

**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



Technip KTI

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 PATENTED OR PATENTABLE FEATURES DISCLOSED HEREON IS PROHIBITED

**PROCESS DATA SHEET
FIRED HEATER**

0	FOR CONSTRUCTION	TIM	MBO	MBO	PCO	05.04.2007
A	FOR APPROVAL	TIM	MBO	MBO	PCO	04.11.2007
REV.	DESCRIPTION	ISS.	CHK.	APP.	AUTH.	DATE

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

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/ hm ²												
16	AVG. RAD. SECT. FLUX DENSITY, CALCULATED : kcal/ hm ²					24522						0	
17	MAX RAD. SECT. FLUX DENSITY : kcal/ hm ²					44140						0	
18	CONV. SECT. FLUX DENSITY (BARE TUBE) : kcal/ hm ²												
19	* MAXIMUM VELOCITY: m/s					(10)					1.5	0	
20	PROCESS FLUID MASS VELOCITY : clean - fouled kg/m ² s					(10)					1150.8	0	
21	* MAXIMUM ALLOW. / CALC. INSIDE FILM TEMPERATURE : °C					--- / 476 (3)							
22	* FOULING FACTOR : m ² °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/m ³					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/m ³					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						 KR-601-1/2 VACUUM HEATERS AB MAZEIKIU NAFTA MAZEIKIAI, LITHUANIA					 Technip KTI		
PROJECT: 30589													
CUSTOMER AB MAZEIKIU NAFTA - Lithuania													
LOCATION MAZEIKIAI, LITHUANIA													
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REV.	DESCRIPTION	ISS.	CHK.	APP.	AUTH.	DATE							

