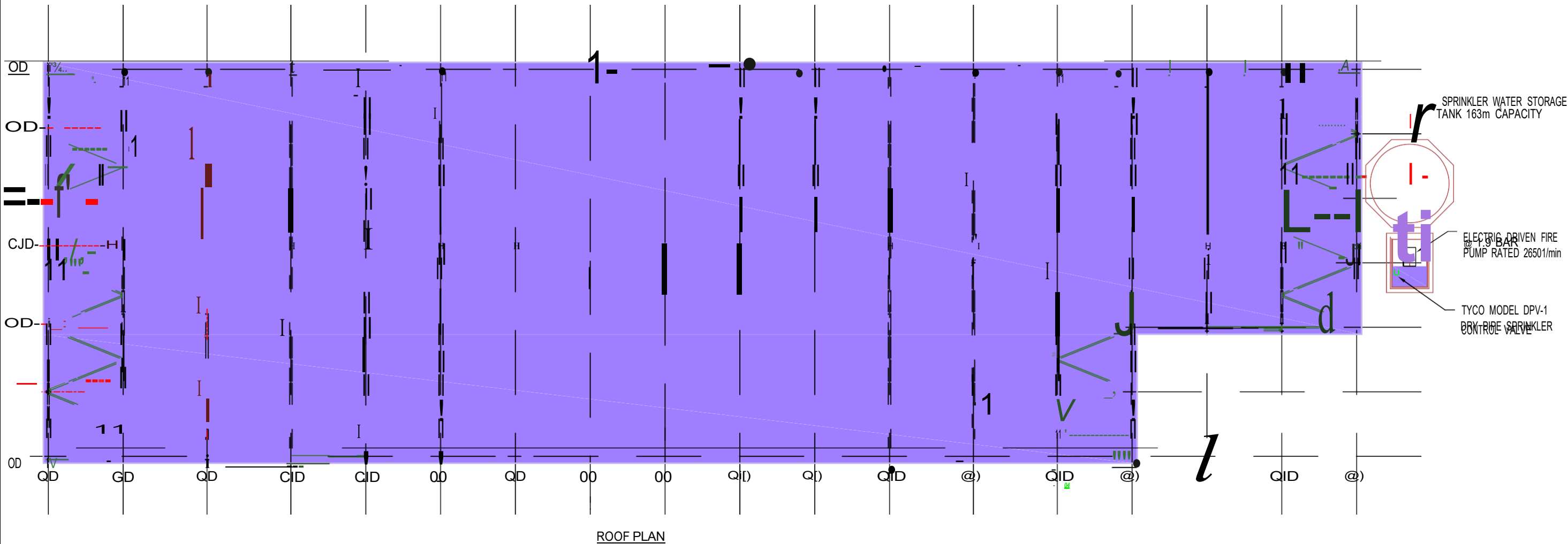
INSTALLATION No.1 - BUILDING ROOF
ORDINARY GROUP 3 HAZARD REQUIREMENTS
5.0mm/min DENSITY OVER 270sq.m.



TYPICAL SECTION THRO' BUILDING

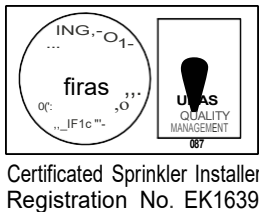
DESIGN CRITERIA
INSTALLATION No.1

OCCUPANCY:	WASTE TRANSFER STATION
HAZARD CLASS:	ORDINARY HAZARD GROUP 3
STORAGE TYPE:	STI
STORAGE HEIGHT:	2.1m
CATEGORY OF GOODS:	III
SYSTEM TYPE:	DRY
HAZARD CLASS:	ORDINARY HAZARD GROUP III
DISCHARGE DENSITY:	5 mm/min
AREA OF OPERATION:	270m ²
HIGHEST SPRINKLER:	12m



SPRINKLER SYSTEM DESIGNED IN ACCORDANCE WITH
BS EN 12845 : 2003 & LPC TECHNICAL BULLETINS

bafsa
British Automatic Fire Sprinkler Association



Registered Office:
SADDLEWORTH BUSINESS CENTRE
Huddersfield Road
Delph, Oldham
OL3 5DF
Tel: 01457 879222
Fax: 01457 879888

SPRINKLER BLOCK PLAN
SKELMERSDALE WASTE
TRANSFER STATION
STANLEY WAY
SKELMERSDALE

CONTRACT No. : C3250	DATE: JUNE 2010
REVISION : 0	CAD REF : 3250-BP

APPENDIX A

SPRINKLER HEAD REPLACEMENT

The thermal release mechanism of a sprinkler head may take the form of a glass bulb which bursts at a predetermined temperature or a metal link incorporating a soldered joint which fuses at a pre-determined temperature.

The thermal ratings of sprinkler heads are shown below with the nationally approved colour codes:

GLASS BULB TYPES °C	COLOUR OF BULBS
57	Orange
68	Red
79	Yellow
93	Green
141	Blue
182	Mauve
204/260	Black

FUSIBLE LINK °C	COLOUR OF YOKE ARMS
68/74	Uncoloured
93/100	White
141	Blue
182	Yellow
227	Red

SECTION TWO

Design Drawings and Hydraulic Calculations

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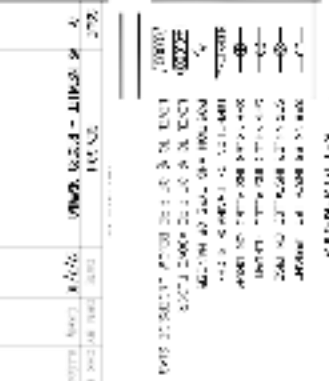
2	DRAWINGS AND HYDRAULIC CALCULATIONS	15
2.1	As Installed Drawings	15

2 DRAWINGS AND HYDRAULIC CALCULATIONS

2.1 As Installed Drawings

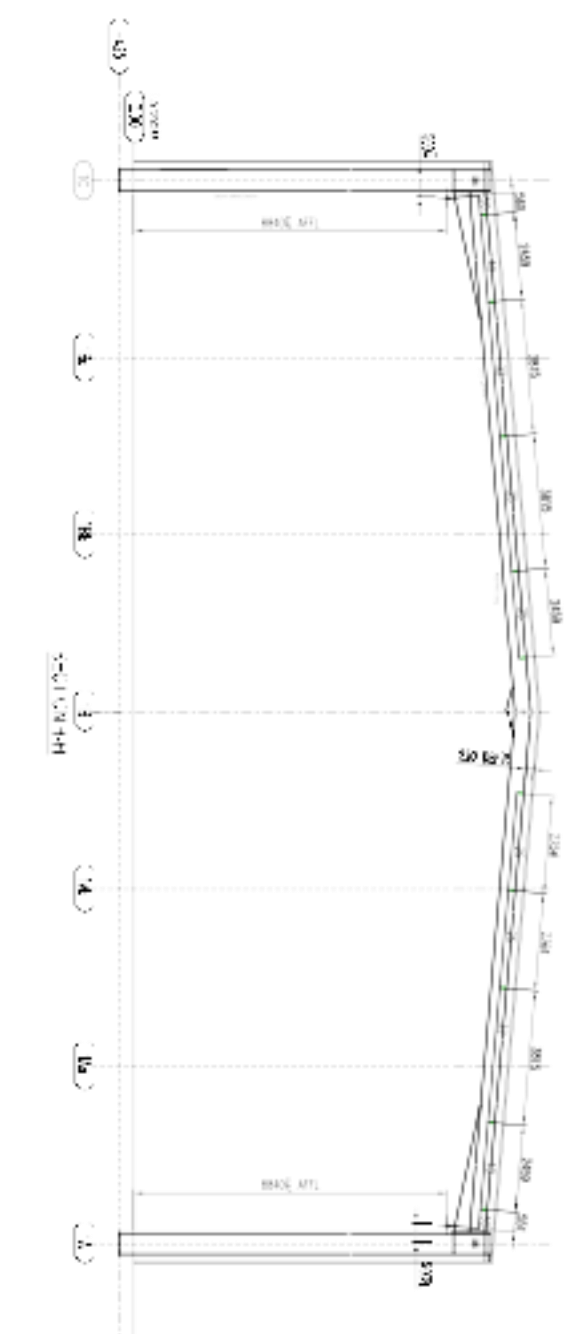
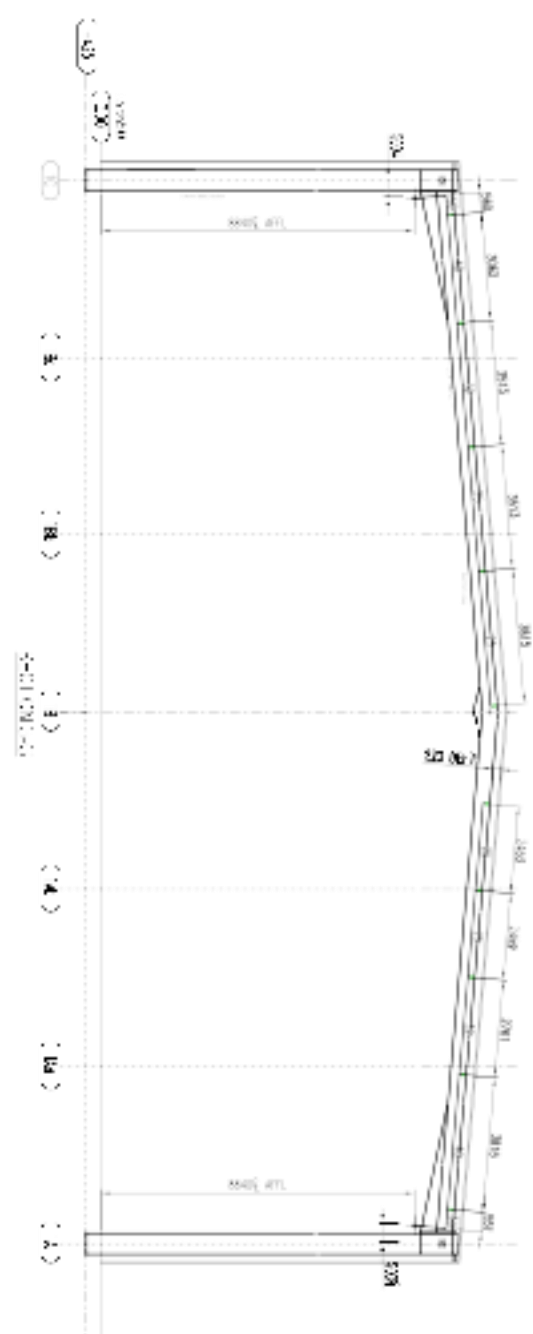
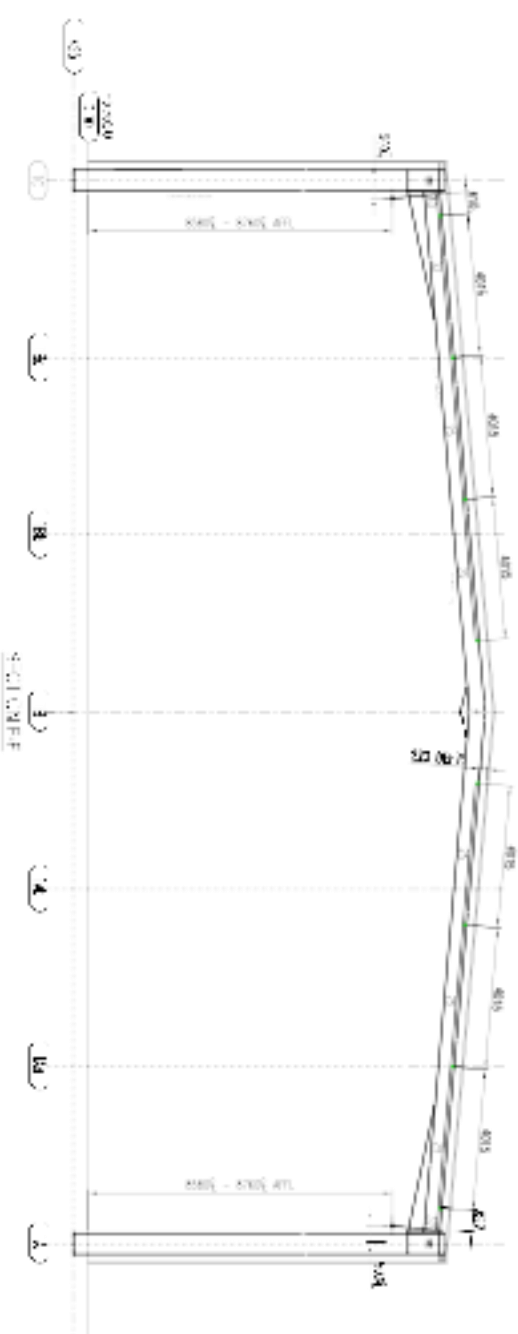
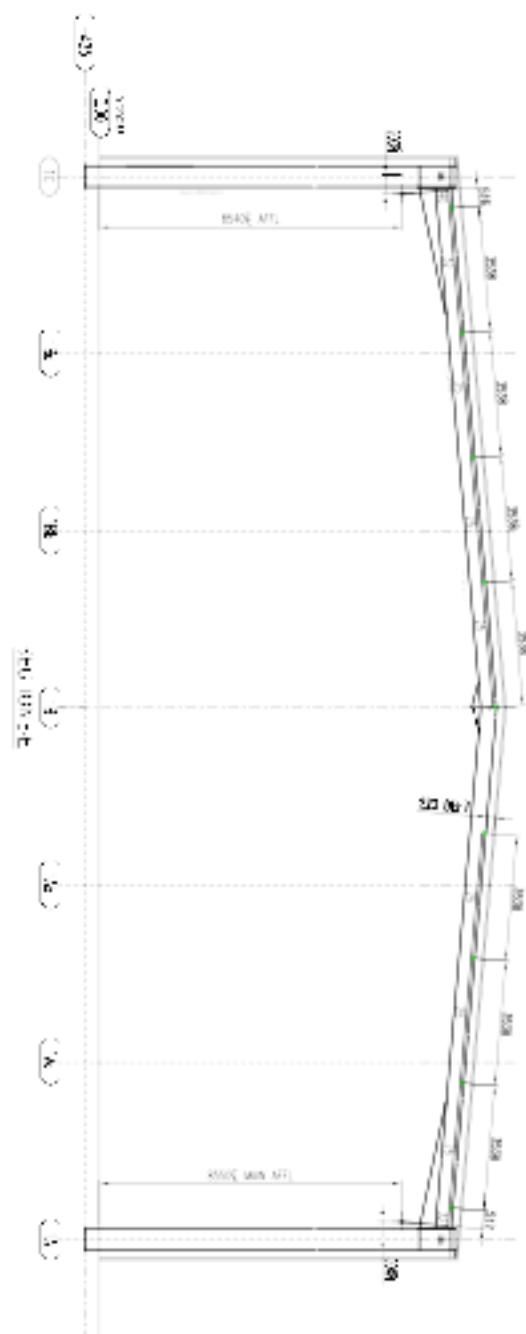
Drawing No.

3250/01	Automatic Fire Sprinkler Protection Plan to Roof Area
3250/02	Automatic Fire Sprinkler Protection Sections to Roof Area
3233/03	Automatic Fire Sprinkler Protection Water Supply Details
3233/04	Automatic Fire Sprinkler Water Supply Builderswork Details

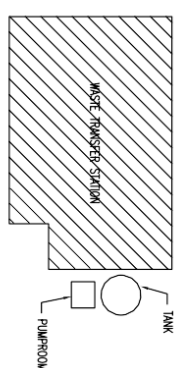


PERSONAL INFORMATION		CONTACT INFORMATION	
NAME	DATE OF BIRTH	PHONE NUMBER	EMAIL ADDRESS
JOHN DOE	1985-03-15	011-123-456789	john.doe@example.com
ADDRESS	CITY	COUNTRY	POSTAL CODE
123 Main St	New York	USA	10001
EDUCATION	DEGREE	UNIVERSITY	GRADUATION DATE
Bachelor's	Computer Science	NYU	2010
EMPLOYMENT	COMPANY	POSITION	START DATE
ABC Corp	Software Engineer	2015	
SKILLS	TECHNOLOGIES	LANGUAGES	TOOLS
Python, Java	JavaScript, React	English, Spanish	Git, Docker
REFERENCES	NAME	RELATIONSHIP	CONTACT INFO
1	John Smith	Former Manager	011-987-654321
2	Jane Doe	Former Colleague	011-555-1234

STANLEY WAY W T 9
STANLEY WAY
SKELMERSDALE
WN8 8EE



KEY TO SYMBOLS	
	SPRINKLER INSTALLED UPRIGHT
	SPRINKLER INSTALLED ON RISE
	SPRINKLER INSTALLED PENDANT
	SPRINKLER INSTALLED ON DROP
	DIRECTION OF DRAINAGE SLOPE
	POSITION AND TYPE OF HANGER
	LEVEL TO $\frac{1}{4}$ OF PIPE ABOVE FLOOR
	LEVEL TO $\frac{1}{4}$ OF PIPE BELOW UNDERSIDE SLAB



AREA OF PROTECTION
SHOWN HATCHED

[illegible][illegible]

STANLEY WAY W T S
STANLEY WAY
SKELMERSDALE
WN8 8EE

MATERIAL SCHEDULE

(D) 20 MPa 6" GATE VALVE

- (T) 200/100 FLAT TOP TAPER
- (D) 25 SOCKET FIRE JOCKEY SUCTION
- (S) 15 SOCKET (OR COLPOUND GAUGE
- (R) 80x150 FLANGED TAPER
- (J) 15 SOCKET FOR PRESSURE GAUGE
- (W) 150 WAFER CHECK VALVE
- (S) 15 SOCKET FOR FIRE PUMP INJECTION
- (G) 150 GROOVED BUTTERFLY VALVE
- (T) 100 PN16 GATE VALVE
- (F) 100 PLATON FLOW METER RANGE: 500 - 3500 L/min
- (D) 100 GROOVED BUTTERFLY VALVE
- (S) 50 BSP GATE VALVE
- (A) FIRE ALARM PRESSURE SWITCH
- (S) 32 SOCKET FOR PUMP HOUSE PROTECTION
- (S) 15 SOCKET FOR JOCKEY INJECTION (TOP)
- (S) 25 SOCKET FOR JOCKEY DELIVERY

EXTERNAL TO BE TRACE HEATED
& INSULATED

VIKING JOHNSON
FLANGED ADAPTOR
150 LONG FLANGED

BLOCK PIECE BY
TANK MANUFACTURER

GALVANISED INTERNAL

ELBOW AND LPCB
APPROX VORTEX INHIBITOR

INLETPIPework /
TO BE TRACE HEATED
& INSULATED

PYRO TO COMMENCE
 FROM SQ. PN16 FLANGE
 ABOVE GROUND LEVEL

SECTION A-A

FIRE PULP DATA
 MODEL: 4x3x6.5 ELECTRIC MOTOR DRIVEN
 PIPE/PELLER DIAMETER: 192mm
 MANUFACTURER: ARMSTRONG INTEGRATED SYSTEMS
 NOMINAL DUTY: 2650 L/min @ 1.9 bar
 MOTOR POWER: 22 kW
 SUPPLY: 415V/3ph/50Hz
 E.L.C. 41A
 START DELTA: 109A

STALL: 327A
DEDICATED SUPPLY REQUIRED FOR FURTHER
INFORMATION REFER TO LPC TECHNICAL BULLETIN 210
 JOCKEY PUMP DATA

MODEL:	AM27 VERTICAL MULTISTAGE PUMP
MANUFACTURER:	ARMSTRONG INTEGRATED SYSTEMS
MOTOR POWER:	1.1 kW

SUPPLY: 415V/3ph/50Hz

100 STUB FLANGE
AND BACKING RING

!

3800 INTERNALLY

1706 CL SPRINKLERDELIVERY™

00 STUB FLANGE
AND BACKING RING

100 GALVANISED;
TE54-RCTU

WELDED ELBOW

SUPPORT TYPE A

SHOWN THUS: @

M10 COACH

SCR7

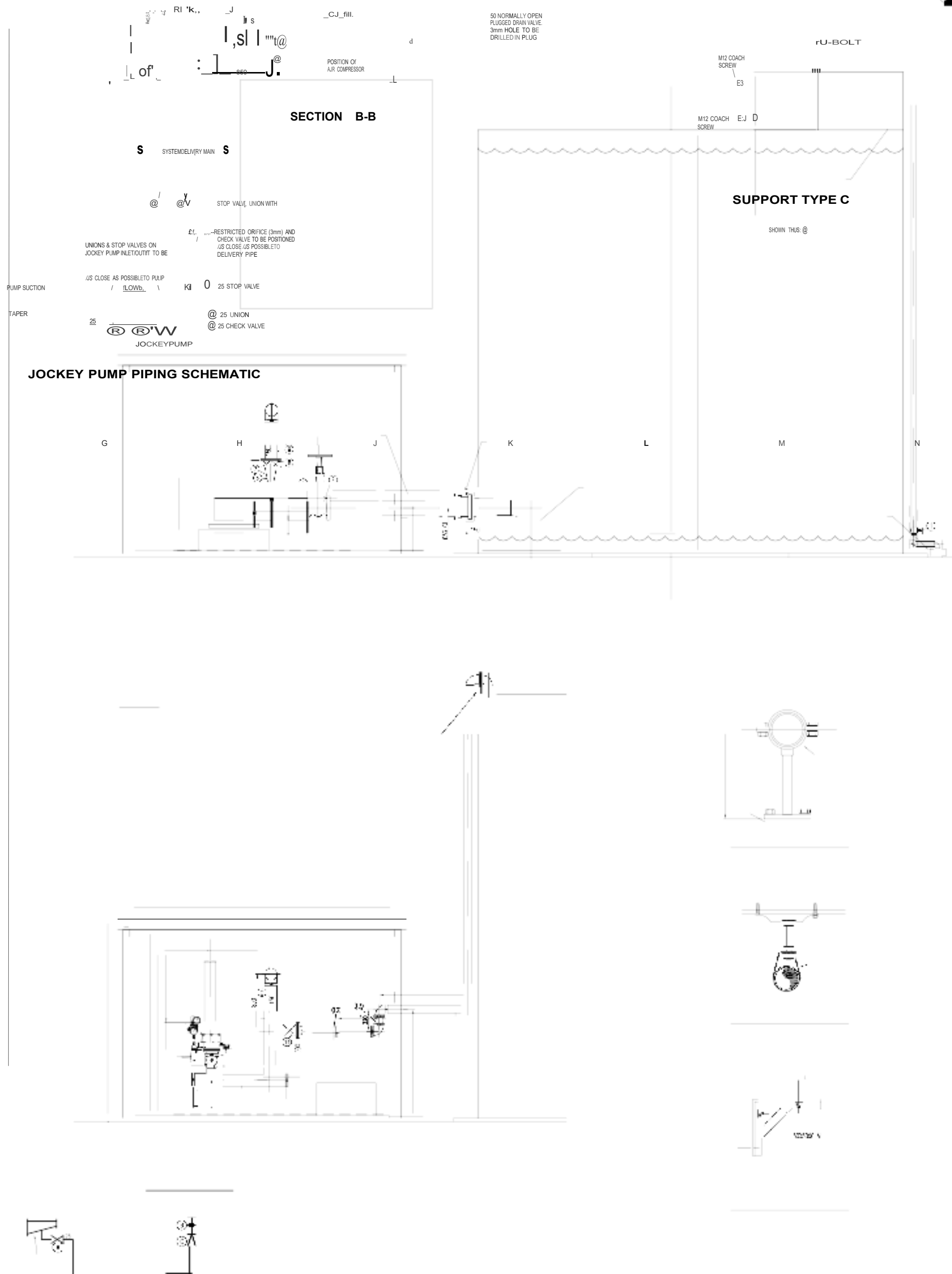
BACKPLATE

-1,110 THREADED
ROD

FILBOW

SUPPORT TYPE B

SHOWN THUS: @



SUPPORT TYPE C

**SKELMERSDALE
WNB BEE**

NOTES

1. ALL INSTALLATIONS IN MILLIMETERS UNLESS NOTED OTHERWISE
2. INITIAL PIPERIGATIONS UNLESS NOTED OTHERWISE
TYPING: MINIMUM HEIGHT 10mm (ALL TYPES) SEE 105200000
FITTINGS: 20mm or BELOW: BLACK POLYETHYLENE BORE IS 143 x 126mm
FITTINGS: ABOVE 20mm: METALLIC BORE IS 143 x 126mm
FLANGES: TO BS 105200000 PN 10
PVC: ORC CODE ORC CODE
3. PIPE AND JOINTS USED IN ALL INTERNAL SYSTEMS TO BE INSTALLED WITH THE FOLLOWING MINIMUM SLOPES FOR GRAVITY FLOW
ALL SPRINKLER PIPES: 3mm PER METRE
DRAINAGE PIPES: 4mm PER METRE
4. ALL SPRINKLER HEADS TO BE FITTED AS (A) PERPENDICULAR TO THE ROOF OR CEILING IN THE PERCENT OR UPRIGHT POSITION
5. WARNING: CONTROLS, NOTICES AND SPRINKLER HEADS MUST NOT BE PAINTED
6. FIRE PROTECTION LISTS: DO NOT ACCEPT ANY RESPONSIBILITY FOR DAMAGE CAUSED BY FIRE.
CLIENTS SHOULD TAKE ADEQUATE PRECAUTIONS AGAINST THE WATER IN VALVES AND PIPES BELOW THE VALVES PREVENTING DRAINING: DRAINING

--O--	SPRINKLER INSTALLED UPRIGHT
---@---	SPRINKLER INSTALLED ON RISE
■ ■ ■	SPRINKLER INSTALLED PENDANT
I	SPRINKLER INSTALLED ON DROP
<u>Slope</u>	DIRECTION OF DRAINAGE SLOPE
A/	POSITION AND TYPE OF HANGER
(+0.000)	LEVEL TO I_u OF PIPE ABOVE FLOOR
/0.000/	LEVEL TO I_u OF PIPE BELOW UNDERSIDE SLAB

DRAWING STATUS			
PRELIMINARY	☐	CONSTRUCTION	☐
APPROVAL	☐	AS INSTALLED	☒

DESIGN SPECIFICATION	
DESIGN STANDARD	BS EN 12845 inc. LPC TECH BULL
HAZARD CLASS	ORDINARY GROUP III
STORAGE CATEGORY	II
STORAGE CONFIGURATION	ST1
DESIGN STORAGE HEIGHT	2.1m
DISCHARGE DENSITY	5mm/min
AREA OF OPERATION	270m ²
PIPEWORK TABLES (PRE-CALC)	30831
DESIGN SPACING	12m ²
SIZE/TYPE OF INSTALLATION	150mm DRY
INSTALLATION No.(s)	1
HIGHEST CRINK ABOVE VALVES	11m

NOTES

1. ALL DIMENSIONS IN MILLIMETERS UNLESS NOTED OTHERWISE
2. MATERIAL SPECIFICATION UNLESS NOTED OTHERWISE
TUBING: MEDIUM MEDIUM NON-ALLOY STEEL AS IN 1025/250/20
FITTING: Steel as in 1025/250. MILLIMETER. ALLOW TO ITS 143 & 1256/2000
WELDED JOINTS: MILLIMETER. MILLIMETER. MILLIMETER. MILLIMETER.
FLANGES TO ITS 1025/250. PIPES 18
THICKNESS: ONE COAT LATE COUSE PROTECT
3. PIPE WORK FOR USE IN DRY OR ALTERNATE SYSTEMS TO BE INSTALLED WITH THE FOLLOWING
MINIMUM SLOPES FOR DRAINAGE:
RANGE PIPES: Three PER METER
DISPERMINER PIPES: Four PER METER
4. DOWNSPILL PIPES TO BE FITTED AT 90° (I.E. PERPENDICULAR) TO THE ROOF OR CEILING IN
THE FORWARD OR UPRIGHT POSITION.
5. **RAINING, CONDENS, HOTWATER AND DRAINAGE PIPES MUST NOT BE PAINTED.**
6. PROTECT LIFELINE LIFT DO NOT ACCEPT ANY RESPONSIBILITY FOR DAMAGE CAUSED BY PIPES.
CLIENTS SHOULD TAKE ADEQUATE PRECAUTIONS AGAINST THE WATER IN VALVES AND PIPES
BEFORE THE WATER FREEZING DURING COLD WEATHER.



STANLEY WAY
SKELMERSDALE
WNB BEE

PYR
PROTECTION
LIMITED

SAKEDWORTH BUSINESS CENTRE
17000, Airedale Road
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W.S. 14 0TJ
T: 01457 876222
F: 01457 876666
E: info@pyrprotection.co.uk

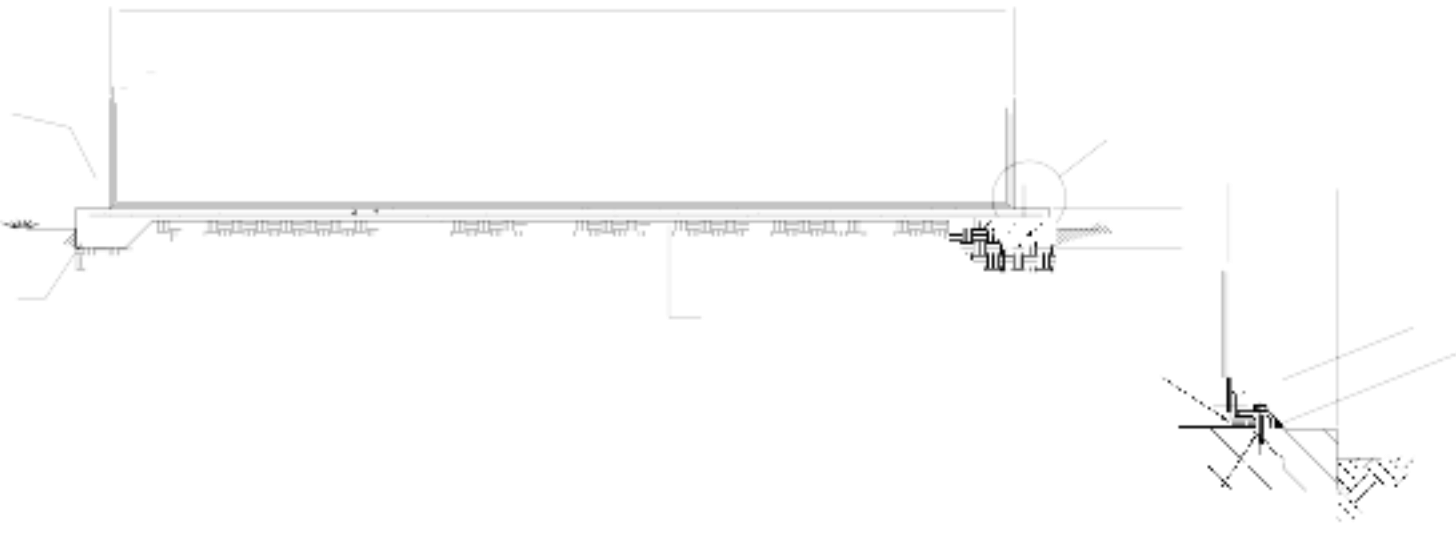
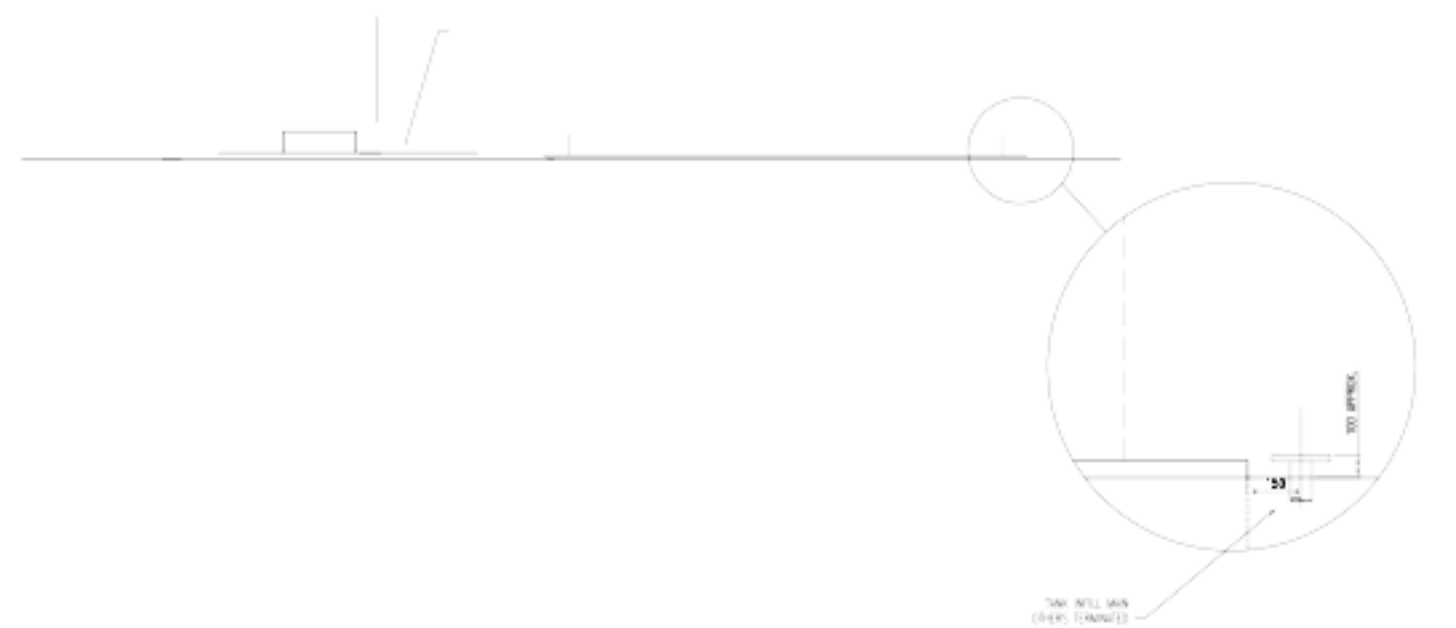
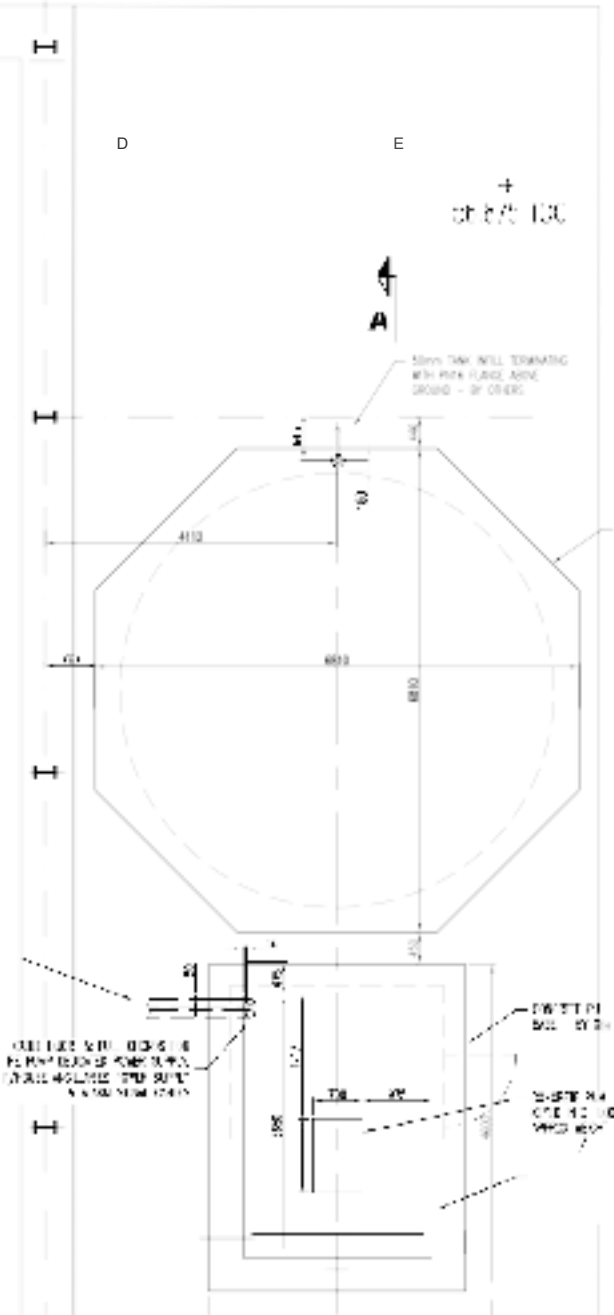
CE UKCA

011 Title: AUTOMATIC SPRINKLER
BUILDERSWORK REQUIREMENTS
FOR WATER SUPPLY

Scale (A3)	Drawn By	Checkd By	Issue	Drawing No.	Rev
1:50	AJ.GOCB	CK	10/05/10	3250	04

A 17

A18



SECTION THREE

Sprinkler Heads Type and Location

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3.1	Type and location of sprinklers	17
3.2	Type TY3651 15mm Sprinkler (Standard Response)	18

3 SPRINKLER HEADS

3.1 Type and location of sprinklers

The type of sprinkler heads installed together with their location are as follows:

TYPE	MODEL	SIZE	TEMP	FINISH	BULB SIZE	QUANTITY
1	TY3651	15mm	68 (red)	Bronze	5mm	201
2	TY3651	15mm	93 (green)	Bronze	5mm	75

Please note the head locations are as follows:-

TYPE 1 – WAREHOUSE ROOF PROTECTION

TYPE 2 – WAREHOUSE ROOF PROTECTION BELOW ROOF LIGHTS

In accordance with BS EN 12845 spare sprinkler heads are provided in a locked cabinet located within the sprinkler pumphouse.

Should it be necessary to change sprinkler heads for any reason, then care should be taken to ensure that no replacements are damaged during installation by using the special spanner provided in the spares cabinet.

Please refer to later in this section for manufacturer's data sheets.

3.2 Type TY3651 15mm Sprinkler (Standard Response)

Series TY-B — 5.6 and 8.0 K-factor Conventional (Old Style) Sprinklers Standard Response

General Description

The Series TY-B, 5.6 and 8.0 K-factor, Conventional Sprinklers described in this data sheet are standard response - standard coverage, decorative 5 mm glass bulb type spray sprinklers. These sprinklers are intended to be installed either pendent or upright, and in either position, they produce a spherical water discharge pattern with approximately 50% of the discharge directed upwards and approximately 50% of the discharge directed downwards.

Conventional sprinklers are generally used with Ordinary and Extra High Hazard Class Systems, as defined by the automatic sprinkler system installation rules of the country and authority having jurisdiction. The NFPA permits the use of "Old Style Sprinklers" where special construction features require a unique water distribution; for the protection of fur vaults; or, the replacement of similar sprinklers that had been installed prior to 1955.

Corrosion resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise be obtained when exposed to corrosive atmospheres. Although corrosion resistant coated sprinklers have passed the standard corrosion tests of the appli-

cable approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

WARNINGS

The Series TY-B Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Model/Sprinkler Identification Numbers

TY3651 - 5.6K, 1/2"NPT
TY4651 - 8.0K, 3/4"NPT



Technical Data

Approvals

UL and C-UL Listed.
LPCB, VdS, and NYC Approved.
(Refer to Table A for complete approval information including corrosion resistant status.)

Maximum Working Pressure

175 psi (12,1 bar)

Discharge Coefficient

K = 5.6 GPM/psi^{1/2} (80,6 LPM/bar^{1/2})
K = 8.0 GPM/psi^{1/2} (115,2 LPM/bar^{1/2})

Temperature Ratings

Refer to Table A

Finishes

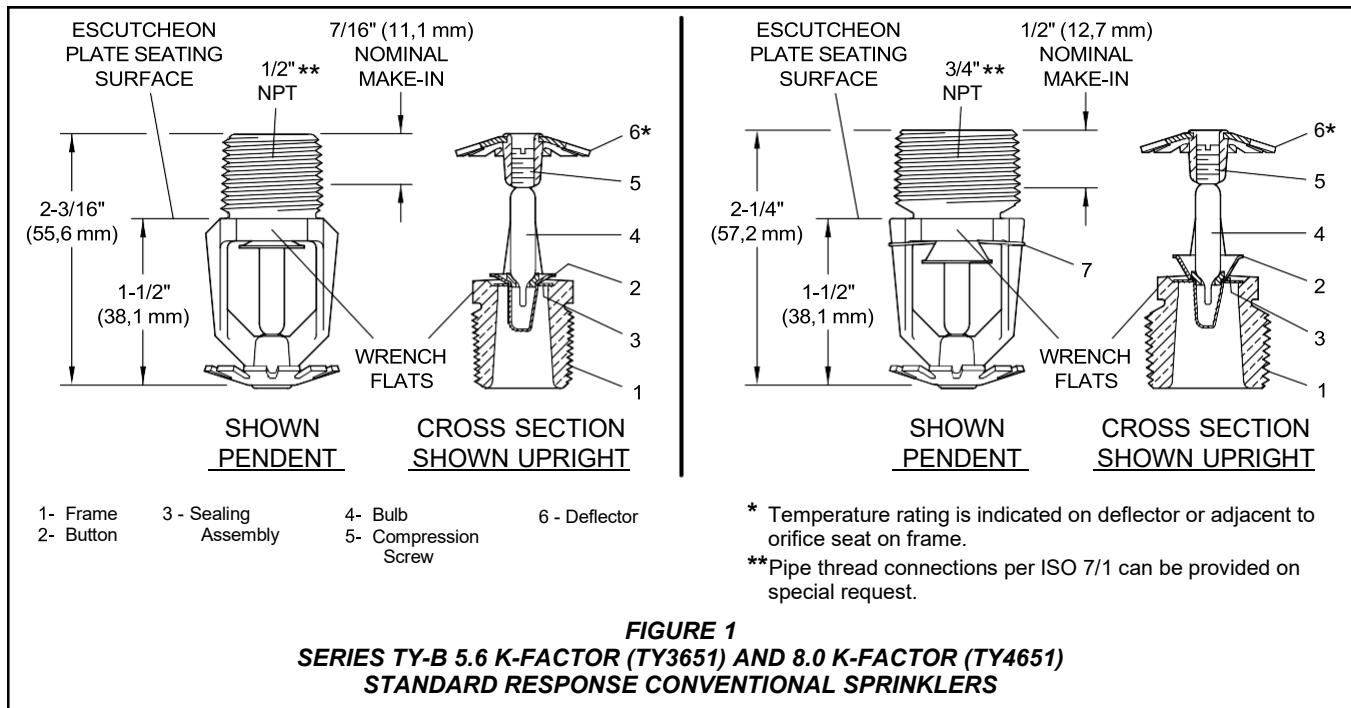
Sprinkler: Refer to Table A

Physical Characteristics

Frame.....	Bronze
Button.....	Brass/Copper
Sealing Assembly.....	Beryllium Nickel w/Teflon†
Bulb.....	Glass
Compression Screw.....	Bronze
Deflector.....	Copper

IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.



Operation

The glass Bulb contains a fluid which expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, allowing the sprinkler to activate and water to flow.

Design Criteria

The Series TY-B Conventional Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency (e.g., UL Listing is based on NFPA 13 requirements). The Series TY-B Conventional Sprinklers are only for non-recessed applications.

Installation

The Series TY-B Sprinklers must be installed in accordance with the following instructions:

NOTES

Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch

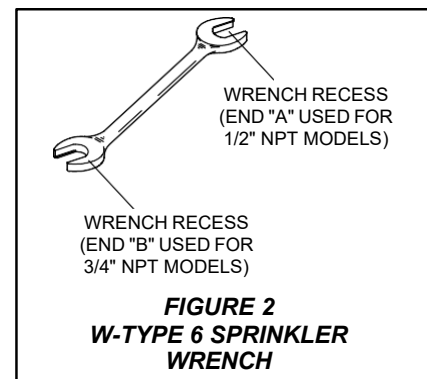
(1,6 mm) for the 135°F/57°C to 3/32 inch (2,4 mm) for the 360°F/182°C temperature ratings.

A leak tight 1/2 inch NPT sprinkler joint should be obtained with a torque of 7 to 14 ft.lbs. (9,5 to 19,0 Nm). A maximum of 21 ft. lbs. (28,5 Nm) of torque may be used to install sprinklers with 1/2 NPT connections. A leak tight 3/4 inch NPT sprinkler joint should be obtained with a torque of 10 to 20 ft.lbs. (13,4 to 26,8 Nm). A maximum of 30 ft.lbs. (40,7 Nm) of torque is to be used to install sprinklers with 3/4 NPT connections. Higher levels of torque may distort the sprinkler inlet and cause leakage or impairment of the sprinkler.

Step 1. With pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

Step 2. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Ref. Figure 2), except that an 8 or 10 inch adjustable Crescent wrench is to be used for wax coated sprinklers. With reference to Figure 1, the W-Type 6 Sprinkler Wrench or the Crescent wrench, as applicable, is to be applied to the wrench flats.

When installing wax coated sprinklers with the adjustable Crescent wrench, additional care needs to be exercised to prevent damage to the wax coating on the sprinkler wrench flats or frame arms and, consequently, exposure of bare metal to the corrosive environment. The jaws of the wrench should be opened sufficiently wide to pass



over the wrench flats without damaging the wax coating. Before wrench tightening the sprinkler, the jaws of the wrench are to be adjusted to just contact the sprinkler wrenching flanges. After wrench tightening the sprinkler, loosen the wrench jaws before removing the wrench.

After installation, the sprinkler wrench flats and frame arms must be inspected and the wax coating retouched (repaired) whenever the coating has been damaged and bare metal is exposed. The wax coating on the wrench flats can be retouched by gently applying a heated 1/8 inch diameter steel rod to the areas of wax that have been damaged, to smooth it back over areas where bare metal is exposed.

NOTES

Only retouching of the wax coating applied to the wrench flats and frame arms is permitted, and the retouching

			SPRINKLER FINISH (See Note 6)					
TYPE	TEMP.	BULB LIQUID	NATURAL BRASS	CHROME PLATED	WHITE*** POLYESTER	LEAD COATED	WAX COATED	WAX OVER LEAD COATED
5.6K CONVENTIONAL (TY3651) or 8.0K CONVENTIONAL (TY4651)	135°F/57°C	Orange	1, 2, 3, 4, 5			1, 2, 4	1, 2, 4	1, 2, 4
	155°F/68°C	Red						
	175°F/79°C	Yellow						
	200°F/93°C	Green						
	286°F/141°C	Blue						
	360°F/182°C	Mauve						
				1**, 2**, 4**	1**, 2**, 4**			
			N/A					

NOTES:

1. Listed by Underwriters Laboratories, Inc. (UL).
2. Listed by Underwriters Laboratories, Inc. for use in Canada (C-UL).
3. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/05 & 007k/03).
4. Approved by the City of New York under MEA 354-01-E.
5. VdS Approved (For details contact Tyco Fire & Building Products, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377).
6. Where Polyester Coated, Lead Coated, Wax Coated, and Wax over Lead Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion Resistant Sprinklers.

** 150°F/66°C Maximum Ceiling Temperature.

*** Frame and Deflector only. Listings and approvals apply to color (Special Order).

N/A: Not Available

TABLE A
LABORATORY LISTINGS AND APPROVALS

is to be performed only at the time of the initial sprinkler installation.

The steel rod should be heated only to the point at which it can begin to melt the wax, and appropriate precautions need to be taken, when handling the heated rod, in order to prevent the installer from being burned.

If attempts to retouch the wax coating with complete coverage are unsuccessful, additional wax can be ordered in the form of a wax stick (the end of which is color coded). Only the correct color coded wax is to be used, and retouching of wrench flats and frame arms is only permitted at the time of initial sprinkler installation. With the steel rod heated as previously described, touch the rod to the area requiring additional wax with the rod angled downward, and then touch the wax stick to the rod approximately one-half inch away from the area requiring retouching. The wax will melt and run down onto the sprinkler.

Care and Maintenance

The Series TY-B Sprinklers must be maintained and serviced in accordance with the following instructions:

NOTES

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

Sprinklers that are found to be leaking or exhibiting visible signs of corrosion must be replaced.

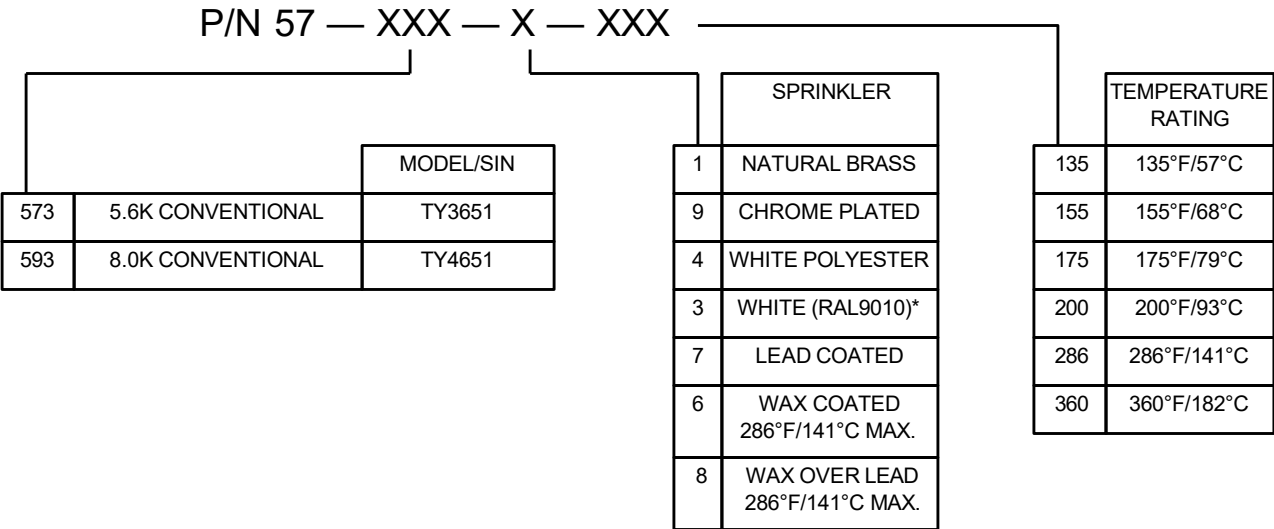
Automatic sprinklers must never be painted, plated, coated or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers - before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Ref. Installation Section).

Frequent visual inspections are recommended to be initially performed for corrosion resistant coated sprinklers, after the installation has been completed, to verify the integrity of the corrosion resistant coating. Thereafter, annual inspections per NFPA 25 should suffice; however, instead of inspecting from the floor level, a random sampling of close-up visual inspections should be made, so as to better determine the exact sprinkler condition and the long term integrity of the corrosion resistant coating, as it may be affected by the corrosive conditions present.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.



* Eastern Hemisphere sales only.

TABLE B
PART NUMBER SELECTION
SERIES TY-B CONVENTIONAL SPRINKLERS

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE

PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Ordering Procedure

When placing an order, indicate the full product name. Refer to the Price List for complete listing of Part Numbers.

Contact your local distributor for availability.

Sprinkler Assemblies with NPT Thread Connections:

Specify: (Specify Model/SIN), Standard Response, (specify K-factor), (specify temperature rating), Series TY-B Conventional Sprinkler with

(specify type of finish or coating), P/N (specify from Table B)

Sprinkler Wrench:

Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387.

Wax Sticks:

(for retouching wrench damaged wax coating)

Specify: (Specify color) color coded Wax Stick for retouching (specify temperature rating) temperature rated Series TY-B Sprinklers, P/N (specify).

Black for 135°F P/N 56-065-1-135
Red for 155°F P/N 56-065-1-155
Yellow for 175°F P/N 56-065-1-175
Blue for 200°F and
286°F P/N 56-065-1-286

NOTES

Each wax stick is suitable for retouching up to twenty-five sprinklers.

The wax used for 286°F sprinklers is the same as for 200°F sprinklers, and, therefore, the 286°F sprinkler is limited to the same maximum ceiling temperature as the 200°F sprinkler (i.e., 150°F).

TYCO FIRE PRODUCTS, 451 North Cannon Avenue, Lansdale, Pennsylvania 19446

SECTION FOUR

Control Valves & Accessories

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4 CONTROL VALVES

The Automatic Sprinkler System is controlled through one off dry pipe valve installation control valve.

4.1 Wet Installation Control Valve

(a) Main Isolating Valve

The isolating gate valve located at the bottom of the valve station is provided as a means of isolating the sprinkler system from the water supplies. The valve is padlocked and strapped in the open position.

The valve must only be closed to carry out maintenance on the wet alarm valve or to stop water discharging from the sprinkler system once it has been established by personnel in charge of the building that a fire condition does not exist.

(b) Dry Pipe Alarm Valve

These systems are installed where temperatures in a building may fall below freezing point.

The dry system is charged with compressed air throughout the year thus mitigating the effects of freezing conditions. However it is crucial that suitable precautions are taken to prevent freezing to those areas of the main control valveset/s that are charged with water.

(c) System Drain Valve

A 50mm gate valve located at the side of the dry alarm valve is provided as a means of draining the sprinkler system pipework. The valve is strapped in the closed position and must only be opened once the main isolating valve has been closed and the system pipework requires draining.

It is imperative that an off site 'Redcare' signal is taken from the sprinkler to system to give an alarm signal when the system operates.

The dry valve is a Tyco model DPV-1 dry pipe valve refer to section 4.3 and 4.4 for operating and maintenance procedure for this control valve.

4.2 Installation Control Valves, Type and Area Protected

The following table outlines the type, size, model number and area covered by that valve on this site:

VALVE No.	TYPE & SIZE	MODEL No.	AREA PROTECTED
Inst. 1	Dry – 150mm	DPV-1	Warehouse Roof

4.3 Dry Pipe Valve Operating Procedure

Read in conjunction with Dry Pipe Valve Set Schematic (FIGURE 4.3 in section 4.4)

Commissioning - to set the Valve (Operating Mode)

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 3. Push down on the reset knob (P) to allow the dry pipe valve (D) to reseal.

Step 4. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 5. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 6. Reset accelerator (Q) using the instruction on its resetting label.

Step 7. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 8. Fully open the main control valve (A) and lock it open.

Step 9. Reset the fire alarm panel and notify the central alarm station.

Weekly Test of the Valve, the Alarm Bell & Pressure Switch

The water turbine operated alarm bell (14) and the associated pressure switch (10) should be tested weekly and the results recorded on a chart kept in the valve chamber. This test should only be conducted by trained personnel.

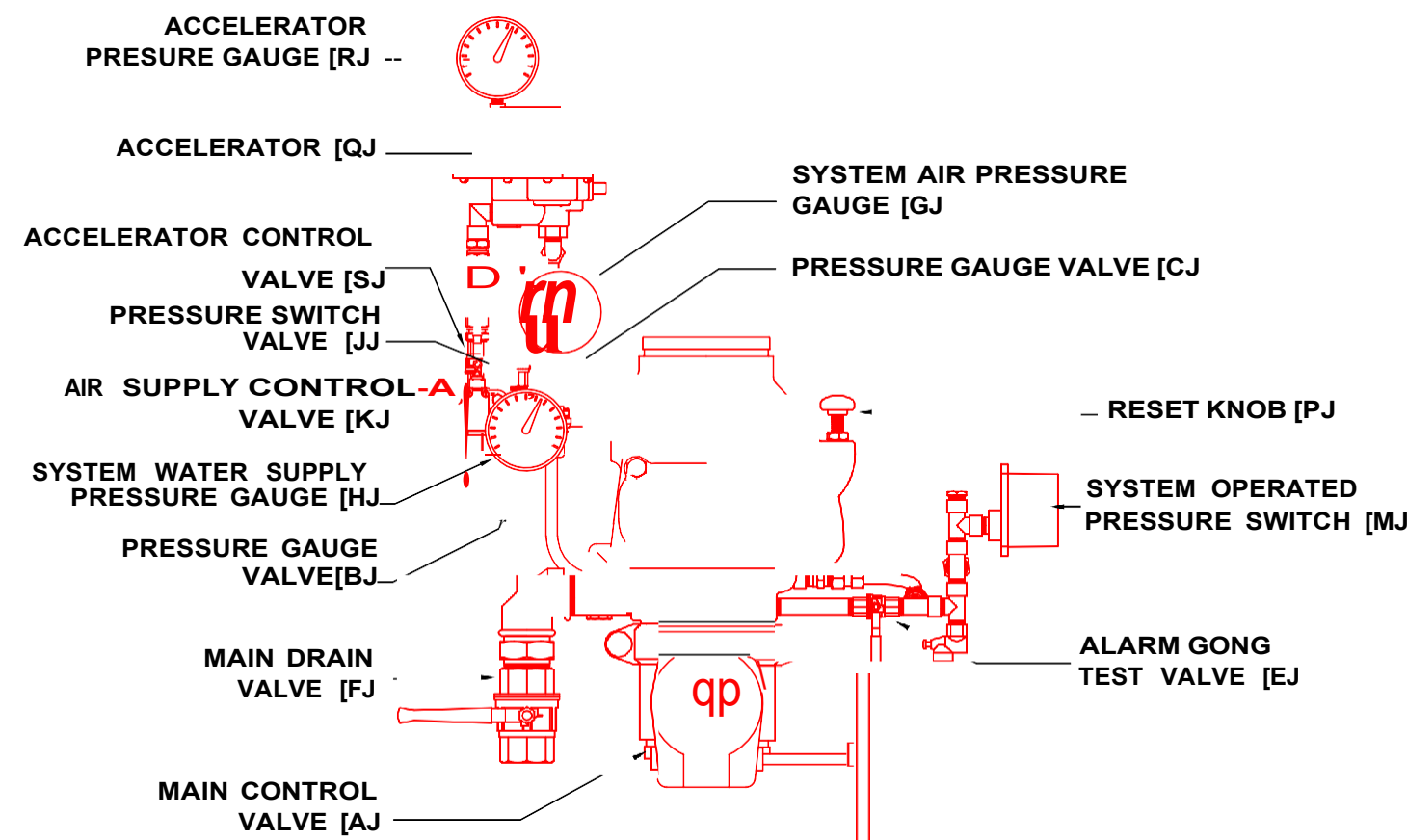
Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

Step 1. Open the alarm test valve (E), verify that the alarm signal created by the water flow pressure alarm switch (M) is visible at the fire panel. If applicable check the sound of the water motor alarm gong – it must be clear and steady.

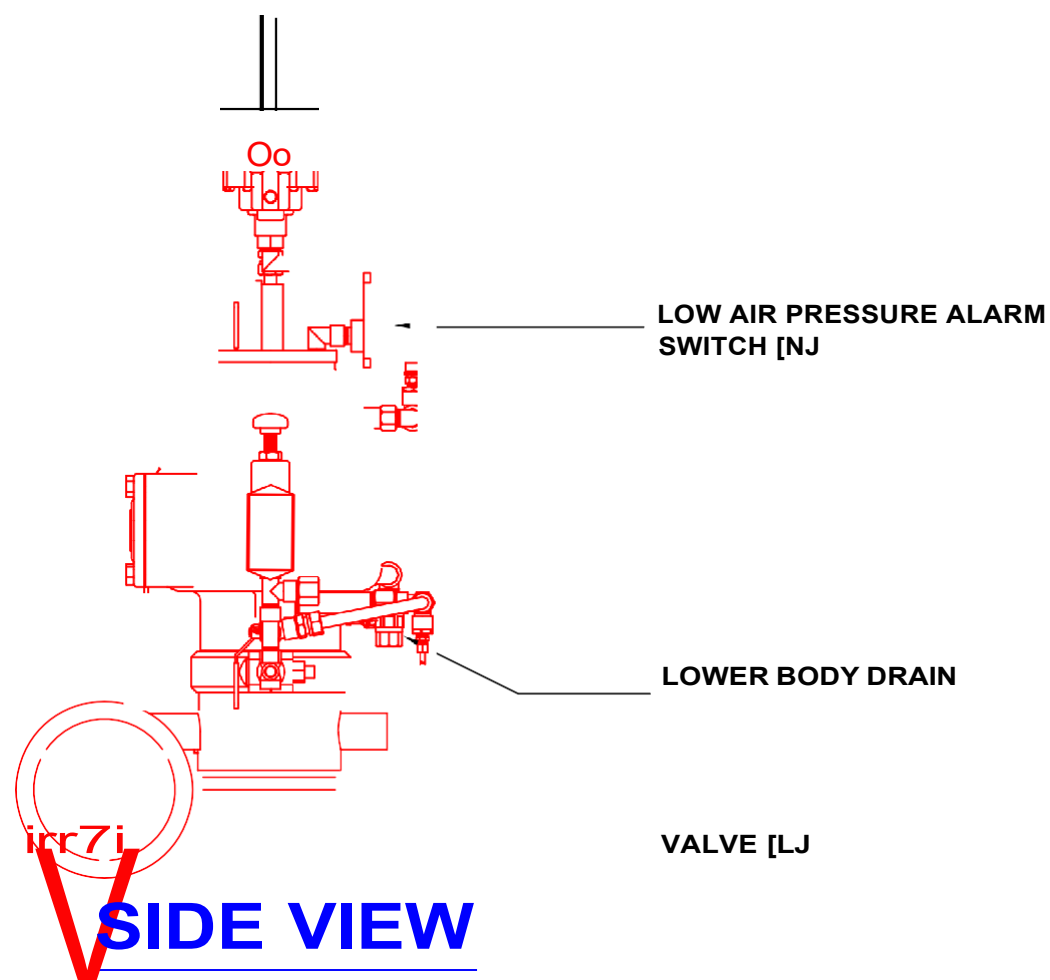
Step 2. Close the alarm test valve (E), verify that the normal supply and system pressure are restored. If the supply pressure is below normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure switch (N).

4.4 Figure 4.3 Diagrammatic View of DPV-1 Dry Pipe Valve



FRONT VIEW



SIDE VIEW

TO SET UP DRY VALVE AFTER OPERATION

- Step 1.** Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.
- Step 2.** Replace the sprinklers that have operated and the sprinklers close to the fire.
- Step 3.** Push down on the reset knob (P) to allow the dry pipe valve (D) to reseal.
- Step 4.** Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.
- Step 5.** Open the air supply control valve (K) to restore the system to the normal system air pressure.
- Step 6.** Reset accelerator (Q) using the instruction on its resetting label.
- Step 7.** Partially open the main control valve (A), and then slowly close the main drain valve (F).
- Step 8.** Fully open the main control valve (A) and lock it open.
- Step 9.** Reset the fire alarm panel and notify the central alarm station.

TO SET UP THE ACCELERATOR

- Step 1.** Verify that the Reset Knob on the accelerator is screwed in.
- Step 2.** Close the system's main control valve (A) and open the main drain valve (F) to relieve the supply pressure to the dry pipe valve.
- Step 3.** Verify that the Accelerator Control Valve (S) is open.
- Step 4.** Open the Inspector's Test Connection. Verify that the time to Accelerator trip is essentially the same as in previous tests. A momentary burst of air from the Automatic Drain Valve indicates that the Accelerator has tripped.

NOTE

As the system pressure is decreasing, check for any sign of water being discharged from the Accelerator Relief Port.

- Step 5.** Depress the plunger of the Automatic Drain Valve. A steady stream of exhausting air indicates that the Accelerator has properly latched in the Tripped position.
- Step 6.** Close the Accelerator Control Valve (S) and the Inspector's Test Connection.
- Step 7.** After the system automatically restores itself to its normal air pressure, reset the Accelerator and Dry Pipe Valve in accordance with the Valve Setting Procedure Steps (outlined above).

WEEKLY TESTING OF DRY VALVE

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

- Step 1.** Open the alarm test valve (E), verify that the alarm signal created by the water flow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm - it must be clear and steady.
- Step 2.** Close the alarm test valve (E), verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.
- Step 3.** Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).
- Step 4.** Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.



Registered Office:
SADLEWORTH BUSINESS CENTRE
Delph, Oldham
Huddersfield Road
OL3 5DF
Fax: 01457 879888
Tel: 01457 879222

FIGURE 4.3
DIAGRAMMATIC VIEW OF
DPV-1 DRY PIPE VALVE

4.5 Tyco Model DPV-1 Dry Pipe Valve Data Sheet

Model DPV-1 Dry Pipe Valve, DN100 & DN150 Model ACC-1 Dry Pipe Valve Accelerator European Conformity Valve Trim, 16 Bar

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Valve Trim is illustrated in Figures 8 thru 15. Refer the Table B on Page 5 for types of trim and corresponding figure and page number.

General Description

DRY PIPE VALVE

The DN100 and DN150, Model DPV-1 Dry Pipe Valves are differential valves used to automatically control the flow of water into a dry pipe fire protection sprinkler systems upon operation of one or more automatic sprinklers. The DPV-1 also provides for actuation of fire alarms upon system operation. The Model DPV-1 features are as fol- lows:

- External reset.
- 16 bar pressure rating.
- Unique offset single clapper design enabling a simple compact valve to minimize installation labor.
- Ductile iron construction to ensure a lightweight valve to minimize shipping cost.
- A variety of inlet and outlet connections.
- Simple reset procedure through the elimination of priming water.

Dry pipe sprinkler systems are used in unheated warehouses, parking garages, store windows, attic spaces, loading docks, and other areas exposed to freezing temperatures, where water filled pipe cannot be utilized. When set for service, the dry pipe sprinkler system is pressurized with air (or nitrogen). The loss of pressure through an operated automatic sprinkler in response to heat from a fire permits the DPV-1 Dry Pipe Valve to open and allow a flow of water into the sprinkler system piping. Table A establishes the minimum required system air pressure that includes a safety factor to help prevent false operations that occur due to water supply fluctuations.

ACCELERATOR

The optional Model ACC-1 Accelerator



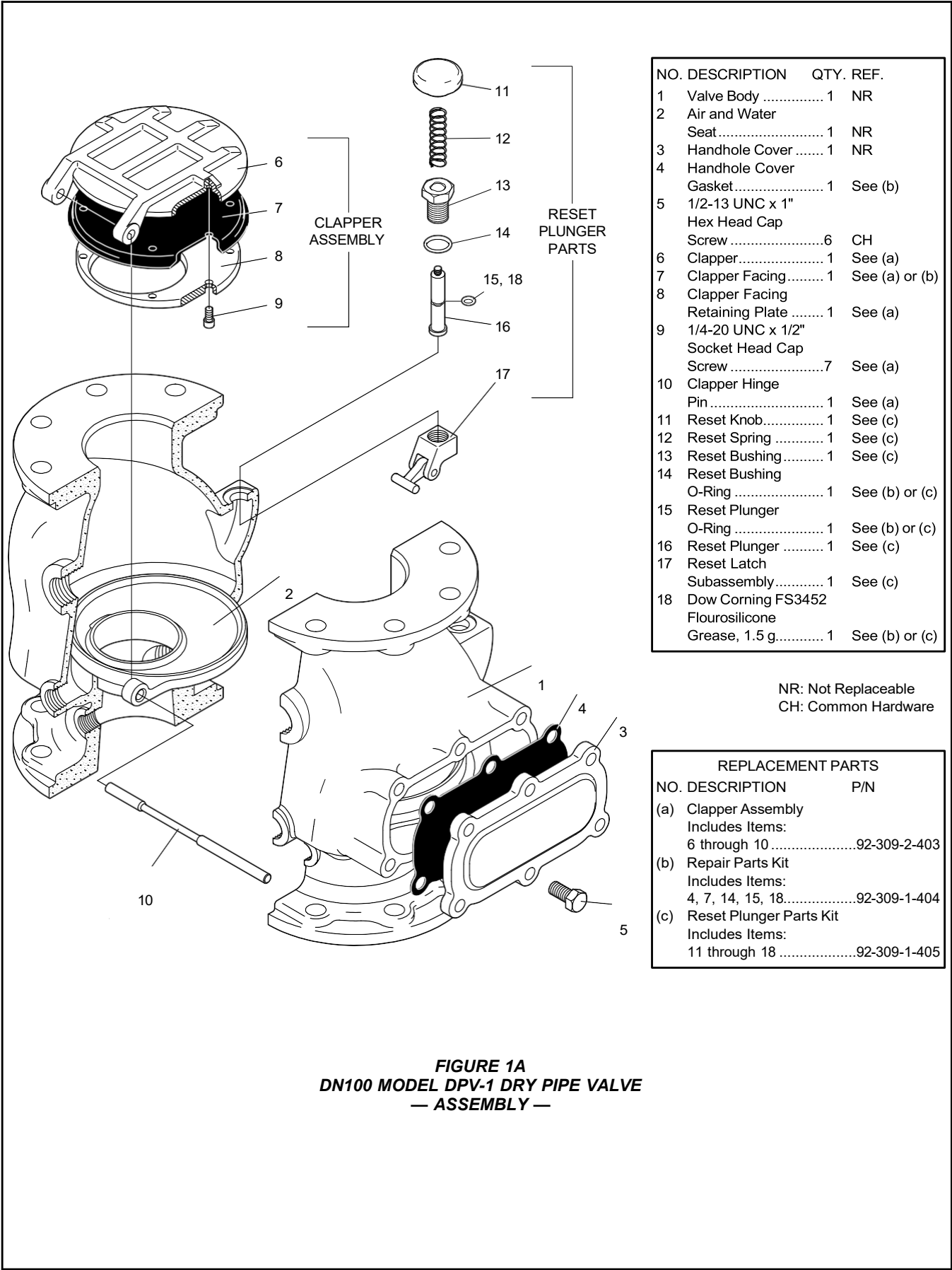


FIGURE 1A
DN100 MODEL DPV-1 DRY PIPE VALVE
— ASSEMBLY —

NO.	DESCRIPTION	QTY.	REF.
1	Valve Body.....	1	NR
2	Air and Water		
	Seat.....	1	NR
3	Water Seal		
	O-Ring.....	1	NR
4	Air Seal O-Ring.....	1	NR

1	Valve Body.....	1	NR
2	Air and Water		
	Seat.....	1	NR
3	Water Seal		
	O-Ring.....	1	NR
4	Air Seal O-Ring.....	1	NR

NO.	DESCRIPTION	QTY.	REF.
5	3/8-16 UNC x 1"		
	Socket Head Cap		
	Screw.....	8	NR
6	Handhole Cover.....	1	NR
7	Handhole Cover		
	Gasket.....	1	See (d)

5	3/8-16 UNC x 1"		
	Socket Head Cap		
	Screw.....	8	NR
6	Handhole Cover.....	1	NR
7	Handhole Cover		
	Gasket.....	1	See (d)

NO.	DESCRIPTION	QTY.	REF.
8	5/8-11 UNC x 1"		
	Hex Head Cap		
	Screw.....	6	CH
9	Clapper.....	1	See (a)
10	Clapper Facing.....	1	See (a) or (b)
11	Clapper Facing		
	Retaining Plate.....	1	See (a)
12	1/4-20 UNC x 1/2"		
	Socket Head Cap		
	Screw.....	9	See (a)
13	Clapper Hinge		
	Pin.....	1	See (a)
14	Reset Knob.....	1	See (c)
15	Reset Spring.....	1	See (c)
16	Reset Bushing.....	1	See (c)
17	Reset Bushing		
	O-Ring.....	1	See (b) or (c)
18	Reset Plunger		
	O-Ring.....	1	See (b) or (c)
19	Reset Plunger.....	1	See (c)
20	Reset Latch		
	Subassembly.....	1	See (c)
21	Dow Corning FS3452		
	Fluorosilicone		
	Grease, 1.5 g.....	1	See (b) or (c)

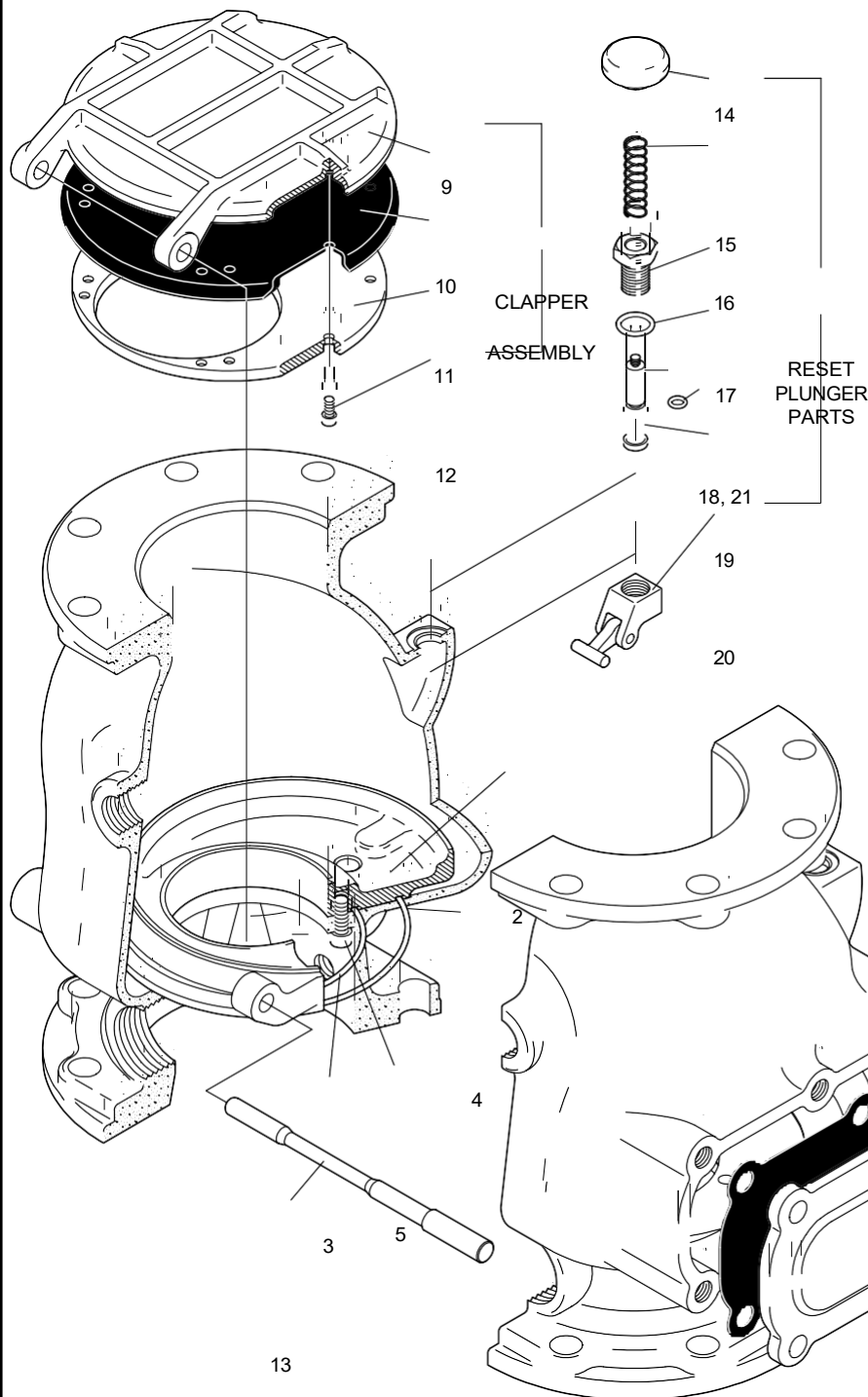
8	5/8-11 UNC x 1"		
	Hex Head Cap		
	Screw.....	6	CH
9	Clapper.....	1	See (a)
10	Clapper Facing.....	1	See (a) or (b)
11	Clapper Facing		
	Retaining Plate.....	1	See (a)
12	1/4-20 UNC x 1/2"		
	Socket Head Cap		
	Screw.....	9	See (a)
13	Clapper Hinge		
	Pin.....	1	See (a)
14	Reset Knob.....	1	See (c)
15	Reset Spring.....	1	See (c)
16	Reset Bushing.....	1	See (c)
17	Reset Bushing		
	O-Ring.....	1	See (b) or (c)
18	Reset Plunger		
	O-Ring.....	1	See (b) or (c)
19	Reset Plunger.....	1	See (c)
20	Reset Latch		
	Subassembly.....	1	See (c)
21	Dow Corning FS3452		
	Fluorosilicone		
	Grease, 1.5 g.....	1	See (b) or (c)

NR: Not Replaceable
CH: Common Hardware

REPLACEMENT PARTS

NO.	DESCRIPTION	P/N
(a)	Clapper Assembly	
	Includes Items:	
	9 through 13.....	92-309-2-603
(b)	Repair Parts Kit	
	Includes Items:	
	7, 10, 17, 18, 21.....	92-309-1-604
(c)	Reset Plunger Parts Kit	
	Includes Items:	
	14 through 21.....	92-309-1-405

NO.	DESCRIPTION	P/N
(a)	Clapper Assembly	
	Includes Items:	
	9 through 13.....	92-309-2-603
(b)	Repair Parts Kit	
	Includes Items:	
	7, 10, 17, 18, 21.....	92-309-1-604
(c)	Reset Plunger Parts Kit	
	Includes Items:	
	14 through 21.....	92-309-1-405



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FIGURE 1B
DN150 MODEL DPV-1 DRY PIPE VALVE
— ASSEMBLY —

Maximum Water Supply Pressure, bar	System Air Pressure Range, bar
1,4	0,7
4,1	1,0 - 1,6
5,5	1,4 - 1,9
6,9	1,7 - 2,3
8,3	2,1 - 2,6
10,0	2,4 - 3,0
11,4	2,8 - 3,3
12,8	3,1 - 3,7
14,1	3,4 - 4,0
15,5	3,8 - 4,3
16,0	4,1 - 4,6

TABLE A
SYSTEM AIR PRESSURE
REQUIREMENTS

is a quick opening device that is intended to reduce the time for valve operation following the operation of one or more automatic sprinklers. The Model ACC-1 Accelerator automatically adjusts to both small and slow changes in system pressure, but trips when there is a rapid and steady drop in pressure (as in the case of a sprinkler operation). Upon tripping, the Accelerator transmits system air pressure to the intermediate chamber of the Model DPV-1 Dry Pipe Valve. This neutralizes the differential pressure holding the Model DPV-1 Dry Pipe Valve closed and permits it to open.

