PROCESS DATA SHEET
FIRED HEATER
COVER PAGE

Project :	30589 Refurbishment of KR-601-1 / 2 Vacuum Heaters
Purchaser / Owner :	AB MAZEIKIU NAFTA - Lithuania
Plant :	VDU PLANT
Item :	KR - 601-1 / 2
Service :	VACUUM HEATERS
Location :	MAZEIKIAI, LITHUANIA

PLANT	VDU PLANT
PROJECT:	30589
CUSTOMER	AB MAZEIKIU NAFTA - Lithuania
LOCATION:	MAZEIKIAI, LITHUANIA

KR-601-1/2 VACUUM HEATERS
AB MAZEIKIU NAFTA
MAZEIKIAI, LITHUANIA

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REV.	DESCRIPTION	ISS.	CHK.	APP.	AUTH.	DATE
0	FOR CONSTRUCTION	TIM	MBO	MBO	PCO	05.04.2007
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PROCESS DATA SHEET
FIRED HEATER

Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet
30589	601	SP	0110	001	0	1 of 9

PURCHASER / OWNER :	**AB MAZEIKIU NAFTA - Lithuania**				**ITEM No. :**		**KR - 601-1 / 2**	
SERVICE:	**VACUUM HEATERS**				**LOCATION :**		**MAZEIKIAI, LITHUANIA**	
1	UNIT : VDU PLANT					* NUMBER REQUIRED : TWO (TWINS) (1)		REV.
2	MANUFACTURER : TECHNIP-KTI					REFERENCE :		
3	TYPE OF HEATER : RADIANT BOX WITH HORIZONTAL TUBE AND CONVECTION							
4	* TOTAL HEATER ABSORBED DUTY : Gcal/h **33,79 (1)**				**@ DESIGN with 50% Fuel Oil + 50% Fuel Gas**			0
5	**PROCESS OPERATING CONDITIONS**							
6	* OPERATING CASE :		DESIGN - CASE 2 / 0.8% wt. CCR					
7	HEATER SECTION :		RADIANT	SHOCK & CONV.	CONVECTION			
8	* SERVICE :		VACUUM		SSH			
9	HEAT ABSORPTION :	Gcal/h	32.964		0.826 (a)			0
10	* FLUID :		97.57% REDUCED CRUDE + 2.43% VB Heavy Diesel		STEAM			
11	* FLOW RATE :	kg/h	309000		12000			0
12								
13	* PRESSURE DROP, ALLOWABLE : Clean / Fouled	bar						
14	PRESSURE DROP, CALCULATED (CLEAN / FOULED) :	bar	--- / 2,12 (2)		0.620 / --- (a)			0
15	* AVG. RAD. SECT. FLUX DENSITY, ALLOWABLE :	kcal/ hm²						
16	AVG. RAD. SECT. FLUX DENSITY, CALCULATED :	kcal/ hm²	24522					0
17	MAX RAD. SECT. FLUX DENSITY :	kcal/ hm²	44140					0
18	CONV. SECT. FLUX DENSITY (BARE TUBE) :	kcal/ hm²						
19	* MAXIMUM VELOCITY:	m/s	(10)	1.5				0
20	PROCESS FLUID MASS VELOCITY : ~~clean - fouled~~	kg/m² s	(10)	1150.8				0
21	* MAXIMUM ALLOW. / CALC. INSIDE FILM TEMPERATURE :	°C	--- / 476 (3)					
22	* FOULING FACTOR :	m² °C / W	0.00053	0.00053				
23	* COKING ALLOWANCE :	mm	3 (2)	3 (2)	-			
24	**INLET CONDITIONS**							
25	* TEMPERATURE :	°C		275	192			
26	* PRESSURE :	bar a		2.36	12.90			
27	* LIQUID FLOW :	kg/h		309000	---			
28	* VAPOR FLOW :	kg/h		---	12000			0
29	* LIQUID GRAVITY, ~~(DEG API) (SP. GR. @ T) :~~	kg/m3		see note 4	---			
30	* VAPOR MOLECULAR WEIGHT :				18.02			
31	* VISCOSITY, (LIQUID / VAPOR) :	mPa s = cP			--- / 0,0154			
32	* SPECIFIC HEAT, (LIQUID / VAPOR) :	kcal/kg °C			--- / 0,678			
33	* THERMAL CONDUCTIVITY, (LIQUID / VAPOR) :	kcal/hm °C			--- / 0,034			
34	**OUTLET CONDITIONS**							
35	* TEMPERATURE :	°C	406		313 (a)			0
36	* PRESSURE :	bar a	0.3		12.28 (a)			0
37	* LIQUID FLOW :	kg/h	216300		---			
38	* VAPOR FLOW :	kg/h	92700		12000			0
39	* LIQUID GRAVITY, ~~(DEG API) (SP. GR. @ T) :~~	kg/m3	see note 4		---			
40	* VAPOR MOLECULAR WEIGHT :				18.02			
41	* VISCOSITY, (LIQUID / VAPOR) :	mPa s = cP			--- / 0,0199			
42	* SPECIFIC HEAT, (LIQUID / VAPOR) :	kcal/kg °C			--- / 0,524			
43	* THERMAL CONDUCTIVITY, (LIQUID / VAPOR) :	kcal/hm °C			--- / 0,0388			
44	**REMARKS AND SPECIAL REQUIREMENTS**							
45	* DISTILLATION DATA OR FEED COMPOSITION : **See note 4**							
46	SHORT TERM CONDITIONS :							
47								
48	NOTES :							
49	(a) Considering 10000 kg/h of Steam: Heat Adsorption for SSH = 0.748 Gcal/h							0
50	Steam Outlet Temperature = 326°C							0
51	Pressure Drop = 0.44 bar							0
52	Considering 8000 kg/h of Steam: Heat adsorption for SSH = 0.66 Gcal/h							0
53	Steam Outlet Temperature = 340°C							0
54	Pressure Drop = 0.29 bar							0
55								
56								