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	* ALTITUDE ABOVE SEA LEVEL :		m						
20	VOLUMETRIC HEAT RELEASE (LHV) :		W/m³						
21	FUEL CHARACTERISTICS (5)								
22	* GAS TYPE: FUEL GAS - 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 : mm²/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									
38	BURNER DATA (16)								
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		0		
49	mg/Nm3		UHC : ---		PARTICULATES : (14)				
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
 Technip KTI			PLANT : VDU PLANT PROJECT N°: 30589 CUSTOMER: AB MAZEIKIU NAFTA - Lithuania LOCATION MAZEIKIAI, LITHUANIA						
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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	
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					
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	
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		
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						
 Technip KTI			PLANT : VDU PLANT PROJECT N°: 30589 CUSTOMER: AB MAZEIKIU NAFTA - Lithuania LOCATION MAZEIKIAI, LITHUANIA			
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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 THICKNESS :		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 :		160,3 / 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 minimum (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											
 Technip KTI					PLANT : VDU PLANT PROJECT N°: 30589 CUSTOMER: AB MAZEIKIU NAFTA - Lithuania LOCATION MAZEIKIAI, LITHUANIA						
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1	MECHANICAL DESIGN CONDITIONS (continued)					
2	REFRACTORY DESIGN BASIS					REV
3	AMBIENT, °C : 27 °C		WIND VELOCITY, m/s : 0		CASING TEMP., °C : 82 / 91	
4	EXPOSED VERTICAL WALLS					
5	LINING THICKNESS, mm : 190		HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C : - / 791			
6	WALL COSTRUCTION : 75 mm CASTABLE LHV 124 + 115 mm CASTABLE LHV 106 (in gunning application)					
7						
8	ANCHOR (MATERIAL AND TYPE) :		Type 304 Stainless Steel Y anchors			
9	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 5 min.		TEMPERATURE, °C : ≤82	
10	SHIELDED VERTICAL WALLS					
11	LINING THICKNESS, mm : 170		HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C : - / 710			
12	WALL COSTRUCTION : 75 mm CASTABLE LHV 124 + 95 mm CASTABLE LHV 106 (in gunning application)					
13						
14	ANCHOR (MATERIAL AND TYPE) :		Type 304 Stainless Steel Y anchors			
15	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 5 min.		TEMPERATURE, °C : ≤82	
16	ARCH					
17	LINING THICKNESS, mm : 175		HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C : - / 791			
18	WALL COSTRUCTION : 75 mm CASTABLE LHV 124 + 100 mm CASTABLE LHV 106					
19						
20	ANCHOR (MATERIAL AND TYPE) :		Type 310 Stainless Steel Y anchors			
21	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 6 min.		TEMPERATURE, °C : ≤82	
22	FLOOR					
23	LINING THICKNESS, mm : 250		HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C : - / 982			
24	FLOOR COSTRUCTION : 65 mm HDFB + 185 mm INSULATING CASTABLE LHV 1:0:6					
25						
26	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 6 min.		TEMPERATURE, °C : ≤ 91	
27	MINIMUM FLOOR ELEVATION, m : 2 min. FREE SPACING BELOW BURNER INDIVIDUAL PLENUM, m					
28	CONVECTION SECTION					
29	LINING THICKNESS, mm : 150		HOT FACE TEMPERATURE, DESIGN / CALCULATED, °C : - / 681			
30	WALL COSTRUCTION : 75 mm INSULATING CASTABLE LHV 1:2:4 (9) + 75 mm INSULATING CASTABLE LHV 1:0:6					
31						
32	ANCHOR (MATERIAL AND TYPE) :		SS 304 "Y" ANCHORS			
33	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 5 min.		TEMPERATURE, °C : ≤82	
34	INTERNAL WALL					
35	TYPE : FLUE GAS TUNNELS		MATERIAL :			
36	DIMENSIONS, HEIGHT / WIDTH, mm :		ACCORDING TO KTI Std.			
37	BREECHING (FLUE GAS)					
38	CASING MATERIAL : Carbon Steel		THICKNESS, mm : 5 min.		TEMPERATURE, °C : ≤82	
39	LINING MATERIAL : INSULATING CASTABLE LHV 1:2:4		THICKNESS, mm : 75			
40	ANCHOR (MATERIAL AND TYPE) : CS "V" ANCHORS					
41	DUCTS					
42						
43	LOCATION :					
44	NET FREE AREA : (21) m²					
45	CASING MATERIAL :					
46	CASING THICKNESS : mm					
47	LINING : INTERNAL / EXTERNAL					
48	THICKNESS : mm					
49	MATERIAL :					
50	ANCHOR (MATERIAL AND TYPE) :					
51	CASING TEMPERATURE : °C					
52	PLENUM CHAMBER (AIR)					
53	CASING MATERIAL : N.A		THICKNESS, mm :		SIZE, m² :	
54	LINING MATERIAL :		THICKNESS, mm :			
55	ANCHOR (MATERIAL AND TYPE) :					
56	NOTE :					
57						
58						
59						



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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
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1	MECHANICAL DESIGN CONDITIONS (continued)					
2	STACK or STACK STUB					REV
3	NUMBER :	none	SELF_SUPPORTED or GUYED :	SELF SUPP. LOCATION :		
4	CASING MATERIAL :	Carbon Steel	THICKNESS, mm :	MINIMUM THICKNESS, mm :		
5	INSIDE METAL DIAMETER, m :		HEIGHT ABOVE GRADE, m :	STACK LENGTH, m :		
6	LINING MATERIAL :	INSULATING CASTABLE		THICKNESS, mm :		
7	ANCHOR (MATERIAL AND TYPE) :					
8	EXTENT OF LINING :		INTERNAL or EXTERNAL :			
9	DESIGN FLUE GAS VELOCITY, m/s :		FLUE GAS TEMPERATURE, °C :			
10	DAMPERS					
11	NUMBER / LOCATION :	3 - INSIDE TAKE OFF TO COMMON DUCT				
12	TYPE (CONTROL, TIGHT SHUT_OFF, ETC.) :	CONTROL				
13	MATERIAL, BLADE :	CS / AISI 304 (d)				
14	SHAFT :					
15	MULTIPLE / SINGLE LEAF :	2 SINGLE / 1 MULTIPLE				
16	PROVISION FOR OPERATION (MANUAL or AUTOMATIC) :	2 MANUAL / 1 AUTOMATIC				
17	TYPE OF OPERATOR (CABLE or PNEUMATIC) :	LOCAL HANDLE / PNEUMATIC				
18	MISCELLANEOUS					
19	PLATFORMS			EXISTINGS		
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28	DOORS			EXISTINGS		
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37	INSTRUMENT CONNECTIONS			EXISTINGS		
38		No.	SIZE	TYPE	RATING	
39	OXYGEN / CO ANALYZER	1	DN 100		150 RF	
40	PT	2				
41	TT	5				
42	SKIN TERMOCOUPLE	8				
43	DRAFT GAUGE	4	DN 20			
44						
45						
46						
47						
48						
49						
50	PAINTING REQUIREMENTS :					
51	INTERNAL COATING : NO					
52	GALVANIZING REQUIREMENTS :					
53	ARE PAINTER 'S TROLLEY AND RAIL INCLUDED? : NO					
54	SPECIAL EQUIPMENTS : SOOTBLOWERS : YES, Number 16 Retractable Sootblowers Disposed on TWO Lanes.					
55	AIR PREHEATERS : NO					
56	FAN(S) : NO					
57	OTHER : NO					
58	NOTES :					
59	(d) Manual damper material = Carbon Steel					
60	Automatic damper material = AISI 304					
61						
62						
63						