The Model ACC-1 Accelerator has a unique, positive action, internal anti-flood device and a ball float which combine to prevent water and water borne debris from entering the more sensitive operating areas of the accelerator. The anti-flood device seals and latches immediately upon operation of the Model ACC-1 Accelerator without waiting for a pressure build-up in the intermediate chamber of the dry pipe valve. The latching feature keeps the anti-flood device sealed, even while the system is being drained. The ball float seals the pilot chamber inlet port if there is an inadvertent trip of the dry pipe valve, due for example, to an air compressor failure combined with a slow loss in system air pressure due to a leak.

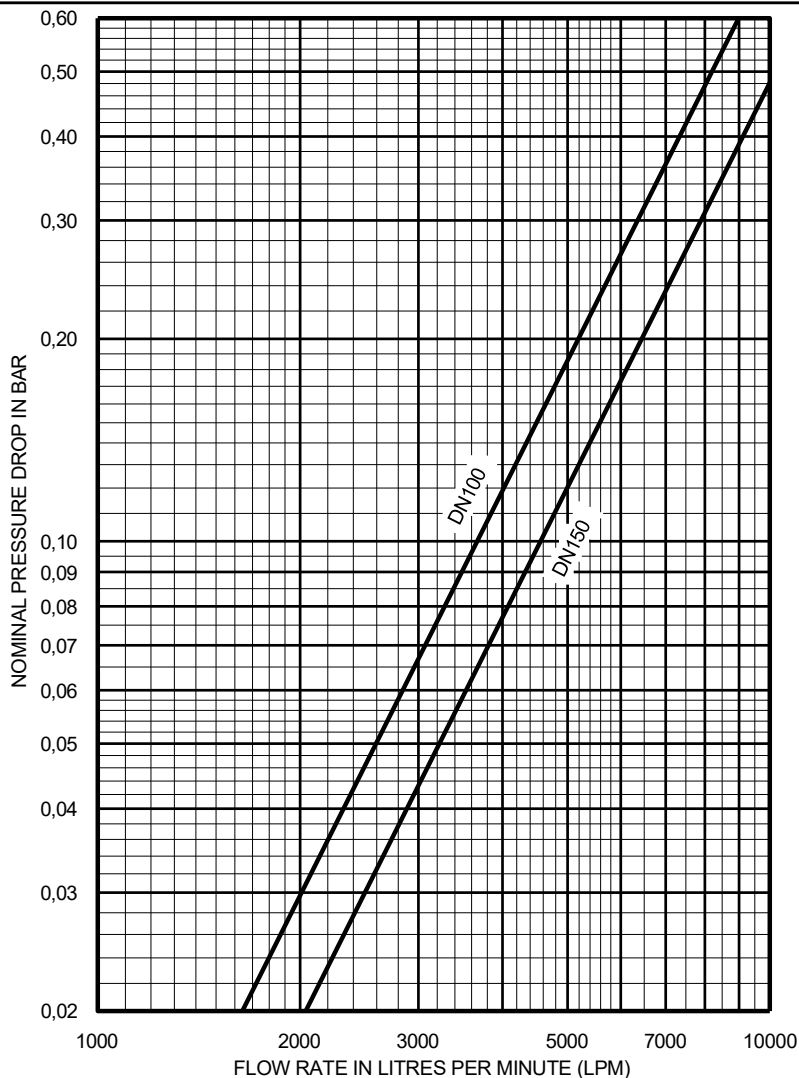


FIGURE 2
DN100 and DN150 MODEL DPV-1 DRY PIPE VALVE
— NOMINAL PRESSURE LOSS VERSUS FLOW —

WARNING

The Model DPV-1 Dry Pipe Valves and Model ACC-1 Dry Pipe Valve Accelerator described herein must be installed and maintained in compliance with this document in addition to the standards recognized by the Approval agency, in addition to any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or manufacturer should be contacted with any questions.

Technical Data

Approvals:

The DN100 and DN150 Model DPV-1 Dry Pipe Valves with or without Model ACC-1 Dry Pipe Valve Accelerator are FM, LPCB, VDS, and CE Approved with European Conformity Valve Trim (Ref. Figures 8 thru 15).

Dry Pipe Valve:

The DN100 and DN150, Model DPV-1 Dry Pipe Valves are for vertical installations (flow going up), and they are rated for use at a maximum service pressure of 16 bar. The nominal pressure loss versus flow is shown in Figure 2, and the valve take-out dimensions are shown in Figure 3.

Flanged connections are drilled per ISO 2084 (PN10/16) or ANSI B16.1 (Class 125). The grooved outlet connections, as applicable, are cut in accordance with standard groove specifications for steel pipe. They are suitable for use with grooved end pipe couplings that are listed or approved for fire protection system service.

Threaded port connections are per ISO 7/1 to readily accept the trim arrangement detailed in Figures 8 -15.

Components of the DN100 DPV-1 Valve are shown in Figure 1A, and components of the DN150 DPV-1 Valve are shown in Figure 1B. The Body and Handhole Cover are ductile iron. The Handhole Cover Gasket is neoprene, and the Clapper Facing is EPDM. The Air/Water Seat Ring is brass, the Clapper is copper, and both the Clapper Retaining Plate and Latch are bronze. The Hinge Pin is aluminum bronze, and the fasteners for the Handhole Cover are carbon steel.

Valve Trim:

The Valve Trim is illustrated in Figures 8 and 15 (Ref. Table B). The Valve Trim forms a part of the laboratory approval of the DPV-1 Valve and is necessary for the proper operation of the DPV-1 Valve. Each package of trim includes the following items:

- Water Supply Pressure Gauge
- System Air Pressure Gauge
- Main Drain Valve
- Low Body Drain Valve
- Alarm Test Valve
- Automatic Drain Valve
- Provision For An Optional Accelerator

Valve Size		Alarm Test Valve		Accelerator		Figure Number	Page Number
DN100	DN150	Three-Way	Standard	Yes	No		
✓		✓			✓	8	13
	✓	✓			✓	9	14
✓			✓		✓	10	15
	✓		✓		✓	11	16
✓		✓		✓		12	17
	✓	✓		✓		13	18
✓			✓	✓		14	19
	✓		✓	✓		15	20

TABLE B
REFERENCE FOR CORRESPONDING
FIGURE NUMBER AND PAGE NUMBER
— EUROPEAN CONFORMITY VALVE TRIM —

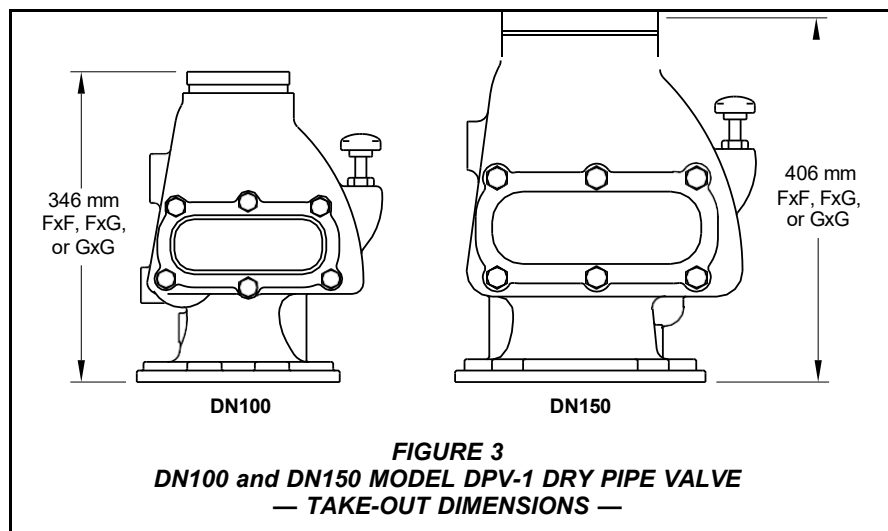


FIGURE 3
DN100 and DN150 MODEL DPV-1 DRY PIPE VALVE
— TAKE-OUT DIMENSIONS —

Air Supply:

Table A shows the system air pressure requirements as a function of the water supply pressure. The air (or nitrogen) pressure in the sprinkler system is recommended to be automatically maintained by using one of the following pressure maintenance devices, as appropriate:

- Model AMD-1 Air Maintenance Device (pressure reducing type).
- Model AMD-2 Air Maintenance Device (compressor control type).
- Model AMD-3 Nitrogen Maintenance Device (high pressure reducing type).

Quick Opening Device:

As an option, the Model DPV-1 Dry Pipe Valve may be acquired with the Model ACC-1 Mechanical Dry Pipe Valve Accelerator (Ref. Figure 4) The ACC-1 is used to reduce the time to valve actuation following the operation of one or more automatic sprinklers.

Patents:

U.S.A. Patent No. 6,557,645 and 4,570,719.

NO.	DESCRIPTION	QTY.	P/N
1	Base	1	NR
2	Cover	1	NR
3	Upper Diaphragm Plate	1	See (c)
4	Pivot Plate Assembly	1	See (b)
a	Spiral Pin	1	
b	Pivot Plate	1	
5	Plunger	1	See (a)
a	Pan Hd. Machine Screw	1	
b	Upper Diaphragm Retaining Ring	2	
c	Upper Diaphragm	1	
d	Jam Nut	1	
6	Exhaust Valve	1	See (a)
a	Upper Plug	1	
b	Washer	1	
c	Lower Diaphragm	1	
d	Lower Plug	1	
e	O-Ring*	1	
f	O-Ring Retainer	1	
g	Exhaust Valve Rd. Head Machine Screw, 1/4"-20 UNC x 5/8"	1	
7	Cover Gasket	6	See (c)
8	Vent Plug	1	See (a)
9	O-Ring*	1	See (a)
10	Restriction	1	See (a)
11	Restriction Access Plug	1	See (c)
12	Pan Hd. Machine Screw, No. 10-32 UNF x 5/8"	4	See (b)
13	Cotter Pin	1	See (b)
14	Lever	1	See (b)
15	Retaining Ring	1	See (b)
16	Anti-Flood Valve	1	See (b)
17	Relief Valve	1	See (b)
18	Spring	1	See (b)
19	Relief Valve Seat	1	See (b)
20	O-Ring*	1	See (b)
21	Seal Washer	1	See (b)
22	Latch	1	See (a)
23	Fillerster Hd. Machine Screw, 1/4"-20 UNC x 1-1/2"	8	See (c)
24	Plug Seat	1	See (c)
25	O-Ring*	1	See (c)
26	O-Ring*	1	See (a)
27	Reset Knob	1	See (c)
28	Anti-Flood Seat Assembly w/Ball Float	1	See (b)
a	Insert	1	
b	Seal	1	
c	Guide	1	
d	Ball	1	
e	Clip	1	
f	O-Ring*	1	

* Requires thin film of FS3452 Fluorosilicone Grease

(a) Repair Parts Kit (a)
Includes Items 5, 6, 8,
10, 11, 23, 27 &
1.5 grams of FS3452 92-311-1-116

(b) Replacement Parts
Kit (b) Includes Items
4, 13-22, 29 &
1.5 grams of FS3452 92-311-1-117

(c) Replacement Parts
Kit (c) Includes Items
3, 7, 9, 12, 24-26, 28,
& 1.5 grams of FS3452 92-311-1-118

NR: Not Replaceable

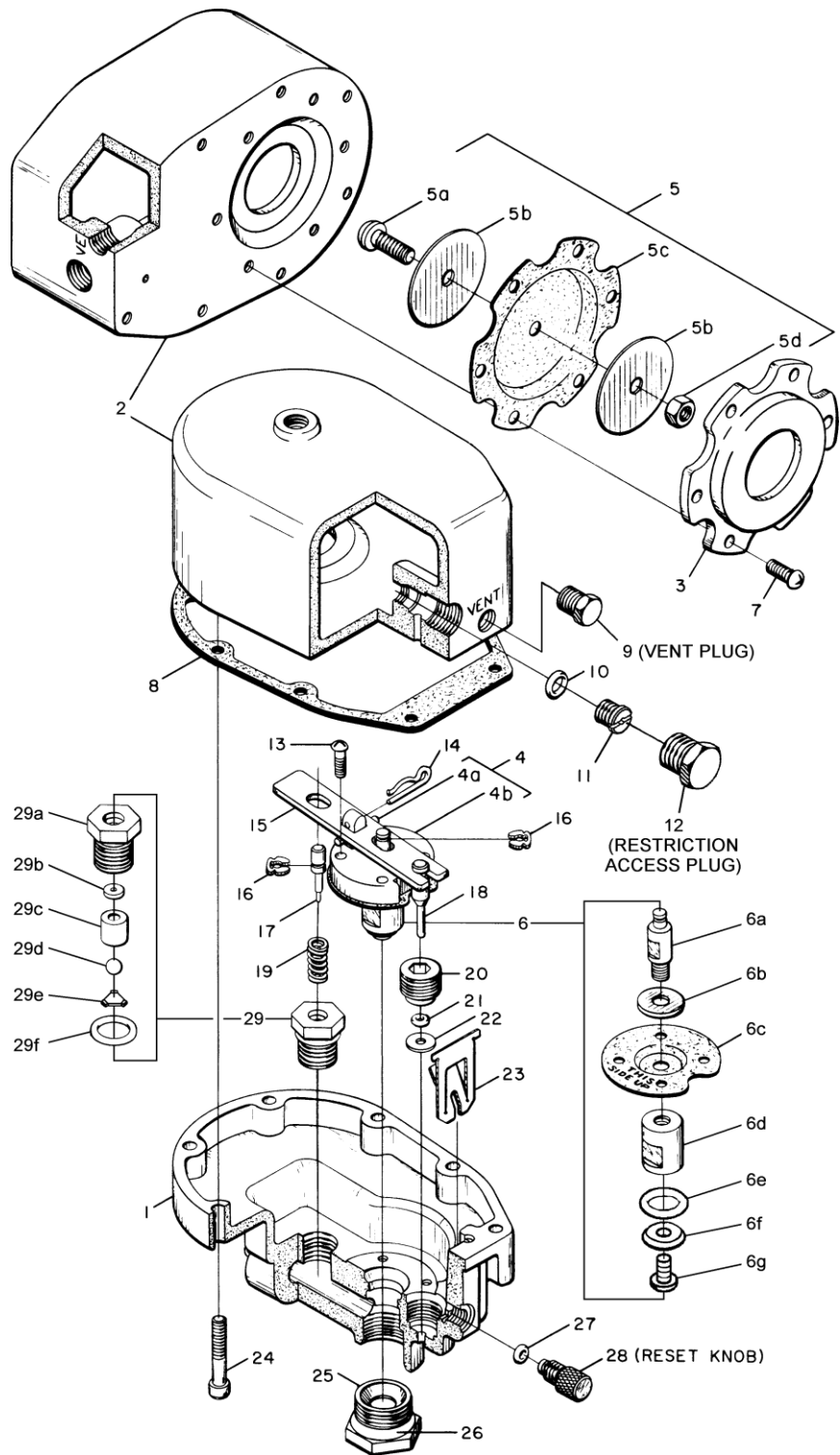
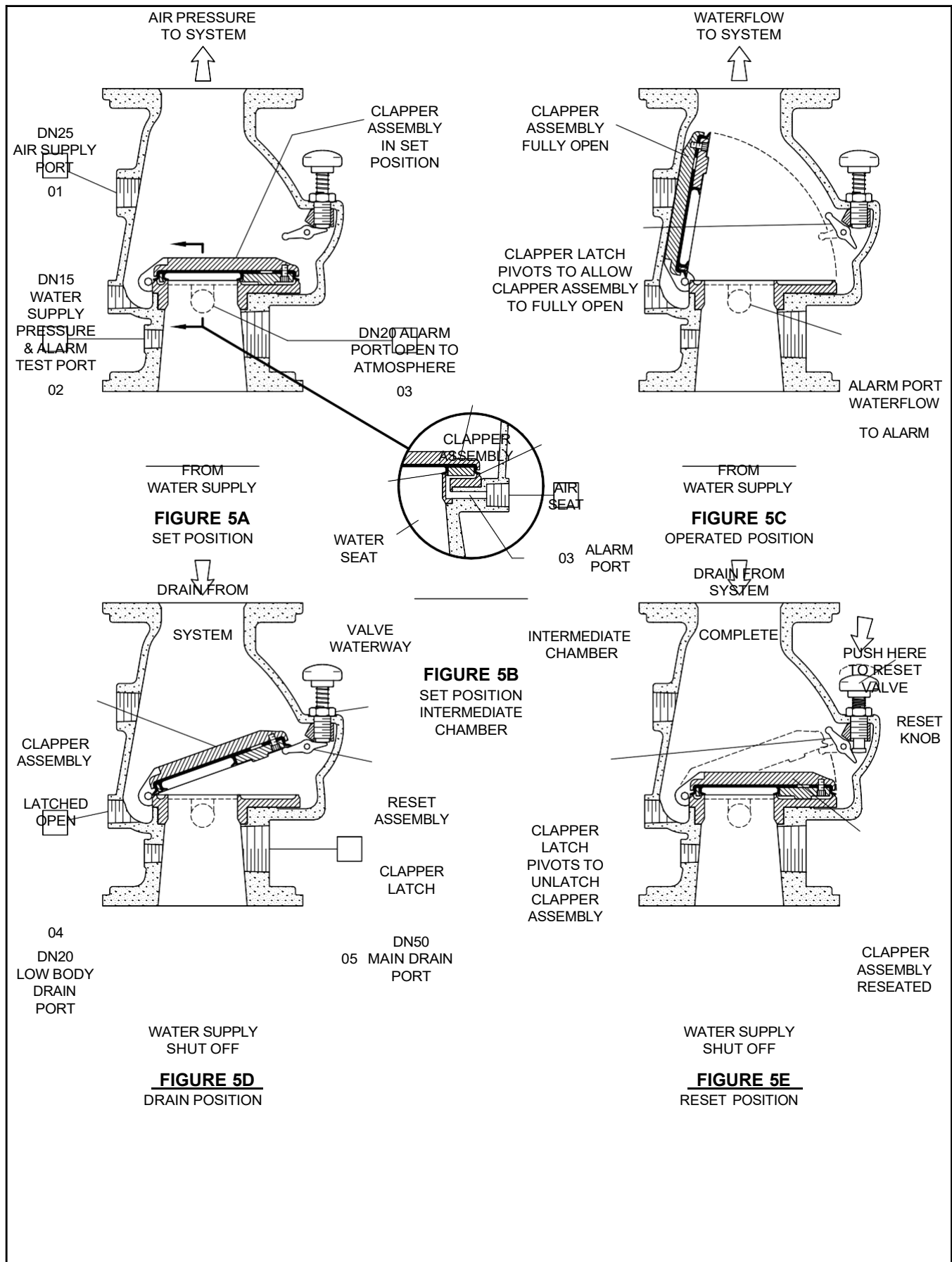


FIGURE 4
MODEL ACC-1 ACCELERATOR ASSEMBLY



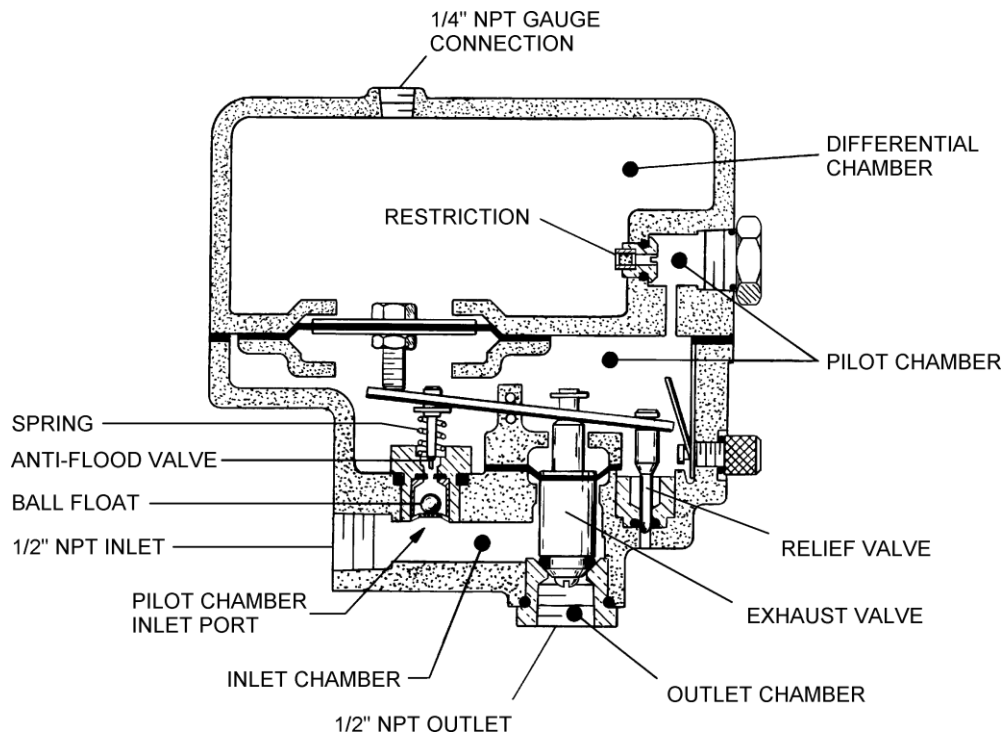


FIGURE 6
MODEL ACC-1 ACCELERATOR IN SET POSITION

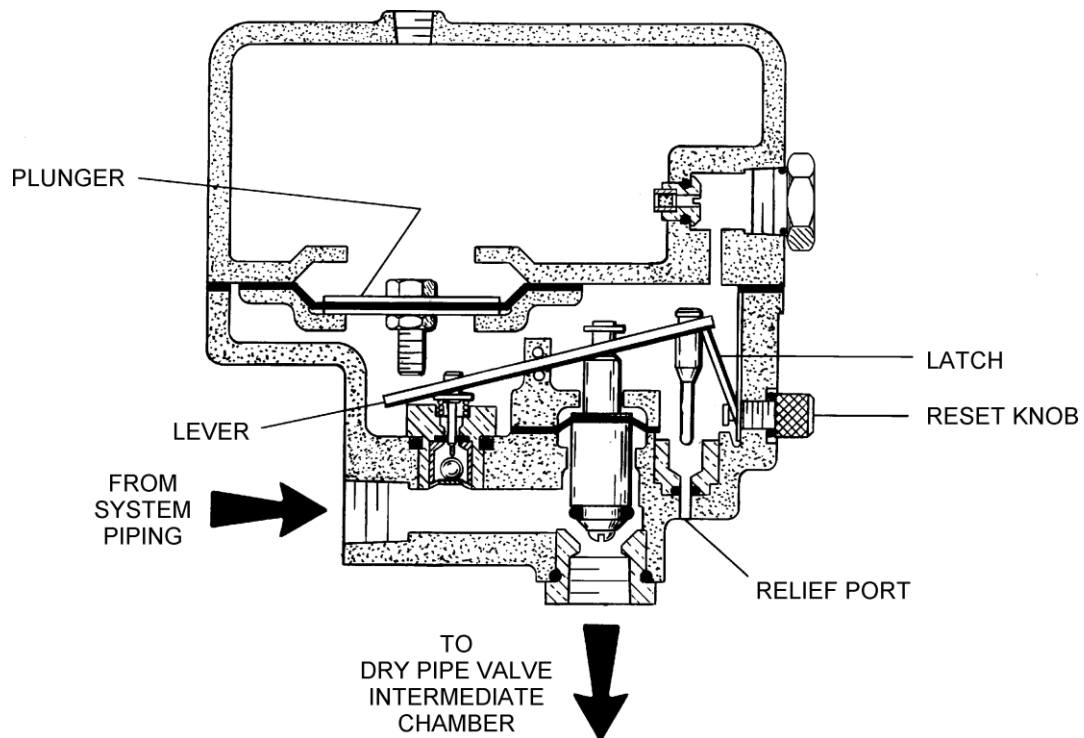


FIGURE 7
MODEL ACC-1 ACCELERATOR IN TRIPPED POSITION

Operating Principles

DRY PIPE VALVE

The Model DPV-1 Dry Pipe Valve is a differential type valve that utilizes a substantially lower system (air or nitrogen) pressure than the supply (water) pressure, to maintain the set position shown in Figure 5A. The differential nature of the DPV-1 is based on the area difference between the air seat and the water seat in combination with the ratio of the radial difference from the Hinge Pin to the center of the Water Seat and the Hinge Pin to the center of the Air Seat. The difference is such that the DPV-1 has a nominal trip ratio of 5.5:1 (water to air).

Table A establishes the minimum required system air pressure that includes a safety factor to help prevent false operations that occur due to water supply fluctuations.

The Intermediate Chamber of the DPV-1 is formed by the area between the Air Seat and Water Seat as shown in Figure 5B. The Intermediate Chamber normally remains at atmospheric pressure through the Alarm Port connection and the valve trim to the normally open Automatic Drain Valve (Ref. Figures 8 thru 15). Having the Intermediate Chamber, Figure 5B, open to atmosphere is critical to the DPV-1 Valve remaining set, otherwise the full resulting pressure of the system air pressure on top of the Clapper Assembly cannot be realized. For example, if the system air pressure is 1.7 bar and there was 1.0 bar pressure trapped in the Intermediate Chamber, the resulting pressure across the top of the Clapper would only be 0.7 bar. This pressure would be insufficient to hold the Clapper Assembly closed against a water supply pressure of 6.9 bar.

When one or more automatic sprinklers operate in response to a fire, air pressure within the system piping is relieved through the open sprinklers. When the air pressure is sufficiently reduced, the water pressure overcomes the differential holding the Clapper Assembly closed and the Clapper Assembly swings clear of the water seat, as shown in Figure 5C. This action permits water flow into the system piping and subsequently to be discharged from any open sprinklers. Also, with the Clapper Assembly open, the intermediate chamber is pressurized and water flows through the alarm port (Ref. Figure 5B) at the rear of the DPV-1 Valve. As the flow through the alarm port exceeds the drain capacity

of the Automatic Drain Valve, the alarm line is pressurized to actuate system water flow alarms.

After a valve actuation and upon subsequent closing of a system main control valve to stop water flow, the Clapper Assembly will latch open as shown in Figure 5D. Latching open of the DPV-1 will permit complete draining of the system (including any loose scale) through the main drain port.

During the valve resetting procedure and after the system is completely drained, the external reset knob can be easily depressed to externally unlatch the Clapper Assembly as shown in Figure 5E. As such, the Clapper Assembly is returned to its normal set position to facilitate setting of the dry pipe sprinkler system, without having to remove the Handhole Cover.

ACCELERATOR

The Inlet Chamber of the Accelerator, (Ref. Figure 6), is pressurized via its connection to the system. The Pilot Chamber is, in turn, pressurized through its inlet port which is formed by the annular opening around the lower tip of the Anti-Flood Valve. As the Pilot Chamber increases in pressure, the Differential Chamber is pressurized through the Restriction.

The Accelerator is in its set position while it is being pressurized as well as after the Inlet, Pilot Chamber and Differential Chamber pressures have equalized. When in the Set position, the Outlet Chamber is sealed off by the Exhaust Valve which is held against its seat by a combination of the Spring pushing up against the Lever and the net downward force exerted by the pressure in the Pilot Chamber.

Both small and slow changes in system pressure are accommodated by flow through the Restriction. When, however, there is a rapid and steady drop in system (i.e., Inlet and Pilot Chamber) pressure, the pressure in the Differential Chamber reduces at a substantially lower rate. This condition creates a net downward force on the Plunger which rotates the Lever. As the Lever is rotated (Ref. Figure 7), the Relief Valve is raised out of the Relief Port and the Anti-Flood Valve is depressed downward into the Pilot Chamber Inlet Port, venting the Pilot Chamber.

The system pressure in the Inlet Chamber then forces (raises) the Exhaust Valve off its seat. This continues the rotation of the Lever into the tripped (latched) position (Ref. Figure 7). As the Exhaust Valve is raised off its seat, system pressure is transmit-

ted to the intermediate chamber of the dry pipe valve which neutralizes the differential pressure holding the valve closed.

Water and any water borne debris such as silt is prevented from entering the Pilot Chamber by virtue of the Anti-Flood Valve having sealed off its inlet port.

After the accelerator/dry pipe valve has tripped and the sprinkler system has been drained, the piping from the system to the Accelerator must also be drained and the Accelerator reset/inspected according to the instructions given in the Valve Setting Procedure section.

The rate-of-flow through the Restriction has been set such that the Model ACC-1 Accelerator provides the maximum practical sensitivity to a loss in system pressure due to a sprinkler operation while still being capable of automatically compensating for normal variations in system pressure such as are caused by environmental temperature changes. A test for verifying that the rate-of-flow through the Restriction is within the range for optimum Accelerator performance is given in the Valve Setting Procedure section.

Installation

NOTES

Proper operation of the Model DPV-1 Dry Pipe Valve depends upon its trim being installed in accordance with Figures 8 thru 15, as applicable. Alteration of the trim may prevent the DPV-1 Valve from functioning properly, as well as void approvals and the manufacturer's warranties.

Failure to latch open the Clapper Assembly prior to a system hydrostatic test may result in damage to the Clapper Assembly.

The DPV-1 Valve must be installed in a readily visible and accessible location.

The DPV-1 Valve and associated trim must be maintained at a minimum temperature of 4°C.

Heat tracing of the DPV-1 Valve or its associated trim is not permitted. Heat tracing can result in the formation of hardened mineral deposits that are capable of preventing proper operation.

The Model DPV-1 Dry Pipe Valve is to be installed in accordance with the following criteria:

Step 1. When trimming valves in the field (i.e., other than valves provided with factory assembled trim), all nipples, fittings, and devices must be clean and free of scale and burrs before installation. Use pipe thread sealant sparingly on male pipe threads only.

Step 2. The DPV-1 Valve must be trimmed in accordance with Figures 8 thru 15.

Step 3. Care must be taken to make sure that check valves, strainers, globe valves, etc. are installed with the flow arrows in the proper direction.

Step 4. Suitable provision must be made for disposal of drain water. Drainage water must be directed such that it will not cause accidental damage to property or danger to persons.

Step 5. Installation of an Air Maintenance Device, as described in the Technical Data Section, is recommended.

Step 6. An Inspector's Test Connection must be provided on the system piping at the most remote location from the Model DPV-1 Valve.

Step 7. Conduit and electrical connections are to be made in accordance with the requirements of the authority having jurisdiction.

Step 8. Before a system hydrostatic test is performed in accordance with

the standards recognized by the Approval agency, in addition to any other authorities having jurisdiction, the Clapper Assembly is to be manually latched open (Ref. Fig. 4D); the Automatic Drain Valve (Ref. Figures 8 thru 15) is to be temporarily plugged, and the Handhole Cover Bolts are to be tightened using a cross-draw sequence.

Valve Setting Procedure

Steps 1 through 12 are to be performed when initially setting the Model DPV-1 Dry Pipe Valve; after an operational test of the fire protection system; or, after system operation due to a fire.

Determine which of Figures 8 through 15 is applicable for your given riser arrangement, and then proceed as follows:

Step 1. Close the Main Control Valve, and close the Air Supply Control Valve. *If the DPV-1 is equipped with a Dry Pipe Valve Accelerator, close the Accelerator Control Valve.*

Step 2. Open the Main Drain Valve and all auxiliary drains in the system. Close the auxiliary drain valves after water ceases to discharge. Leave the Main Drain Valve open.

Step 3. As applicable, place the Three-way Alarm Control Valve in the open position.

Step 4. Verify that the Automatic Drain Valve has stopped draining to determine the DPV-1 Valve is completely drained.

Step 5. As necessary, replace all sprinklers that have operated. Replacement sprinklers must be of the same type and temperature rating as those which have operated.

NOTE

In order to prevent the possibility of a subsequent operation of an overheated solder type sprinkler, any solder type sprinklers which were possibly exposed to a temperature greater than their maximum rated ambient must be replaced.

Step 6. Push down on the Reset Knob (Fig. 5E) to allow the Clapper Assembly to reset.

Step 7. Pressurize the system with air (or nitrogen) to 0,7 bar, and then individually open all auxiliary drain valves

in the system piping to drain any remaining water in trapped sections. Close each drain valve as soon as water ceases to discharge. Also partially open the Low Body Drain Valve in the valve trim to assure that the riser is completely drained. Close the Low Body Drain Valve as soon as water ceases to discharge.

Step 8. Refer to Table A and then restore the system to the normal system air pressure as necessary to hold the DPV-1 Valve closed.

Step 9. Verify that there is not any air discharging from the Automatic Drain Valve.

The absence of air discharging from the Automatic Drain Valve is an indication of a properly set air seat within the DPV-1 Valve. If air is discharging, refer to the Care and Maintenance section under Automatic Drain Valve Inspection to determine/correct the cause of the leakage problem.

Step 10. If the DPV-1 is equipped with a Dry Pipe Valve Accelerator, reset the Dry Pipe Valve Accelerator in accordance with Steps 10A thru 10H. Otherwise, proceed to Step 11.

Step 10A. While holding the plunger of the Automatic Drain Valve depressed, open the Accelerator Control Valve one-quarter turn and allow the water in the Accelerator piping to blow out. After water spray stops discharging, close the Accelerator Control Valve and then release the plunger.

Step 10B. Slowly remove the Vent Plug located in the front of the Accelerator Cover and bleed off any residual air pressure in the Differential Chamber.

Step 10C. Unscrew (counter-clockwise rotation) the knurled Reset Knob at the front of the Accelerator until it resists further turning. A click, which is the sound of the Lever snapping back into the Set Position, may be heard. Screw the Reset Knob back in until it is finger tight.

NOTE

Do not wrench on the reset Knob, since damage may result. The Reset Knob will turn with finger torque only.

Step 10D. Replace the Vent Plug.

Step 10E. Verify that the system air pressure has returned to normal.

Step 10F. Using a watch, note the time for the pressure in the Differential Chamber of the Accelerator to increase to 0,7 bar after the Accelerator Control Valve is opened. The

Pressure, bar	Minimum, sec.	Maximum, sec.
1,4	24	160
1,7	18	116
2,1	15	92
2,8	10	60
3,5	8	48
4,1	6	36

TABLE C
DIFFERENTIAL CHAMBER FILL TIMES TO 0,7 BAR

time should be within the range of values indicated in Table C for optimum performance of the Accelerator.

NOTE

If the time to pressurize the Differential Chamber to 0,7 bar is not within the range of values given in the Table C, then the Accelerator Control Valve should be closed and the corrective procedure described in the Care and Maintenance Section followed.

Step 10G. When the air pressure in the Differential Chamber of the Accelerator is equal to that in the system, then the Accelerator is set and ready for service.

Step 10H. Close the Accelerator Control Valve and then slowly open the Low Body Drain Valve in the trim, to bleed off any excess water trapped above the dry pipe valve clapper. Reclose the Low Body Drain Valve, return system pressure to its normal value, and then re-open the Accelerator Control Valve.

Step 11. Partially open the Main Control Valve. Slowly close the Main Drain Valve as soon as water discharges from the drain connection.

Verify that there is not any water discharging from the Automatic Drain Valve.

The absence of water discharging from the Automatic Drain Valve is an indication of a properly set water seat within the DPV-1 Valve. If water is discharging, refer to the Care and Maintenance section under the Automatic Drain Valve Inspection to determine/correct the cause of the leakage problem.

If there are no leaks, the DPV-1 Valve is ready to be placed in service and the Main Control Valve must then be fully opened.

NOTE

After setting a fire protection system, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

Step 12. Once a week after a valve is reset following an operational test or system operation, the Low Body Drain Valve (and any low point drain valves) should be partially opened (and then subsequently closed) to relieve drain-back water. Continue this procedure until drain-back water is no longer present.

Care and Maintenance

The following procedures and inspections should be performed as indicated, in addition to any specific requirements of any authority having jurisdiction. Impairments must be immediately corrected.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service.

NOTES

The operational test procedure and waterflow pressure alarm test procedure will result in operation of the associated alarms. Consequently, notification must first be given to the owner and the fire department, central station, or other signal station to which the alarms are connected.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection systems must first be obtained from the proper authorities and all personnel who may be affected by this decision must be notified.

Annual Operation Test Procedure

Proper operation of the DPV-1 Valve (i.e., opening of the DPV-1 Valve during a fire condition) should be verified at least once a year as follows:

Step 1. If water must be prevented from flowing beyond the riser, perform the following steps.

- Close the Main Control Valve.
- Open the Main Drain Valve.
- Open the Main Control Valve one turn beyond the position at which water just begins to flow from the Main Drain Valve.
- Close the Main Drain Valve.

Step 2. Open the system's Inspector's Test Connection.

Step 3. Verify that the DPV-1 Valve has operated, as indicated by the flow of water into the system and that all waterflow alarms operate properly.

Step 4. Close the system's Main Control Valve.

Step 5. Reset the DPV-1 Valve in accordance with the Valve Setting Procedure.

NOTE

It is recommended that the inside of the valve be inspected at this time and prior to resetting the DPV-1 Valve. Refer to the Self Closing Drain Valve Inspection sub-section Steps 2 through 5 for instructions with regard to the inspection of the Clapper Facing.

Periodic Waterflow Alarm Test Procedure

Testing of the system waterflow alarms should be performed periodically based on the requirements of the authority having jurisdiction. To test the waterflow alarm, place the Three-way Alarm Test Valve in the "Test" position or open the Standard Alarm Test Valve, as applicable, which will allow a flow of water to the Water-flow Pressure Alarm Switch and/or Water Motor Alarm. Upon satisfactory completion of the test, place the Three-way Alarm Test Valve in the "Open" position or close the Standard Alarm Test Valve, as applicable.

Water Pressure Inspection

The Water Pressure Gauge is to be inspected periodically based on the requirements of the authority having jurisdiction to ensure that normal system water pressure is being maintained.

Air Pressure Inspection

The Air Pressure Gauge is to be inspected periodically based on the requirements of the authority having jurisdiction.

jurisdiction to ensure that normal system air pressure is being maintained.

Automatic Drain Valve Inspection

The Automatic Drain Valve should be inspected periodically based on the requirements of the authority having jurisdiction by depressing the plunger and checking to ensure that the Automatic Drain Valve is not discharging water and/or air. A discharge of water and/or air is an indication that the air and/or water seats are leaking, which could subsequently cause a false operation should the intermediate chamber become inadvertently pressurized.

If leakage is present, take the DPV-1 Valve out of service (i.e., close the main control valve, open the main drain valve, close the air supply control valve, remove the Dry Pipe Valve Accelerator from service, as applicable, by closing the Accelerator Control Valve, and open the Inspector's Test Connection to relieve the system air pressure to 0 psig as indicated on the System Air Pressure Gauge), and then after removing the Handhole Cover, perform the following steps:

Step 1. Make sure that the Seat Ring is clean and free of any nicks or significant scratches.

Step 2. Remove the Clapper Assembly from the valve by first pulling out the Hinge Pin.

Step 3. Disassemble the Clapper Facing Retainer from the Clapper so that the Clapper Facing can be removed and inspected. Make sure that the Clapper Facing does not show signs of compression set, damage, etc. Replace the Clapper Facing if there is any signs of wear.

Step 4. Clean the Clapper Facing, Clapper, and Clapper Facing Retainer, and then reassemble the Clapper Assembly.

Step 5. Reinstall the Clapper Assembly with its Hinge Pin and then reinstall the Handhole Cover.

Accelerator Inspection Procedure

It is recommended that the Accelerator be inspected periodically based on the requirements of the authority having jurisdiction to determine proper operation of the Accelerator without having to trip the dry pipe valve. This procedure must also be used whenever flooding the system would expose the water to freezing conditions.

NOTE

Refer to Technical Data Sheet TFP1112 for guidance with regard to

trouble shooting of the Model ACC-1 Dry Pipe Valve Accelerator.

Step 1. Verify that the Reset Knob is screwed in.

Step 2. Close the system's main control valve and open the main drain valve to relieve the supply pressure to the dry pipe valve.

Step 3. Verify that the Accelerator Control Valve is open.

Step 4. Open the Inspector's Test Connection. Verify that the time to Accelerator trip is essentially the same as in previous tests. A momentary burst of air from the Automatic Drain Valve indicates that the Accelerator has tripped.

NOTE

As the system pressure is decreasing, check for any sign of water being discharged from the Accelerator Relief Port.

Step 5. Depress the plunger of the Automatic Drain Valve. A steady stream of exhausting air indicates that the Accelerator has properly latched in the Tripped position.

Step 6. Close the Accelerator Control Valve and the Inspector's Test Connection.

Step 9. After the system automatically restores itself to its normal air pressure, reset the Accelerator and Dry Pipe Valve in accordance with the Valve Setting Procedure Steps 10 and 11.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with the standards recognized by the Approval agency, as well as the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr	1
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 4".....	1
11	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
12	923431012; Air pressure gauge; 300 psi; 1/4" npt	1
13	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
14	A28012; malleable fitting; nipple male; BSP thread; size 2"; galvanized.....	1
15	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized.....	1
16	AP100E4; pipe nipple; stainless steel 316; size 3/4"; length 100 mm.....	1
17	AP120I2; pipe nipple; steel; size 2"; length 120 mm; galvanized.....	1
18	AP180D4; pipe nipple; stainless steel 316; size 1/2"; length 180 mm	1
19	AP80D4; pipe nipple; stainless steel 316; size 1/2"; length 80 mm	1

NO.	DESCRIPTION	QTY.
20	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	4
21	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1
22	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.	1
23	ETDMCON; Adapter elbow; brass; thread DN15 male x compr.15 mm; nickel pl.	1
24	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.	4
25	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.	2
26	K00128; Alarm test/shut off valve; PN40; 1/2"; BSP; 3 way	1
27	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15	1
28	PTDN; Plug; brass; thread DN15 male; nickel plated	2
29	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.	2
30	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.	1
31	RTEMDFN; Adapter reduce; brass; thread DN20 male x DN15 fem.; n.	1
32	TTDDDFN; adapter tee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	2
33	TTDDMDFN; adapter tee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
34	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated	1
35	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent	3
36	WS000000082; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN100.....	1

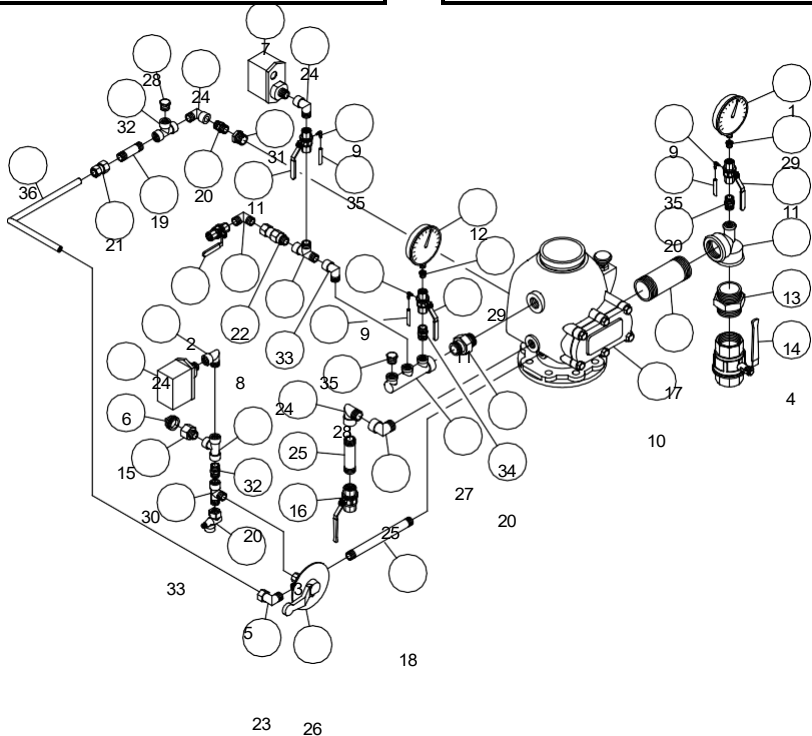


FIGURE 8
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with THREE-WAY ALARM TEST VALVE
without ACC-1 ACCELERATOR
— DN100 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi.....	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr.....	1
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr.....	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur.....	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch.....	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated.....	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 6".....	1
11	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
12	923431012; Air pressure gauge; 300 psi; 1/4" npt.....	1
13	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
14	A280I2; malleable fitting; nipple male; BSP thread; size 2"; galvanized.....	1
15	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized.....	1
16	AP100D4; pipe nipple; stainless steel 316; size 1/2"; length 100 mm.....	1
17	AP100I2; pipe nipple; steel; size 2"; length 100 mm; galvanized.....	1
18	AP120E4; pipe nipple; stainless steel 316; size 3/4"; length 120 mm.....	1
19	AP180D4; pipe nipple; stainless steel 316; size 1/2"; length 180 mm.....	1
20	AP60D4; pipe nipple; stainless steel 316; size 1/2"; length 60 mm.....	1

NO.	DESCRIPTION	QTY.
21	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	2
22	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1
23	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.....	1
24	ETDMCON; Adapter elbow; brass; thread DN15 male x compr.15 mm; nickel pl.....	1
25	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	4
26	ETEEMN; Adapter elbow; brass; thread DN20 male x DN20 male; nickel pl.....	1
27	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.....	1
28	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15.....	1
29	PTDN; Plug; brass; thread DN15 male; nickel plated.....	2
30	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.....	2
31	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.....	2
32	TTDDDFN; adaptertee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	2
33	TTDDMDFN; adaptertee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
34	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated.....	1
35	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent.....	3
36	WS00000088; Nickel pl. copp. tube 15 x 1 mm type D for DPV-1 DN150.....	1
37	WS00000095; Alarm test/shut off valve; PN40; 1/2"; BSP; 3 way.....	1

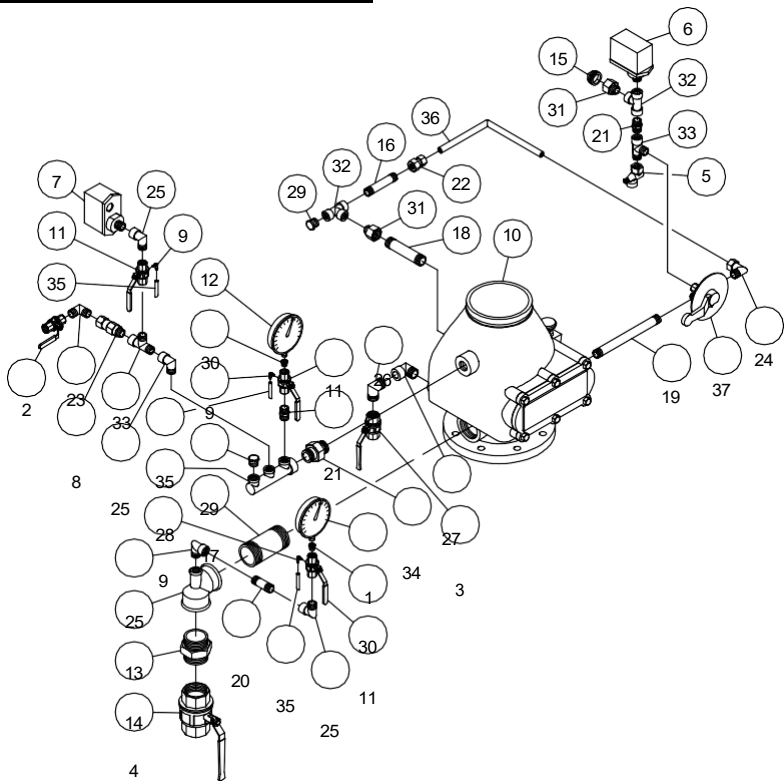


FIGURE 9
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with THREE-WAY ALARM TEST VALVE
without ACC-1 ACCELERATOR
— DN150 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi.....	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr.....	2
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr.....	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur.....	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch.....	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated.....	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 4".....	1
11	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
12	920321002; Fitting anti flood; 3/32".....	1
13	923431012; Air pressure gauge; 300 psi; 1/4" npt.....	1
14	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
15	A28012; malleable fitting; nipple male; BSP thread; size 2"; galvanized.....	1
16	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized.....	1
17	AP100D4; pipe nipple; stainless steel 316; size 1/2"; length 100 mm.....	1
18	AP100E4; pipe nipple; stainless steel 316; size 3/4"; length 100 mm.....	1
19	AP120I2; pipe nipple; steel; size 2"; length 120 mm; galvanized.....	1
20	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	3
21	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1

NO.	DESCRIPTION	QTY.
22	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	1
23	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.....	1
24	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	1
25	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	3
26	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.....	2
27	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15.....	1
28	PTDN; Plug; brass; thread DN15 male; nickel plated.....	2
29	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.....	4
30	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.....	1
31	RTEMDFN; Adapter reduce; brass; thread DN20 male x DN15 fem.; n.....	1
32	TTDDDFN; adapter tee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	1
33	TTDDMDFN; adapter tee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
34	TTDDMDFN; adapter tee; brass; thread DN15 male x DN15 fem x DN15 fem; nickel pl.....	3
35	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated.....	1
36	V923221002; Check valve brass; NPT 1/2" male/male; seat buna-n.....	1
37	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent.....	3
38	WS00000008; Copper pipe 6 mm; length 1 meter.....	1
39	WS00000082; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN100.....	1

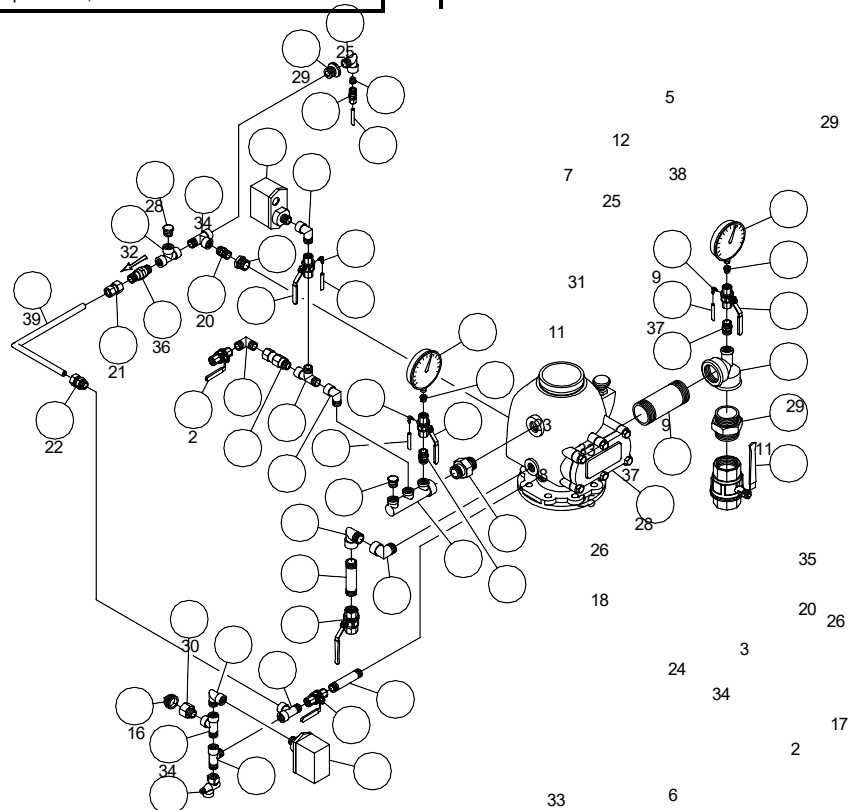


FIGURE 10
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
without ACC-1 ACCELERATOR
— DN100 —

	1	
9		29
37		11
20		14
	15	
19		4
10		

FIGURE 10
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
without ACC-1 ACCELERATOR
— DN100 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi.....	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr.....	2
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr.....	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur.....	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch.....	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 6".....	1
11	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
12	920321002; Fitting anti flood; 3/32".....	1
13	923431012; Air pressure gauge; 300 psi; 1/4" npt.....	1
14	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
15	A280I2; malleable fitting; nipple male; BSP thread; size 2"; galvanized	1
16	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized	1
17	AP100I2; pipe nipple; steel; size 2"; length 100 mm; galvanized	1
18	AP120D4; pipe nipple; stainless steel 316; size 1/2"; length 120 mm.....	1
19	AP120E4; pipe nipple; stainless steel 316; size 3/4"; length 120 mm.....	1
20	AP60D4; pipe nipple; stainless steel 316; size 1/2"; length 60 mm.....	1
21	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	1

NO.	DESCRIPTION	QTY.
22	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1
23	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	1
24	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.....	1
25	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	4
26	ETEEMN; Adapter elbow; brass; thread DN20 male x DN20 male; nickel pl.....	1
27	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.....	1
28	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15.....	1
29	PTDN; Plug; brass; thread DN15 male; nickel plated.....	3
30	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.....	3
31	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.....	2
32	TTDDDFN; adaptertee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	1
33	TTDDMDFN; adaptertee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
34	TTDDMDFN; adaptertee; brass; thread DN15 male x DN15 fem x DN15 fem; nickel pl.....	4
35	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated.....	1
36	V923221002; Check valve brass; NPT 1/2" male/male; seat buna-n.....	1
37	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent	3
38	WS00000008; Copper pipe 6 mm; length 1 meter.....	1
39	WS00000088; Nickel pl. copp. tube 15 x 1 mm type D for DPV-1 DN150.....	1

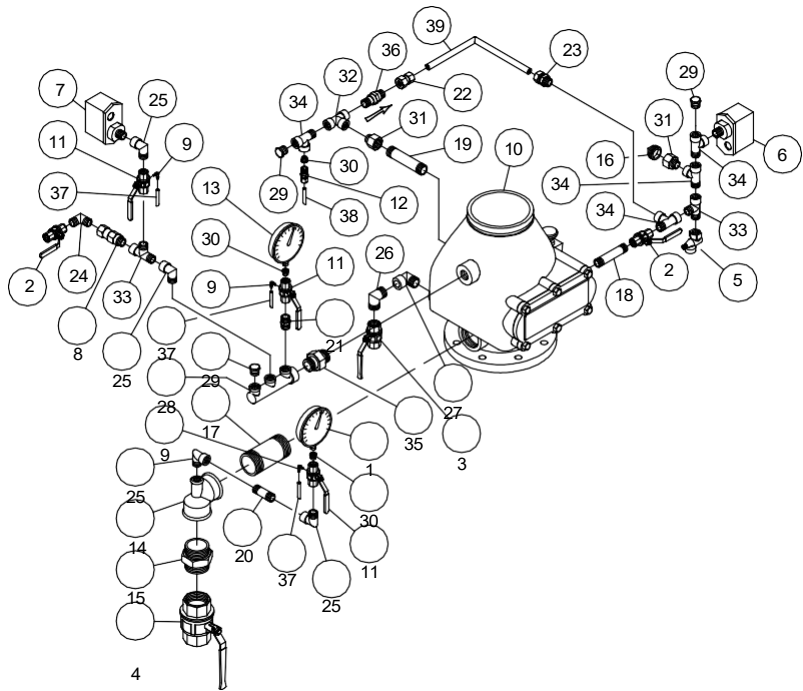
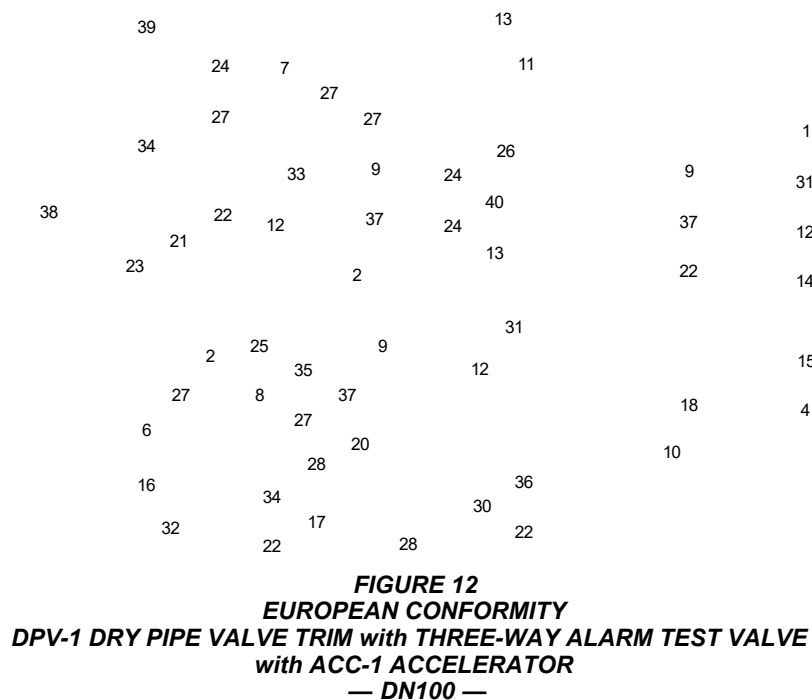


FIGURE 11
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
without ACC-1 ACCELERATOR
— DN150 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr	2
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5	1
6	260; Alarm pressure switch	1
7	262; Low pressure switch	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated	1
9	406012; Elbow 3 mm x m5	3
10	Dry pipe valve; DPV-1; ductile iron; 4"	1
11	523111001; Accelerator; ACC-1	1
12	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded	3
13	923431012; Air pressure gauge; 300 psi; 1/4" npt	2
14	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2"	1
15	A28012; malleable fitting; nipple male; BSP thread; size 2"; galvanized	1
16	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized	1
17	AP100E4; pipe nipple; stainless steel 316; size 3/4"; length 100 mm	1
18	AP120I2; pipe nipple; steel; size 2"; length 120 mm; galvanized	1
19	AP180D4; pipe nipple; stainless steel 316; size 1/2"; length 180 mm	1
20	AP60D4; pipe nipple; stainless steel 316; size 1/2"; length 60 mm	1
21	AP80D4; pipe nipple; stainless steel 316; size 1/2"; length 80 mm	1
22	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.	4

NO.	DESCRIPTION	QTY.
23	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.	1
24	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.	3
25	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.	1
26	ETDMCON; Adapter elbow; brass; thread DN15 male x compr.15 mm; nickel pl.	2
27	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.	5
28	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.	2
29	K00128; Alarm test/shut off valve; PN40; 1/2"; BSP; 3 way	1
30	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15	1
31	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.	2
32	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.	1
33	RTEMDFN; Adapter reduce; brass; thread DN20 male x DN15 fem.; n.	1
34	TTDDDFN; adapter tee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.	2
35	TTDDMDFN; adapter tee; brass; thread DN15 male x DN15 male x DN15 fem; n.	2
36	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated	1
37	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent	3
38	WS00000082; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN100	1
39	WS00000083; Nickel pl. copp. tube 15 x 1 mm type C for DPV-1 DN100	1
40	WS00000086; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN150	1



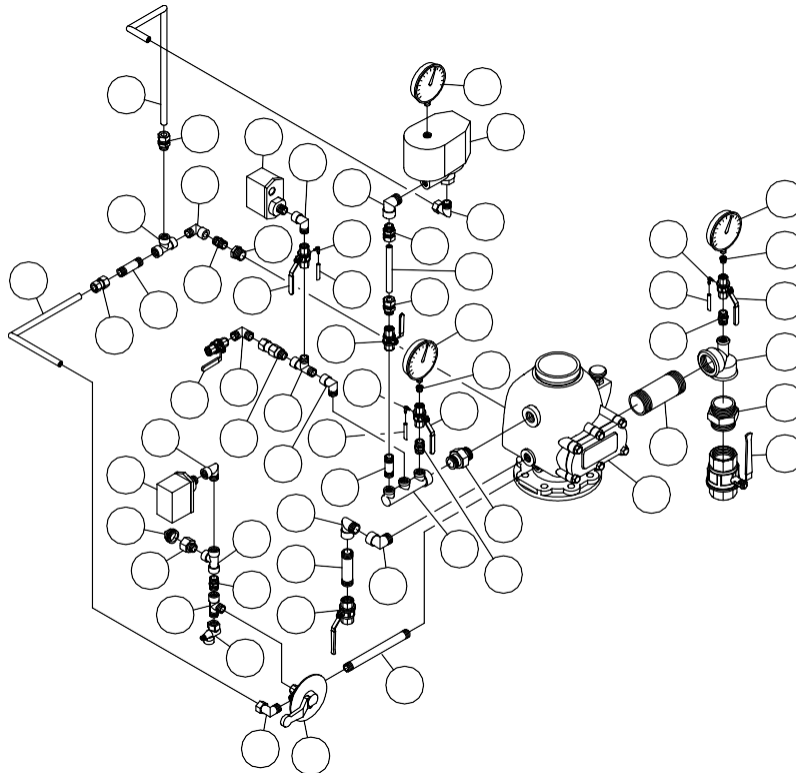


FIGURE 12
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with THREE-WAY ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN100 —

NO.	DESCRIPTION	QTY.	NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi	1	23	ATDFCON; Adapter fitting; brass;	
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30;			thread DN15 fem. x compr. 15 mm; n.	1
	kv=16.3; pr	2	24	ATDMCON; Adapter fitting; brass;	
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30;			thread DN15 male x compr. 15 mm; n.	3
	kv=29.5; pr.....	1	25	ETDDMN; Adapter elbow; brass;	
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25;			thread DN15 male x DN15 male; nickel pl.	1
	kv=265; ur.....	1	26	ETDMCON; Adapter elbow; brass;	
5	2162156; Automatic drain valve; 1/2";			thread DN15 male x compr. 15 mm; nickel pl.	2
	oper: k=25 & non oper: k=5	1	27	ETDMDFN; Adapter elbow; brass;	
6	260; Alarm pressure switch.....	1		thread DN15 male x DN15 fem.; nickel pl.	5
7	262; Low pressure switch.....	1	28	ETEEMN; Adapter elbow; brass;	
8	305105; Check valve brass thread;			thread DN20 male x DN20 male; nickel pl.	1
	DN15 male x DN15 fem.; nickel plated	1	29	ETEMEFN; Adapter elbow; brass;	
9	406012; Elbow 3 mm x m5.....	3		thread DN20 male x DN20 fem.; nickel pl.	1
10	Dry pipe valve; DPV-1; ductile iron; 6"	1	30	MANIF3WAY; Manifold; threaded; nickel plated brass;	
11	523111001; Accelerator; ACC-1	1		DN25 x DN15	1
12	59304FO; Ball valve; size 1/2"; full bore; PN40;		31	RTDMBFN; Adapter reduce; brass;	
	venthole threaded.....	3		thread DN15 male x DN8 fem.; nickel pl.	2
13	923431012; Air pressure gauge;		32	RTDMEFN; Adapter reduce; brass;	
	300 psi; 1/4" npt.....	2		thread DN15 male x DN20 fem.; n.	2
14	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1	33	TTDDDFN; adaptertee; brass;	
15	A280I2; malleable fitting; nipple male; BSP thread;			thread DN15 fem x DN15 fem x DN15 fem; nickel pl.	2
	size 2"; galvanized	1	34	TTDDMDFN; adaptertee; brass;	
16	A291E2; malleable fitting; plug male; BSP thread;			thread DN15 male x DN15 male x DN15 fem; n.....	2
	size 3/4"; galvanized	1	35	UTFFMN; Adapter union; brass;	
17	AP100D4; pipe nipple; stainless steel 316; size 1/2";			thread DN25 x DN25 male; nickel plated	1
	length 100 mm.....	1	36	WS00000004; Pressure relief hose;	
18	AP100I2; pipe nipple; steel; size 2"; length 100 mm;			3 x 6 length 1.2 m; transparent.....	3
	galvanized	1	37	WS000000086; Nickel pl.c opp. tube 15 x 1 mm	
19	AP120E4; pipe nipple; stainless steel 316; size 3/4";			type B for DPV-1 DN150.....	1
	length 120 mm.....	1	38	WS000000087; Nickel pl. copp. tube 15 x 1 mm	
20	AP180D4; pipe nipple; stainless steel 316; size 1/2";			type C for DPV-1 DN150	1
	length 180 mm.....	1	39	WS000000088; Nickel pl. copp. tube 15 x 1 mm	
21	AP60D4; pipe nipple; stainless steel 316; size 1/2";			type D for DPV-1 DN150	1
	length 60 mm.....	2	40	WS000000095; Alarm test/shut off valve; PN40; 1/2";	
22	ATDDMN; Adapter fitting; brass;			BSP; 3 way.....	1
	thread DN15 x DN15 male; nickel pl.	2			

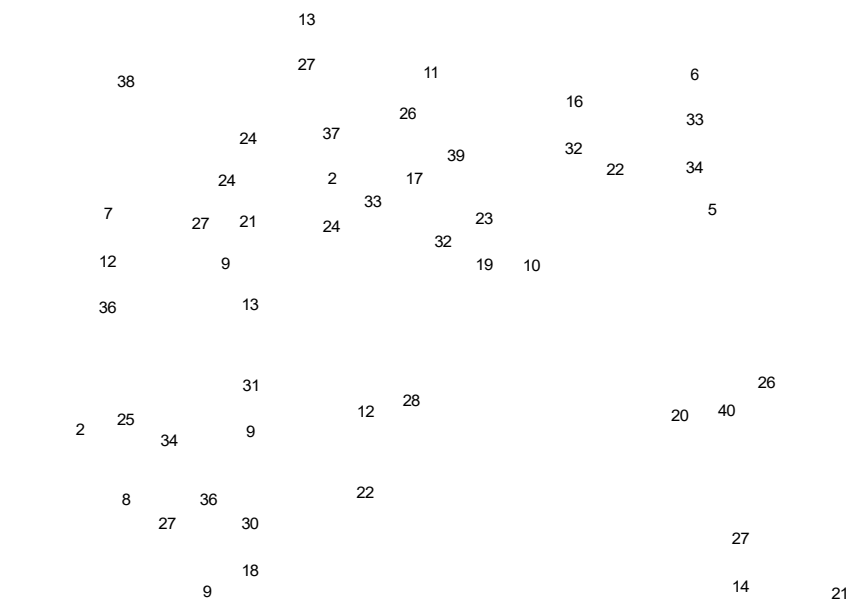


FIGURE 13
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with THREE-WAY ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN150 —

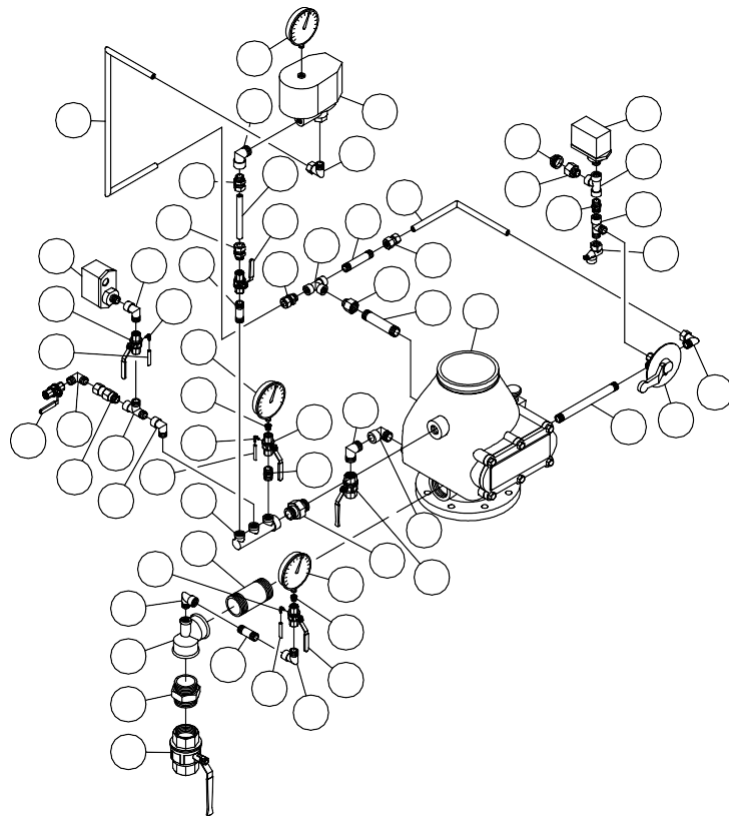
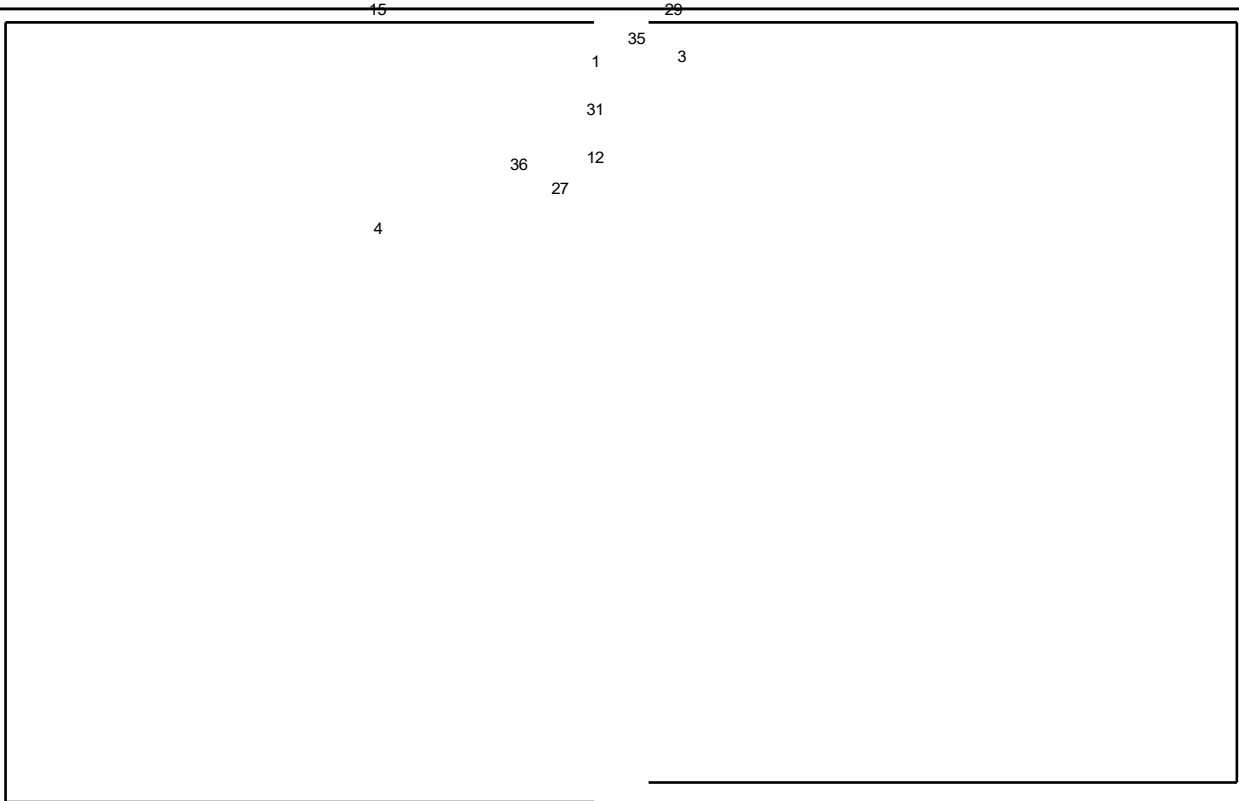
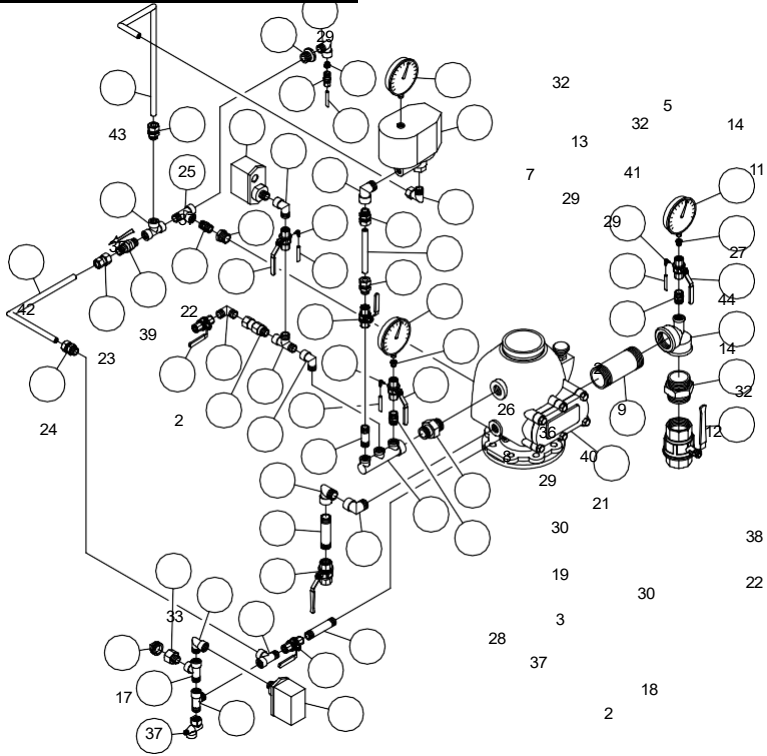


FIGURE 13
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with THREE-WAY ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN150 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi.....	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr.....	3
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr.....	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur.....	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch.....	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated.....	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 4".....	1
11	523111001; Accelerator; ACC-1.....	1
12	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
13	920321002; Fitting anti flood; 3/32".....	1
14	923431012; Air pressure gauge; 300 psi; 1/4" npt.....	2
15	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
16	A280I2; malleable fitting; nipple male; BSP thread; size 2"; galvanized.....	1
17	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized.....	1
18	AP100D4; pipe nipple; stainless steel 316; size 1/2"; length 100 mm.....	1
19	AP100E4; pipe nipple; stainless steel 316; size 3/4"; length 100 mm.....	1
20	AP120I2; pipe nipple; steel; size 2"; length 120 mm; galvanized.....	1
21	AP60D4; pipe nipple; stainless steel 316; size 1/2"; length 60 mm.....	2
22	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	3
23	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1
24	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	1

NO.	DESCRIPTION	QTY.
25	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	3
26	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.....	1
27	ETDMCON; Adapter elbow; brass; thread DN15 male x compr.15 mm; nickel pl.....	1
28	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	1
29	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	4
30	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.....	2
31	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15.....	1
32	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.....	4
33	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.....	1
34	RTEMDFN; Adapter reduce; brass; thread DN20 male x DN15 fem.; n.....	1
35	TTDDDFN; adapter tee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	1
36	TTDDMDFN; adapter tee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
37	TTDMDDFN; adapter tee; brass; thread DN15 male x DN15 fem x DN15 fem; nickel pl.....	3
38	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated.....	1
39	V923221002; Check valve brass; NPT 1/2" male/male; seat buna-n.....	1
40	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent.....	3
41	WS00000008; Copper pipe 6 mm; length 1 meter.....	1
42	WS00000082; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN100.....	1
43	WS00000083; Nickel pl. copp. tube 15 x 1 mm type C for DPV-1 DN100.....	1
44	WS00000086; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN150.....	1



34 9 25
12 40 25

31

FIGURE 14
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN100 —

1		
9		32
40		12
22		15
16		
20		4
10		

FIGURE 14
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN100 —

NO.	DESCRIPTION	QTY.
1	025500013; Water gauge; 1/4" npt; 300 psi.....	1
2	1610000210; Ball valve; brass; full bore; 1/2" BSP; PN30; kv=16.3; pr.....	3
3	1610000270; Ball valve; brass; full bore; 3/4" BSP; PN30; kv=29.5; pr.....	1
4	1610000600; Ball valve; brass; full bore; 2" BSP; PN25; kv=265; ur.....	1
5	2162156; Automatic drain valve; 1/2"; oper: k=25 & non oper: k=5.....	1
6	260; Alarm pressure switch.....	1
7	262; Low pressure switch.....	1
8	305105; Check valve brass thread; DN15 male x DN15 fem.; nickel plated.....	1
9	406012; Elbow 3 mm x m5.....	3
10	Dry pipe valve; DPV-1; ductile iron; 6".....	1
11	523111001; Accelerator; ACC-1.....	1
12	59304FO; Ball valve; size 1/2"; full bore; PN40; venthole threaded.....	3
13	920321002; Fitting anti flood; 3/32".....	1
14	923431012; Air pressure gauge; 300 psi; 1/4" npt.....	2
15	A130RIID2; malleable fitt.; reducing tee; BSP thread 2" x 2".....	1
16	A280I2; malleable fitting; nipple male; BSP thread; size 2"; galvanized.....	1
17	A291E2; malleable fitting; plug male; BSP thread; size 3/4"; galvanized.....	1
18	AP100I2; pipe nipple; steel; size 2"; length 100 mm; galvanized.....	1
19	AP120D4; pipe nipple; stainless steel 316; size 1/2"; length 120 mm.....	1
20	AP120E4; pipe nipple; stainless steel 316; size 3/4"; length 120 mm.....	1
21	AP60D4; pipe nipple; stainless steel 316; size 1/2"; length 60 mm.....	2
22	ATDDMN; Adapter fitting; brass; thread DN15 x DN15 male; nickel pl.....	1
23	ATDFCON; Adapter fitting; brass; thread DN15 fem. x compr.15 mm; n.....	1
24	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	1

NO.	DESCRIPTION	QTY.
25	ATDMCON; Adapter fitting; brass; thread DN15 male x compr.15 mm; n.....	3
26	ETDDMN; Adapter elbow; brass; thread DN15 male x DN15 male; nickel pl.....	1
27	ETDMCON; Adapter elbow; brass; thread DN15 male x compr.15 mm; nickel pl.....	1
28	ETDMDFN; Adapter elbow; brass; thread DN15 male x DN15fem.; nickel pl.....	5
29	ETEEMN; Adapter elbow; brass; thread DN20 male x DN20 male; nickel pl.....	1
30	ETEMEFN; Adapter elbow; brass; thread DN20 male x DN20 fem.; nickel pl.....	1
31	MANIF3WAY; Manifold; threaded; nickel plated brass; DN25 x DN15.....	1
32	PTDN; Plug; brass; thread DN15 male; nickel plated.....	1
33	RTDMBFN; Adapter reduce; brass; thread DN15 male x DN8 fem.; nickel pl.....	3
34	RTDMEFN; Adapter reduce; brass; thread DN15 male x DN20 fem.; n.....	2
35	TTDDDFN; adaptertee; brass; thread DN15 fem x DN15 fem x DN15 fem; nickel pl.....	1
36	TTDDMDFN; adaptertee; brass; thread DN15 male x DN15 male x DN15 fem; n.....	2
37	TTDMDDFN; adaptertee; brass; thread DN15 male x DN15 fem x DN15 fem; nickel pl.....	4
38	UTFFMN; Adapter union; brass; thread DN25 x DN25 male; nickel plated.....	1
39	V923221002; Check valve brass; NPT 1/2" male/male; seat buna-n.....	1
40	WS00000004; Pressure relief hose; 3 x 6 length 1.2 m; transparent.....	3
41	WS00000008; Copper pipe 6 mm; length 1 meter.....	1
42	WS00000086; Nickel pl.c opp. tube 15 x 1 mm type B for DPV-1 DN150.....	1
43	WS00000087; Nickel pl. copp. tube 15 x 1 mm type C for DPV-1 DN150.....	1
44	WS00000088; Nickel pl. copp. tube 15 x 1 mm type D for DPV-1 DN150.....	1

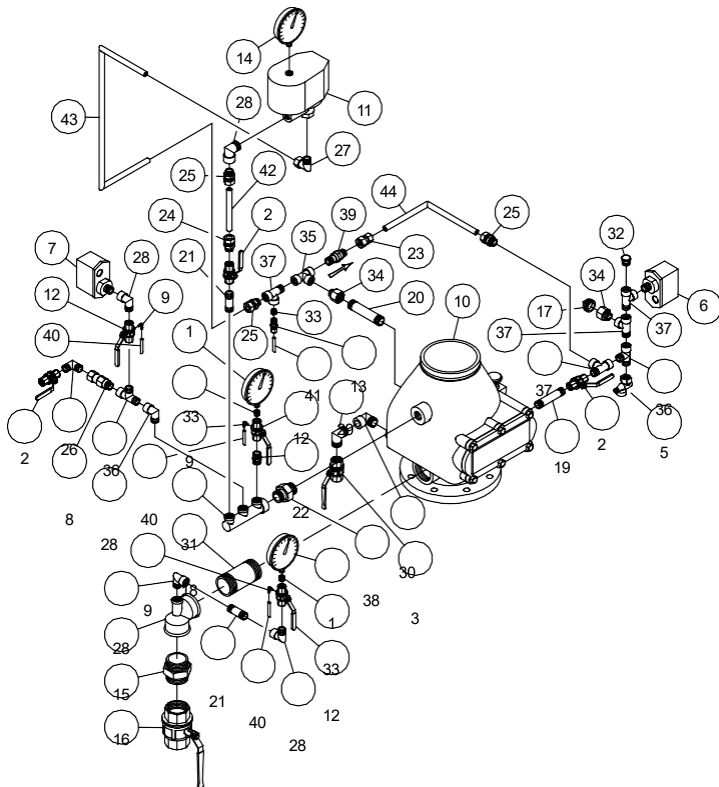


FIGURE 15
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN150 —

FIGURE 15
EUROPEAN CONFORMITY
DPV-1 DRY PIPE VALVE TRIM with STANDARD ALARM TEST VALVE
with ACC-1 ACCELERATOR
— DN150 —

Ordering Procedure

Model DPV-1 Dry Pipe Valve with Assembled European Conformity Valve Trim

Specify: Fully Assembled Model DPV- 1 Dry Pipe Valve with European Conformity Valve Trim, P/N (Table D).