PLANT VDU PLANT
PROJECT: 30589
CUSTOMER AB MAZEIKIU NAFTA - Lithuania
LOCATION MAZEIKIAI, LITHUANIA

KR-601-1/2 VACUUM HEATERS
AB MAZEIKIU NAFTA
MAZEIKIAI, LITHUANIA

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FIRED HEATER

Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet
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COMBUSTION DESIGN CONDITIONS

							REV
2	OPERATING CASE :		DESIGN - CASE 2	CASE 2	CASE 2		0
3	* TYPE OF FUEL :		50% FO + 50% FG	100% Fuel Gas	100% Fuel Oil		0
4	* EXCESS AIR :	%	20	20	25		
5	CALCULATED HEAT RELEASE (LHV) :	Gcal/h	41.452	41.693	41.297		0
6	FUEL EFFICIENCY CALCULATED (LHV) :	%	81.5% (11)	81.06% (11)	81% (11)		0
7	FUEL EFFICIENCY GUARANTEED (LHV) :	%	80.5% (11)	80% (11)	80% (11)		0
8	THERMAL EFFICIENCY GUARANTEED :	%	---				
9	RADIATION LOSS BASED ON HEAT RELEASE (LHV) :	%	3	3	3		
10	FLUE GAS TEMP. LEAVING RADIANT SECTION :	°C	790	791	789		0
11	LEAVING CONVECTION SECTION :	°C	344	345	349		0
12	LEAVING AIR PREHEATER :	°C	---	---	---		
13	FLUE GAS QUANTITY :	kg/h	74880	74880	78840		0
14	FLUE GAS MASS VEL.THROUGH CONVECTION SECT.:	kg/s m²					
15	DRAFT AT ARCH :	mmWC	- 2.5	2.5	2.5		
16	AT BURNERS :	mmWC	14.3	14.3	14.3		
17	* AMBIENT AIR TEMP. FOR EFFICIENCY CALCULATION :	°C	15	15	15		
18	* AMBIENT AIR TEMP. FOR STACK DESIGN :	°C					
19	* ALTITUTE ABOVE SEA LEVEL :	m					
20	VOLUMETRIC HEAT RELEASE (LHV) :	W/m³					

FUEL CHARACTERISTICS (5)

