



Hofung Sulphur  
Technology

**DATA SHEET**  
**SHELL-TUBE HEAT EXCHANGERS**

Project No. : HF220803

**Final Sulfur Condenser**

**E-0504**

Rev.	Issue Data	Revision Description	Prepared by	Checked by	Approved by	Client approval
1	29/06/2023	Final PDP				
0	24/03/2023	For PDP				

Client : Jiangsu Sopo (Group) Co., Ltd.

Plant : Sulfur Recovery Unit

Location : Zhenjiang, Jiangsu, P.R. China

Equipment : Final Sulfur Condenser	Sheet 1 of 7
	Equipment No. : E-0504
	Data No. : HF220803-P07.2-EDS-11



**GENERAL DATA**

Number required	: One	Case identification	: Design
Shell-and-Tube heat exchanger	: Horizontal Shell	Calculation type	: Design
TEMA type	: Fixed Tube Sheet	Duty	: 163 kW
Mech. cleaning required		Overcapacity on	
- shell side	: No	- duty	: - %
- tube side	: Yes	- surface	: - %

**PROCESS DATA**

Location	Shell side		Tube side		Unit
	BFW / Steam		Process gas / Liquid sulfur		
Flow rate - total	278 1)		3856		kg/h
- liquid in / out	100	0	0	1.08	wt%
- vapour in / out	0	100	100	98.92 2)	wt%
Temperature - in / out	120	120	257	135 3)	°C
Pressure at inlet	1.0		0.19		bar g
Pressure drop - calculated / allowed	Negl.	Negl.	0.03	0.04	bar
Fouling resistance	0.00017		0.00090		m <sup>2</sup> .K/W
Average wall temperature	122		124		°C
Vapour properties	in	out	in	out	
- density			0.74	0.92	kg/m <sup>3</sup>
- viscosity			0.024	0.019	cp
- specific heat			1.264	1.23	kJ/kg.K
- therm. conductivity			0.045	0.034	W/m.K
Liquid properties	in	out	in	out	
- density				1791	kg/m <sup>3</sup>
- viscosity				9.8	cp
- specific heat				1.0	kJ/kg.K
- therm. conductivity				0.134	W/m.K
Total heat duty	: 163	kW	Total surface per unit	:	m <sup>2</sup>
Effective temperature difference	: 55.1	°C	Effective surface per unit	:	m <sup>2</sup>
Overall coefficient clean	:	W/m <sup>2</sup> .K	Required surface per unit	: 42.4	m <sup>2</sup>
Overall coefficient fouled	: 69.6 4)	W/m <sup>2</sup> .K	Number of tubes submerged	: 103	
Total number of shells per unit	: One				
Connected - in series	: -				
- in parallel	: -				

**NOTES**

- 1) BFW / steam data refer to total duty of WHB after subtraction of heat losses.
- 2) Including 0.09 wt% of sulfur mist.
- 3) Liquid sulfur is cooled more than process gas. And the temperature of liquid sulfur is 130 °C.
- 4) Empirical value.

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Sheet 2 of 7

Equipment No. : E-0504

Data No. : HF220803-P07.2-EDS-11



**CONSTRUCTION DATA PER SHELL**

Shell inside diameter	: 950	mm	Num. of tube holes per tubesheet	: 103	5)
Bundle diameter outer tube limit	: 1)	mm	Type of tubes	: Bare	
Number of passes shell side	: One		Tube OD (plain end)	: 32	mm
Number of passes tube side	: One		Tube wall thickness	: 3	mm
Baffle type	: Support		Tube length	: 4200	mm
Baffle cut	:	%	Tube pitch	: 40	mm
Baffle orientation	: Vertical		Tube lay-out angle	: 60	°
Tube attachment	: Strength welded		Baffle spacing central	:	mm
Impingement protection below inlet nozzle			Baffle spacing inlet/outlet	:	mm
	: No		Number of cross passes	:	

**MAIN CONSTRUCTION MATERIAL 2)**

Part	Material	Part	Material
Shell	Carbon Steel	Channel flange - shell side	
Channel - shell	Carbon Steel	- cover side	
- head	Carbon Steel	Nozzles - shell side	Carbon Steel
Fixed tube sheet	Carbon Steel	- tube side	Carbon Steel
Tubes	Carbon Steel	Cladding / lining - shell side	
Shell flange - channel side		- tube side	- / see sheet 6
Baffles and support plates	Carbon Steel	- tube sheets	