Accessories

Specify: ("description") and P/N.

- "Supervisory Switch" for accelerator control valve, P/N CEDPV1ASS.
- "Supervisory Switch" for water motor alarm control valve, P/N CEDPV1ASS.

- "Air Pressure Relief Valve set at 3,1 bar", P/N 92-343-1-020.
- "Model WMA-1 Water Motor Alarm with Red Finish Gong", P/N 52-630-2-021.
- "A thru Z" Labels for attaching to valve trim components, P/N WS00000033.

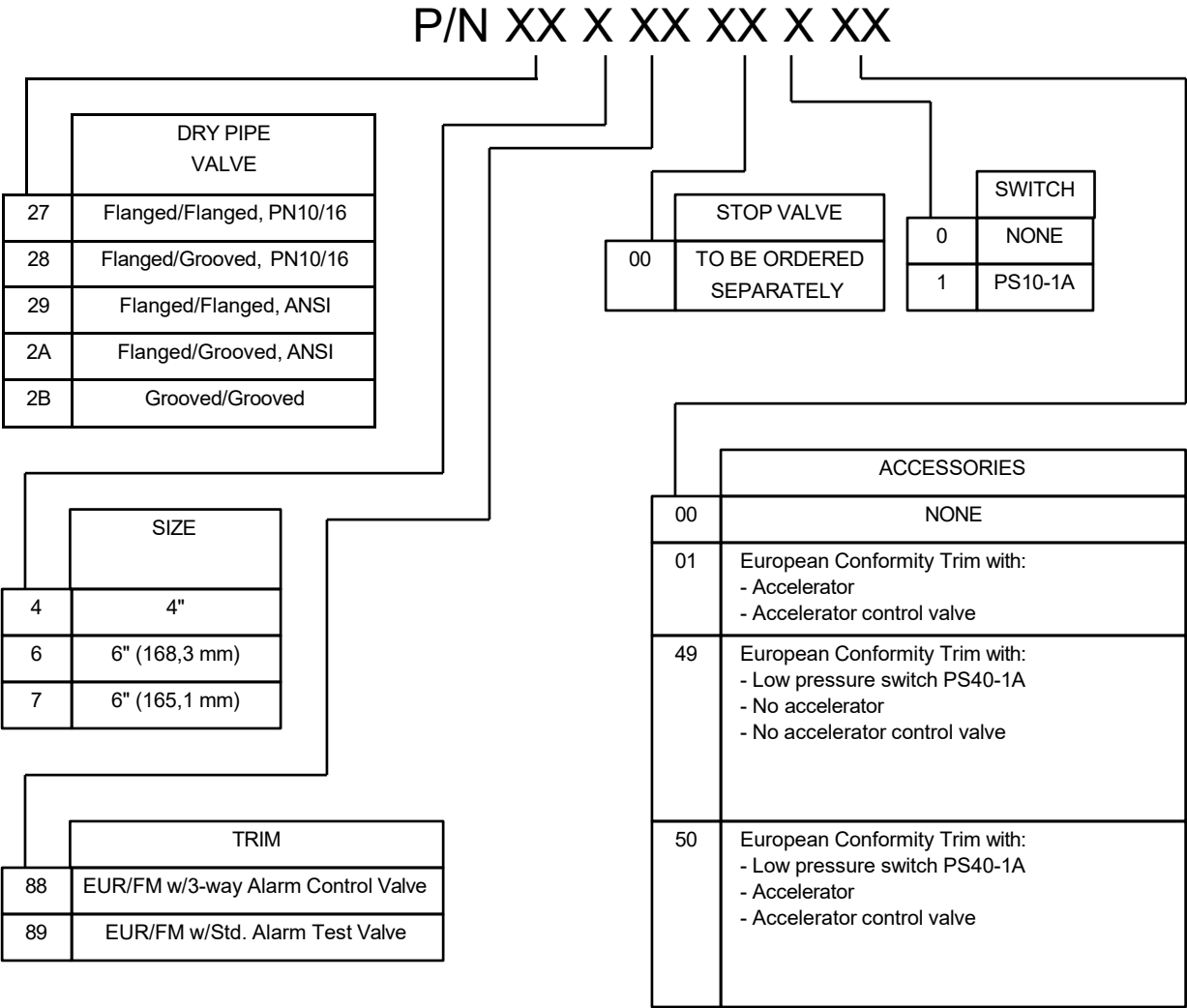
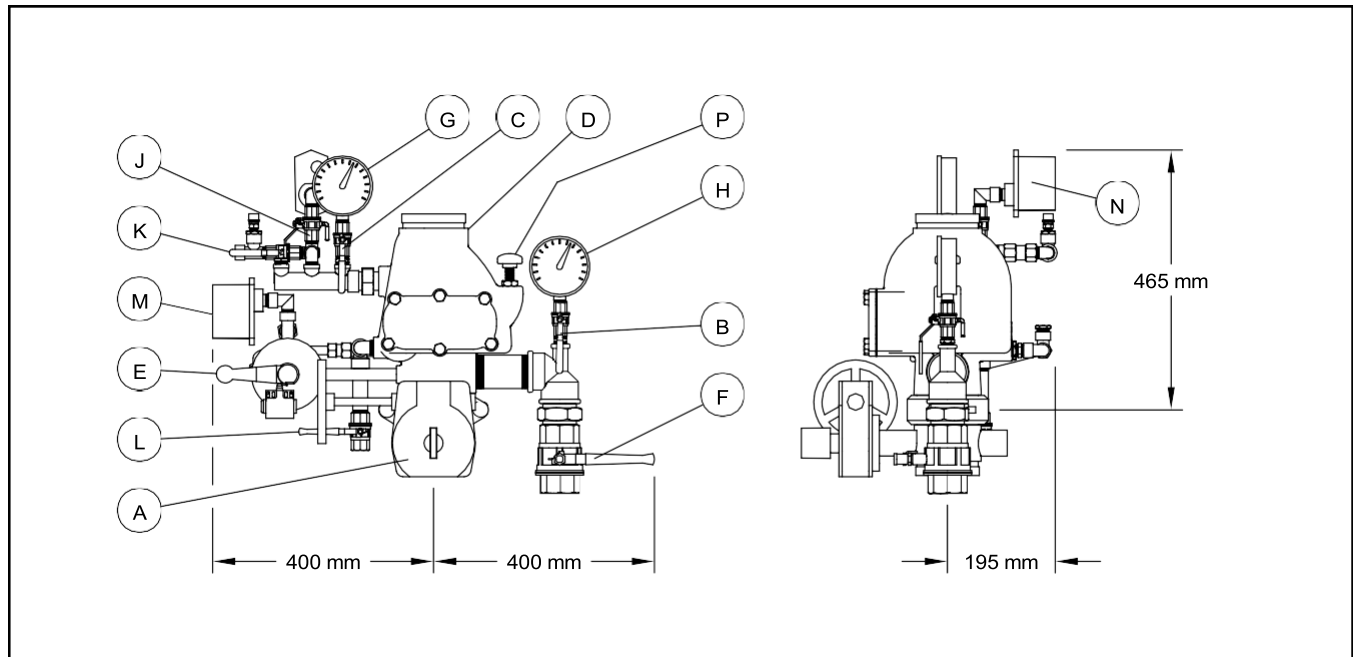


TABLE D
MODEL DPV-1 DRY PIPE VALVE
WITH EUROPEAN CONFORMITY VALVE TRIM
— FULLY ASSEMBLED —

Appendix A of TFP1090 (09/2005)

Summary Instructions (If problems occur, consult full document)

Dry Pipe Valve, DPV-1, DN100, Three-Way Alarm Test, Without Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The three-way alarm control valve (E) is in the open position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- The air supply control valve (K) is open.
- System air pressure gauge (G) reads downstream air pressure.
- Water supply pressure gauge (H) reads the upstream water pressure.

II. Operation

When one or more sprinklers are activated, air pressure is reduced downstream of the dry pipe valve. When the air pressure is sufficiently reduced, the water pressure overcomes the differential holding the dry pipe valve closed and the dry pipe valve opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows through the alarm port at the rear of the dry pipe valve to actuate the waterflow pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), close the air supply control valve (K), and place the three-way alarm control valve (E) in the closed position.

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Place the three-way alarm control valve (E) in the open position.

Step 3. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 4. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 5. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 6. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 7. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 8. Fully open the main control valve (A) and lock it open.

Step 9. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

Step 1. Place the three-way alarm control valve (E) in the test position, verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Place the three-way alarm control valve (E) in the open position and verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

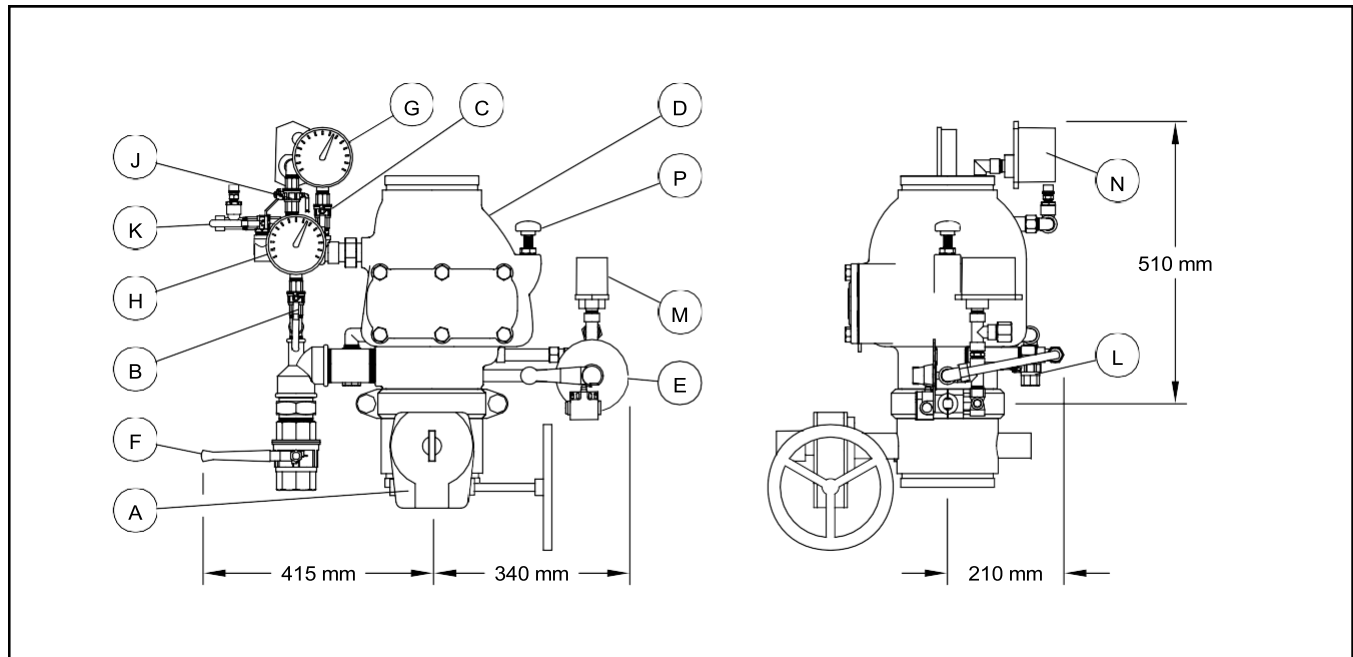
Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix B of TFP1090 (09/2005)

Summary Instructions (If problems occur, consult full document)

Dry Pipe Valve, DPV-1, DN150, Three-Way Alarm Test, Without Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The three-way alarm control valve (E) is in the open position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- The air supply control valve (K) is open.
- System air pressure gauge (G) reads downstream air pressure.
- Water supply pressure gauge (H) reads the upstream water pressure.

II. Operation

When one or more sprinklers are activated, air pressure is reduced downstream of the dry pipe valve. When the air pressure is sufficiently reduced, the water pressure overcomes the differential holding the dry pipe valve closed and the dry pipe valve opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows through the alarm port at the rear of the dry pipe valve to actuate the waterflow pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), close the air supply control valve (K), and place the three-way alarm control valve (E) in the closed position.

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Place the three-way alarm control valve (E) in the open position.

Step 3. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 4. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 5. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 6. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 7. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 8. Fully open the main control valve (A) and lock it open.

Step 9. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

Step 1. Place the three-way alarm control valve (E) in the test position, verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Place the three-way alarm control valve (E) in the open position and verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

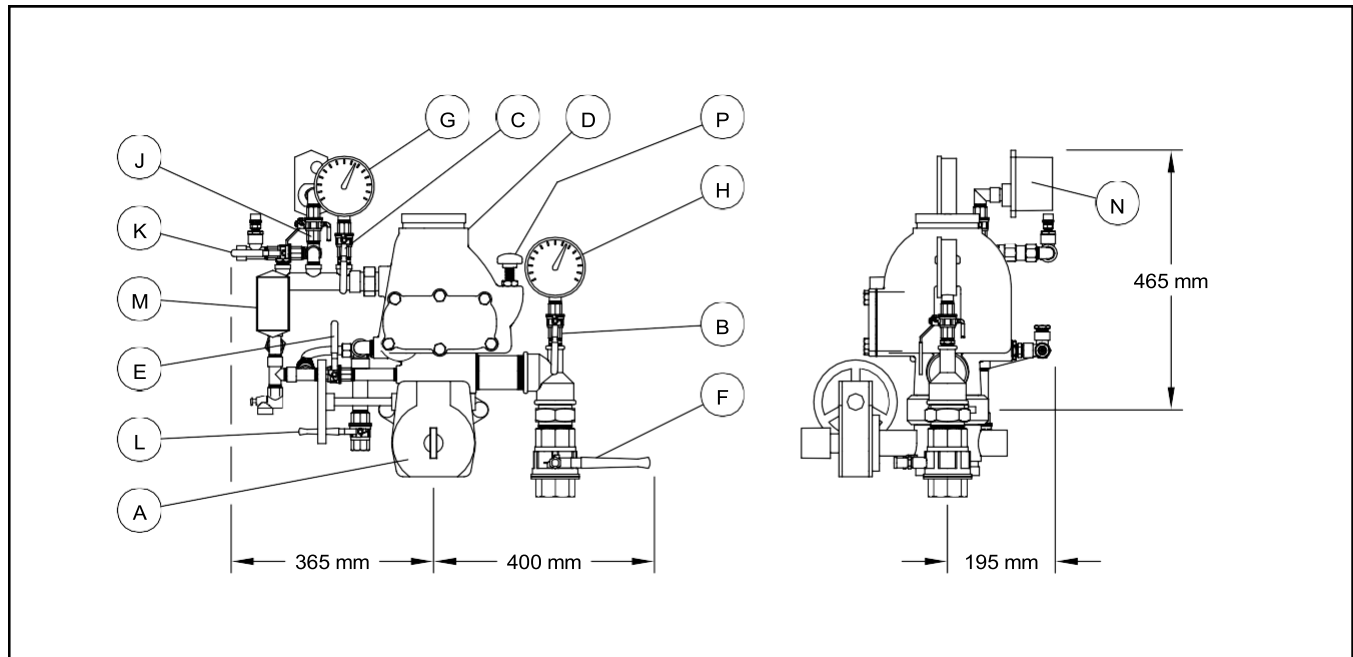
Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix C of TFP1090 (09/2005)

Summary Instructions (If problems occur, consult full document)

Dry Pipe Valve, DPV-1, DN100, Standard Alarm Test, Without Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The alarm test valve (E) is in the closed position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- The air supply control valve (K) is open.
- System air pressure gauge (G) reads downstream air pressure.
- Water supply pressure gauge (H) reads the upstream water pressure.

II. Operation

When one or more sprinklers are activated, air pressure is reduced downstream of the dry pipe valve. When the air pressure is sufficiently reduced, the water pressure overcomes the differential holding the dry pipe valve closed and the dry pipe valve opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows through the alarm port at the rear of the dry pipe valve to actuate the waterflow pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), and close the air supply control valve (K).

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 3. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 4. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 5. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 6. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 7. Fully open the main control valve (A) and lock it open.

Step 8. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

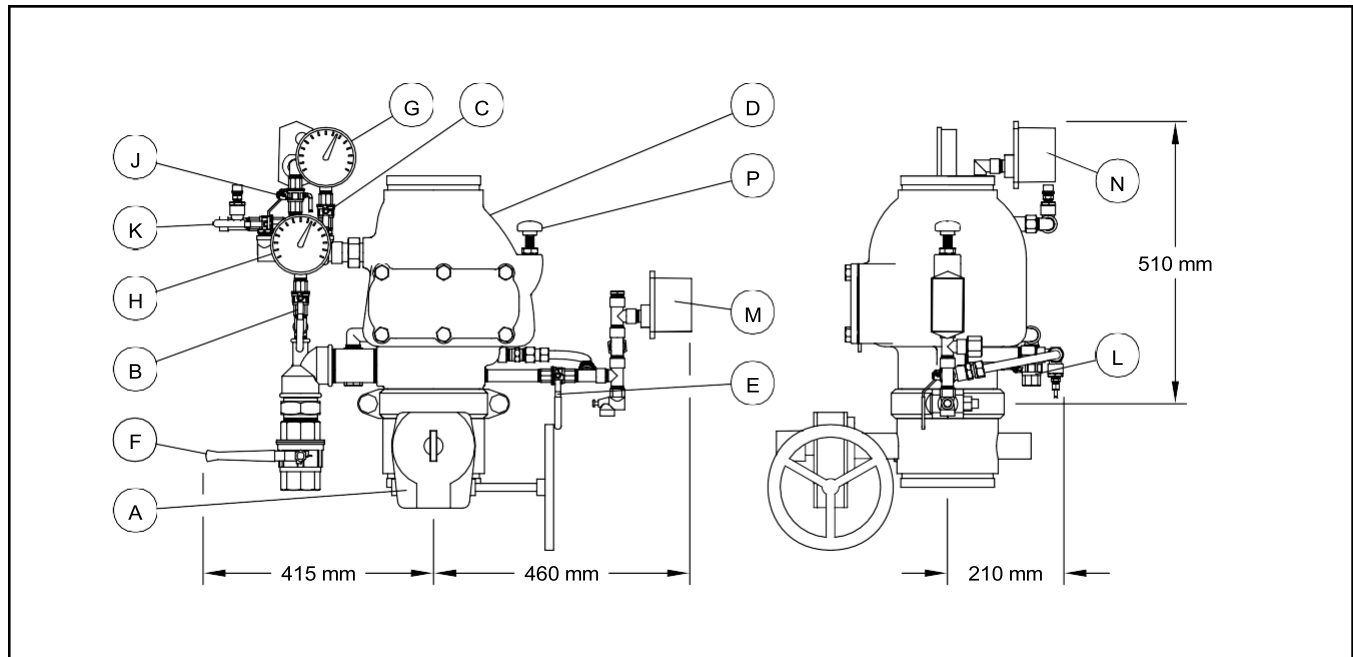
Step 1. Open the alarm test valve (E), verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Close the alarm test valve (E), verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix D of TFP1090 (09/2005)
Summary Instructions (If problems occur, consult full document)
Dry Pipe Valve, DPV-1, DN150, Standard Alarm Test, Without Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The alarm test valve (E) is in the closed position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- The air supply control valve (K) is open.
- System air pressure gauge (G) reads downstream air pressure.
- Water supply pressure gauge (H) reads the upstream water pressure.

II. Operation

When one or more sprinklers are activated, air pressure is reduced downstream of the dry pipe valve. When the air pressure is sufficiently reduced, the water pressure overcomes the differential holding the dry pipe valve closed and the dry pipe valve opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows through the alarm port at the rear of the dry pipe valve to actuate the waterflow pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), and close the air supply control valve (K).

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 3. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 4. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 5. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 6. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 7. Fully open the main control valve (A) and lock it open.

Step 8. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

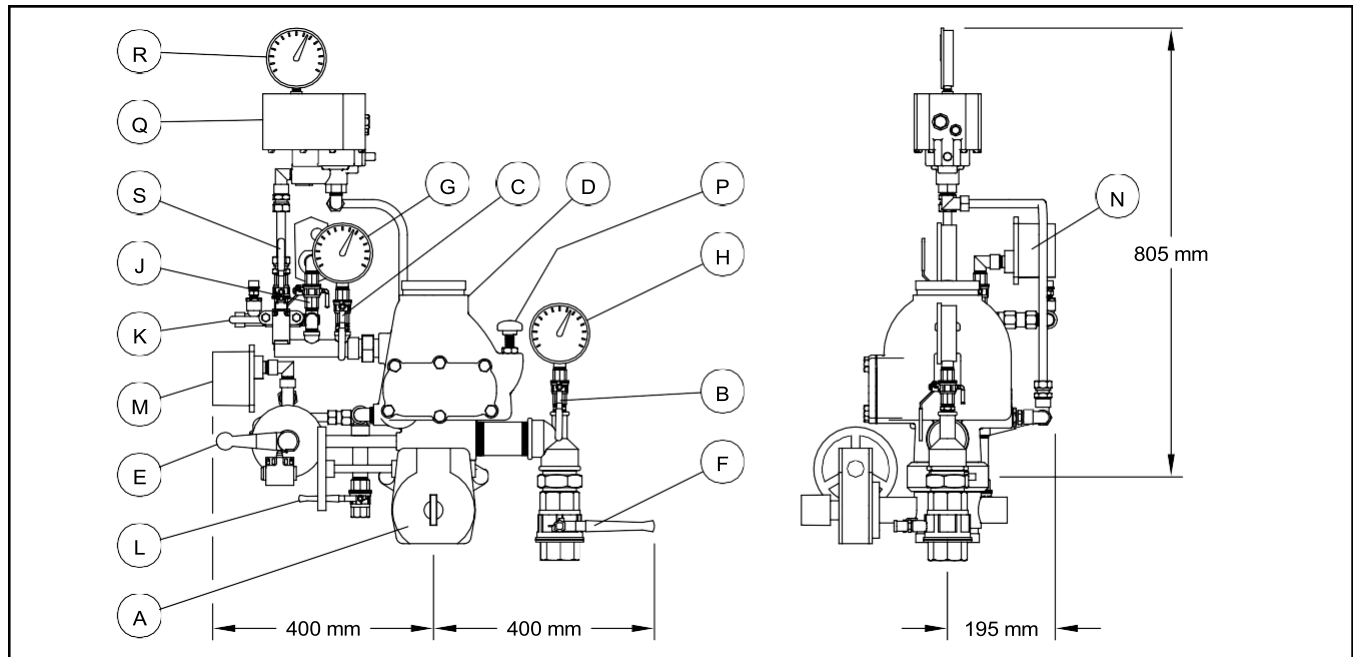
Step 1. Open the alarm test valve (E), verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Close the alarm test valve (E), verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix E of TFP1090 (09/2005)
Summary Instructions (If problems occur, consult full document)
Dry Pipe Valve, DPV-1, DN100, Three-Way Alarm Test, With Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked, and the accelerator control valve (S) and air supply control valve (K) are open.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The three-way alarm control valve (E) is in the open position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- System air pressure gauge (G) reads downstream air pressure, water supply pressure gauge (H) reads the upstream water pressure, and accelerator air pressure gauge (R) reads the accelerator pressure.

II. Operation

When one or more sprinklers are activated, the accelerator operates to permit system air pressure into the dry pipe valve intermediate chamber. Doing so will immediately overcome the ability of the system air pressure to hold the dry pipe valve closed without having to wait for a system air pressure to decay to approximately 20% of the water supply. The dry pipe valve immediately opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows to actuate the waterflow pressure alarm switch (M) and, as ap-

plicable, the water motor alarm.

III. Removing system from service:

- Step 1.** Close the main control valve (A), close the air supply control valve (K), close the accelerator control valve (R), and place the three-way alarm control valve (E) in the closed position.
- Step 2.** Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

- Step 1.** Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.
- Step 2.** Place the three-way alarm control valve (E) in the open position.
- Step 3.** Replace the sprinklers that have operated and the sprinklers close to the fire.
- Step 4.** Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.
- Step 5.** Via the air supply control valve (K) pressurize the system with air to 0.7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.
- Step 6.** Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 7. Reset accelerator (Q) using the instruction on its resetting label.

Step 8. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 9. Fully open the main control valve (A) and lock it open.

Step 10. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

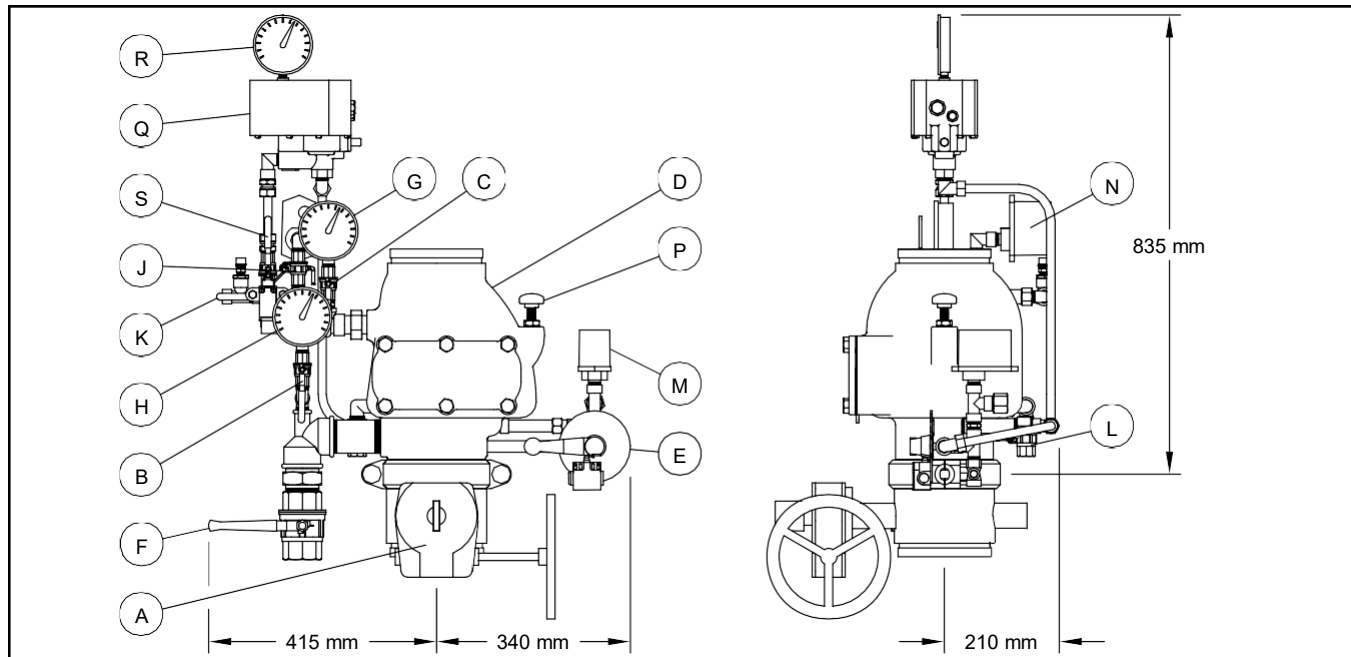
Step 1. the three-way alarm control valve (E) in the test position, verify that the alarm signal created by the water-flow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Place the three-way alarm control valve (E) in the open position and verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix F of TFP1090 (09/2005)
Summary Instructions (If problems occur, consult full document)
Dry Pipe Valve, DPV-1, DN150, Three-Way Alarm Test, With Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked, and the accelerator control valve (S) and air supply control valve (K) are open.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The three-way alarm control valve (E) is in the open position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- System air pressure gauge (G) reads downstream air pressure, water supply pressure gauge (H) reads the upstream water pressure, and accelerator air pressure gauge (R) reads the accelerator pressure.

II. Operation

When one or more sprinklers are activated, the accelerator operates to permit system air pressure into the dry pipe valve intermediate chamber. Doing so will immediately overcome the ability of the system air pressure to hold the dry pipe valve closed without having to wait for a system air pressure to decay to approximately 20% of the water supply. The dry pipe valve immediately opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows to actuate the waterflow pressure alarm switch (M) and, as ap-

plicable, the water motor alarm.

III. Removing system from service:

- Step 1.** Close the main control valve (A), close the air supply control valve (K), close the accelerator control valve (R), and place the three-way alarm control valve (E) in the closed position.
- Step 2.** Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

- Step 1.** Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.
- Step 2.** Place the three-way alarm control valve (E) in the open position.
- Step 3.** Replace the sprinklers that have operated and the sprinklers close to the fire.
- Step 4.** Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.
- Step 5.** Via the air supply control valve (K) pressurize the system with air to 0.7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.
- Step 6.** Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 7. Reset accelerator (Q) using the instruction on its resetting label.

Step 8. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 9. Fully open the main control valve (A) and lock it open.

Step 10. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

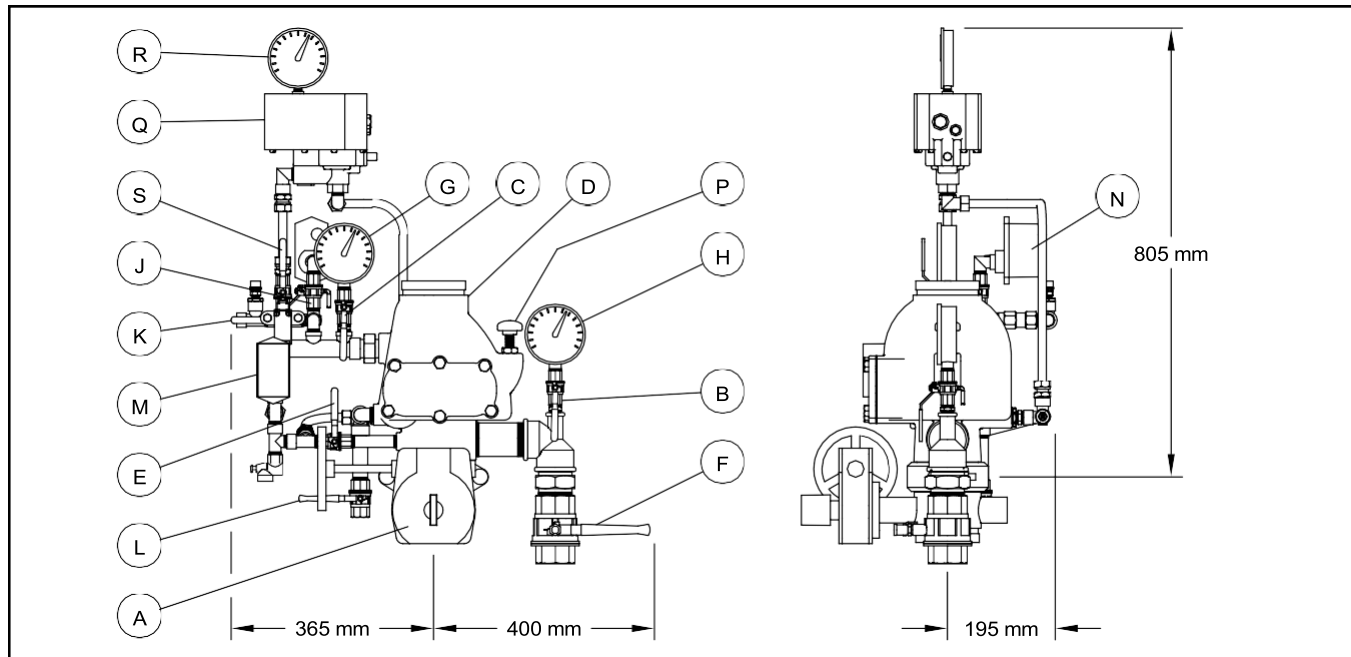
Step 1. Place the three-way alarm control valve (E) in the test position, verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Place the three-way alarm control valve (E) in the open position and verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix G of TFP1090 (09/2005)
Summary Instructions (If problems occur, consult full document)
Dry Pipe Valve, DPV-1, DN100, Standard Alarm Test, With Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked, and the accelerator control valve (S) and air supply control valve (K) are open.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The alarm test valve (E) is in the closed position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- System air pressure gauge (G) reads downstream air pressure, water supply pressure gauge (H) reads the upstream water pressure, and accelerator air pressure gauge (R) reads the accelerator pressure.

II. Operation

When one or more sprinklers are activated, the accelerator operates to permit system air pressure into the dry pipe valve intermediate chamber. Doing so will immediately overcome the ability of the system air pressure to hold the dry pipe valve closed without having to wait for a system air pressure to decay to approximately 20% of the water supply. The dry pipe valve immediately opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows to actuate the waterflow

pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), close the air supply control valve (K), and close the accelerator control valve (R).

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 3. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 4. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 5. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 6. Reset accelerator (Q) using the instruction on its resetting label.

Step 7. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 8. Fully open the main control valve (A) and lock it open.

Step 9. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

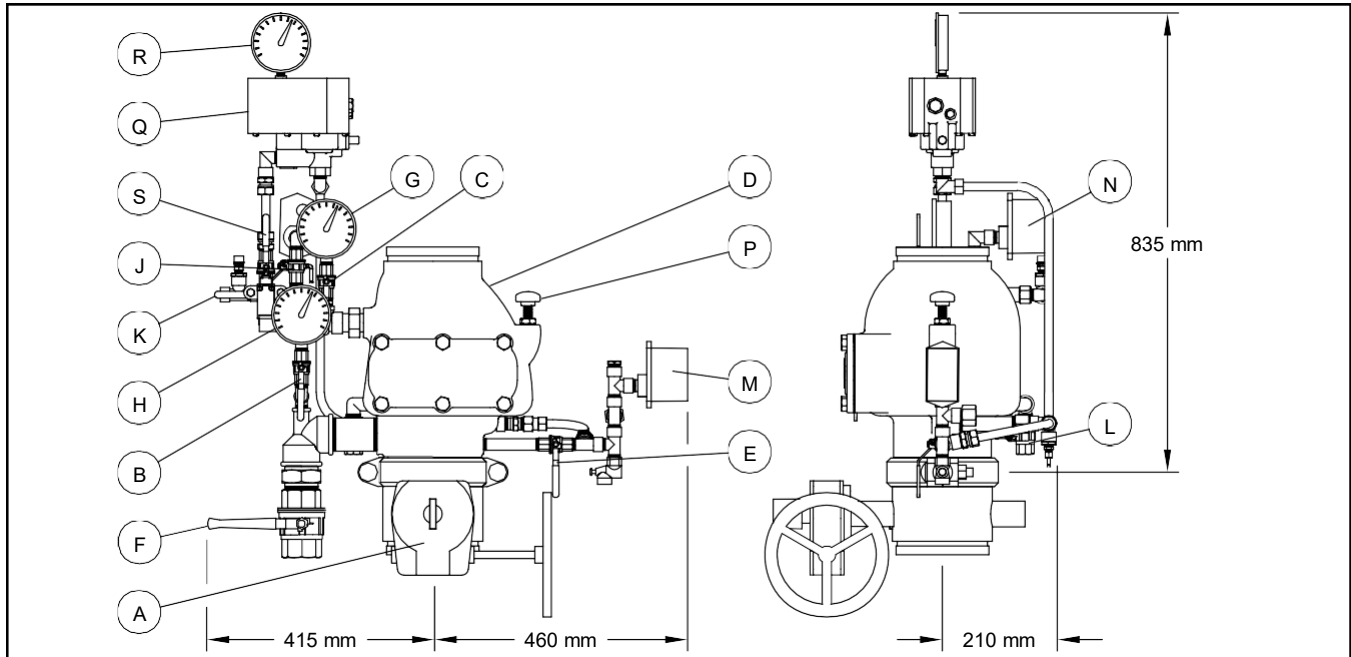
Step 1. Open the alarm test valve (E), verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Close the alarm test valve (E), verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

Appendix H of TFP1090 (09/2005)
Summary Instructions (If problems occur, consult full document)
Dry Pipe Valve, DPV-1, DN100, Standard Alarm Test, With Accelerator



I. Normal conditions:

- The main control valve (A) is opened and locked, and the accelerator control valve (S) and air supply control valve (K) are open.
- The sprinkler system is filled with air and is pressurized.
- The main drain valve (F), and low body drain valve (L) are closed.
- The alarm test valve (E) is in the closed position.
- The pressure gauge valves (B) and (C) are open.
- The pressure switch valve (J) is open.
- System air pressure gauge (G) reads downstream air pressure, water supply pressure gauge (H,) reads the upstream water pressure, and accelerator air pressure gauge (R) reads the accelerator pressure.

II. Operation

When one or more sprinklers are activated, the accelerator operates to permit system air pressure into the dry pipe valve intermediate chamber. Doing so will immediately overcome the ability of the system air pressure to hold the dry pipe valve closed without having to wait for a system air pressure to decay to approximately 20% of the water supply. The dry pipe valve immediately opens to permit water flow into the system piping and to be discharged from any open sprinklers. Also, with the dry pipe valve open, water flows to actuate the waterflow

pressure alarm switch (M) and, as applicable, the water motor alarm.

III. Removing system from service:

Step 1. Close the main control valve (A), close the air supply control valve (K), and close the accelerator control valve (R).

Step 2. Drain the system with the main drain valve (F) and by opening all auxiliary drain valves in the system to make sure that cross-mains and branch lines are drained.

IV. Placing the system back in service:

Step 1. Close the auxiliary drain valves after water ceases to discharge, and leave the main drain valve (F) open.

Step 2. Replace the sprinklers that have operated and the sprinklers close to the fire.

Step 3. Push down on the reset knob (P) to allow the dry pipe valve (D) to reset.

Step 4. Via the air supply control valve (K) pressurize the system with air to 0,7 bar, and then open and close each auxiliary drain valves in the system piping to drain any remaining water in trapped sections. Also, partially open the low body drain valve (L) to assure that the riser is completely drained. Close the low body drain valve (L) as soon as water ceases to discharge.

Step 5. Open the air supply control valve (K) to restore the system to the normal system air pressure.

Step 6. Reset accelerator (Q) using the instruction on its resetting label.

Step 7. Partially open the main control valve (A), and then slowly close the main drain valve (F).

Step 8. Fully open the main control valve (A) and lock it open.

Step 9. Reset the fire alarm panel and notify the central alarm station.

V. Weekly test:

Important: Prior to closing any valves or activating any alarms, notify local security guards and the central alarm station if applicable.

Step 1. Open the alarm test valve (E), verify that the alarm signal created by the waterflow pressure alarm switch (M) is visible at the fire panel. If applicable, check the sound of the water motor alarm — it must be clear and steady.

Step 2. Close the alarm test valve (E), verify that the normal supply and system pressures are restored. If the supply pressure is below the normal, use the instructions from the water supply to obtain the usual pressure.

Step 3. Close the pressure switch valve (J) and verify operation of the low air pressure alarm switch (N).

Step 4. Return the pressure switch valve (J) to the normally open position after verifying that the alarm signal is visible at the fire panel.

4.6 Model Wma-1 Water Motor Alarm Gong

Model WMA-1 Water Motor Alarm Hydraulically Operated Mechanical Sprinkler Alarm

General Description

The Model WMA-1 Water Motor Alarm is a hydraulically operated outdoor alarm designed for use with fire protection system waterflow detection valves. It is lightweight yet rugged, and it can be used in conjunction with alarm check, dry pipe, deluge, and preaction valves to sound a local alarm.

The Water Motor Alarm is suitable for mounting to any type of rigid wall and can accommodate a wall thickness range of 2 to 18 inches (50 to 450 mm). It is provided with a listed and approved Model WM-1 Y-Strainer for use in the alarm line.

The WMA-1 utilizes a lightweight, impeller design which can produce a very high sound pressure level. The Gong, Gong Mount, and Water Motor Housing are fabricated from corrosion resistant aluminum alloys. The polymer drive bearings do not require lubrication, and the Gong is closely fitted to the Gong Mount to eliminate the need for a separate cover.

The Model WMA-1 Water Motor Alarm is a redesignation for the Central Model F-2, Gem Model F630, and Star Model S450.

WARNING

The Model WMA-1 Water Motor Alarm described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of this device.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Approvals

UL and ULC Listed.
FM, LPCB, and VdS Approved.

Gong Finish

Red or Aluminum

Working Water Pressure Range

7 to 300 psi (0,5 to 20,7 bar)

Nozzle K-Factor

0.7 GPM/psi^{1/2} (10,1 LPM/bar^{1/2})

Y-Strainer

3/4 inch, cast iron, 20 mesh screen

Trim Components

Galvanized steel nipples and cast iron fittings.

Design Data

The Model WMA-1 Water Motor Alarm must be used in accordance with the following design criteria:

Item 1. The Y-Strainer is to be located at the "alarm outlet" of the waterflow detection valve trim.

Item 2. The Water Motor Alarm must only be mounted to a rigid wall surface, which will not permit the Striker/Gong Mount to loosen and fall out of alignment.

Item 3. In order to obtain the highest possible sound level, the Water Motor Alarm should be located as close as possible to the waterflow detecting valve. (Refer to NFPA 13 for guidance.)

Item 4. The alarm line piping from the alarm outlet of the waterflow detection valve trim to the Water Motor Alarm must be 3/4 inch size throughout and it must be galvanized steel, brass, or other suitable corrosion resistant material.

Item 5. The alarm line piping must be



positioned such that it can be drained back to the water flow detection valve trim.

Item 6. The Clean-Out Sump Plug is to be located vertically below the Inlet to the Water Motor.

Item 7. Piping from the Water Motor Drain must be a minimum of 1 inch in size throughout and directed to an open drain, in order to ensure proper drainage for obtaining the maximum sound pressure level.

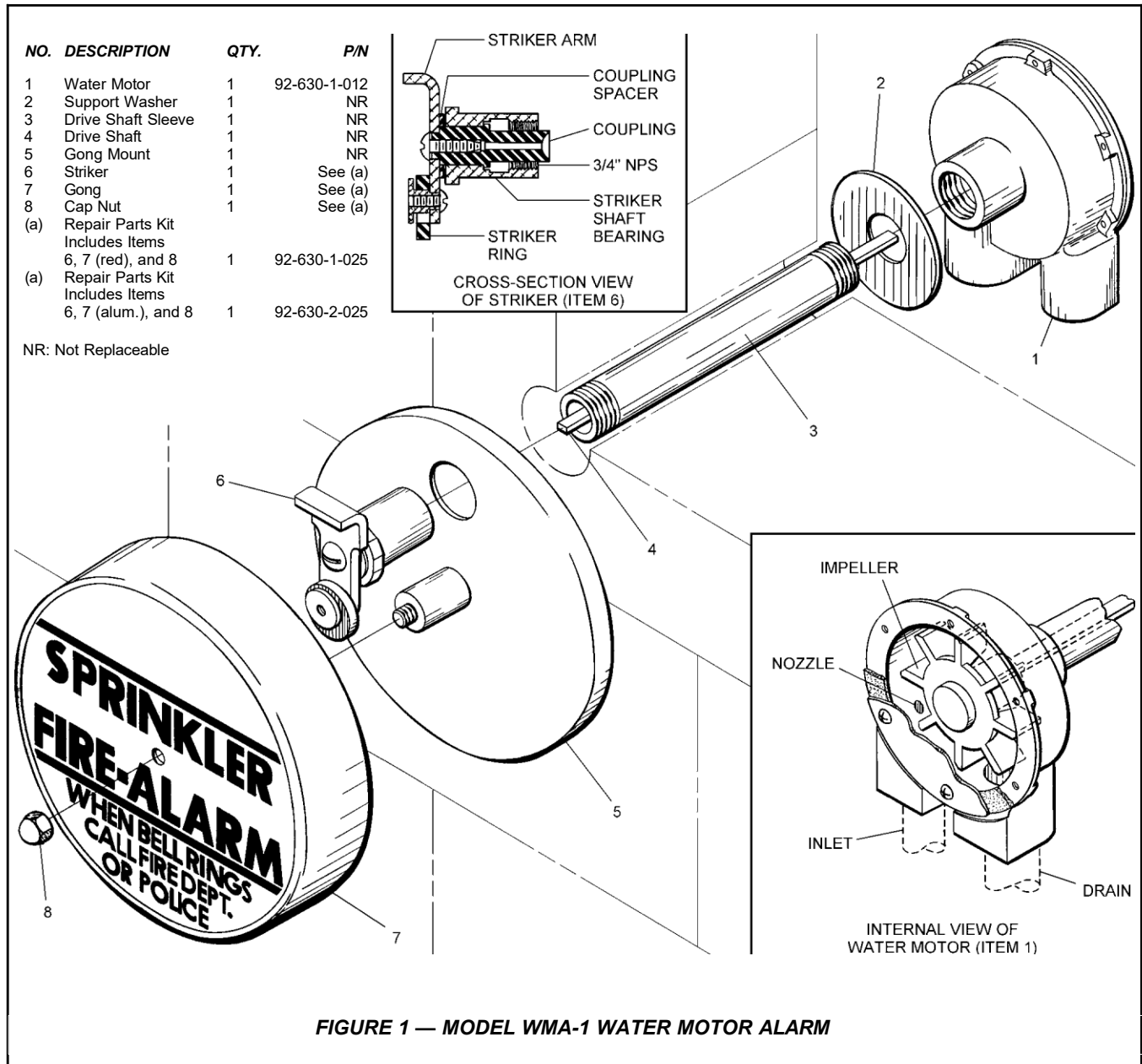
NOTE

The Water Motor Alarm Drain may be connected to the main drain of a water flow detection valve if a non-spring loaded swing type check valve is installed in a horizontal portion of the water motor alarm drain piping (before its connection to the main drain).

Item 8. In order to minimize any wall staining that can be created by drain water, it is recommended that the drain piping from the Water Motor be galvanized steel, brass, or other suitable corrosion resistant material.

Item 9. Drain water must be directed such that there will be no accidental damage to property or danger to persons when the alarm is operating or thereafter.

Item 10. The alarm line drain (at the



waterflow detection valve) must be maintained at a minimum temperature of 40°F/4°C.

Item 11. A single Water Motor Alarm may be connected to the alarm lines from a maximum of three separate fire protection systems. However, when two or three alarm lines are interconnected, each alarm line must be provided with a 3/4 inch (P/N 52-271-1-001) Model WM-1 Y-Strainer and a 3/4 inch (P/N 52-403-1-005) Check Valve with 3/32 inch orifice. The strainers must be located at the "alarm outlet" in the trim of each of the waterflow detection valves. The check valves must be located between each strainer and the interconnection with the alarm line from another system.

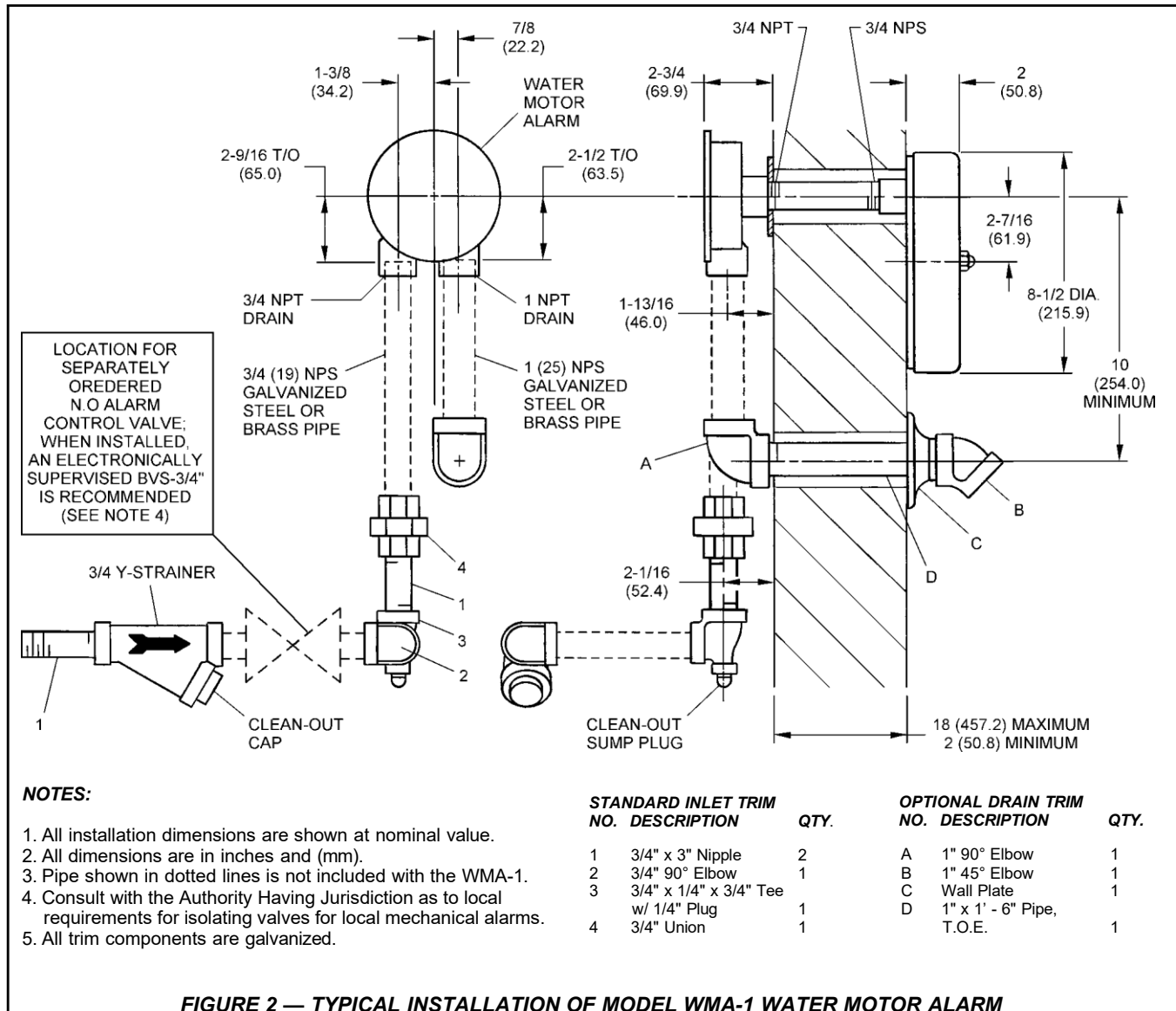
Operation

Upon operation of the alarm check, dry pipe, deluge, or preaction valve to which the Model WMA-1 Water Motor Alarm is connected, water will flow to the Water Motor and through the Inlet Nozzle. As water flows through the Inlet Nozzle, a high velocity jet is formed which impinges on the Impeller, causing the Impeller and the Striker to rotate. With each rotation, the free swinging Striker Ring hits the Gong and sounds the alarm. The spent water is then drained through the 1 inch outlet.

The alarm will sound as long as water is flowing into the system and flowing to the Water Motor Alarm. Water in the

alarm line will automatically drain back through the orifice which is also provided in the trim of the waterflow detection valve.

The Water Motor Alarm does not have to be reset after an operation. However, if the alarm was silenced during operation by closing of an alarm control valve, the alarm control valve must be reopened after the fire protection system is restored to service.



Installation

The Model WMA-1 Water Motor Alarm must be installed in accordance with the following instructions:

Step 1. Mark the through-wall locations for the centerlines of the Sleeve and Drain Outlet. The Drain Outlet must be located at least 10 inches (250 mm) below the Sleeve per Figure 2.

Step 2. Make 1-1/2 inch (38 mm) diameter holes straight through the wall at both locations.

Step 3. Cut the non-threaded end of the Sleeve to a length equal to that of the wall thickness plus 0 to 1/8 inch (0 to 3 mm). Thread the cut end to 3/4 inch NPT per ANSI B1.20.1.

Step 4. Install the alarm line piping up to and including the union half, Item 4 - Fig. 2.

NOTE

Use thread sealant sparingly on male threads only.

Step 5. Prior to initiating installation of the Water Motor Alarm, mount the Drain Trim (less the Wall Plate and 45° Elbow), as well as the balance of alarm line piping (including other union half) to the Water Motor.

Step 6. Tighten the NPT threaded end of the Sleeve into the Body hand tight plus 1/8 turn.

Step 7. Slip the Support Washer over the Sleeve and place the assembly in position against the wall.

Step 8. Tighten the 3/4 inch Union. Install the Wall Plate and tighten the 45° Elbow.

NOTE

NOTE
Apply pressure against the outside edge of the Water Motor Body and

verify that the Body and Support Washer sit square against the wall. If not, adjust the alarm line and/or drain piping to suit.

Step 9. From the outside wall, insert the Drive Shaft through the Sleeve and fully insert it into the Impeller. (*When fully inserted, the Shaft should protrude beyond the face of the wall by approximately 20" minus 2" minus wall thickness.*)

Mark the Drive Shaft at a point of approximately 1/8 to 1/4 inch inside the face of the wall; remove the Shaft; cut the Shaft where previously marked; file off burrs from the cut end of the Drive Shaft; and, re-insert the Drive Shaft through the Sleeve and fully insert it into the Impeller.

Step 10. Hold the Gong Mount in position against the wall, engage the Coupling with the Drive Shaft and then carefully thread the Striker Shaft Bear-

ing onto the Sleeve. Securely tighten the Striker Shaft Bearing using a pair of channel locks on the 1-1/2 inch (38 mm) hex end.

Step 11. Spin the Striker by hand and verify that it spins freely (without any sign of binding). If not, make the necessary adjustments.

Step 12. Install the gong and securely tighten the Cap Nut. The identification sign lettering must be orientated horizontally,

Step 13. Test the Water Motor Alarm by opening the alarm test valve in the trim of the water flow detection valve. The alarm must be clear and steady. If not, make the necessary adjustments.

NOTE

Testing of the Water Motor Alarm may result in operation of other associated alarms. Consequently, notification must be given to the owner and the fire department, central control station, or other signal station to which the alarms are connected.

Care and Maintenance

The following procedures and inspections should be performed as indicated, in addition to any specific requirements of the NFPA, and any impairment must be immediately corrected.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

NOTES

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection systems must first be obtained from the proper authorities and all personnel who may be affected by this decision must be notified.

Testing of the Water Motor Alarm may result in operation of other associated alarms. Consequently, notification

must be given to the owner and the fire department, central control station, or other signal station to which the alarms are connected.

If the alarm was silenced during operation, the alarm control valve must be reopened immediately after the fire protection system is restored to service.

The Model WMA-1 Water Motor Alarm must be maintained and serviced in accordance with the following instructions:

Step 1. The Model WMA-1 Water Motor Alarm does not require any regularly scheduled maintenance. Rotating parts do not require lubrication. It is recommended, however, that fire alarms be periodically operated, i.e., inspected, to verify that they generate a clear and steady sound. Any impairment must be immediately corrected.

Step 2. The inspection should be made quarterly or more frequently, as may be necessary in the case of locations subject to vandalism. The Y-Strainer and Sump are to be cleaned out after each operation of the Water Motor Alarm and after the alarm line piping has been drained.

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Ordering Information

Orders for the WMA-1, Optional Drain Trim, and replacement parts must include the description and Part Number (P/N).

The Complete Model WMA-1 Alarm Assembly includes the Model WMA-1 Water Motor Alarm, Model WM-1 Strainer, and Standard Inlet Trim.

WMA-1 Alarm Assemblies:

Specify: Model WMA-1 Alarm Assembly with Red Finish Gong, P/N 52-630-1-001.

or

Specify: Model WMA-1 Alarm Assembly with Aluminum Finish Gong, P/N 52-630-2-001

Optional Drain Trim:

Specify: Optional Drain Trim for Model WMA-1 Water Motor Alarm, P/N 52-630-2-002.

Separately Ordered Alarm Control Valve:

Specify: UL/FM 3/4 Inch Ball Valve, P/N 92-300-1-006.

Separately Ordered Parts for Multiple Systems:

Specify: Model WM-1 Y-Strainer, P/N 52-271-1-001. (1 required for two system, 2 required for 3 systems.)

Specify: 3/4 Inch Check valve with 3/32 Inch Orifice, P/N 52-403-1-005 (2 required for two system, 3 required for 3 systems.)

Replacement Parts for Water Motor Alarm:

(Specify description) for use with Model WMA-1 Water Motor Alarm, P/N (see Figure 1).

TYCO FIRE PRODUCTS, 451 North Cannon Avenue, Lansdale, Pennsylvania 19446

4.7 Pressure Switches



PS10-1A Single Switch - Stock No. 1340101
PS10-2A Double Switch - Stock No. 1340102

UL and CSFM Listed, FM and LPC Approved, NYMEA Accepted, CE Marked

Dimensions: 4 3/4" (12,1cm)W x 2 1/4" (5,7cm)D x 4 3/8" (11,1cm)H

Enclosure: Cover - Die-cast with textured red powdercoat finish
Base - Plated Steel

Pressure Connection: 1/2" NPT Male

Factory Adjustment:

Operates on Pressure increase at 6 ± 1 PSI ($0,41 \pm 0,07$ BAR)
Operates on Pressure decrease at 5 ± 1 PSI ($0,35 \pm 0,07$ BAR)

Maximum Differential: 1 PSI ($0,06$ BAR)

Maximum System Pressure: 250 PSI ($17,2$ BAR)

Switch Contacts: SPDT (Form C)

15.0 Amps at 125/250VAC, 2.5 Amps at 30VDC
One set in PS10-1A, Two sets in PS10-2A

Environmental Specifications: Indoor or outdoor use

NEMA 4/IP55 Rated Enclosure - when used with proper conduit fittings

Temperature range: -40°F to 140°F (-40°C to 60°C)
(Not for use in hazardous locations)

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential Occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

Tamper: Cover incorporates tamper resistant fasteners that require a special key for removal. One key is supplied with each device. For optional cover tamper switch kit, order Stock No. 0090134.

INSTALLATION AND TEST PROCEDURES

The Potter PS10A Series Pressure Actuated Switches are designed for the detection of a waterflow condition in automatic fire sprinkler systems of particular designs such as wet systems with alarm check valves or dry pipe systems. They may also be used to provide a low pressure supervisory signal. They may be adjusted to operate on pressure between 4 and 20 PSI ($0,27$ and $0,4$ BAR).

MOUNTING: Device should be mounted in upright position (threaded connection down). Requires NEMA type 4 conduit hub for outdoor installations.

TESTING: The operation of the pressure alarm switch should be tested upon completion of installation and periodically thereafter in accordance with the applicable NFPA codes and standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

WET SYSTEM:

METHOD 1: When using PS10A and control unit with retard - connect PS10A into alarm port piping on the input side of retard chamber and electrically connect PS10A to control unit that provides a retard to compensate for surges. Insure that no unsupervised shut-off valves are present between the alarm check valve and PS10A.

METHOD 2: When using the PS10A for local bell application or with a control that does not provide a retard feature - the PS10A must be

installed on the alarm outlet side of the retard chamber of the sprinkler system.

TESTING: Accomplished by opening the inspector's end-of-line test valve. Allow time to compensate for system or control retard.

CAUTION: Method 2 is not applicable for remote station service use, if there is an unsupervised shut-off valve between the alarm check valve and the PS10A.

WET SYSTEM WITH EXCESS PRESSURE:

Connect PS10A into alarm port piping extending from alarm check valve. Retard provisions are not required. Insure that no unsupervised shut-off valves are present between the alarm check valve and the PS10A.

TESTING: Accomplished by opening the water by-pass test valve or the inspector's end-of-line test valve. When using end-of-line test, allow time for excess pressure to bleed off.

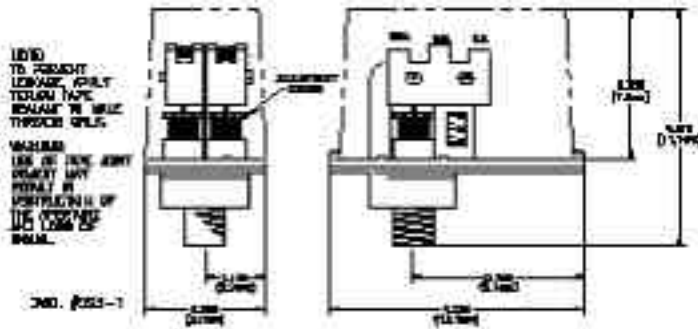
DRY SYSTEM:

Connect PS10A into alarm port piping that extends from the intermediate chamber of the alarm check valve. Install on the outlet side of the in-line check valve of the alarm port piping. Insure that no unsupervised shut-off valves are present between the alarm check valve and the PS10A.

TESTING: Accomplished by opening the water by-pass test valve.

CAUTION: The above tests may also activate any other circuit closer or water motor gongs that are present on the system.

DIMENSIONS



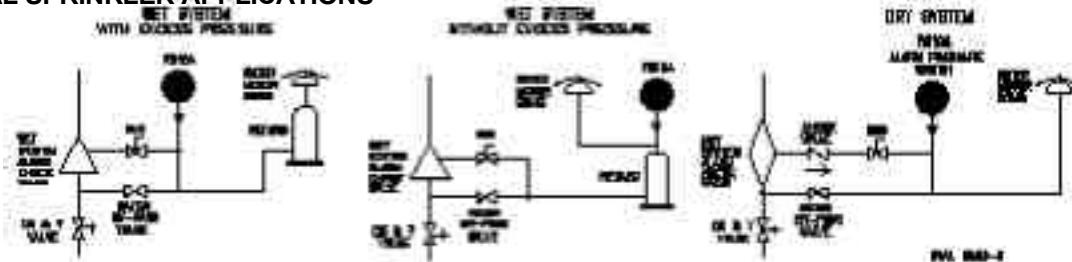
SWITCH TERMINAL CONNECTIONS CLAMPING PLATE TERMINAL



CAUTION:

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

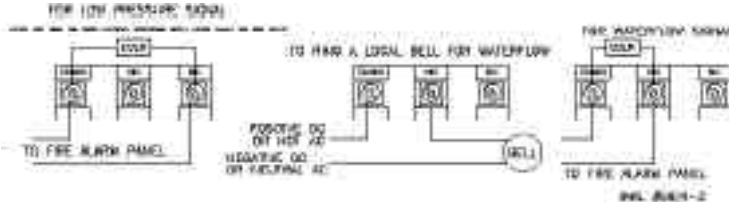
TYPICAL SPRINKLER APPLICATIONS



CAUTION:

Closing of any shutoff valves between the alarm check valve and the PS10A will render the PS10A inoperative. To comply with NFPA-72 any such valve shall be electrically supervised with a supervisory switch such as Potter Model BVS.

TYPICAL ELECTRICAL CONNECTIONS



ORDERING INFORMATION

Model No.	Description	Stock
PS10-1A	Pressure switch with one set SPDT contacts	1340101
PS10-2A	Pressure switch with two sets SPDT contacts	1340102
	Hex Key	5250062
	Cover Tamper Switch Kit	0090134
BVS	1/2" Ball Valve with tamper switch	1010150

APPLICATION WARNING!

Due to the possibility of unintended discharges caused by pressure surges, trapped air, or short retard times, waterflow switches that are monitoring wet pipe sprinkler systems should not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems.

ENGINEER/ARCHITECT SPECIFICATIONS

Pressure type waterflow switches shall be a Model PS10A as manufactured by Potter Electric Signal Co. of St. Louis, Mo. and shall be installed on the sprinkler systems as shown on the drawings and/or specified herein.

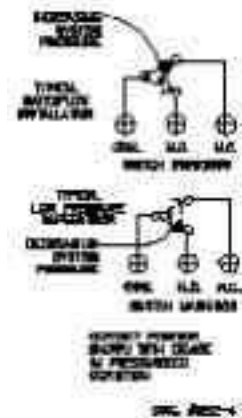
Switches shall be provided with a 1/2" NPT male pressure connection to be connected into the alarm check valve of a "wet" sprinkler system or into the intermediate chamber of a "dry" pipe system and shall be actuated by any flow of water to or in excess of the discharge from one sprinkler head.

Switches shall have a maximum service pressure rating of 250 PSI (17.2 BAR) and shall be factory adjusted to operate on pressure increase at 6 ± 1 PSI (0.4 $\pm$ 0.06 BAR). There shall be one (1) or two (2) SPDT contacts rated at 15.0 Amps at 125/250VAC and 2.5 Amps at 30VDC.

The switch housing shall be weather proof and oil resistant. The cover shall incorporate tamper resistant screws.

The unit shall be UL and CSFM Listed, FM and LPC Approved, and NYMEA Accepted.

PRESSURE SWITCH TERMINATION



MODEL PS40A PRESSURE SWITCH FOR MONITORING HIGH AND/OR LOW PRESSURE VARIATIONS



PS40-1A Single Switch - Stock No. 1340401

PS40-2A Double Switch - Stock No. 1340402
UL and CSFM Listed, FM and LPC Approved,
NYMEA Accepted, CE Marked

Dimensions: 4 3/4" (12,1cm)W x 2 1/4" (5,7cm)D x 4 3/8" (11,1cm)H

Enclosure: Cover - Die-cast with textured red powdercoat finish.
Base - Plated Steel

Pressure Connection: 1/2" NPT Male

Factory Adjustment:

PS40-1A: Operates on decrease at 30 PSI (2,1 BAR)
PS40-2A: Operates on increase at 50 PSI (3,5 BAR), and on decrease at 30 PSI (2,1 BAR)

Pressure Range: 10 - 175 PSI (0,7 - 12,1 BAR)

Maximum Differential: Approx. 2 lbs. at 20 PSI (0,14@1,4 BAR)
5 lbs. at 175 PSI (0,35@12,1 BAR)

Maximum System Pressure: 250 PSI (17,2 BAR)

Switch Contacts: SPDT (Form C)

15.0 Amps at 125/250VAC, 2.5 Amps at 30VDC
One set in PS40-1A, Two sets in PS40-2A

Environmental Specifications:

Indoor or outdoor use
NEMA 4/IP55 Rated Enclosure - when used with proper conduit fittings
Temperature range: -40°F to 140°F (-40°C to 60°C)
(Not for use in hazardous locations)

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

Tamper: Cover incorporates tamper resistant fasteners that require a special key for removal. One key is supplied with each device. For optional cover tamper switch kit, order Stock No. 0090134.

The PS40A is designed as a pressure type supervisory switch. The NFPA 72, National Fire Alarm Code, requires that a low pressure signal is sent at 10 psi below normal air pressure and 10 psi above normal pressure on dry pipe valves. Therefore, the PS40-2A switches are factory set for a pressure decrease at 30 psi and a pressure increase at 50 psi with a normal air pressure of 40 psi. The switches are adjustable at any point between 10 and 175 psi.

The PS40-1A is intended for applications that are looking for a specific pressure, either increase or decrease. These applications would include monitoring city water pressure or monitoring a water tank pressure.

INSTALLATION AND TEST PROCEDURES

Mounting: The device should be mounted in the upright position (threaded connection down). Only teflon tape should be applied to the male threads. Using pipe joint cement or pipe thread compound (pipe dope) could obstruct the device and cause it to not work properly.

In outdoor applications, a NEMA type 4 conduit hub should be installed.

If the pressure needs to be adjusted from the factory settings, adjust the system pressure to the desired trip point. Use a ohm meter on the appropriate contacts (COM and NC for pressure decrease and COM and NO for pressure increase). Adjust the knurled knob until the meter indicates continuity. At that point the switch is set for that particular pressure. When the adjustments are complete, raise and lower the system pressure to ensure the switch is properly set.

On dry systems, connect the PS40A in the air supply line on the system side of any shutoff and check valves.

Provisions for testing the unit without affecting the entire system can be accomplished with the installation of a Potter Bleeder Valve (Model BVL) in the line to the PS40A.

Testing: The operation of the pressure supervisory switch should be tested upon completion of installation and periodically thereafter in accordance with the applicable NFPA codes and standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

CAUTION: Testing the PS40A may activate other system connected devices.

MODEL PS40A

Potter Electric Signal Company • 2081 Craig Road, St. Louis, MO, 63146-4161 • Phone: 800-325-3936/Canada 888-882-1441 • www.potter-electric-signal.com

~~HIGH/LOW
PRESSURE SWITCHES~~

DIMENSIONS

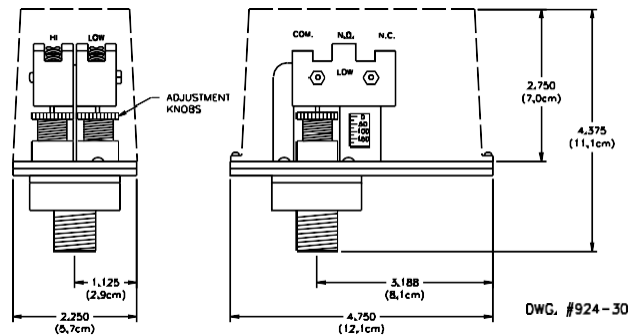
NOTE:

TO PREVENT LEAKAGE, APPLY TEFLON TAPE SEALANT TO MALE THREADS ONLY.

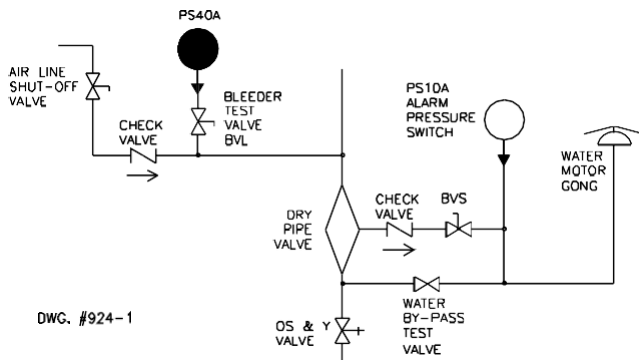
WARNING:

USE OF PIPE JOINT CEMENT MAY RESULT IN OBSTRUCTION OF APERTURE AND LOSS OF SIGNAL.

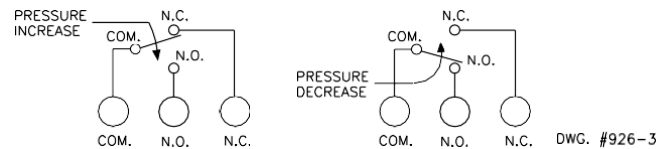
FIELD ADJUSTMENTS: The operating point of the switch (or switches on the PS40-2A) can be adjusted to any point between 10 and 175 PSI (0,7 and 12,1 BAR) by turning the adjustment knob(s) clockwise to raise the actuation point, and counter-clockwise to lower the actuation point. In the case of the PS40-2A, the two switches operate completely independently of one another, and each switch may be adjusted to actuate at any point the system requires. Final adjustment should be made with a pressure gauge.



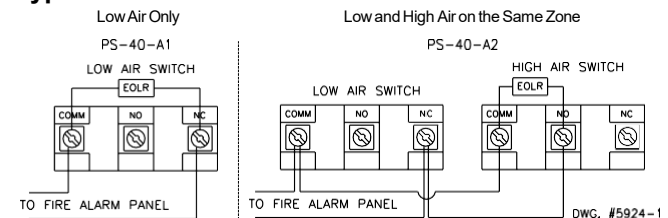
Typical Sprinkler Application - Dry System



Pressure Switch Terminations



Typical Electrical Connections

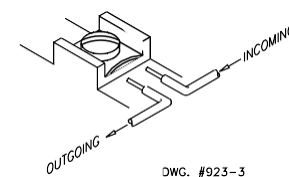


NOTE: High switch changes with pressure increase. Low switch changes with pressure decrease.

Ordering Information

Model	Description	Stk. No.
PS40-1A	Pressure switch with one set SPDT contacts	1340401 PS40-
2A	Pressure switch with two sets SPDT contacts	1340402 BVL
	Bleeder Valve	1000018
	Hex Key	5250062
	Cover Tamper Switch	0090134
BVS	1/2" Ball Valve with tamper switch	1010150

Switch Terminal Connections Clamping Plate Terminal



CAUTION:

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

Engineer/Architect Specifications

Air pressure supervisory switch shall be a Model PS40A as manufactured by Potter Electric Signal Co. of St. Louis, Mo. and shall be installed on the sprinkler systems as shown on the drawings and/or as specified herein.

Switches shall be provided with a 1/2" NPT male pressure connection to be connected into the air supply line on the system side of any shut-off valve. A Model BVL bleeder valve as supplied by Potter Electric Signal Co. of St. Louis, Mo. or equivalent shall be connected in line with the PS40A to provide a means of testing the operation of the supervisory switch. (See DWG. #924-1)

The switch unit shall contain SPDT (Form C) switch(es). One switch shall operate at a pressure decrease of 10 PSI (0,7 BAR) from normal. If two switches are provided, the second switch shall operate at a pressure increase of 10 PSI (0,7 BAR) from normal. Switch contacts shall be rated at 15.0 Amps at 125/250VAC and 2.5 Amps at 30VDC. The units shall have a maximum pressure rating of 250 PSI (17,2 BAR) and shall be adjustable from 10 to 175 PSI (0,7 to 12,1 BAR).

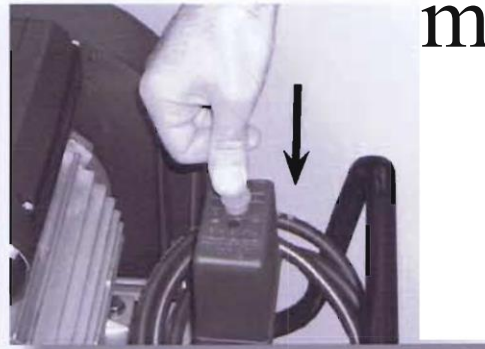
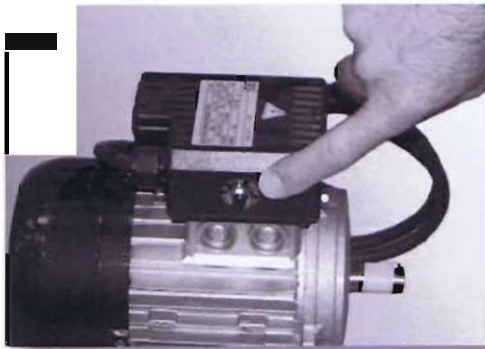
The switch housing shall be weatherproof and oil resistant. The cover shall incorporate tamper resistant screws.

The unit shall be UL and CSFM Listed, FM and LPC Approved, and NYMEA Accepted.