												REV
22	* GAS TYPE:	FUELGAS - H2 normal		* LIQUID TYPE:	Fuel Oil			* OTHER TYPE:	HLC FUEL OIL - from FCC			
23	* LHV :	kcal / kg	10746	* LHV :	kcal / kg	9450-9550		* LHV :	kcal / kg	9200		0
24	* HHV :	kcal / kg	---	* HHV :	kcal / kg	---		* HHV :	kcal / kg	-----		0
25	* PRESS. @ BURNER :	bar (g)	0.5	* PRESS. @ BURNER :	bar (g)	5		* PRESS. @ BURNER :	bar (g)	5		0
26	* TEMP. @ BURNER :	°C	25	* TEMP. @ BURNER :	°C	120 - 145		* TEMP. @ BURNER :	°C	220		0
27	* MOLECULAR WEIGHT		28.4	* VISCOSITY @ 80 °C :	cst	114 - 120		* VISCOSITY @ 80 °C :	mm^2/s	3.795		0
28				* ATOM. STEAM TEMP. :	°C	190		* ATOM. STEAM TEMP. :	°C	190		0
29				* PRESSURE @ BURNER :	bar (g)	6,3		* PRESSURE @ BURNER :	bar (g)	6,3		0
30	COMPOSITION	MOLE		COMPOSITION		WT %		COMPOSITION		MOLE %		
31	See note 5			SULPHUR	%wt	2 - 2,3		See note 5				
32				VANADIUM	ppm wt	130 - 240						
33				SODIUM	ppm wt	14 - 20						
34				ASH	%wt	8,7 - 13						
35				See note 5 for further info								
36												
37												

BURNER DATA (16)

						REV
39	MANUFACTURER : TO BE DEFINED	SIZE / MODEL No. : TO BE DEFINED	NUMBER : 22			
40	TYPE : NATURAL DRAFT - LOW NOX	LOCATION : FLOOR	ORIENTATION : UPWARD			
41	HEAT RELEASE PER BURNER, Gcal/h DESIGN: 2.20	NORMAL : 1.90	MIN. : 0.542 / 0.72 (12)			
42	PRESSURE DROP ACROSS BURNER @ DESIGN HEAT RELEASE : 13 mmWC (MINIMUM)					
43	DISTANCE BURNER CENTER LINE TO TUBE CENTER LINE, mm	HORIZONTAL :	VERTICAL :			
44	DISTANCE BURNER CENTER LINE TO UNSHIELDED WALL, mm	HORIZONTAL :	VERTICAL :			
45	* PILOT TYPE :SELF INSPIRATING, CONTINUOUS	CAPACITY, kW: 22	FUEL : Fuel Gas			
46	* IGNITION METHOD : ELECTRIC SPARKING FIXED TYPE (IGNITION ROD ON EACH PILOT)					
47	* FLAME DETECTION, TYPE : UV+IR SCANNER FOR MAIN FLAME + IONIZATION ROD FOR PILOT		NUMBER:			
48	* REQUIRED EMISSIONS (CORRECTED TO 3% O2, DRY) mg/Nm3	NOx : 450 (13)	CO : 50	SOx: ---		0
49	mg/Nm3	UHC : ---	PARTICULATES : (14)	H_2S : ---		

