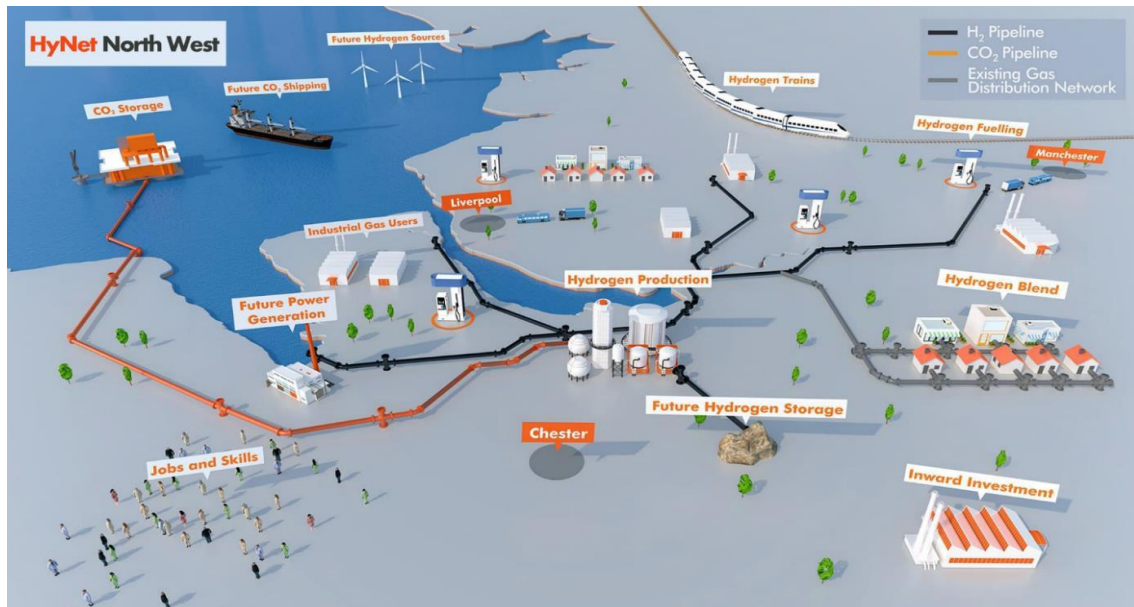


HyNet Low Carbon Hydrogen Plant



EQUIPMENT DATASHEET FEED FIRED HEATER 10-AAJ-F-101

Project Document No: **5194812-000-45ED-4-0003**
Member Document No: **805459-0001-I-45-EDS-0035**

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Revision : 03 Date : 03-SEP-2020

REV	DATE	ISSUE DESCRIPTION	AUTHOR	CHECKER	QA/QC/SHSE	APPROVER
03	03-Sep-2020	Issued for Use	AP	WB	HS	MW
02	10-Aug-2020	Issued for Consortium Review	WB	AP	HS	MW
01	16-Jul-2020	Issued for Internal Review	WB	MW	HS	MW

PROJECT DOC NO: 5194812-000-45ED-4-0003	REVISION: 03	DATE: 03-SEP-2020
MEMBER DOC NO: 805459-0001-I-45-EDS-0035	REVISION: B1	
DOCUMENT TITLE: FEED FIRED HEATER DATSHEET		PAGE: 2 OF 18

REVISION	COMMENTS
01	Issued for Internal Review.
02	Issued for Consortium Review.
03	Issued for Use.

HOLDS	
HOLD DESCRIPTION / REFERENCE	
HOLD 1	Zone 2, IIC, T1 used for equipment proposal purposes at this stage. This will be confirmed when location of equipment known and site areas classified.

The holds section is only to be used during document development and can be removed once all holds are released and the document is approved for use. Holds that cannot be removed in FEED shall be removed during Detailed Design.

ACRONYMS	
ACRONYM	DESCRIPTION
BMS	Burner Management System
CCW	Counter Clockwise
CW	Clockwise
HHV	Higher Heating Value
LER	Local Equipment Room
LHV	Lower Heating Value
MCR	Maximum Continuous Rating
NG	Natural Gas
PLC	Programmable Logic Controller
ROG	Refinery Off Gas
STA	SUPPLIER to Advise
STC	SUPPLIER to Confirm
TBC	To Be Confirmed



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Technical Data Sheet

FIRED HEATER DATA SHEET

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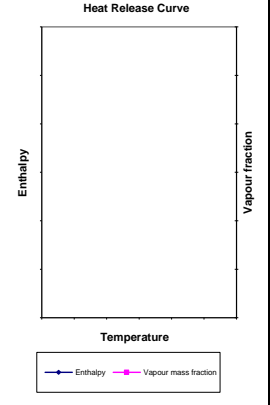
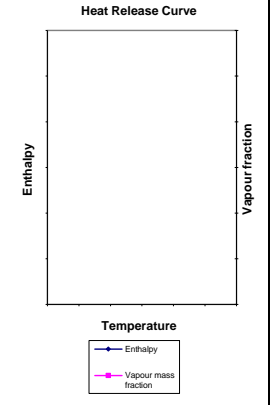
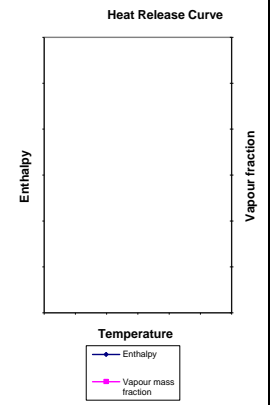
Table with 53 rows and multiple columns. Columns include UNIT, MANUFACTURER, TYPE OF HEATER, TOTAL HEATER ABSORBED DUTY, OPERATING CASE, HEATER SECTION, SERVICE, HEAT ABSORPTION RATE, FLUID, MASS FLOW RATE, VOLUME FLOW RATE, PRESSURE DROP, AVERAGE RADIANT SECTION FLUX DENSITY, MAX RADIANT SECTION FLUX DENSITY, CONVECTION SECTION FLUX DENSITY, VELOCITY LIMITATION, PROCESS FLUID MASS VELOCITY, MAXIMUM ALLOW./CALC. INSIDE FILM TEMPERATURE, FOULING FACTOR, COKING ALLOWANCE, INLET CONDITIONS, OUTLET CONDITIONS, REMARKS AND SPECIAL REQUIREMENTS, and NOTES.