**DESIGN DATA**

	Shell side	Tube side	Tube sheets	Unit
Cladding / lining		See sheet 6		
Corrosion allowance	1.5	3.0 3)	4.5 (3.0 + 1.5)	mm
Design pressure	11 / FV	3.0		bar g
Design temperature	200	220 4)		°C
Insulation required	Against heat loss	Against heat loss		

**NOTES**

- 1) See sheet 5 for sketch.
- 2) For additional material requirements see 'Material Specification' doc.no. : HF220803-P04-MLS.
- 3) Except for tubes.
- 4) Design temperature of inlet channel: 370 °C.
- 5) At least 2 tubes at bottom tube row. More are preferred.

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Sheet 3 of 7

Equipment No. : E-0504

Data No. : HF220803-P07.2-EDS-11



**NOZZLES DATA**

Mark	Number	Nom. Diameter	Service	Remarks
N1	1	250	Gas inlet	
N2	1	250	Gas outlet	
N3	1	80 x 100	Sulfur outlet	1)
N4	1	50	BFW inlet	2)
N5	1	50	Steam outlet	
N6	1	50	Condensate return	
N7	2	3)	Relief valve	
N8	1	50 x 20	Vent	
N9	1	50	Blow down / drain	4)
N10	1	50	Steam inlet	5)

**INSTRUMENT**

K1	2	3)	LC (H/L)	
K2	2	3)	LG	
K3	2	3)	LI (LL)	
K4	1	3)	TI(H)	
K5	1	3)	Pressure tap	6)