| | | | | | | | | | | | |

1	**MECHANICAL DESIGN CONDITIONS**					REV
2	* PLOT LIMITATION :			* STACK LIMITATIONS :		
3	* TUBE LIMITATION :			* NOISE LIMITATIONS :		
4	* STRUCTURAL DESIGN DATA, WIND VELOCITY km/h :			* WIND OCCURANCE :		
5	SNOW LOAD :	N/A		* SEISMIC ZONE :		
6	* MIN ~~/NORM/~~ MAX (in the shade) AMBIENT AIR TEMPERATURE :	°C	-36 / 33	* RELATIVE HUMIDITY :	63% - 89%	
7	HEATER SECTION :	RADIANT	SHOCK & CONV.	CONVECTION		
8	SERVICE :	VACUUM HEATERS		SSH		
9	**COIL DESIGN**					
10	* DESIGN BASIS. TUBE WALL THK(CODE or SPECIFICATION) :	API 530		ASME I		
11	RUPTURE STRENGTH (MINIMUM or AVERAGE) :	MINIMUM				
12	* STRESS-TO-RUPTURE BASIS : hrs	100000				
13	* DESIGN PRESSURE, IN / OUT : bar (g)	6		16		
14	* DESIGN FLUID TEMPERATURE : °C	410		350		0
15	* TEMPERATURE ALLOWANCE : °C	15		15		
16	CORROSION ALLOWANCE, TUBES / FITTINGS : mm	3		3		
17	HYDROSTATIC TEST PRESSURE : bar (g)	by code		by code		
18	* POSTWELD HEAT TREATMENT (YES or NO) :	YES		YES		
19	* PERCENT OF WELD FULLY RADIOGRAPHED :	100%		100%		
20	MAXIMUM (CLEAN) TUBE METAL TEMPERATURE : °C	494		363		0
21	MAXIMUM (FOULED) TUBE METAL TEMPERATURE : °C	519		---		0
22	DESIGN TUBE METAL TEMPERATURE : °C	534		378 (6)		0
23	INSIDE FILM COEFFICIENT : W/m² °C					
24	**COIL ARRANGEMENT**					
25	TUBE ORIENTATION, VERTICAL or HORIZONTAL :	HORIZONTAL	HORIZONTAL	HORIZONTAL		
26	* TUBE MATERIAL (ASTM SPECIFICATION AND GRADE) :	A 335 P5	A 335 P5	A 335 P5		
27	TUBE OUTSIDE DIAMETER : mm	168,3 (7)	168.3	168.3		
28	TUBE WALL THICKNESS, (MINIMUM) (AVERAGE) : mm	7,11 (7)	7.11	7,11		
29	NUMBER OF FLOW PASSES :	4	4	1		0
30	NUMBER OF TUBES :	72 (7)	40	8		
31	NUMBER OF TUBES PER ROW (CONVECTION SECTION) :	---	4	4		
32	OVERALL (STRAIGHT) TUBE LENGTH : m		18.165	18.165		
33	EFFECTIVE (HEATED) TUBE LENGTH : m	22.40	17.3	17.3		
34	BARE TUBES, NUMBER :	72	12	---		
35	TOTAL EXPOSED SURFACE : m²	963 (b)	112,94	---		0
36	EXTENDED SURFACE TUBES, NUMBER :	---	28	8		
37	TOTAL EXPOSED SURFACE : m²	---	1368.8	456,3		
38	TUBE LAYOUT (IN LINE or STAGGERED) :	IN LINE	STAGGERED	STAGGERED		
39	TUBE SPACING(CENT.TO CENT.)(hor.x diag.~~or vert.~~) : mm	304,8 (7)	260 x 304,8	260 x 304,8		
40	SPACING TUBE CENT. TO FURNACE WALL (MIN) : mm	228.6 (7)	---	---		
41	CORBELS (YES or NO) :	NO	YES (8)	YES		
42	CORBEL WIDTH : mm	---	130	130		
43	**DESCRIPTION OF EXTENDED SURFACE**					
44	TYPE (STUDS) (SERRATED FINS) (SOLID FINS) :		STUDS	STUDS		
45	MATERIAL :		CS	CS		
46	DIMENSIONS (HEIGHT x DIAMETER / ~~THICKNESS~~) : mm		25 x 12,7	25 x 12,7		
47	SPACING ~~(FINS~~ or STUDS / m) :		62.5	62.5		
48	MAXIMUM (CALCULATED) TIP TEMPERATURE : °C		454	350		
49	EXTENSION RATIO (TOTAL AREA / BARE AREA) :		3.83	3.83		
50	**PLUG TYPE HEADERS**					
51	* TYPE :					
52	MATERIAL (ASTM SPECIFICATION AND GRADE) :					
53	NOMINAL RATING :					
54	DESIGN TEMPERATURE : °C					
55	* LOCATION (ONE or BOTH ENDS) :					
56	WELDED OR ROLLED JOINT :					
57	NOTES :					
58	(b) Including internal jump over					
59						
60						
61						
62						
63						
64						
65						
66						
67						

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PLANT : VDU PLANT
PROJECT N°: 30589
CUSTOMER: AB MAZEIKIU NAFTA - Lithuania
LOCATION MAZEIKIAI, LITHUANIA

PROCESS DATA SHEET
FIRED HEATER

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Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet

1	**MECHANICAL DESIGN CONDITIONS (continued)**					REV
2	HEATER SECTION :	RADIANT	SHOCK & CONV.	CONVECTION		
3	SERVICE :	VACUUM HEATERS		SSH		
4	**RETURN BENDS**					
5	TYPE :	SR 180°+jump-overs (7)	SR 180°	SR 180°		
6	MATERIAL (ASTM SPECIFICATION AND GRADE) :	A 234 WP 5	A 234 WP 5	A 234 WP 5		
7	NOMINAL RATING or SCHEDULE :	AS PER TUBE	AS PER TUBE	AS PER TUBE		
8	* LOCATION (FB = FIRE BOX, HB = HEADER BOX) :	FB	HB	HB		
9	**TERMINALS AND / OR MANIFOLDS**					
10	* TYPE (BEV = BEVELED, MANIF = MANIFOLD, FLG = FLANGED) :	BEV	FLG	FLG		0
11	INLET : MATERIAL (ASTM SPECIFICATION AND GRADE) :	---	A 335 P5	A 335 P5		0
12	DESIGN TEMPERATURE : °C	---	310	220		
13	SIZE / SCHEDULE or THICKNESS :	---	6" / 7,11 mm	6" / 7,11 mm		
14	NUMBER OF TERMINALS :	---	FOUR	ONE		0
15	FLANGE MATERIAL (ASTM SPECIFICATION AND GRADE) :	---	A 182 F 5	A 182 F 5		0
16	FLANGE SIZE AND RATING :	---	6", 300#	6", 300#		
17	OUTLET : MATERIAL (ASTM SPECIFICATION AND GRADE) :	A 335 P5	---	A 335 P5		0
18	DESIGN TEMPERATURE : °C	437	---	350		0
19	SIZE / SCHEDULE or THICHNESS :	12" / 10,31 mm	---	6" / 7,11 mm		
20	NUMBER OF TERMINALS :	FOUR	---	ONE		0
21	FLANGE MATERIAL (ASTM SPECIFICATION AND GRADE) :		---	A 182 F 5		0
22	FLANGE SIZE AND RATING :		---	6", 300#		0
23	* MANIFOLD TO TUBE CONNECTION (WELDED, EXTRUDED, ETC.) :		---			0
24	MANIFOLD LOCATION (INSIDE or OUTSIDE HEADER BOX) :		---			0
25	**CROSSOVERS**					
26	* WELDED or FLANGED :	WELDED				
27	* PIPE MATERIAL (ASTM SPECIFICATION AND GRADE) :	A 335 P5				
28	PIPE SIZE / SCHEDULE or THICKNESS :	168,3 / 7,11				
29	* FLANGE MATERIAL :	---				
30	FLANGE SIZE AND RATING :	---				
31	* LOCATION (INTERNAL / EXTERNAL) :	INTERNAL				
32	FLUID TEMPERATURE : °C	325				
33	**TUBE SUPPORTS**					
34	LOCATION (ENDS, TOP, BOTTOM) :	---	ENDS	ENDS		
35	MATERIAL (ASTM SPECIFICATION AND GRADE) :	---	Carbon Steel	Carbon Steel		
36	DESIGN METAL TEMPERATURE : °C	---	---	---		
37	THICKNESS : mm	---	14	14		
38	TYPE AND THICKNESS OF INSULATION : mm	---	LHV 1:2:4; 100mm	LHV 1:2:4; 100mm		
39	INSULATION REINFORCEMENT (MATERIAL AND TYPE) :	---	SS 304"V"Anchors	SS 304"V"Anchors		
40	**INTERMEDIATE TUBE SUPPORTS**					
41	MATERIAL (ASTM SPECIFICATION AND GRADE) :	35-45 Cr-Ni	35-45 Cr-Ni / 25-20 Cr-Ni / 19-9 Cr-Ni (c)			
42	DESIGN METAL TEMPERATURE : °C	901	900 / 679 / 474			
43	THICKNESS : mm		14 mm mimimum (17)			
44	NUMBER / SPACING : mm		3 / 4380 mm			0
45	**TUBE GUIDES**					
46	LOCATION :	N/A	N/A	N/A		
47	TYPE :					
48	MATERIAL :					
49	**HEADER BOXES**					
50	LOCATION :	CONVECTION SECTION	HINGED DOOR / BOLTED PANEL:	BOLTED		
51	CASING MATERIAL :	Carbon Steel	THICKNESS mm:	5		
52	LINING MATERIAL :	LHV 1:2:4	THICKNESS mm:	50		
53	ANCHOR (MATERIAL AND TYPE) :	C.S. "V" ANCHORS				
54	NOTE:					
55	(c) Flue Gas Temperature for each row of convection section In reference to flue gas flow direction:					

56	Inlet Temp. [°C]			Inlet Temp. [°C]			Inlet Temp. [°C]	
57	Row 1	790		Row 5	624		Row 11	419
58	Row 2	754		Row 6	567		Row 12	396
59	Row 3	721		Row 7	528		Design Temp. = 474°C	
60	Row 4	691		Row 8	502			
61	Design Temp. = 900°C			Row 9	481			
62				Row 10	445			
63				Design Temp. = 679°C				
64								