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Rev	PROCESS STREAM PROPERTY DATA														
1															
2	HEAT RELEASE AND PROPERTY DATA (SEE NOTE P1)														
3															
4	COLD SIDE PROPERTIES - REFERENCE PRESSURE 1														
5	Pressure barA			Vapour				Liquid							
6	Temp.	Enthalpy	Vapour Mass	Density	Viscosity	Thermal Cond.	Specific Heat	Density	Viscosity	Thermal Cond.	Specific Heat	Surface Tension	Critical Pressure	Critical Temp.	
7	°C	kJ/kg	Fraction	kg/m ³	mPa-s	W/m.K	kJ/kg.K	kg/m ³	mPa-s	W/m.K	kJ/kg.K	mN/m	barA	°C	
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
22															
23	COLD SIDE PROPERTIES - REFERENCE PRESSURE 2														
24	Pressure barA			Vapour				Liquid							
25	Temp.	Enthalpy	Vapour Mass	Density	Viscosity	Thermal Cond.	Specific Heat	Density	Viscosity	Thermal Cond.	Specific Heat	Surface Tension	Critical Pressure	Critical Temp.	
26	°C	kJ/kg	Fraction	kg/m ³	mPa-s	W/m.K	kJ/kg.K	kg/m ³	mPa-s	W/m.K	kJ/kg.K	mN/m	barA	°C	
27															
28															
29															
30															
31															
32															
33															
34															
35															
36															
37															
38															
39															
40															
41															
42	COLD SIDE PROPERTIES - REFERENCE PRESSURE 3														
43	Pressure barA			Vapour				Liquid							
44	Temp.	Enthalpy	Vapour Mass	Density	Viscosity	Thermal Cond.	Specific Heat	Density	Viscosity	Thermal Cond.	Specific Heat	Surface Tension	Critical Pressure	Critical Temp.	
45	°C	kJ/kg	Fraction	kg/m ³	mPa-s	W/m.K	kJ/kg.K	kg/m ³	mPa-s	W/m.K	kJ/kg.K	mN/m	barA	°C	
46															
47															
48															
49															
50															
51															
52															
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Rev	COMBUSTION DESIGN CONDITIONS						
1	OPERATING CASE						
2	TYPE OF FUEL						
3	EXCESS AIR %						
4	CALCULATED HEAT RELEASE (LHV) MW						
5	FUEL EFFICIENCY CALCULATED (LHV) %						
6	FUEL EFFICIENCY GUARANTEED (LHV) %						
7	RADIATION LOSS, % OF HEAT RELEASE (LHV) %						
8	FLUE GAS TEMPERATURE LEAVING RADIANT SECTION °C						
9	CONVECTION SECTION °C						
10	AIR PREHEATER °C						
11	FLUE GAS QUANTITY kg/h						
12	FLUE GAS MASS VELOCITY THROUGH CONVECTION SECTION kg/s m ²						
13	DRAFT AT ARCH Pa						
14	AT BURNERS Pa						
15	AMBIENT AIR TEMPERATURE, EFFICIENCY CALCULATION °C						
16	AMBIENT AIR TEMPERATURE, STACK DESIGN °C						
17	ALTITUDE ABOVE SEA LEVEL m 7 - 15						
18	VOLUMETRIC HEAT RELEASE (LHV) W/m ³						
19	EMISSION LIMITS (DRY): CORRECTED TO 3% O ₂ mg/m ³ NO _x : CO: SO _x :						
20	(LHV) (HHV) kJ/kg UHC: Particulates:						
21	FUEL CHARACTERISTICS see Process Datasheet 5194812-100-49ED-3-0006						
22	GAS TYPE Hydrogen Rich		LIQUID TYPE None		OTHER TYPE NG (Start up)		
23	LHV kJ/kg kJ/Nm ³		LHV kJ/kg kJ/Nm ³		LHV kJ/kg kJ/Nm ³		
24	HHV kJ/kg kJ/Nm ³		HHV kJ/kg kJ/Nm ³		HHV kJ/kg kJ/Nm ³		
25	PRESSURE @ BURNER barg		PRESSURE @ BURNER barg		PRESSURE @ BURNER barg		
26	TEMPERATURE @ BURNER °C		TEMPERATURE @ BURNER °C		TEMPERATURE @ BURNER °C		
27	RELATIVE MOLECULAR WEIGHT		VISCOSITY @ °C		RELATIVE MOLECULAR WEIGHT		
28			ATOMIZING STEAM TEMP. °C				
29			ATOMIZING STEAM PRESSURE barg				
30	COMPONENT	MOLE %	COMPONENT	WEIGHT %	COMPONENT	WEIGHT %	
31							
32							
33							
34			VANADIUM	ppm			
35			SODIUM	ppm			
36			SULPHUR				
37			ASH				
38	BURNER DATA						
39	MANUFACTURER		SIZE / MODEL NO		NUMBER		
40	TYPE		LOCATION		ORIENTATION		
41	HEAT RELEASE / BURNER: MW		DESIGN NORMAL		MINIMUM		
42	PRESSURE DROP ACROSS BURNER @ DESIGN HEAT RELEASE				Pa		
43	DISTANCE BURNER CENTRE LINE TO TUBE CENTRE LINE: HORIZONTAL				mm		VERTICAL mm
44	DISTANCE BURNER CENTRE LINE TO UNSHIELDED REFRACTORY: HORIZONTAL				mm		VERTICAL mm
45	PILOT, TYPE		CAPACITY		MW		FUEL
46	IGNITION METHOD :						
47	FLAME DETECTION TYPE		LOCATION		NUMBER		
48	EMISSIONS GUARANTEES						
49	NO _x : 40 g/GJ		CO =: 125g/GJ				
50							
51							



