

Sleaford Renewable Energy Plant

DSEAR Assessment Report Summary

**Natural Power Ltd
Sleaford**

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Gexcon Project Number	201312
Date of Issue	14.06.2021
Revision	02
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DSEAR ASSESSMENT REPORT

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Revision	Date	Author	Checker	Approver	Notes
02	14.06.2021	Hannes Engel	Aaron McMillan	Dave Price	Updated report to include olive pellet handling equipment for trial runs
01	26.02.2021	Hannes Engel	Louise Black	Dave Price	Updated following client comments
00	29.01.2021	Hannes Engel	Louise Black	Dave Price	First Issue

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1 Executive Summary

Project Overview

Natural Power have contacted Gexcon to perform an assessment in line with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) for the straw and waste wood handling areas at the Sleaford Renewable Energy Plant (SREP), located in Sleaford, UK.

The DSEAR assessment is based on information provided by Gregory Atebe of Natural Power as well as information gathered by Hannes Engel of Gexcon during a site visit at SREP on 19th January 2021.

This report details the outcome of this assessment which provides the area classification and risk assessment for the installation, as required by Regulation 7 and Regulation 5 of DSEAR respectively.

Following the initial issue and first revision of the DSEAR assessment this report has been updated as revision 2 to include olive pellet handling and to reflect the recently installed chemical suppression and barrier system.

Summary of Risks Identified

The following table provides a summary of the risks identified during the assessment. A breakdown of each risk can be found in the appendix document 'Gexcon-21-201312-APP1_rev02'. Full details of the risk calculation are provided in the methodology. Medium risks indicate that further risk reduction measures are required unless it can be demonstrated that the risks are As Low As Reasonably Practicable (ALARP). High risks indicate an unacceptable level of risk, immediate action must be taken to reduce these risks.

Table 1 Identified Risks

Grade	Risk Level	Description	Identified Risks
A	Very High	Intolerable - Risk reduction measures must be implemented immediately	0
B	High	Intolerable - Risk reduction measures must be implemented	0
C	Medium (upper band)	Tolerable if ALARP – Further risk reduction must be considered, and all reasonably practicable measures implemented, risks in the upper band of tolerable if ALARP should be prioritised over those in the lower band.	6
C	Medium (lower band)	Tolerable if ALARP – Further risk reduction must be considered, and all reasonably practicable measures implemented	68
D	Low	Broadly Acceptable - Further risk reduction may be necessary	32

Grade	Risk Level	Description	Identified Risks
E	Very Low	Broadly Acceptable - Further risk reduction may be necessary	2

Further Risk Reduction

Where a hazard has been identified, 84 recommendations to support reducing the risk towards as low as reasonably practicable (ALARP) have been provided. These risk reduction measures are listed for each Area in the report and summarised in Section 3.3.

2 Introduction

2.1 Report Layout

This report is structured as follows;

Section 1: Executive Summary – a high level overview of the findings of the risk assessment, highlighting the higher risk areas of the facility.

Section 2: Introduction – this section provides a brief overview of DSEAR and the Gexcon assessment methodology.

Section 3: Site Assessment Summary – tabulates the zone designations, risk assessment results and recommendations for the whole site.

Section 4: Bibliography - contains a list of Gexcon reference standards and documents provided by the client which were used as part of this assessment.

Appendix 1 (Separate Document): Detailed Assessment Considerations – includes all observations and notes taken during the assessment for each area. This provides the reasoning behind each aspect of the area classification and risk assessment.

Appendices 2-3 (Separate Document)– provide additional information about Gexcon as a company and a detailed description of Gexcon's risk assessment methodology.

2.2 DSEAR

The Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) apply to any industrial premises handling or storing flammable, explosive or corrosive substances. These are substances that could, if not properly controlled, cause harm to people as a result of a fire or explosion, asphyxiation or corrosion of metal. They can be found in nearly all workplaces and include such things as solvents, paints, varnishes, flammable gases, including liquid petroleum gas (LPG), dusts from machining and sanding operations, dusts from foodstuffs, pressurised gases and substances corrosive to metal.

Compliance with the Regulations is a legal requirement and imposes several duties on employers to achieve full compliance. The analysis and assessment provided in this report will satisfy Regulation 7 paragraph 1 (ATEX 137 article 7) and Regulation 5 paragraph 2 (ATEX 137 Article 4). These Regulations require that Hazardous Area Classification (Reg 7) and a suitable and sufficient Risk Assessment (Reg 5) are performed.

Note also that Regulation 9 requires that appropriate information, training and instruction is given to contractors and employees on the dangerous substances present together with information on the hazards, risks, precautions and actions necessary for them to remain safe. Gexcon offer an online training tool 'DSEAR & ATEX Made Easy' to help satisfy this requirement. Further information can be provided on request.