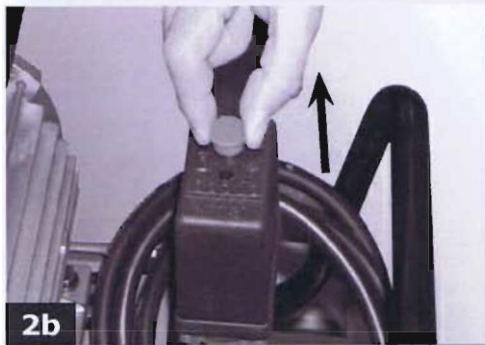
4.8 Air Compressor Manual

- *Manuale istruzioni*
- *Instructions for use manual*
- *Manuel utilisateur*
- *Betriebsanleitung*
 - *Manual de instrucciones*
 - *Manual de instru oes*
 - *Gebruiksaanwijzing*
 - *Brugsanvisning*
 - *Instruktionsmanual*
- *Kayttoohjeet*
- *Eyx1:1pi610 06qy1wv*
- *Instrukcje obsługi*
- *Uputstvo za uporabu*
- *Priročnik z navodili*
- *Kezelesi utmutat6*
- *Pfirucka k obsluze*
- *Navod na obsluhu*
 - *Py«oaoocmao no 3Kcnnyamau,uu*
 - *Bruksanvisning*
 - *Kullanma talimati*
 - *Manual de utilizare*
 - *Pb«oaoocmao no e«cMoamau,uRma*

COMPRESSORE CON TRASMISSIONE A CINGHIA



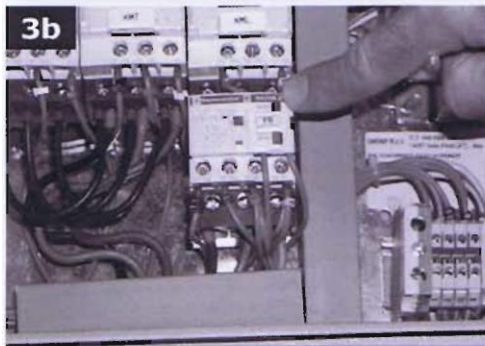
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2b



3a



3b



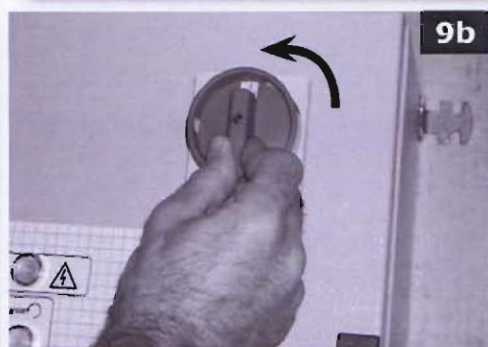
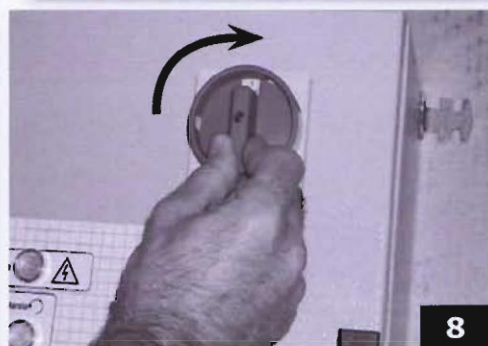
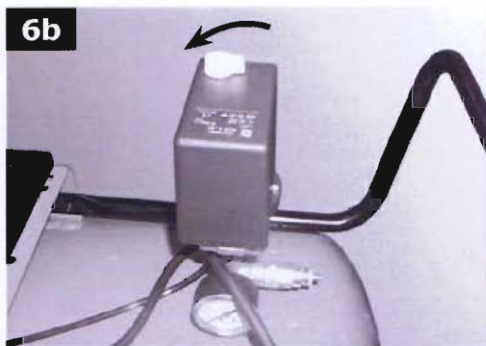
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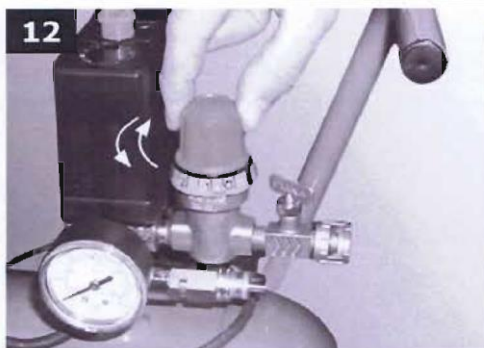


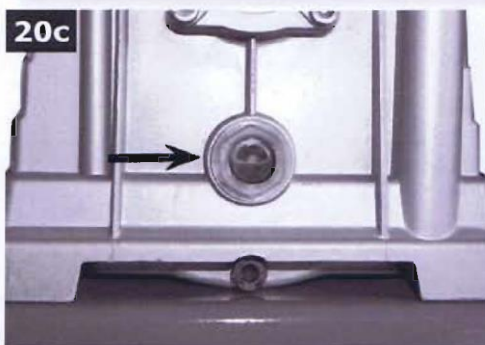
5



6a







BELT-DRIVEN ELECTRIC COMPRESSOR



Important:

Before using the compressor, always read the instructions manual and consult it if you have any doubts regarding compressor functioning

Important:

safety goggles **MUST** be worn when using the compressor

Warning:

certain parts of the compressor may become very hot

Warning:

To avoid risks of electric shock, always use sockets with a ground connection

PRECAUTIONS

THINGS NOT TO DO

- Never direct the jet of air towards persons, animals or your body. (Always wear safety goggles to protect your eyes from flying objects that may be lifted by the jet).
- Never direct the jet of liquids sprayed by tools connected to the compressor towards the compressor.
- Never use the appliance in your bare feet or with wet hands or feet.
- Never pull the power cable to pull the plug out of the socket or to move the compressor.
- Never leave the appliance exposed to adverse weather conditions (rain, sun, fog, snow).
- Never transport the compressor with the reservoir pressurized
- Never weld or machine the reservoir. In the case of faults or corrosion, replace it completely.
- Never allow inexperienced persons to use the compressor. Keep children and animals away from the work area.
- Never position flammable or nylon or fabric articles close to and/or on the compressor.
- Never clean the compressor with flammable liquids or solvents. Clean with a damp cloth only, after making sure that you have unplugged the compressor.
- The compressor is designed only to compress air and must not be used for any other type of gas.
- The compressed air produced by the compressor cannot be used for pharmaceutical, food or hospital purposes except after particular treatments. It is not suitable for filling the air bottles of scuba divers.
- Never use the compressor without guards (belt guard) and never touch moving parts.

THINGS TO DO

- **The compressor must be used in a suitable environment (well ventilated with an ambient temperature of between +5°C and +40°C) and never in places affected by dust, acids, vapors, explosive or flammable gases.**
- Always maintain a safety distance of at least 4 meters between the compressor and the work area.
- Any coloring of the belt guards of the compressor during painting operations indicates that the distance is too short.
- Insert the plug of the electric cable in a socket of suitable shape, voltage and frequency complying with current regulations.
- For 3-phase versions, have the plug fitted by a qualified electrician according to local regulations.
- When starting the compressor for the first time, check the correct direction of rotation and that this matches the direction indicated by the arrow on the belt guard (versions with plastic protection) or on the motor (versions with metal protection).
- Use extension cables with a maximum length of 5 meters and of suitable cross-section. The use of extension cables of different length and also of adapters and multiple sockets should be avoided.
- Always use the switch of the pressure switch to switch off the compressor or use the switch of the electric panel for models equipped with this. Never switch off the compressor by pulling out the plug. In order to avoid restart with pressure in the head.
- Always use the handle to move the compressor.
- When operating, the compressor must be placed on a stable, horizontal surface to guarantee correct lubrication.
- Position the compressor at least 50 cm from the wall to permit optimal circulation of fresh air and to guarantee correct cooling.

THINGS YOU SHOULD KNOW



- To avoid overheating of the electric motor, this compressor is designed for intermittent operation as indicated on the data-plate (for example, 53-50 means 5 minutes ON and 5 minutes OFF). In the case of overheating, the thermal cutout of the motor trips, automatically cutting off the power when the temperature is too high due to excess current take-off.
- On single-phase versions, press the reset button on the terminal box of the motor (fig. 1).
- To facilitate machine restart, it is important not only to carry out the operations indicated but also to set the button of the pressure switch, returning this to the OFF position and then ON again (figures 2a - 2b).
- On 3-phase versions, operate manually on the button of the pressure switch, returning this to the ON position or press the button of the thermal cutout inside the box of the electric panel (figures 3a - 3b).
- The single-phase versions are fitted with a pressure switch equipped with a delayed dosing air vent valve (or with a valve located on the check valve) that facilitates motor start-up; therefore a few-second jet of air from this, with the reservoir empty, is to be considered normal.
- To guarantee machine safety, all the compressors are fitted with a safety valve that is activated in the case of failure of the pressure switch. (fig. 4).
- All two-stage compressors are equipped with safety valves on the air delivery manifold to the reservoir and on the connection hose between the low and high pressure located on the head. These are activated in the case of malfunctioning (fig. 5).
- When connecting an air-powered tool to a hose of compressed air supplied by the compressor, interruption of the flow of air from the hose is compulsory.
- Use of the compressed air for the various purposes envisaged (inflation, air-powered tools, painting, washing with water-based detergents only, etc.) requires knowledge of and compliance with the rules established for each individual use.

START-UP AND USE

- Fit the wheels and foot (or the caster wheel for models that are fitted with this) according to the instructions provided in the packaging. For versions with fixed feet, assemble the front bracket kit or the vibration-dampers if furnished. Check that the rating data match the effective characteristics of the system (voltage and power).
 - Insert the power plug in a suitable socket checking that the button of the pressure switch located on the compressor is in the "O" (OFF) position (**figures 6a - 6b**).
 - For the 3-phase versions, connect the plug to a panel protected by suitable fuses.
 - For the versions fitted with electric panel ("Tandem" control units or delta/star starters) have installation and connections (to the motor, to the pressure switch and to the electrovalve if any) carried out by qualified personnel.
 - Check the oil level using the sight glass and if necessary unscrew the vent plug and top up. (**figures 7a - 7b**).
- At this point, the compressor is ready for use.
- Operating on the switch of the pressure switch (or the selector for versions with electric panel, (**figures 6a - 6b - 8**), the compressor starts, pumping air in the reservoir through the delivery hose. On 2-stage versions, air is sucked in to the so-called low pressure cylinder liner and precompressed. It is then routed, through the recirculation hose, into the so-called high pressure liner and then into the reservoir. With this work cycle, it is possible to reach higher pressure, with availability of air at 11 bar (15 bar for special machines).
 - On reaching maximum operating pressure (factory-set during testing), the compressor stops, venting the excess air present in the head and in the delivery hose through a valve located under the pressure switch (in delta/star versions, through an electrovalve that is activated when the motor stops).
 - The absence of pressure in the head facilitates subsequent restart. When air is used, the compressor restarts automatically when the lower calibration value is reached (approx. 2 bar between upper and lower). The pressure inside the reservoir can be checked on the gauge provided (**fig. 4**).
 - The compressor continues to operate automatically with this work cycle until the position of the switch of the pressure switch (or of the selector of the electric panel) **figures 2a - 9a - 9b** is modified.
 - To use the compressor again, wait at least 10 seconds after this has been switched off before restarting.
 - In the versions with electric panel, the pressure switch must always be aligned with the I (ON) position.
 - In tandem versions, the control unit provided permits use of only one of the two compressor groups (If necessary alternatively) or of both at the same time according to requirements. In this second case, start-up will be differentiated slightly to avoid excessively high current take-off at start-up (timed starting).
 - Only the wheel-mounted compressors are fitted with a pressure reducer (in the versions with fixed feet, it is usually installed on the use line). Air pressure can be regulated in order to optimize use of air-powered tools operating on the knob with the valve open (pulling it up and turning it in a clockwise direction to increase pressure and counterclockwise to reduce this) (**fig. 10**). Once you have set the value required, push the knob down to lock it.

- The value set can be checked on the gauge (for versions equipped with this, **fig. 11**) or the numbered notches on the knob (**fig. 12**) the values of which correspond to the related pressures.
- When you have finished working, stop the machine, pull out the plug and empty the reservoir.

MAINTENANCE

- The service life of the machine depends on maintenance quality.
- **PRIOR TO ANY OPERATION SET THE PRESSURE SWITCH TO THE OFF POSITION, PULL OUT THE PLUG AND COMPLETELY DRAIN THE RESERVOIR.**
- After the first hour of work, check that all screws (in particular those of the head of the unit) are tightly drawn up, in order to restore the correct tightening torque following thermal dilatation (**fig. 13**).

	Nm Min. torque	Nm Max. torque
BoltM6	9.3	11.36
Bolt MS	22.45	27.43
BoltM10	45.28	55.34
Bolt M12	77.10	94.23
BoltM14	123	150.37

- Clean the suction filter according to the type of environment and in any case at least every 100 hours. If necessary, replace the filter (**a** dogged filter impairs efficiency while an inefficient filter causes harsher wear on the compressor **{figures 14a - 14b}**).
- Change the oil after the first 100 hours of operation and subsequently every 300 hours. Check the oil level periodically.
- Use API/CC Sae 40 mineral oil. (For cold climates, Sae 20 is recommended). Never mix different grade oils. If the oil changes color (whitish = presence of water; dark = overheated), It is good practice to replace the oil immediately.
- After topping up, tighten the plug (**fig. 15**) making sure that there are no leaks during use. Once a week, check the oil level to assure lubrication in time (**fig. 7a**).
- Periodically (or after completing work if for more than an hour), drain the condensate that forms inside the reservoir due to the humidity in the air (**fig. 16**) in order to protect the reservoir from rust and so as not to restrict its capacity.
- Periodically, check the tension of the belts which must have a flexion (f) of around 1 cm (**fig. 17**).
- Spent oil and condensate **MUST BE DISPOSED OF** in compliance with protection of the environment and current legislation.

WARRANTY

The warranty does not cover all electrical parts and all parts that, due to their specific use, are liable to wear. The warranty envisages the manufacturer's obligation to repair or replace, at its discretion, parts acknowledged as faulty by its own technicians provided that such faults refer to the construction of the products and/or the quality of the materials (i.e. they are to be ascribed to the manufacturer) and are not caused by normal wear, negligence, incorrect or improper use of the product by the user not complying with the instructions, tampering, repairs or disassembly even only partial by persons not authorized by the manufacturer, excessive use of the machine or unsuitable applications, fortuitous events or circumstances of incorrect installation or mis-use.

All compressors with up to 100-liter receivers must be sent to the Service Center carriage free and will be returned carriage forward.

Ask your supplier for the location of your nearest Center.

The manufacturer reserves the right to make any modifications it considers necessary without prior notice.

POSSIBLE FAULTS • RELATED PERMITTED REMEDIES

Request the assistance of a qualified electrician for operations on electric components (cables, motor, pressure switch, electric panel etc)

Fault	Cause	Remedy
Air leak from the valve of the pressure switch	Check valve does not perform its function correctly due to wear or dirt on the seal	Unscrew the hex-shaped head of the check valve, clean the housing and the special rubber disk (replace if worn). Re-assemble and tighten carefully (figures 18a - 18b)
	Condensate drainage cock open	Close the Condensate drainage cock
	Rilsan hose not inserted correctly in pressure switch	Insert the Rilsan hose correctly inside the pressure switch (fig. 19)
Reduction of efficiency, frequent start-up. Low pressure values	Excessively high consumption	Reduce demand
	Leaks from joints and/or pipes	Rework seals
	Clogging of the suction filter	Clean/replace the suction filter (figures 14a - 14b)
	Slipping of the belt	Check belt tension (fig. 17)
The motor and/or the compressor overheat irregularly	Insufficient ventilation	Improve ambient conditions
	Closing of air ducts	Check and if necessary clean the air filter
	Insufficient lubrication	Top up or change oil (figures 20a - 20b - 20c)
After an attempt to start the compressor, it stops due to tripping of the thermal cutout caused by forcing of the motor	Start-up with head of the compressor charged	Discharge head of the compressor
	Low temperature	Improve ambient conditions
	Voltage too low	Check that the mains voltage matches that of the dataplate. Eliminate any extensions.
	Incorrect or insufficient lubrication	Check level, top up and if necessary change the oil
	Inefficient electrovalve	Call the Service Center
During operation, the compressor stops for no apparent reason	Tripping of the thermal cutout of the motor	Check level oil
		Single-stage, mono-phase versions: reset the thermal cutout (fig. 1) and restart (figures 2a - 2b) If the fault persists, call the Service Center
		Versions with delta-star starter: operate on the button of the thermal cutout located inside the box of the electric panel (fig. 3b) and restart (fig. 8). If the fault persists, call the Service Center
		Other versions: Operate on the button of the pressure switch returning this to the OFF position and then to ON again (fig. 3a). If the fault persists, call the Service Center
When operating, the compressor vibrates and the motor emits an irregular buzzing sound. If it stops, it does not restart although the sound of the motor is present	Electric fault	call the Service Center
	Single-phase motors: faulty capacitor	Have the capacitor replaced
Irregular presence of oil in the network	3-phase motors: One of the phases of the 3-phase power supply is missing due probably to blowing of a fuse	Check the fuses inside the electric panel or the electric box and if necessary replace those that have been damaged (fig. 21)
	Too much Oil inside the unit	Check oil level
Leaking of condensate from the vent cock	Wear on segments	Call the Service Center
	Presence of dirt/grit inside the cock	Clean the cock

Any other type of operation must be carried out by authorized Service Centers, requesting original parts. Tampering with the machine may impair its safety and in any case make the warranty null and void.

SECTION FIVE Fire Pumps

INDEX

5	FIRE PUMP SETS	29
5.1	Electric Fire Pump	29
5.2	Jockey Pump.....	30
5.3	Pump Manufacturer's Manual	31
5.4	Roxspur Flow Meter Operating Manual.	32

5 FIRE PUMP SETS

The fire pump assembly consists of an electric driven fire pump and a jockey pump to maintain the system pressure. The fire pump is located within the pump house. The pumps draw water from an underground water storage tank with suction connection and each pump has its own integral priming water storage tank.

5.1 Electric Fire Pump

GENERAL

The electric fire pump is set to operate once the installation pressure drops to below 4.5 bar. The pump is designed to give a duty of 2,650 l/min @ 1.9 Bar static.

(a) Weekly Tests

Check AC supply LED on electric pump panel is illuminated green.

To ensure that the primary electric pump is operating correctly the following procedures should be adopted during the weekly testing of the system.

- (i) On the pump initiation board close valve ref [23].
- (ii) Slowly open valve ref [21] observing the pressure drop indicated on gauge ref [25].
- (iii) Pressure switch ref [24] will initiate the operation of the pump at 4.5 bar.
- (iv) Close valve ref [21] and open valve ref [23] the pressure should increase on gauge [25].
- (v) Allow electric motor to run observing water flow from the relief valve to drain.
- (vi) Stop the motor by means of pressing the stop / reset button located on the front of the electric pump panel.
- (vii) Replace padlocks and straps.
- (viii) Reset the remote alarm panel by pressing the reset button on the panel.

Note. This section to be read with 'Figure 7.1 Pumproom Pipework and Identification Diagram' located Section 7.6 of this file.

5.2 Jockey Pump

GENERAL

To avoid unnecessary operation of the main fire pumps, which have to be stopped manually, an electric jockey pump is provided to automatically maintain the installation pressure at 6.0bar. The jockey pump is controlled by a pressure switch which is set to a start and stop pressure thereby maintaining the system pressure above the start pressure of the main fire pump.

(a) Weekly Checks

- (i) Check starter isolator is in "on" position.
- (ii) Check suction and delivery isolating valves are padlocked and in the open position.
- (iii) Check system pressure being maintained between 6.0 bar and 6.5 bar.

(b) Weekly Test

To ensure that the jockey pump is operating satisfactorily, the following procedures should be adopted during the weekly testing of the system.

- (i) Close valve ref [28]
- (ii) Slowly open valve ref [26]
- (iii) Pressure switch ref [29] will initiate the start of the pump at 5.0 bar.
- (iv) Close valve at ref [26] and open valve at ref [28] and once the re-set pressure of 5.5 bar is achieved pressure switch ref [29] will stop the jockey pump
- (v) Replace padlocks and straps.

5.3 Pump Manufacturer's Manual

ARMSTRONG



Armstrong Integrated Systems Limited, Mucklow Hill, Halesowen, B62 8DJ, UK. Tel + 44 (0) 121 550 5333 Fax + 44 (0) 121 550 1679
www.armstrongintegratedsystems.com

FIRE PUMP

OPERATION & TECHNICAL DATA MANUAL

DECLARATION OF CONFORMITY

Directives: Machinery Directive, 98/37/EC

We declare that the equipment listed below conforms to the above directive(s) and carries the CE Mark subject to the following conditions;

1. Equipment must be installed and operated in accordance with our Essential Fire Pump Safety Instructions (Issued in our Operating and Maintenance instructions).

Customer: Pyro Protection

Customer Order Number: 7130

AI SL Order Number: 230493

Site/Project Name: Stanley Way Waste Transfer Station

Equipment Details:

Serial Number	Equipment Description
230493 - 01	4x3x8.5 4280FE Electric Fire Pump
230493 - 02	AM2 / 7 Jockey Pump

Signed: _____



Date: 3rd June 2010

Steve Cooper, Managing Director

Essential Fire Pump Safety Instructions



Noise levels can be 80dB (A) or above and ear protection should be worn.



This equipment is designed for automatic starting and the engine battery negative / earth (ground) cables and electric supplies must be isolated before removing guards or any components.



Ensure all guards are correctly fitted before operating the equipment.



All lifting must be carried out in accordance with local health and safety regulations by competent personnel. Complete packages must not be lifted by component eye bolts or lifting lugs.



The equipment contains hazardous liquids and the correct safety equipment must be worn when handling them.



The area around the equipment must be kept clean and free of trip hazards.



Surfaces can be hot and care should be taken. Engines with radiators or heat exchangers contain super heated water. Pressure / filler cap must not be removed until the engine has cooled down.



As a precaution it is not recommended that personnel stand next to the coupling assembly during operation or test.



Engines omit harmful fumes and must be installed and maintained to prevent leakage. The pump house must be adequately ventilated according to engine size. The exhaust outlet must be positioned to prevent fumes entering the air intake.



Adequate lighting must be installed in and around the location of the pumps. The use of florescent lights is not recommended around rotating machinery.



All Diesel Fire Pump Drivers manufactured by Clarke are for use with #2 Diesel Fuel (ASTM D-975, No. 2-D). This includes LPCB, FM Approved, UL Listed, and engines for specific country codes, and non-Listed engines. Note, in European Countries the alternative acceptable fuel is "Red" Diesel Fuel (BS2869, Class A2).

SERVICES & MAINTENANCE

PUTTING THE CUSTOMER FIRST

It is Armstrong's policy to look after the people that count.... 'You, the user'. We want you to feel confident, not only in our equipment but also in our after sales service. Armstrong Engineers are trained to carryout commissioning and service of our equipment on site to the very highest standards.

RESPONSE

With a service team throughout the UK we can offer short response times resulting in quick and efficient completion of service work. Armstrong Engineers carry a comprehensive stock of spare parts, which reduces lead times and enables work to be completed in one visit.

Our networks of agents throughout the world are all fully trained to provide service support of Armstrong equipment.

INFORMATION

Keeping a history of your installation is of great importance. On completion of work a report will be issued detailing the Engineer's findings and the action taken. In addition to this, the Engineers carry a stock of literature, which can be left with you at site if required.

COMMISSIONING

The commissioning of your equipment is the first step towards ensuring high quality and prolonged performance standards.

Armstrong trained Engineers will commission your unit to suit the individual requirements of the system. Also, Armstrong can train your staff in routine maintenance and fault finding procedures, reducing the risk of plant shutdown.

MAINTENANCE

As with everything prevention is better than cure. Armstrong offers maintenance agreements, which will mean regular site visits by our trained Engineers, thus reducing the risk of failure. You specify your requirements, we do the rest!

As with all equipment regular servicing is essential in maintaining prolonged performance standards. It is a proven method of reducing plant failure and breakdown.

Prevention is preferable to cure!!!

WHAT CAN ARMSTRONG DO?

As a company that believes in taking care of the customers after the sale, Armstrong offers a scheduled maintenance service tailored to meet your individual requirements. We will arrange for a trained Engineer to attend site, service your equipment and produce a detailed report on the work carried out, together with any advice or comments regarding your installation.

You decide when and how often, we do the rest!

WHAT ARE THE ADVANTAGES?

- Reduced long term service costs
- Regular visits by a trained Engineer
- Detailed reports to enable you to keep a full service history
- Reduce risk of plant failure or breakdown
- Prolonged life expectancy of equipment

For further information and a full quotation please contact our service department:

LET US TAKE CARE OF IT!

ARMSTRONG



SALES ORDER NUMBER	230493
--------------------	--------

Electrical Pump Data

Pump Model No	4x3x8.5 4280FE 22kW	
Serial No	230493 - 01	
G A Drawing No	S6009-L-1002 Rev 5	Dated 14 Jul 08
Performance Curve No	230493 - 01	Dated 06 Mar 09
Pump O & M Instructions	S6064-L-0015-01	Dated Jan 08
Flow (L/min)	2650	Pressure (Bar) 1.9

Electrical Motor Details					Supply		
Enclosure	kW	Frame	FLC	SC	V	Ph	Hz
IP55	22	180M	38.90	112.00	415	3	50
Electrical Controller Diagram			A2-17010 1st Issue		Dated 01 Mar 04		

Diesel Pump Data

Pump Model No	
Serial No	
G A Drawing No	
Performance Curve No	
Pump O & M Instructions	
Flow (L/min)	Pressure (Bar)

Diesel Engine Details				
Make	Type	Manual Code	Hr Rating	Anti Churn Valve
Diesel Controller Diagram				

Jockey Pump Data

Pump Model No	AM2 / 7 Vertical Multistage	
Serial No	230493 - 02	
G A Drawing No	UKD02610 Rev.A	Dated 21 Dec 93
Performance Curve No	AP408/A	Dated 14 Nov 95
Pump O & M Instructions	S6064-L-0016-01	Dated Jan 08
Flow (L/min)	25	Pressure (Bar) 1.9

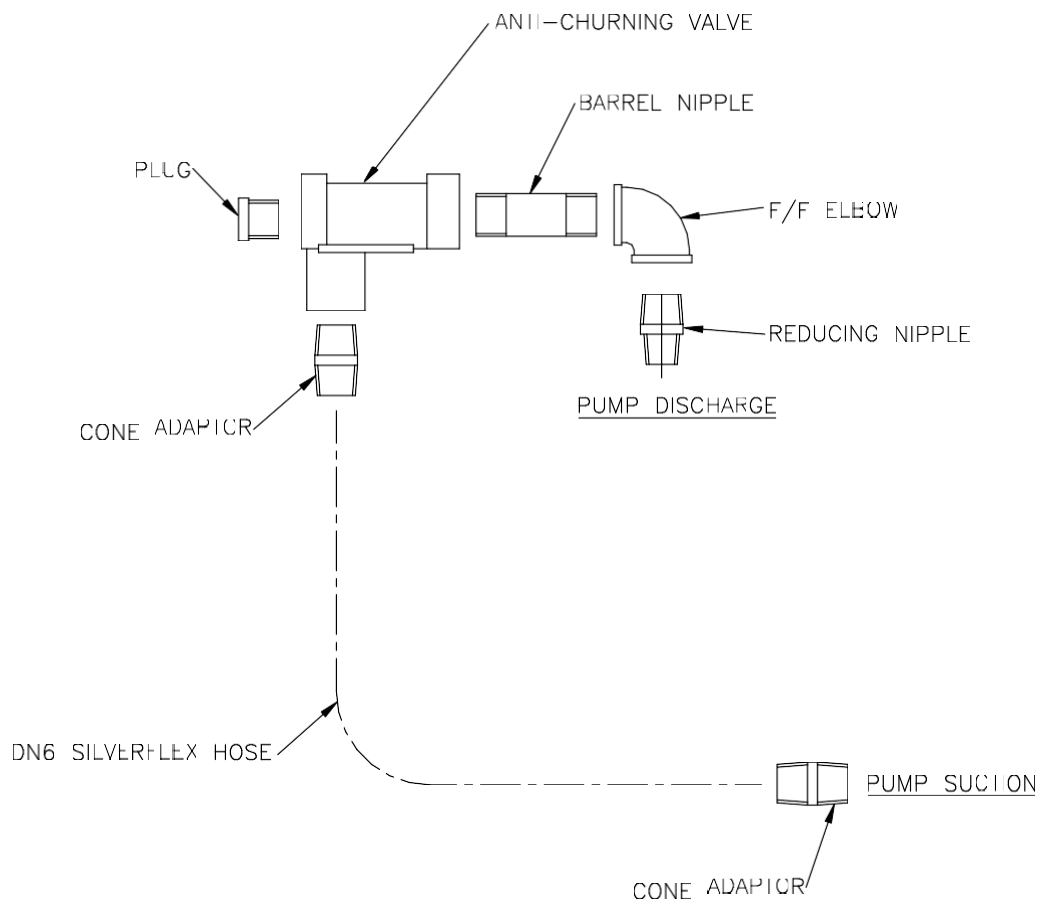
Electrical Motor Details					Supply		
Enclosure	kW	Frame	FLC	SC	V	Ph	Hz
TEFV	1.10	80	2.61	17.70	415	3	50
Jockey Controller Diagram			A4-10723 1st Issue		Dated 14 Nov 95		

Remote Alarm Panel	A3-11341 3rd Issue	Dated 25 Apr 00
Link Up Diagram	A3-18060	

WARNING

Electric & Air Cooled Diesel Driven Fire Sets

THE PLUG FITTED TO THE ANTI-CHURNING VALVE MUST BE REMOVED AND THE WATER PIPED AWAY TO DRAIN BEFORE OPERATION OF THE PUMPS

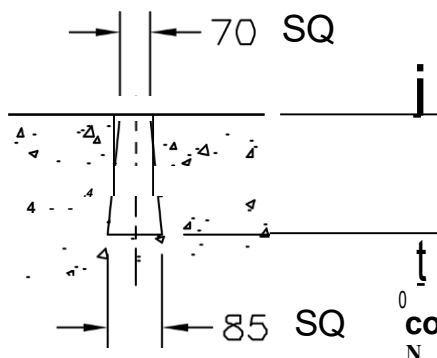


FOUNDATION RECOMMENDATIONS

- 1) PUMP TO BE MOUNTED ON A FOUNDATION SUFFICIENTLY SUBSTANTIAL TO ABSORB ANY VIBRATION.
- 2) PLINTH SHOULD WEIGH AT LEAST 2« TIMES THE SHIPPING WEIGHT OF THE PUMP & HAVE A MINIMUM HEIGHT OF 300mm. PLINTH SHOULD BE KEYED INTO FLOOR. NB APPROX WEIGHT OF CONCRETE = 220Dkg/m³
- 3) PLINTH SHOULD BE LARGER BY AT LEAST 300mm THAN PUMP BASEPLATE AS SHOWN



- 4) PUMP BASEPLATE SHOULD BE LEVELLED USING PACKING/SHIMS. GAP BETWEEN PLINTH & PUMP BASEPLATE TO BE 25mm FOR GROUTING.
- 5) FOUNDATION BOLTS SHOULD BE FITTED INTO TAPER POCKETS AS SHOWN BELOW.



- 6) FOUNDATION BOLTS SUPPLIED M20x260mm

@ ARMSTRONG PUMPS LIMITED

All dimensions in millimetres
unless otherwise s-tated

Third Angle Projection SCALE		or ± 0.5 ular ± 0.5 a enal	F				ARMSTRONG PUMPS LTD COLCHESTER ESSEX UK
DATE	5Jul95		E				
DETAIL NAME	CHECKED		D				
0549 290			C				
A4	DRAWN DCA		B	8429	27JANOS	JW	
Strudural :scdion:s to 8S4 part 1 Hollow sections to BS4848 part 2			A	2556	6Ju195	DCA	TITLE FOUNDA110N RECOMMENDATIONS FIRE: PUMPS
			REV	ECO No.	DATE	SIGN	
			DRAWING NUMBER UKD05493-290				

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Notes

1. PAINT COLOUR IS :
8S381C (538) CHERRY.

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ORIFICE PLATE (3MM
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PUMP CASING
DRAIN 1/2" NPT(F)

580

218

340

4 HOLES 022

720

400

05 14Jul08 RJS Minor Changes, ECO: H00021

04 16.04.07 RPB FIRST FORMAL ISSUE
ECO:H00015
03 02.04.08 RPB DIMS CHANGED
02 28.11.07 J-P.R.DATAUPDATED
01 06.07.07 J-P.R.FIRST ISSUE

Rev. Date By Description

DRAWING TITLE
ELECTRIC CLOSE-COUPLED FIRE PUMP
4 x 3 x 8.5 - ORDINARY HAZARD
IP55 TEFV MOTOR

J-PR	RPB	J-PR	J-PR
NTS		16.04.07	
		A2	

FLANGE DATA

SUCTION DISCHARGE

RATING PN16 PN16
SIZE 100mm 80mm

PUMP DATA
MODEL DIM. 'L'

FLANGE	FLANGE
8	4
18	18
N/A	N/A
35	30

The technical drawing shows a cross-section of a mechanical assembly. On the left, a vertical flange is shown with a horizontal section line. To its right is a cylindrical component with a flange. The drawing includes dimension lines and labels for various parts, such as the flange, the cylindrical component, and the mounting bracket. The drawing is oriented vertically, with the flange at the top and the cylindrical component at the bottom.

Gh	R
S6009-L-1002	05

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APPRO	
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ARMSTRONG
In Integrated Systems





MUCKLOW HILL,
HALESOWEN,
WEST MIDLANDS B62 8DJ
TEL 0121 5550333 FAX 0121 5551679
E MAIL ais@armstrong.com
www.armstrongintegratedsystems.com

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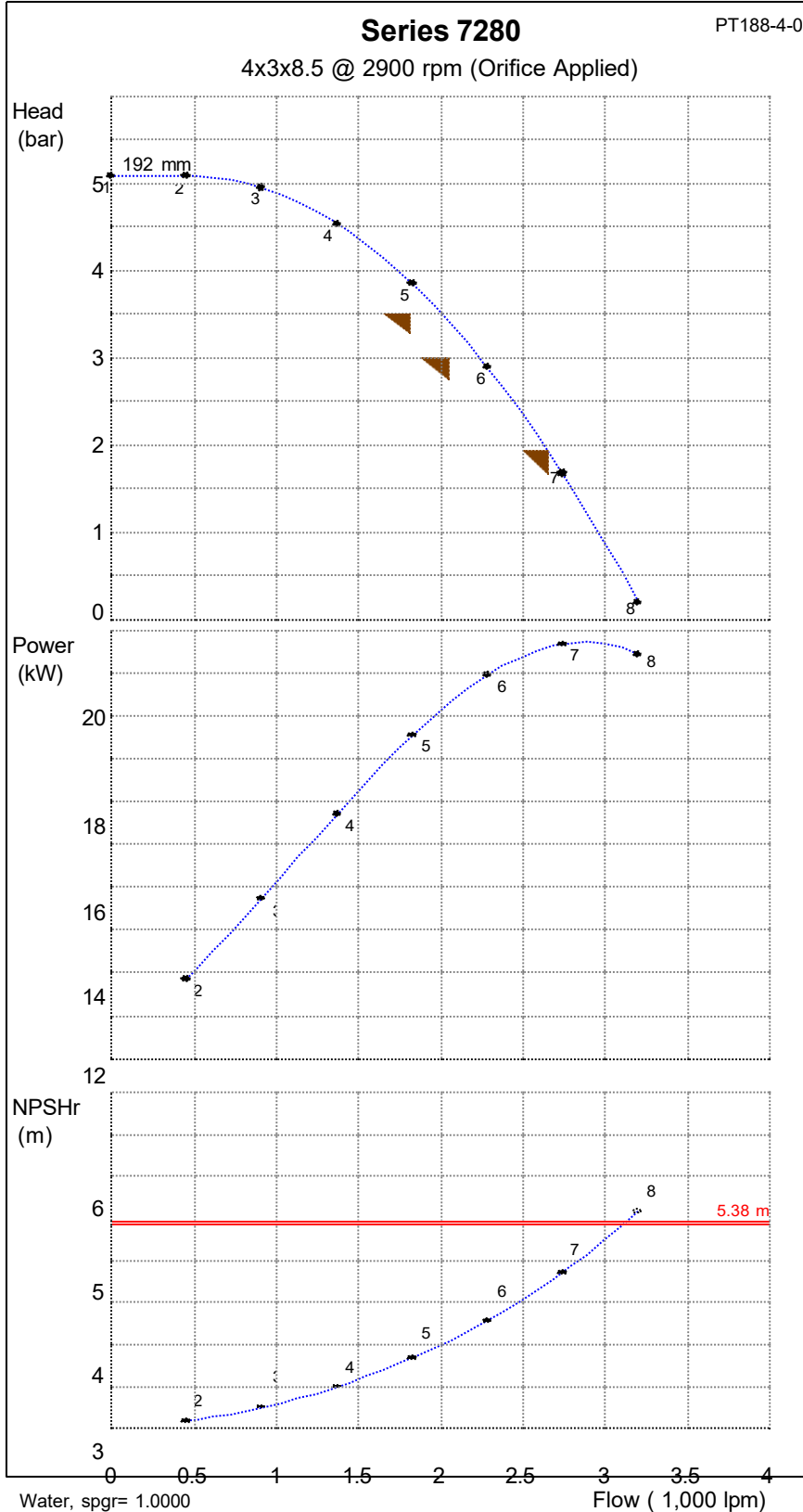
ARMSTRONG



Series 7280

4x3x8.5

LPC Approved Horizontal End Suction CC Pump



---- Admin Data ----

Customer: Pyro Protection

Customer Ref: 7130

Site: Stanley Waste Transfer Station

AI SL Ref: 230493

AI SL Curve Ref: 230493 - 01

Date: 03-Jun-10

---- Duty Points ----

1800 lpm @ 3.5 bar

2100 lpm @ 3.0 bar

2650 lpm @ 1.9 bar

---- Pump Data ----

Pump Qty = 2

Impeller Dia: 192 mm

Orifice k = 1.4189e-007 bars/lpm²

Close Valve Head: 5.14 bar

Peak Power: 21.71 kW @ 2841.1 lpm

Max Approved Flow,

at 5.38m NPSH: 2834.8 lpm

---- Motor Data ----

Mtr Qty = 2

Mtr Supplier: Armstrong Standard

Mtr Size: 22 kW

---- Sample Data Pts ----

Pt. [lpm @ bar], [Power], [NPSHr]

1. [0 @ 5.14]

2. [458.5 @ 5.07],[13.85 kW],[3.46 m]

3. [917 @ 4.94],[15.73 kW],[3.622 m]

4. [1375.4 @ 4.53],[17.71 kW],[3.869 m]

5. [1833.9 @ 3.84],[19.55 kW],[4.208 m]

6. [2292.4 @ 2.88],[20.96 kW],[4.654 m]

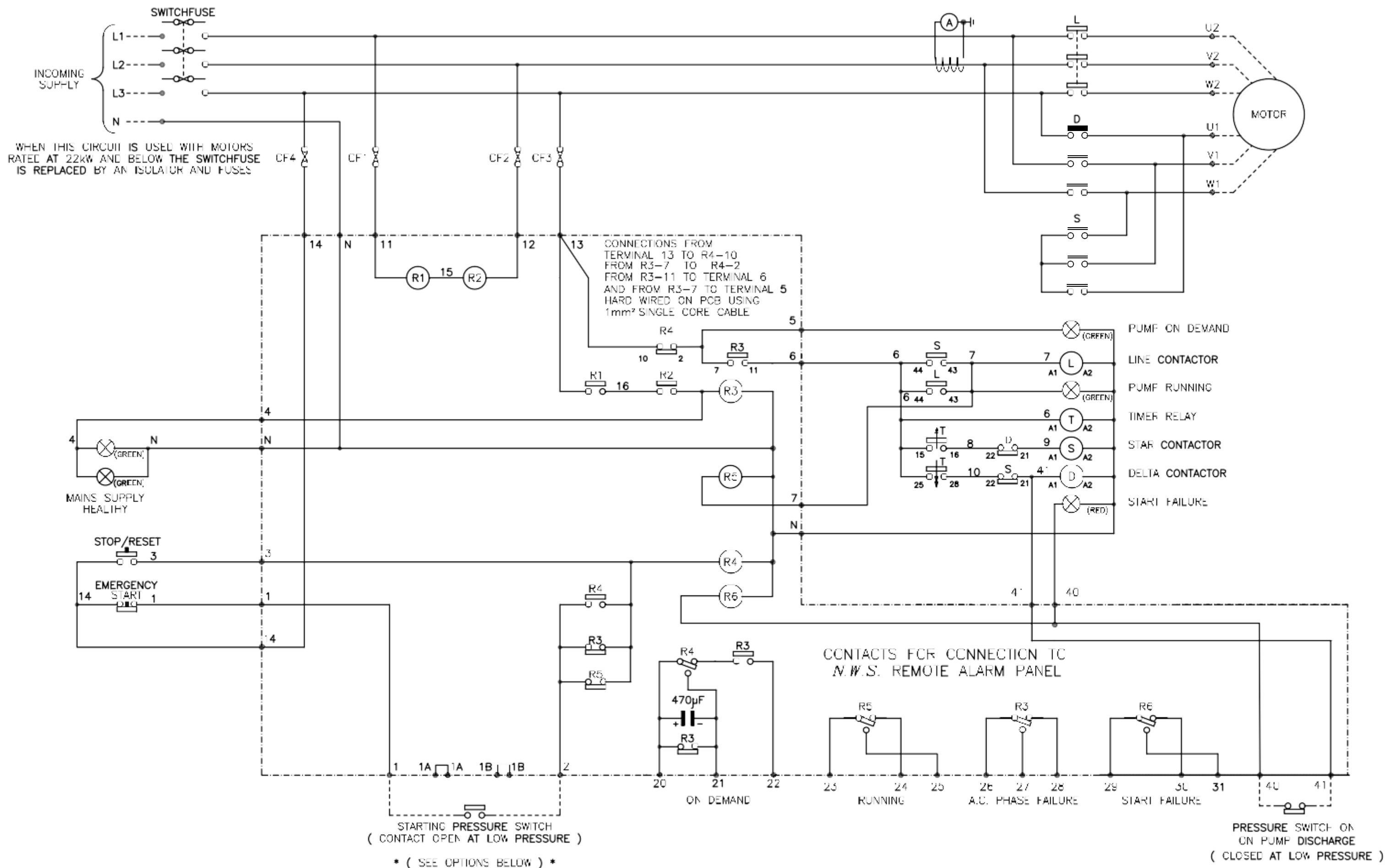
7. [2750.9 @ 1.66],[21.68 kW],[5.227 m]

8. [3209.3 @ 0.19],[21.45 kW],[5.958 m]

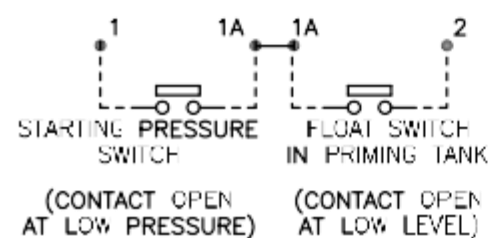


Certificate No: 197a

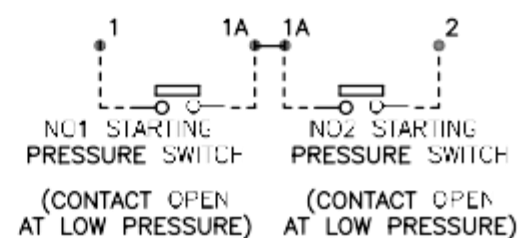




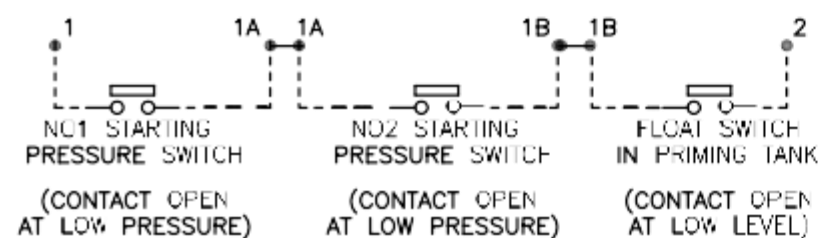
FOR APPLICATIONS ON SUCTION LIFT



FOR "EN" APPLICATION



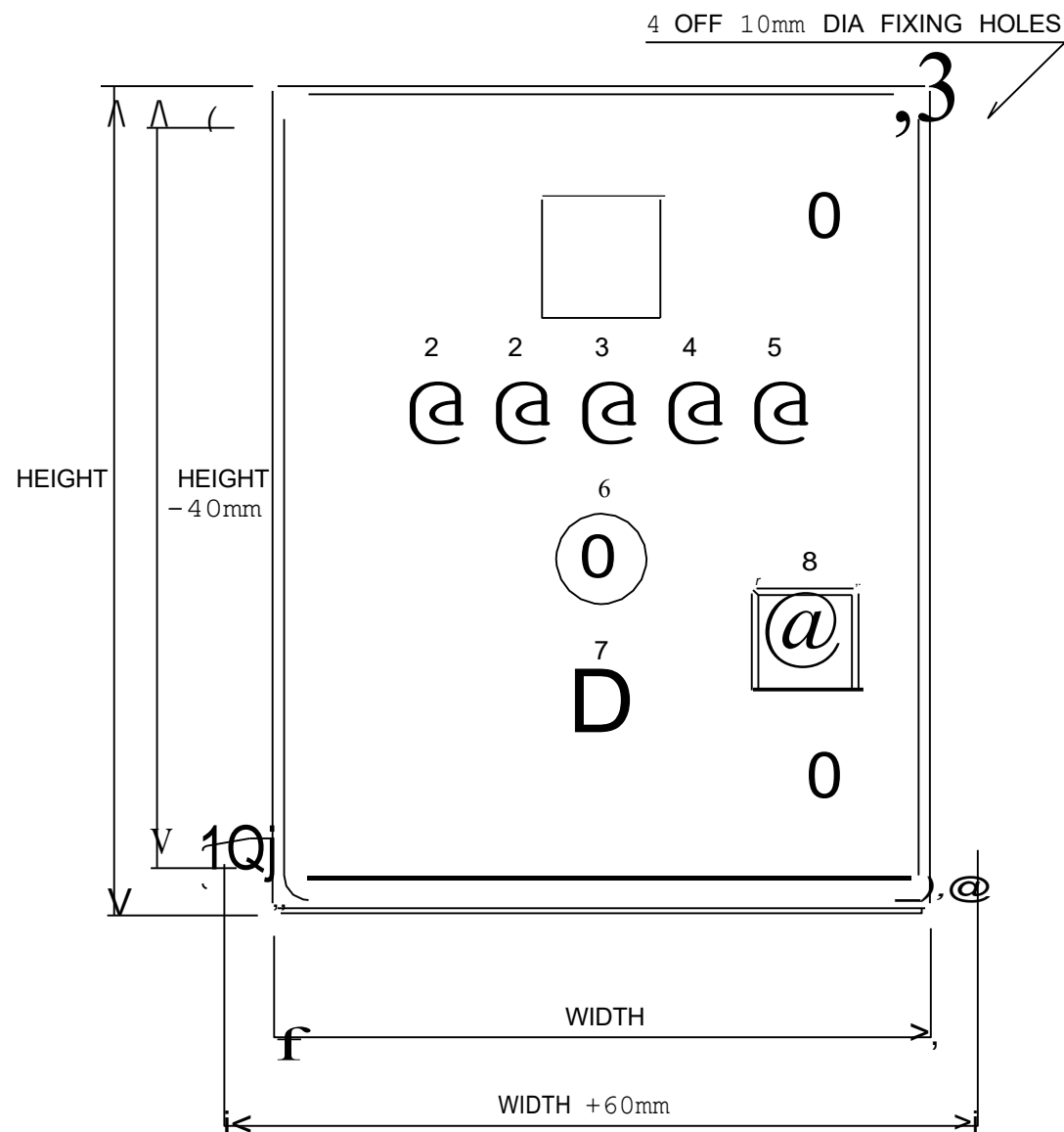
FOR "EN" APPLICATION ON SUCTION LIFT



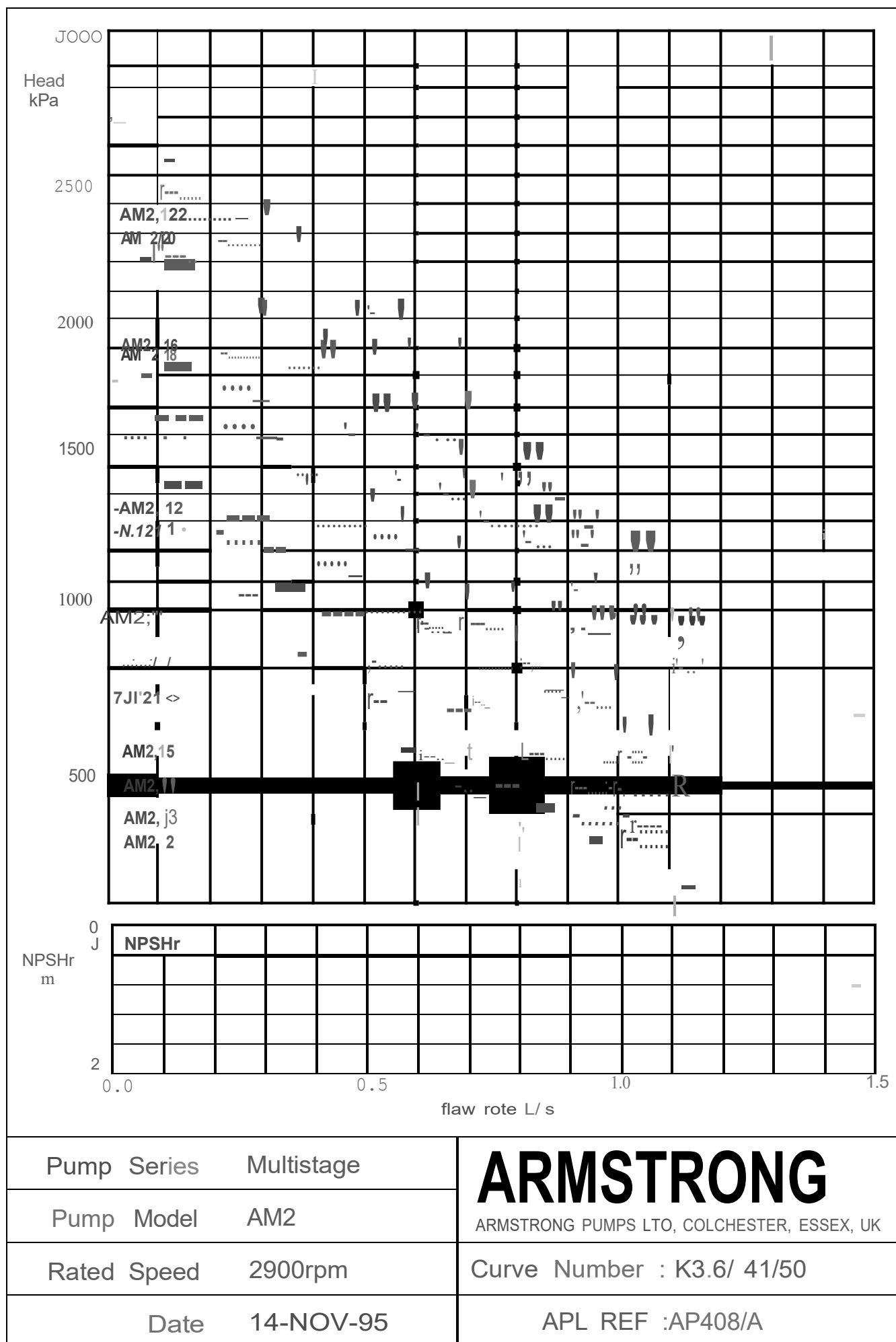
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REVISION	DRAWN BY	CHECKED BY	DATE
<i>NORTH WEST SWITCHGEAR Ltd</i>			
MURELAMBE		LANCASHIRE	
DIAGRAM FOR L.P.C. STAR/DELTA CONTROLLER			
LPC/EN A2-17010			

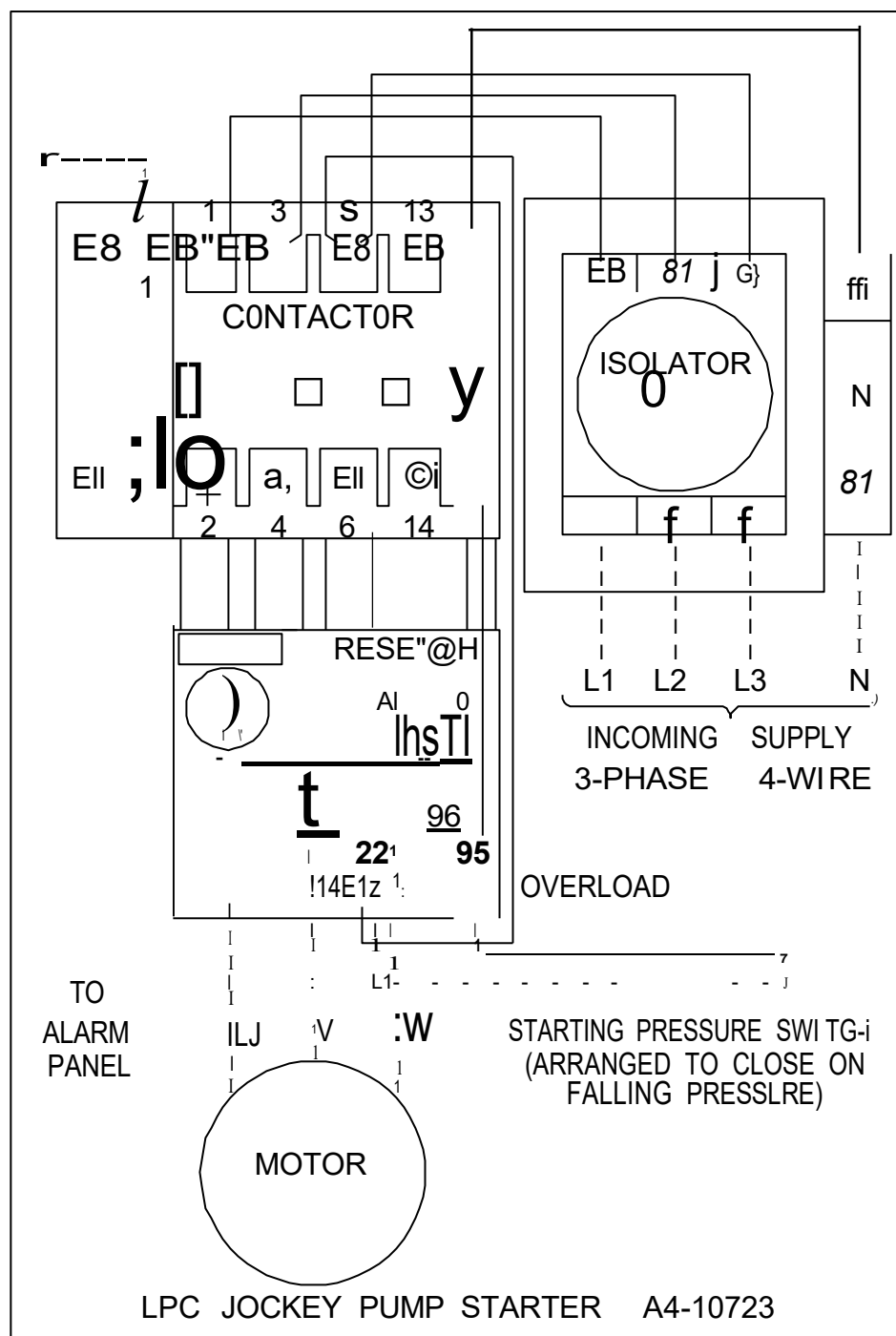
ITEM	DESCRIPTION
1	AMMETER
2	MAINS SUPPLY HEALTHY-INDICATING LAMP
3	PUMP ON DEMAND -INDICATING LAMP
4	PUMP RUNNING -INDICATING LAMP
5	START FAILURE -INDICATING LAMP
6	EMERGENCY START -PUSHBUTTON
7	STOP/RESET -PUSHBUTTON
8	ISOLATOR SWITCH FUSE OPERATING HANDLE

Kw RATING	HEIGHT	WIDTH	DEPTH	
5.5	500	500	210	
7.5	500	500	210	
11	500	500	210	
15	500	500	210	
18.5	500	500	210	
??	500	500	210	
30	600	600	210	
37	600	600	210	
45	600	600	210	
55	600	600	210	
75	800	700	250	
90	800	800	210	
110	800	800	210	
132-220	1000	800	300	



1st ISSUE	Porte,1	ID	126/06/04
REVISION	DRAWN BY	DATE	
NORTH WEST SWITCHGEAR Ltd			
HIRECABE LANCASHIRE			
GENERAL ARRANGEMENT OF FIRE PUMP CONTROLLER (BS5306 & EN12845 COMPLIANT) A3-17536			





**NORTH WEST
SW/ TCHGEAR LTD**

MORECAMBE LANCASHIRE

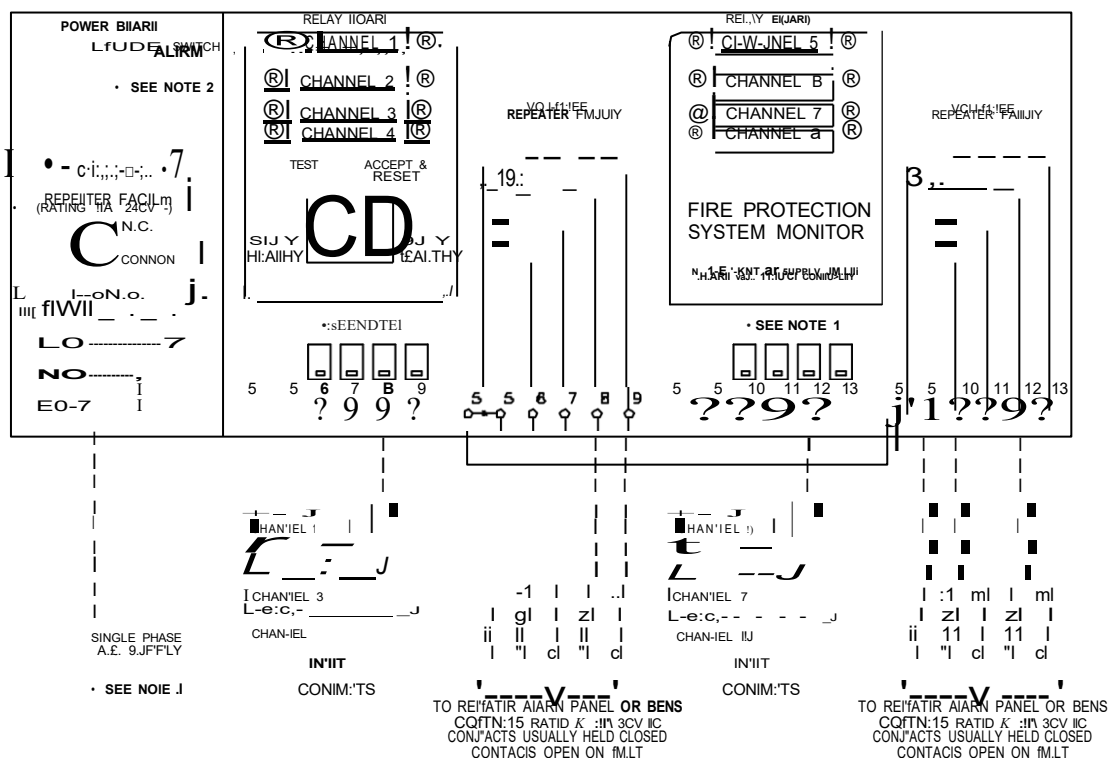
L.P.C. JOCKEY PUMP STARTER

A4-10723

1st ISSUE	JRA	EJF	14-11-95
REV	DRAWN	CKD	DATE

NOTES:

1. SPARE CHANNELS WHEN NOT IN USE - SLIDE SWITCH INTO THE UP POSITION
2. ALARM SILENCE SWITCH - TO BE POSITIONED AS SHOWN ON COMMISSIONING
3. INCOMING SUPPLY IS SINGLE PHASE AC IN ACCORDANCE WITH CURRENT LPC RULES.



CHANNEL	1	2	3	4	5	6	7	B
* PART 1	PUMPS ON DEMAND	AC PIVISE FAILURE	ELMTRIC PUMP RUNNING	FIRE IN PIM' HOUSE	DIESEL CONTROLLER FAULT	DESEL PUMP RUNNING		
PART 2	PUMPS ON DEMAND	1-b.1 PLM' RLNIIC	Na.1 CONTROLLER FALL	FIRE IN PLM' HOUSE	Na.2 PUW' RUNNING	Na.2 CONTROLLER FALL		
PART 3	PUMPS ON DEMAND	1-b.1 PLM' RLNIIC	Na.1 CONTROLLER FALL	FIRE IN PIM' HOUSE	Na.2 PV' RUNNING	Na.2 AC PHASE FAILURE		
* PART 4	PUMPS ON DEMAND	AC PIVISE FAILURE	ELMTRIC PUMP RUNNING	FIRE IN PIM' HOUSE	No.1 DIESEL CONTROLLER FAULT	No.1 DIESEL PUMP RUNNING	No.2 DIESEL CONTROLLER FAULT	No.2 DIESEL PUMP RUNNING
PART 5	PUMPS ON DEMAND	1-b.1 PLM' RLNIIC	Na.1 CONTROLLER FALL	FIRE IN PIM' HOUSE	Na.2 PUW' RUNNING	Na.2 CONTROLLER FALL	Na.1 PIM' RLNIIC	Na.3 CONTROLLER FALL
PART 6	PUMPS ON DEMAND	AC PIVISE FAILURE	ELMTRIC PUMP RUNNING	FIRE IN PIM' HOUSE	DIESEL CONTROLLER FAULT	DESEL PUMP RUNNING	LOW WATER	JOCKEY PUMP RUNNING
PART 7	DESEL PUMP ON DEMAND	DIESEL PIM' RLNIIC	TRouble AT ENGINE	FIRE IN PIM' HOUSE	ELECTRIC PUW' ON DEMAND	ELECTRIC PUMP RUNNING	H. FAULT	
PART 8	ELECTRIC PUMP RUNNING	PIVISE FAILURE			CONTROLLER N IFF CA NANLIAL	ENGINE RUNNING	FAULT ON CONTROLLER	
PART 9	No.1 PIMP ON DEMAND	No.1 PIM' RLNIIC	No.1 PHASE FAILURE	FIRE IN PIM' HOUSE	No.1 PUMP ON CEMAN	No.2 PUMP RUNNING	ND.2 AC PHASE FAILURE	
PART 10	PUMPS ON DEMAND	AC PIVISE FAILURE	ELMTRIC SET RUNNING	FIRE IN PIM' HOUSE	DIESEL CONTROLLER FAULT	DESEL SIT RUNNING	FIRE BUILDING HI	FIRE BUILDING 1 2
PART 11	PUMPS ON DEMAND	1-b.1 PLM' RLNIIC	ND.1 AC PHASE FAILURE	FIRE IN PIM' HOUSE	Na.2 PUW' RUNNING	1-b.2 N. PHASE FAILURE	Na.1 PIM' RLNIIC	ND.3 AC PHASE FAILURE
PART 12	ELECTRIC PUMP ON DEMAND	ELECTRIC PIM' RLNIIC	SIMPLY FAILURE	FIRE IN PIM' HOUSE	DIESEL PUMP ON DEMAND	DESEL PUMP RUNNING	IR(JI.S.E AT ENGINE	
PART 13	PUMP ON DEMAND	AC PIVISE FAILURE	ELECTRIC PUMP RUNNING	FIRE IN PIM' HOUSE	HCH LEVEL TANK ALARM	LOW LEVEL TANK ALARM		
*PART 14	PUMPS ON DEMAND	Na.1 CONTROLLER FAULT	No.1 PUMP RUNNING	FIRE IN PLM' HOUSE	No.1 CONTROLLER FAULT	No.2 PUMP RUNNING		
*PART 15	PUMPS ON DEMAND	No.1 CONTROLLER FAULT	Na.1 PUMP RUNNING	FIRE IN PIM' HOUSE	No.2 CONTROLLER FAULT	No.2 PUMP RUNNING	No.1 CONTROLLER FAULT	No.1 PUMP RUNNING
*PART 16	PUMPS ON DEMAND	No.1 J.C. PIVISE FAILURE	No.1 PUMP RUNNING	FIRE IN PIM' HOUSE	No.2 AC PHASE FAILURE	No.2 PUMP RUNNING		
PART 17								
PART 18								
PART 19								
PART 20								
PART 21								

1dle * LEGENDS AVAILABLE IN DUTCH, ENGLISH, NORWEGIAN AND POLISH.

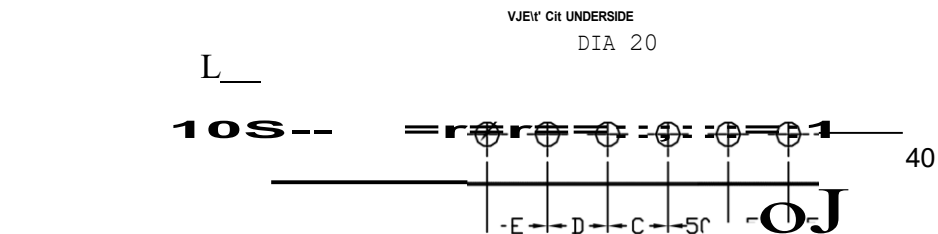
2dle

2d

3d

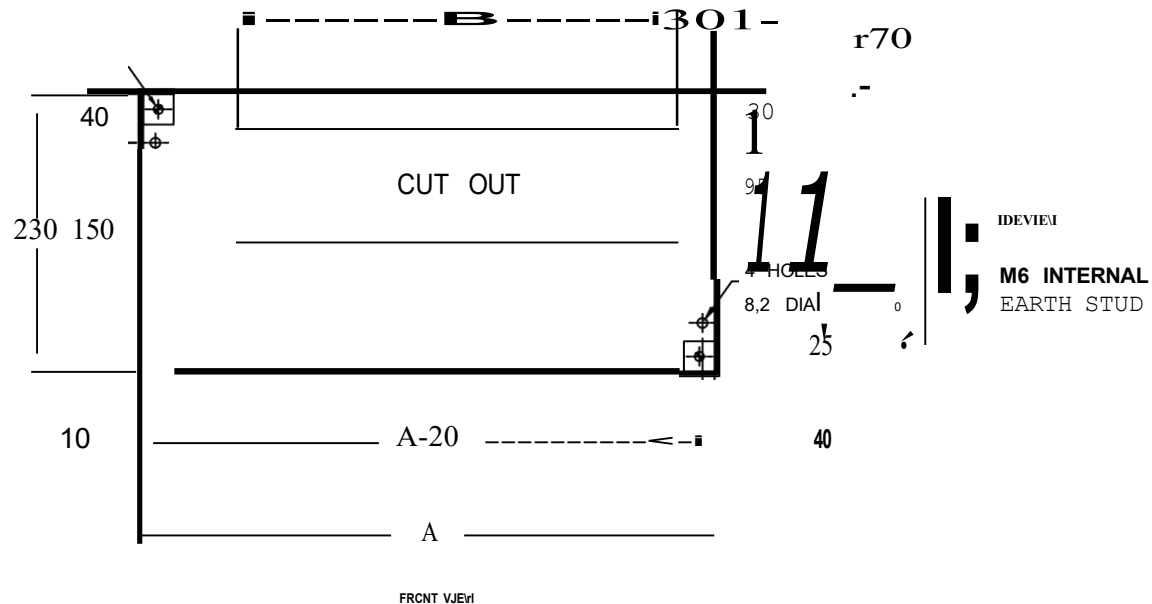
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3rd ISSU	en Porter	ID	25/04/2000
2nd ISSU	JRA	JB	115/07/97
1st ISSUE	JRA	JB	09/12/96
REVISION	DRAWN BY	CHECKED BY	DATE
NORTH WEST SWITCHGEAR Ltd			
MORECAMBE LANCASHIRE			
8 CHANNEL ALARM PANEL AC VERSION			
A3-11341			



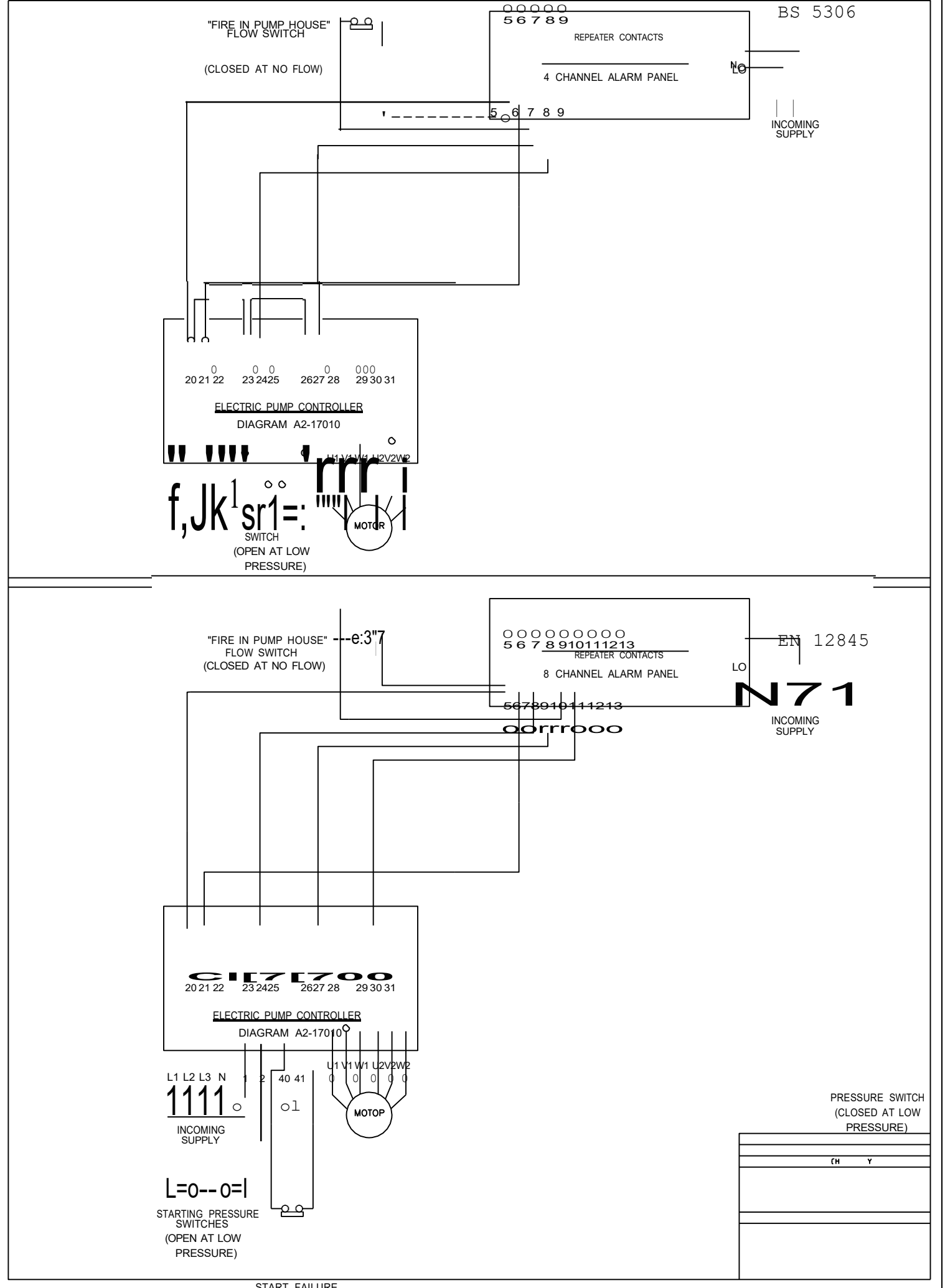
PART	No OF 'WAYS	A	B	C	D	E
1	4/8	250	140			
2	12	325	215	50	50	50
3	16	400	290	50	50	50
4	20	475	365	50	50	50

M4 SCREWS TO
FIX LID



FINISH TO BE STATED ON ORDER,
ALL DIMENSIONS ARE INTERNAL,

1st ISSUE	Jr	DH	3/V03
REVISION	DRAWN BY	CHECKED BY	DATE
NORTH WEST SWITCHGEAR Lt			
HORECARBE		LANCASHIRE	
ENCLOSURE FOR ALARM PANEL			
A3-11430			



1st ISSUE I CT I JB I 20/07/06
REVISION DRAWN BY . ECKED B DATE

*NORTH WEST
SWITCHGEAR*

d Lt

MORECAMBE LANCASHIRE
CONTROLLER LINK UP DIAGRAM
BS5306 and EN12845
1 ELECTRIC INSTALLATION

A3-18060

FIRE PUMPS

Series 4280FE Motor Mounted Pumps & Series 4030FE Base Mounted Pumps

CE CONFORMITIES

For declaration of Conformities contact Armstrong Pumps.

INTRODUCTION

This document contains specific information regarding the safe installation, operating and maintenance of the Series 4280FE & 4030FE pumps and should be read and understood by installing, operating and maintenance personnel. The equipment supplied has been designed and constructed to be safe and without risk to health and safety when properly installed, operated and maintained. The instructions following must be strictly adhered to. If clarification is needed on any point please contact Armstrong quoting the equipment serial number.

WARNING SYMBOLS



Safety instruction where an electrical hazard is involved.



Safety instruction where non-compliance would affect safety risk.



Safety instruction relating to safe operation of the equipment. (ATTENTION)

INSTRUCTIONS FOR SAFE USE



No installation of this equipment should take place unless this document has been studied and understood. handling, transportation and installation of this equipment should only undertaken by trained personnel with proper use of lifting equipment. See later diagrams for lifting advice. Refer to the pump nameplate for pump speed, pressure and temperature limitations. The limits stated must not be exceeded without written permission from Armstrong Pumps.

TEMPERATURE



Where under normal operating conditions the limit of 68°C/155°F (Restricted Zone) for normal touch, or 80°C/176°F (Unrestricted Zone) for unintentional touch, may be experienced, steps should be taken to minimize contact or warn operators/users that normal operating conditions will be exceeded. In certain cases where the temperature of the pumped liquid exceeds the above stated temperature levels, pump casing temperatures may exceed 100°C/212°F and not withstanding pump insulation techniques appropriate measures must be taken to minimize risk for operating personnel.

NOISE LEVELS



Estimated Pumping Unit Sound Level, Decibels, A-Weighted, at 1m (3ft) from unit.

Motor Size (kW)	1000 min ⁻¹ (dB-A)	1500 min ⁻¹ (dB-A)	3000 min ⁻¹ (dB-A)
> 2.2 - 5.5	77	78	85
> 5.5 - 11	80	83	90
> 11 - 22	84	89	93
> 22 - 37	88	92	95
> 37 - 55	90	94	97
> 55 - 110	92	98	100
> 110 - 220	96	102	102

STORAGE

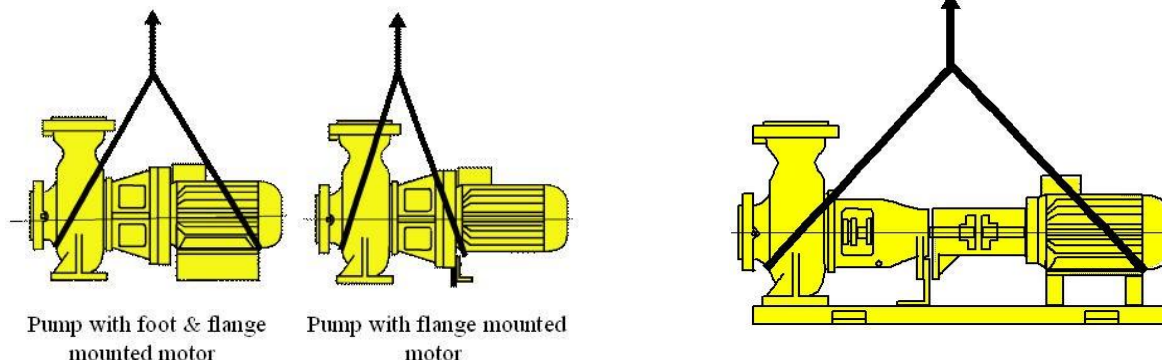
Pumps not immediately placed into service, or removed from service and stored, must be properly prepared to prevent excessive rusting. Pump port protection plates must not be removed until the pump is ready to connect to the piping. Rotate the shaft periodically (at least monthly) to keep rotating element free and bearings fully functional. For long-term storage, the pump must be placed in a vertical position in a dry environment. Internal rusting can be prevented by removing the plugs at the top and bottom of the casing and drain or air blow out all water to prevent rust buildup or the possibility of freezing. Be sure to reinstall the plugs when the unit is made operational. Rust proofing or packing the casing with moisture absorbing material and covering the flanges is acceptable. When returning to service be sure to remove the drying agent from the pump.

UNCRATING

Armstrong End Suction pumps are thoroughly inspected before shipment to assure they meet with your order requirements. After removing the pump from the crate, make sure the equipment is in good order and that all components are received as called for on the packing list. Any shortages or damage should be reported immediately. Use extreme care in handling the unit, placing slings and hooks carefully so that stress will not be imposed on the pump. **NEVER PLACE CABLE SLINGS AROUND THE PUMP SHAFT.** The eye bolts or lifting lugs on the motor are intended for lifting only the motor and not the complete unit.

HANDLING

Use slings as shown in the diagram to lift the set. Do not use the motor eyebolts to lift the pump set. See the delivery note for the weight of the set.



LIMITATIONS

See pump nameplate for speed, duty and maximum pressure/temperature limitations. These limits must not, under any circumstances, be exceeded without prior consultation with Armstrong Pumps.

IMPORTANT:

Do not run the pump for any length of time under very low flow conditions or with the discharge valve closed. To do so could cause the water in the casing to reach super heated steam conditions and will cause premature failure and could cause serious and dramatic damage to the pump and surrounding area.

INSTALLATION

1. LOCATION

- In open systems, locate the unit as close as practical to the liquid being pumped, with a short, direct suction pipe. Ensure adequate space is left above and around the unit for operation, maintenance, service and inspection of parts.
- In closed systems, where possible, the pumps should be installed immediately downstream of the expansion tank/make-up connection. This is the point of zero pressure change and is necessary for effective pump operation. Do not install more than one expansion tank connection into any closed hydronic system.
- Electric motor driven pumps should not be located in damp or dusty location without special protection.
- Airflow into the motor and/or motor fan should not be obstructed.