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Technical Data Sheet

FIRE HEATER DATA SHEET

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Rev	MECHANICAL DESIGN CONDITIONS									
1	PLOT LIMITATIONS					STACK LIMITATIONS				
2	TUBE LIMITATIONS (See note M4)					NOISE LIMITATIONS 85 dB(A) @ 1 m				
3	STRUCTURAL DESIGN DATA		WIND VELOCITY		23	m/s		WIND OCCURANCE See Basis of Design 5194812-000-30EA-2-0001		
4			SNOW LOAD		0.5	KN/m2		SEISMIC ZONE No Seismic required to EN1998-1		
5	MIN / NORM / MAX AMBIENT AIR TEMPERATURE		-17	20	35	°C		RELATIVE HUMIDITY Min 40 / Max 100 %		
6	HEATER SECTION									
7	SERVICE									
8	COIL DESIGN									
9	DESIGN BASIS: TUBE WALL THICKNESS (CODE OR SPEC.)					API 530 / ISO13709				
10	RUPTURE STRENGTH (MINIMUM OR AVERAGE)									
11	STRESS-TO-RUPTURE BASIS					hr				
12	DESIGN PRESSURE, ELASTIC / RUPTURE					barg				
13	DESIGN FLUID TEMPERATURE					°C				
14	TEMPERATURE ALLOWANCE					°C				
15	CORROSION ALLOWANCE, TUBES / FITTINGS					mm				
16	HYDROSTATIC TEST PRESSURE					barg				
17	POST WELD HEAT TREATMENT (YES OR NO)									
18	PERCENT OF WELDS FULLY RADIOGRAPHED					%				
19	MAXIMUM (CLEAN) TUBE METAL TEMPERATURE					°C				
20	DESIGN TUBE METAL TEMPERATURE					°C				
21	INSIDE FILM COEFFICIENT					W/m².K				
22	COIL ARRANGEMENT									
23	TUBE ORIENTATION: (VERTICAL OR HORIZONTAL)									
24	TUBE MATERIAL (ASTM SPECIFICATION AND GRADE)									
25	TUBE OUTSIDE DIAMETER					mm				
26	TUBE WALL THICKNESS, (MINIMUM) (AVERAGE)					mm				
27	NUMBER OF FLOW PASSES									
28	NUMBER OF TUBES									
29	NUMBER OF TUBES / ROW (CONVECTION SECTION)									
30	OVERALL TUBE LENGTH					m				
31	EFFECTIVE TUBE LENGTH					m				
32	BARE TUBES					NUMBER				
33						TOTAL EXPOSED SURFACE				
						m²				
34	EXTENDED SURFACE TUBES					NUMBER				
35						TOTAL EXPOSED SURFACE				
						m²				
36	TUBE LAYOUT (IN LINE OR STAGGERED)									
37	TUBE SPACING, CENT.-CENT.: HORIZ. x DIAG. (OR VERT.)					mm				
38	TUBE SPACING, CENT. TO FURNACE WALL (MIN.)					mm				
39	CORBELS (YES OR NO)									
40	CORBEL WIDTH					mm				
41	DESCRIPTION OF EXTENDED SURFACE									
42	TYPE : (STUDS) (SERRATED FINS) (SOLID FINS)									
43	MATERIAL									
44	DIMENSIONS (HEIGHT x DIAMETER / THICKNESS)					mm				
45	SPACING (FINS / m) (STUDS / PLANE)									
46	MAXIMUM TIP TEMPERATURE (CALCULATED)					°C				
47	EXTENSION RATIO (TOTAL AREA / BARE AREA)									
48	PLUG TYPE HEADERS									
49	TYPE									
50	MATERIAL (ASTM SPECIFICATION AND GRADE)									
51	NOMINAL RATING									
52	LOCATION (ONE OR BOTH ENDS)									
53	WELDED OR ROLLED JOINT									
54	NOTES:									
55										
56										



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Rev	MECHANICAL DESIGN CONDITIONS (continued)				
1	HEATER SECTION				
2	SERVICE				
3	RETURN BENDS				
4	TYPE				
5	MATERIAL (ASTM SPECIFICATION AND GRADE)				
6	NOMINAL RATING OR SCHEDULE				
7	LOCATION (F.B. = FIRE BOX, H.B. = HEADER BOX)				
8	TERMINALS AND / OR MANIFOLDS				
9	TYPE (BEV. = BEVELED, MANIF. = MANIFOLD, FLG. = FLANGED)				
10	INLET	MATERIAL (ASTM SPECIFICATION AND GRADE)			
11		SIZE / SCHEDULE OR THICKNESS			
12		NUMBER OF TERMINALS			
13		FLANGE MATERIAL (ASTM SPECIFICATION AND GRADE)			
14		FLANGE RATING AND FACING			
15	OUTLET	MATERIAL (ASTM SPECIFICATION AND GRADE)			
16		SIZE / SCHEDULE OR THICKNESS			
17		NUMBER OF TERMINALS			
18		FLANGE MATERIAL (ASTM SPECIFICATION AND GRADE)			
19		FLANGE RATING AND FACING			
20	MANIFOLD TO TUBE CONNECTION (WELDED, EXTRUDED, ETC.)				
21	MANIFOLD LOCATION (INSIDE OR OUTSIDE HEADER BOX)				
22	CROSSOVERS				
23	WELDED OR FLANGED				
24	PIPE MATERIAL (ASTM SPECIFICATION AND GRADE)				
25	PIPE SIZE / SCHEDULE OR THICKNESS				
26	FLANGE MATERIAL				
27	FLANGE RATING AND FACING				
28	LOCATION (INTERNAL / EXTERNAL)				
29	FLUID TEMPERATURE °C				
30	TUBE SUPPORTS				
31	LOCATION (ENDS, TOP, BOTTOM)				
32	MATERIAL (ASTM SPECIFICATION AND GRADE)				
33	DESIGN METAL TEMPERATURE °C				
34	THICKNESS mm				
35	TYPE AND THICKNESS OF INSULATION mm				
36	ANCHOR (MATERIAL AND TYPE)				
37	INTERMEDIATE TUBE SUPPORTS				
38	MATERIAL (ASTM SPECIFICATION AND GRADE)				
39	DESIGN METAL TEMPERATURE °C				
40	THICKNESS mm				
41	SPACING m				
42	TUBE GUIDES				
43	LOCATION				
44	MATERIAL				
45	TYPE / SPACING				
46	HEADER BOXES				
47	LOCATION HINGED DOOR/BOLTED PANEL :				
48	CASING MATERIAL	THICKNESS			mm
49	LINING MATERIAL	THICKNESS			mm
50	ANCHOR (MATERIAL AND TYPE)				
51	NOTES:				
52					
53					
54					
55					
56					