**MANHOLES ETC.**

A1	1	600	Manhole	Blinded

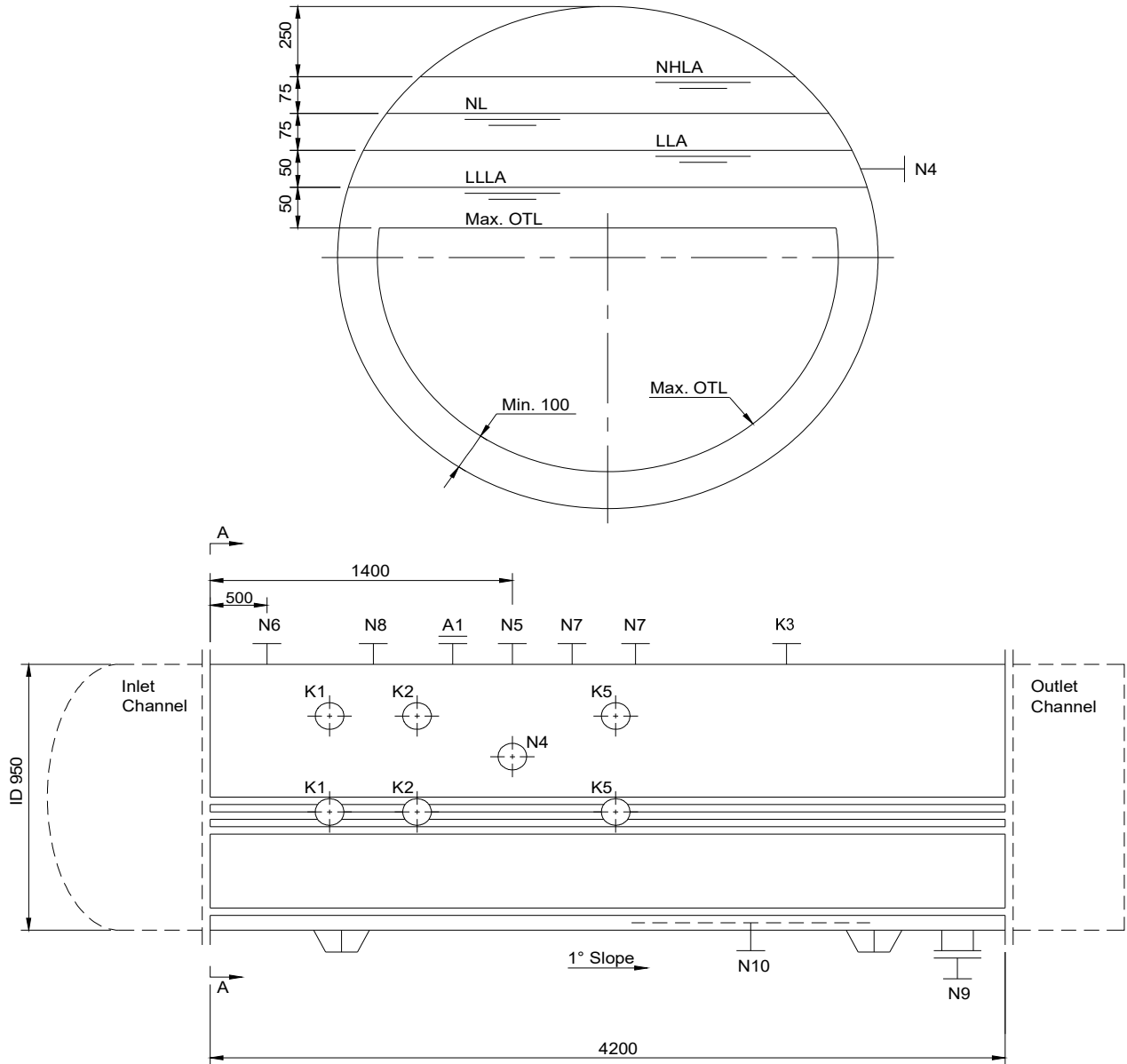
**NOTES**

- 1) Steam jacketed.
- 2) With perforated distributor pipe (design by manufacturer).
- 3) To be determined during detailed engineering.
- 4) On DN150 pad type nozzle.
- 5) With perforated distributor pipe (design by manufacturer). For heating up only.
- 6) Located above centerline of inlet channel.

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Sheet 4 of 7  
Equipment No. : E-0504  
Data No. : HF220803-P07.2-EDS-11

SECTION A-A

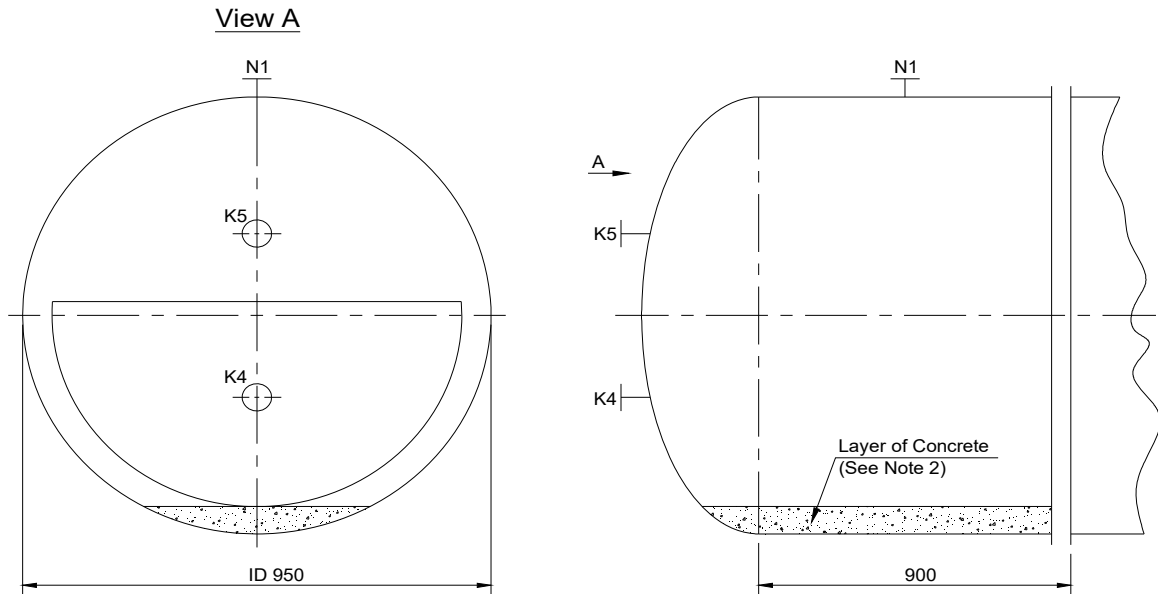


Hold for nozzle position.