2.3 Methodology Summary

The first stage in the assessment is to conduct the Hazardous Area Classification, the zone designations and extent are based on the likelihood of a flammable atmosphere occurring using the relevant standards for gases, dusts and liquids. Zones are designated as follows:

Zone Designation	Description
0 (20)	An area in which an explosive gas (dust) atmosphere is present continuously or for long periods or frequently. N.B. Both “long” and “frequently” are the terms which are intended to describe a very high likelihood of a potentially explosive atmosphere in the area.
1 (21)	An area in which an explosive gas (dust) atmosphere is likely to occur periodically or occasionally in normal operation
2 (22)	An area in which an explosive gas (dust) atmosphere is not likely to occur in normal operation but, if it does occur, it will exist for a short period only

The risk assessment will assess the likelihood and consequences of a fire, explosion, and/or any other similar energy releasing events, as well as releases of asphyxiating gases, to determine the risk tolerability. The risk assessment is a semi-quantitative assessment, the zone designation determines the frequency of a flammable atmosphere, the assessment then considers the potential ignition sources, occupancy and current mitigation measures to determine the likelihood of an event. The worst-case consequences are then assessed, taking into account to the zone extents. The risk is then determined using the risk matrix as defined below. Further risk reduction recommendations will be provided for each area, to reduce or maintain the level of risk to an acceptable level. The risk assessment will not only consider risks to people, as required by health and safety law, but also the risks to the business (plant and equipment). The analysis will also comment on the installation of any prevention, protection (explosion mitigation and isolation systems) and their application to the process.

Full details of the risk assessment methodology are provided in Appendix 3 of the appendix document ‘Gexcon-21-201312-APP1_rev02’..

2.4 Risk Matrix

The risk matrix has been set as shown below. The risk rankings require any event that is expected to result in the highest severity consequences or occurring very frequently, to be reviewed for further risk reduction.

It is proposed that the same matrix is used for both personnel and business risk, though business risk is somewhat subjective to the client and therefore may require amendment. The matrix will be agreed with the client prior to the assessment being undertaken.

Consequence	5	C	C	B	A	A
	4	D	C	C	B	A
	3	D	C	C	C	B
	2	E	D	C	C	C
	1	E	E	D	D	C
		1	2	3	4	5
Frequency						

Grade	Risk Level	Description
A	Very High	Intolerable - Risk reduction measures must be implemented immediately
B	High	Intolerable - Risk reduction measures must be implemented
C	Medium (upper band)	Tolerable if ALARP – Further risk reduction must be considered, and all reasonably practicable measures implemented, risks in the upper band of tolerable if ALARP should be prioritised over those in the lower band.
C	Medium (lower band)	Tolerable if ALARP – Further risk reduction must be considered, and all reasonably practicable measures implemented
D	Low	Broadly Acceptable - Further risk reduction may be necessary
E	Very Low	Broadly Acceptable - Further risk reduction may be necessary

3 Site Assessment Summary

3.1 Area Classification

Location	Area	Component	Material	Zone Classification	Zone Extent	Minimum Equipment Requirements	Appendix Section
Straw Handling	Straw Barns	Straw Barns	Straw Dust	Non-hazardous	N/A	N/A	1.1.1
Straw Handling	Straw Conveyors (Open)	Straw Conveyors (Open)	Straw Dust	Non-hazardous	N/A	N/A	1.1.2
Straw Handling	Straw Reject Installation	Straw Reject Installation	Straw Dust	Non-hazardous	N/A	N/A	1.1.3
Straw Handling	Straw Feed Lines	Straw Feed Lines	Straw Dust / Wood Dust	Zone 21 / Zone 22	Zone 21 for the internal volume of the debaler, extended into the enclosed straw feed line as a Zone 22 for 2m.	Ex II 2 D IIIB T235* / Ex II 3 D IIIB T235*	1.1.4
Boiler Feed Area	Boiler Feed Area	Chute to Stokers	Straw Dust / Wood Dust	Zone 21	For the internal volume of the chute between debaler and stoker.	Ex II 2 D IIIB T205*	1.2.1
Boiler Feed Area	Boiler Feed Area	Stokers	Straw Dust / Wood Dust	Zone 22	For the internal volume of the stokers.	Ex II 3 D IIIB T205*	1.2.1
Wood Handling	Storage Hall	Storage Hall	Wood Dust	Zone 22	For the footprint of the storage hall, extending vertically 5m from the floor.	Ex II 3 D IIIB T235*	1.3.1
Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Wood Dust	Zone 22	For the entire internal volume of the vibrating conveyor.	Ex II 3 D IIIB T235*	1.3.2
Wood Handling	First Incline Conveyor	First Incline Conveyor	Wood Dust	Zone 22	For the entire internal volume of the first incline conveyor.	Ex II 3 D IIIB T235*	1.3.3
Wood Handling	Separation Area	Overband Magnet	Wood Dust	Zone 22	For the internal volume of the overband magnet installation.	Ex II 3 D IIIB T235*	1.3.4
Wood Handling	Separation Area	Ferrous Discharge Chute & Skip	Wood Dust	Non-hazardous	Inside the ferrous discharge chute and skip	N/A	1.3.4
Wood Handling	Separation Area	Disc Screen	Wood Dust	Zone 22	For the internal volume of the disc screen.	Ex II 3 D IIIB T235*	1.3.4
Wood Handling	Separation Area	Oversize Discharge Chute and Skip	Wood Dust	Non-hazardous	Inside the oversize discharge chute and skip	N/A	1.3.4
Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Wood Dust	Zone 22	For the entire internal volume of the short transfer conveyor.	Ex II 3 D IIIB T235*	1.3.5
Wood Handling	Incline Conveyor	Incline Conveyor	Wood Dust	Zone 22	For the entire internal volume of the incline conveyor.	Ex II 3 D IIIB T205	1.3.6
Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Wood Dust	Zone 22	For the entire internal volume of the horizontal conveyor.	Ex II 3 D IIIB T205	1.3.7
Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Wood Dust	Zone 21	For the internal volume of the feed hoppers and dirty side of the dust collector.	Ex II 2 D IIIB T205	1.3.8
Wood Handling	Feed Hoppers	Dust Filter (Clean Side)	Wood Dust	Zone 22	For the internal volume of the clean air section, extending 1 m in all directions out of the clean air discharge.	Ex II 3 D IIIB T205	1.3.8
Wood Handling	Feed Hoppers	Feed Hopper (Discharge Screw & Chute)	Wood Dust	Zone 22	For the internal volume of the discharge screws and chutes between feed hopper and debaler.	Ex II 3 D IIIB T205	1.3.8