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Rev	MECHANICAL DESIGN CONDITIONS (continued)					
1	REFRACTORY DESIGN BASIS					
2	AMBIENT TEMPERATURE	°C	WIND VELOCITY	23	m/s	CASING TEMPERATURE °C
3	EXPOSED VERTICAL WALLS					
4	LINING THICKNESS	mm	HOT FACE TEMPERATURE: DESIGN	°C	CALCULATED	°C
5	WALL CONSTRUCTION					
6						
7	ANCHOR (MATERIAL & TYPE)					
8	CASING MATERIAL:		THICKNESS	mm	TEMPERATURE	°C
9	SHIELDED VERTICAL WALLS					
10	LINING THICKNESS	mm	HOT FACE TEMPERATURE: DESIGN	°C	CALCULATED	°C
11	WALL CONSTRUCTION					
12						
13	ANCHOR (MATERIAL & TYPE)					
14	CASING MATERIAL:		THICKNESS	mm	TEMPERATURE	°C
15	ARCH					
16	LINING THICKNESS	mm	HOT FACE TEMPERATURE: DESIGN	°C	CALCULATED	°C
17	WALL CONSTRUCTION					
18						
19	ANCHOR (MATERIAL & TYPE)					
20	CASING MATERIAL:		THICKNESS	mm	TEMPERATURE	°C
21	FLOOR					
22	LINING THICKNESS	mm	HOT FACE TEMPERATURE: DESIGN	°C	CALCULATED	°C
23	FLOOR CONSTRUCTION					
24						
25	CASING MATERIAL:		THICKNESS	mm	TEMPERATURE	°C
26	MINIMUM FLOOR ELEVATION	m	FREE SPACE BELOW PLENUM			m
27	CONVECTION SECTION					
28	LINING THICKNESS	mm	HOT FACE TEMPERATURE: DESIGN	°C	CALCULATED	°C
29	WALL CONSTRUCTION					
30						
31	ANCHOR (MATERIAL & TYPE)					
32	CASING MATERIAL:		THICKNESS	mm	TEMPERATURE	°C
33	INTERNAL WALL					
34	TYPE		MATERIAL			
35	DIMENSIONS: HEIGHT	mm	WIDTH	mm		
36	DUCTS		FLUE GAS		COMBUSTION AIR	
37	LOCATION		Breeching			
38	SIZE OR NET FREE AREA	m or m ²				
39	CASING MATERIAL					
40	CASING THICKNESS mm					
41	LINING INTERNAL / EXTERNAL					
42	THICKNESS mm					
43	MATERIAL					
44	ANCHOR MATERIAL					
45	ANCHOR TYPE					
46	CASING TEMPERATURE °C					
47	PLENUM CHAMBER (AIR) :					
48	TYPE OF PLENUM (COMMON OR INTEGRAL)					
49	CASING MATERIAL:		THICKNESS	mm	SIZE	mm
50	LINING MATERIAL THICKNESS mm					
51	ANCHOR (MATERIAL & TYPE)					
52	NOTES:					
53						
54						
55						
56						



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FIRE HEATER DATA SHEET

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Rev	MECHANICAL DESIGN CONDITIONS (continued)					
1	STACK OR STACK HUB					
2	NUMBER	SELF-SUPPORTED		LOCATION		
3	CASING MATERIAL	CORROSION ALLOWANCE	mm	MINIMUM THICKNESS mm		
4	INSIDE METAL DIAMETER m	HEIGHT ABOVE GRADE	m	STACK LENGTH m		
5	LINING MATERIAL	THICKNESS				mm
6	ANCHOR (MATERIAL AND TYPE)					
7	EXTENT OF LINING INTERNAL					
8	DESIGN FLUE GAS VELOCITY m/s	FLUE GAS TEMPERATURE		°C		
9	DAMPERS					
10	LOCATION					
11	TYPE (CONTROL, TIGHT SHUT-OFF, ETC.)					
12	MATERIAL: BLADE					
13	SHAFT					
14	MULTIPLE / SINGLE LEAF					
15	OPERATION (MANUAL OR AUTO)					
16	OPERATOR TYPE (CABLE OR PNEUMATIC)					
17	MISCELLANEOUS					
18	PLATFORMS: LOCATION	NUMBER	WIDTH	LENGTH / ARC	STAIRS / LADDER	ACCESS FROM
19						
20						
21						
22						
23	TYPE OF FLOORING					
24	DOORS		NUMBER	LOCATION	SIZE	BOLTED / HINGED
25	ACCESS					
26						
27	OBSERVATION					
28						
29	TUBE REMOVAL					
30						
31	INSTRUMENT CONNECTIONS			NUMBER	SIZE	TYPE
32	COMBUSTION AIR TEMPERATURE					
33	FLUE GAS TEMPERATURE					
34	COMBUSTION AIR PRESSURE					
35	FLUE GAS AIR PRESSURE					
36	FLUE GAS SAMPLE					
37	SNUFFING STEAM / PURGE					
38	O2 ANALYZER					
39	CO OR NOx ANALYZER					
40	VENTS / DRAINS					
41	PROCESS FLUID TEMPERATURE					
42	TUBESKIN THERMOCOUPLES					
43	PAINTING REQUIREMENTS					
44	INTERNAL COATING					
45	GALVANIZING REQUIREMENTS					
46	ARE PAINTERS TROLLEY & RAIL INCLUDED?					
47	SPECIAL EQUIPMENT: SOOT BLOWERS					
48	AIR PREHEATER					
49	FAN(S)					
50	OTHER					
51						
52	NOTE 1. ADDITIONAL PRESSURE CONNECTIONS TO BE SUPPLIED: BURNER FLOOR					
53	UPSTREAM & DOWNSTREAM OF CONVECTION SECTION					
54	UPSTREAM & DOWNSTREAM OF DAMPERS (IF DAMPERS INCLUDED/REQUIRED)					
55	NOTE 2. ADDITIONAL TEMPERATURE CONNECTIONS IN FLUE GAS EXIT FROM RADIANT SECTION TO PROVIDE ALARM AND TRIP ON HIGH TEMPERATURE.					
56						