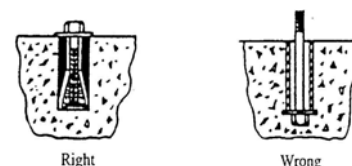
2. INSTALLATION

- Recommended installation arrangements are:

2.1 FOUNDATION

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent rigid support for the baseplate. This is essential in maintaining the alignment of a direct connected unit. A good foundation should weigh approx. 2.5 times the shipping weight of the pump. In building the foundation make ample allowance for grouting. Foundation bolts of the proper size should be arranged as shown, with a pipe sleeve embedded in the concrete to permit adjustment of the bolts after the concrete has been poured. Use sleeves with a diameter 2.5 times the diameter of the bolts.

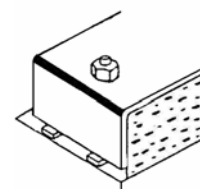
Locate the pump on its foundation holes using the motor feet as a template. Drill four holes of the required size and insert the anchors. Take the tamping tool (supplied with the anchors) and drive home the lead sleeve until it is below the level of the foundation and firmly fixed in the concrete.



2.2 LEVELLING

When the unit has been placed on its foundation, slacken off the coupling setscrews and slide back the coupling halves so that the pump and motor shafts are free to rotate independently. Re-tighten the setscrews in this position. Do not re-connect the coupling until after the unit has been piped up, finally aligned and checked for correct direction of rotation.

Insert metal wedges approx. 15mm thick on either side of the foundation bolts under the baseplate as shown. Adjust wedges until the shafts of the pump and motor are level. On flanged pumps check suction and discharge flanges for vertical or horizontal position using a level and correct as necessary by adjusting the wedges. When the baseplate is completely level, the foundation bolts should be tightened evenly and firmly. Do not over-tighten bolts at this stage.



2.3 ALIGNMENT

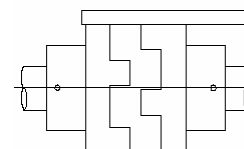
The pump unit is accurately aligned in our factory prior to being shipped. However all baseplates are flexible to some extent and must not be relied upon to maintain factory alignment. Re-alignment is necessary as follows:

- After the unit has been set level on its foundation.
- After the grout has set and the foundation bolts have been tightened.
- After the pipes have been connected.

Accurate alignment is absolutely essential, proper mechanical operation of the equipment cannot be guaranteed unless the factory alignment is reproduced in the field.

Coupling Alignment

Check the alignment by placing a straight edge across the coupling rims at the top, bottom and both sides. Care must be taken to have the straight edge parallel to the axis of the pump and motor shaft. Alignment is obtained when the straight edge rests evenly on both rims in all four positions.



Adjust as necessary by placing shims under the motor feet.

2.4 GROUTING

After levelling the unit and checking the alignment. Fill the baseplate completely with grout, allowing it to flow around the wedges under the baseplate. Allow 48 hours for the grout to harden before final tightening of the foundation bolts.

2.5 PIPING

Both the suction and discharge pipes should be independently supported near the pump so that no strain is imposed on the pump when the pipes are connected. All connecting pipework should be accurately located – do not attempt to force the suction and discharge pipes into position.

Suction Piping

Use short direct suction piping one or two times larger than the pump suction nozzle. Arrange piping to eliminate potential air pockets and use an eccentric reducer to connect to the suction nozzle. A strainer three or four times the area of the suction pipe will prevent foreign materials entering the pump.

Discharge Piping

A check valve and gate valve should be installed in the discharge line. If an increaser is used on the discharge side to increase the size of the discharge pipe it should be placed between the check valve and the pump.

2.6 FINAL ALIGNMENT

When the piping has been connected, check the alignment and make corrections if necessary. Energise the motor (with coupling halves disconnected) and check that the rotation corresponds with the direction arrow on the pump to reverse the rotation on a three-phase motor, interchange two leads.

When rotation and alignment are correct, re-connect the coupling with both halves butting against the rubber insert. Tighten the coupling set screws.

3. PUMP PIPING - GENERAL

- Never connect a pump to piping, unless extra care is taken to measure and align the piping flanges well. Always start piping from pump. Use as few bends as possible and preferably long radius elbows.
- Ensure the piping exerts no strain on the pump as this could distort the casing causing breakage or early failure due to pump misalignment.
- All connecting pipe flanges must be square to the pipework and parallel to the pump flanges.
- Suction and discharge pipes may be increased or decreased at the pump nozzle to suit pump capacity and particular conditions of installation. Use eccentric reducers on suction connection with flat side uppermost.
- Layout the suction line with a continual rise towards the pump without high points, thus eliminating possibility of air pockets that may prevent the pump from operating effectively.
- A strainer of three or four times the area of the suction pipe, installed in the suction line, will prevent the entrance of foreign materials into the pump. 5mm diameter perforations in the strainer is typical.
- In open systems, test suction line for air leaks before starting; this becomes essential with long suction line or static lift.
- Install, at the pump suction, a straight pipe of a length equivalent to 4 or 6 times its diameter; this becomes essential when handling liquids above 49°C (120°F). Armstrong suction guides may be used in place of the straight pipe run and in-line strainer.
- Install an isolation valve in both suction and discharge lines on flooded suction application; these valves are used primarily to isolate the pump for inspection or repair
- Install a non-slam non-return check valve in discharge line between pump and isolation valve to protect pump from excessive back pressure and to prevent water running back through the pump in case of driver failure on open systems. An Armstrong Flo-Trex valve may be used in place of non-return check valve and isolation valve on pump discharge.

CAUTION:

The discharge valve only is to be used to throttle pump flow, not the suction valve. Care must be taken in the suction line layout and installation, as it is usually the major source of concern in centrifugal pump applications

OPERATION

4. STARTING PUMP



- Ensure that the pump turns freely by hand, or with some mechanical help such as a strap and lever on larger pumps. Ensure that all protective guarding is securely fixed in position.
- The pump must be fully primed on start up. Fill the pump casing with liquid and rotate the shaft by hand to remove any air trapped in the impeller.
- “Bump” or energize the motor momentarily and check that the rotation corresponds with the directional arrow on the pump casing.
- To reverse rotation of a three-phase motor, interchange any two power leads.
- Start the pump with the discharge valve closed and the suction valve open, then gradually open the discharge valve when the motor is at operating speed. The discharge valve may be “cracked” or open slightly at start up to help eliminate trapped air.
- When stopping the pump: Close the discharge valve and de-energize the motor.
- DO NOT run the pump against a closed discharge valve for an extended period of time. (a few minutes maximum).
- Star-Delta motor starters should be fitted with electronic/mechanical interlocks that have a timed period of no more than 40 milli-seconds when switching from star (Starting) to delta (Run) connection yet allow the motor to reach full star (Starting) speed before switching to delta (Run).
- Should the pump be noisy or vibrate on start-up a common reason is overstated system head. Check this by calculating the pump operating head by deducting the suction pressure gauge value from the discharge gauge reading. Convert the result into the units of the pump head as stated on the pump nameplate and compare the values. Should the actual pump operating head be significantly less than the nameplate head value it is typically permissible to throttle the discharge isolation valve until the actual operating head is equal to the nameplate value. Any noise or vibration usually disappears. The system designer or operator should be made aware of this soon as some adjustment may be required to the pump impeller diameter or drive settings, if applicable, to make the pump suitable for the system as installed.

CAUTION:



Check the direction of rotation against the rotation arrow prior to operating the unit.

5. GENERAL CARE

- The pumps are built to operate without periodic maintenance, other than bearing lubrication on some units. A systematic inspection made at regular intervals will ensure years of trouble-free operation, give special attention to the following:
- Keep the unit clean.
- Provide the motor with correctly sized overload protection.
- Keep moisture, refuse, dust or other loose particles away from the pump and ventilating openings of the motor.
- Avoid operating the unit in overheated surroundings (above 40°C/100°F).

WARNING:



Whenever any service work is to be performed on a pumping unit, disconnect the power source to the driver, LOCK it OFF and tag with the reason. Any possibility of the unit starting while being serviced must be eliminated.

- If mechanical seal environmental accessories are installed, ensure water is flowing through the sight flow indicator and that filter cartridges are replaced as recommended. (See Armstrong files 43.85 & 43.86 for seal environmental instructions).

CAUTION:



Under no circumstances should the pump be used for flushing out the system. In line with CIBSE commissioning code W: 1994, the pump should be out of line or bypassed during flushing.

6. LUBRICATION

Pump

Sealed Grease Bearings

- If the pump is fitted with greased lubricated bearings, no external lubrication is required.
- These bearings are custom greased for general service applications and sealed.

Oil Lubricated Bearings

- If the pump is fitted with oil lubricated bearings; use a non-detergent oil equal to No.10 motor oil.
- Prior to start up check to make sure the oil level is visible in the sight glass.
- Under normal operating conditions the oil should be changed every year or 3000 hours as follows:
 - a) Drain the oil from the old bearing bracket.
 - b) Thoroughly flush the bearing bracket with Kerosene.
 - c) Refill the oil through the vent on top of the bracket until the oil level is visible in the middle of the sight glass.

Motor

- Follow the lubrication procedures recommended by the motor manufacturer. Many small and medium sized motors are permanently lubricated and need no added lubrication. Generally if there are grease fittings evident the motor needs periodic lubrication. None if not.
- Check the lubrication instructions supplied with the motor for the particular frame size indicated on the motor nameplate.

Mechanical Seal

- Mechanical seals require no special attention. If leakage occurs investigate the cause and replace the seal following the makers recommendations, then realign the pump and motor shafts.
- Do not run the pump unless properly filled with water as the mechanical seals need a film of liquid between the faces for proper operation.
- Mechanical seals may 'weep' slightly at start-up. Allow the pump to continue operating for several hours and the mechanical seal to 'seat' properly prior to calling for service personnel.

7. SYSTEM CLEANLINESS

- Before starting the pump the system must be thoroughly cleaned, flushed and drained and replenished with clean liquid.
- Welding slag and other foreign materials, "Stop Leak" and cleaning compounds and improper or excessive water treatment are all detrimental to the pump internals and sealing arrangement.
- Proper operation cannot be guaranteed if the above conditions are not adhered to.

CAUTION:



Under no circumstances should the pump be used for flushing out the system. In line with CIBSE commissioning code W: 1994, the pump should be out of line or bypassed during flushing.

NOTE:

Particular care must be taken to check the following before the pump is put into operation:

- a) Pump primed?
- b) Rotation OK?
- c) Lubrication OK?
- d) Pipework properly supported?
- e) Voltage supply OK?
- f) Overload protection OK?
- g) Is the system clean?
- h) Is the area around the pump clean?

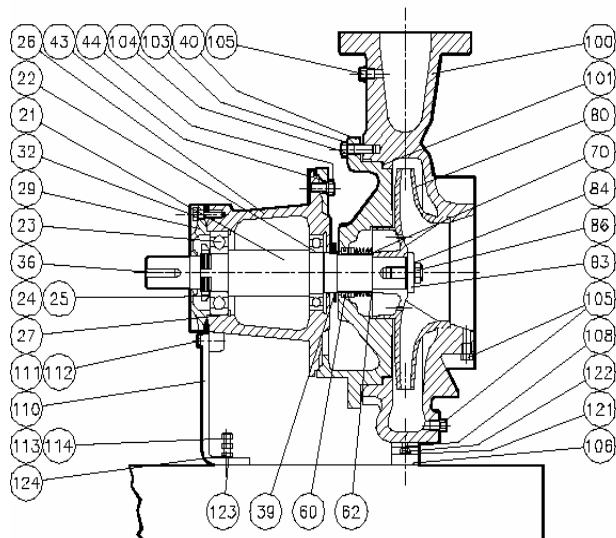
WARRANTY

Does not cover any damages to the equipment resulting from failure to observe the above precautions. Refer to Armstrong General Terms and Warranty sheet. Contact your local Armstrong representative for full information.

Symptoms	Reasons
<i>Pump fails to deliver</i>	• Pump not primed. • Suction line not filled. • Air or vapour pocket in suction line. • Inlet of suction pipe insufficiently submerged. • N.P.S.H. available too low. • Suction lift too high. • Air leaks in suction line, gland or pump joints. • Blocked suction. • Incorrect rotation. • Speed too low. • Total head of system higher than that of pump.
<i>Pump vibrates</i>	• Misalignment. • Air or vapour pocket in suction line. • Inlet of suction pipe insufficiently submerged. • N.P.S.H. available too low. Suction lift too high. • Blocked suction. • Impeller damaged. • Packing too tight. • Misalignment of pipework. • Operation at low capacity. • Rotating element out of balance. • Shaft bent. • Poor foundations.
<i>Seal leaks or fails</i>	• Misalignment. • Impurities in water. • Entrained air. • Cavitation. • Bearing failure. • Water treatment not allowed for.
<i>Low delivery rate</i>	• Air or vapour pocket in suction line. • Inlet of suction pipe insufficiently submerged. • N.P.S.H. available too low. • Suction lift too high. • Air leaks in suction line, gland or pump joints. • Blocked suction. • Incorrect rotation. • Speed too low. • Excessive system friction. • Impeller damaged
<i>Insufficient pressure</i>	• Incorrect rotation. • Speed too low. • Excessive system friction. • Impeller damaged.
<i>Low bearing life</i>	• Misalignment. • Dirt in bearings. • Bearings too tight. • Bearings badly installed. • Misalignment of pipework. • Rotating element out of balance. • Shaft bent.
<i>Bearings overheat</i>	• Misalignment. • Insufficient cooling to stuffing box. • Badly packed stuffing box. • Misalignment of pipework. • Dirt in bearings. • Bearings too tight. • Bearings badly installed.
<i>Stuffing box overheats</i>	• Packing too tight. • Insufficient cooling to stuffing box. • Badly packed stuffing box. • Misalignment of pipework.
<i>Pump delivery fails after start</i>	• Suction line not filled. • Air or vapour pocket in suction line. • Inlet of suction pipe insufficiently submerged. • N.P.S.H. available too low. • Suction lift too high. • Air leaks in suction line, gland or pump joints. • Blocked suction. • Impeller damaged.

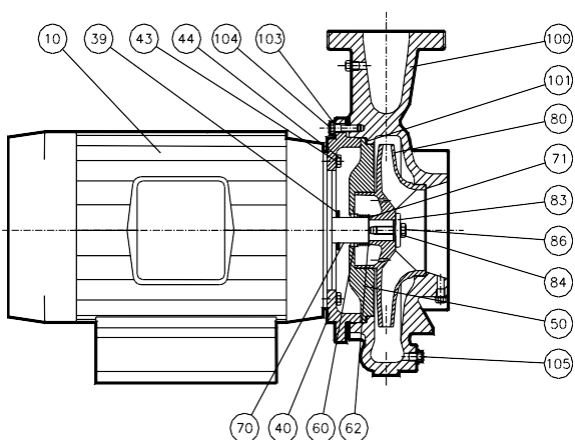
Symptoms	Reasons
<i>Pump seized</i>	• Pump not primed. • Misalignment of pipework. • Operation at low capacity
<i>Pump does not prime</i>	• Pump not primed. • Inlet of suction pipe insufficiently submerged. • Suction lift too high. • Blocked suction. • Incorrect rotation. • Badly packed stuffing box
<i>Pump Noisy</i>	• Misalignment. • Air or vapour in suction line. • Inlet or suction pipe insufficiently submerged. • N.P.S.H. available too low. • Air leaks in suction line, gland or pump joints. • Blocked suction. • Impeller damaged. • Operation at low capacity. • Rotating element out of balance. • Shaft bent. • Poor foundations. • Packing too tight. • Operation at high capacity.
<i>Motor overloading</i>	• Misalignment. • Speed too high. • Low system friction. • Pumped liquid density is greater than anticipated. • Packing too tight.
<i>Motor overheating</i>	• Misalignment. • Speed too high. • Low system friction. • Pumped liquid density is greater than anticipated. • Packing too tight.

4030FE ITEM DESCRIPTION



21	Shaft	84	Lockwasher (when fitted)
22	Bearing (Inboard)	86	Capscrew Hex Hd.
23	Bearing (Outboard)	100	Casing
24	Lockwasher	101	Gasket
25	Lock Nut	103	Washer
26	Bearing Housing	104	Capscrew Hex Hd.
27	Snap Ring	105	Pipe plug
29	Cap (O/B)	106	Support foot
32	Capscrew Hex Hd.	108	Capscrew
36	Key	110	Support foot (casing)
39	Water Slinger	111	Washer
40	Adapter	112	Capscrew Hex Hd.
43	Washer	113	Nut jam (when fitted)
44	Capscrew Hex Hd.	114	Capscrew (when fitted)
60	Seat	121	Washer
62	Mechanical Seal	122	Capscrew Hex Hd.
70	Shaft Sleeve	123	Washer
80	Impeller	124	Capscrew Hex Hd.
83	Washer Impeller		

4280FE ITEM DESCRIPTION



10	Motor
39	Water Slinger
40	Adapter
43	Washer
44	Capscrew Hex Head
50	Stuffing Box Cover (when required)
60	Seat
62	Mechanical Seal Head
70	Shaft Sleeve
71	Spacer
80	Impeller
83	Washer Imp.
84	Washer (when required)
86	Capscrew Hex Head
100	Casing
101	Gasket
103	Washer
104	Capscrew Hex Head
105	Pipe Plug

INSTALLATION & OPERATING INSTRUCTIONS SERIES AM MULTISTAGE PUMPS

IMPORTANT

- The pumps must be earthed in accordance with local electrical regulations
- Ensure that the pump is disconnected from the mains before carrying out any installations or maintenance operations.
- The standard version pump is not suitable for operation if in the presence of inflammable and explosive gases or in steamy or dusty environments.

1. GENERAL

Always specify the model number together with the serial number when asking out sales or servicing departments for technical information or spare parts. The instructions given below apply to standard versions; for the variations and characteristics of the special versions, refer to the sale contract documentation. For instructions and situations not contained in this manual or in the sale documentation, contact our service department.

When the pump is delivered, check that it has not been damaged during transport. Promptly inform your supplier if necessary.

2. WORKING LIMITS

Pump

Caution

- Max working pressure:
- 16 bar for versions with oval flange ports
 - 25 bar for versions with round flange ports

Max. temperature of the liquid: 120 Deg. C

Warning

- Pump not suitable for pumping of:
- Liquids containing abrasive
 - Liquids with solid and fibrous substances

Danger: Inflammable and explosive liquids

Motor

Warning

Max number of starts per hour:

1 phase	30
3 phase 11-15 kW	15
3 phase up to 3 kW	30
3 phase 18.5-22 kW	12
3 phase 4-7.5 kW	20

Max. ambient temperature: 40 Deg. C

3. INSTALLATION

Positioning

The pump should not be exposed to bad weather or frost. Ensure that there are no obstacles preventing normal flow of the cooling air moved by the motor fan.

Fixing

The pump must be firmly secured by means of appropriate bolts to a concrete base or equivalent metal structure. (Bracket or platform)

If you are installing a large pump near a residential property you are advised to insulate it from the reinforced concrete structure by means of vibration-damping supports or pieces of anti-vibration piping on the suction and delivery near the pump.

Suction and delivery pipes

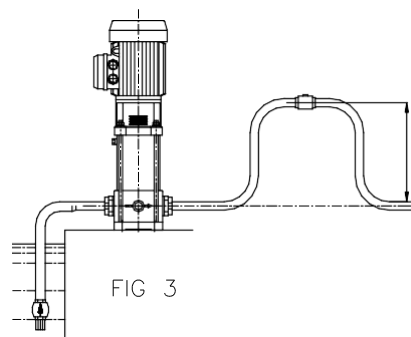
Ensure that the pipes can withstand the maximum pump working pressure.

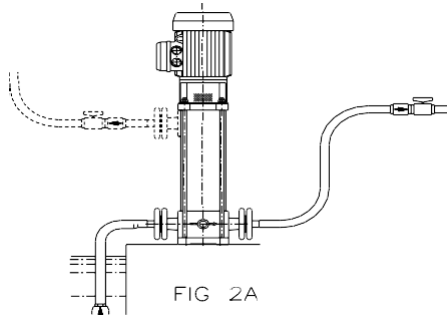
The suction pipe must be completely sealed and sized according to suction conditions.

When the level of the liquid to be moved is lower than the pump, a foot valve must be fitted at the end of the suction pipe. See fig. 2A for correct hydraulic connection.

WARNING For in-line open circuit pumps with delivery pipe discharging below the pumps, a min. elevation of 200mm, with insert of an air valve must be provided to prevent the pump from disengaging after each stop (fig. 3)

The pipes must be secured independently of the pump to avoid stressing the flanges.





4. ELECTRICAL CONNECTION

N.B. AM pumps use single and three phase motors sized and powered according to European standards.

The motor must be connected by a qualified electrical in compliance with the electrical regulations in force. Ensure that the main voltage corresponds to the voltage specified on the motor rating plate. To facilitate the connection, the terminal board can be positioned on one of the 4 positions at 90 degrees. The motor can be positioned to the right direction for connection of the power supply cables by removing the 4 spider/motor clamp screws and rotating it to the required position. Refit and tighten the 4 screws. Remove the connection box lid and connect as shown on the back of the lid and in fig. 4A or 4B.

DANGER The motor must be earthed first before carrying out any other operations.

FIG 4A
THREE PHASE MOTORS

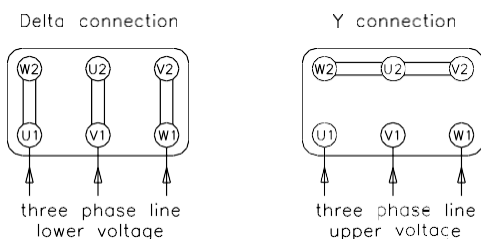
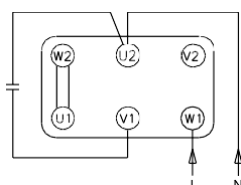


FIG 4B
SINGLE PHASE MOTORS

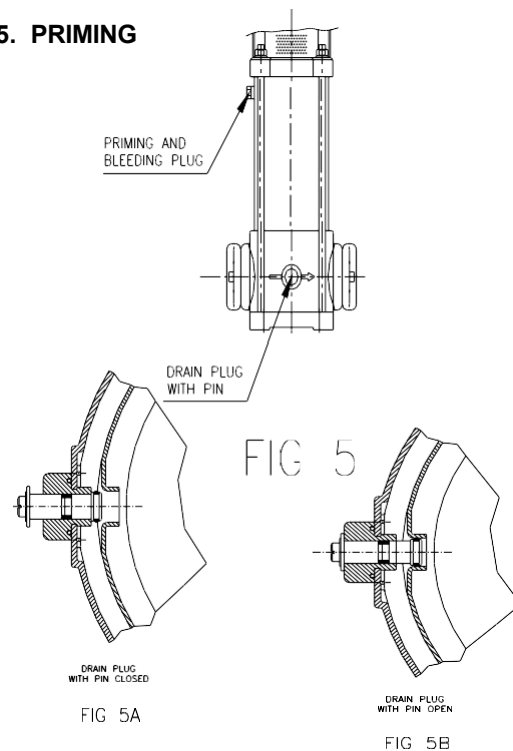


4.1 Overload Protections

- Single phase motors
The single-phase motors have incorporated protection device 2.2kW motors excluded, for which we recommend you use suitable protection
- Three phase motors

WARNING The three phase motors must be protected from overloads by a remote overload cut-out to protect them from lack of phase and excessive variations in voltage (as per point 5.1 and 5.2). The thermal relay must be set to the current specified on the rating plate of the working current of the motor is not used to full load.

5. PRIMING



WARNING For priming, the pump and suction piping must be filled with liquid before start up. In models AM2 and AM4 the drain plug pin must be fully unscrewed without forcing it (fig. 5B)

5.1 Liquid level higher than the pump

Close the on-off valve downstream from the pump in the in-line models (fig. 6)
Remove the priming-bleeding plug and open the suction valve until the water flows out of the delivery outlet (pump with overlapping outlets) or the priming-bleeding plug (pumps with in-line outlets). Close the drain pin in the series AM2 and AM4 pumps and the priming-bleeding plug.

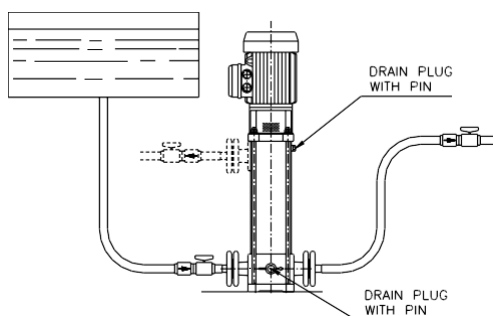


FIG 6

5.2 Liquid level lower than the pump

Close the suction valve of the pumps with in-line ports (fig. 7) unless the delivery piping is as shown in fig.3. Remove the priming-bleeding plug and by means of the pipe-shaped container provided with the pump, let the water in until full. Replace the priming plug and close the drain plug and close the drain plug pin of pumps AM2 and AM4.

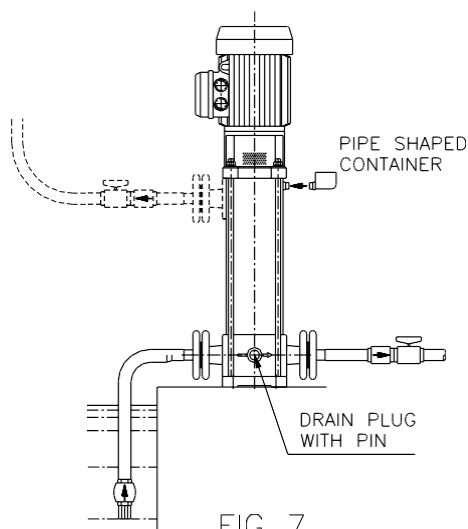


FIG 7

6. CHECKING THE ROTATION DIRECTION – THREE PHASE MOTORS

After connecting up and filling, start the pump with the delivery gate valve closed and check that the rotation direction is correct (shown on the spider and on the joint) through the joint protection or the fan cover.

DANGER if the direction of rotation is not correct, stop the motor, disconnect from the mains and invert wires in the terminal board or the starter.

7. OPERATION

Start the pump with the delivery gate valve closed and then open it gradually. The pump should function regularly and quietly. Check the current absorbed by the motor and if necessary adjust the setting of the thermal relay.

WARNING Avoid prolonged operation with the on-off valve closed in delivery unless the system is provided with a suitable by-pass. Prolonged operation with the on-off valve closed in delivery will cause the liquid to overheat.

WARNING Regulate the control equipment to avoid too many hourly start-ups in the pressurisation plants. The maximum number permitted has been already given.

If the pump is exposed to frost, drain it when not in use unless a suitable anti-freeze has been added to the liquid.

8. PERIODICAL INSPECTIONS

The pump does not require specific inspections at set times. As a precaution, however, you are advised to carry out the following checks or some of them as required depending on operating conditions:

Leaks	Operating Pressure
Thermal Protection Cut In	No. of hourly starts
Noisy operation	

If faults are found, refer to point 10 for possible causes and remedies.

9. MAINTENANCE

The pump does not require any ordinary scheduled maintenance. It may require extraordinary maintenance which generally involves cleaning the hydraulic parts or replacing the mechanical seal or other worn parts. In this case, refer to our service department.

10. PROBLEMS, POSSIBLE CAUSES AND REMEDIES

DANGER: Ensure that the pump is disconnected from the mains before carrying out any operation.

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDIES
1. The pump does not start	A) No mains voltage B) Fuses blown: B1) because they are inadequate (cut-in current too low) B2) because the motor or the power supply cable is damaged C) Overload protection previously cut in	B1) Replace the fuses with suitable ones B2) Repair the motor or replace the cable C) Reset the protection (if it cuts in again, see problem 4)
2. The pump does not deliver or delivers a reduced or irregular flow	A) Piping obstruction or valve blockage B) Pump not primed as it has not been filled, or faulty suction piping or foot valve seal (Caution: the mechanical seal may have been seriously damaged) C) Difference in level and/or pressure losses during suction too high D) Incorrect rotation direction (3-phase motors only) E) Air suction pipe or pump	A) Dismantle and clean or replace B) Fill the pump with liquid after checking the foot valve suction pipe seal and mechanical seal. C) Reduce the difference. Use a larger diameter pipe. Clean the foot valve. Replace the foot valve with a larger capacity valve D) Invert two power supply wires in the terminal board or in the starter E) Bleed the air
3. The pump vibrates and is noisy	A) The pump is working in cavitation B) Motor or support bearing worn C) Foreign bodies between fixed and rotating parts	A) Choke the flow. See possible cause B) Replace the bearings C) Clean
4. The overload protection cuts in: - 4A accidentally - 4B systematically	A) See 3C B) Temporary lack of a phase A) Incorrect setting B) The pump is delivering a flow higher than required C) Dense viscous liquid D) See 3B	A) Set to the rated current B) Close the valve in delivery until the flow rate falls within the rated valve C) Determine the actual power required and then replace the motor
5. The pump rotates in reverse when it is stopped	A) Leak in the suction pipe B) Faulty foot valve or check valve C) Air in suction pipe	A) Repair or replace C) Bleed the air

5.4 Roxspur Flow Meter Operating Manual



PLATON

OPERATION & MAINTENANCE MANUAL

LPCB APPROVED GAPMETER TYPE SGUV MK. 2

OMM1002



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for good measure

Measurement & Control

Every effort has been made during the preparation of this document to ensure the accuracy of statements and specifications. However, we do not accept liability for damage, injury, loss or expense caused by errors or omissions made. We reserve the right to withdraw or amend products or documentation without notice.

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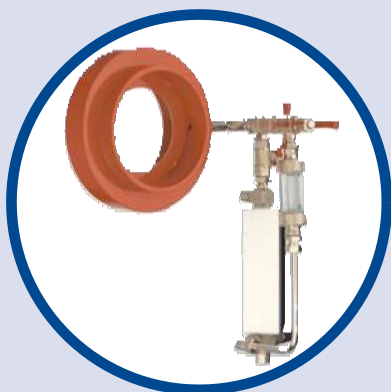
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INTRODUCTION

The SGUV Mk.2 is a flow meter specifically designed to meet the requirement for a direct reading flow meter for use in Automatic Sprinkler, Water spray or Deluge systems. It is approved for regular monitoring and testing of such systems by the LPCB (Loss Prevention Certification Board), under their 'Rules for Automatic Sprinkler Installations' (LPS1045), in the UK.

The SGUV Mk.2 provides a robust, direct reading flow meter for 50, 80, 100, 150 & 200 mm pipelines and is suitable for use in both Horizontal & Vertical pipes, with the flow in any direction:

- Horizontally, Left to Right
 Right to Left
- Vertically, Upwards
 Downwards

Full bore Isolation valves are located in the by-pass loop, allowing meter isolation for Filter cleaning & Tube replacement.

The inline Filter avoids clogging of the by-pass loop with any pipeline debris. In addition, a Rodding device ensures that the secondary Restrictor Orifice remains clear of any smaller particles or algae.

Bleed/Drain valves allow venting of trapped Air or draining of the isolated Indicator by-pass loop.

PRINCIPLES OF OPERATION

The SGUV Mk.2 is a combination of two simple measuring elements:

1. Installed in the main pipeline is a sharp edged Orifice, mounted in a Carrier ring. This assembly produces a pressure drop proportional to the square root of the flow.
2. Installed across the main Orifice / Carrier assembly is an Indicator by-pass loop containing an accurately calibrated Restrictor (secondary Orifice). This Restrictor converts the main Orifice pressure drop into flow rate, which is directly proportional to the main pipeline flow.

MATERIALS OF CONSTRUCTION

Carrier Assy - Orifice Plate, Stainless Steel, mounted in:
Carrier, Steel, Red Polyester Powder coated, in 2 styles.

Indicator Assy - Housing: Die-cast Aluminium Alloy, White Polyester Powder coated.
Bezel: Die-cast Aluminium Alloy, Black Polyester Powder coated.
Window, Perspex.

Isolation Valves: Full Bore Brass Ball valve, Bright Nickel Plated.
Rodding Device: Stainless Steel.
Filter Element: Stainless Steel with 1.5mm perforations.
Filter Housing: TPX.

Other Pipes & Connectors: Copper & Brass, Bright Nickel Plated.
Seals: Nitrile & Polyurethane.
Bleed/Drain Valve Seats, PTFE.

Tube Assy - Tube, Borosilicate Glass with 100 mm fused in ceramic scale.
Float, Stainless Steel.
Float Stops, Polypropylene.



SPECIFICATION

- Sizes

Ranges

Mounting
- Accuracy

Temperature

Pressure

Pressure Drop

Approval

LPCB Listing
- 50, 80, 100, 150 & 200 mm Nominal Bores
 - See Table 1
 - Either Flange or Grooved styles available
 - Flanged to suit BS10 Table 'E' (also suitable for Table 'D') flanges
 - Grooved to suit 'Victaulic®' grooved piping system
 - Other manufacturers products can be used providing they conform to the Victaulic® specification.
 - ±5 % at various test flows specified by LPCB (see Table 1)
 - Design, -30 to 80°C
 - Operation, 15°C
 - Design, 30 bar g maximum @ 15°C, hydraulic
 - Operation, 12 bar g maximum @ 20°C
 - 65% of the Orifice Pressure loss (354" wg) is recovered at maximum flow
 - By LPCB to LPS1045 standard
 - LPCB Reference No's 088a/05 – 14 (see Table 2 for Platon Ref's)
 - Approved Fire & Security Products & Services
 - Part 5 – Automatic Sprinkler, Water Spray & Deluge Systems
 - Section 6 – Direct Reading Flow Meters



Table 1 - Flow Ranges

LPCB Ref No.	Nominal Pipe Size (mm)	Flow Ranges dm³/min	Test Flows dm³/min	Accuracy @ Test Flows dm³/min
088a/05, 088a/10	50	150-750	500	±25
088a/06, 088a/11	80	300-2300	800	±40
088a/07, 088a/12	100	500-3500	1300	±65
088a/08, 088a/13	150	900-8200	1500	±75
088a/09, 088a/14	200	2500-12500	2200	±110
			2500	±125
			3500	±175
			4500	±225
			5000	±250
			7000	±350
			9000	±450

Table 2 - LPCB & Platon No. Cross referencing

Flanged Carrier Ref's LPCB*	Platon~	Groove Carrier Ref's LPCB*	Platon~
088a/05	F1/5	088a/10	F1/10
088a/06	F1/6	088a/11	F1/11
088a/07	F1/7	088a/12	F1/12
088a/08	F1/8	088a/13	F1/13
088a/09	F1/9	088a/14	F1/14

* The LPCB ref No. appears on the Carrier only
~ The Platon ref No. appears on both the Carrier & Tube.
Also, the Tube & Float assemblies of a particular NB are universal between the 2 carrier styles and therefore, carry both Platon Ref No's, i.e. F1/6 or F1/11

INSTALLATION

Prior to Installation

1. Check the instrument for any transit damage. Any damage to the by-pass loop could increase resistance to flow and therefore render calibration inaccurate.
2. Re-check that the instrument is suitable for the chosen application.
3. Check that the box includes (for complete instruments only):
 - a) A Carrier of either Flanged or Grooved style.
 - b) An Indicator by-pass loop, assembled for Horizontal pipelines & Left to Right flows.
 - c) 2 x Tube & Float Assemblies (1x assembled in Indicator housing).
 - d) An impulse pipe for Vertically, Upwards flows.
 - e) An impulse pipe for Vertically, Downwards flows.
4. Check that the Platon Reference numbers on the Carrier and glass Tube are identical. i.e. F1/** (see Table 2).
5. Remove any packing materials, as necessary, from any component.
6. For best accuracy ensure that the pipeline bores are smooth and that they match that of the Carrier.
7. Select a location to ensure compliance with the Recommended Pipeline Configurations (see Fig 1 & Table 3).

Carrier Installation

Flanged Style

1. The Carrier should be mounted inside the bolt circle of two flanges (see Specification).
2. Ensure the Carrier is precisely centred in relation to the pipeline & flanges.
3. Ensure that the Gaskets (not supplied) either side of the Carrier has an Inside Diameter (I.D.) greater than or equal to the pipe nominal bore. Also ensure that when assembled no part of the gasket protrudes into the pipeline at any point.

Grooved Style

1. The Carrier should be mounted to the pipeline using two appropriately specified joints.
2. Always lubricate gasket joints, so as to avoid pinching and leakage.

Both Carrier Styles

- 1. Ensure the Carrier flow label matches the flow direction of the pipeline.
- 2. Ensure the process connections of the Carrier protrude from the pipeline in the correct direction to ensure:
 - a) Vertical Indicator assembly.
 - b) Readable Viewing angle.

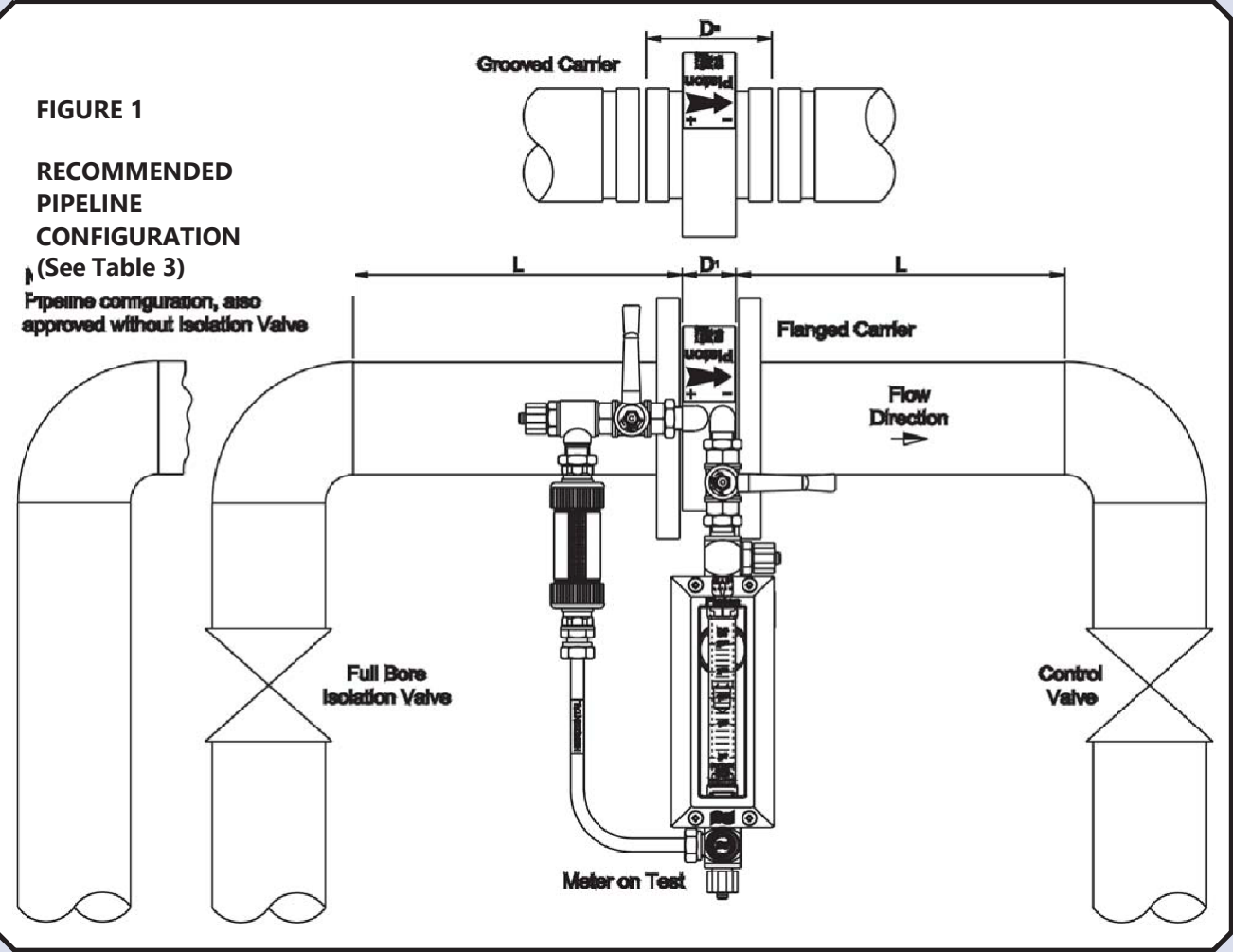
Indicator Installation

- 1. Based on the pipeline orientation and direction of flow, assemble the Indicator by-pass loop, using the appropriate impulse pipe. Note the factory supplied set-up, is for Horizontal, Left to Right flows.
- 2. Whatever the main pipeline configuration ensure that the Float moves freely in the glass Tube and that the indicator is accurately Vertical.
- 3. Rotate the Indicator housing & glass Tube, in relation to the rest of the Indicator by-pass loop, to obtain the best viewing angle.

Table 3 - Recommended Minimum Upstream & Downstream Pipe Lengths (See Fig 1).

Carrier Style	Nominal Bore (mm) & Pipe Specification				
	50	80	100	150	200
	BS1387				BS3600
L	250	400	500	750	1000
D1 Flanged	38.1				
D2 Grooved	89.1			98.1	
	min 5 x NB				

FIGURE 1
RECOMMENDED
PIPELINE
CONFIGURATION
(See Table 3)
Pipeline configuration, also
approved without Isolation Valve



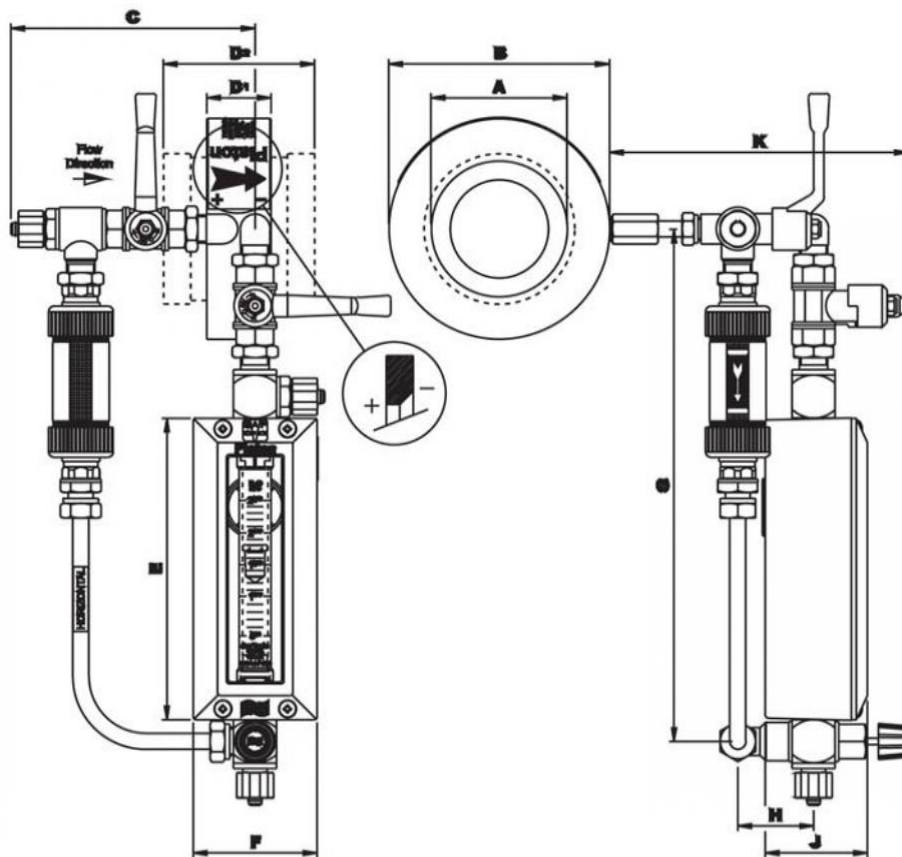


FIGURE 2

**HORIZONTAL
PIPELINE - FLOW
LEFT TO RIGHT**

	mm
A	=NB
B	PCD - Bolt Dia
C	150 max
D1	See Table 3
D2	
E	178
F	73
G	305 max
H	45
J	60
K	180 max

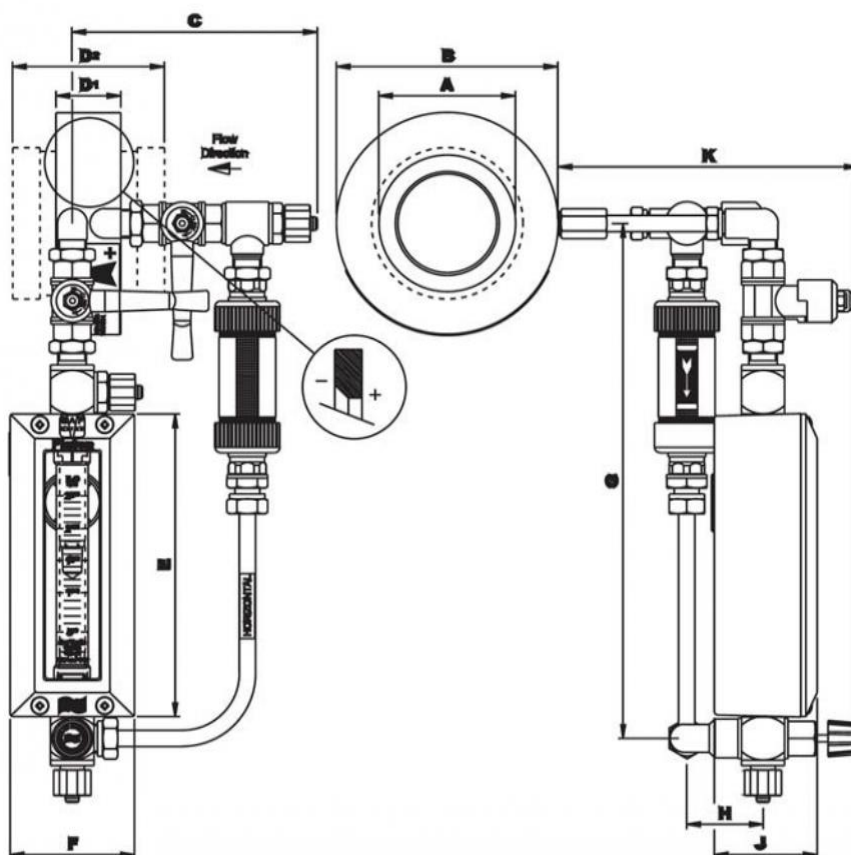


FIGURE 3

**HORIZONTAL
PIPELINE - FLOW
RIGHT TO LEFT**

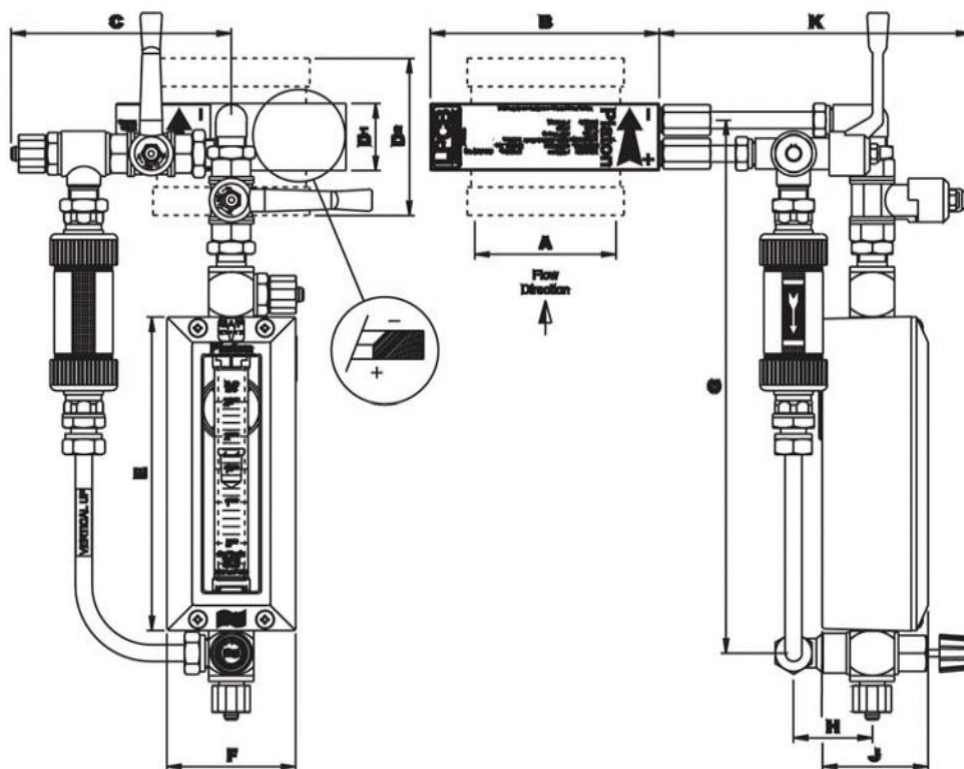


FIGURE 4
VERTICAL PIPELINE -
FLOW UPWARDS

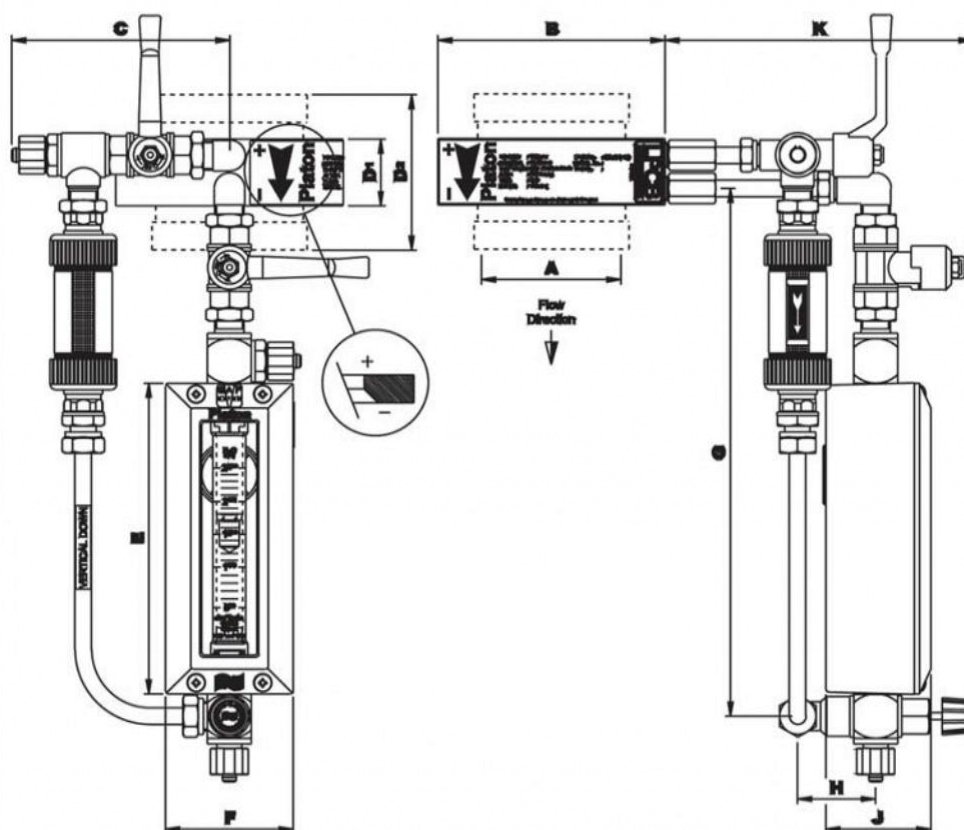


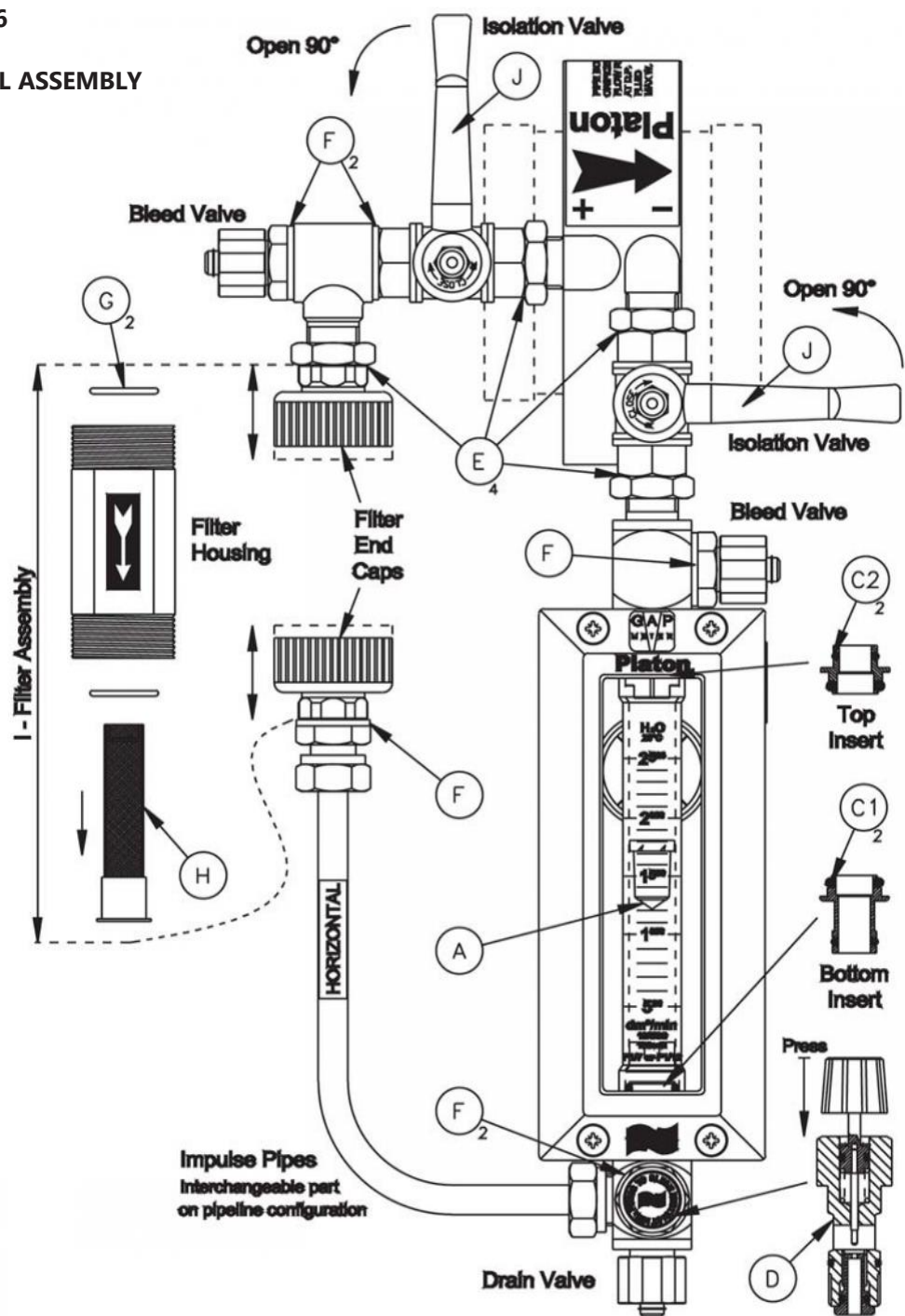
FIGURE 5
VERTICAL PIPELINE
- FLOW
DOWNWARDS

	mm
A	=NB
B	PCD - Bolt Dia
C	133 max
D1	See Table 3
D2	
E	178
F	73
G	305 max
H	45
J	60
K	180 max

OPERATION

1. Ensure that the Filter (H) is clean.
2. Check that no pipe debris is obstructing the Restrictor by pressing the Restrictor cleaning valve (D).
3. Bleed all Air from the Indicator by-pass loop before taking any flow readings.
4. Make sure that the Isolating Valves (J) are fully open before taking any flow readings.
5. Read the top edge of the Float.
6. When not in use the Isolation Valves should be closed and the Indicator by-pass loop drained. Once the unit has been fully drained all the Bleed/Drain Valves should then be closed.

FIGURE 6
GENERAL ASSEMBLY

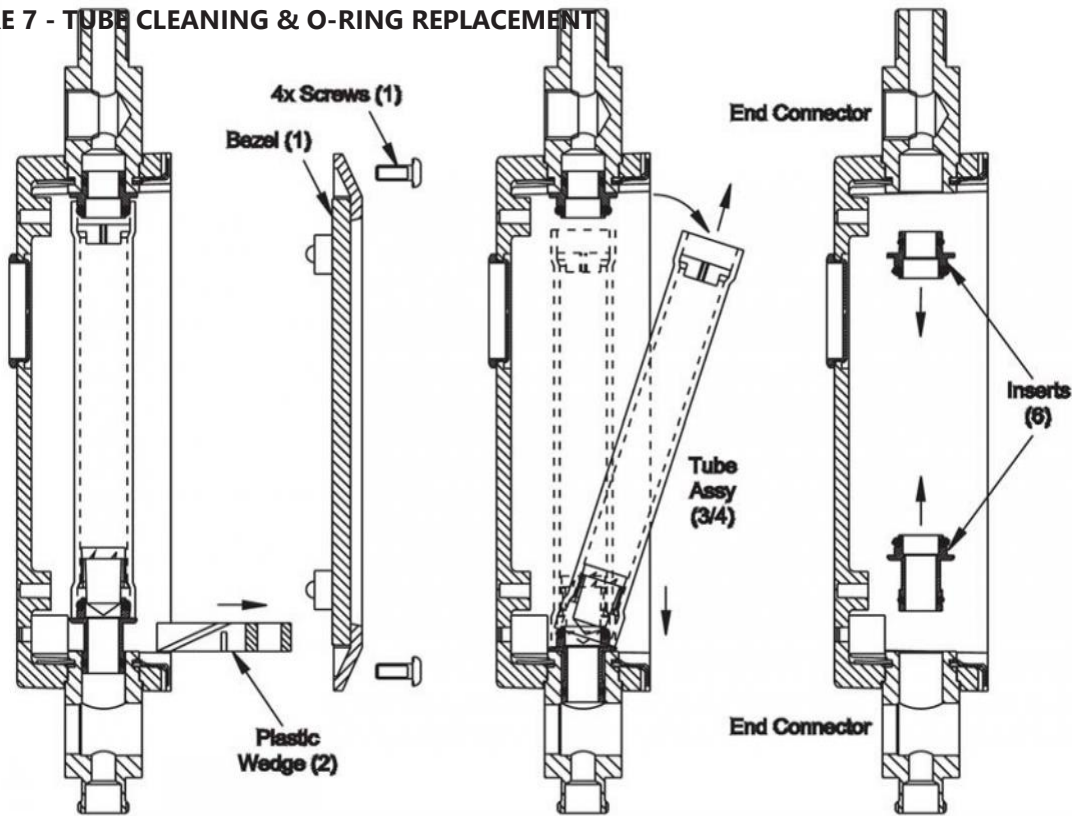


MAINTENANCE

Glass Tube Cleaning or O-ring/Glass Tube Replacement (See Fig 7)

1. Unscrew 4x screws and remove the bezel.
2. By pulling towards you, remove the plastic wedge, located at the bottom of the housing.
3. Slide the tube downwards, towards the gap created by the removal of the plastic wedge, until the bottom Insert is fully engaged in its end connector. Ensure that the top insert & end connector remain engaged together.
4. Noting the tube & float orientation, carefully tilt the top of the tube towards you, until it is clear of the Insert, then pull upwards.
5. If the O-rings DO NOT require replacing, then proceed to instruction 11.
6. Remove both Inserts from their end connectors by pulling, noting which Insert came from which end connector. To aid with their removal the plastic wedge can now be used as a sliding wedge.
7. Remove 2x old O-rings from each insert.
8. Care should be taken that the new O-rings (C1 & C2) are not damaged when assembling them to the inserts.
9. Moistening the O-rings with a suitable lubricant is advisable, such that when re-assembling to the end connectors or tube the O-rings are not damaged.
10. As previously noted, push the inserts back into the appropriate end connector, fully.
11. To replace the tube (A), reverse steps 1-4, using steps 12 & 13, for guidance.
12. To aid engagement and reduce possibility of O-ring damage, rotate the tube back & forth, whilst pushing the tube & insert together.
13. Once the tube (A) is located on the bottom Insert, use the plastic wedge on the bottom Insert as a sliding wedge to force the top Insert & tube together.

FIGURE 7 - TUBE CLEANING & O-RING REPLACEMENT



Filter Cleaning or O-ring/Filter Element Replacement (See Fig 6)

1. Unscrew both end caps.
2. Remove Filter Housing from the Indicator by-pass loop, noting Flow direction label orientation.
Back wash Housing & Filter assembly using
3. clean water.
4. As necessary change the O-rings (G) or Filter (H).
5. Reassemble in reverse order.

By-pass Loop Air Removal (See Fig 6)

1. Close the Isolation Valve nearest to where the Air was observed.
2. Open the Bleed Valve nearest to where the Air was observed.
3. Close the Bleed Valve when the Air has been removed.
4. Open the Isolation Valve.

SPARES

The instruments should not require maintenance to replace parts if the instrument is used in accordance with these instructions. However spare parts are available to meet most needs as detailed below:

For Complete Instruments, see Table 4.
For Major Assemblies, see Table 5.
For Components & Sub-Assemblies, see Table 6.

Complete assembled Instruments consist of a:

- Carrier of Flanged or Grooved style
includes: Carrier, Process pipes, Ferrules & Nuts.
- 2 x Tube & Float assembly of a flow range to suit the Nominal Bore of the Carrier
includes: Tube, Float and top & bottom Float stops.
- Indicator By-pass loop
includes: parts starting at Elbows that join to Carrier Process pipes, except Tube & Float assembly.

Table 4 - Complete Instrument

NB	Flanged		Grooved	
	Part No.	Weight (kg)	Part	Weight (kg)
	No.			
50	LPCB-F1/5	4.25	LPCB-F1/10	4.65
80	LPCB-F1/6	5.10	LPCB-F1/11	5.50
100	LPCB-F1/7	6.45	LPCB-F1/12	7.40
	LPCB-F1/8	8.50	LPCB-F1/13	9.75
150	LPCB-F1/9	11.00	LPCB-F1/14	13.60
200				

Table 5 - Major Assemblies

NB	Carrier		Tube & Float*		By-Pass
	Flanged	Grooved	Flanged	Grooved	
50	LPCBC312	LPCBC314	LGTF-F1/5	LGTF-F1/10	LPCB1
80	LPCBC512	LPCBC514	LGTF-F1/6	LGTF-F1/11	
100	LPCBC612	LPCBC614	LGTF-F1/7	LGTF-F1/12	
150	LPCBC812	LPCBC814	LGTF-F1/8	LGTF-F1/13	
200	LPCBC912	LPCBC914	LGTF-F1/9	LGTF-F1/14	

* The Tube & Float assemblies of a particular NB are universal between the 2 Carrier styles. Two sets of codes have been included for simplicity. However, all Tubes, for each NB & Carrier style, carry both Platon Ref No's. (See Table 2).

Table 6 - Component & Sub-assemblies (See Fig 6)

Item	Description	Qty/Assy	Part No.
A	Tube & Float Assy	1	See Table 5
C1	Insert O-Rings - Tube to Insert	2	K23012*
C2	Insert O-Rings - End Connector to Insert	2	K23056*
D	Restrictor Cleaning Valve Assy	1	54150
E	Polyurethane Seals	4	K28115*
F	Bonded Seals	6	K23014*
G	Filter O-Rings	2	K23170*
H	Filter Element	1	56272
I	Filter Assembly (Includes G & H + Housing, End Connectors & Caps)	1	54149
J	Isolation Valves	2	K49356

* Sold in packs of 10's



RETURNS & WARRANTY

Before returning any goods to RM&C, you must obtain a Returns form containing a unique returns (CA) authorisation number. Failure to do so will result in the goods being returned to you, without any inspection, etc. To obtain this form, contact the QA department of our Sheffield office and by return the form will be faxed to you.

On receipt of the Returns form, fill in any required fields and return it with the goods to the Sheffield office. It is advisable to keep a copy of this form (with authorisation no.) for reference purposes.

If the goods have come into contact with any processes or environments that may be harmful to a user, then COSHH Regulations must also be observed. It is requested that a Material Safety Data Sheet (MSDS) is also supplied with returned goods, if this is likely to be the case. If not provided and the goods are suspected of being contaminated, they will be returned to you.

On receipt of the appropriate documentation, the goods will be examined and assessed in accordance with the terms of any Warranty agreement.

Repairs

Prior to any repair work being carried out, you will be informed of our findings and any charges that may be incurred.

Replacement

Prior to the supply of any replacements, you will be informed of our findings and any charges that may be incurred.

No replacements will be sent prior to receiving the goods back from you, unless an Order number is supplied to cover the cost of the new unit/s. After inspection, etc of the returned goods, a Credit may be issued, based on our findings.

Warranty (extract from Terms and Conditions)

The warranty period is normally 12 months from the date of shipment, except as agreed at the time of sale.

Any misuse of the goods will void any warranty.

For full Warranty and other Contract details, refer to our 'Terms & Conditions'.

Call RM&C now for good measure

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- World leader in ceramic strain gauge technology since 1988
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- Experienced Design Team will help integrate pressure capsules into your product

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- Standard and custom designs
- Fast track system for urgent deliveries and accessories

Flow

- Flow measurement solutions for 1,000s of applications
- Industry standard or custom designed products
- UK's leading manufacturer of VA Flowmeters
- Application specialists to help with product selection
- Flowbits Catalogue 2005

Systems

- Design, develop, install and commission process measurement panels
- Simple temperature monitoring panels to complex gas emission sampling installations
- Environmental monitoring specialists
- Approved contractor for nuclear facilities

Service

- UKAS accredited for 4 fields of expertise: Pressure - Temperature - Flow - Electrical
- Approved to ISO9001:2008 and ISO 17025
- Laboratory calibration and on-site service
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CERTIFICATE NO. FM22358

SECTION SIX

Trace Heating and Lagging

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6 TRACE HEATING AND INSULATION

6.1 Areas Served

Trace heating and insulation is provided to pipework exposed to the atmosphere ie. the suction pipework and the tank infill main.

(a) DESCRIPTION

(i) TRACE HEATING

The trace heating tape installed in the sprinkler pipework is the constant wattage, series resistant heating tape. Two duplicate tapes have been installed.

The purpose of the trace heating system is to maintain a temperature of 4° for the pipework against maximum ambient condition of –10°C.

The heating has a watts per metre output limit of 10w/min at 240V A.C. and is capable of circuit designs up to a maximum of 140 metres.

All aspects of the design, manufacture and installation of the trace heating system are in strict accordance with BS 6351 parts 1 and 2.

(ii) CONTROL

The trace heating circuits are controlled by surface mounted air sensing thermostats.

The thermostats have a range of - 5°C to + 5°C preset at 4° C.

(iii) INSULATION

Insulation has been applied to all trace heated pipework and comprises of non-combustible resin bonded mineral wool section in accordance with the recommendations given in BS 5422:1977. The thickness of the insulation is based on a thermal conductivity of 0.04w/m which is 25mm thick for the pipe diameter being insulated.

The finish on this is of the bright glass “0” foil finish to BS 476 (surface spread of Flame).

6.2 Heating Tape Specification

Element	:	Bunched wire Copper nickel Nickel chrome Copper tin
Electrical	:	High Temperature PVC extrusion
Dimension	:	12mm x 3mm 1.5mm centre
Shape	:	Dumbell
Max. Temperature rating	:	35° C at 10 watts per metre
Max. Withstand of temperature Heating tape not energized.	:	105° C
Min. Temperature of heating tape	:	- 20° C
Standard Loading	:	As design
Standard lengths	:	As per design. Max. circuit length 140 metres
Terminations	:	Weatherproof adhesive heat shrink sleeve

6.3 Temperature Control Thermostat Specification

(a) ENCLOSURE

Materials	:	Moulded polycarbon enclosure
Classification	:	IP 65 Non-Hazardous
Temperature Limited	:	60° C

(b) TEMPERATURE CONTROL

Type	:	Air Sensor
Temperature range	:	- 5° C to + 5° C
Accuracy	:	1° C
Switching capacity	:	16A at 360V AC
Standard Supply	:	220V/240V AC
Indication	:	Power supply on-Red Heating circuit on - Ammeter

SECTION SEVEN Service and Maintenance Schedule

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7 GENERAL

A sprinkler system may be liable to inspection by the Fire Insurer's and by the public Fire Brigade.

7.1 Staff Action

All Staff

Sprinkler system care and maintenance involves everybody in a sprinklered building, not only the specialist.

All staff should be given instructions on:-

- (a) The purpose of the sprinkler system.
- (b) Keeping sprinkler head unobstructed
- (c) The avoidance of damage to sprinkler heads and pipework
- (d) What to do if the system operates (refer to Section 8)

7.2 Specialists

Specialist personnel should be additionally responsible for the care and maintenance of the system.

- (a) Security patrolmen should, if possible, be given further information (see Check list 1).
- (b) The Fire Safety Manager, such as the Fire Safety officer or Works Engineer, should be given overall responsibility for the system. He should be trained, normally by the Sprinkler Installing company, so that he fully understands the system and is competent to carry out or supervise regular inspections and tests.
- (c) Maintenance engineers, who should be suitably qualified staff personnel or, the installing engineer under contract should carry out the yearly maintenance.

7.3 Regular Inspections and Test by Fire Safety Manager

The following inspections and tests should be carried out by the person responsible for the system: The Fire Safety Manager.

Preferably these inspections should be carried out on weekdays when it is possible to effect immediate repairs. Servicing should not take place at weekend unless the person responsible is confident that all necessary resources are available to complete the task and re-commission the system.

If a serious fault is found the leading Fire Insurer's should be informed immediately and the sprinkler installing company engaged as soon as possible to correct the fault.

Completed checklists should be retained after each inspection or test to provide a written record of the system's condition.

The Fire Brigade and/or central alarm should be warned before any directly connected alarms are tested.

As the sequence in which the inspections and tests are carried out depends on the arrangement of the plant, the following may require re-scheduling.

7.4 Weekly Test Procedure

The following test is to be carried out on a weekly basis and will test the operation of the sprinkler valve.

Please refer to figure 7.1 in section 7.6 of this file whilst carrying out this procedure.

1. Make note of pressures on gauges 'B' (below sprinkler valve) and gauge 'C' (above sprinkler valve).
2. Before ringing alarms check that the remote off site monitoring station (if applicable) has been informed that tests are being carried out.
3. The water turbine operated alarm bell and the associated pressure switch should be tested weekly and the results recorded on a chart kept in the valve chamber. This test should only be conducted by trained personnel.
4. Open the alarm test valve (E), verify that the alarm signal created by the water flow pressure alarm switch (M) is visible at the fire panel. If applicable check the sound of the water motor alarm gong – it must be clear and steady.
5. Close the alarm test valve (E), verify that the normal supply and system pressure are restored. If the supply pressure is below normal, use the instructions from the water supply to obtain the usual pressure.
6. Close the pressure switch valve (J) and verify operation of the low air pressure switch (N).
7. Check if alarm signal has received at the remote alarm panel.
8. Reset remote alarm panel and all lights should extinguish.
9. Record pressures on gauges 'B' (below sprinkler valve) and gauge 'C' (above sprinkler valve).
10. Inform remote monitoring station that the system is back 'on line'.

Should you experience any problems with the alarm valve refer to section four of this manual under the heading 'Fault Finding'.

Please Ensure the following test procedure is copied and completed during each weekly test.

Sprinkler System Weekly Checklist

This form is intended for use by the user of the sprinkler system to ensure correct maintenance checks are carried out. assistance please contact Pyro Protection Limited ☐01457 879222.

It should be completed Monday to Friday. Should you require any

Premises: Skelmersdale WTS

Date: _____

Checked by: _____

Complete the Status and Comments column. In the Status column indicate: Yes or the reading (if applicable) , if the item has been addressed and completed; No, if item has not been addressed or completed; N/A, if the item has not been addressed and is not related to this system. Provide comments or plan to resolve "No" items in the last column.

	<i>Item</i>	<i>Status</i>	<i>Comments/ Plan to Resolve</i>
1	Check and record pressures at B & C gauges		
1.1	Supply B Gauge (8)		
1.2	System C Gauge (9)		
2	Before performing the bell test ensure that any off-site monitoring station has been informed or isolated and if necessary isolate the evacuation alarm		
3	Check Pump Priming tank is full		
4	Check power supply on to electric pump (indicator on starter panel)		

	<i>Item</i>	<i>Status</i>	<i>Comments/ Plan to Resolve</i>
5	Open Alarm Test Valve (6) to simulate the operation of a single sprinkler and record the time taken for the Alarm Gong (11) to sound		
6	The fire pump or jockey pump should start		
7	Check gong rings continuously for 30 seconds		
8	Close Alarm Test Valve (6). The gong should cease to ring		
9	If the main fire pump has operated press the Start/Reset button on the pump starter panel to stop the pump		
10	Recheck and record pressure at B & C gauges (8) & (9)		
10.1	Supply B Gauge (8)		
10.2	System C Gauge (9)		
11	Re-commission alarms in step 2		
12	Close Jockey Initiation Test Valve 1 (12)		

	<i>Item</i>	<i>Status</i>	<i>Comments/ Plan to Resolve</i>
13	Slowly open Jockey Initiation Test Valve 2 (13) while observing the pressure on the corresponding gauge. The Jockey pump should start, record its starting (cut in) pressure		
14	Close Jockey Initiation Test Valve 2 (13) while observing the corresponding gauge. The jockey pump should stop, record its stopping (cut out) pressure		
15	Open Jockey Initiation Test Valve 1 (12)		
16	Open Main Pump Initiation Test Valve 1 (14)		
17	Slowly open Main Pump Initiation Test Valve 2 (15) while observing the pressure on the corresponding gauge. The pump should start, record its starting (cut in) pressure		
18	Allow the pump to run and ensure water is discharging back to the pump priming tank:		
19	Close Main Pump Initiation Test Valve 2 (15)		
20	Open Main Pump Initiation Test Valve 1 (14)		
21	Stop the pump by pressing the Stop/Reset button on the pump starter panel		

	<i>Item</i>	<i>Status</i>	<i>Comments/ Plan to Resolve</i>
22	Repeat steps 16 – 21 this time using the twin test valves to test the operation of the back up pressure switch and leave the pump running for a minimum of 10 minutes		
22.1	Record cut in pressure		
23	Reset Remote Alarm Panel		
24	Ensure all valves are in the correct open/closed position and secured where necessary		
25	Check the operation of trace heating		
26	Check the operation of pump house heating (minimum 5° C)		
27	Check cut-in and cut-out pressure of the air compressor		
28	Visually check water level in the sprinkler tank		

Signatures

<i>Position/Title</i>	<i>Name</i>	<i>Date</i>	<i>Sign</i>

7.5 Maintenance by Sprinkler Installing Engineers

While qualified staff may be available to carry out minor repairs and overhauls of the sprinkler system, it is strongly recommended that a maintenance contract be placed with the installing engineers for half yearly maintenance.

The contractor should provide a complete report of all work carried out and should certify that the system has been in good operable condition.

The maintenance required for the system(s) is extensive, but those measures which are normally carried out include those given below: -

(a) Annually

Major inspection and maintenance of all equipment including:

Water supplies.

- (i) Tested to show that correct water flows and pressures are being maintained.
- (ii) Proportioning equipment to be run through the hydrant valve header.
- (iii) Full flow test of sprinkler/spray systems.

Stop valves

Exercised to ascertain freedom of movements – Spindles greased.

Pressure gauges

Checked for accuracy against a standard.

Sprinkler heads

Checked to see if free from corrosion, dust or foreign material, painted or damaged heads replaced as necessary.

Pipework and hangers

Checked to see if free from mechanical damage and corrosion and necessary remedial action taken.

Storage tanks

- (i) Action of all ball valves to be tested.
- (ii) Level gauges checked for accuracy.
- (iii) All connections free from leaks and no foam solution present.

(b) **Biannually**

Flow Testing of sprinkler pumpsets.

(c) **Triennially**

Valves

Complete examination and overhaul.

Pipework and sprinkler heads

Inspection of protective coatings (e.g. Bituminous paint and protective tape for pipework, special finishes for sprinkler heads). Provide where sprinklers are installed in corrosive atmosphere. Repair and replace as necessary.

(d) **At least every 15 years**

Mechanical damage

Pipework, hangers and sprinkler heads can be damaged by carelessness.

Sprinkler piping should not be used for supporting ladders, stock or other material. Where overhead pipework is liable to damage it can be protected by the construction of "goal posts" or other adequate guards.

Suitable metal guards should protect sprinkler heads in situations where they may be damaged, but these guards shall not be used in conjunction with ceiling or ceiling flush type sprinklers.

Overheating

Overheating refers to ambient temperatures approaching that at which a sprinkler head is designed to operate. This weakens the head, which may eventually operate at a lower temperature. Solder type heads are particularly susceptible.

If a proposed change in production practices will alter ambient temperatures the installing contractor and fire insurers should be consulted about the possibility of replacing sprinkler heads with those of a different temperature rating.

Frost

Wet pipe systems are susceptible to frost. Freezing of a small part of the system may result in water damage and render it inoperable.

- (i) The temperature within buildings containing a wet pipe system should not fall below 4°C. Temperatures should be checked daily in the winter using a minimum reading temperature.
- (ii) When sections of pipework are unavoidably exposed to frost conditions they should be lagged and if necessary, trace heated.

Sprinkler shut down

Maintenance or inspection may reveal faults, which will require the closedown of the sprinkler system while repairs are undertaken. In this case, strict precautions should be observed in line with the fire insurer's requirements.

Records

Drawings and other details of the system should be kept on site. They should be revised as necessary whenever changes are made to the system.

Change in risk layout

Changes in structure, occupancy, storage layout or heating and lighting equipment may call for modification of the sprinkler system. The need to update the system in this way should be constantly borne in mind and the fire insurers and installing contractors consulted before any such changes are carried out.

Changes in water supply

The fire insurers should be informed of any depletion of water supplies which may result from, or from blockages or sedimentation, or from an increase in the amount of water taken elsewhere, or from a burst main or drought. In the case of a burst main, it may be possible to close the stop valve between the two separate inlets of a "duplicate" supply from a main fed from both ends, thus safeguarding the supply from the other end.

Obstructing of sprinkler heads

To ensure effective distribution of water, a clear space of at least 500mm should be maintained below the level of the sprinkler deflectors. For high-piled stock a clearance of 1 meter or more should be provided.