Location	Area	Component	Material	Zone Classification	Zone Extent	Minimum Equipment Requirements	Appendix Section
Wood Handling	Wood Bypass	Screw Conveyor	Wood Dust	Zone 22	For the internal volume of the wood bypass screw conveyor.	Ex II 3 D IIIB T205	1.3.9
Wood Handling	Wood Bypass	Discharge Pipe	Wood Dust	Zone 22	For the internal volume of the wood bypass discharge pipe and skip.	Ex II 3 D IIIB T205	1.3.9
Dust Handling	Central Vacuum System	Flexible LEV Ducting	Straw Dust / Wood Dust	Zone 21	For the internal volume of any flexible LEV ducting.	Ex II 2 D IIIB T205	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Straw Dust / Wood Dust	Zone 20	For the internal volume of the reverse jet cleaned dust collector.	Ex II 1 D IIIB T205	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Clean Side)	Straw Dust / Wood Dust	Zone 22	For the internal volume of the clean air section, extending 1 m in all directions out of the clean air outlet.	Ex II 3 D IIIB T205	1.4.1
Dust Handling	Containerised Dust Collector	Flexible LEV Ducting	Straw Dust / Wood Dust	Zone 21	For the internal volume of any flexible LEV ducting.	Ex II 2 D IIIB T205	1.4.2
Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Straw Dust / Wood Dust	Zone 20	For the internal volume of the reverse jet cleaned dust collector.	Ex II 1 D IIIB T205	1.4.2
Dust Handling	Containerised Dust Collector	Dust Collector (Clean Side)	Straw Dust / Wood Dust	Zone 22	For the internal volume of the clean air section, extending 1 m in all directions out of the clean air outlet.	Ex II 3 D IIIB T205	1.4.2
Olive Pellet Handling	Olive Pellet Trailer	Internal Volume & Discharge Point	Olive Pellet Dust	Zone 22	For the entire internal volume of the belt trailer, extending out of the discharge point for 1m in all directions and to the ground.	Ex II 3 D IIIB T205	1.5.1
Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Olive Pellet Dust	Zone 22	Extending 0.5m in all directions and to the floor around the conveyor, including feed-on and head sections.	Ex II 3 D IIIB T205	1.5.2
Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Olive Pellet Dust	Zone 22	For the internal volume of the inclined belt conveyor and extending 0.5m in all directions and to the floor around the conveyor feed-on and head sections.	Ex II 3 D IIIB T205	1.5.3
Olive Pellet Handling	Intermediate Hopper	Internal Volume	Olive Pellet Dust	Zone 22	For the internal volume of the intermediate hopper, extending 0.5m in all directions from the open top and down to the ground.	Ex II 3 D IIIB T205	1.5.4
Olive Pellet Handling	Screw Conveyor	Internal Volume	Olive Pellet Dust	Zone 22	For the internal volume of the screw conveyor and chute connecting to the inclined conveyor.	Ex II 3 D IIIB T205	1.5.5

*Temperature class is based on assumed Layer Ignition Temperature and should be confirmed through physical testing of typical wood dust obtained from site.