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Rev	NOTES / DRAWINGS				
1					
2	Mechanical Notes				
3					
4	M1 SUPPLIER shall supply a PLC based BMS with redundant power supplies. The PLC cabinet shall either be local and suitable for hazardous area or be located in a				
5	Local Equipment Room (LER) classified as "Safe".				
6	M2 A local control Panel shall be provided on the fuel skid, be suitable for Hazardous area Zone 2, IIC, T1 and display all status and alarms.				
7	The Hazardous area of the Heater is "non-classified" except for pipework containing flanges and valves shall have a Zone 2, IIC, T1 classification of 3m radius.				
	M3 Fired heater shall be supplied in pre-assembled sections, in maximum size shippable pieces.				
8	Stack section shall be supplied in one or two pieces, refractory lined, platform clips installed.				
9	Fuel gas skid shall be supplied completely assembled.				
10	BMS Panel shall be supplied completely assembled, pre-wired, FAT tested with Local Control Panel.				
11	M4 Fired heater tubes shall be designed for 100,000 hours per API 530.				
12	M5 SUPPLIER shall complete the data in this equipment datasheet and submit with their proposal.				
13	M6 SUPPLIER shall design air intake to allow for potential freezing fog which occurs in certain weather conditions which could accumulate frost/ice on the air intake mes				
14	Add: M7 Provide a description of the proposed combustion operating techniques to reduce CO emissions and comply with BAT 37 of Refining Mineral Oil BAT conclusions.				
15					
16					
17					
18	Process Notes				
19	P1 A mixture of natural Gas and ROG is fed to the first section, the gas is pre-heated, steam is added and fed to the second section.				
20	For Process conditions see Process Datasheet 5194812-100-49ED-3-0006.				
21	P2 Estimated Emissions to atmosphere via the fluegas stack. SUPPLIER shall confirm.				
22					
23		Units	NG firing (Start up)	Tailgas firing	
24	Flowrate – normal	kNm ³ /hr	22.6	22.6	
25	Flowrate – design	kNm ³ /hr	25.2	25.2	
26	Temperature	°C	140	140	
27	Composition				
28	Water	mol %		28.8	
29	Carbon Dioxide	mol %		2.47	
30	Oxygen	mol %		1.42	
31	NO _x (ppmv)	ppmv	80	80	
32	SO ₂ (ppmv)	ppmv	0.5	0	
33	Particulates	ppmv	5	5	
34	CO	ppmv	<5-30 (Indicative), <100	<5-30 (Indicative), <100	
35	Ammonia	ppmv	<5-15		
36	HCl	ppmv		<1-5 av samples/yr	
37	HF	ppmv		<1-2 av samples/yr	
38	PCDD/F	ppmv		<0.012 - 0.036 ng I-TEQ/Nm ³	
39	VOC	ppmv		0.6 - 12	
40					
41	P3 Sketch included in Process Datasheet 5194812-100-49ED-3-0006.				
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					



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Technical Data Sheet

BURNER DATA SHEET

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Rev			
1	GENERAL DATA		
2	TYPE OF HEATER		
3	ALTITUDE ABOVE SEA LEVEL	m	7 - 15
4	AIR SUPPLY		
5	AMBIENT / PREHEATED AIR / GAS TURBINE EXHAUST (See Note M6)	Ambient Air inlet to package, SUPPLIER shall advise if air pre-heat is required.	
6	TEMPERATURE (MINIMUM / MAXIMUM / DESIGN)	°C	-17 20 35
7	RELATIVE HUMIDITY	%	Min 40 / Max 100
8	DRAFT TYPE: FORCED / NATURAL / INDUCED	Forced (STC)	
9	DRAFT AVAILABLE: ACROSS BURNER	Pa	
10	ACROSS PLENUM	Pa	
11	REQUIRED TURNDOWN		
12	BURNER WALL LINING THICKNESS	mm	
13	HEATER CASING THICKNESS	mm	
14	FIREBOX HEIGHT	m	
15	TUBE CIRCLE DIAMETER	m	
16	BURNER DATA		
17	MANUFACTURER		
18	TYPE OF BURNER	Low Nox	
19	MODEL / SIZE		
20	DIRECTION OF FIRING		
21	LOCATION (ROOF / FLOOR / SIDEWALL)		
22	NUMBER REQUIRED		
23	MINIMUM DISTANCE BURNER CENTRELINE		
24	TO TUBE CENTRELINE (HORIZONTAL / VERTICAL)	m	
25	TO ADJACENT BURNER CENTRELINE (HORIZONTAL / VERT.)	m	
26	TO UNSHIELDED REFRACTORY (HORIZONTAL / VERTICAL)	m	
27	BURNER CIRCLE DIAMETER	m	
28	PILOTS		
29	NUMBER REQUIRED		
30	TYPE		
31	IGNITION METHOD		
32	FUEL		
33	FUEL PRESSURE	barg	
34	CAPACITY	MW	
35	OPERATING DATA		
36	FUEL	Hydrogen Mix / NG for start up	
37	HEAT RELEASE PER BURNER:		
38	DESIGN (LHV)	MW	
39	NORMAL (LHV)	MW	
40	MINIMUM (LHV)	MW	
41	EXCESS AIR @ DESIGN HEAT RELEASE	%	
42	AIR TEMPERATURE	°C	
43	DRAFT LOSS		
44	DESIGN	Pa	
45	NORMAL	Pa	
46	MINIMUM	Pa	
47	FUEL PRESSURE REQUIRED	barg	
48	FLAME LENGTH @ DESIGN HEAT RELEASE	m	
49	FLAME SHAPE (ROUND, FLAT, ETC.)		
50	ATOMIZING MEDIUM / OIL RATIO	kg/kg	
51	NOTES		
52			
53			
54			