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CUSTOMER: AB MAZEIKIU NAFTA - Lithuania
LOCATION MAZEIKIAI, LITHUANIA

PROCESS DATA SHEET
FIRED HEATER

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Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet

MECHANICAL DESIGN CONDITIONS (continued)

REFRACTORY DESIGN BASIS

REV

AMBIENT, °C :	27 °C	WIND VELOCITY, m/s :	0	CASING TEMP., °C :	82 / 91		

EXPOSED VERTICAL WALLS

LINING THICKNESS, mm :	190	HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C :	- / 791	
WALL COSTRUCTION :	75 mm CASTABLE LHV 124 + 115 mm CASTABLE LHV 106 (in gunning application)			
ANCHOR (MATERIAL AND TYPE) :		Type 304 Stainless Steel Y anchors		
CASING MATERIAL :	Carbon Steel	THICKNESS, mm : 5 min.	TEMPERATURE, °C :	≤82

SHIELDED VERTICAL WALLS

LINING THICKNESS, mm :	170	HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C :	- / 710	
WALL COSTRUCTION :	75 mm CASTABLE LHV 124 + 95 mm CASTABLE LHV 106 (in gunning application)			
ANCHOR (MATERIAL AND TYPE) :		Type 304 Stainless Steel Y anchors		
CASING MATERIAL :	Carbon Steel	THICKNESS, mm : 5 min.	TEMPERATURE, °C :	≤82

ARCH

LINING THICKNESS, mm :	175	HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C :	- / 791	
WALL COSTRUCTION :	75 mm CASTABLE LHV 124 + 100 mm CASTABLE LHV 106			
ANCHOR (MATERIAL AND TYPE) :		Type 310 Stainless Steel Y anchors		
CASING MATERIAL :	Carbon Steel	THICKNESS, mm 6 min.	TEMPERATURE, °C :	≤82

FLOOR

LINING THICKNESS, mm :	250	HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C :	- / 982	
FLOOR COSTRUCTION :	65 mm HDFB + 185 mm INSULATING CASTABLE LHV 1:0:6			
CASING MATERIAL :	Carbon Steel	THICKNESS, mm : 6 min.	TEMPERATURE, °C :	≤ 91
MINIMUM FLOOR ELEVATION, m :	2 min.	FREE SPACING BELOW BURNER INDIVIDUAL PLENUM, m		

CONVECTION SECTION

LINING THICKNESS, mm :	150	HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C :	- / 681	
WALL COSTRUCTION :	75 mm INSULATING CASTABLE LHV 1:2:4 (9) + 75 mm INSULATING CASTABLE LHV 1:0:6			
ANCHOR (MATERIAL AND TYPE) :		SS 304 "Y" ANCHORS		
CASING MATERIAL :	Carbon Steel	THICKNESS, mm : 5 min.	TEMPERATURE, °C :	≤82

INTERNAL WALL

TYPE :	FLUE GAS TUNNELS	MATERIAL :	
DIMENSIONS, HEIGHT / WIDTH, mm :		ACCORDING TO KTI Std.	

BREECHING (FLUE GAS)

CASING MATERIAL :	Carbon Steel	THICKNESS, mm : 5 min.	TEMPERATURE, °C :	≤82	
LINING MATERIAL :	INSULATING CASTABLE LHV 1:2:4		THICKNESS, mm :	75	
ANCHOR (MATERIAL AND TYPE) :		CS "V" ANCHORS			

DUCTS

LOCATION :						
NET FREE AREA : (21)	m²					
CASING MATERIAL :						
CASING THICKNESS :	mm					
LINING : INTERNAL / EXTERNAL						
THICKNESS :	mm					
MATERIAL :						
ANCHOR (MATERIAL AND TYPE) :						
CASING TEMPERATURE :	°C					

PLENUM CHAMBER (AIR)

CASING MATERIAL :	N.A.	THICKNESS, mm :	SIZE, m² :	
LINING MATERIAL :			THICKNESS, mm :	
ANCHOR (MATERIAL AND TYPE) :				
NOTE :				

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PLANT :	VDU PLANT
PROJECT N°:	30589
CUSTOMER:	AB MAZEIKIU NAFTA - Lithuania
LOCATION	MAZEIKIAI, LITHUANIA