When stored goods may cause obstructions to sprinkler discharge, the practice of placing notices advising of storage height restrictions and height limit bars or height lines painted on walls is recommended.

Redecoration and dust

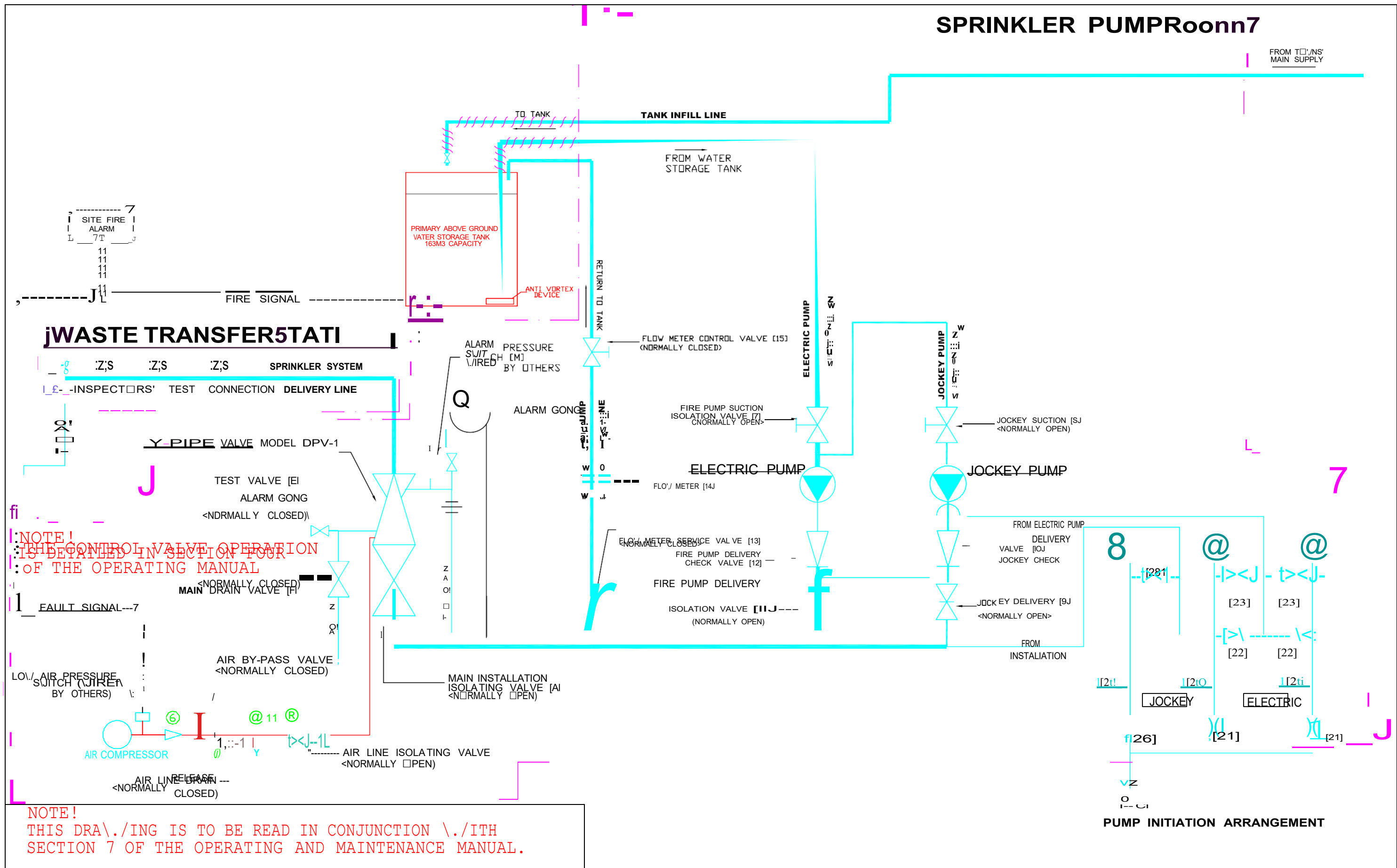
Sprinkler heads are heat sensitive and their sensitivity and reliability can be greatly impaired by coating with paint or dust. The build up of dust along distribution and range pipes can also aid the spread of fire.

The checking and cleaning of any ceiling void plenums should be carried out on a regular basis depending on the likely accumulation of dust and debris.

During redecoration, painting should be carefully supervised and the installation checked afterwards. Painted heads should be replaced. In a dusty atmosphere heads should be cleaned regularly.

7.6 Figure 7.1 Pumproom Pipework & Identification Diagram

SPRINKLER PUMPHOUSE



NOTE!
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH
SECTION 7 OF THE OPERATING AND MAINTENANCE MANUAL.



SADDLEWORTH BUSINESS CENTRE
Huddersfield Road
Delph, Oldham
OL3 5DF
Tel: 01457 879888
Fax: 01457 879222

FIGURE 7.1

SPRINKLER PROTECTION PUMPHOUSE
DIAGRAMMATIC FLOW & VALVE DIAGRAM

SECTION EIGHT

Staffing Action

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8 STAFF ACTION UPON SYSTEM OPERATION

8.1 When The Alarm Sounds

- (a) Staff should be instructed to call the Fire Brigade on hearing the alarm and follow the normal fire procedure for the premises. The Fire Brigade should be called, even if there is an automatic brigade connection, as this will confirm that a call has been received.
- (b) Only after carrying out '1 a' should the cause of the alarm be investigated if it appears safe to do so.
- (c) **ON NO ACCOUNT** (other than the express command of the Fire Brigade) should sprinkler stop valves be closed unless it is certain that there is no fire or that it is out. Even if an extinguished fire is found in one area the WHOLE building should be searched before the valve is turned off – there may be more than one seat of fire.

REINSTATEMENT

After a fire, every effort should be made to reinstate the sprinkler system as soon as possible by replacing the heads with spares. If several heads have opened this is probably best done by the sprinkler contractors, who in any case should be informed of the fire and asked to re-inspect the system. While the system remains inoperative strict precautions should be observed.

FALSE ALARMS

Leaks and damaged sprinkler heads can cause the alarm to sound. Repair and reinstatement should be carried out immediately.

False alarms can also be caused by pressure surges from the Town main water supplied. If this problem occurs the fire insurers should be consulted and the sprinkler installing contractors should be asked to modify the system as necessary.

INCIDENT REPORT

The Fire Insurers should be informed of any incident whether or not an Insurance claim is made.

SECTION NINE

System Certification

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9 SYSTEM CERTIFICATION

9.1 Pressure Test Certificates



PRESSURE TEST CERTIFICATE

Pyro Protection Limited

Saddleworth Business Centre
Huddersfield Road

Delph

OL3 5DF

Pyro Protection Job No: C3250

Site Address:

Stanley Waste Transfer Station

Stanley Way

Junction of Stanley Way and Seddon Place

Skelmersdale

WN8 8EE

Standard: BS En 12845: 2003

All tests have been carried out in conformance with BS En 12845: 2003, F.M. N.F.P.A. or specific Fire Insurers requirements. Air test must be completed prior to hydrostatic test.

Description of equipment tested.

Installation number: One Valve size: 150 J Type: Dry

Valve Serial Number: 0a11J Manuf: Tyco Model: DPV-1

Remarks:

Test gauge Serial Number:

TEST RESULTS*

Location:	Pneumatic/ hydrostatic	Pressure (Bar)	Duration
Waste Transfer Roof	Hydro	15	1 hour

* If hydrostat. pressure test less than 15 bar or 1.5 times working pressure state reason below:

Witnessed by the Client's Representative.

Test passed and certified by Pyro Protection's Engineer.

Name: P.3.0Lvlv

Name:

Signature ! (p . f3rot....;>J

Signature ! J -

Date j ?-9/:r-

9.2 Pyro Protection Ltd Completion Certificate

PYRO PROTECTION LIMITED - COMPLETION CERTIFICATE

Client Name	Cheetham Hill Construction	Completion Date	30 June 2010	Contract No	C3250
Contract Name & Address	Skelmersdale Waste Transfer Station, Stanley Way, Skelmersdale, WN8 5EE.				

DESIGN DATA

Designed to:	LPC	FM	NFPA	Other
Details of alternatives provided in lieu of recommendations: None.				

ROOF FIRE SPRINKLERS DATA

Occupancy	Waste Transfer Station				
Goods Category	III	Storage Height	2.1m	Storage Type	ST1 (Block) AMAO 270m ²
Design Density of Discharge	5.0 mm/min		Hazard Class	Ordinary Group 3	

INRACK FIRE SPRINKLERS DATA - not applicable

No of Racks in Operation	n/a	No of Levels of Protection	n/a
No of Sprinklers in Operation Per Level	n/a	Total No of Sprinklers in Operation	n/a

INSTALLATION CONTROL VALVES

Installation No	Type	Size	Manufacturer	Serial No
One	Dry Model DPV-1	150mm	Tyco	#0071

INSTALLATION ACCESSORIES

Item	Manufacturer	Type	No. Off
Alarm Motor & Gong	Tyco	WMA-1	One
Compressor	ABAC	Model B289/50	One

SPRINKLERS

Location	Hazard Class	Inst No	Dia mm	Type	Temp °C	Qty	Manufacturer
Roof	OH3	1	15mm	CU/P	68	201	Tyco
Roof	OH3	1	15mm	CU/P	93	75	Tyco

WATER STORAGE TANK

Manufacturer	Franklyn Hodge Industries		Type	Above ground cylindrical galvanised	
Dia	6.11m	Height	6.08m to rim	Capacity	163m³
Infil Size	50nb	Infil Flow	115l/min	Float Valve Size	50mm

PUMPS

Electric Pump	Duty	2,650 Umin@ 1.9 bar			
Manufacturer	Armstrong Pumps Limited	Qty	1	Serial No/s	230493-01
	Model	4x3x8.5 4280FE 22kw			
Jockey Pump	Model	AM2/7 Vertical Multistage			
Manufacturer	Armstrong Pumps limited	Qty	1	Serial No	230493-02

suction Dia	200mm	Delivery Dia	150mm
-------------	-------	--------------	-------

PUMPHOUSE ANCILLARIES

Item	Manufacturer	Size	Model
Suction Stop Valve	AVK	200	210S
Delivery Stop Valve	Texan	150	GR-1SW
Check Valve	Duo	150	Fig 41S
Flow Meter	Roxspur MMC	100	FLPCB-F1/7
Flow Switch	Potter	50	VSR-F

PUMP TEST DATA

Pump Curve Requirement		No 1 Pump Results Electric			No 2 Pump Results Diesel (not applicable)			No 3 Pump Results Electric/Diesel (not applicable)		
Flow Umin	Press Bar	Flow Umin	Press Bar	Amps	Flow Umin	Press Bar	Amps	Flow Umin	Press Bar	Rpm
0	5.10	0	5.40	23						
1,000	4.90	1,000	5.00	31						
1,500	4.30	1,500	4.50	34						
2,000	3.50	2,000	3.90	38						
2,650	2.30	2,650	2.50	40						
2,900	1.90	2,650	1.90	41						

TOWNS MAIN - not applicable

Flow Requirements		No 1 Valve Set		No 2 Valve Set		No 3 Valve Set	
Flow Umin	Press Bar	Flow Umin	Press Bar	Flow Umin	Press Bar	Flow Umin	Press Bar

We Pyro Protection limited of Saddleworth Business Centre, Huddersfield Road, Delph, Oldham, OL3 5DF hereby certify that the fire sprinkler installation(s) designed and erected in accordance with all the appropriate requirements.

Date	29 July 2010	Signature of Installing Engineer	
------	--------------	----------------------------------	---

9.3 Firas Certificate Of Conformity

Sprinkler System Certificate

Page 1 of 2

This Certificate is issued by the Contractor in accordance with the FIRAS Certification Scheme 'Requirements for Contractors Installing Commercial and Industrial Sprinkler Systems'. It confirms that the fire sprinkler system has been installed by a certificated or approved sprinkler contractor in accordance with the requirements of the Scheme. Recorded variations to the standard are listed on the reverse of this Certificate.

Installation Details

Contract Name:	Stanley Waste Transfer Facility					
Name of Client:	Cheetham Hill Construction					
Address of premises to be protected:	Stanley Waste Transfer, Stanley Way Skelmersdale, Lancashire, WN8 8EE					
Completion Date:	28/07/2010					
Contract Type:	System					
Scope of Works:	PCW					
Rules:	LPC (EN 12845)					
Area Protected:	Waste Transfer Building Roof					
Design Hazard Classification:	OH					
Storage Type:	S1					
Category:	III			Max Height:	2.1 m	
Type of Water Supply:	Pump and tank - Single					
Type of Tank:	A			Size:	163 cu metres	
Pump Details (Nominal Rating):	Flowrate: 2650 Lpm. Running pressure: 1.9 bar					
Installation 1:	Hazard:	OH	No. of sprinklers:	276	Alarm valve type:	Dry
Installation 2:	Hazard:		No. of sprinklers:		Alarm valve type:	
Installation 3:	Hazard:		No. of sprinklers:		Alarm valve type:	
Installation 4:	Hazard:		No. of sprinklers:		Alarm valve type:	
Installation 5:	Hazard:		No. of sprinklers:		Alarm valve type:	
Installation 6:	Hazard:		No. of sprinklers:		Alarm valve type:	
Any other relevant information:	Requires signature by client or end user in order to validate the certificate					

Maintenance Requirement - Owners or Occupiers Responsibility

This Certificate is only valid if the system above and the water supply are maintained and serviced by a contractor certificated or approved under the FIRAS Scheme or an equivalent third party Scheme.

Signature:

Print Name:

For and on behalf of:

Date:

FIRAS Certification Number:	EK1639
FIRAS URN:	OD39820
Contract Name:	Stanley Waste Transfer Facility

Contractor's Details

FIRAS Certification Number:	EK1639		
Company Name:	Pyro Protection Limited		
Address:	Saddleworth Business Centre, Huddersfield Road, Delph Oldham, Lancashire, OL3 5DF		
Name of Signatory:	Chris Kelly	Firas ID:	S14163
Position:	Director/MD		
Telephone:	01457 879222		
Fax:	01457 879888		
Mobile:	07979510766		
Email:	ckelly@pyroprotection.co.uk		
Verification Organisation:	IMS International		
Signature:		Date:	

9.4 Pyro Protection Ltd Commissioning Certification

SPRINKLER CONTROL VALVES

CLIENT ..CH ...H.1... -:r..... CONTRACT No...C:--'3.....

INSTALLATION No.

TYPE OF INSTALLATION

ALARM VALVE SERIAL No.

TEST AT ALARM VALVES

- Pressure on Gauge 'C' (above Alarm Valve)
Pressure on Gauge 'B' (below Alarm Valve)
Open 15mm Test Valve and record time taken for Alarm to sound
Alarm rang continuously for 30 secs.
15mm Test Valve closed and secured
Pressure on Gauge 'C' after test
Audible Alarms at remote location sounded and gave visual signal
Alarms re-set after test
All Valves secured in normal open/closed positions
Priming water level checked (Wet and Dry Valve)

COMPRESSOR

- Compressor cut in pressure
Compressor cut out pressure

GENERAL

- Sprinkler spanner in spares box
Spare sprinkler heads available
Spare platon flow glass available
Installation test card complete

FLOW TEST AT ALARM VALVES (ANNUALLY)

PRESSURE/FLOW REQUIREMENT ACTUAL FLOW/PRESSURE

Table with 6 columns: UMIN., AT, BAR, UMIN., AT, BAR. Rows for pressure and flow requirements.

QUARTERLY

- Exercise main stop valve and strap in open position
Remove and clean strainer on Water Motor Alarm Gong

HALF YEARLY

- Change Alternate Wet and Dry Valve to Winter mode
Check Alarm Valve Seatings and Grease Valve if necessary
Change Alternate Wet and Dry Valve to Summer Mode
Lubricate Alarm Motor and Gong

Installation left fully operational

Handwritten table with 4 columns and 2 rows. Row 1: 10 e., 11, 11, 11, 11. Row 2: 1bH, 11, 11, 11, 11.

Handwritten table with 5 columns and 10 rows. Contains test results like '1.76', '5.806', 'YES', '6.0', 'YES', 'YES', 'YES', 'YES', 'N/A'.

Handwritten table with 5 columns and 1 row. Contains test results like '1.5', '11', '11', '11', '11'.

Handwritten table with 5 columns and 4 rows. Contains test results like 'YES', 'YES', 'YES', 'N/A'.

Handwritten table with 5 columns and 2 rows. Contains test results like '11', '11', '11', '11', '11'.

Handwritten table with 5 columns and 2 rows. Contains test results like '1', '1', '1', '1', '1'.

.....C.....r

.....

Date..Y!{1:-:{.....

FORM S2 04/05

CLEARANCE CERTIFICATE

Site Name: Contract Number

Site address: Jft: 1/1/f

This report must be filled in by Pyro Protection Limited Engineer on completion of work and prior to leaving the premises.
A responsible representative of the company must accompany the Engineer when making this inspection and upon satisfactory completion countersign this report

INSTALLATION No. @

INSTALLATION TYPE: WET, ALTERNATE, DELUGE, PRE-ACTION, delete)

- Did you ensure by personal inspection that the Main Installation Stop Valve including the Stop Valves on the Supply Connection were fully open before you left the premises, and the water supply equipment was left operating? No
- How were these stop valves secured open? **Padlock & strap** / **Padlock & chain?**
- Was the 1/2" alarm test cock secured closed? **Yes/ No**
- Was the 1/2" alarm cock to the alarm motor and gong left open, @
- Alternate system on air and left operative for winter season? **Yes/ No**
- For alternate installations which are left set on air was the accelerator (if present) left operational? **No**
- Alternate system on water and left operative for summer season? **Yes/ No**
- For alternate installations left set on water was the accelerator (if present) left isolated? **Yes/ No**

If no to any of the above please explain reason (below) / General Comments:

..... V.C C. < / (/ (ff. cs. Z.
..... e9. ?-:?:?!, \$.....

-1-... r-:?:? C -l. lfi.h5:..... -A!-! a. a...-r.0 fe !T'..... b!??d. (-:~...-... Jr.....

Engineer's signature

..... Signature of responsible firm's representative

Print name of firm's representative: Position held: Date: **29/1/08**

we confirm that we have rendered the installation and water supply equipment fully operational and we have opened all main installation stop valve(s) and supply stop valve(s) and confirm the answers to the above are correct.

Note: This report indicated the state of the valve(s) and water supply equipment at the time and date of signing only and in the case of new installations does not necessarily indicate that the installations have been finally commissioned an Installation Commissioning Certificate must be signed.

ELECTRIC PUMP TEST CERTIFICATE

CLIENT.CH.c.ETHA.tY.\...H:). W:..CO.hl.S.IKU.C.TIO-NcoNTRACTNo... 3.25.Q.....

ELECTRIC PUMP

Nominal Duty Flow26..B..6.....UMin.....J..q.bar.....J.0.0.....% overload
Starter panel indicator lamps operating\\£\$.
Electric pumpmotor heater (if fitted) lamp operating...NJ.A.
Cut in pressure4...?5.....bar
Time to full speed (30 sec. approx.)3.....sec.
Ammeter reading at full speed.....l.....amps
Relief valve flow operating satisfactory...\\1f,?
Churn pressure on delivery gauge....s. +bar
Time period of pump run....J.O.....min.
Check visual and audible alarms at remote panel S.....O.K.
Check supply failure alarm on remote panel.....{. \$.O.K.
Check alarms re-set after test.....f.S.....O.K.
Pump bearing lubrication satisfactoryWI.A.
Manual start (if fitted) satisfactoryE-5.
Priming tank (if fitted) condition satisfactoryN ../A.
Priming tank float switch operates satisfactory ..Jl..l.A.

FLOW/PRESSURE TEST RESULTS FOR ELECTRIC PUMP

Pump curve requirements		No. 1 Pump Results			No. 2 Pump Results		
Flow (UMin.)	Pressure (b)	Flow UMin.	Press. bar	RPM	Flow L/Min.	Press. bar	RPM
0		0	5.4				
500		500	6.6				
1000		1000	8.0				
1500		1500	4.5				
2000		2000	3.				
2-650	/1	2-500	2.5				
1-q <'JO	/ /r.111	11qoo	1.9				

Pyro Protection Engineer.....L.

Date.....2-3.../..6..G/.1.Q.

WATER SUPPLY CERTIFICATE

CLIENT...C.t1££.TH:A.M.:HJLL CO..N.\$..I.WC.\ {CN;oNTRACT No ... C.3.2..50

JOCKEY PUMPS

Automatic start facility tested....4£\$
Cut in pressure5...?t, bar
Cut out pressure.....5...2..... bar

PUMPSUCTION TANK/GRAVITY TANK/RESERVOIR

Tank/reservoir condition satisfactory-1:t>.....
Suction pipe insulation condition..... £\$0.K
Immersion heater test ammeter.....O...K
Trace heating test ammeterD..K
Infill control valve open chained and padlockedW...tt.E£.L...eE..MOV.:E.D.....
Infill pipe insulation condition"-:1eS....O..K
Tank drain valve secured shut and blanked off:16.....
Ball valve operate satisfactorilyA.E.S.....
Water level satisfactory....ES
Water level indicator giving correct readingY.lfS.....
Tank cover condition satisfactory..... .E.S.....
Tank access ladder/platform condition satisfactory.....
Check for tank leaksO.k

PUMPHOUSE EQUIPMENT

Are all main stop valves padlocked and strapped in correct position.....YI S.....
Exercise stop valves and lubricate (annually).....N..fA
Pump room heated and ventilatedt.5

Pyro Protection Engineer

Date....'LI+,.../..0.6 .../... \.Q

- .rm r: J.

FIRE PUMP COMMISSIONING CHECK LIST

Customer:	Site:
Address:	
<i>Ao</i>	<i>\$>/cf....(/'7//? So-9...(/ --"9.s;;;-</i>
Contact:	Contact:
Tel No:	Tel No:
Service Order No:	Date:
	<i>?<- / -.,,,€)</i>

Electric Pump No 1

Pump Ser No:	Tvcc:			
Motor Ser No:	Frame Size:	Volts:		
Manufacturer:	Ratn! (KW):	FLC:		
CHECK	YES	NO	N/A	COMMENTS
Foundation Bolts				
Pipe Strain				
Condition of Coupling				
Coupling Alie.nment				
Coupling Bolts				
Cooling Piped to Drain				
Mechanical Seal for Leaks				
Condition of Gland Packing				
Adjust Gland Packing				
Bearing Bracket Oil Level				
Motor Bearines are Greased				
Star/Delta Wiring to Motor				
Motor Cables are Tight				
Control Fuses				
Main Fuses				
Panel Lights				
Pressure Switch Wired Correctly				
Isolating V/Vs are Open				
Rotation of Pump				
Full Panel Function Test				
Auto Start				
Emergency Start				
Pressure Switch Cut In	Nominal Duty		UMin	Bar
Hei2ht of Water in Tank				Metres
FLOW UMIN	sue PRESS.	Pump Panel	R.P.M	
0		S-	S?	'2 ;9")'.,u
		S:t<	"5./	"l.'6
/C,?->r?		"S°.r?;		/
7a::::r,7		...(<,-	-?-	54
26/517		. "y	O	3lr
		7 <-	26"	

2900

111111 arnhlrnngml llr llctl 1.1cm. om

JOCKEY PUMP

Pump Serial Number	2010042200089			Type	SV20T/11T
Motor Serial Number	107230160	Frame Size	5M80B14	Volts	400
Manufacturer	LowA/29	Rating (KW)	1.1	FLC	2.4

Check	Yes	No	N/A	Comments
Foundation Bolts	/			0, d'
Pipe Strain	//			
Condition of Couoling	///			" "
Mechanical Seal for Leaks	/,			'-
Overloads are Set Correctly	/			'7-
Motor Cables are Tight	/ ,,,			0..-k
Isolating V/Vs are Ooen				"
Rotation of Pumo				...
Bleed Air from Pump	/			
Pressure Switch Cut in	5'>'	Bar	Cut Out	_S:?' Bar

REMOTE ALARM PANEL

Check	Yes	No	NIA	Comments
Power Supply Connected				/Vo7/
Test, Ac-cept and Reset Functions				/.....,r/.7 J
Alarm Signal Seauence				
Battery Condition A.C.				
Battery Condition D.C.				

ADDITIONAL INFORMATION

[illegible]

I Service Order No

Date 24-6-10

I Test Engineer C'

I Witnessed By: _____

SECTION TEN

Essential Health and Safety when Operating Sprinkler Installations

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10 HEALTH AND SAFETY INFORMATION

10.1 Water Storage Tank

- (a) Care must be taken when any kind of drilling is being carried out around the sprinkler tanks to ensure that the tank itself is not pierced.
- (b) When personnel are inspecting/maintaining the ball valve housing they should ensure that they are adequately secured to the frame of the tank using an approved full body harness.

10.2 Fire Pump Safety

(a) Hot surfaces

Engines and motors have hot surfaces. Do not touch. Keep clear of debris.

(b) Noise

While engines and motors are running ear defenders must be worn.

(c) Fumes

Engines emit harmful fumes. Exhaust systems must be installed and maintained to prevent leakage. Pump house must be adequately ventilated according to engine size.

Exhaust outlet must be positioned to prevent fumes entering any air intake.

(d) Hazard to skin

Battery electrolyte and oil are poisonous and corrosive. Wear protective clothing.

Do not swallow.

Manufacturer's instructions must be followed.

(e) Moving Parts

Guards must be securely fixed at all times except when carrying out essential maintenance (only by qualified personnel).

(f) Automatic Starting

Pumps are designed for automatic stalling. Completely remove engine battery earth lead and isolate electric motor before removing guards or any component (only by qualified personnel).

(g) Super Heated Water

Engines with radiators or heat exchanges contain super heated water. Pressure/fill cap must not be removed until engine has cooled.

(h) Lifting

All lifting must be carried out in accordance with local health and safety regulations by competent personnel. Complete packages must not be lifted by component eye bolt or lifting lugs.

10.3 Fire Sprinkler Installation Control Valves

- (a) No maintenance work should be carried out whilst the fire sprinkler system is in the 'LIVE' mode.

10.4 Fire Sprinkler System

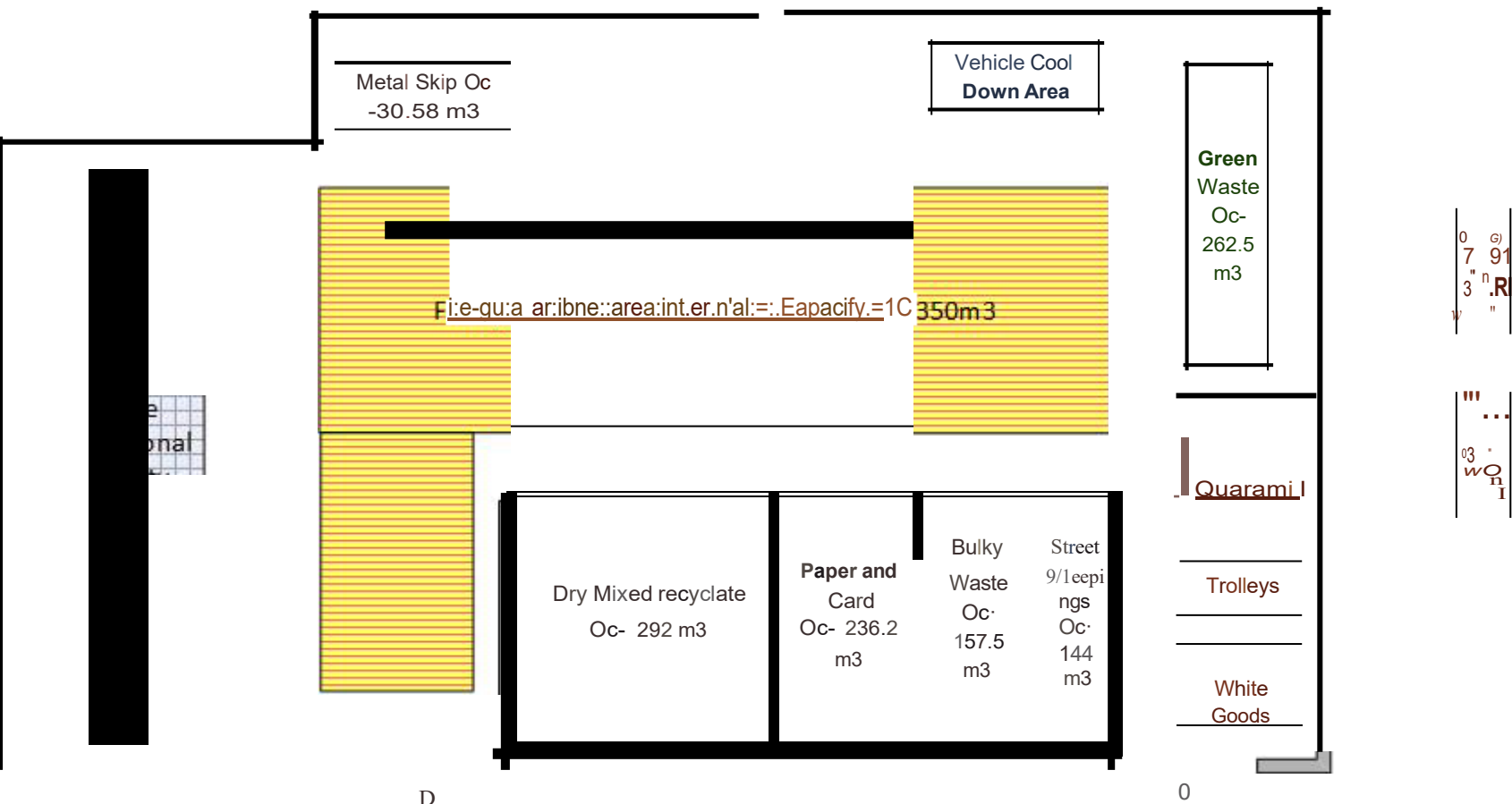
- (a) No work to the fire sprinkler system should be carried out whilst the system is in the 'LIVE' mode.
- (b) Only approved firms are to alter sprinkler systems.

ONLY AUTHORISED AND TRAINED PERSONNEL ARE TO OPERATE THE SPRINKLER SYSTEM.

Appendix 5

Block drawing

Fire Prevention & Mitigation Plan - Simple Block Layout



Appendix 6

Drainage plan



Project

Project Name: 13015 SURVEY OPERATIONS SKELMERSDALE

Project Description: CCTV Drainage Inspection Report

Project Date: 10/07/2020

Inspection Standard: MSCC4 Sewers & Drainage GB (SRM4 Scoring)

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Project Information**Project Name**
13015 SURVEY OPERATIONS SKELMERSDALE**Project Number****Project Date**
10/07/2020**Client**

Company: Survey Operations
Contact: Ian Thompson
Street: Smith Street
Town or City: Skelmersdale
Post Code: WN8 8LN

Site

Company: Site Address
Department: Robert Hodge Centre
Street: Stanley Way
Town or City: Skelmersdale
Post Code: WN8 8EE

Contractor

Company: Underground Surveys (UK) Ltd
Contact: Kelly Richardson
Department: Director
Street: Unit CG17 & 18 Warrington Business Park
Town or City: Long Lane
County: Warrington
Post Code: WA2 8TX
Phone: 01925 444 664
Mobile: 07789 243 238
Email: info@undergroundsveys.co.uk

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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Number of sections	56
Total length of sewer network	1244.19 m
Total length of inspections	1040.76 m
Total length of abandoned inspections	192.45 m
Total abandoned inspections	14
Number of section inspection photos	14
Number of section inspection videos	57
Number of section inspection scans	0
Number of section inclination measurements	0

PLR:	MH001X	Upstream Node:	MH001
Inspection Direction:	Downstream	Downstream Node:	MH003
Inspected Length:	55.67 m	Dia/Height:	225 mm
Total Length:	55.67 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH001
2	0.00	WL	Water level, 5% of the vertical dimension
3	2.34	DES	Settled deposits, fine, 5% cross-sectional area loss, start
4	5.79	CXB	Connection defective, connecting pipe is blocked at 10 o'clock, diameter: 150mm
5	5.79	CUZ	Loss of vision, other
6	5.79	DEE	Attached deposits, encrustation from 6 o'clock to 10 o'clock, 45% cross-sectional area loss
7	9.56	JN	Junction at 10 o'clock, diameter: 150mm
8	12.00	WL	Water level, 10% of the vertical dimension
9	18.40	JN	Junction at 10 o'clock, diameter: 150mm
10	34.00	WL	Water level, 5% of the vertical dimension
11	41.96	JN	Junction at 11 o'clock, diameter: 150mm
12	48.00	WL	Water level, 5% of the vertical dimension
13	49.00	WL	Water level, 10% of the vertical dimension
14	50.00	WL	Water level, 10% of the vertical dimension
15	55.67	JN	Junction at 6 o'clock, diameter: 225mm
16	55.67	MHF	Finish node type, manhole, reference number: MH002
17	55.67	DES	Settled deposits, fine, 5% cross-sectional area loss, finish
18	55.67	MHF	Finish node type, manhole, reference number: MH002

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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PLR:	GY001X	Upstream Node:	GY001
Inspection Direction:	Upstream	Downstream Node:	MH001
Inspected Length:	10.00 m	Dia/Height:	150 mm
Total Length:	10.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH001
2	0.00	WL	Water level, 5% of the vertical dimension
3	2.20	LR	Line deviates right
4	2.21	SC	Size changes, new size(s), 100mm high
5	2.36	JN	Junction at 1 o'clock, diameter: 100mm
6	2.69	JDL	Joint displaced, large
7	3.00	LU	Line deviates up
8	4.49	JDL	Joint displaced, large
9	6.21	LL	Line deviates left
10	10.00	GYF	Finish node type, gully, reference number: GY001

PLR:	MH003X	Upstream Node:	MH003
Inspection Direction:	Downstream	Downstream Node:	MH009
Inspected Length:	30.19 m	Dia/Height:	300 mm
Total Length:	30.19 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH003
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.81	CN	Connection other than junction at 12 o'clock, diameter: 150mm
4	9.35	WL	Water level, 15% of the vertical dimension
5	11.00	WL	Water level, 5% of the vertical dimension
6	23.27	DES	Settled deposits, fine, 15% cross-sectional area loss, start
7	23.29	WL	Water level, 15% of the vertical dimension
8	27.45	DER	Settled deposits, coarse, 40% cross-sectional area loss, start
9	28.23	CN	Connection other than junction at 1 o'clock, diameter: 150mm
10	30.19	DES	Settled deposits, fine, 15% cross-sectional area loss, finish
11	30.19	DER	Settled deposits, coarse, 40% cross-sectional area loss, finish
12	30.19	MHF	Finish node type, manhole, reference number: MH009

PLR:	MH032X	Upstream Node:	MH032
Inspection Direction:	Upstream	Downstream Node:	MH003
Inspected Length:	25.67 m	Dia/Height:	225 mm
Total Length:	50.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH003
2	0.00	WL	Water level, 0% of the vertical dimension
3	1.00	JN	Junction at 6 o'clock, diameter: 225mm
4	1.20	WL	Water level, 5% of the vertical dimension
5	2.58	DES	Settled deposits, fine, 15% cross-sectional area loss, start
6	6.62	DES	Settled deposits, fine, 15% cross-sectional area loss, finish
7	6.62	DES	Settled deposits, fine, 5% cross-sectional area loss, start

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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No.	m+	Code	Observation
8	8.40	JN	Junction at 1 o'clock, diameter: 150mm
9	11.31	DER	Settled deposits, coarse, 20% cross-sectional area loss, start
10	13.84	JN	Junction at 10 o'clock, diameter: 150mm
11	13.84	WL	Water level, 30% of the vertical dimension
12	13.84	CUW	Loss of vision, camera under water
13	14.00	CUD	Loss of vision, silt
14	25.60	GP	General photograph taken at this point
15	25.67	DER	Settled deposits, coarse, 65% cross-sectional area loss
16	25.67	DES	Settled deposits, fine, 5% cross-sectional area loss, finish
17	25.67	DER	Settled deposits, coarse, 20% cross-sectional area loss, finish
18	25.67	SA	Survey abandoned

PLR:	MH002X	Upstream Node:	MH002
Inspection Direction:	Downstream	Downstream Node:	MH011
Inspected Length:	28.33 m	Dia/Height:	100 mm
Total Length:	28.33 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH002
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.69	DER	Settled deposits, coarse, 5% cross-sectional area loss
4	0.69	REM	General remark
5	5.63	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
6	28.33	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
7	28.33	MHF	Finish node type, manhole, reference number: MH011

PLR:	WC001X	Upstream Node:	WC001
Inspection Direction:	Upstream	Downstream Node:	MH002
Inspected Length:	14.97 m	Dia/Height:	100 mm
Total Length:	14.97 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH002
2	0.00	WL	Water level, 5% of the vertical dimension
3	7.03	LL	Line deviates left
4	9.48	DES	Settled deposits, fine, 5% cross-sectional area loss, start
5	11.00	DES	Settled deposits, fine, 5% cross-sectional area loss, finish
6	14.95	LU	Line deviates up
7	14.97	OCF	Finish node type, other special chamber, reference number: WC001

PLR:	MH030X	Upstream Node:	MH030
Inspection Direction:	Downstream	Downstream Node:	MH028
Inspected Length:	38.17 m	Dia/Height:	300 mm
Total Length:	44.00 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH030
2	0.00	WL	Water level, 5% of the vertical dimension

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Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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No.	m+	Code	Observation
3	0.00	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
4	7.23	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
5	9.91	DES	Settled deposits, fine, 5% cross-sectional area loss, start
6	22.53	CN	Connection other than junction at 12 o'clock, diameter: 150mm
7	25.89	DES	Settled deposits, fine, 30% cross-sectional area loss, start
8	28.15	DES	Settled deposits, fine, 5% cross-sectional area loss, finish
9	28.17	DES	Settled deposits, fine, 30% cross-sectional area loss, finish
10	33.49	WL	Water level, 15% of the vertical dimension
11	33.51	CN	Connection other than junction at 12 o'clock, diameter: 150mm
12	35.00	DES	Settled deposits, fine, 25% cross-sectional area loss, start
13	35.89	CUD	Loss of vision, silt, start
14	38.17	DES	Settled deposits, fine, 25% cross-sectional area loss, finish
15	38.17	CUD	Loss of vision, silt, finish
16	38.17	SA	Survey abandoned

PLR:	MH030X	Upstream Node:	MH030
Inspection Direction:	Upstream	Downstream Node:	MH028
Inspected Length:	7.47 m	Dia/Height:	300 mm
Total Length:	44.00 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH028
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.00	WL	Water level, 15% of the vertical dimension
4	7.47	DES	Settled deposits, fine, 20% cross-sectional area loss
5	7.47	CUD	Loss of vision, silt
6	7.47	SA	Survey abandoned

PLR:	GY002X	Upstream Node:	GY002
Inspection Direction:	Upstream	Downstream Node:	MH030
Inspected Length:	7.74 m	Dia/Height:	150 mm
Total Length:	7.74 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH030
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.90	LR	Line deviates right
4	4.52	LR	Line deviates right
5	7.27	LU	Line deviates up
6	7.61	LL	Line deviates left
7	7.74	SC	Size changes, new size(s), 100mm high
8	7.74	GYF	Finish node type, gully, reference number: GY002

PLR:	MH028X	Upstream Node:	MH028
Inspection Direction:	Downstream	Downstream Node:	MH014
Inspected Length:	34.00 m	Dia/Height:	300 mm
Total Length:	35.50 m	Pipe Material:	Concrete

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH028
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.90	DER	Settled deposits, coarse, 5% cross-sectional area loss, start
4	14.73	CN	Connection other than junction at 12 o'clock, diameter: 150mm
5	26.08	WL	Water level, 20% of the vertical dimension
6	26.08	CUW	Loss of vision, camera under water, start
7	34.00	CUD	Loss of vision, silt
8	34.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
9	34.00	CUW	Loss of vision, camera under water, finish
10	34.00	SA	Survey abandoned

PLR:	GY003X	Upstream Node:	GY003
Inspection Direction:	Upstream	Downstream Node:	MH028
Inspected Length:	17.52 m	Dia/Height:	150 mm
Total Length:	17.52 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH028
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LL	Line deviates left
4	1.00	JN	Junction at 1 o'clock, diameter: 150mm
5	11.00	LU	Line deviates up, start
6	13.24	LU	Line deviates up, finish
7	16.82	LR	Line deviates right
8	17.52	GYF	Finish node type, gully, reference number: GY003

PLR:	GY004X	Upstream Node:	GY004
Inspection Direction:	Upstream	Downstream Node:	MH004
Inspected Length:	11.62 m	Dia/Height:	150 mm
Total Length:	11.62 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH004
2	0.00	WL	Water level, 5% of the vertical dimension
3	5.35	LR	Line deviates right
4	6.26	WL	Water level, 10% of the vertical dimension
5	8.01	FM	Fracture, multiple from 1 o'clock to 11 o'clock
6	8.12	H	Hole in drain or sewer from 5 o'clock to 7 o'clock
7	10.92	LL	Line deviates left
8	10.92	LU	Line deviates up, start
9	11.62	LU	Line deviates up, finish
10	11.62	GYF	Finish node type, gully, reference number: GY004

PLR:	GY005X	Upstream Node:	GY005
Inspection Direction:	Upstream	Downstream Node:	MH004
Inspected Length:	1.01 m	Dia/Height:	150 mm
Total Length:	4.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

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Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH004
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.00	DES	Settled deposits, fine, 70% cross-sectional area loss
4	1.01	SA	Survey abandoned

PLR:	GY006X	Upstream Node:	GY006
Inspection Direction:	Upstream	Downstream Node:	MH006
Inspected Length:	11.08 m	Dia/Height:	150 mm
Total Length:	11.08 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH006
2	0.00	WL	Water level, 5% of the vertical dimension
3	6.13	OJM	Open joint, medium
4	10.51	LR	Line deviates right
5	11.08	GYF	Finish node type, gully, reference number: GY006

PLR:	GY007X	Upstream Node:	GY007
Inspection Direction:	Upstream	Downstream Node:	MH006
Inspected Length:	4.83 m	Dia/Height:	150 mm
Total Length:	4.83 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH006
2	0.00	WL	Water level, 5% of the vertical dimension
3	4.83	GYF	Finish node type, gully, reference number: GY007

PLR:	MH006X	Upstream Node:	MH006
Inspection Direction:	Downstream	Downstream Node:	MH008
Inspected Length:	22.79 m	Dia/Height:	150 mm
Total Length:	22.79 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH006
2	0.00	WL	Water level, 5% of the vertical dimension
3	14.57	LD	Line deviates down, start
4	15.49	LR	Line deviates right
5	15.50	LD	Line deviates down, finish
6	15.50	WL	Water level, 25% of the vertical dimension
7	18.79	WL	Water level, 45% of the vertical dimension
8	22.79	MHF	Finish node type, manhole, reference number: MH008

PLR:	MH007X	Upstream Node:	MH007
Inspection Direction:	Downstream	Downstream Node:	MH010
Inspected Length:	33.05 m	Dia/Height:	300 mm
Total Length:	33.05 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH007
2	0.00	WL	Water level, 5% of the vertical dimension

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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No.	m+	Code	Observation
3	7.38	CN	Connection other than junction at 12 o'clock, diameter: 150mm
4	29.27	DES	Settled deposits, fine, 5% cross-sectional area loss
5	33.05	MHF	Finish node type, manhole, reference number: MH010

PLR:	RWP001X	Upstream Node:	RWP001
Inspection Direction:	Upstream	Downstream Node:	MH007
Inspected Length:	31.30 m	Dia/Height:	150 mm
Total Length:	31.30 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH007
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.60	WL	Water level, 30% of the vertical dimension
4	0.80	DES	Settled deposits, fine, 25% cross-sectional area loss, start
5	4.85	DES	Settled deposits, fine, 25% cross-sectional area loss, finish
6	4.85	WL	Water level, 5% of the vertical dimension
7	10.28	JN	Junction at 11 o'clock, diameter: 150mm
8	28.60	JN	Junction at 11 o'clock, diameter: 150mm
9	29.53	DER	Settled deposits, coarse, 10% cross-sectional area loss
10	29.54	LU	Line deviates up
11	31.30	OCF	Finish node type, other special chamber, reference number: RWP001

PLR:	MH010X	Upstream Node:	MH010
Inspection Direction:	Downstream	Downstream Node:	MH009
Inspected Length:	8.00 m	Dia/Height:	300 mm
Total Length:	18.98 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH010
2	0.00	WL	Water level, 5% of the vertical dimension
3	3.15	DES	Settled deposits, fine, 15% cross-sectional area loss, start
4	7.19	CUD	Loss of vision, silt, start
5	8.00	DES	Settled deposits, fine, 15% cross-sectional area loss, finish
6	8.00	CUD	Loss of vision, silt, finish
7	8.00	MHF	Finish node type, manhole, reference number: MH009

PLR:	MH014X	Upstream Node:	MH014
Inspection Direction:	Upstream	Downstream Node:	MH010
Inspected Length:	21.15 m	Dia/Height:	300 mm
Total Length:	21.15 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH010
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.90	DES	Settled deposits, fine, 25% cross-sectional area loss, start
4	3.73	CN	Connection other than junction at 1 o'clock, diameter: 150mm
5	5.58	DES	Settled deposits, fine, 25% cross-sectional area loss, finish
6	21.15	MHF	Finish node type, manhole, reference number: MH014

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PLR:	MH022X	Upstream Node:	MH022
Inspection Direction:	Downstream	Downstream Node:	BRF022
Inspected Length:	11.10 m	Dia/Height:	150 mm
Total Length:	11.10 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH022
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.60	DES	Settled deposits, fine, 45% cross-sectional area loss, start
4	2.85	DES	Settled deposits, fine, 45% cross-sectional area loss, finish
5	2.87	WL	Water level, 15% of the vertical dimension
6	2.89	DES	Settled deposits, fine, 15% cross-sectional area loss, start
7	6.38	DES	Settled deposits, fine, 15% cross-sectional area loss, finish
8	6.38	WL	Water level, 5% of the vertical dimension
9	6.38	FCJ	Fracture, circumferential at joint from 1 o'clock to 11 o'clock
10	6.87	LL	Line deviates left
11	6.89	LD	Line deviates down, start
12	7.67	FC	Fracture, circumferential from 12 o'clock to 5 o'clock
13	9.24	LL	Line deviates left
14	10.71	LR	Line deviates right
15	11.09	LD	Line deviates down, finish
16	11.10	BRF	Finish node type, major connection without manhole, reference number: BRF022

PLR:	IC033X	Upstream Node:	IC033
Inspection Direction:	Upstream	Downstream Node:	MH022
Inspected Length:	3.44 m	Dia/Height:	100 mm
Total Length:	3.44 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH022
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LU	Line deviates up, start
4	3.43	LU	Line deviates up, finish
5	3.44	ICF	Finish node type, inspection chamber, reference number: IC033

PLR:	SVP001X	Upstream Node:	SVP001
Inspection Direction:	Upstream	Downstream Node:	IC033
Inspected Length:	0.60 m	Dia/Height:	100 mm
Total Length:	6.50 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	RE	Start node type, rodding eye, reference number: IC033
2	0.00	WL	Water level, 0% of the vertical dimension
3	0.00	LD	Line deviates down
4	0.60	OBI	Obstacles protruding through wall at 3 o'clock, 70% cross-sectional area loss
5	0.60	SA	Survey abandoned

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PLR:		MH019X	Upstream Node:	MH019
Inspection Direction:		Downstream	Downstream Node:	BRF019
Inspected Length:		2.01 m	Dia/Height:	150 mm
Total Length:		2.01 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH019	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	1.00	LL	Line deviates left	
4	2.00	LD	Line deviates down, start	
5	2.01	LD	Line deviates down, finish	
6	2.01	SA	Survey abandoned	
PLR:		WC002X	Upstream Node:	WC002
Inspection Direction:		Upstream	Downstream Node:	MH019
Inspected Length:		7.89 m	Dia/Height:	150 mm
Total Length:		7.89 m	Pipe Material:	Polyvinyl chloride
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH019	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	0.91	LU	Line deviates up	
4	3.81	JN	Junction at 9 o'clock, diameter: 100mm	
5	4.93	JN	Junction at 9 o'clock, diameter: 100mm	
6	5.76	JN	Junction at 9 o'clock, diameter: 100mm	
7	7.54	LR	Line deviates right	
8	7.89	OCF	Finish node type, other special chamber, reference number: WC002	
PLR:		WC003X	Upstream Node:	WC003
Inspection Direction:		Upstream	Downstream Node:	MH019
Inspected Length:		10.09 m	Dia/Height:	150 mm
Total Length:		10.09 m	Pipe Material:	Polyvinyl chloride
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH019	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	1.27	LU	Line deviates up, start	
4	2.00	LU	Line deviates up, finish	
5	6.37	JN	Junction at 9 o'clock, diameter: 100mm	
6	7.15	SC	Size changes, new size(s), 100mm high	
7	7.60	LL	Line deviates left	
8	10.09	LU	Line deviates up	
9	10.09	OCF	Finish node type, other special chamber, reference number: WC003	
PLR:		WC004X	Upstream Node:	WC004
Inspection Direction:		Upstream	Downstream Node:	MH019
Inspected Length:		1.86 m	Dia/Height:	100 mm
Total Length:		1.86 m	Pipe Material:	Polyvinyl chloride

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No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH019
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.84	LU	Line deviates up
4	1.86	OCF	Finish node type, other special chamber, reference number: WC004

PLR:	MH015X	Upstream Node:	MH015
Inspection Direction:	Downstream	Downstream Node:	BRF015
Inspected Length:	4.26 m	Dia/Height:	150 mm
Total Length:	4.26 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH015
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.60	DES	Settled deposits, fine, 5% cross-sectional area loss
4	1.00	LD	Line deviates down
5	1.85	LL	Line deviates left
6	4.26	BRF	Finish node type, major connection without manhole, reference number: BRF015

PLR:	RWP015X	Upstream Node:	RWP015
Inspection Direction:	Upstream	Downstream Node:	MH015
Inspected Length:	2.30 m	Dia/Height:	100 mm
Total Length:	2.30 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH015
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LU	Line deviates up, start
4	2.29	LU	Line deviates up, finish
5	2.30	OCF	Finish node type, other special chamber, reference number: RWP015

PLR:	MH035X	Upstream Node:	MH035
Inspection Direction:	Upstream	Downstream Node:	MH034
Inspected Length:	47.10 m	Dia/Height:	300 mm
Total Length:	47.10 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH034
2	0.00	WL	Water level, 5% of the vertical dimension
3	8.96	DER	Settled deposits, coarse, 5% cross-sectional area loss, start
4	12.36	CN	Connection other than junction at 11 o'clock, diameter: 150mm
5	30.85	CN	Connection other than junction at 1 o'clock, diameter: 150mm
6	31.76	CN	Connection other than junction at 11 o'clock, diameter: 150mm
7	47.10	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
8	47.10	MHF	Finish node type, manhole, reference number: MH035

PLR:	RWP002X	Upstream Node:	RWP002
Inspection Direction:	Upstream	Downstream Node:	MH035
Inspected Length:	1.46 m	Dia/Height:	150 mm
Total Length:	3.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

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No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH035
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.60	LL	Line deviates left
4	1.46	LR	Line deviates right
5	1.46	SA	Survey abandoned

PLR:	MH011X	Upstream Node:	MH011
Inspection Direction:	Downstream	Downstream Node:	MH012
Inspected Length:	8.23 m	Dia/Height:	100 mm
Total Length:	8.23 m	Pipe Material:	Polyvinyl chloride

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH011
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	DER	Settled deposits, coarse, 5% cross-sectional area loss, start
4	0.40	LL	Line deviates left
5	1.00	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish
6	4.57	LL	Line deviates left
7	7.91	WL	Water level, 10% of the vertical dimension
8	8.23	MHF	Finish node type, manhole, reference number: MH012

PLR:	GY009X	Upstream Node:	GY009
Inspection Direction:	Downstream	Downstream Node:	BRF009
Inspected Length:	12.53 m	Dia/Height:	100 mm
Total Length:	12.53 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	GY	Start node type, gully, reference number: GY009
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.00	LD	Line deviates down, start
4	1.65	LD	Line deviates down, finish
5	1.69	LR	Line deviates right
6	12.08	LL	Line deviates left
7	12.53	BRF	Finish node type, major connection without manhole, reference number: BRF009

PLR:	GY010X	Upstream Node:	GY010
Inspection Direction:	Downstream	Downstream Node:	BRF010
Inspected Length:	15.34 m	Dia/Height:	100 mm
Total Length:	15.34 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	GY	Start node type, gully, reference number: GY010
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.08	LD	Line deviates down
4	1.48	LR	Line deviates right
5	3.13	JN	Junction at 3 o'clock, diameter: 100mm
6	14.51	LD	Line deviates down
7	15.34	BRF	Finish node type, major connection without manhole, reference number: BRF010

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PLR:		GY012X	Upstream Node:	GY012
Inspection Direction:		Downstream	Downstream Node:	BRF012
Inspected Length:		0.60 m	Dia/Height:	100 mm
Total Length:		0.60 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)
No.	m+	Code	Observation	
1	0.00	GY	Start node type, gully, reference number: GY012	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	0.60	LD	Line deviates down	
4	0.60	BRF	Finish node type, major connection without manhole, reference number: BRF012	
PLR:		GY011X	Upstream Node:	GY011
Inspection Direction:		Downstream	Downstream Node:	MH025
Inspected Length:		11.23 m	Dia/Height:	100 mm
Total Length:		11.23 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)
No.	m+	Code	Observation	
1	0.00	GY	Start node type, gully, reference number: GY011	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	0.40	LD	Line deviates down, start	
4	1.00	LR	Line deviates right	
5	8.13	LR	Line deviates right	
6	10.05	LL	Line deviates left	
7	11.23	LD	Line deviates down, finish	
8	11.23	MHF	Finish node type, manhole, reference number: MH025	
PLR:		GY013X	Upstream Node:	GY013
Inspection Direction:		Downstream	Downstream Node:	BRF013
Inspected Length:		3.51 m	Dia/Height:	100 mm
Total Length:		3.51 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)
No.	m+	Code	Observation	
1	0.00	GY	Start node type, gully, reference number: GY013	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	1.92	LD	Line deviates down	
4	2.30	JN	Junction at 9 o'clock, diameter: 100mm	
5	3.51	BRF	Finish node type, major connection without manhole, reference number: BRF013	
PLR:		ACO001X	Upstream Node:	ACO001
Inspection Direction:		Upstream	Downstream Node:	MH014
Inspected Length:		14.52 m	Dia/Height:	100 mm
Total Length:		14.52 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH014	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	9.51	BJ	Broken pipe at joint from 7 o'clock to 3 o'clock ,	
4	9.51	LR	Line deviates right	
5	12.34	LU	Line deviates up, start	
6	13.67	LU	Line deviates up, finish	

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No.	m+	Code	Observation
7	14.09	FCJ	Fracture, circumferential at joint from 11 o'clock to 4 o'clock
8	14.09	DES	Settled deposits, fine, 5% cross-sectional area loss
9	14.52	OCF	Finish node type, other special chamber, reference number: ACO001

PLR:	MH018X	Upstream Node:	MH018
Inspection Direction:	Downstream	Downstream Node:	BRF018
Inspected Length:	2.25 m	Dia/Height:	150 mm
Total Length:	2.25 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH018
2	0.00	WL	Water level, 5% of the vertical dimension
3	1.57	LL	Line deviates left
4	2.25	BRF	Finish node type, major connection without manhole, reference number: BRF018

PLR:	RWP018X	Upstream Node:	RWP018
Inspection Direction:	Upstream	Downstream Node:	MH018
Inspected Length:	2.65 m	Dia/Height:	100 mm
Total Length:	2.65 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH018
2	0.00	WL	Water level, 5% of the vertical dimension
3	0.40	LU	Line deviates up, start
4	2.37	LU	Line deviates up, finish
5	2.65	LD	Line deviates down
6	2.65	OCF	Finish node type, other special chamber, reference number: RWP018

PLR:	UUMH01X	Upstream Node:	UUMH01
Inspection Direction:	Downstream	Downstream Node:	UUMH02
Inspected Length:	1.36 m	Dia/Height:	375 mm
Total Length:	80.00 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: UUMH01
2	0.00	WL	Water level, 50% of the vertical dimension
3	0.90	CUW	Loss of vision, camera under water
4	1.36	DES	Settled deposits, fine, 50% cross-sectional area loss
5	1.36	SA	Survey abandoned

PLR:	UUMH03X	Upstream Node:	UUMH03
Inspection Direction:	Downstream	Downstream Node:	UUMH04
Inspected Length:	72.25 m	Dia/Height:	825 mm
Total Length:	80.00 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: UUMH03
2	0.00	WL	Water level, 5% of the vertical dimension
3	14.44	CN	Connection other than junction at 1 o'clock, diameter: 150mm
4	36.51	CN	Connection other than junction at 1 o'clock, diameter: 150mm

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No.	m+	Code	Observation
5	63.43	CN	Connection other than junction at 1 o'clock, diameter: 150mm
6	71.31	DER	Settled deposits, coarse, 5% cross-sectional area loss
7	72.25	DER	Settled deposits, coarse, 10% cross-sectional area loss
8	72.25	SA	Survey abandoned

PLR:	MH026X	Upstream Node:	MH026
Inspection Direction:	Downstream	Downstream Node:	UUMH04
Inspected Length:	13.66 m	Dia/Height:	450 mm
Total Length:	13.66 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH026
2	0.00	WL	Water level, 5% of the vertical dimension
3	2.88	CN	Connection other than junction at 1 o'clock, diameter: 150mm
4	5.18	CN	Connection other than junction at 11 o'clock, diameter: 150mm
5	13.66	JN	Junction at 6 o'clock, diameter: 450mm
6	13.66	MHF	Finish node type, manhole, reference number: UUMH04

PLR:	MH025X	Upstream Node:	MH025
Inspection Direction:	Upstream	Downstream Node:	MH026
Inspected Length:	1.78 m	Dia/Height:	450 mm
Total Length:	1.78 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH026
2	0.00	WL	Water level, 10% of the vertical dimension
3	1.78	REM	General remark
4	1.78	OCF	Finish node type, other special chamber, reference number: MH025

PLR:	MH012X	Upstream Node:	MH012
Inspection Direction:	Downstream	Downstream Node:	MH020
Inspected Length:	41.15 m	Dia/Height:	225 mm
Total Length:	41.15 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH012
2	0.00	WL	Water level, 5% of the vertical dimension
3	10.87	JN	Junction at 12 o'clock, diameter: 150mm
4	16.48	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
5	19.58	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
6	25.66	DER	Settled deposits, coarse, 10% cross-sectional area loss
7	28.33	JN	Junction at 12 o'clock, diameter: 150mm
8	39.12	JN	Junction at 12 o'clock, diameter: 150mm
9	39.12	LL	Line deviates left
10	41.15	MHF	Finish node type, manhole, reference number: MH020

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PLR:	MH020X	Upstream Node:	MH020
Inspection Direction:	Downstream	Downstream Node:	UUMH02
Inspected Length:	62.03 m	Dia/Height:	225 mm
Total Length:	62.03 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH020
2	0.00	WL	Water level, 5% of the vertical dimension
3	2.06	DER	Settled deposits, coarse, 10% cross-sectional area loss
4	2.66	JN	Junction at 1 o'clock, diameter: 150mm
5	4.32	WL	Water level, 10% of the vertical dimension
6	12.31	JN	Junction at 11 o'clock, diameter: 150mm
7	14.22	DEX	Settled deposits, other, 5% cross-sectional area loss
8	23.60	DEX	Settled deposits, other, 20% cross-sectional area loss, start
9	28.92	DEX	Settled deposits, other, 20% cross-sectional area loss, finish
10	28.93	WL	Water level, 5% of the vertical dimension
11	41.09	JN	Junction at 12 o'clock, diameter: 100mm
12	49.99	WL	Water level, 10% of the vertical dimension
13	52.96	FC	Fracture, circumferential from 7 o'clock to 5 o'clock
14	59.15	RM	Roots, mass, 20% cross-sectional area loss
15	60.47	WL	Water level, 50% of the vertical dimension
16	60.51	DEX	Settled deposits, other, 50% cross-sectional area loss
17	61.56	FC	Fracture, circumferential from 9 o'clock to 3 o'clock
18	61.57	RM	Roots, mass, 5% cross-sectional area loss
19	62.03	REM	General remark
20	62.03	FL	Fracture, longitudinal at 12 o'clock
21	62.03	RM	Roots, mass, 40% cross-sectional area loss
22	62.03	SA	Survey abandoned

PLR:	MH013X	Upstream Node:	MH013
Inspection Direction:	Upstream	Downstream Node:	MH012
Inspected Length:	4.06 m	Dia/Height:	225 mm
Total Length:	4.06 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH012
2	0.00	WL	Water level, 20% of the vertical dimension
3	3.63	DEEJ	Attached deposits, encrustation at joint from 7 o'clock to 11 o'clock, 5% cross-sectional area loss
4	3.64	DES	Settled deposits, fine, 10% cross-sectional area loss
5	4.06	MHF	Finish node type, manhole, reference number: MH013

PLR:	MH008X	Upstream Node:	MH008
Inspection Direction:	Upstream	Downstream Node:	MH013
Inspected Length:	7.05 m	Dia/Height:	225 mm
Total Length:	30.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH013
2	0.00	WL	Water level, 40% of the vertical dimension

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No.	m+	Code	Observation
3	0.80	DER	Settled deposits, coarse, 20% cross-sectional area loss, start
4	7.05	DER	Settled deposits, coarse, 20% cross-sectional area loss, finish
5	7.05	DEX	Settled deposits, other, 40% cross-sectional area loss
6	7.05	SA	Survey abandoned

PLR:	MH008X	Upstream Node:	MH008
Inspection Direction:	Downstream	Downstream Node:	MH013
Inspected Length:	24.56 m	Dia/Height:	225 mm
Total Length:	30.00 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH008
2	0.00	WL	Water level, 30% of the vertical dimension
3	0.80	DEX	Settled deposits, other, 30% cross-sectional area loss, start
4	0.80	REM	General remark
5	24.54	SA	Survey abandoned
6	24.54	DEX	Settled deposits, other, 30% cross-sectional area loss, finish

PLR:	MH48X	Upstream Node:	MH48
Inspection Direction:	Downstream	Downstream Node:	MH008
Inspected Length:	22.82 m	Dia/Height:	225 mm
Total Length:	22.82 m	Pipe Material:	Vitrified clay pipe (i.e. all clayware)

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH48
2	0.00	WL	Water level, 0% of the vertical dimension
3	0.80	DES	Settled deposits, fine, 60% cross-sectional area loss, start
4	3.68	DES	Settled deposits, fine, 30% cross-sectional area loss
5	22.82	DES	Settled deposits, fine, 60% cross-sectional area loss, finish
6	22.82	REM	General remark
7	22.82	MHF	Finish node type, manhole, reference number: MH008

PLR:	MH004X	Upstream Node:	MH004
Inspection Direction:	Downstream	Downstream Node:	MH009
Inspected Length:	71.30 m	Dia/Height:	450 mm
Total Length:	71.30 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH004
2	0.00	WL	Water level, 10% of the vertical dimension
3	3.48	DER	Settled deposits, coarse, 20% cross-sectional area loss
4	4.67	CN	Connection other than junction at 12 o'clock, diameter: 100mm
5	17.68	CN	Connection other than junction at 12 o'clock, diameter: 150mm
6	34.37	DER	Settled deposits, coarse, 5% cross-sectional area loss
7	34.82	CN	Connection other than junction at 12 o'clock, diameter: 150mm
8	42.44	WL	Water level, 5% of the vertical dimension
9	49.95	CN	Connection other than junction at 12 o'clock, diameter: 150mm
10	49.98	DEE	Attached deposits, encrustation from 7 o'clock to 5 o'clock, 5% cross-sectional area loss

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No.	m+	Code	Observation
11	60.29	DER	Settled deposits, coarse, 20% cross-sectional area loss, start
12	63.25	CN	Connection other than junction at 12 o'clock, diameter: 150mm
13	63.26	WL	Water level, 20% of the vertical dimension
14	69.69	DES	Settled deposits, fine, 30% cross-sectional area loss
15	71.30	DER	Settled deposits, coarse, 20% cross-sectional area loss, finish
16	71.30	MHF	Finish node type, manhole, reference number: MH009

PLR:	MH009X	Upstream Node:	MH009
Inspection Direction:	Downstream	Downstream Node:	MH021
Inspected Length:	69.96 m	Dia/Height:	600 mm
Total Length:	69.96 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH009
2	0.00	WL	Water level, 5% of the vertical dimension
3	8.86	WL	Water level, 10% of the vertical dimension
4	8.86	DER	Settled deposits, coarse, 10% cross-sectional area loss, start
5	22.92	CN	Connection other than junction at 12 o'clock, diameter: 150mm
6	32.73	CN	Connection other than junction at 12 o'clock, diameter: 150mm
7	47.58	CN	Connection other than junction at 12 o'clock, diameter: 150mm
8	58.01	CN	Connection other than junction at 12 o'clock, diameter: 150mm
9	69.96	DER	Settled deposits, coarse, 10% cross-sectional area loss, finish
10	69.96	MHF	Finish node type, manhole, reference number: MH021

PLR:	MH021X	Upstream Node:	MH021
Inspection Direction:	Downstream	Downstream Node:	MH024
Inspected Length:	8.49 m	Dia/Height:	600 mm
Total Length:	30.00 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH021
2	0.00	WL	Water level, 10% of the vertical dimension
3	1.40	REM	General remark
4	2.78	DES	Settled deposits, fine, 30% cross-sectional area loss, start
5	2.80	WL	Water level, 20% of the vertical dimension
6	8.49	DES	Settled deposits, fine, 30% cross-sectional area loss, finish
7	8.49	SA	Survey abandoned

PLR:	MH005X	Upstream Node:	MH005
Inspection Direction:	Upstream	Downstream Node:	MH004
Inspected Length:	10.63 m	Dia/Height:	300 mm
Total Length:	10.63 m	Pipe Material:	Concrete

No.	m+	Code	Observation
1	0.00	MH	Start node type, manhole, reference number: MH004
2	0.00	WL	Water level, 5% of the vertical dimension
3	9.94	DEE	Attached deposits, encrustation from 4 o'clock to 8 o'clock, 40% cross-sectional area loss
4	10.63	MHF	Finish node type, manhole, reference number: MH005

Section Summary

Project Name 13015 SURVEY OPERATIONS SKELMERSDALE	Project Number	Project Date 10/07/2020
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PLR:		MH034X	Upstream Node:	MH034
Inspection Direction:		Upstream	Downstream Node:	MH005
Inspected Length:		41.22 m	Dia/Height:	300 mm
Total Length:		41.22 m	Pipe Material:	Concrete
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH005	
2	0.00	WL	Water level, 40% of the vertical dimension	
3	5.26	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
4	9.26	CN	Connection other than junction at 2 o'clock, diameter: 150mm	
5	9.26	WL	Water level, 20% of the vertical dimension	
6	15.82	WL	Water level, 10% of the vertical dimension	
7	19.43	WL	Water level, 5% of the vertical dimension	
8	24.28	CN	Connection other than junction at 1 o'clock, diameter: 150mm	
9	24.32	DEE	Attached deposits, encrustation from 5 o'clock to 7 o'clock, 10% cross-sectional area loss	
10	41.22	MHF	Finish node type, manhole, reference number: MH034	
PLR:		MH024X	Upstream Node:	MH024
Inspection Direction:		Downstream	Downstream Node:	MH025
Inspected Length:		2.45 m	Dia/Height:	600 mm
Total Length:		2.45 m	Pipe Material:	Concrete
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH024	
2	0.00	WL	Water level, 5% of the vertical dimension	
3	1.40	DES	Settled deposits, fine, 10% cross-sectional area loss, start	
4	2.45	DES	Settled deposits, fine, 10% cross-sectional area loss, finish	
5	2.45	LD	Line deviates down	
6	2.45	OCF	Finish node type, other special chamber, reference number: MH025	
PLR:		MH021X	Upstream Node:	MH021
Inspection Direction:		Upstream	Downstream Node:	MH024
Inspected Length:		3.02 m	Dia/Height:	600 mm
Total Length:		30.00 m	Pipe Material:	Concrete
No.	m+	Code	Observation	
1	0.00	MH	Start node type, manhole, reference number: MH024	
2	0.00	WL	Water level, 30% of the vertical dimension	
3	1.40	REM	General remark	
4	1.40	DER	Settled deposits, coarse, 40% cross-sectional area loss	
5	1.40	DES	Settled deposits, fine, 30% cross-sectional area loss, start	
6	2.56	CN	Connection other than junction at 2 o'clock, diameter: 150mm	
7	3.02	DES	Settled deposits, fine, 30% cross-sectional area loss, finish	
8	3.02	REM	General remark	
9	3.02	SA	Survey abandoned	

Section Inspection - 14/07/2020 - MH001X

Section 1	Inspection 1	Date 14/07/20	Time 9:23	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH001X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH001
Road:	Robert Hodge Centre Stanley	Inspected Length:	55.67 m	Upstream Pipe Depth:	1.890 m
Location:	Road	Total Length:	55.67 m	Downstream Node:	MH003
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale:	1:460	Position [m]	Code	Observation	Grade
Depth: 1.89 m MH001					
	0.00	MH	Start node type, manhole, reference number: MH001		
	0.00	WL	Water level, 5% of the vertical dimension		
	2.34	S01	DES	Settled deposits, fine, 5% cross-sectional area loss, start	
	5.79	CXB	Connection defective, connecting pipe is blocked at 10 o'clock, diameter: 150mm: BLOCKED		
	5.79	CUZ	Loss of vision, other: DER FROM CN		
	5.79	DEE	Attached deposits, encrustation from 6 o'clock to 10 o'clock, 45% cross-sectional area loss: FROM CN		4
	9.56	JN	Junction at 10 o'clock, diameter: 150mm		
	12.00	WL	Water level, 10% of the vertical dimension		
	18.40	JN	Junction at 10 o'clock, diameter: 150mm		
	34.00	WL	Water level, 5% of the vertical dimension		
	41.96	JN	Junction at 11 o'clock, diameter: 150mm		
	48.00	WL	Water level, 5% of the vertical dimension		
	49.00	WL	Water level, 10% of the vertical dimension		
	50.00	WL	Water level, 10% of the vertical dimension		



DEE @ 5.79 m

Section Inspection - 14/07/2020 - MH001X

Section 1	Inspection 1	Date 14/07/20	Time 9:23	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH001X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Scale:	1:460	Position [m]	Code	Observation	Grade
MH003		55.67	JN	Junction at 6 o'clock, diameter: 225mm	
		55.67	MHF	Finish node type, manhole, reference number: MH002	
		55.67	F01 DES	Settled deposits, fine, 5% cross-sectional area loss, finish	2
		55.67	MHF	Finish node type, manhole, reference number: MH002	
Depth: m					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	6.0	1.1	59.0	4.0

Section Pictures - 14/07/2020 - MH001X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Downstream	MH001X	AR00000001	13015



1, 5.79 m
Attached deposits, encrustation from 6 o'clock to 10 o'clock, 45% cross-sectional area loss,
FROM CN

Section Inspection - 14/07/2020 - GY001X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
2	1	14/07/20	9:46	AR00000001	No Rain Or Snow	No	GY001X
Operator		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID
ANDREW		DY61VGR		Solo Pro	Not Specified	Category C	Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY001
Road:	Robert Hodge Centre Stanley	Inspected Length:	10.00 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	10.00 m	Downstream Node:	MH001
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.890 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

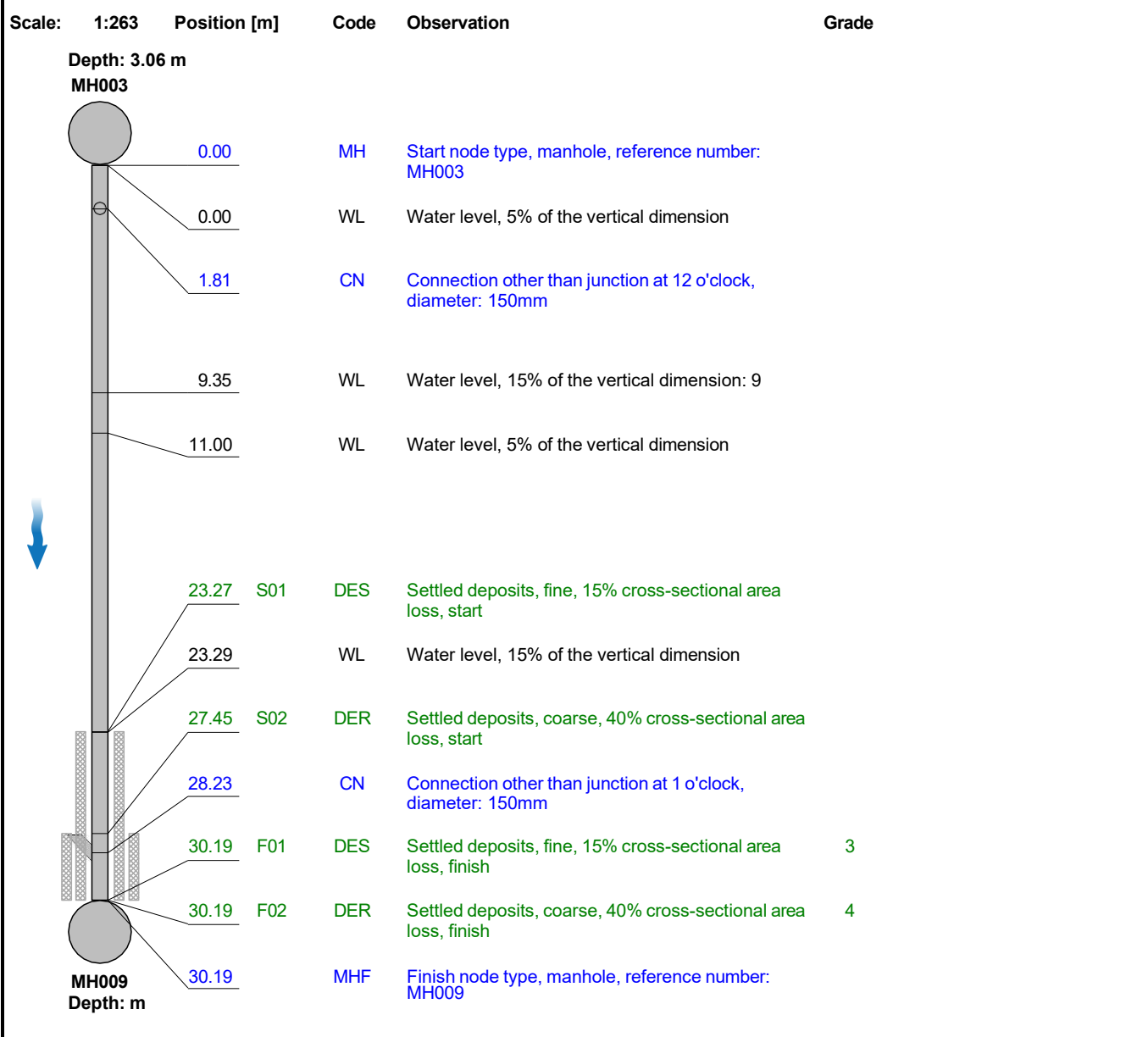
Scale:	1:87	Position [m]	Code	Observation	Grade
Depth: 1.89 m MH001					
		0.00	MH	Start node type, manhole, reference number: MH001	
		0.00	WL	Water level, 5% of the vertical dimension	
		2.20	LR	Line deviates right	
		2.21	SC	Size changes, new size(s), 100mm high	
		2.36	JN	Junction at 1 o'clock, diameter: 100mm	
		2.69	JDL	Joint displaced, large	1
		3.00	LU	Line deviates up	
		4.49	JDL	Joint displaced, large	1
		6.21	LL	Line deviates left: SLIGHT	
		10.00	GYF	Finish node type, gully, reference number: GY001	
GY001 Depth: m					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	2.0	0.4	4.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 14/07/2020 - MH003X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
3	1	14/07/20	10:08	AR00000001	No Rain Or Snow	No	MH003X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH003
Road:	Robert Hodge Centre Stanley	Inspected Length:	30.19 m	Upstream Pipe Depth:	3.060 m
Location:	Road	Total Length:	30.19 m	Downstream Node:	MH009
Surface Type:		Joint Length:	1.50 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	Other (state in remarks)		
Comments:					
Recommendations:					



Construction Features

Structural Defects

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	7.0	1.0	29.0	4.0

Miscellaneous Features

Service & Operational Observations

Section Inspection - 14/07/2020 - MH032X

Section 4	Inspection 1	Date 14/07/20	Time 10:28	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH032X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH032
Road:	Robert Hodge Centre Stanley	Inspected Length:	25.67 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	50.00 m	Downstream Node:	MH003
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.990 m
Use:	Surface water		Pipe Shape:	Circular	
Type of Pipe:	Gravity drain/sewer		Dia/Height:	225 mm	
Year Constructed:			Pipe Material:	Vitrified clay pipe (i.e. all clayware)	
Flow Control:	No flow control		Lining Type:	No Lining	
Inspection Purpose:	Routine inspection of condition		Lining Material:	No Lining	
Comments:					
Recommendations:					

Scale:	1:223	Position [m]	Code	Observation	Grade
Depth: 1.99 m MH003					
	0.00	MH		Start node type, manhole, reference number: MH003	
	0.00	WL		Water level, 0% of the vertical dimension	
	1.00	JN		Junction at 6 o'clock, diameter: 225mm: BACKDROP	
	1.20	WL		Water level, 5% of the vertical dimension	
	2.58	S01	DES	Settled deposits, fine, 15% cross-sectional area loss, start	
	6.62	F01	DES	Settled deposits, fine, 15% cross-sectional area loss, finish	3
	6.62	S02	DES	Settled deposits, fine, 5% cross-sectional area loss, start	
	8.40	JN		Junction at 1 o'clock, diameter: 150mm	
	11.31	S03	DER	Settled deposits, coarse, 20% cross-sectional area loss, start	
	13.84	JN		Junction at 10 o'clock, diameter: 150mm	
	13.84	WL		Water level, 30% of the vertical dimension	
	13.84	CUW		Loss of vision, camera under water	
	14.00	CUD		Loss of vision, silt	
	25.60	GP		General photograph taken at this point: MH032 INTRNAL PHOTO	