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Rev	GAS FUEL CHARACTERISTICS See Process Datasheet 5194812-100-49ED-3-0006			
1	FUEL TYPE			
2	HEATING VALUE (LHV)	kJ/kg	kJ/Nm ³	
3	RELATIVE DENSITY (AIR = 1.0)			
4	MOLECULAR WEIGHT			
5	FUEL TEMPERATURE @ BURNER		°C	
6	FUEL PRESSURE; AVAILABLE @ BURNER		barg	
7	FUEL GAS COMPOSITION:	H ₂ O	Mole %	
8		H ₂ S	Mole %	
9		H ₂	Mole %	
10		C ₁	Mole %	
11		C ₂ =	Mole %	
12		C ₂	Mole %	
13		C ₃ =	Mole %	
14		C ₃	Mole %	
15		C ₄ =	Mole %	
16		iC ₄	Mole %	
17		nC ₄	Mole %	
18			Mole %	
19				
20	TOTAL		Mole %	
21	LIQUID FUEL CHARACTERISTICS			
22	FUEL TYPE			
23	HEATING VALUE (LHV)	kJ/kg	kJ/Nm ³	
24	SPECIFIC GRAVITY		@ 15 °C	
25	H/C RATIO (BY WEIGHT)			
26	VISCOSITY AT	°C	mPa-s	
27	VISCOSITY AT	°C	mPa-s	
28	VANADIUM		ppm	
29	POTASSIUM		ppm	
30	SODIUM		ppm	
31	NICKEL		ppm	
32	FIXED NITROGEN		ppm	
33	SULPHUR		% wt	
34	ASH		% wt	
35	WATER		% wt	
36	LIQUIDS: ASTM INITIAL BOILING POINT		°C	
37	ASTM MID-POINT		°C	
38	ASTM END POINT		°C	
39	FUEL TEMPERATURE @ BURNER		°C	
40	FUEL PRESSURE AVAILABLE @ BURNER		barg	
41	ATOMIZING MEDIUM: AIR / STEAM / MECHANICAL			
42	TEMPERATURE		°C	
43	PRESSURE		barg	
44	NOTES			
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Technical Data Sheet

BURNER DATA SHEET

API 560 4th Edition (ISO 13705:2006)

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Rev	MISCELLANEOUS	
1	BURNER PLENUM	COMMON / INTEGRAL
2		MATERIAL
3		PLATE THICKNESS mm
4		INTERNAL INSULATION
5	INLET AIR CONTROL	DAMPER OR REGISTERS
6		MODE OF OPERATION
7		LEAKAGE %
8	BURNER TILE	COMPOSITION
9		MINIMUM SERVICE TEMPERATURE °C
10	NOISE SPECIFICATION	85 dB(A) @ 1 m
11	ATTENUATION METHOD	
12	PAINTING REQUIREMENTS	
13	IGNITION PORT	SIZE / NO
14	SIGHT PORT	SIZE / NO
15	FLAME DETECTION	TYPE
16		NUMBER
17	SCANNER CONNECTION	SIZE / NO
18	SAFETY INTERLOCK SYSTEM FOR ATOMIZING MEDIUM & OIL	
19	PERFORMANCE TEST REQUIRED (YES OR NO)	
20	EMISSION REQUIREMENTS	
21	FIREBOX BRIDGEWALL TEMPERATURE	°C
22	NOx	(LHV) (HHV) mg/Nm ³ or g/GJ
23	CO	(LHV) (HHV) mg/Nm ³ or g/GJ
24	UHC	(LHV) (HHV) mg/Nm ³ or g/GJ
25	PARTICULATES	(LHV) (HHV) mg/Nm ³ or g/GJ
26	SOx	(LHV) (HHV) mg/Nm ³ or g/GJ
27		
28	CORRECTED TO 3% O ₂ (DRY BASIS @ DESIGN HEAT RELEASE)	
29		
30	NOTE 1 AT DESIGN CONDITIONS, MINIMUM OF 90% OF THE AVAILABLE DRAFT WITH AIR REGISTER FULLY OPEN SHALL BE UTILIZED ACROSS THE BURNER. IN ADDITION, A MINIMUM OF 75% OF THE AIR SIDE PRESSURE DROP WITH AIR REGISTERS FULL OPEN SHALL BE UTILISED ACROSS BURNER THROAT.	
31		
32	NOTE 2 SUPPLIER TO GUARANTEE BURNER FLAME LENGTH.	
33		
34	NOTE 3 SUPPLIER TO GUARANTEE EXCESS AIR, HEAT RELEASE AND DRAFT LOSS ACROSS BURNER.	
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1	MANUFACTURER			
2	MODEL			
3	NUMBER REQUIRED			
4	HEATING SURFACE	m ²		
5	WEIGHT	kg		
6	APPROXIMATE DIMENSIONS (H x W x L)	mm	x	x
7	PERFORMANCE DATA			
8	OPERATING CASE			
9	AIR SIDE:	FLOW ENTERING	kg/h	
10		INLET TEMP	°C	
11		OUTLET TEMP	°C	
12		PRESSURE DROP ALLOWED	Pa	
13		PRESSURE DROP CALCULATED	Pa	
14		HEAT ABSORBED	MW	
15	FLUE GAS SIDE:	FLOW ENTERING	kg/h	
16		INLET TEMP	°C	
17		OUTLET TEMP	°C	
18		PRESSURE DROP ALLOWED	Pa	
19		PRESSURE DROP CALCULATED	Pa	
20		HEAT ABSORBED	MW	
21	AIR BYPASS		kg/h	
22	TOTAL AIR FLOW TO BURNERS		kg/h	
23	MIX AIR TEMPERATURE		°C	
24	FLUE GAS COMPOSITION:	O ₂	mole %	
25		N ₂	mole %	
26		H ₂ O	mole %	
27		CO ₂	mole %	
28		Ar	mole %	
29		SO _x	mole %	
30	FLUE GAS SPEC HEAT		kJ/kg.K	
31	FLUE GAS ACID DEW POINT TEMPERATURE		°C	
32	MINIMUM METAL TEMPERATURE:	ALLOWABLE	°C	
33		CALCULATED	°C	
34	MISCELLANEOUS			
35	MINIMUM AMBIENT AIR TEMPERATURE		°C	-17
36	SITE ELEVATION ABOVE SEA LEVEL		m	7 - 15
37	RELATIVE HUMIDITY		%	Min: 40% Max: 100%
38	EXTERNAL COLD AIR BY-PASS (YES / NO)			
39	COLD END THERMOCOUPLES (YES / NO) NUMBER REQUIRED			
40	ACCESS DOORS: NUMBER / SIZE / LOCATION			
41	INSULATION (INTERNAL / EXTERNAL)			
42	CLEANING MEDIUM	STEAM OR WATER		
43		PRESSURE	bar	
44		TEMPERATURE	°C	
45	MECHANICAL DESIGN:			
46	DESIGN FLUE GAS TEMPERATURE		°C	
47	DESIGN PRESSURE DIFFERENTIAL		Pa	
48	SEISMIC FACTOR			No Seismic to EN1998-1
49	PAINTING REQUIREMENTS			
50	LEAK TEST			
51	STRUCTURAL WIND LOAD		kg/m ²	
52	AIR LEAKAGE (GUARANTEED)		%	
53	NOTES: (All data on per unit basis.)			
54				
55				