3.2 Risk Assessment

Location	Area	Component	Event	Event Description	Personnel Risk Ranking	Equipment Risk Ranking	Appendix Section
Straw Handling	Straw Barns	Straw Barns	N/A	N/A	N/A	N/A	1.1.1
Straw Handling	Straw Conveyors (Open)	Straw Conveyors (Open)	N/A	N/A	N/A	N/A	1.1.2
Straw Handling	Straw Reject Installation	Straw Reject Installation	N/A	N/A	N/A	N/A	1.1.3
Straw Handling	Straw Feed Lines	Straw Feed Lines	Primary	A confined dust explosion	D	D	1.1.4
Straw Handling	Straw Feed Lines	Straw Feed Lines	Secondary	An explosion propagation through connected equipment.	D	D	1.1.4
Boiler Feed Area	Boiler Feed Area	Chute to Stokers	Primary	A confined dust explosion	C(lower)	C(lower)	1.2.1
Boiler Feed Area	Boiler Feed Area	Chute to Stokers	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.2.1
Boiler Feed Area	Boiler Feed Area	Stokers	Primary	A confined dust explosion	C(lower)	C(lower)	1.2.1
Boiler Feed Area	Boiler Feed Area	Stokers	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.2.1
Wood Handling	Storage Hall	Storage Hall	Primary	Smouldering fire.	D	D	1.3.1
Wood Handling	Storage Hall	Storage Hall	Secondary	A fire in the surrounding area.	D	C(lower)	1.3.1
Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.2
Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.2
Wood Handling	First Incline Conveyor	First Incline Conveyor	Primary	A confined dust explosion.	C(lower)	C(lower)	1.3.3
Wood Handling	First Incline Conveyor	First Incline Conveyor	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.3
Wood Handling	Separation Area	Overband Magnet	Primary	Flash fire.	C(lower)	D	1.3.4
Wood Handling	Separation Area	Overband Magnet	Secondary	An explosion propagation through connected equipment.	D	C(lower)	1.3.4
Wood Handling	Separation Area	Ferrous Discharge Chute & Skip	N/A	N/A	N/A	N/A	1.3.4
Wood Handling	Separation Area	Disc Screen	Primary	A confined dust explosion.	C(lower)	C(lower)	1.3.4
Wood Handling	Separation Area	Disc Screen	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.4
Wood Handling	Separation Area	Oversize Discharge Chute & Skip	N/A	N/A	N/A	N/A	1.3.4
Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.5

Location	Area	Component	Event	Event Description	Personnel Risk Ranking	Equipment Risk Ranking	Appendix Section
Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.5
Wood Handling	Incline Conveyor	Incline Conveyor	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.6
Wood Handling	Incline Conveyor	Incline Conveyor	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.6
Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.7
Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.7
Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.8
Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Secondary	An explosion propagation through connected equipment.	C(upper)	C(upper)	1.3.8
Wood Handling	Feed Hoppers	Dust Filter (Clean Side)	Primary	Smouldering fire.	D	C(lower)	1.3.8
Wood Handling	Feed Hoppers	Dust Filter (Clean Side)	Secondary	A confined dust explosion	C(lower)	C(lower)	1.3.8
Wood Handling	Feed Hoppers	Feed Hopper (Discharge Screw & Chute)	Primary	A confined dust explosion	C(lower)	C(lower)	1.3.8
Wood Handling	Feed Hoppers	Feed Hopper (Discharge Screw & Chute)	Secondary	An explosion propagation through connected equipment.	C(lower)	C(lower)	1.3.8
Wood Handling	Wood Bypass	Screw Conveyor	Primary	Smouldering fire.	D	C(lower)	1.3.9
Wood Handling	Wood Bypass	Screw Conveyor	Secondary	A fire in the surrounding area.	D	C(lower)	1.3.9
Wood Handling	Wood Bypass	Discharge Pipe	Primary	A confined dust explosion.	D	D	1.3.9
Wood Handling	Wood Bypass	Discharge Pipe	Secondary	A fire in the surrounding area.	D	D	1.3.9
Dust Handling	Central Vacuum System	Flexible LEV Ducting	Primary	A confined dust explosion	D	D	1.4.1
Dust Handling	Central Vacuum System	Flexible LEV Ducting	Secondary	An explosion propagation through connected equipment.	D	D	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Primary	A confined dust explosion	C(lower)	C(lower)	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Secondary	An explosion propagation through connected equipment.	C(upper)	C(upper)	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Clean Side)	Primary	A smouldering fire.	D	C(lower)	1.4.1
Dust Handling	Central Vacuum System	Dust Collector (Clean Side)	Secondary	A confined dust explosion	D	C(lower)	1.4.1
Dust Handling	Containerised Dust Collector	Flexible LEV Ducting	Primary	A confined dust explosion	D	D	1.4.2
Dust Handling	Containerised Dust Collector	Flexible LEV Ducting	Secondary	An explosion propagation through connected equipment.	D	D	1.4.2