GP @ 25.60 m



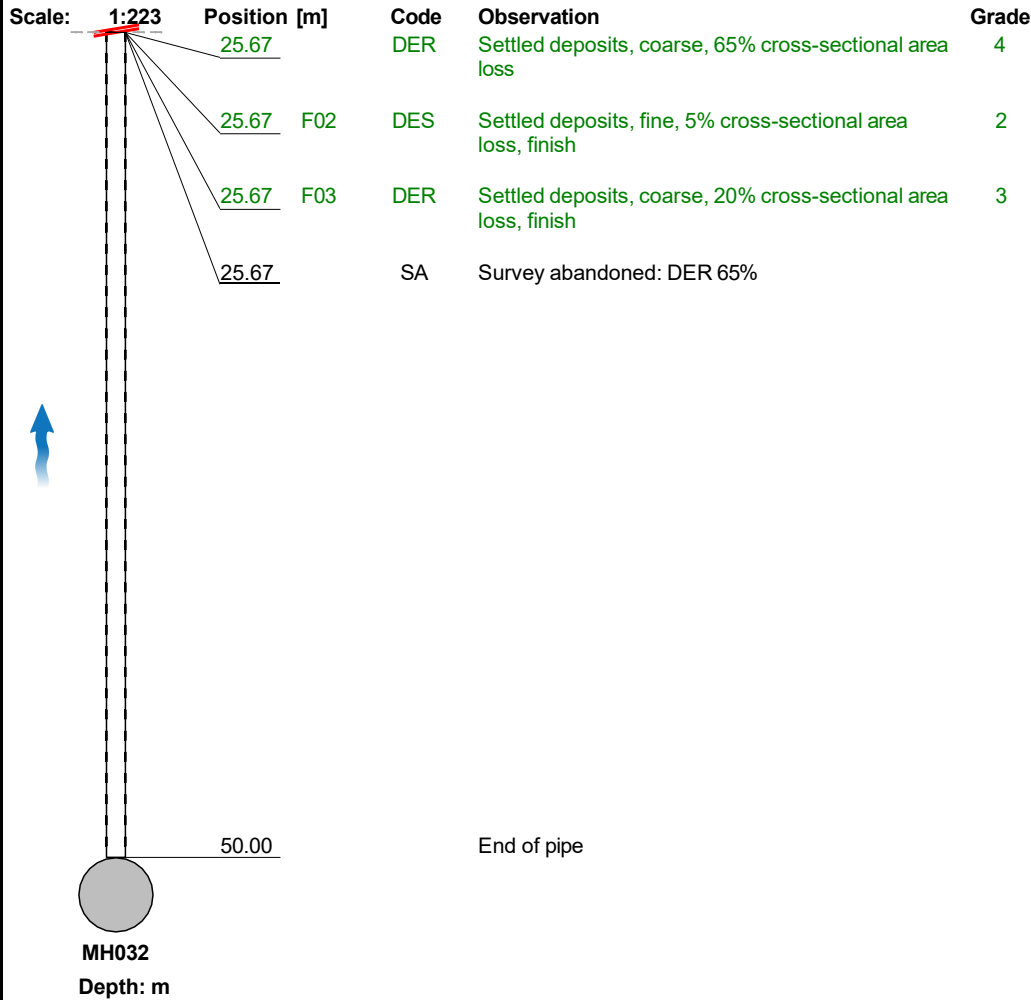
GP @ 25.60 m



DER @ 25.67 m

Section Inspection - 14/07/2020 - MH032X

Section 4	Inspection 1	Date 14/07/20	Time 10:28	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH032X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	11.0	2.6	68.0	5.0

Section Pictures - 14/07/2020 - MH032X

Section 4	Inspection Direction Upstream	PLR MH032X	Client's Job Ref AR00000001	Contractor's Job Ref 13015
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1, 25.60 m
General photograph taken at this point, MH032 INTRNL PHOTO



2, 25.60 m
General photograph taken at this point, MH032 INTRNL PHOTO

Section Pictures - 14/07/2020 - MH032X

Section 4	Inspection Direction Upstream	PLR MH032X	Client's Job Ref AR00000001	Contractor's Job Ref 13015
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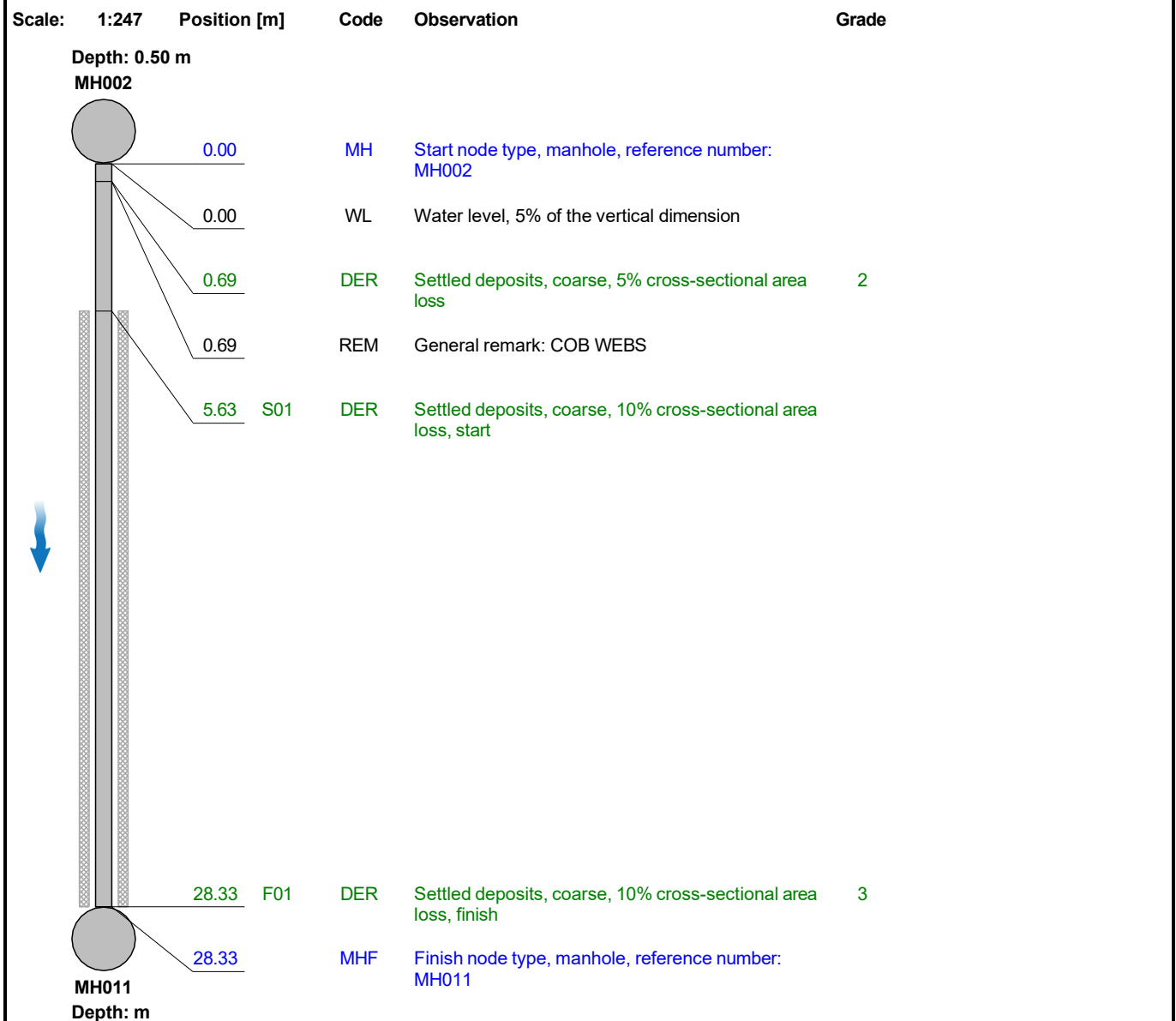


3, 25.67 m
Settled deposits, coarse, 65% cross-sectional area loss

Section Inspection - 14/07/2020 - MH002X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
5	1	14/07/20	10:54	AR00000001	No Rain Or Snow	No	MH002X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH002
Road:	Robert Hodge Centre Stanley	Inspected Length:	28.33 m	Upstream Pipe Depth:	0.500 m
Location:	Road	Total Length:	28.33 m	Downstream Node:	MH011
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

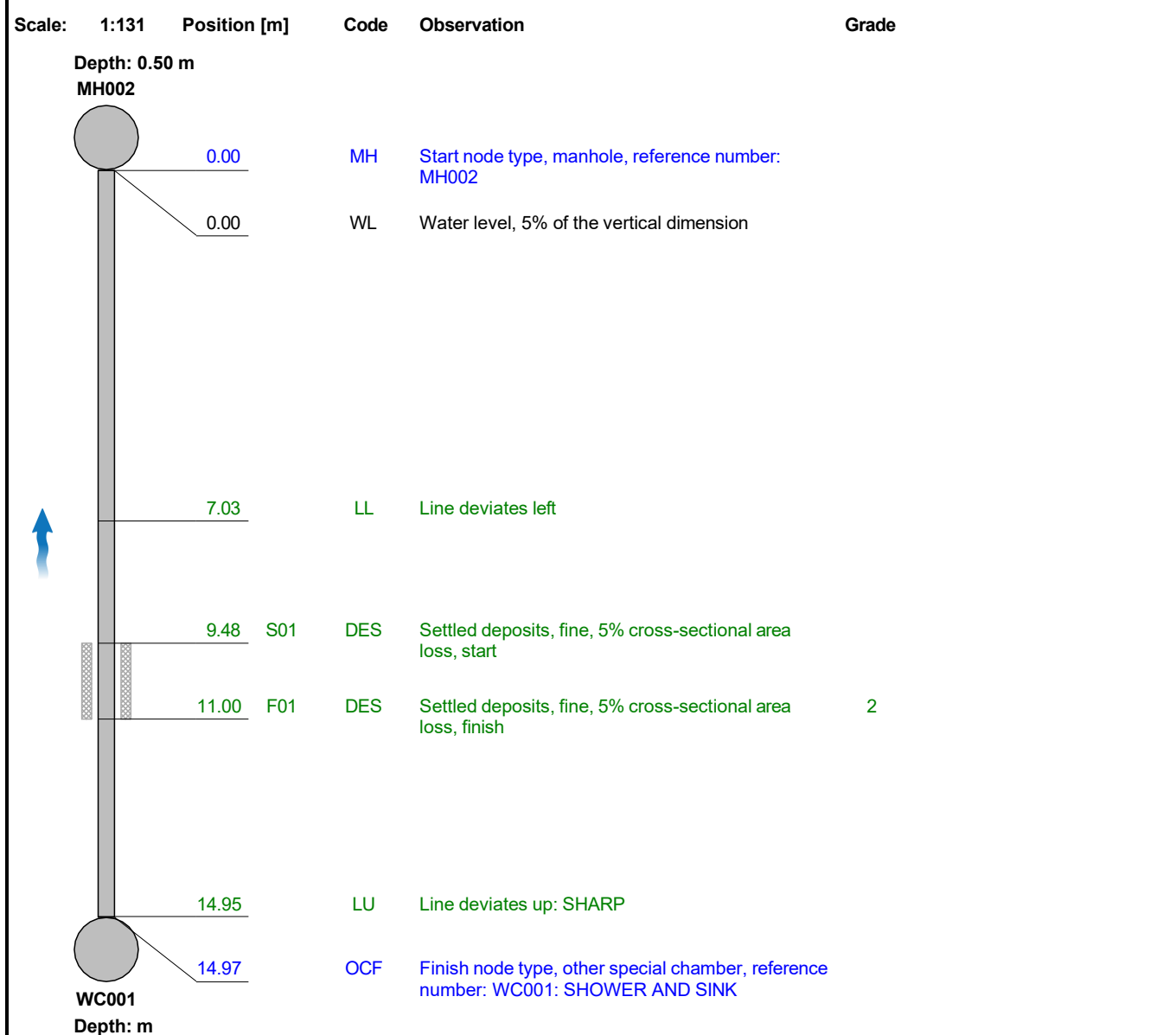


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	2.0	1.7	47.0	3.0

Section Inspection - 14/07/2020 - WC001X

Section 6	Inspection 1	Date 14/07/20	Time 11:08	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR WC001X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	WC001
Road:	Robert Hodge Centre Stanley	Inspected Length:	14.97 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	14.97 m	Downstream Node:	MH002
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	0.500 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

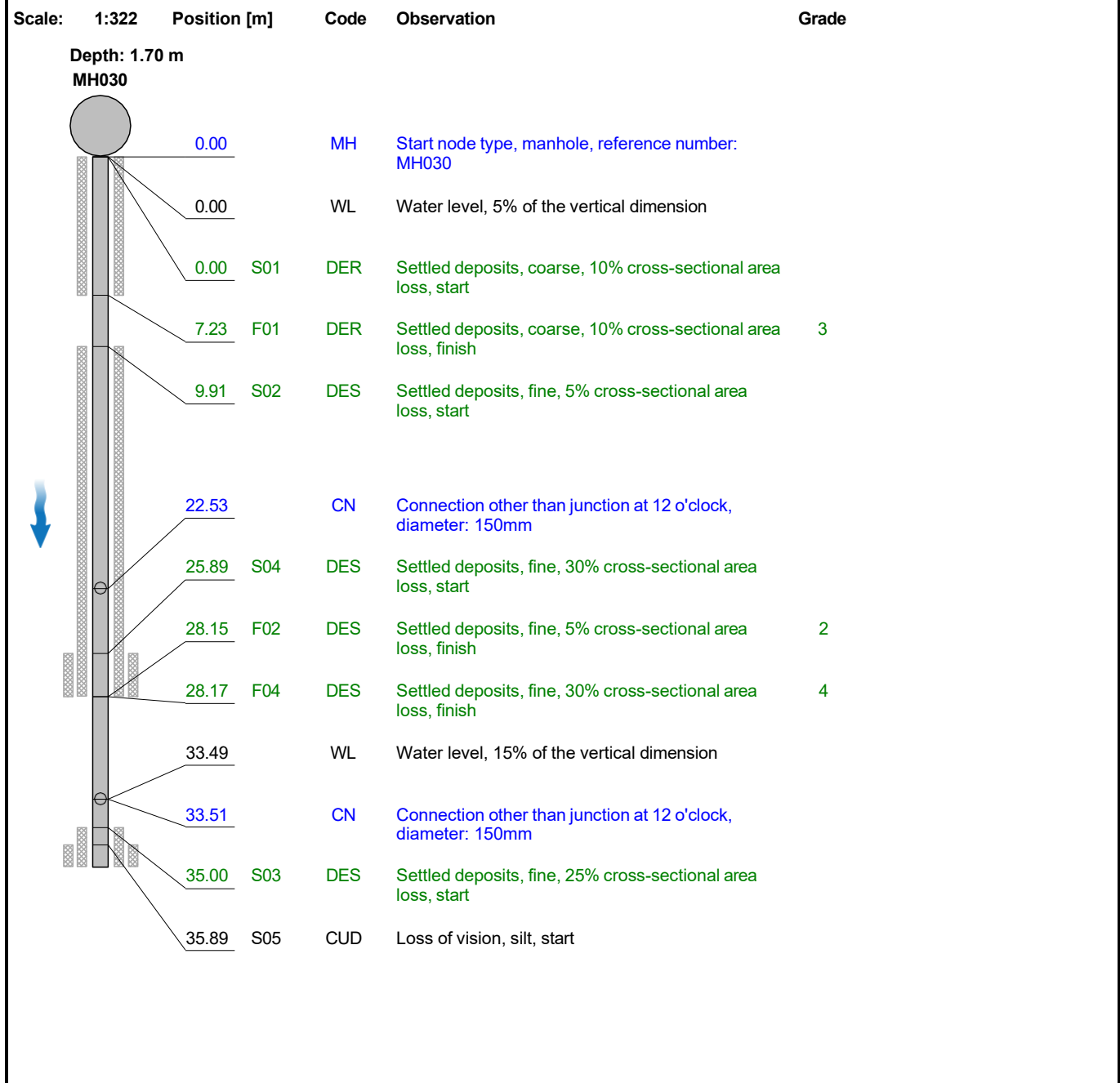


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	1.0	0.1	2.0	2.0

Section Inspection - 14/07/2020 - MH030X

Section 7	Inspection 1	Date 14/07/20	Time 11:42	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH030X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH030
Road:	Robert Hodge Centre Stanley	Inspected Length:	38.17 m	Upstream Pipe Depth:	1.700 m
Location:	Road	Total Length:	44.00 m	Downstream Node:	MH028
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Section Inspection - 14/07/2020 - MH030X

Section 7	Inspection 1	Date 14/07/20	Time 11:42	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH030X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Scale:	Position [m]	Code	Observation	Grade
1:322	38.17	F03	DES Settled deposits, fine, 25% cross-sectional area loss, finish	4
	38.17	F05	CUD Loss of vision, silt, finish	
	38.17	SA	Survey abandoned: NEEDS CLEANING	
	44.00		End of pipe	

MH028
Depth: m

Construction Features

Structural Defects

Miscellaneous Features

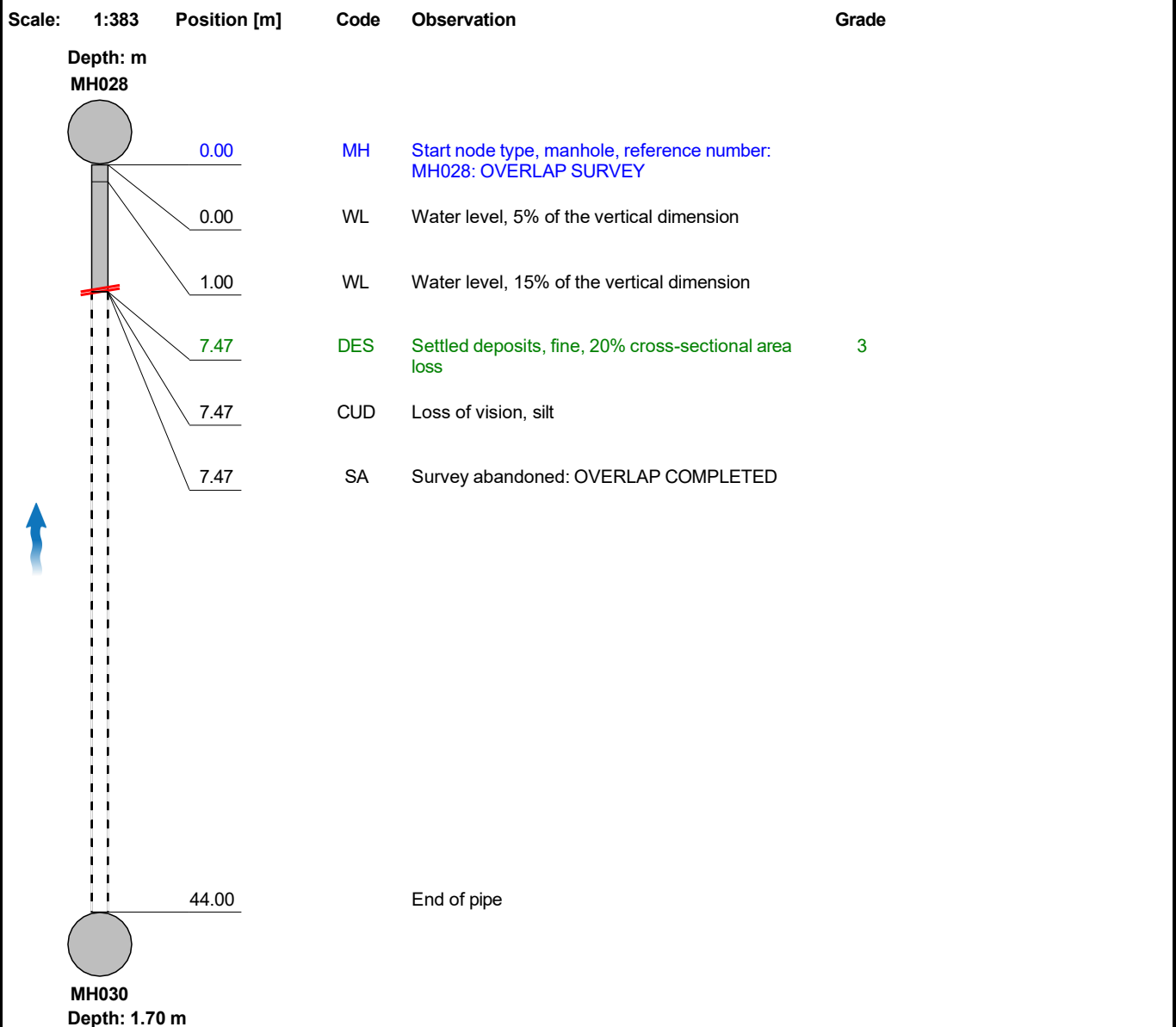
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	4	6.0	1.8	70.0	4.0

Section Inspection - 14/07/2020 - MH030X

Section 7	Inspection 2	Date 14/07/20	Time 12:37	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH030X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH030
Road:	Robert Hodge Centre Stanley	Inspected Length:	7.47 m	Upstream Pipe Depth:	1.700 m
Location:	Road	Total Length:	44.00 m	Downstream Node:	MH028
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features

Structural Defects

Miscellaneous Features

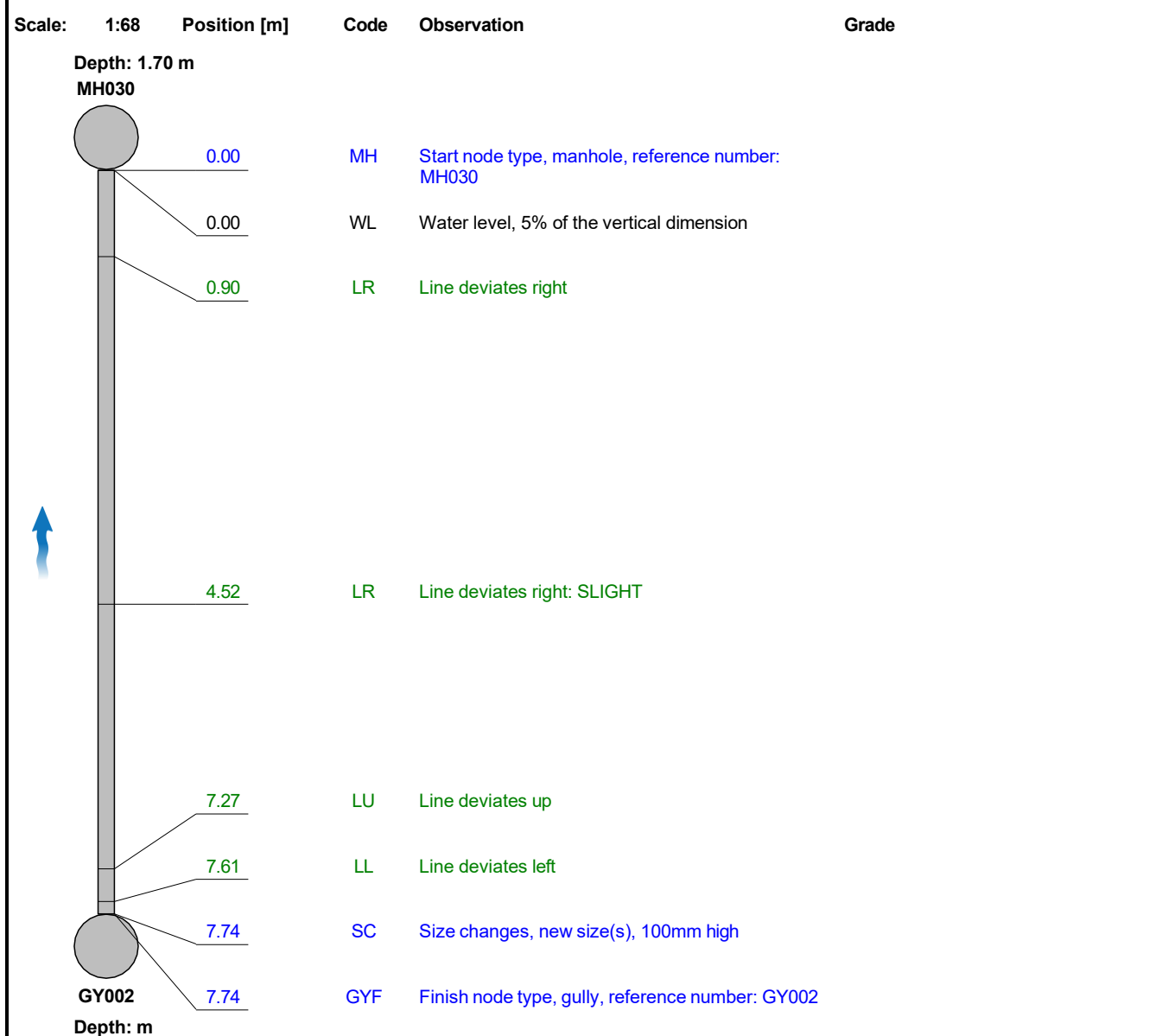
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	0.3	2.0	3.0

Section Inspection - 14/07/2020 - GY002X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
9	1	14/07/20	11:54	AR00000001	No Rain Or Snow	No	GY002X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY002
Road:	Robert Hodge Centre Stanley	Inspected Length:	7.74 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	7.74 m	Downstream Node:	MH030
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.700 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

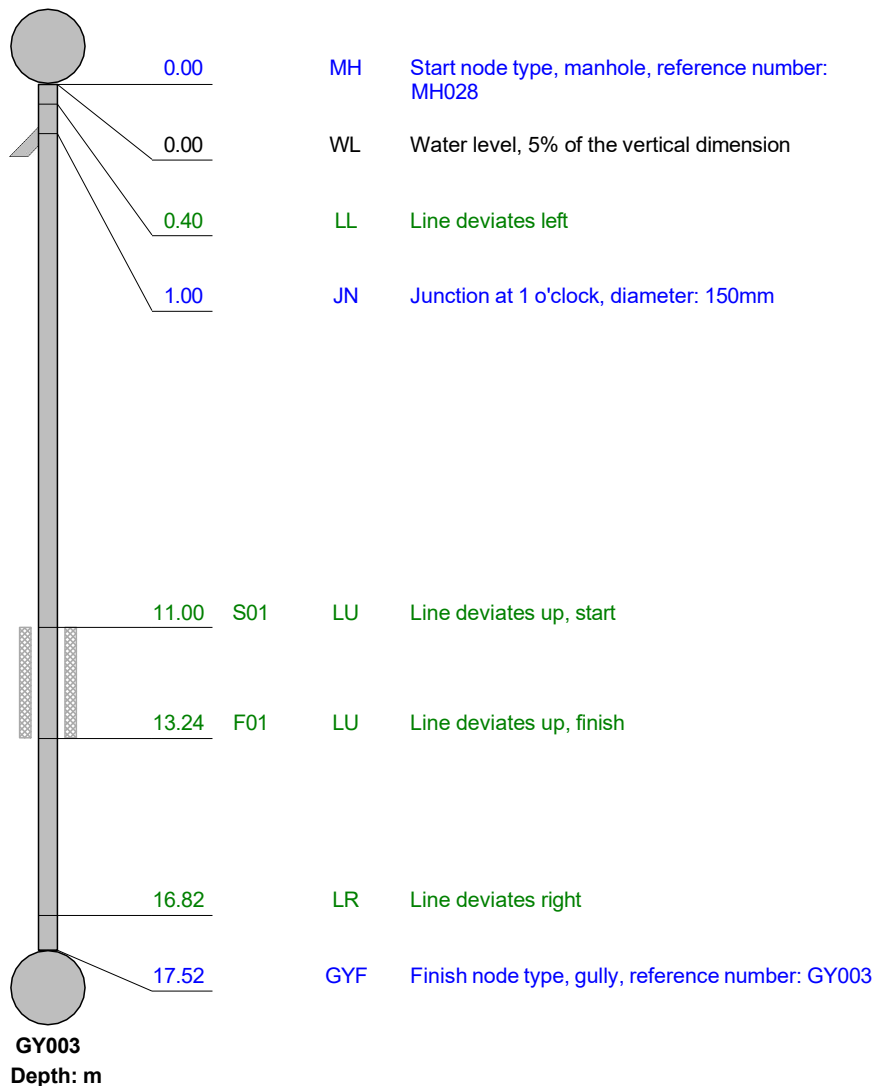
Section Inspection - 14/07/2020 - GY003X

Section 11	Inspection 1	Date 14/07/20	Time 12:42	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR GY003X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY003
Road:	Robert Hodge Centre Stanley	Inspected Length:	17.52 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	17.52 m	Downstream Node:	MH028
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.730 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale: 1:153 Position [m] Code Observation Grade

Depth: 1.73 m
MH028



Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 14/07/2020 - GY004X

Section 12	Inspection 1	Date 14/07/20	Time 13:17	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR GY004X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY004
Road:	Robert Hodge Centre Stanley	Inspected Length:	11.62 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	11.62 m	Downstream Node:	MH004
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.110 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale: 1:102 Position [m] Code Observation Grade

Depth: 1.11 m
MH004



0.00

MH

Start node type, manhole, reference number:
MH004: HIGH LEVEL PIPE

0.00

WL

Water level, 5% of the vertical dimension

5.35

LR

Line deviates right

6.26

WL

Water level, 10% of the vertical dimension

8.01

FM

Fracture, multiple from 1 o'clock to 11 o'clock

4

8.12

H

Hole in drain or sewer from 5 o'clock to 7 o'clock

4

10.92

LL

Line deviates left

10.92

S01

LU

Line deviates up, start

11.62

F01

LU

Line deviates up, finish

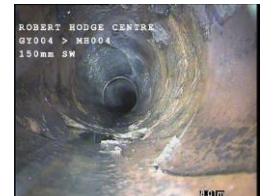
11.62

GYF

Finish node type, gully, reference number: GY004

GY004

Depth: m



FM @ 8.01 m



H @ 8.12 m

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	160.0	13.8	160.0	4.0	0	0.0	0.0	0.0	1.0

Section Pictures - 14/07/2020 - GY004X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
12	Upstream	GY004X	AR00000001	13015



1, 8.01 m
Fracture, multiple from 1 o'clock to 11 o'clock



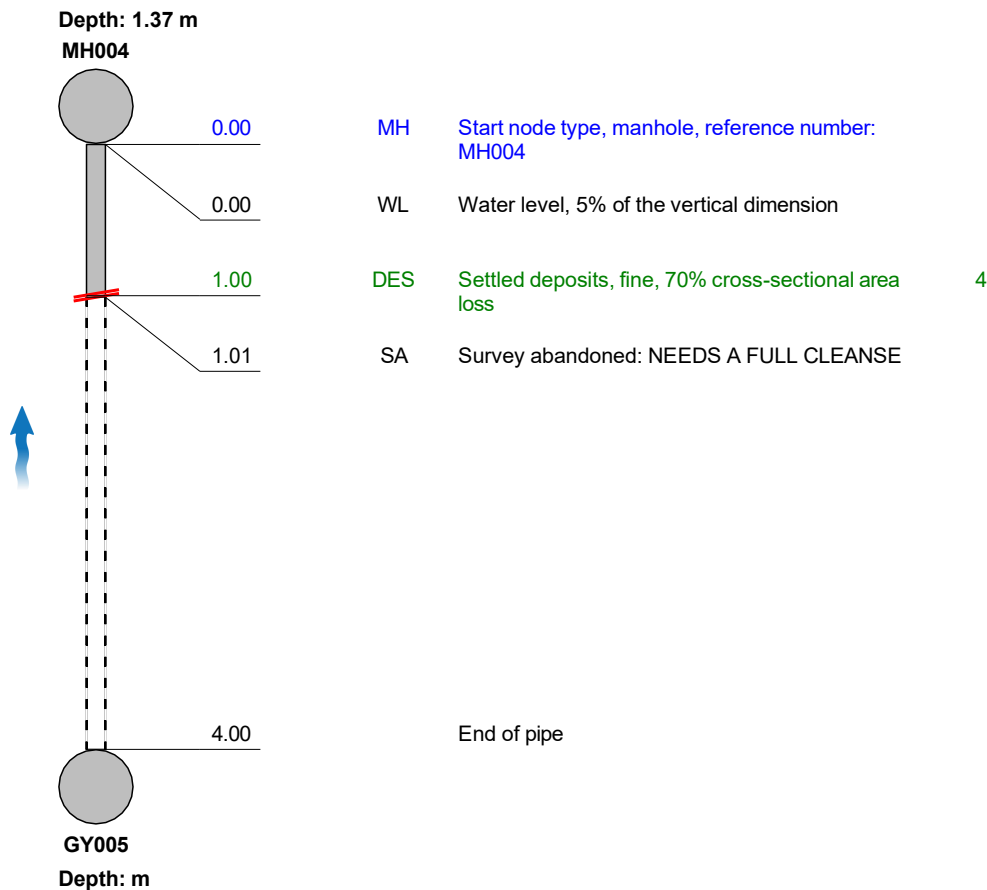
2, 8.12 m
Hole in drain or sewer from 5 o'clock to 7 o'clock

Section Inspection - 14/07/2020 - GY005X

Section 13	Inspection 1	Date 14/07/20	Time 13:24	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR GY005X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY005
Road:	Robert Hodge Centre Stanley	Inspected Length:	1.01 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	4.00 m	Downstream Node:	MH004
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.370 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	Vitrified clay		
Comments:					
Recommendations:					

Scale: 1:50 Position [m] Code Observation Grade



Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	8.0	20.0	8.0	5.0

Section Inspection - 14/07/2020 - GY006X

Section 14	Inspection 1	Date 14/07/20	Time 13:45	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR GY006X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY006
Road:	Robert Hodge Centre Stanley	Inspected Length:	11.08 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	11.08 m	Downstream Node:	MH006
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	0.750 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale: 1:97 Position [m] Code Observation Grade

Depth: 0.75 m
MH006



0.00

MH

Start node type, manhole, reference number: MH006

0.00

WL

Water level, 5% of the vertical dimension

6.13

OJM

Open joint, medium

1

10.51

LR

Line deviates right

11.08

GYF

Finish node type, gully, reference number: GY006

GY006

Depth: m

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
1	1.0	0.1	1.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 14/07/2020 - GY007X

Section 15	Inspection 1	Date 14/07/20	Time 13:50	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR GY007X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	GY007
Road:	Robert Hodge Centre Stanley	Inspected Length:	4.83 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	4.83 m	Downstream Node:	MH006
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	0.750 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale: 1:50 Position [m] Code Observation Grade

Depth: 0.75 m
MH006



0.00

MH

Start node type, manhole, reference number: MH006

0.00

WL

Water level, 5% of the vertical dimension

4.83

GYF

Finish node type, gully, reference number: GY007

GY007

Depth: m

Construction Features

Structural Defects

Miscellaneous Features

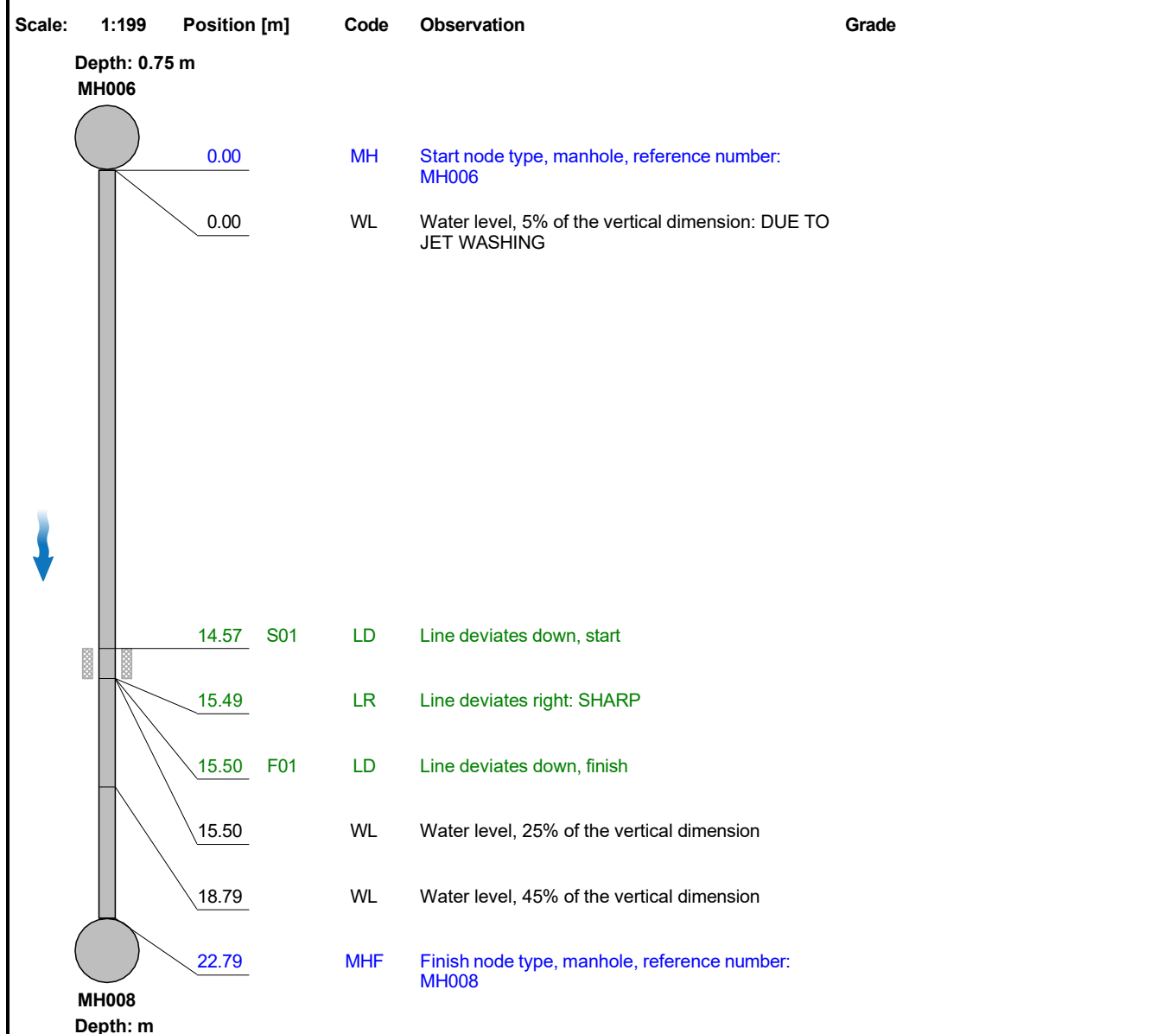
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 14/07/2020 - MH006X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
16	1	14/07/20	13:53	AR00000001	No Rain Or Snow	No	MH006X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH006
Road:	Robert Hodge Centre Stanley	Inspected Length:	22.79 m	Upstream Pipe Depth:	0.750 m
Location:	Road	Total Length:	22.79 m	Downstream Node:	MH008
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

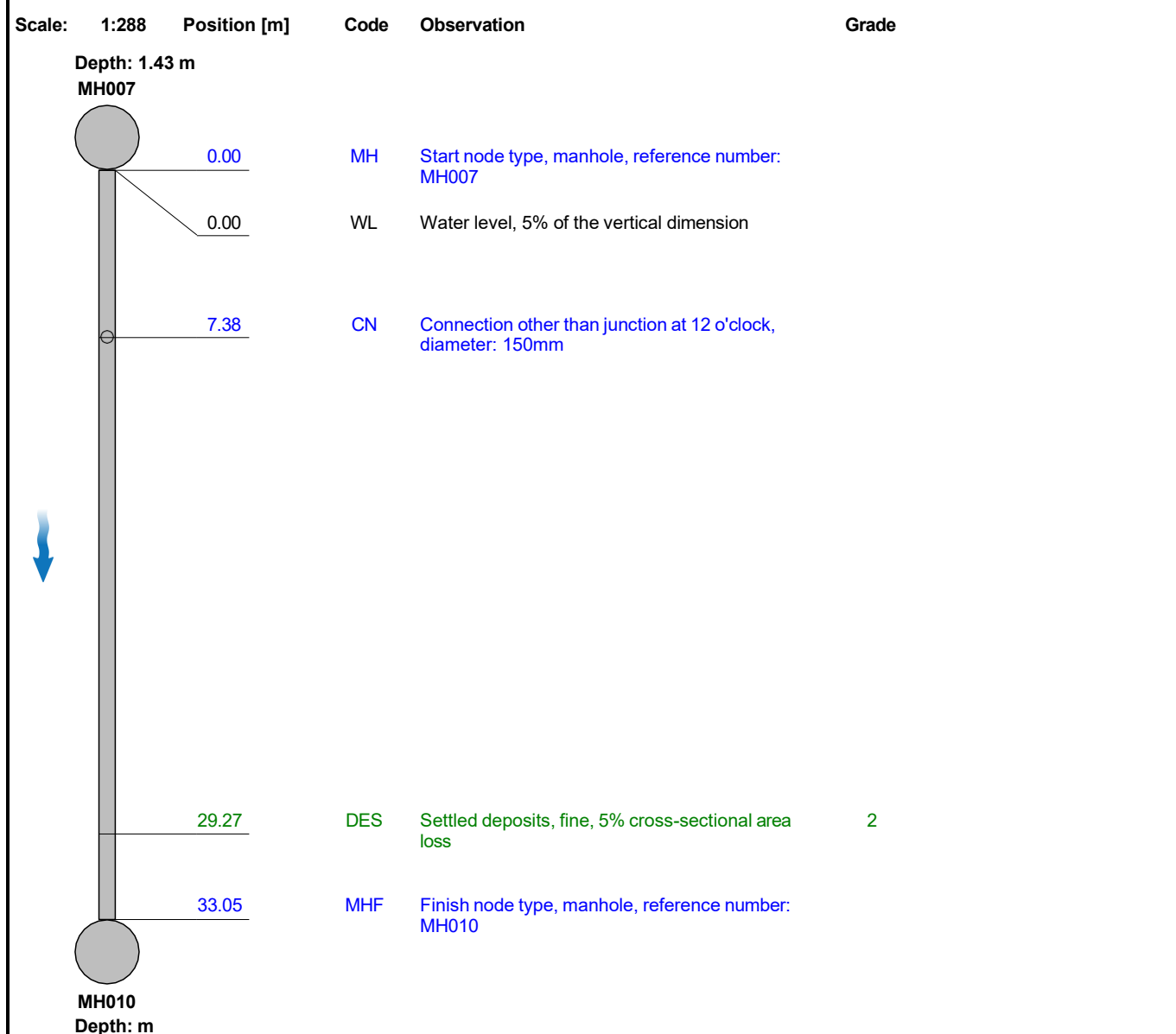


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 14/07/2020 - MH007X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
17	1	14/07/20	14:31	AR00000001	No Rain Or Snow	No	MH007X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH007
Road:	Robert Hodge Centre Stanley	Inspected Length:	33.05 m	Upstream Pipe Depth:	1.430 m
Location:	Road	Total Length:	33.05 m	Downstream Node:	MH010
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

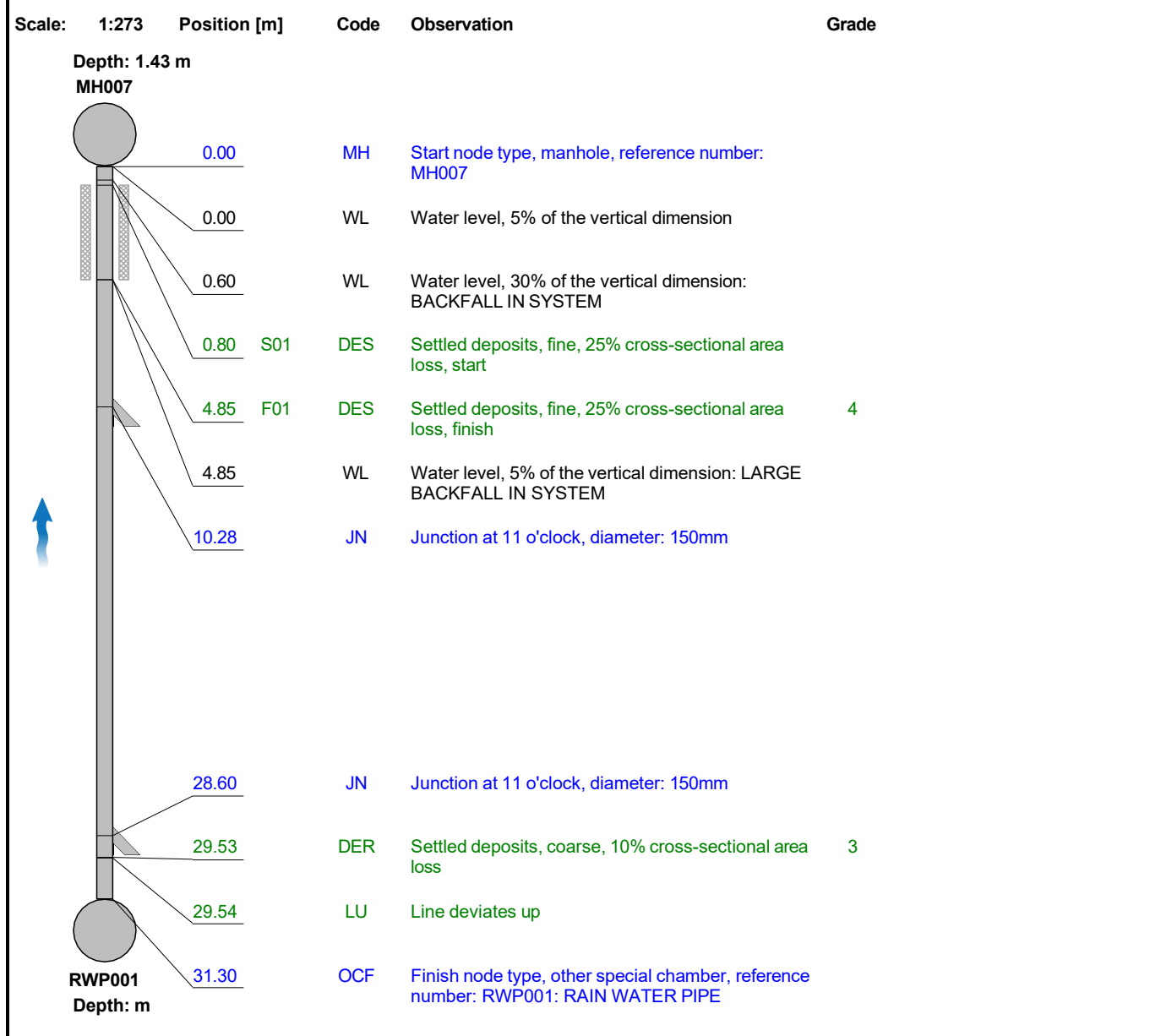


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	1.0	0.0	1.0	2.0

Section Inspection - 14/07/2020 - RWP001X

Section 18	Inspection 1	Date 14/07/20	Time 14:41	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR RWP001X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	RWP001
Road:	Robert Hodge Centre Stanley	Inspected Length:	31.30 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	31.30 m	Downstream Node:	MH007
Surface Type:		Joint Length:	1.00 m	Downstream Pipe Depth:	1.430 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

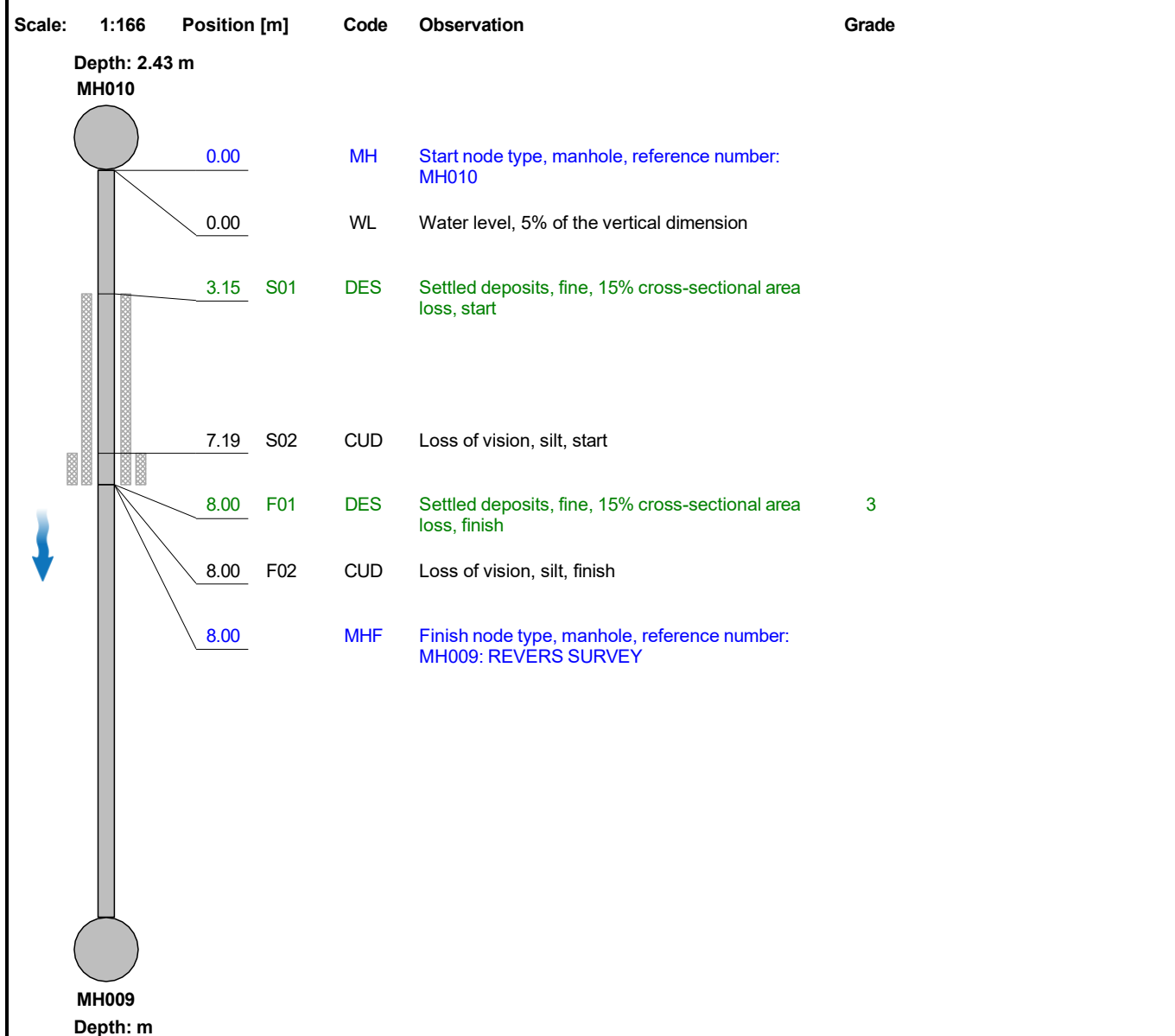


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	5.0	0.9	27.0	4.0

Section Inspection - 14/07/2020 - MH010X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
19	1	14/07/20	15:03	AR00000001	No Rain Or Snow	No	MH010X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH010
Road:	Robert Hodge Centre Stanley	Inspected Length:	8.00 m	Upstream Pipe Depth:	2.430 m
Location:	Road	Total Length:	18.98 m	Downstream Node:	MH009
Surface Type:		Joint Length:	1.50 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	0.5	10.0	3.0

Section Inspection - 14/07/2020 - MH014X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
20	1	14/07/20	15:16	AR00000001	No Rain Or Snow	No	MH014X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH014
Road:	Robert Hodge Centre Stanley	Inspected Length:	21.15 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	21.15 m	Downstream Node:	MH010
Surface Type:		Joint Length:	1.50 m	Downstream Pipe Depth:	2.430 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	1.2	25.0	4.0

Section Inspection - 15/07/2020 - MH022X

Section 21	Inspection 1	Date 15/07/20	Time 8:34	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH022X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH022
Road:	Robert Hodge Centre Stanley	Inspected Length:	11.10 m	Upstream Pipe Depth:	1.540 m
Location:	Road	Total Length:	11.10 m	Downstream Node:	BRF022
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Combined		Pipe Shape:	Circular	
Type of Pipe:	Gravity drain/sewer		Dia/Height:	150 mm	
Year Constructed:			Pipe Material:	Vitrified clay pipe (i.e. all clayware)	
Flow Control:	No flow control		Lining Type:	No Lining	
Inspection Purpose:	Routine inspection of condition		Lining Material:	No Lining	
Comments:					
Recommendations:					

Scale:	1:97	Position [m]	Code	Observation	Grade
Depth: 1.54 m MH022					
	0.00	MH	Start node type, manhole, reference number: MH022		
	0.00	WL	Water level, 5% of the vertical dimension		
	0.60	S01	DES	Settled deposits, fine, 45% cross-sectional area loss, start	
	2.85	F01	DES	Settled deposits, fine, 45% cross-sectional area loss, finish	4
	2.87	WL	Water level, 15% of the vertical dimension		
	2.89	S02	DES	Settled deposits, fine, 15% cross-sectional area loss, start	
	6.38	F02	DES	Settled deposits, fine, 15% cross-sectional area loss, finish	3
	6.38	WL	Water level, 5% of the vertical dimension		
	6.38	FCJ	Fracture, circumferential at joint from 1 o'clock to 11 o'clock		3
	6.87	LL	Line deviates left		
	6.89	S03	LD	Line deviates down, start	
	7.67	FC	Fracture, circumferential from 12 o'clock to 5 o'clock		3
	9.24	LL	Line deviates left		
	10.71	LR	Line deviates right		
	11.09	F03	LD	Line deviates down, finish	



FCJ @ 6.38 m

Section Inspection - 15/07/2020 - MH022X

Section 21	Inspection 1	Date 15/07/20	Time 8:34	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH022X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Scale: 1:97 Position [m] Code Observation Grade

 11.10 BRF Finish node type, major connection without manhole, reference number: BRF022

BRF022
 Depth: m

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	40.0	7.2	80.0	3.0	2	7.0	2.1	23.0	4.0

Section Pictures - 15/07/2020 - MH022X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
21	Downstream	MH022X	AR00000001	13015

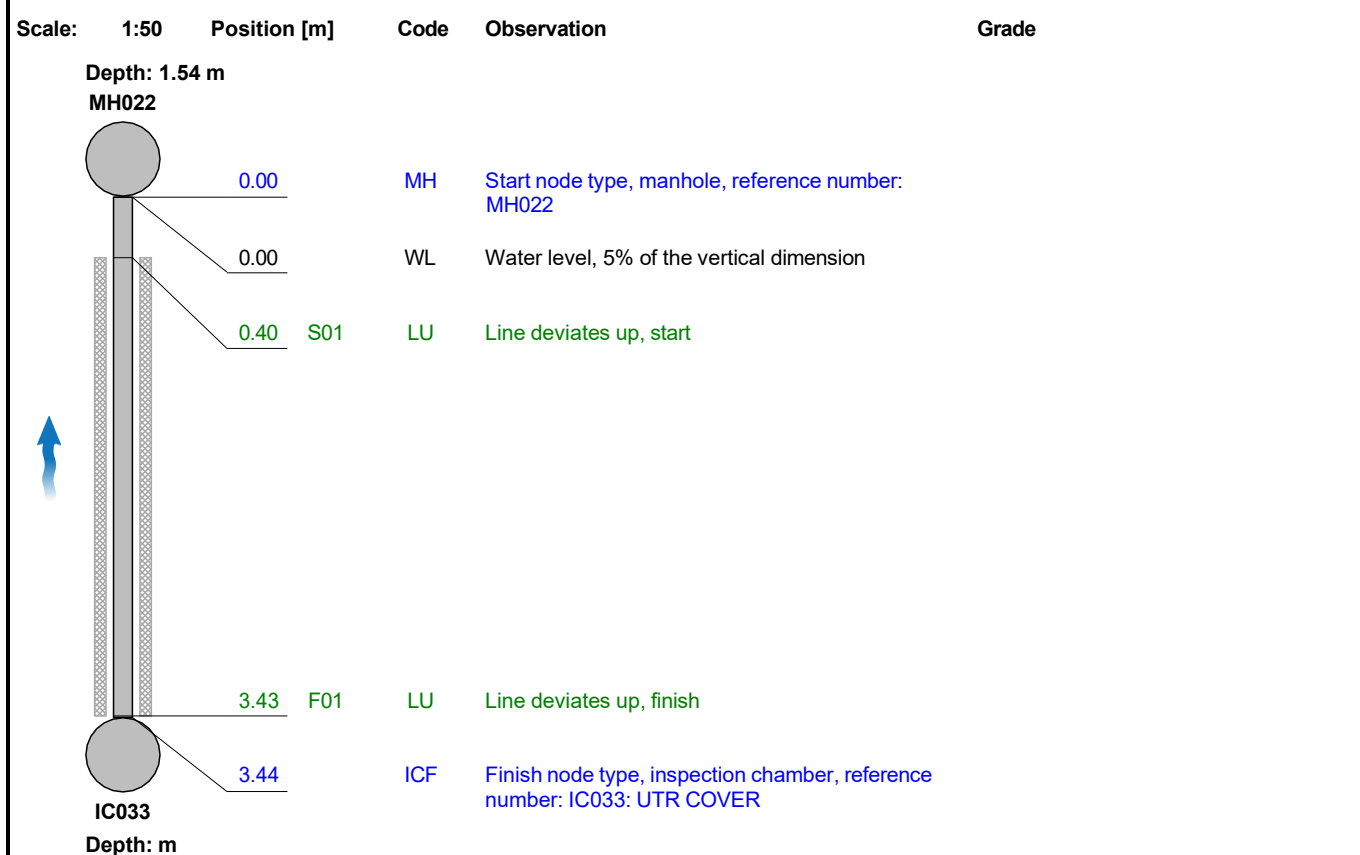


1, 6.38 m
Fracture, circumferential at joint from 1 o'clock to 11 o'clock

Section Inspection - 15/07/2020 - IC033X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
22	1	15/07/20	8:54	AR00000001	No Rain Or Snow	No	IC033X
Operator		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID
ANDREW		DY61VGR		Solo Pro	Not Specified	Category C	Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	IC033
Road:	Robert Hodge Centre Stanley	Inspected Length:	3.44 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	3.44 m	Downstream Node:	MH022
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.540 m
Use:	Combined	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

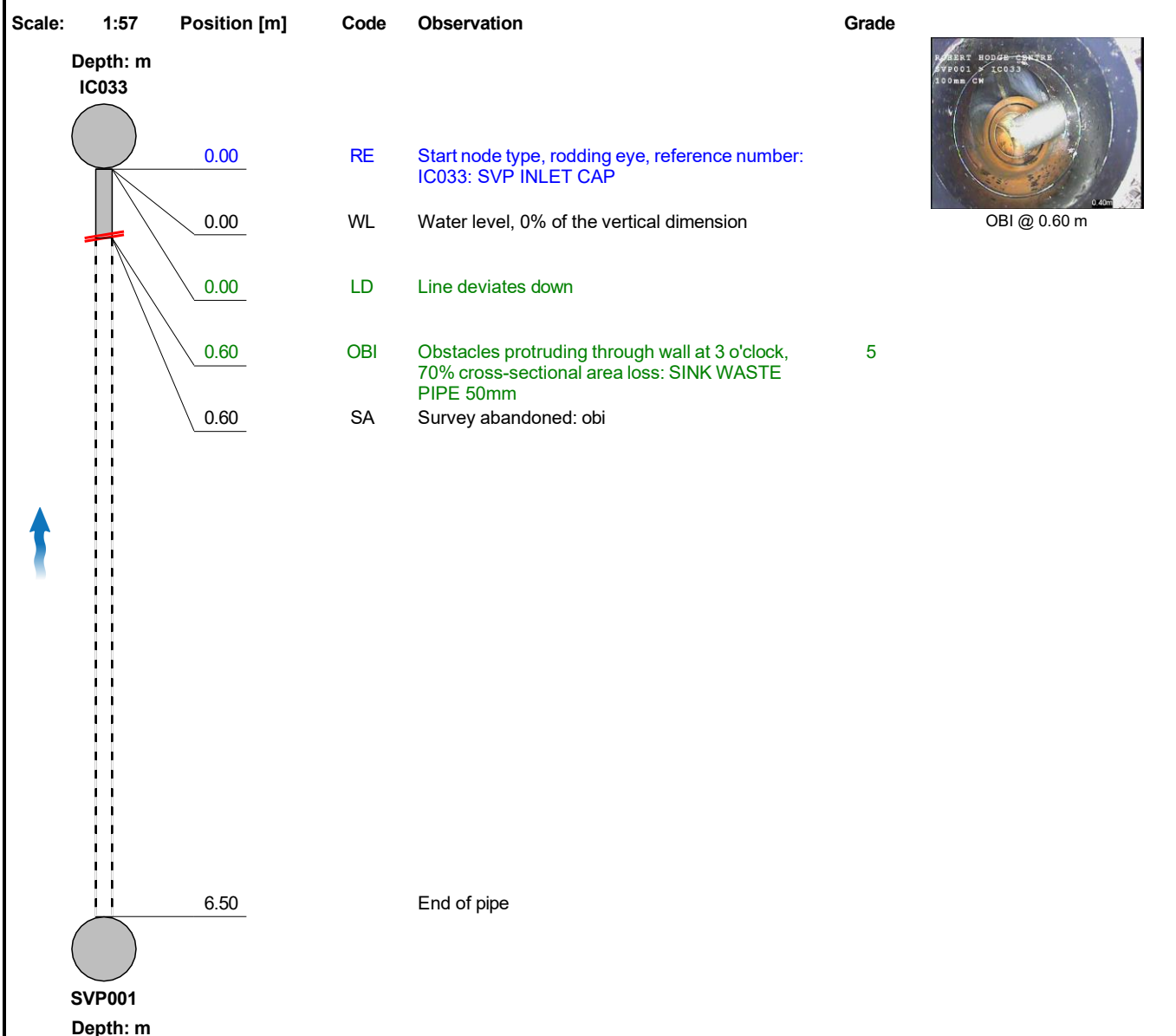


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - SVP001X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
23	1	15/07/20	9:09	AR00000001	No Rain Or Snow	No	SVP001X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	SVP001
Road:	Robert Hodge Centre Stanley	Inspected Length:	0.60 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	6.50 m	Downstream Node:	IC033
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Combined	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	10.0	16.7	10.0	5.0

Section Pictures - 15/07/2020 - SVP001X

Section 23	Inspection Direction Upstream	PLR SVP001X	Client's Job Ref AR00000001	Contractor's Job Ref 13015
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1, 0.60 m
Obstacles protruding through wall at 3 o'clock, 70% cross-sectional area loss, SINK WASTE
PIPE 50mm

Section Inspection - 15/07/2020 - MH019X

Section 24	Inspection 1	Date 15/07/20	Time 9:32	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH019X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH019
Road:	Robert Hodge Centre Stanley	Inspected Length:	2.01 m	Upstream Pipe Depth:	1.300 m
Location:	Road	Total Length:	2.01 m	Downstream Node:	BRF019
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

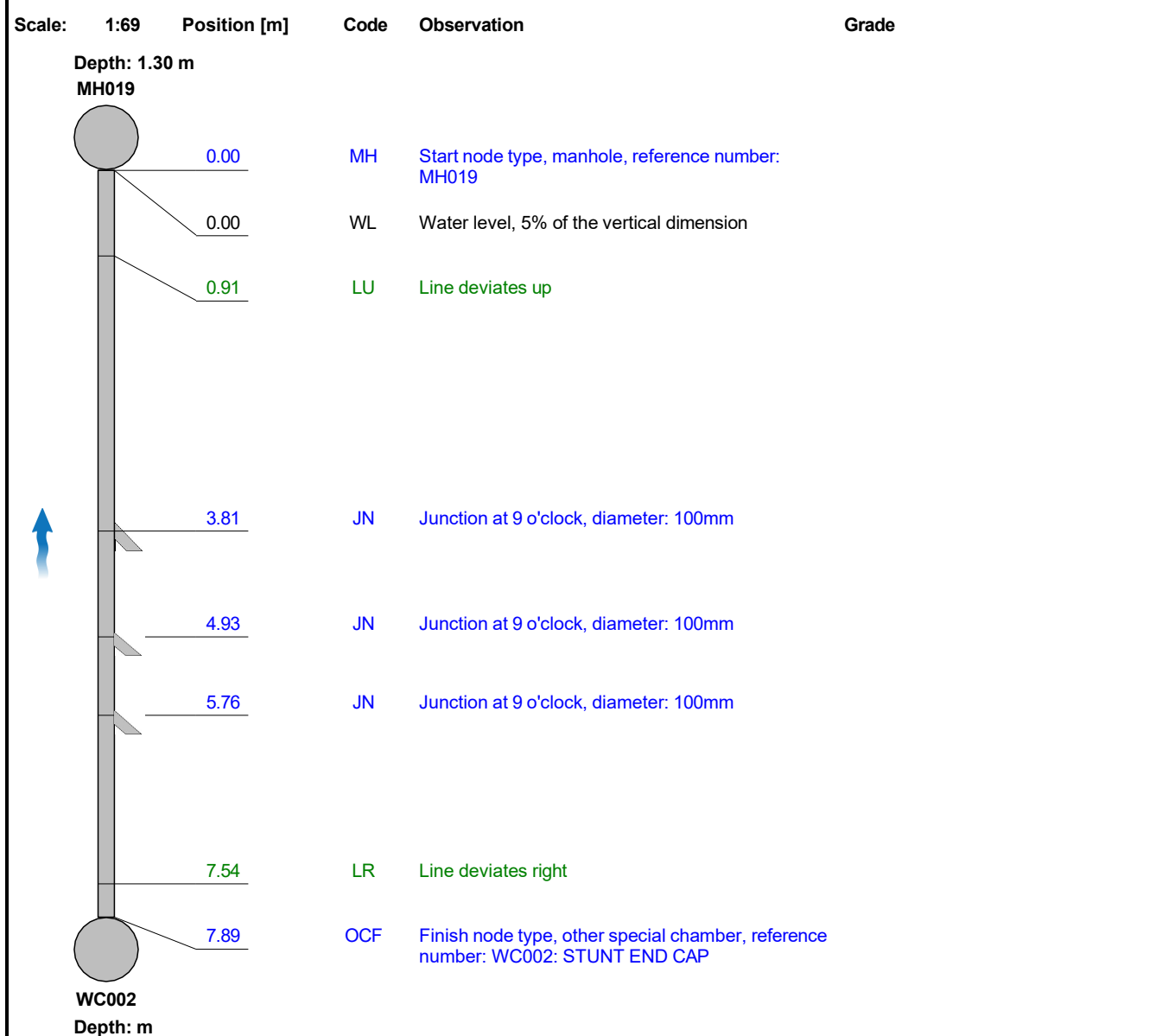
Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: 1.30 m MH019					
		0.00	MH	Start node type, manhole, reference number: MH019	
		0.00	WL	Water level, 5% of the vertical dimension	
		1.00	LL	Line deviates left	
		2.00	S01	LD	Line deviates down, start
		2.01	F01	LD	Line deviates down, finish
		2.01	SA	Survey abandoned: LINE DOWN SHARP	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - WC002X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
25	1	15/07/20	9:47	AR00000001	No Rain Or Snow	No	WC002X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	WC002
Road:	Robert Hodge Centre Stanley	Inspected Length:	7.89 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	7.89 m	Downstream Node:	MH019
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.300 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

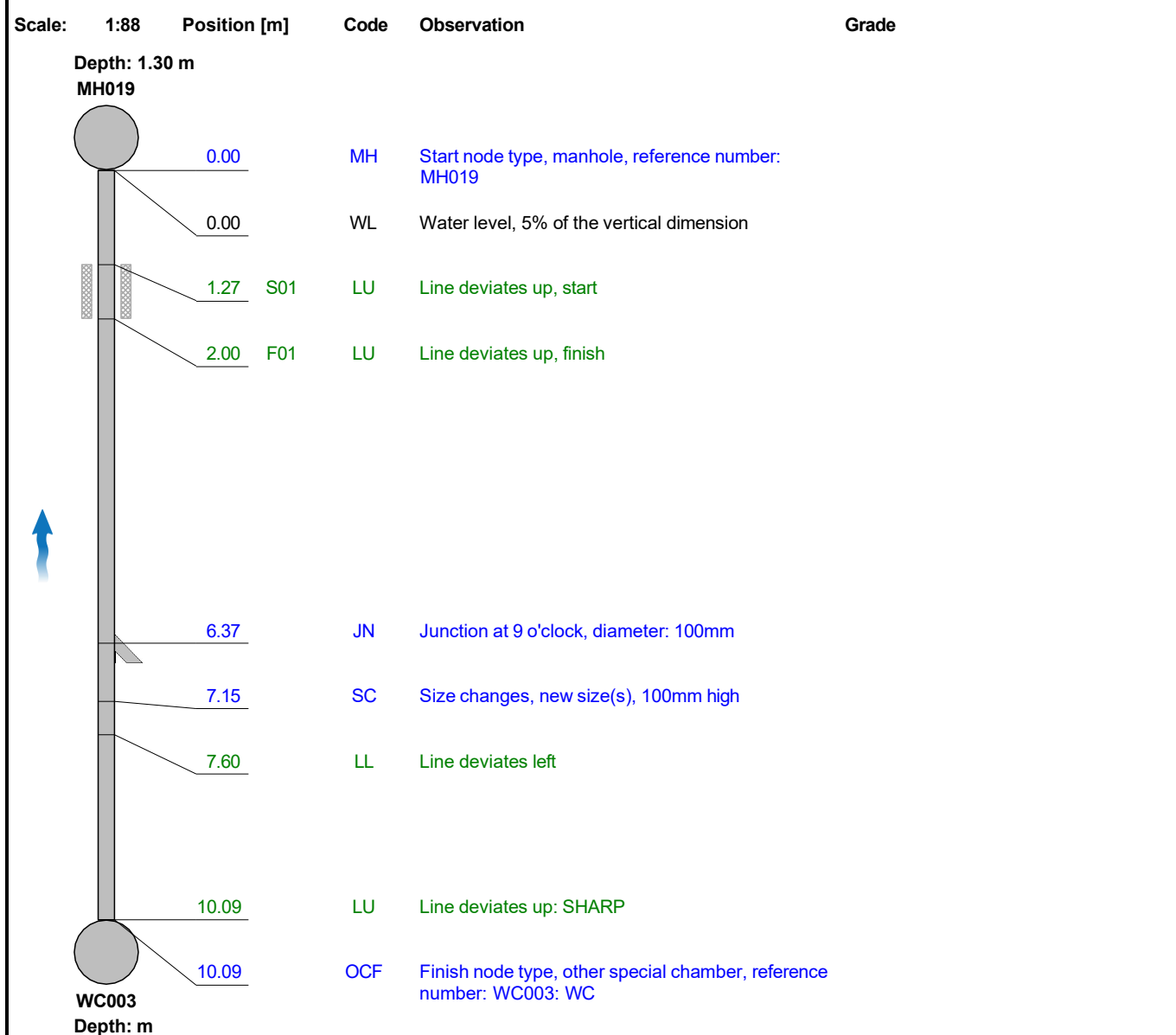


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - WC003X

Section 26	Inspection 1	Date 15/07/20	Time 9:50	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR WC003X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	WC003
Road:	Robert Hodge Centre Stanley	Inspected Length:	10.09 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	10.09 m	Downstream Node:	MH019
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.300 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - WC004X

Section 27	Inspection 1	Date 15/07/20	Time 9:55	Client's Job Ref AR00000001	Weather No Rain Or Snow	Pre Cleaned No	PLR WC004X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	WC004
Road:	Robert Hodge Centre Stanley	Inspected Length:	1.86 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	1.86 m	Downstream Node:	MH019
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.300 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale:	1:50	Position [m]	Code	Observation	Grade
		0.00	MH	Start node type, manhole, reference number: MH019	
		0.00	WL	Water level, 5% of the vertical dimension	
		1.84	LU	Line deviates up: SHARP	
		1.86	OCF	Finish node type, other special chamber, reference number: WC004: SINK	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - MH015X

Section 28	Inspection 1	Date 15/07/20	Time 10:16	Client's Job Ref AR000000001	Weather No Rain Or Snow	Pre Cleaned No	PLR MH015X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH015
Road:	Robert Hodge Centre Stanley	Inspected Length:	4.26 m	Upstream Pipe Depth:	1.450 m
Location:	Road	Total Length:	4.26 m	Downstream Node:	BRF015
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: 1.45 m MH015					
	0.00	MH	Start node type, manhole, reference number: MH015		
	0.00	WL	Water level, 5% of the vertical dimension		
	0.60	DES	Settled deposits, fine, 5% cross-sectional area loss	2	
	1.00	LD	Line deviates down: SHARP		
	1.85	LL	Line deviates left		
	4.26	BRF	Finish node type, major connection without manhole, reference number: BRF015		
BRF015 Depth: m					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	1.0	0.2	1.0	2.0

Section Inspection - 15/07/2020 - RWP015X

Section 29	Inspection 1	Date 15/07/20	Time 10:22	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR RWP015X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	RWP015
Road:	Robert Hodge Centre Stanley	Inspected Length:	2.30 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	2.30 m	Downstream Node:	MH015
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.450 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale:1:50

Position [m]

Code

Observation

Grade

Depth: 1.45 m

MH015

</

Section Inspection - 15/07/2020 - MH035X

Section 30	Inspection 1	Date 15/07/20	Time 10:45	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR MH035X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH035
Road:	Robert Hodge Centre Stanley	Inspected Length:	47.10 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	47.10 m	Downstream Node:	MH034
Surface Type:		Joint Length:	1.50 m	Downstream Pipe Depth:	1.180 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale:	1:410	Position [m]	Code	Observation	Grade
Depth: 1.18 m MH034					
	0.00	MH		Start node type, manhole, reference number: MH034: WAS BURIED UNDER MUD	
	0.00	WL		Water level, 5% of the vertical dimension	
	8.96	S01	DER	Settled deposits, coarse, 5% cross-sectional area loss, start	
	12.36	CN		Connection other than junction at 11 o'clock, diameter: 150mm: RWP	
	30.85	CN		Connection other than junction at 1 o'clock, diameter: 150mm	
	31.76	CN		Connection other than junction at 11 o'clock, diameter: 150mm: RWP	
	47.10	F01	DER	Settled deposits, coarse, 5% cross-sectional area loss, finish	2
	47.10	MHF		Finish node type, manhole, reference number: MH035: BURIED	
MH035 Depth: m					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	1.0	0.8	39.0	2.0

Section Inspection - 15/07/2020 - RWP002X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
31	1	15/07/20	11:26	AR00000001	Rain	No	RWP002X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	RWP002
Road:	Robert Hodge Centre Stanley	Inspected Length:	1.46 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	3.00 m	Downstream Node:	MH035
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

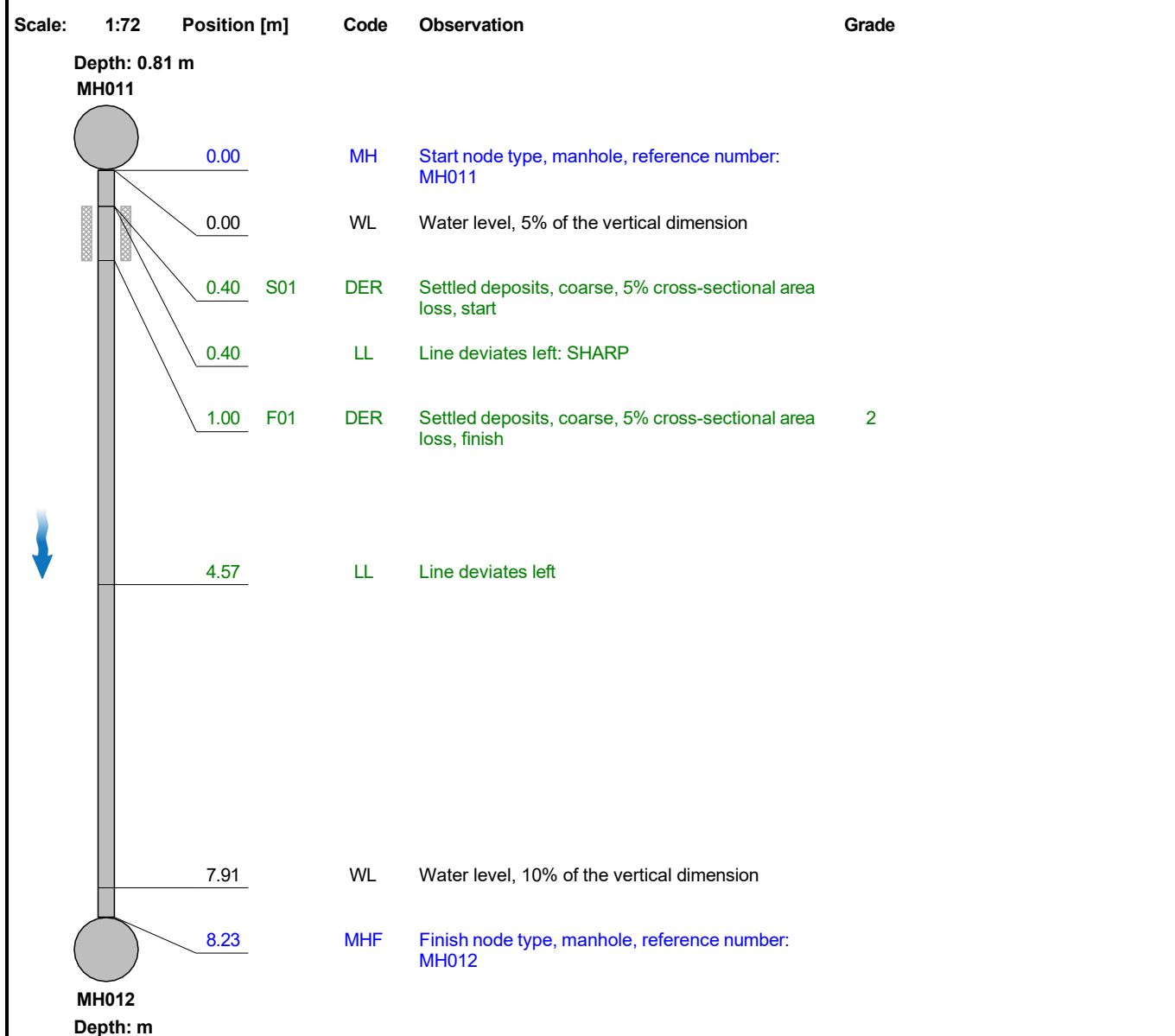
Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: m MH035 RWP002 Depth: m					
		0.00	MH	Start node type, manhole, reference number: MH035: BURIED	
		0.00	WL	Water level, 5% of the vertical dimension	
		0.60	LL	Line deviates left	
		1.46	LR	Line deviates right: SHARP	
		1.46	SA	Survey abandoned: DUE TO SHARP BEND	
		3.00		End of pipe	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - MH011X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
32	1	15/07/20	11:50	AR00000001	Rain	No	MH011X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH011
Road:	Robert Hodge Centre Stanley	Inspected Length:	8.23 m	Upstream Pipe Depth:	0.810 m
Location:	Road	Total Length:	8.23 m	Downstream Node:	MH012
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Polyvinyl chloride		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