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Rev	CONSTRUCTION DATA		
1	I CAST IRON:		
2	NUMBER OF PASSES		
3	NUMBER OF TUBES PER BLOCK		
4	NUMBER OF BLOCKS		
5	TYPE OF SURFACE		
6	TUBE MATERIAL		
7	TUBE THICKNESS		mm
8	GLASS BLOCK (YES/NO)		
9	NUMBER OF GLASS TUBES		
10	AIR CROSS OVER DUCT:	NUMBER	
11		BOLTED / WELDED	
12		SUPPLIED WITH CLIPS	
13	WATER WASH	YES/NO	
14		TYPE (OFF-LINE OR ON-LINE)	
15		LOCATION	
16			
17	II PLATE TYPE:		
18	NUMBER OF PASSES		
19	NUMBER OF PLATES PER BLOCK		
20	NUMBER OF BLOCKS		
21	PLATE THICKNESS		mm
22	WIDTH OF AIR CHANNEL		mm
23	WIDTH OF FLUE GAS CHANNEL		mm
24	AIR SIDE RIB PITCH		mm
25	FLUE GAS SIDE RIB PITCH		mm
26	MATERIAL	PLATE	
27		RIB	
28		FRAME	
29	AIR CROSS OVER DUCT:	NUMBER	
30		BOLTED / WELDED	
31		SUPPLIED WITH CLIPS	
32	WATER WASH	YES/NO	
33		TYPE (OFF-LINE OR ON-LINE)	
34		LOCATION	
35			
36	III HEAT PIPE:		
37	NUMBER OF TUBES		
38	TUBE OUTER DIAMETER / WALL THICKNESS		mm
39	TUBE MATERIAL		
40	TUBES PER ROW		
41	NUMBER OF ROWS		
42	TUBE PITCH (SQUARE OR TRIANGULAR)		mm
43		AIR SIDE	GAS SIDE
44	FINS: TYPE		
45		HEIGHT / THICKNESS	mm
46		NUMBER / m	
47	MATERIAL		
48		EFFECTIVE LENGTH	m
49		HEATING SURFACE	m ²
50		MAXIMUM ALLOWABLE SOAK TEMPERATURE	°C
51	SOOT BLOWER	YES/NO	
52		TYPE (OFF-LINE OR ON-LINE)	
53		LOCATION	
54	NOTES:		
55			
56			



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Technical Data Sheet

FAN DATA SHEET

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Rev				
1	FAN MANUFACTURER	MODEL / SIZE		
2	SERVICE	ARRANGEMENT	NUMBER REQUIRED	
3	DRIVE SYSTEM	Electric Motor	FAN ROTATION FROM DRIVEN END	<input type="checkbox"/> CW <input type="checkbox"/> CCW
4	GAS HANDLED	MOLECULAR WEIGHT		
5	SITE ELEVATION, m	7 - 15	FAN LOCATION	
6	OPERATING CONDITIONS			
7	OPERATING CONDITION / CASE :		NORMAL	RATED
8	MASS FLOW-RATE CAPACITY	kg/h		
9	VOLUME FLOW-RATE CAPACITY	Am ³ /h		
10	DENSITY	kg/m ³		
11	TEMPERATURE	°C		
12	RELATIVE HUMIDITY	%		
13	STATIC PRESSURE @ INLET	Pa		
14	STATIC PRESSURE @ OUTLET	Pa		
15	PERFORMANCE:			
16	POWER @ TEMPERATURE (ALL LOSSES INCLUDED)	kW		
17	FAN SPEED	rpm		
18	STATIC PRESSURE RISE ACROSS FAN	Pa		
19	INLET DAMPER / VANE POSITION			
20	DISCHARGE DAMPER POSITION			
21	FAN STATIC EFFICIENCY	%		
22	STEAM RATE (TURBINE ONLY)	kg/kW-hr		
23	FAN CONTROL:		DRIVER:	
24	AIR SUPPLY		MAKE	TYPE
25	FAN CONTROL FURNISHED BY		RATED kW	SPEED rpm
26	METHOD	<input type="checkbox"/> INLET DAMPER <input type="checkbox"/> OUTLET DAMPER	ELECTRICAL AREA CLASSIFICATION	
27		<input type="checkbox"/> INLET GUIDE VANES <input type="checkbox"/> VARIABLE SPEED	ZONE (HOLD 1, 2	GROUP IIC TEMP. CLASS T1
28	STARTING METHOD		POWER	VOLTS PHASE HZ
29	CONSTRUCTION FEATURES			
30	HOUSING:		BEARINGS:	
31	MATERIAL	THICKNESS mm	<input type="checkbox"/> HYDRODYNAMIC	<input type="checkbox"/> ANTI-FRICTION
32	SPLIT FOR WHEEL REMOVAL <input type="checkbox"/> YES <input type="checkbox"/> NO		TYPE	
33	DRAINS (NO / SIZE)		LUBRICATION	
34	ACCESS DOORS (NO / SIZE)		COOLING WATER	m ³ /h @ °C
35	BLADES:		THERMOSTATICALLY CONTROLLED HEATERS <input type="checkbox"/> YES <input type="checkbox"/> NO	
36	TYPE		TEMPERATURE DETECTORS <input type="checkbox"/> YES <input type="checkbox"/> NO	
37	NUMBER	THICKNESS mm	VIBRATION DETECTORS <input type="checkbox"/> YES <input type="checkbox"/> NO	
38	MATERIAL			
39	HUB:		SPEED DETECTORS:	
40	<input type="checkbox"/> SHRINK FIT <input type="checkbox"/> KEYED		<input type="checkbox"/> NON-CONTACT PROBE	
41	MATERIAL		<input type="checkbox"/> SPEED SWITCH	
42	SHAFT:		<input type="checkbox"/> OTHER	
43	MATERIAL		COUPLINGS:	
44	DIAMETER AT BEARINGS, mm		TYPE	
45	SHAFT SLEEVES:		MAKE	
46	MATERIAL		MODEL	
47	SHAFT SEALS:		SERVICE FACTOR	
48	TYPE		MOUNT COUPLING HALVES	
49			<input type="checkbox"/> FAN <input type="checkbox"/> DRIVER	
50	INERTIA (wr ²), kg-m ²		SPACER <input type="checkbox"/> YES <input type="checkbox"/> NO	LENGTH mm
51	NOTES: ALL DATA ON PER UNIT BASIS			
52				
53				
54				