Location	Area	Component	Event	Event Description	Personnel Risk Ranking	Equipment Risk Ranking	Appendix Section
Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Primary	A confined dust explosion	C(lower)	C(lower)	1.4.2
Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Secondary	An explosion propagation through connected equipment.	C(upper)	C(upper)	1.4.2
Dust Handling	Containerised Dust Collector	Dust Collector (Clean Side)	Primary	A smouldering fire.	D	C(lower)	1.4.2
Dust Handling	Containerised Dust Collector	Dust Collector (Clean Side)	Secondary	A confined dust explosion	D	C(lower)	1.4.2
Olive Pellet Handling	Olive Pellet Trailer	Internal Volume & Discharge Point	Primary	Confined Explosion	C(lower)	C(lower)	1.5.1
Olive Pellet Handling	Olive Pellet Trailer	Internal Volume & Discharge Point	Secondary	Fire in the surrounding area	D	C(lower)	1.5.1
Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Primary	Flash fire	C(lower)	E	1.5.2
Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Secondary	Fire in the surrounding area	D	C(lower)	1.5.2
Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Primary	Confined Explosion	C(lower)	C(lower)	1.5.3
Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Secondary	Fire in the surrounding area	D	C(lower)	1.5.3
Olive Pellet Handling	Intermediate Hopper	Internal Volume	Primary	Semi-confined Explosion	C(lower)	C(lower)	1.5.4
Olive Pellet Handling	Intermediate Hopper	Internal Volume	Secondary	Fire in the surrounding area	D	C(lower)	1.5.4
Olive Pellet Handling	Screw Conveyor	Internal Volume	Primary	Smouldering Fire	E	D	1.5.5
Olive Pellet Handling	Screw Conveyor	Internal Volume	Secondary	Fire in the surrounding area	C(lower)	C(lower)	1.5.5

3.3 Recommendations

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
1	Straw Handling	Straw Barns	Straw Barns	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment is in place to mitigate the formation of dust layers in this area.	1.1.1
2	Straw Handling	Straw Conveyors (Open)	Straw Conveyors (Open)	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment is in place to mitigate the formation of dust layers in this area.	1.1.2
3	Straw Handling	Straw Reject Installation	Straw Reject Installation	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment is in place to mitigate the formation of dust layers in this area.	1.1.3
4	Straw Handling	Straw Feed Lines	Straw Feed Lines	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel in accordance with the manufacturer's guidelines.	1.1.4
6	Straw Handling	Straw Feed Lines	Straw Feed Lines	Confined Explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the debaler, which is assumed to not be ATEX rated.	1.1.4
7	Straw Handling	Straw Feed Lines	Straw Feed Lines	Confined Explosion	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment is in place to mitigate the formation of dust layers in this area.	1.1.4
8	Boiler Feed Area	Boiler Feed Area	Chute to Stokers	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel in accordance with the manufacturer's guidelines.	1.2.1
9	Boiler Feed Area	Boiler Feed Area	Chute to Stokers	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential of an explosion in the chute is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may be achieved by the implementation of a suitable explosion suppression and isolation system in accordance with EN 14373 and EN 15089 for the chute between debaler and stokers.	1.2.1
10	Boiler Feed Area	Boiler Feed Area	Stokers	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.2.1
11	Boiler Feed Area	Boiler Feed Area	Stokers	Confined Explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the stokers, which are assumed to not be ATEX rated.	1.2.1
12	Wood Handling	Storage Hall	Storage Hall	Smouldering Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel in accordance with the manufacturer's guidelines.	1.3.1
13	Wood Handling	Storage Hall	Storage Hall	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment such as the central vacuum system is in place to mitigate the formation of dust layers in this area.	1.3.1
14	Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Confined dust explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the vibrating conveyor, which is assumed to not be ATEX rated.	1.3.2
15	Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential of an explosion in the vibrating conveyor is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may include the implementation of an explosion protection concept for the conveyor.	1.3.2
16	Wood Handling	Vibrating Conveyor	Vibrating Conveyor	Confined dust explosion	Good Practice Measure	SHOULD	It should be ensured that periodic cleaning of the conveyor internals is carried out using suitable equipment such as the central vacuum system to mitigate the formation of dust layers in this area.	1.3.2
17	Wood Handling	First Incline Conveyor	First Incline Conveyor	Confined dust explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the first incline conveyor, which is assumed to not be ATEX rated.	1.3.3