PROCESS DATA SHEET
FIRED HEATER

Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet
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MECHANICAL DESIGN CONDITIONS (continued)

STACK or STACK STUB

REV

NUMBER :	none	SELF_SUPPORTED or GUYED :	SELF SUPP. LOCATION :	
CASING MATERIAL :	Carbon Steel	THICKNESS, mm :	MINIMUM THICKNESS, mm :	
INSIDE METAL DIAMETER, m :		HEIGHT ABOVE GRADE, m :	STACK LENGTH, m :	
LINING MATERIAL :	INSULATING CASTABLE		THICKNESS, mm :	
ANCHOR (MATERIAL AND TYPE) :				
EXTENT OF LINING :		INTERNAL or EXTERNAL :		
DESIGN FLUE GAS VELOCITY, m/s :		FLUE GAS TEMPERATURE, °C :		

DAMPERS

NUMBER / LOCATION :	3 - INSIDE TAKE OFF TO COMMON DUCT			
TYPE (CONTROL, TIGHT SHUT_OFF, ETC.) :	CONTROL			
MATERIAL, BLADE :	CS / AISI 304 (d)			
SHAFT :				
MULTIPLE / SINGLE LEAF :	2 SINGLE / 1 MULTIPLE			
PROVISION FOR OPERATION (MANUAL or AUTOMATIC) :	2 MANUAL / 1 AUTOMATIC			
TYPE OF OPERATOR (CABLE or PNEUMATIC) :	LOCAL HANDLE / PNEUMATIC			

MISCELLANEOUS

PLATFORMS — EXISTINGS

DOORS — EXISTINGS

INSTRUMENT CONNECTIONS — EXISTINGS

	No.	SIZE	TYPE	RATING
OXIGEN / CO ANALYZER	1	DN 100		150 RF
PT	2			
TT	5			
SKIN TERMOCOUPLE	8			
DRAFT GAUGE	4	DN 20		

PAINTING REQUIREMENTS :

INTERNAL COATING : NO

GALVANIZING REQUIREMENTS :

ARE PAINTER 'S TROLLEY AND RAIL INCLUDED? : NO

SPECIAL EQUIPMENTS : SOOTBLOWERS : YES, Number 16 Retractable Sootblowers Disposed on TWO Lanes.

AIR PREHEATERS : NO

FAN(S) : NO

OTHER : NO

NOTES :

(d) Manual damper material = Carbon Stell

Automatic damper material = AISI 304

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PLANT : 30589
PROJECT N°: AB MAZEIKIU NAFTA - Lithuania
CUSTOMER: MAZEIKIAI, LITHUANIA
LOCATION MAZEIKIAI, LITHUANIA

PROCESS DATA SHEET
FIRED HEATER

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VACUUM HEATERS

NOTES: REV

(1) All data reported in this data sheet are referred to one heater only.

(2) Coke layer thickness for pressure drop calculations is assumed 3 mm.

(3) Max film temperature evaluated in fouled conditions.

(4) Distillation Data: ASTM D1160 :

REDUCED CRUDE		VB HEAVY DOESEL	
(% vol)	(°C)	(% vol)	(°C)
1.00	323	1.00	229
5.00	371	10.00	318
10.00	393	30.00	365
20.00	425	50.00	398
30.00	453	70.00	436
40.00	482	90.00	492
50.00	516	96.30	530
60.00	553		
Density at 15°C = 0.955		Density at 15°C = 0.927	

(5)

Fuel gas composition	H_2 min	H_2 average	H_2 max.
	% vol	% vol	% vol
H2	2.13	6.10	25.60
CO	0.63	0.87	0.84
CO2	0.01	0.09	0.04
N2	1.51	4.61	11.50
CH4	31.52	35.34	36.68
C2H4	3.40	8.73	13.78
C2H6	18.68	18.36	10.09
C3H6	6.62	6.74	1.02
C3H8	15.24	9.02	0.16
I-C4H10	1.92	1.10	0.04
n-C4H10	8.92	3.56	0.04
sum C4H8	5.60	2.50	0.02
I-C5H12	1.76	1.52	0.16
n-C5H12	2.02	1.46	0.03
H2S	0.04	0.00	0.00
Density at 20°C [kg/m3]	1.441	1.2013	0.73
Molecular Weight	33.96	28.40	17.47
LHV [kcal/kg]	11009	10746	9808