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Rev	CONSTRUCTION FEATURES (continued)			
1	MISCELLANEOUS:			
2	<input checked="" type="checkbox"/> COMMON BASEPLATE (FAN / DRIVER)	<input checked="" type="checkbox"/> SILENCER (INLET) (OUTLET)	<input checked="" type="checkbox"/> INLET (SCREEN) (FILTER)	
3	<input checked="" type="checkbox"/> BEARING PEDESTAL / SOLEPLATES	<input checked="" type="checkbox"/> EVASE	<input checked="" type="checkbox"/> HOUSING DRAIN CONNECTION	
4	<input checked="" type="checkbox"/> PERFORMANCE CURVES	<input checked="" type="checkbox"/> VIBRATION ISOLATION	<input checked="" type="checkbox"/> SPARK RESISTANT COUPLING GUARD	
5	<input checked="" type="checkbox"/> SECTIONAL DRAWING	<input type="checkbox"/> TYPE	<input type="checkbox"/> INSULATION CLIPS	
6	<input checked="" type="checkbox"/> OUTLINE DRAWING	<input type="checkbox"/> SPECIAL COATINGS	<input checked="" type="checkbox"/> INSPECTION ACCESS	
7	<input checked="" type="checkbox"/> INLET BOXES	<input type="checkbox"/> CONTROL PANEL	<input type="checkbox"/> HEAT SHIELDS	
8	NOISE ATTENUATION		WEIGHTS	
9	MAX ALLOWABLE SOUND PRESSURE LEVEL	85 dB(A) @ 1 m	FAN kg	DRIVER kg
10	PREDICTED SOUND PRESSURE LEVEL	dB(A) @ 1 m	BASE kg	SOUND TRUNK kg
11	ATTENUATION METHOD		EVASE kg	
12	FURNISHED BY	Fan Supplier	TOTAL SHIPPING WEIGHT kg	
13	PAINTING		CONNECTIONS	
14	<input type="checkbox"/> MANUFACTURER'S STANDARD			SIZE RATING ORIENTATION
15	<input checked="" type="checkbox"/> As per 5194812-000-45EG-4-0001		INLET	
16	SHIPMENT		OUTLET	
17	<input type="checkbox"/> DOMESTIC <input checked="" type="checkbox"/> EXPORT <input checked="" type="checkbox"/> EXPORT BOXING REQUIRED		DRAINS	
18				
19	ERECTION		TESTS	
20	<input checked="" type="checkbox"/> ASSEMBLED		<input checked="" type="checkbox"/> MECHANICAL RUN IN (NO LOAD)	
21	<input type="checkbox"/> PARTLY ASSEMBLED		<input checked="" type="checkbox"/> WITNESSED PERFORMANCE	
22	<input checked="" type="checkbox"/> OUTDOOR STORAGE OVER 6 MONTHS		<input checked="" type="checkbox"/> ROTOR BALANCE	
23				
24	APPLICABLE SPECIFICATIONS		<input checked="" type="checkbox"/> SHOP INSPECTION	
25				
26	<input checked="" type="checkbox"/> ASSEMBLY AND FIT- UP CHECK			
27	<input checked="" type="checkbox"/> LATERAL CRITICAL SPEED			
28	<input type="checkbox"/> TORSIONAL CRITICAL SPEED			
28	NOTES:			
29	ITEMS MARKED <input checked="" type="checkbox"/> TO BE INCLUDED IN VENDOR SCOPE OF SUPPLY			
30				
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1	OPERATING DATA:			
2	FUEL OIL TYPE			
3	SPECIFIC GRAVITY OR °API			
4	SULPHUR	% wt		
5	VANADIUM	ppm (wt)		
6	NICKEL	ppm (wt)		
7	ASH	% wt		
8	LANE LOCATION			
9	FLUE GAS TEMPERATURE AT BLOWER, MAXIMUM	°C		
10	FLUE GAS PRESSURE AT BLOWER, MAXIMUM	barg		
11	CLEANING MEDIUM			
12				
13	UTILITY DATA:			
14	STEAM	barg @	°C	kg/h per blower
15	AIR	barg	Nm ³ /h per blower	
16	POWER	Volts	Phase	Hz
17				
18	LAYOUT DATA:			
19	TUBE OUTSIDE DIAMETER	mm		
20	TUBE LENGTH	mm		
21	TUBE SPACING	mm		
22	(STAGGERED) (IN-LINE)			
23	BANK WIDTH	m		
24	NUMBER OF INTERMEDIATE TUBE SHEETS			
25	LANE DIMENSION (MINIMUM CLEARANCE)	mm		
26	MAXIMUM CLEANING RADIUS	m		
27	EXTENDED SURFACE TYPE			
28	NUMBER OF FINNED ROWS			
29	LINING THICKNESS	mm		
30	BLOWER DATA:			
31	MANUFACTURER			
32	TYPE (RETRACTABLE OR ROTARY)			
33	MODEL			
34	NUMBER REQUIRED			
35	NUMBER OF LANES (ROWS)			
36	NUMBER PER LANE			
37	ARRANGEMENT			
38	OPERATION			
39	CONTROL REQUIRED (AUTO OR MANUAL)			
40	CONTROL PANEL LOCATION (LOCAL OR REMOTE)			
41	DRIVER TYPE (MANUAL, PNEUMATIC OR ELECTRICAL MOTOR)			
42	ELECTRICAL AREA CLASSIFICATION			
43	MOTOR STARTERS CLASSIFICATION			
44	MOTOR	RATED POWER	kW	
45		ENCLOSURE		
46		SPEED	rpm	
47	LANCE TRAVEL SPEED		m/s	
48	HEAD: MATERIAL & RATING			
49	WALL BOX ISOLATION			
50				
51	NOTES:			
52				
53				
54				