 Technip KTI	PLANT : 30589 PROJECT N°: AB MAZEIKIU NAFTA - Lithuania CUSTOMER: MAZEIKIAI, LITHUANIA LOCATION MAZEIKIAI, LITHUANIA					
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Project	Unit	Doc. Type	Material Code	Serial N°	Rev	Sheet

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VACUUM HEATERS

NOTES:

(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 H₂ min H₂ average H₂ 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

Fuel Oil characteristics

SP. Gravity @ 15.6°C

Viscosity @ 80°C

Viscosity @ 100°C

Pour Point

Flash Point

LHV

Pressure @ B.L.

Temperature @ B.L.

Composition

Water

Ash

of which FCC catalyst

Coke

Sulphur

Carbon residue, CCR

Asphaltenes

Hydrogen

Nitrogen

Coking

Solid

Vandium content, ppm

Sodium content, ppm

Nickel content, ppm

C/H ratio

Atomizing steam Press. @ B.L.

Atomizing steam Temp. @ B.L.

Fuel Oil

1001 - 103: kg/m³

114 - 120 cSt

No data cSt

6 - 25 °C

110 - 150 °C

9450-9550 kcal / kg

7.0 bar g

120-145 °C

wt%

0,08 - 0,5 max

0,07 / 0,82 max

0,0597

0,0048

2 - 2,3 max

7 - 19 max

8,7 - 13 max

No data

0.4261

7 - 15 max

0,2 - 1,5 max

130 - 240

14 - 20 max

50 - 80 max

No data

9.0 bar g

190 °C

9 barg

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



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PROCESS DATA SHEET FIRED HEATER

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VACUUM HEATERS					
1	NOTES:				REV
2	(10)	Tube Diameter	Max Velocity (m/s).	Fluid Mass Velocity [kg/m2/s]	0
3		6"	1.8	1245.92	
4		8"	32.3	705.74	
5		10"	40.4	443.129	
6		12"	59.5	309.745	
7					
8	(11) Fuel Efficiency has been calculated considering 12000 kg/h of Steam on SSH.				0
9					
10	(12) Fuel Gas Turn Down = 0.542 Gcal/h				0
11	Fuel Oil Turn Down = 0.722 Gcal/h				0
12					
13	(13) 450 mg/Nm3 is based on 50% Fuel Oil and 50% Fuel Gas.				0
14					
15	(14) 5 mg/Nm3 + ASH in the Oil				0
16					
17	(15) The draft available at common duct is 92 mmH2O.				0
18					
19	(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
20	Polluted Air Composition:		Nitrogen	79%	
21			Oxygen	19%	Max Air Temperature = 80°C
22			Hydrocarbons	2%	Max Air Pressure = 4 barg
23					
24	(17) See relevant calculation note, Document N° 30589-601-CN-0125-001 / 002 / 003.				
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PROCESS DATA SHEET FIRED HEATER

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