Additional Fuel Oil Data:	
Pour Point:	6+25°C
Coking	7+15% wt.
Solid Contaminant	0.2+1.5% wt
Carbon Residue CCR	7+19%
Water by Distillation	0.5+0.8% wt

Fuel Oil characteristics	Fuel Oil	HLC FO
SP. Gravity @ 15.6°C	1001 - 103: kg/m3	1075 kg/m3
Viscosity @ 80°C	114 -120 cSt	
Viscosity @ 100°C	No data cSt	3.795 cSt
Pour Point	6 - 25 °C	
Flash Point	110 - 150 °C	
LHV	9450-9550 kcal / kg	9200 kcal/kg
Pressure @ B.L.	7.0 bar g	
Temperature @ B.L.	120-145 °C	
Composition	wt%	
Water	0,08 - 0,5 max	
Ash	0,07 / 0,82 max	0.0645
of which FCC catalyst		0.0597
Coke		0.0048
Sulphur	2 - 2,3 max	
Carbon residue, CCR	7 - 19 max	
Asphaltens	8,7 - 13 max	
Hydrogen	No data	
Nitrogen	0.4261	
Coking	7 - 15 max	
Solid	0,2 - 1,5 max	
Vandium content, ppm	130 - 240	
Sodium content, ppm	14 - 20 max	
Nickel content, ppm	50 - 80 max	
C/H ratio	No data	
Atomizing steam Press. @ B.L.	9.0 bar g	9 barg
Atomizing steam Temp. @ B.L.	190 °C	190°C

(6) Suitable for no flow conditions.

(7) Radiant section coil consists of total 72 tubes arranged on four passes; 64 tubes horizontally disposed along heater side walls + 8 tubes horizontally disposed along heater roof.

- 64 tubes of whose: 52 tubes 168,3 mm Outside Diameter 7,11 mm average thickness + 4 tubes 219,1 mm Outside Diameter 8,18 mm average thickness + 4 tubes 273 mm Outside Diameter 9,27 mm average thickness + 4 tubes 323,8 mm Outside Diameter 10,31 mm average thickness.
- 8 tubes 168,3 mm Outside Diameter 7,11 mm average thickness.

64 tubes horizontally disposed along heater side walls are arranged on two lanes of tubes. Tubes on each pass are connected by return bends and jump-overs.
Jump-overs are made by elbows and tube stubs.
Center to Center between tubes inside radiant section shall be as follows:

Tube O.D. 168,3 mm : Center to Center 304,8 mm	Spacing Tube Center to furnace wall:	228.6 mm
Tube O.D. 219,1 mm : Center to Center 406,4 mm	Spacing Tube Center to furnace wall:	304.8 mm
Tube O.D. 273,0 mm : Center to Center 508 mm	Spacing Tube Center to furnace wall:	389 mm
Tube O.D. 323,8 mm : Center to Center 400 mm	Spacing Tube Center to furnace wall:	389 mm

Convection section shall incorporate space for the future addition of two rows.

(8) No corbels for shock tubes rows will be provided.

(9) In corrispondence of the sootblowers, the first refractory layer (front layer) shall be replaced with high density castable refractory (2081 kg/m3).

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FIRED HEATER

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VACUUM HEATERS

NOTES:

REV

(10)

Tube Diameter	Max Velocity [m/s].	Fluid Mass Velocity [kg/m2/s]
6"	1.8	1245.92
8"	32.3	706.74
10"	40.4	443.129
12"	59.5	309.745

0

(11) Fuel Efficiency has been calculated considering 12000 kg/h of Steam on SSH. 0

(12) Fuel Gas Turn Down = 0.542 Gcal/h 0

Fuel Oil Turn Down = 0.722 Gcal/h 0

(13) 450 mg/Nm3 is based on 50% Fuel Oil and 50% Fuel Gas. 0

(14) 5 mg/Nm3 + ASH in the Oil 0

(15) The draft available at common duct is 92 mmH2O. 0

(16) N° 4 Guns within the heater will be provided to burn 150 Nm3/hr maximum of polluted air (from BBF demercaptanisation unit). Guns will be in AISI 304 material. 0

Polluted Air Composition:

Nitrogen	79%
Oxigen	19%
Hydrocarbons	2%

Max Air Temperature = 80°C

Max Air Pressure = 4 barg

(17) See relevant calculation note, Document N° 30589-601-CN-0125-001 / 002 / 003.

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