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
18	Wood Handling	First Incline Conveyor	First Incline Conveyor	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential of an explosion in the first incline conveyor is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may include the implementation of an explosion protection concept for the conveyor.	1.3.3
19	Wood Handling	First Incline Conveyor	First Incline Conveyor	Confined dust explosion	Good Practice Measure	SHOULD	It should be ensured that periodic cleaning of the conveyor internals is carried out using suitable equipment such as the central vacuum system to mitigate the formation of dust layers in this area.	1.3.3
20	Wood Handling	Separation Area	Overband Magnet	Flash Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines, this includes the overband magnet itself.	1.3.4
21	Wood Handling	Separation Area	Overband Magnet	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment such as the central vacuum system is in place to mitigate the formation of dust layers in this area.	1.3.4
22	Wood Handling	Separation Area	Disc Screen	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines, this includes the disc screen itself.	1.3.4
23	Wood Handling	Separation Area	Disc Screen	N/A	Good Practice Measure	SHOULD	It should be ensured that a rigorous housekeeping regime using suitable equipment such as the central vacuum system is in place to mitigate the formation of dust layers in this area.	1.3.4
24	Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Confined dust explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the short transfer conveyor, which is assumed to not be ATEX rated.	1.3.5
25	Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential of an explosion in the short transfer conveyor is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may include the implementation of an explosion protection concept for the conveyor.	1.3.5
26	Wood Handling	Short Transfer Conveyor	Short Transfer Conveyor	Confined dust explosion	Good Practice Measure	SHOULD	It should be ensured that periodic cleaning of the conveyor internals is carried out using suitable equipment such as the central vacuum system to mitigate the formation of dust layers in this area.	1.3.5
27	Wood Handling	Incline Conveyor	Incline Conveyor	Confined dust explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the incline conveyor, which is assumed to not be ATEX rated.	1.3.6
28	Wood Handling	Incline Conveyor	Incline Conveyor	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential for an explosion in the incline conveyor is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may include the implementation of an explosion protection concept for the conveyor.	1.3.6
29	Wood Handling	Incline Conveyor	Incline Conveyor	Confined dust explosion	Good Practice Measure	SHOULD	It should be ensured that periodic cleaning of the conveyor internals is carried out using suitable equipment such as the central vacuum system to mitigate the formation of dust layers in this area.	1.3.6
30	Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Confined dust explosion	Ignition Control	SHOULD	An Ignition Hazard Analysis should be carried out for the horizontal conveyor, which is assumed to not be ATEX rated.	1.3.7
31	Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Confined Explosion	Explosion / Fire Protection	MUST	It must be ensured that the risk arising from the potential for an explosion in the horizontal conveyor is reduced to a level which can be regarded to be 'As Low As Reasonably Practicable' (ALARP). This may include the implementation of an explosion protection concept for the conveyor.	1.3.7
32	Wood Handling	Horizontal Conveyor	Horizontal Conveyor	Confined dust explosion	Good Practice Measure	SHOULD	It should be ensured that periodic cleaning of the conveyor internals is carried out using suitable equipment such as the central vacuum system to mitigate the formation of dust layers in this area.	1.3.7
33	Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.3.8

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
34	Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the explosion vent which is believed to discharge through a 90° angle duct is not causing pressure piling effects which negatively affect the performance of the explosion vent.	1.3.8
35	Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the existing explosion relief vent is certified in accordance with EN 14797 to ensure a confined explosion is effectively vented. If this is not the case, the existing non-conforming explosion vent should be replaced with an explosion venting device certified in accordance with EN 14797.	1.3.8
36	Wood Handling	Feed Hoppers	Feed Hopper (Internal Volume)	Explosion Propagation	Explosion / Fire Protection	CONSIDER	Consider the installation of a suitable explosion isolation device on the inlet and outlet of the feed hopper to mitigate an explosion propagation through connected equipment following a vented explosion within the feed hopper. Any explosion isolation devices should be type tested following the procedures detailed in EN 15089 'Explosion Isolation Systems'.	1.3.8
37	Wood Handling	Feed Hoppers	Dust Filter (Clean Side)	Smouldering Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.3.8
38	Wood Handling	Feed Hoppers	Dust Filter (Clean Side)	Smouldering Fire	Ignition Control	SHOULD	The integral fan for the filter unit should be certified in accordance with EN 14986 to reduce the likelihood of ignition.	1.3.8
39	Wood Handling	Feed Hoppers	Feed Hopper (Discharge Screw & Chute)	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.3.8
40	Wood Handling	Wood Bypass	Screw Conveyor	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.3.9
41	Dust Handling	Central Vacuum System	Flexible LEV Ducting	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the flexible LEV ducting is rated to withstand the reduced explosion overpressure generated by a confined explosion within the main dust collector.	1.4.1
42	Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the explosion relief area for the dust extraction unit is in accordance with EN 14491 to ensure that it is effective.	1.4.1
43	Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the existing explosion relief vent is certified in accordance with EN 14797 to ensure a confined explosion is effectively vented. If this is not the case, the existing non-conforming explosion vent should be replaced with an explosion venting device certified in accordance with EN 14797.	1.4.1
44	Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Explosion Propagation	Explosion / Fire Protection	SHOULD	An explosion isolation back flap valve certified in accordance with EN 16447 should be installed to the dirty side inlet of the dust collector unit to mitigate the propagation of a primary explosion to other process units.	1.4.1
45	Dust Handling	Central Vacuum System	Dust Collector (Dirty Side)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be ensured that the dust collector body, including any skirts is rated to withstand the reduced explosion pressure in accordance with EN 14460.	1.4.1
46	Dust Handling	Central Vacuum System	Dust Collector (Clean Side)	Smouldering Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.4.1
47	Dust Handling	Containerised Dust Collector	Flexible LEV Ducting	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the flexible LEV ducting is rated to withstand the reduced explosion overpressure generated by a confined explosion within the main dust collector.	1.4.2
48	Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the explosion relief area for the dust extraction unit is in accordance with EN 14491 to ensure that it is effective.	1.4.2
49	Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Confined Explosion	Explosion / Fire Protection	SHOULD	It should be confirmed that the existing explosion relief vent is certified in accordance with EN 14797 to ensure a confined explosion is effectively vented. If this is not the	1.4.2