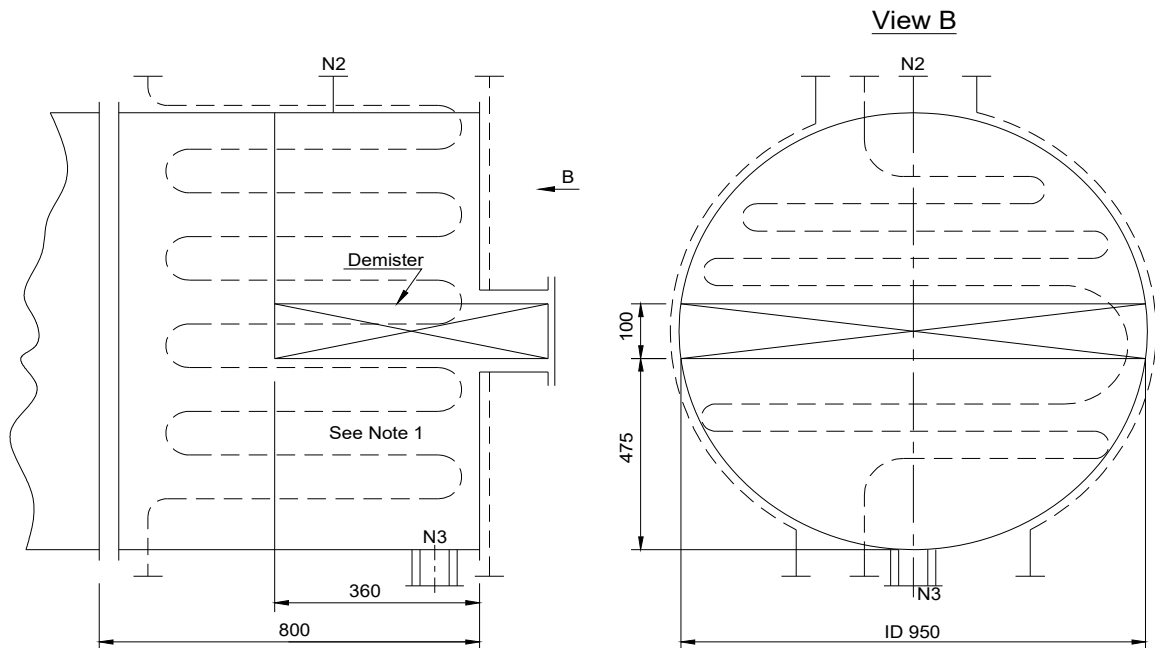
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Sheet	5	of	7
Equipment No.	: E-0504		
Data No.	: HF220803-P07.2-EDS-11		

Inlet Channel



Outlet Channel



Hold for nozzle position.

**NOTES**

- 1) Outlet channel to be provided with 1" steam tracing, 300 mm pitch, tracing by manufacturer.
- 2) Layer of concrete to be flush with inside of lowest tubes.
- 3) Sulfur outlet N3 shall be at the bottom of outlet channel close to the end plate.
- 4) Demister removable from drawer.

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Sheet 6 of 7

Equipment No. : E-0504

Data No. : HF220803-P07.2-EDS-11



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**DATA SHEET**  
**SHELL-TUBE HEAT EXCHANGERS**  
(WIRE MESH DEMISTERS)

Project No. : HF220803

**GENERAL**

Drawing	:	
Inside diameter	mm	:
All parts of demister to pass through Drawer	:	See sketch on sheet 6

**WIRE MAT (woven wire mesh filling)**

Location		Outlet Channel	
Number required		One	
Demister diameter	mm	Refer to sheet 6	
Wire material		AISI 316	
Type		York Mesh Style 709	
Total mat thickness	mm	100	
Wire thickness	mm	By Manufacturer	
Free volume of mat	%	By Manufacturer	
Wire surface area	m <sup>2</sup> /m <sup>3</sup>	By Manufacturer	

**WOVEN WIRE MESH SCREENS**

Material		AISI 316	
Upper/lower woven wire mesh			

**GRIDS (upper and lower grating)**

Grids to be supplied		Yes	
Material		Carbon Steel	
Free area	m <sup>2</sup>	Min. 97%	
Design acc. to Manuf. standards			
Design acc. to drawing			

**REFERENCES AND NOTES**

Engineered by :  Hofung Sulphur Technology	Sheet	7	of	7
	Equipment No.	:	E-0504	
	Data No.	:	HF220803-P07.2-EDS-11	