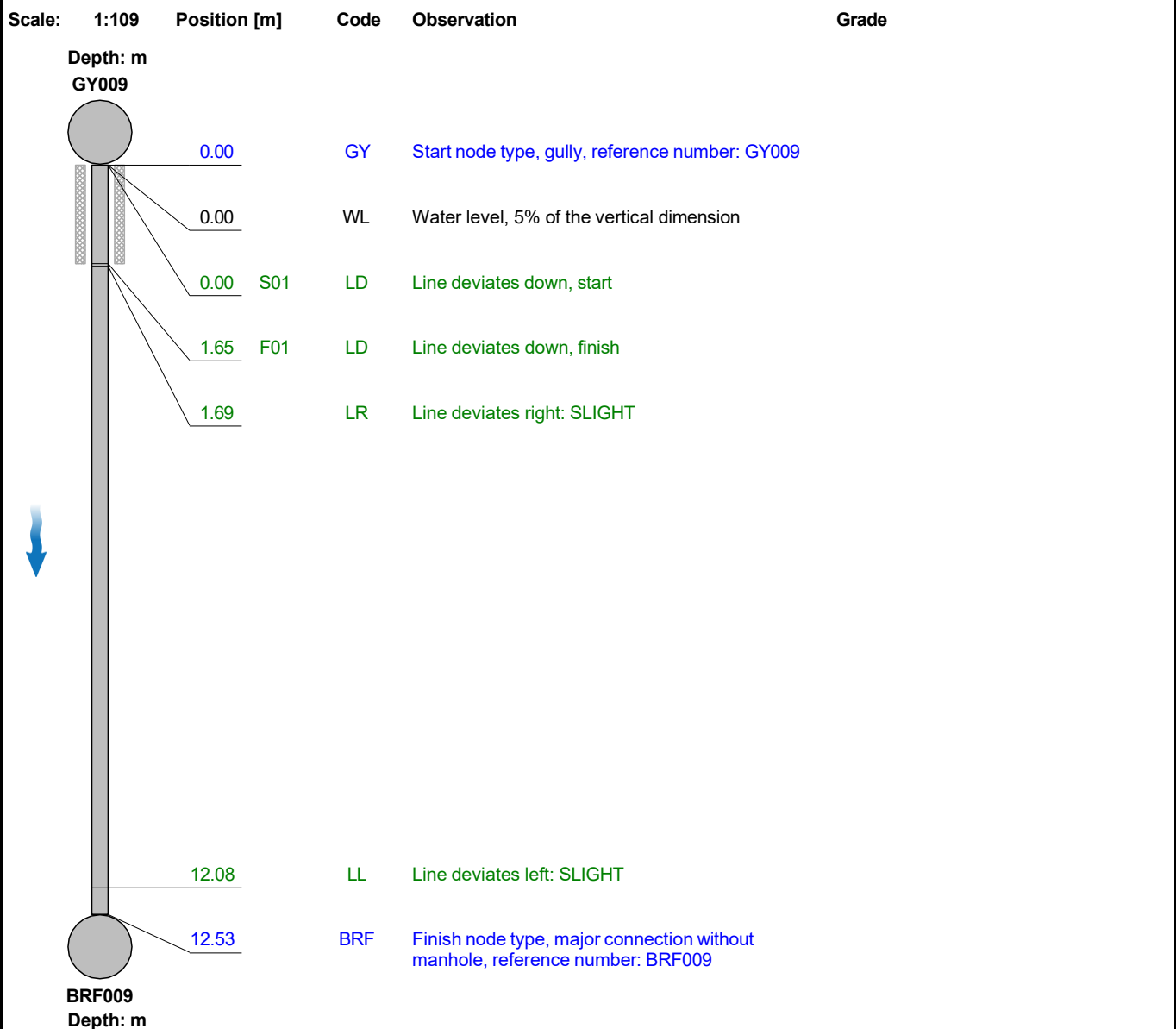


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	1.0	0.1	1.0	2.0

Section Inspection - 15/07/2020 - GY009X

Section 33	Inspection 1	Date 15/07/20	Time 12:26	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR GY009X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	GY009
Road:	Robert Hodge Centre Stanley	Inspected Length:	12.53 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	12.53 m	Downstream Node:	BRF009
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features

Structural Defects

Miscellaneous Features

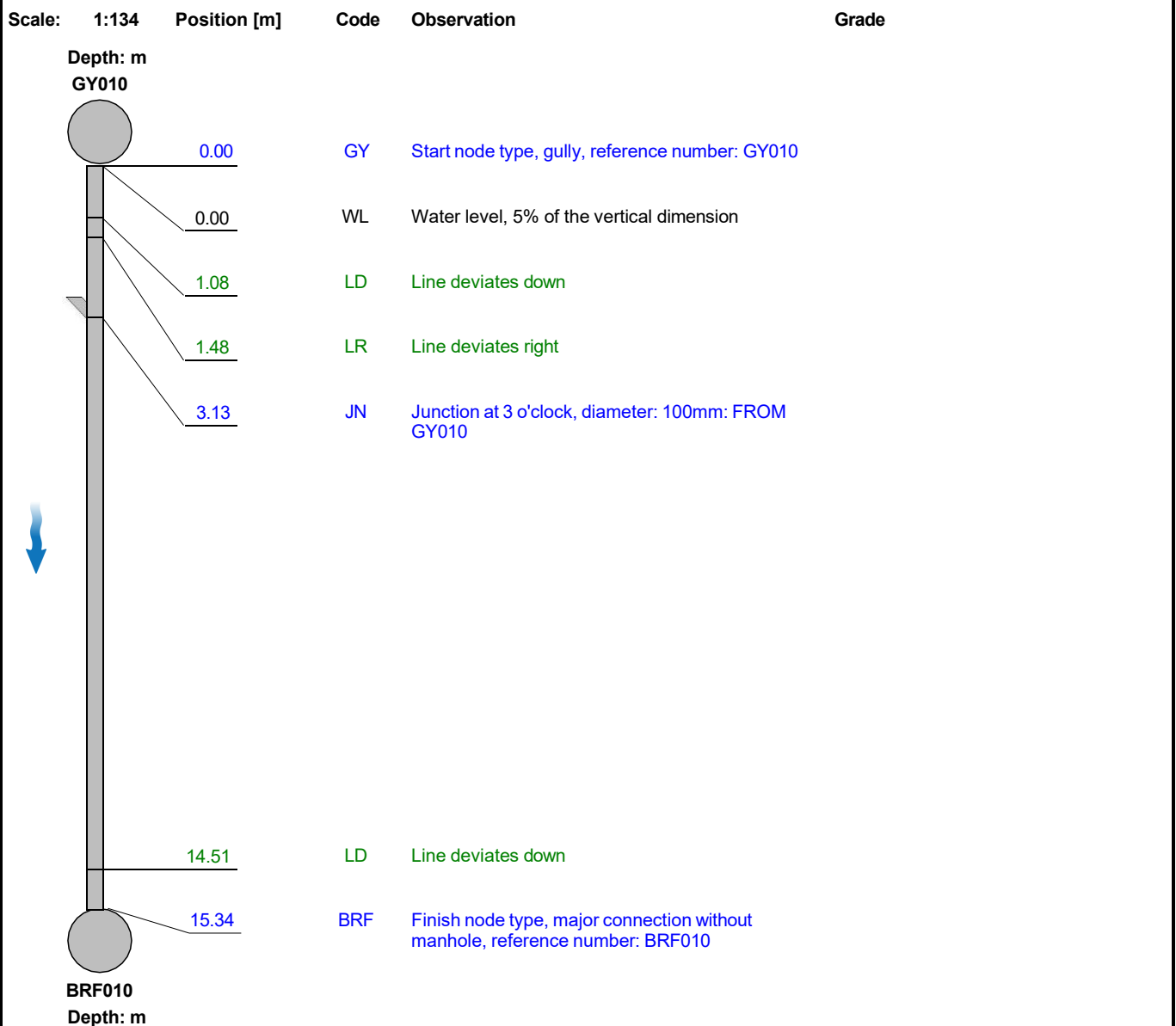
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - GY010X

Section 34	Inspection 1	Date 15/07/20	Time 12:31	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR GY010X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	GY010
Road:	Robert Hodge Centre Stanley	Inspected Length:	15.34 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	15.34 m	Downstream Node:	BRF010
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - GY012X

Section 35	Inspection 1	Date 15/07/20	Time 12:57	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR GY012X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	GY012
Road:	Robert Hodge Centre Stanley	Inspected Length:	0.60 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	0.60 m	Downstream Node:	BRF012
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

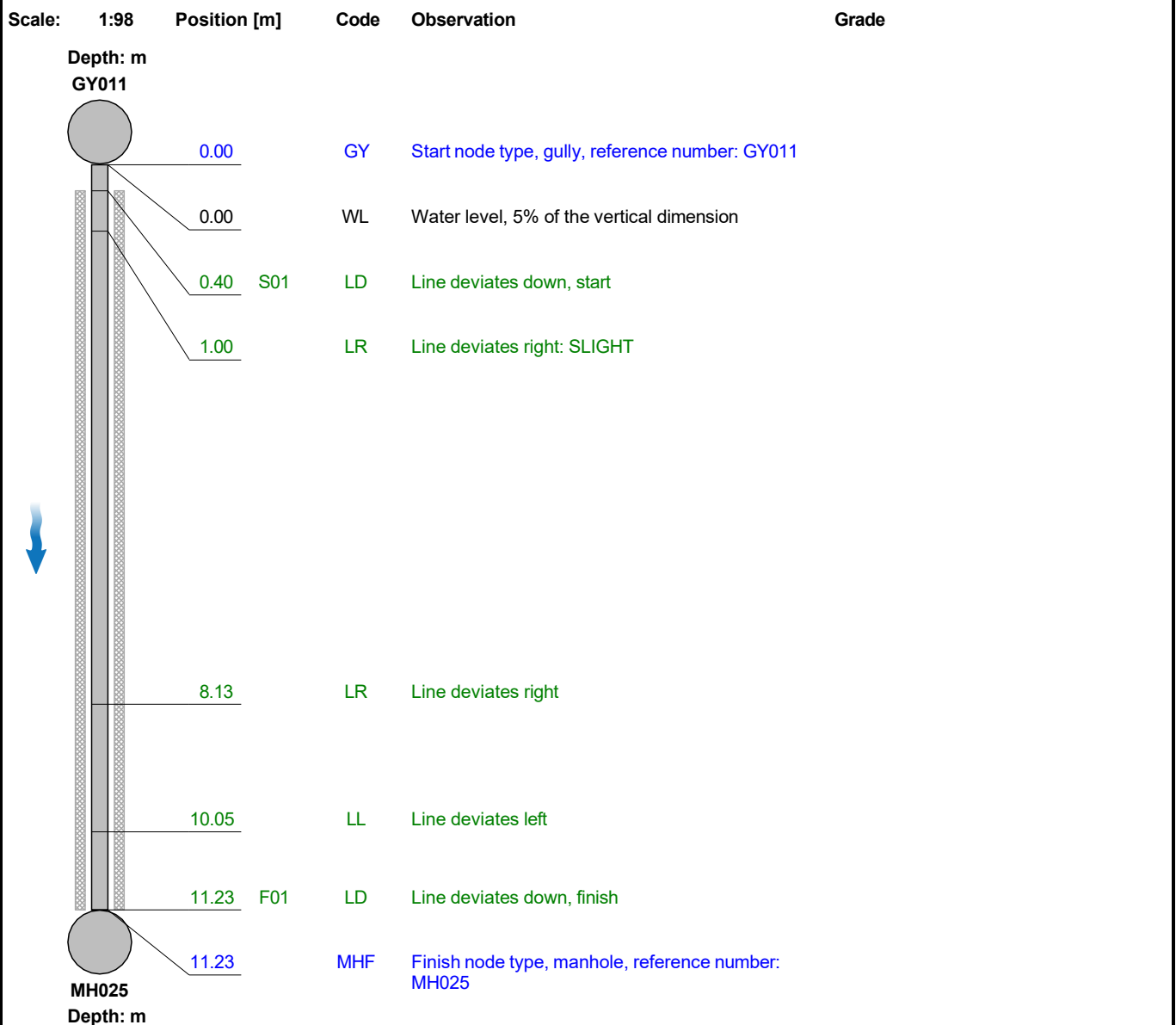
Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: m GY012 BRF012 Depth: m					
		0.00	GY	Start node type, gully, reference number: GY012	
		0.00	WL	Water level, 5% of the vertical dimension	
		0.60	LD	Line deviates down: SHARP	
		0.60	BRF	Finish node type, major connection without manhole, reference number: BRF012	

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - GY011X

Section 36	Inspection 1	Date 15/07/20	Time 13:29	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR GY011X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	GY011
Road:	Robert Hodge Centre Stanley	Inspected Length:	11.23 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	11.23 m	Downstream Node:	MH025
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - GY013X

Section 37	Inspection 1	Date 15/07/20	Time 13:44	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR GY013X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	GY013
Road:	Robert Hodge Centre Stanley	Inspected Length:	3.51 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	3.51 m	Downstream Node:	BRF013
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features

Structural Defects

Miscellaneous Features

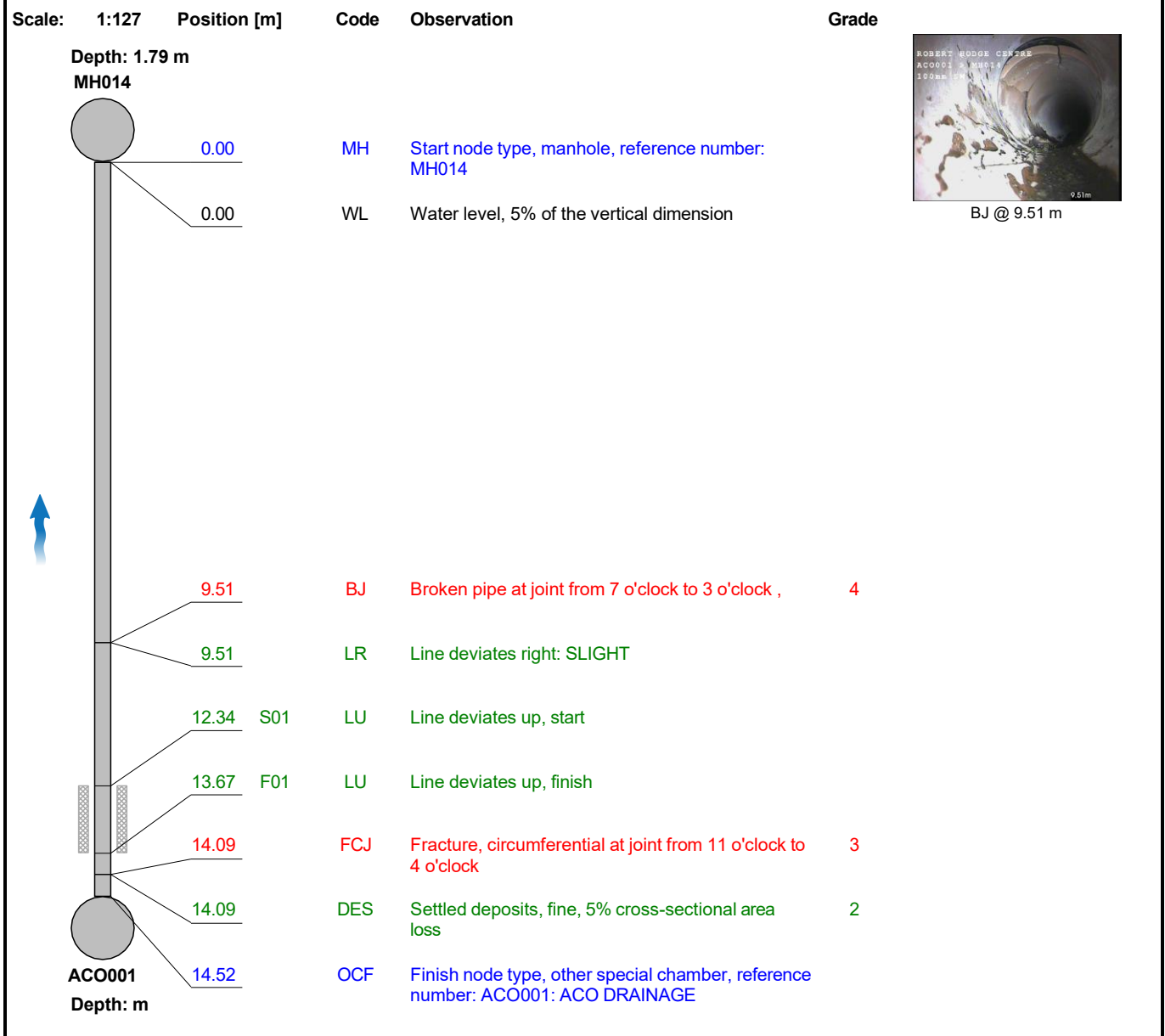
Service & Operational Observations

STR No.	Def	STR Peak	STR Mean	STR Total	STR Grade	SER No.	Def	SER Peak	SER Mean	SER Total	SER Grade
0		0.0	0.0	0.0	1.0	0		0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - ACO001X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
38	1	15/07/20	14:26	AR00000001	Rain	No	ACO001X
Operator		Vehicle		Camera	Preset Length	Criticality Grade	Alternative ID
ANDREW		DY61VGR		Solo Pro	Not Specified	Category C	Not Specified

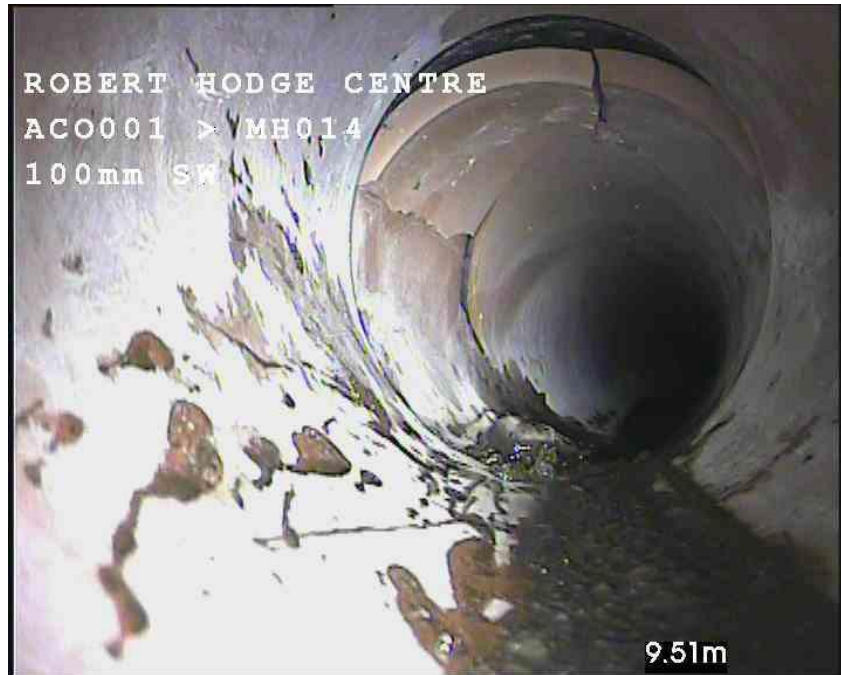
Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	ACO001
Road:	Robert Hodge Centre Stanley	Inspected Length:	14.52 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	14.52 m	Downstream Node:	MH014
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.790 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	80.0	8.3	120.0	4.0	1	1.0	0.1	1.0	2.0

Section Pictures - 15/07/2020 - ACO001X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
38	Upstream	ACO001X	AR00000001	13015



1, 9.51 m
Broken pipe at joint from 7 o'clock to 3 o'clock ,

Section Inspection - 15/07/2020 - MH018X

Section 39	Inspection 1	Date 15/07/20	Time 14:47	Client's Job Ref AR000000001	Weather Rain	Pre Cleaned No	PLR MH018X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH018
Road:	Robert Hodge Centre Stanley	Inspected Length:	2.25 m	Upstream Pipe Depth:	1.080 m
Location:	Road	Total Length:	2.25 m	Downstream Node:	BRF018
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	150 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

Scale: 1:50 Position [m] Code Observation Grade

Depth: 1.08 m
MH018

0.00

0.00

1.57

2.25

BRF018
Depth: m

MH Start node type, manhole, reference number: MH018

WL Water level, 5% of the vertical dimension

LL Line deviates left

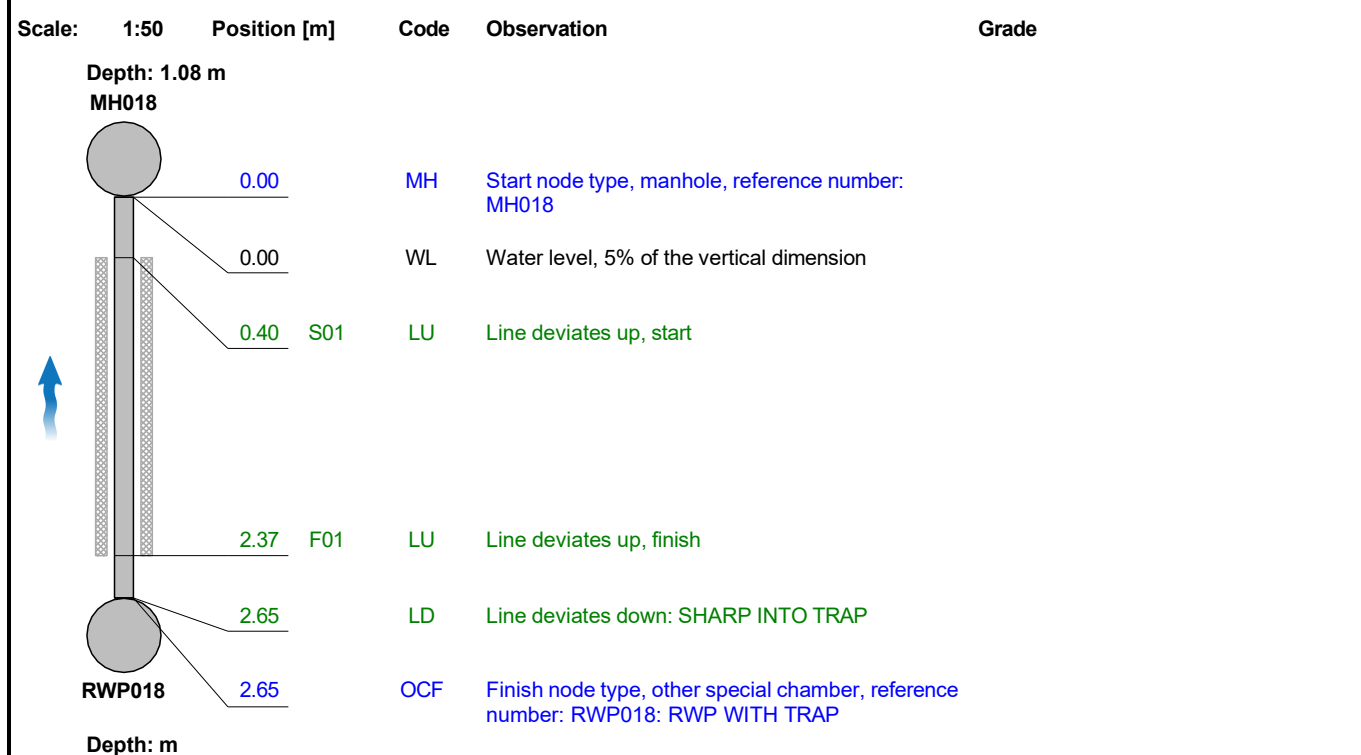
BRF Finish node type, major connection without manhole, reference number: BRF018

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - RWP018X

Section 40	Inspection 1	Date 15/07/20	Time 14:51	Client's Job Ref AR00000001	Weather Rain	Pre Cleaned No	PLR RWP018X
Operator ANDREW		Vehicle DY61VGR		Camera Solo Pro	Preset Length Not Specified	Criticality Grade Category C	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	RWP018
Road:	Robert Hodge Centre Stanley	Inspected Length:	2.65 m	Upstream Pipe Depth:	
Location:	Road	Total Length:	2.65 m	Downstream Node:	MH018
Surface Type:		Joint Length:	0.60 m	Downstream Pipe Depth:	1.080 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Routine inspection of condition	Lining Material:	No Lining		
Comments:					
Recommendations:					

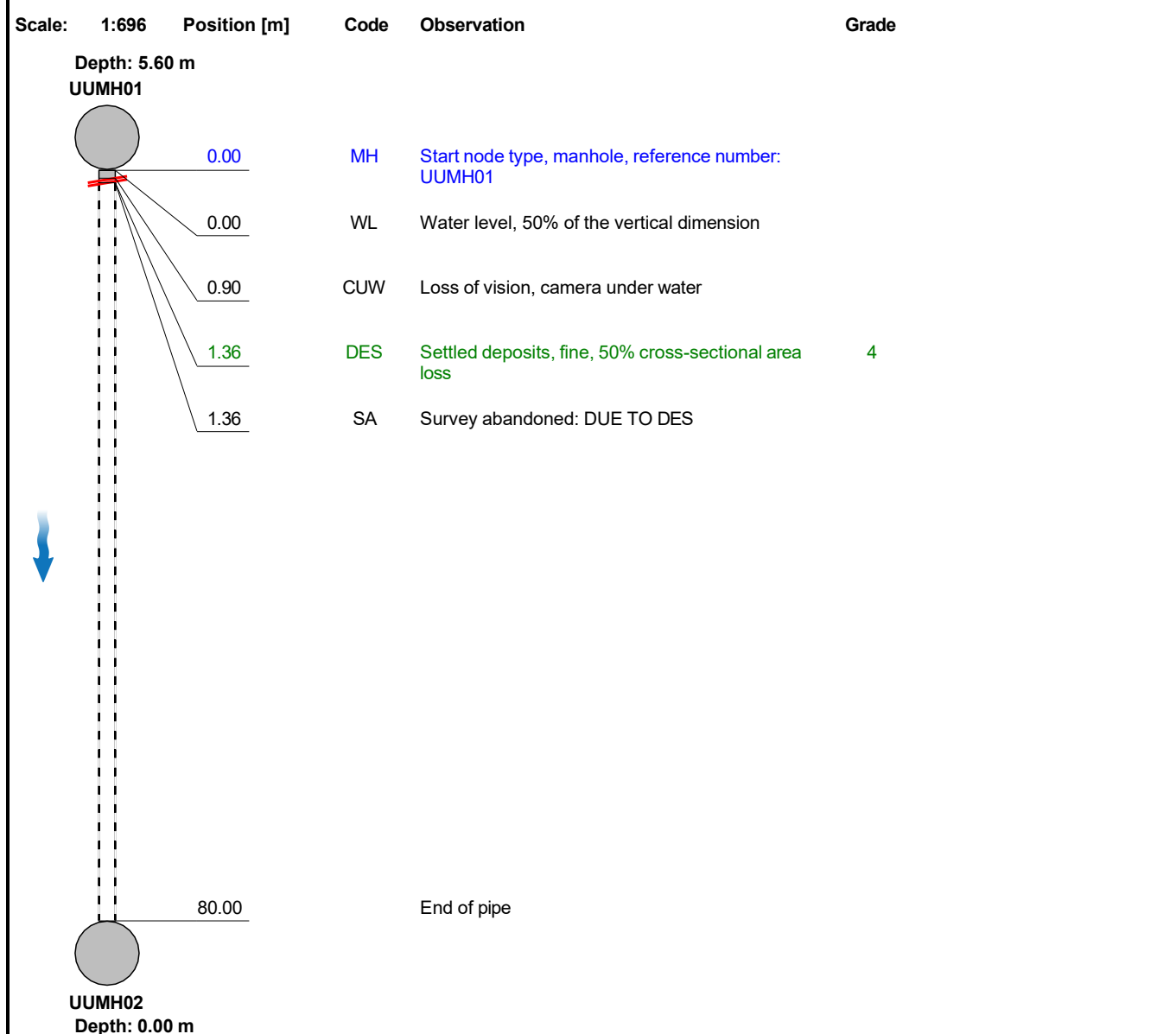


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 10/07/2020 - UUMH01X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
41	1	10/07/20	12:17	PK00000719	No Rain Or Snow	No	UUMH01X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
PK		SC15NYG		Ipek Ex	0.90 m	Public Sewer	Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	UUMH01
Road:	Robert Hodge Centre Stanley	Inspected Length:	1.36 m	Upstream Pipe Depth:	5.600 m
Location:	Verge	Total Length:	80.00 m	Downstream Node:	UUMH02
Surface Type:	Grass	Joint Length:	1.00 m	Downstream Pipe Depth:	0.000 m
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	375 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	HPWJ due to silt/debris > 20%				

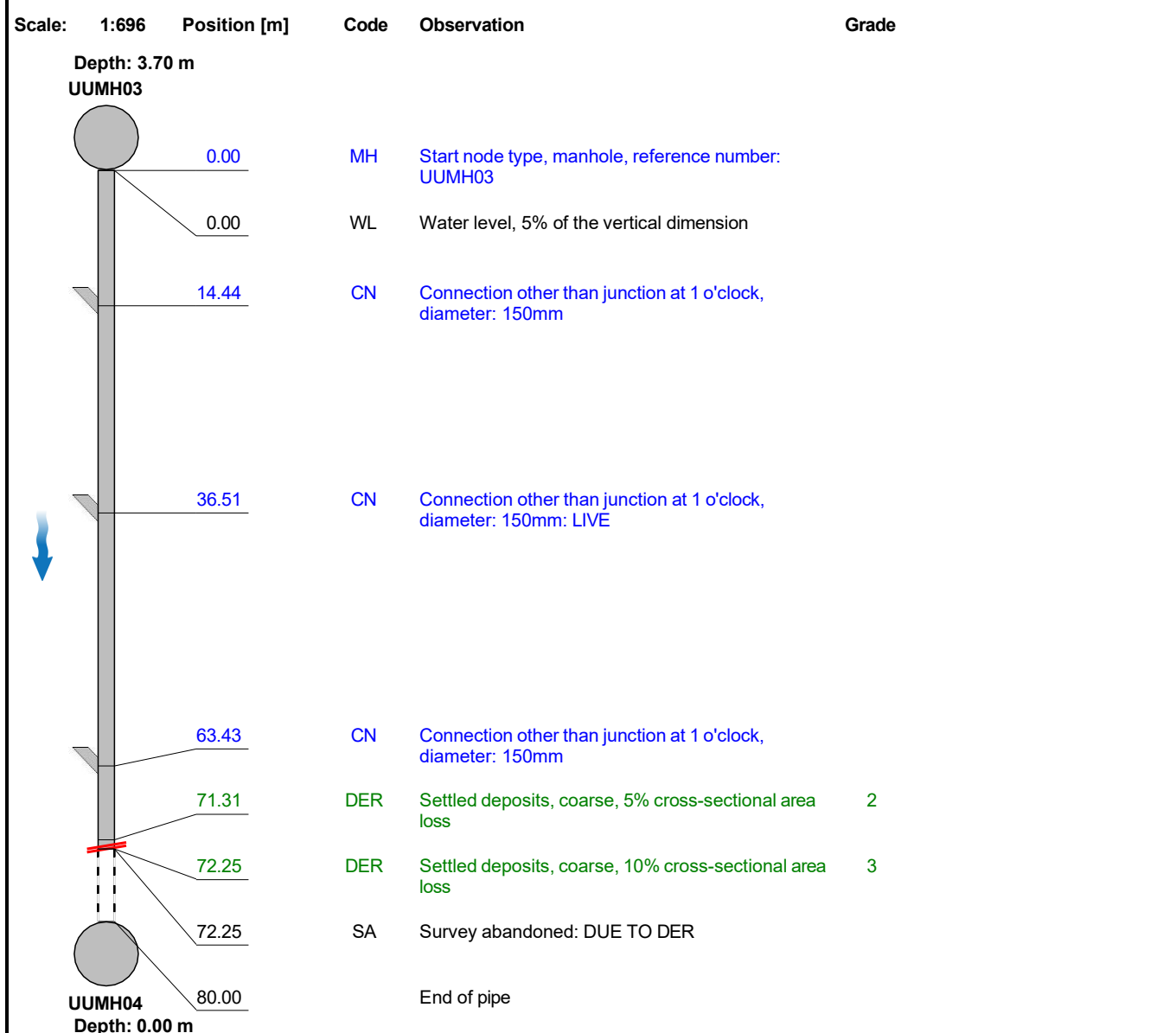


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	3.7	5.0	4.0

Section Inspection - 10/07/2020 - UUMH03X

Section 42	Inspection 2	Date 10/07/20	Time 12:37	Client's Job Ref PK00000720	Weather No Rain Or Snow	Pre Cleaned No	PLR UUMH03X
Operator PK		Vehicle SC15NYG		Camera Ipek Ex	Preset Length 1.60 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	UUMH03
Road:	Robert Hodge Centre Stanley	Inspected Length:	72.25 m	Upstream Pipe Depth:	3.700 m
Location:	Verge	Total Length:	80.00 m	Downstream Node:	UUMH04
Surface Type:	Grass	Joint Length:	1.00 m	Downstream Pipe Depth:	0.000 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	825 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

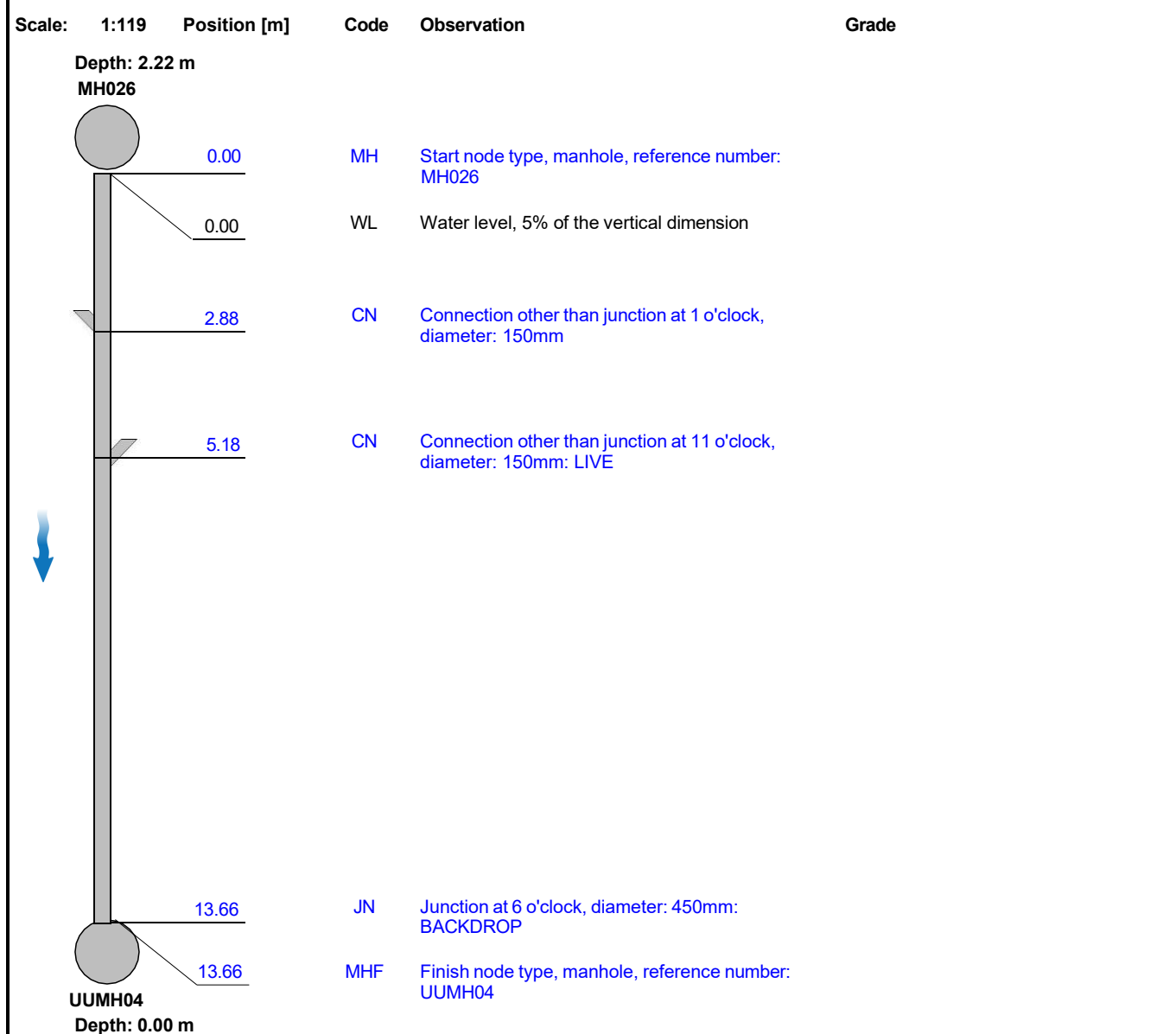


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	2.0	0.0	3.0	3.0

Section Inspection - 15/07/2020 - MH026X

Section 43	Inspection 1	Date 15/07/20	Time 13:27	Client's Job Ref JC00002856	Weather Rain	Pre Cleaned No	PLR MH026X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.20 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH026
Road:	Robert Hodge Centre Stanley	Inspected Length:	13.66 m	Upstream Pipe Depth:	2.220 m
Location:	Difficult access	Total Length:	13.66 m	Downstream Node:	UUMH04
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	0.000 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	450 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - MH025X

Section 44	Inspection 2	Date 15/07/20	Time 13:36	Client's Job Ref JC00002857	Weather Rain	Pre Cleaned No	PLR MH025X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.20 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH025
Road:	Robert Hodge Centre Stanley	Inspected Length:	1.78 m	Upstream Pipe Depth:	0.000 m
Location:	Difficult access	Total Length:	1.78 m	Downstream Node:	MH026
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	2.220 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	450 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:1:50

Position [m]

Code

Observation

Grade

Depth: 2.22 m

MH026

0.00

MH

Start node type, manhole, reference number: MH026

0.00

WL

Water level, 10% of the vertical dimension

1.78

REM

General remark: RATAINING WALL IN UP STREAM MANHOLE

1.78

OCF

Finish node type, other special chamber, reference number: MH025: OIL INTERCEPTOR

Depth: 0.00 m

MH025

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	0	0.0	0.0	0.0	1.0

Section Inspection - 15/07/2020 - MH012X

Section 45	Inspection 3	Date 15/07/20	Time 13:44	Client's Job Ref JC00002858	Weather Rain	Pre Cleaned No	PLR MH012X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.80 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH012
Road:	Robert Hodge Centre Stanley	Inspected Length:	41.15 m	Upstream Pipe Depth:	0.000 m
Location:	Difficult access	Total Length:	41.15 m	Downstream Node:	MH020
Surface Type:	Asphalt Highway	Joint Length:	1.00 m	Downstream Pipe Depth:	0.000 m
Use:	Combined			Pipe Shape:	Circular
Type of Pipe:	Gravity drain/sewer			Dia/Height:	225 mm
Year Constructed:				Pipe Material:	Vitrified clay pipe (i.e. all clayware)
Flow Control:	No flow control			Lining Type:	No Lining
Inspection Purpose:	Other (state in remarks)			Lining Material:	No Lining
Comments:	SURVEY OPS				
Recommendations:	None				

Scale: 1:358 Position [m] Code Observation Grade

Depth: 0.00 m
MH012

Code	Observation	Grade
MH	Start node type, manhole, reference number: MH012	
WL	Water level, 5% of the vertical dimension	
JN	Junction at 12 o'clock, diameter: 150mm	
S01	DER	
F01	DER	3
DER	Settled deposits, coarse, 10% cross-sectional area loss	3
JN	Junction at 12 o'clock, diameter: 150mm	
JN	Junction at 12 o'clock, diameter: 150mm: LIVE	
LL	Line deviates left: SLIGHT	
MHF	Finish node type, manhole, reference number: MH020	

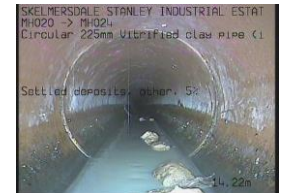
Depth: 0.00 m
MH020

Section Inspection - 15/07/2020 - MH020X

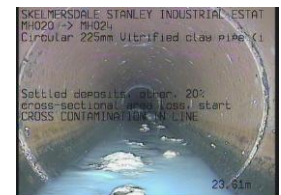
Section 46	Inspection 4	Date 15/07/20	Time 13:53	Client's Job Ref JC00002859	Weather Rain	Pre Cleaned No	PLR MH020X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.80 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH020
Road:	Robert Hodge Centre Stanley	Inspected Length:	62.03 m	Upstream Pipe Depth:	3.530 m
Location:	Difficult access	Total Length:	62.03 m	Downstream Node:	UUMH02
Surface Type:	Asphalt Highway	Joint Length:	1.00 m	Downstream Pipe Depth:	0.000 m
Use:	Combined		Pipe Shape:	Circular	
Type of Pipe:	Gravity drain/sewer		Dia/Height:	225 mm	
Year Constructed:			Pipe Material:	Vitrified clay pipe (i.e. all clayware)	
Flow Control:	No flow control		Lining Type:	No Lining	
Inspection Purpose:	Other (state in remarks)		Lining Material:	No Lining	
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:526	Position [m]	Code	Observation	Grade
Depth: 3.53 m MH020	0.00	MH	Start node type, manhole, reference number: MH020		
	0.00	WL	Water level, 5% of the vertical dimension		
	2.06	DER	Settled deposits, coarse, 10% cross-sectional area loss	3	
	2.66	JN	Junction at 1 o'clock, diameter: 150mm		
	4.32	WL	Water level, 10% of the vertical dimension		
	12.31	JN	Junction at 11 o'clock, diameter: 150mm		
	14.22	DEX	Settled deposits, other, 5% cross-sectional area loss: FOUL	2	
	23.60	S01	Settled deposits, other, 20% cross-sectional area loss, start: FOUL		
	28.92	F01	Settled deposits, other, 20% cross-sectional area loss, finish: FOUL	3	
	28.93	WL	Water level, 5% of the vertical dimension		
	41.09	JN	Junction at 12 o'clock, diameter: 100mm		
	49.99	WL	Water level, 10% of the vertical dimension		
	52.96	FC	Fracture, circumferential from 7 o'clock to 5 o'clock	3	
	59.15	RM	Roots, mass, 20% cross-sectional area loss	3	
	60.47	WL	Water level, 50% of the vertical dimension		



DEX @ 14.22 m



DEX @ 23.60 m



FC @ 52.96 m



FC @ 61.56 m

Section Inspection - 15/07/2020 - MH020X

Section 46	Inspection 4	Date 15/07/20	Time 13:53	Client's Job Ref JC00002859	Weather Rain	Pre Cleaned No	PLR MH020X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.80 m	Legal Status Public Sewer	Alternative ID Not Specified

Scale:	1:526	Position [m]	Code	Observation	Grade
		60.51	DEX	Settled deposits, other, 50% cross-sectional area loss: FOUL	4
		61.56	FC	Fracture, circumferential from 9 o'clock to 3 o'clock	3
		61.57	RM	Roots, mass, 5% cross-sectional area loss	3
		62.03	REM	General remark: BACKDROP IN VIEW	
		62.03	FL	Fracture, longitudinal at 12 o'clock	3
		62.03	RM	Roots, mass, 40% cross-sectional area loss	5
		62.03	SA	Survey abandoned: DUE TO ROOTS MASS AND DEX	

Construction Features

Structural Defects

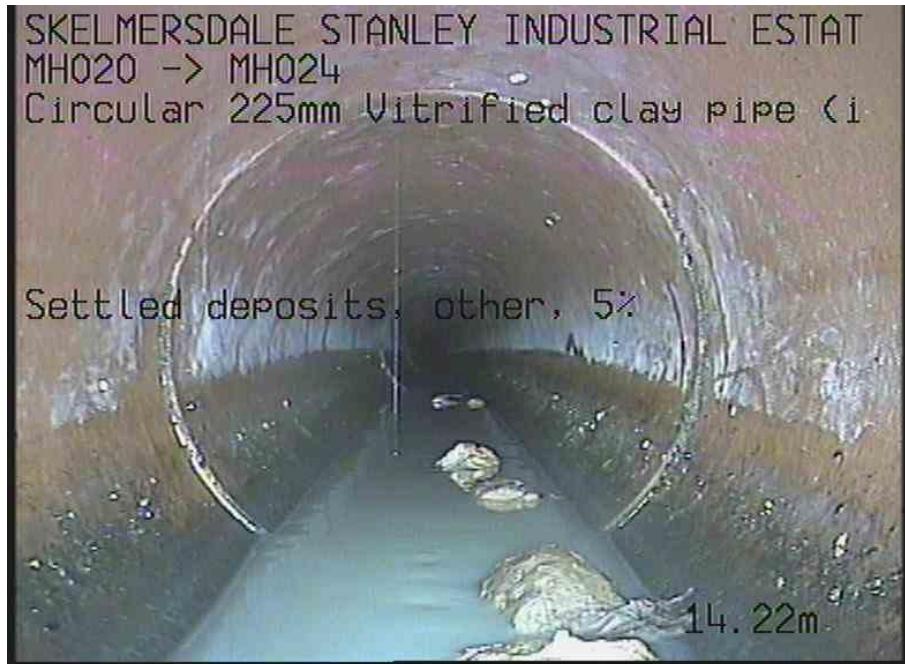
Miscellaneous Features

Service & Operational Observations

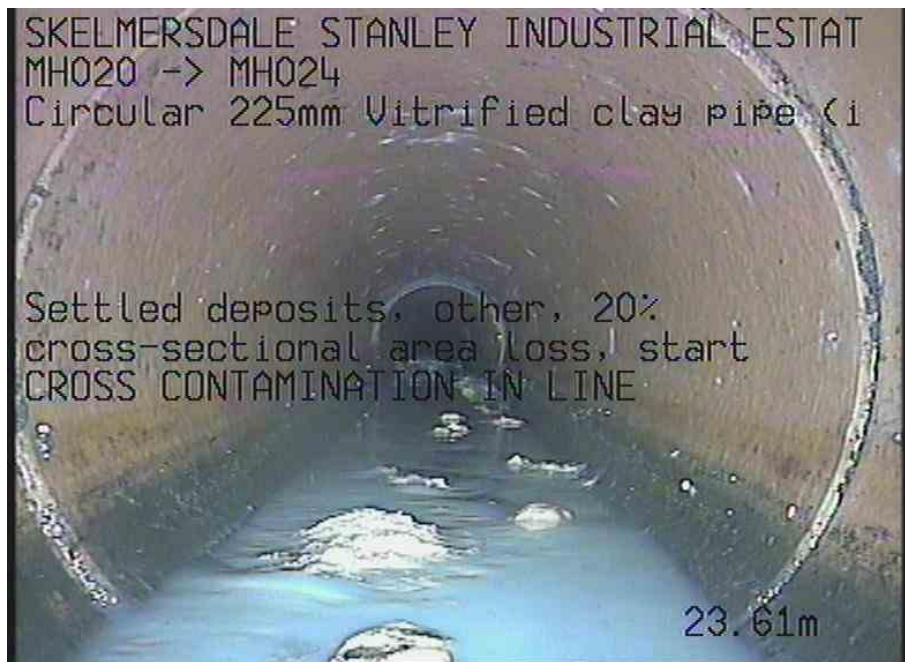
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
3	80.0	1.9	120.0	3.0	7	10.0	0.6	36.0	5.0

Section Pictures - 15/07/2020 - MH020X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
46	Downstream	MH020X	JC00002859	13015



1, 00:01:30, 14.22 m
Settled deposits, other, 5% cross-sectional area loss, FOUL



2, 00:02:21, 23.60 m
Settled deposits, other, 20% cross-sectional area loss, start, FOUL

Section Pictures - 15/07/2020 - MH020X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
46	Downstream	MH020X	JC00002859	13015



3, 00:05:30, 52.96 m
Fracture, circumferential from 7 o'clock to 5 o'clock



4, 00:06:30, 61.56 m
Fracture, circumferential from 9 o'clock to 3 o'clock

Section Inspection - 15/07/2020 - MH013X

Section 47	Inspection 5	Date 15/07/20	Time 14:15	Client's Job Ref JC00002860	Weather Rain	Pre Cleaned No	PLR MH013X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.80 m	Legal Status Public Sewer	Alternative ID Not Specified

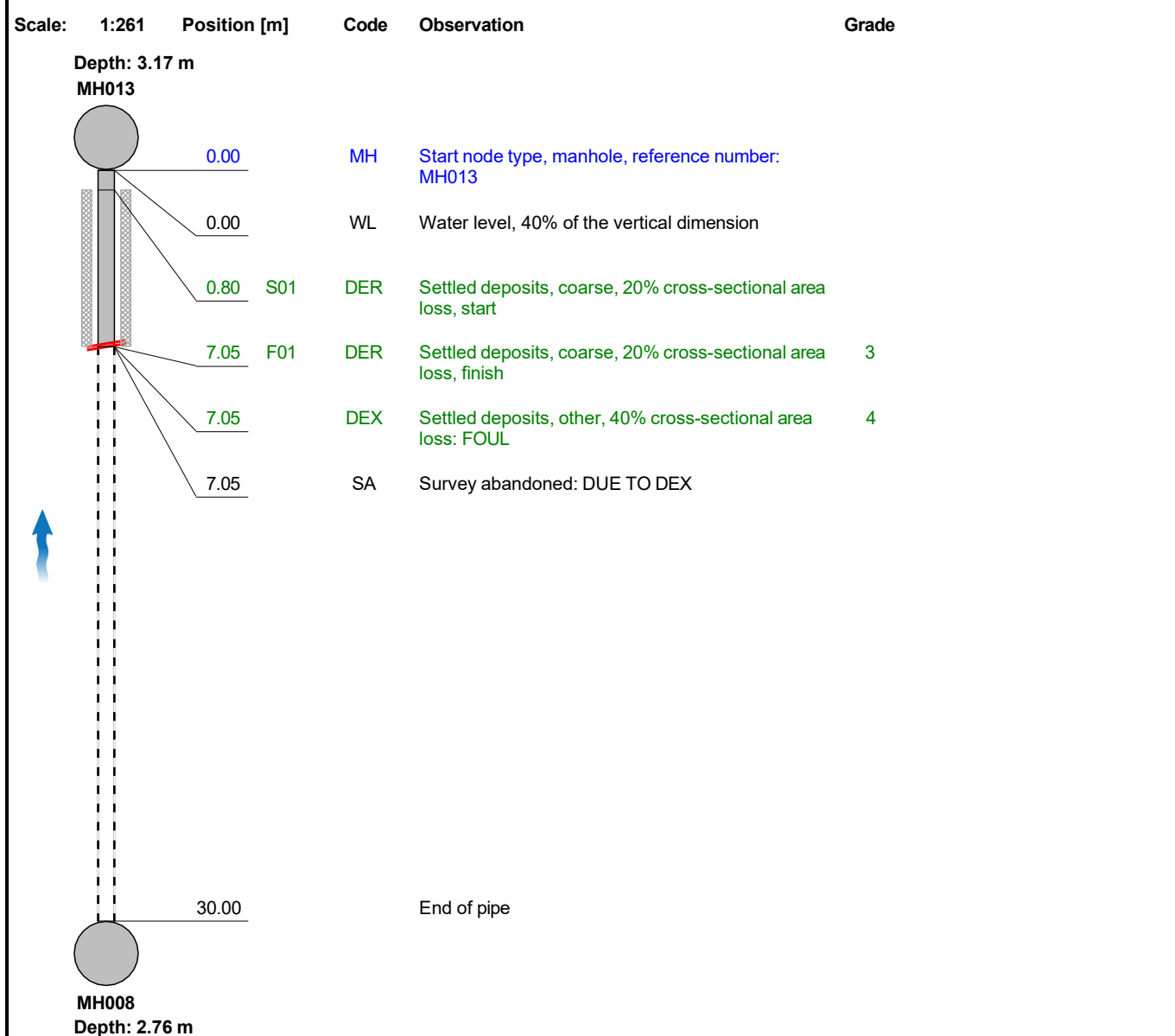
Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH013
Road:	Robert Hodge Centre Stanley	Inspected Length:	4.06 m	Upstream Pipe Depth:	3.170 m
Location:	Difficult access	Total Length:	4.06 m	Downstream Node:	MH012
Surface Type:	Asphalt Highway	Joint Length:	1.00 m	Downstream Pipe Depth:	3.200 m
Use:	Combined	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: 3.20 m MH012 0.00 0.00 3.63 3.64 4.06 Depth: 3.17 m MH013					

Section Inspection - 15/07/2020 - MH008X

Section	Inspection	Date	Time	Client's Job Ref	Weather	Pre Cleaned	PLR
48	6	15/07/20	14:24	JC00002861	Rain	No	MH008X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
JC		MD64UPB		Proteus Ex	0.80 m	Public Sewer	Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH008
Road:	Robert Hodge Centre Stanley	Inspected Length:	7.05 m	Upstream Pipe Depth:	2.760 m
Location:	Difficult access	Total Length:	30.00 m	Downstream Node:	MH013
Surface Type:	Asphalt Highway	Joint Length:	1.00 m	Downstream Pipe Depth:	3.170 m
Use:	Combined	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	225 mm		
Year Constructed:		Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	7.0	2.7	19.0	4.0

Section Inspection - 15/07/2020 - MH008X

Section 49	Inspection 7	Date 15/07/20	Time 14:31	Client's Job Ref JC00002862	Weather Rain	Pre Cleaned No	PLR MH008X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.80 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH008
Road:	Robert Hodge Centre Stanley	Inspected Length:	24.56 m	Upstream Pipe Depth:	2.760 m
Location:	Difficult access	Total Length:	30.00 m	Downstream Node:	MH013
Surface Type:	Asphalt Highway	Joint Length:	1.00 m	Downstream Pipe Depth:	3.170 m
Use:	Combined		Pipe Shape:	Circular	
Type of Pipe:	Gravity drain/sewer		Dia/Height:	225 mm	
Year Constructed:			Pipe Material:	Vitrified clay pipe (i.e. all clayware)	
Flow Control:	No flow control		Lining Type:	No Lining	
Inspection Purpose:	Other (state in remarks)		Lining Material:	No Lining	
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:261	Position [m]	Code	Observation	Grade
Depth: 2.76 m MH008					
		0.00	MH	Start node type, manhole, reference number: MH008	
		0.00	WL	Water level, 30% of the vertical dimension	
		0.80	S01	DEX Settled deposits, other, 30% cross-sectional area loss, start: FOUL	
		0.80	REM	General remark: OVERLAP	
		24.54	C	Remark: ***** Combined *****	
		24.54	C	Remark: Inspection from the other side	
		24.54	C	Remark: Uninspected Length: 0.0	
		24.54	C	Remark: Inspection from the other side	
		24.54	C	Remark: ***** Combined *****	
		24.54	SA	Survey abandoned: OVERLAP COMPLETE	
		24.54	F01	DEX Settled deposits, other, 30% cross-sectional area loss, finish: FOUL	4
		24.54			
Depth: 3.17 m MH013					

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	4.9	120.0	4.0

Section Inspection - 15/07/2020 - MH004X

Section 51	Inspection 9	Date 15/07/20	Time 14:59	Client's Job Ref JC00002864	Weather Rain	Pre Cleaned No	PLR MH004X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.20 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH004
Road:	Robert Hodge Centre Stanley	Inspected Length:	71.30 m	Upstream Pipe Depth:	1.110 m
Location:	Difficult access	Total Length:	71.30 m	Downstream Node:	MH009
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	2.490 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	450 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:613	Position [m]	Code	Observation	Grade
Depth: 1.11 m MH004					
		0.00	MH	Start node type, manhole, reference number: MH004	
		0.00	WL	Water level, 10% of the vertical dimension	
		3.48	DER	Settled deposits, coarse, 20% cross-sectional area loss	3
		4.67	CN	Connection other than junction at 12 o'clock, diameter: 100mm: LIVE	
		17.68	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
		34.37	DER	Settled deposits, coarse, 5% cross-sectional area loss	2
		34.82	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
		42.44	WL	Water level, 5% of the vertical dimension	
		49.95	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
		49.98	DEE	Attached deposits, encrustation from 7 o'clock to 5 o'clock, 5% cross-sectional area loss	2
		60.29	S01 DER	Settled deposits, coarse, 20% cross-sectional area loss, start	
		63.25	CN	Connection other than junction at 12 o'clock, diameter: 150mm: LIVE	
		63.26	WL	Water level, 20% of the vertical dimension	
		69.69	DES	Settled deposits, fine, 30% cross-sectional area loss	4

Section Inspection - 15/07/2020 - MH004X

Section 51	Inspection 9	Date 15/07/20	Time 14:59	Client's Job Ref JC00002864	Weather Rain	Pre Cleaned No	PLR MH004X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.20 m	Legal Status Public Sewer	Alternative ID Not Specified

Scale: 1:613	Position [m] 71.30	F01	Code DER	Observation Settled deposits, coarse, 20% cross-sectional area loss, finish	Grade 3
	MH009	71.30	MHF	Finish node type, manhole, reference number: MH009	
Depth: 2.49 m					

Construction Features

Structural Defects

Miscellaneous Features

Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	5	7.0	0.5	33.0	4.0

Section Inspection - 15/07/2020 - MH009X

Section 52	Inspection 10	Date 15/07/20	Time 15:07	Client's Job Ref JC00002865	Weather Rain	Pre Cleaned No	PLR MH009X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.40 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH009
Road:	Robert Hodge Centre Stanley	Inspected Length:	69.96 m	Upstream Pipe Depth:	2.490 m
Location:	Difficult access	Total Length:	69.96 m	Downstream Node:	MH021
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	2.870 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	600 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

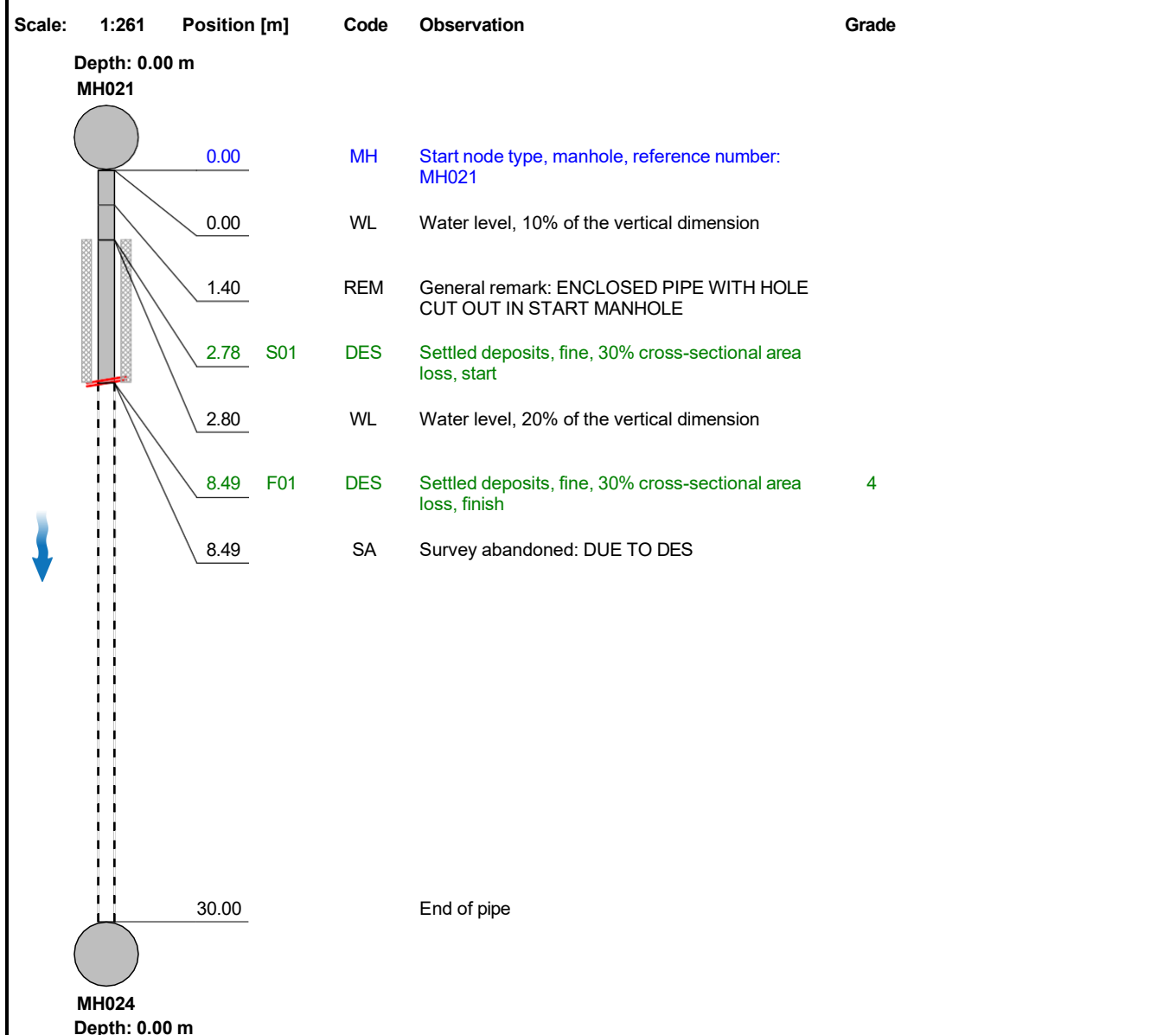
Scale:	1:609	Position [m]	Code	Observation	Grade
Depth: 2.49 m MH009					
		0.00	MH	Start node type, manhole, reference number: MH009	
		0.00	WL	Water level, 5% of the vertical dimension	
		8.86	WL	Water level, 10% of the vertical dimension	
		8.86	S01 DER	Settled deposits, coarse, 10% cross-sectional area loss, start	
		22.92	CN	Connection other than junction at 12 o'clock, diameter: 150mm: LIVE	
		32.73	CN	Connection other than junction at 12 o'clock, diameter: 150mm: LIVE	
		47.58	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
		58.01	CN	Connection other than junction at 12 o'clock, diameter: 150mm	
		69.96	F01 DER	Settled deposits, coarse, 10% cross-sectional area loss, finish	3
		69.96	MHF	Finish node type, manhole, reference number: MH021	
Depth: 2.87 m MH021					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	1.8	124.0	3.0

Section Inspection - 15/07/2020 - MH021X

Section 53	Inspection 11	Date 15/07/20	Time 15:14	Client's Job Ref JC00002866	Weather Rain	Pre Cleaned No	PLR MH021X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.40 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH021
Road:	Robert Hodge Centre Stanley	Inspected Length:	8.49 m	Upstream Pipe Depth:	0.000 m
Location:	Difficult access	Total Length:	30.00 m	Downstream Node:	MH024
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	0.000 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	600 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

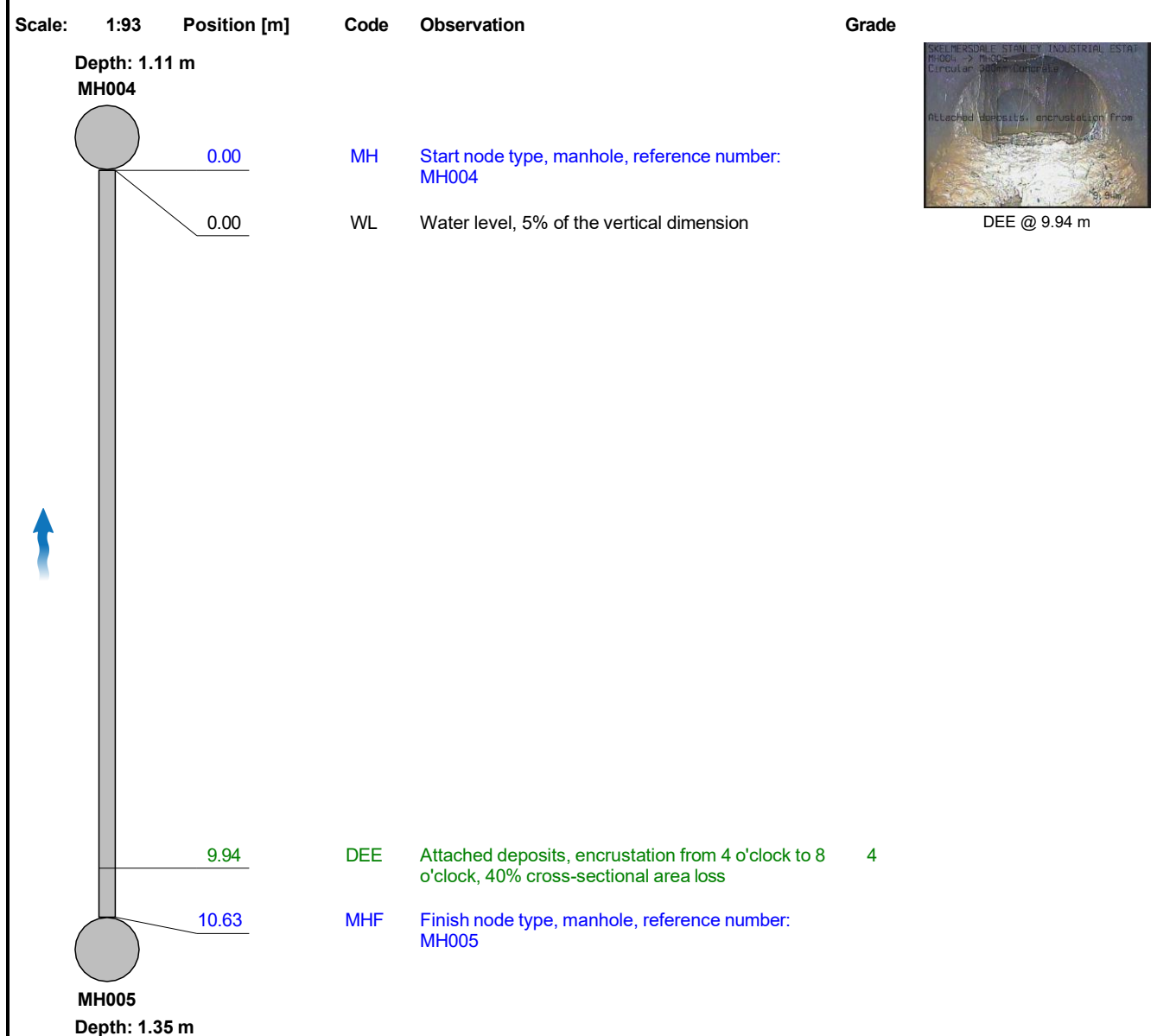


Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	3.5	30.0	4.0

Section Inspection - 15/07/2020 - MH005X

Section 54	Inspection 12	Date 15/07/20	Time 15:18	Client's Job Ref JC00002867	Weather Rain	Pre Cleaned No	PLR MH005X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.90 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH005
Road:	Robert Hodge Centre Stanley	Inspected Length:	10.63 m	Upstream Pipe Depth:	1.350 m
Location:	Difficult access	Total Length:	10.63 m	Downstream Node:	MH004
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	1.110 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				



Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	5.0	0.5	5.0	4.0

Section Pictures - 15/07/2020 - MH005X

Section	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
54	Upstream	MH005X	JC00002867	13015



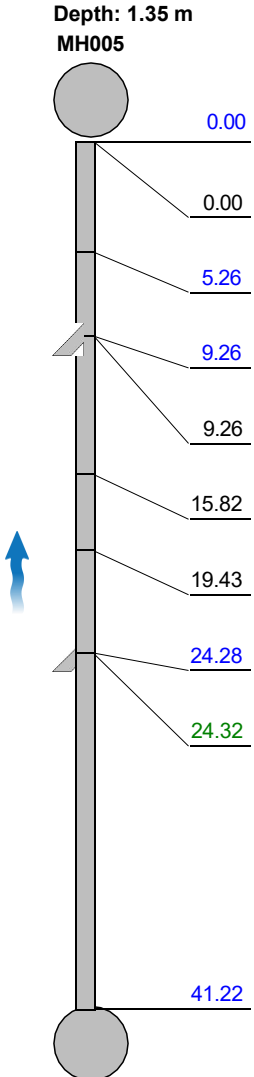
1, 00:00:39, 9.94 m

Attached deposits, encrustation from 4 o'clock to 8 o'clock, 40% cross-sectional area loss

Section Inspection - 15/07/2020 - MH034X

Section 55	Inspection 13	Date 15/07/20	Time 15:19	Client's Job Ref JC00002868	Weather Rain	Pre Cleaned No	PLR MH034X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 0.90 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH034
Road:	Robert Hodge Centre Stanley	Inspected Length:	41.22 m	Upstream Pipe Depth:	0.000 m
Location:	Difficult access	Total Length:	41.22 m	Downstream Node:	MH005
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	1.350 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	300 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:359	Position [m]	Code	Observation	Grade
Depth: 1.35 m MH005  0.00 0.00 5.26 9.26 9.26 15.82 19.43 24.28 24.32 41.22 MH WL CN CN WL WL WL CN DEE MHF Start node type, manhole, reference number: MH005 Water level, 40% of the vertical dimension Connection other than junction at 12 o'clock, diameter: 150mm Connection other than junction at 2 o'clock, diameter: 150mm: CAPPED OFF Water level, 20% of the vertical dimension Water level, 10% of the vertical dimension Water level, 5% of the vertical dimension Connection other than junction at 1 o'clock, diameter: 150mm Attached deposits, encrustation from 5 o'clock to 7 o'clock, 10% cross-sectional area loss Finish node type, manhole, reference number: MH034 MH034 Depth: 0.00 m					

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	0.1	2.0	3.0

Section Inspection - 15/07/2020 - MH024X

Section 56	Inspection 14	Date 15/07/20	Time 15:20	Client's Job Ref JC00002869	Weather Rain	Pre Cleaned No	PLR MH024X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.40 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Downstream	Upstream Node:	MH024
Road:	Robert Hodge Centre Stanley	Inspected Length:	2.45 m	Upstream Pipe Depth:	2.870 m
Location:	Difficult access	Total Length:	2.45 m	Downstream Node:	MH025
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	0.000 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	600 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				

Scale:	1:50	Position [m]	Code	Observation	Grade
Depth: 2.87 m MH024					
	0.00	MH		Start node type, manhole, reference number: MH024	
	0.00	WL		Water level, 5% of the vertical dimension	
	1.40	S01	DES	Settled deposits, fine, 10% cross-sectional area loss, start	
	2.45	F01	DES	Settled deposits, fine, 10% cross-sectional area loss, finish	3
	2.45	LD		Line deviates down: SHARP	
	2.45	OCF		Finish node type, other special chamber, reference number: MH025: OIL INTERCEPTOR	
Depth: 0.00 m					

Construction Features

Structural Defects

Miscellaneous Features

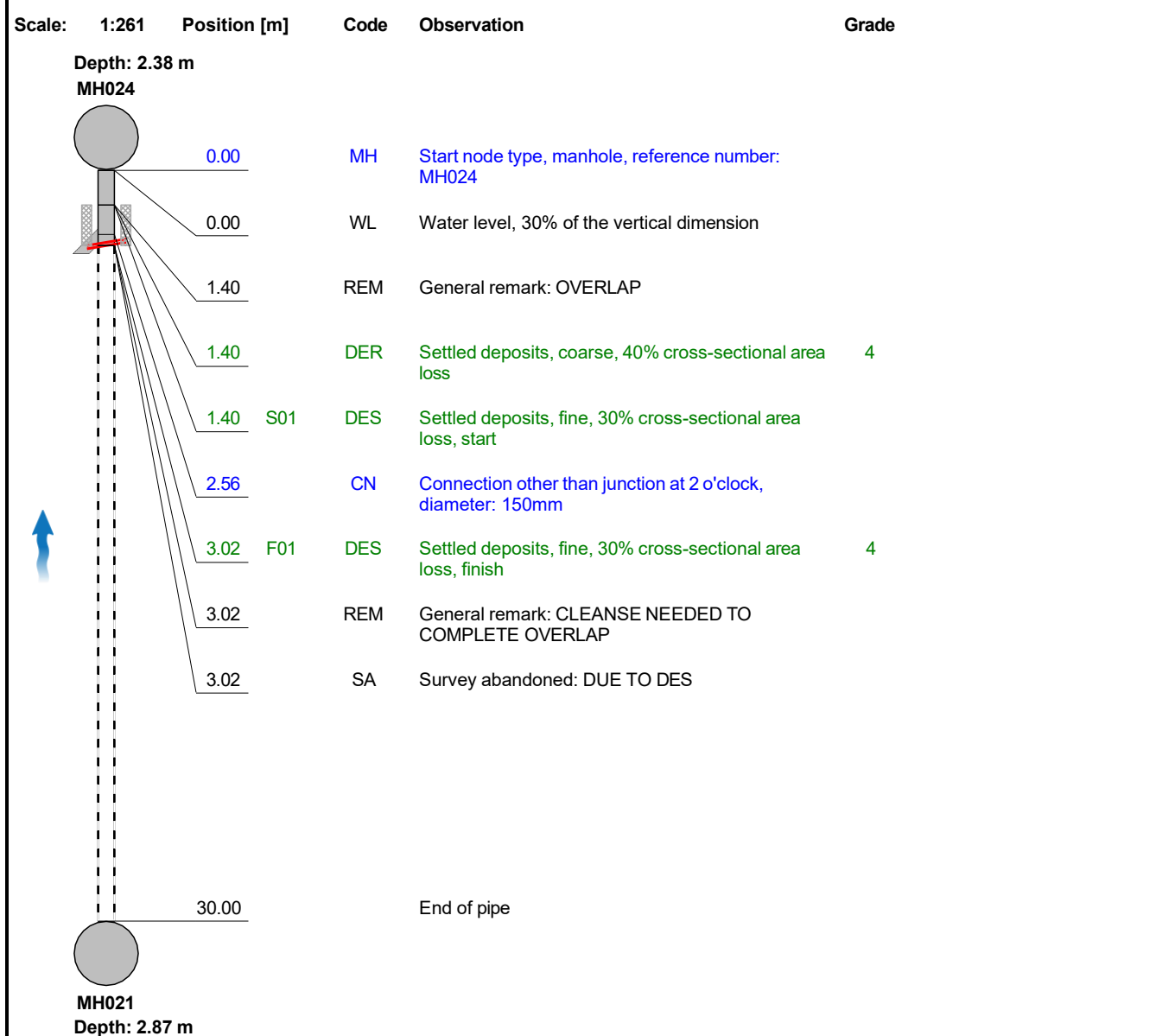
Service & Operational Observations

STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	1	2.0	1.6	4.0	3.0

Section Inspection - 15/07/2020 - MH021X

Section 57	Inspection 15	Date 15/07/20	Time 15:44	Client's Job Ref JC00002870	Weather Rain	Pre Cleaned No	PLR MH021X
Operator JC		Vehicle MD64UPB		Camera Proteus Ex	Preset Length 1.40 m	Legal Status Public Sewer	Alternative ID Not Specified

Town or Village:	Skelmersdale	Inspection Direction:	Upstream	Upstream Node:	MH021
Road:	Robert Hodge Centre Stanley	Inspected Length:	3.02 m	Upstream Pipe Depth:	2.870 m
Location:	Difficult access	Total Length:	30.00 m	Downstream Node:	MH024
Surface Type:	Asphalt Highway	Joint Length:	2.00 m	Downstream Pipe Depth:	2.380 m
Use:	Surface water	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	600 mm		
Year Constructed:		Pipe Material:	Concrete		
Flow Control:	No flow control	Lining Type:	No Lining		
Inspection Purpose:	Other (state in remarks)	Lining Material:	No Lining		
Comments:	SURVEY OPS				
Recommendations:	None				



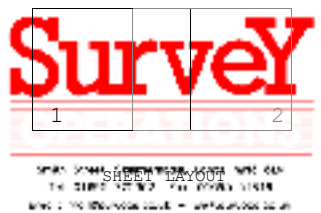
Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
0	0.0	0.0	0.0	1.0	2	10.0	5.0	15.0	5.0

Drainage information must be verified with local authority records before use

All drainage information taken from CCTV drainage survey.

Topographical survey information shown for location of drainage only.

STANDARD REFERENCE & ABBREVIATIONS

[illegible]

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Client
WBC

Drawing Title
Drainage Survey of Land at:
The Robert Hodge Centre
Skelmersdale

Sheet 1 of 2

Scale(s)	1:200	Surveyor	TW
Date	JUL 20	Drawn	IT
Job Number	20F152	Checked	SO

Drawing Title
Drainage Survey of Land at:
The Robert Hodge Centre
Skelmersdale

Sheet 2 of 2

Scale(s)	1:200	Surveyor	TW
Date	JUL 20	Drawn	IT
Job Number	20F152	Checked	SO