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
							case, the existing non-conforming explosion vent should be replaced with an explosion venting device certified in accordance with EN 14797.	
50	Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	Explosion Propagation	Explosion / Fire Protection	SHOULD	An explosion isolation back flap valve certified in accordance with EN 16447 should be installed to the dirty side inlet of the dust collector unit to mitigate the propagation of a primary explosion to other process units.	1.4.2
51	Dust Handling	Containerised Dust Collector	Dust Collector (Dirty Side)	N/A	Good Practice Measure	SHOULD	It should be ensured that the dust collector is maintained in accordance with the manufacturer's guidelines.	1.4.2
52	Dust Handling	Containerised Dust Collector	Dust Collector (Clean Side)	Smouldering Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.4.2
53	Dust Handling	GWS Dust Collector	GWS Dust Collector	N/A	Regulatory Compliance	MUST	It must be ensured that the supplier of the hired GWS dust collector system provides a suitable and sufficient DSEAR assessment for the equipment.	1.4.3
73	Olive Pellet Handling	Olive Pellet Trailer	Internal Volume & Discharge Point	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.5.1
74	Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Flash Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.5.2
75	Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Flash Fire	Control of Release	SHOULD	The misting system designed to reduce the dust liberation should be re-instated as soon as possible.	1.5.2
76	Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Flash Fire	Control of Release	SHOULD	Accumulations of dust on equipment and in the general area should be removed frequently to mitigate the formation of dust layers of hazardous thickness. The removal of dust should be conducted using suitably ATEX rated vacuum systems.	1.5.2
77	Olive Pellet Handling	First Inclined Belt Conveyor	N/A	Flash Fire	Ignition Control	SHOULD	The velocity of the belt conveyor should be reduced to below 0.2m/s if practicable to reduce the likelihood of generating hot surfaces which may become an effective source of ignition. This especially applies for any fixed solutions installed following a successful trial.	1.5.2
78	Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.5.3
79	Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Confined Explosion	Ignition Control	SHOULD	The velocity of the belt conveyor should be reduced to below 0.2m/s if practicable to reduce the likelihood of generating hot surfaces which may become an effective source of ignition. This especially applies for any fixed solutions installed following a successful trial.	1.5.3
80	Olive Pellet Handling	Second Inclined Belt Conveyor	N/A	Confined Explosion	Control of Release	SHOULD	Accumulations of dust on equipment and in the general area should be removed frequently to mitigate the formation of dust layers of hazardous thickness. The removal of dust should be conducted using suitably ATEX rated vacuum systems.	1.5.3
81	Olive Pellet Handling	Intermediate Hopper	Internal Volume	Semi-Confined Explosion	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.5.4
82	Olive Pellet Handling	Intermediate Hopper	Internal Volume	Semi-Confined Explosion	Control of Release	SHOULD	The misting system designed to reduce the dust liberation should be re-instated as soon as possible.	1.5.4
83	Olive Pellet Handling	Intermediate Hopper	Internal Volume	Semi-Confined Explosion	Control of Release	SHOULD	Accumulations of dust on equipment and in the general area should be removed frequently to mitigate the formation of dust layers of hazardous thickness. The removal of dust should be conducted using suitably ATEX rated vacuum equipment. If dust is allowed to accumulate to significant dust layers then additional hazardous areas may have to be classified.	1.5.4

