

Technological waste heat recovery boiler (HRB) in Clause process

Data Sheet (technological part)

1	Process / Unit	Clause process, Sulfur recovery unit in oil refinery		
2	Technological number	20KU-2		
3	Existing WHRB type	G105/300BC (Г 105/300 БЦ)		
4	Number or required	1		
5	Boiler purpose	HRB in Clause process		
6	HRB construction feature	Existing HRB consist – two boiler water evaporating drums and steam separation drum; Process gas inside tubes, boiler water outside tubes, stream position – process gas inlet – left side, outlet – right side		
7	Process design and operating conditions			
8	Steam side:			
9	Steam capacity (design)	t/h	10	HRB manufacturer can change this value according calculated heat demand
10	Pressure - design - operating (average)	barg	4 3,7	HRB manufacturer must increase pressure if HRB construction (nozzle, support) will not change
11	Steam temperature - design - operating	°C	152 150	
12	Steam quality	-	Dry (99 %) saturated steam	Steam seperator or other type steam dryer must be installed
13	Heating surface (existing design)	m²	405 (first drum 105, second 300)	
14	Process gas side:			
15	Process gas flow rate inlet to combustion chamber (design/operating)	nm³/h	3200 / 2500	3200 nm³/h is desirable if HRB construction (nozzle, support) will not change.
16	Process gas temperature inlet to combustion chamber (average operating)	° C	98	
17	Technological gas pressure inlet to combustion chamber (average operating)	barg	0,225	
18	Air (for combustion) flow rate inlet to combustion chamber (design/operating)	nm³/h	7300 / 6040	
19	Air temperature inlet to combustion chamber (average operating)	° C	74	
20	Air pressure inlet to combustion chamber (average operating)	barg	0,21	
21	Process gas flow rate inlet to HRB (design)	nm³/h	10500	
22	Process gas temperature inlet to WHRB (design/operating)	° C	1400 /1190	
23	Process gas temperature outlet from HRB (design/operating)	° C	160 /148	
24	Max process gas pressure drop(design) - combustion chamber - HRB	mbar mbar	53,41 14,7	
25	Process gas mass velocity	kg/m²s	10-25	

26	Process gas composition (existing average) H ₂ S CO ₂ C ₂ H ₆ C ₃ H ₈ C ₄ H ₁₀ C ₅ H ₁₂ C ₆ H ₁₄ NH ₃	mol % mol % mol % mol % mol % mol % mol % mol %	92,2 7,71 0,01 0.034 0.002 0.004 0.015 0,016	
27	Sulfur liquid from HRB	t/h	3,63	
28	Boiler feed water requirement			
29	Temperature: Design Operating (average)	° C ° C	130 100	
30	Boiler feed water analyses (available) pH Fe Total hardness O ₂	- µg/l µg-ekv/l µg/l	8,5 - 9,5 <150 <20 < 50	
31	Boiler water analyzes (existing)			Boiler manufacturer can change this value according EN requirements
32	Conductivity	µs/cm	<1500	
33	PH	-	>9,3	
34	Relative alkalinity	%	<50	
35	SiO ₂	mg/l	<80	
36	Saturated steam analyzes (existing)			
37	Chloride	µg/l	<500	HRB manufacturer can change this value to other wich indicating wet in the saturated steam
38	Design conditions			
39	Boiler installation		Outdoor	
40	Ambient temperature min/max	° C	-36/+33	
41	Relative Humidity normal/max	%	63/89	
42	Barometric pressure	mmHg	760	
43	Other (seismic zone, wind load, level above sea and etc.		See "Technical requirements. General. OL-TR-GR-000	
44	Process description:			
45	Process gas and air is supplying to combustion chamber for combustion. After combustion gas is supplying to HRB for gas cooling and sulfur condensing. Liquide sulfur is discharged from middle and outlet chambers. Non condensible gas from HRB outlet chamber is discharged to Clause process.			
46	Special requirements			
	1. Pressure equipment must be marked CE.			
	2. HRB must be produced according	EN, ISO standards ASME/ANSI Codes PED 97/23 EC 93/465/EEC OL-TR-MHR-002		
	3. Heat insulation	HRB manufacturer must indicate heat insulation thickness for all parts of the HRB. Shall be installed special ancors for heat insulation.		
	4. Location and diameters	Location and diameters of combustion chamber connection and outlet piping remain the same.		
	5. Level gauge	The manufacturer must provide water level gauge glass to measure the boiler water level in the boiler drum		
	6. Design temperature	The design temperature of the boiler drum and tubes is 250°C		
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