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
84	Olive Pellet Handling	Screw Conveyor	Internal Volume	Smouldering Fire	Ignition Control	MUST	It must be ensured that equipment installed within the hazardous area is suitably ATEX rated and installed and maintained by competent personnel and in accordance with the manufacturer's guidelines.	1.5.5
85	Olive Pellet Handling	Screw Conveyor	Internal Volume	Smouldering Fire	Control of Release	SHOULD	It should be confirmed that the olive pellet particle size is not affected significantly by attrition caused by the screw conveyor. If this is the case, then the hazardous area may have to be updated to reflect higher dust concentrations downstream of the screw conveyor.	1.5.5
54	General Recommendations	N/A	N/A	N/A	Regulatory Compliance / Ignition Control	MUST	Any equipment which has been in use or made available at the workplace after 30th June 2003, is capable of causing an explosion through its own potential sources of ignition and is located within a hazardous zone must be declared or certified in line with The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (transposition of Directive 2014/34/EU 'ATEX Product Directive').	2.1
55	General Recommendations	N/A	N/A	N/A	Regulatory Compliance	MUST	Any protective systems (systems intended to stop incipient explosions immediately and/or to limit the effective range of an explosion) and components essential to the safe functioning of protective systems and/or equipment which has been in use or made available at the workplace after 30th June 2003 must be declared or certified in line with The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (transposition of Directive 2014/34/EU 'ATEX Product Directive').	2.1
56	General Recommendations	N/A	N/A	N/A	Good Practice Measure	SHOULD	It should be verified that all ATEX equipment has been installed by a competent person (preferably part of a recognized accredited scheme, e.g. CompEx or IECEx) and in accordance with the manufacturer's instructions.	2.1
57	General Recommendations	N/A	N/A	N/A	Explosion / Fire Protection	SHOULD	It should be confirmed that all flexible connections, ductwork and their fittings associated with vessels which are fitted with explosion protection are pressure rated to withstand the designed reduced explosion overpressure (Pred) of the connected vessels.	2.1
58	General Recommendations	N/A	N/A	N/A	Ignition Control	SHOULD	An effective permit to work system should be used to control hot work, welding, etc.	2.1
59	General Recommendations	N/A	N/A	N/A	Control of Release	SHOULD	A good level of housekeeping should be maintained by the use of a fully earthed, centralised piped vacuum cleaning system. Avoid the use of sweeping brushes and compressed air except for non-dusty cleaning activities.	2.1
60	General Recommendations	N/A	N/A	N/A	Ignition Control	SHOULD	A specification for appropriate ATEX equipment to be located within hazardous zones should be provided to suppliers ensure incorrect equipment is not installed in future. This applies to both non-electrical and electrical equipment.	2.1
61	General Recommendations	N/A	N/A	N/A	Ignition Control and Explosion / Fire Protection	SHOULD	The explosivity data for the dusts should be tested / obtained from the supplier to ensure that the explosion protection and ATEX equipment is suitably designed.	2.1
62	General Recommendations	N/A	N/A	N/A	Ignition Control	CONSIDER	Consider implementing a standard minimum ATEX equipment specification for equipment across the entire facility (or sections of the facility), based on the worst-case combination of material properties of all of the materials used in the process. This will facilitate improved management of change and procurement processes regarding ATEX equipment.	2.1
63	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	ATEX equipment must be inspected and maintained in order to maintain its certification. A rolling inspection of equipment certified suitable for use within a hazardous zone should be compiled in accordance with EN 60079 Part 17 Inspection. Non-electrical equipment should be inspected and maintained in line with the manufacturer's instructions for safety, which should be provided in line with EN 80079-36.	2.2

Number	Location	Area	Component	Event Description	Hierarchy	Term	Recommendation	Appendix Section
64	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	A record of documentation demonstrating compliance with DSEAR must be kept and made available upon request of an enforcing officer, specifically the significant findings of the risk assessment listed in Regulation 5(4). An Explosion Protection Document (or equivalent document) is an effective way to demonstrate compliance.	2.2
65	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	Personnel must receive suitable and sufficient information, instruction and training in accordance with Regulation 9 of DSEAR.	2.2
66	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	The employer must ensure that appropriate work clothing which does not give rise to electrostatic discharges is provided for use in areas classified as hazardous in line with Regulation 7(5) of DSEAR.	2.2
67	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	All hazardous zones must be identified with Ex Signage in accordance with Regulation 7(3) of DSEAR.	2.2
68	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	Before a workplace containing hazardous areas is used for the first time, the overall explosion safety must be verified by a person competent in the field of explosion protection (as a result of experience, professional training, or both).	2.2
69	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	A periodic review of the DSEAR risk assessment must be scheduled in accordance with Regulation 5(3) of DSEAR.	2.2
70	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	There must be arrangements in place to deal with accidents, incidents and emergencies in accordance with the requirements of Regulation 8 of DSEAR.	2.2
71	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	The nature of the contents and any associated hazards of dangerous substances within containers and pipes must be clearly identifiable in line with Regulation 10 of DSEAR, if not already marked in accordance with the relevant legislation listed in Schedule 5 of DSEAR.	2.2
72	Additional DSEAR Compliance Activities	N/A	N/A	N/A	Regulatory Compliance	MUST	Where two or more employers share the same workplace where an explosive atmosphere may occur, the employer responsible for the workplace must co-ordinate the implementation of all the measures required by DSEAR to be taken to protect employees from the risk of the explosive atmosphere(s).	2.2

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