



**OIL & GAS DEVELOPMENT COMPANY LIMITED**  
**KPD-TAY PLANT.**

**Phone#022-2789200 & Fax#022-2761410**



**Annexure-A**

## **Schedule of Requirement**

**Tender Enquiry No. TE/MECH/WT/KPD-0002/EA-4401/2022**

**“Web Tender for Supply and installation of Sleeves at 552 inlet tube ends of Lean Amine Air Cooler (EA-4401) Installed at Amine Unit-01 of KPD-TAY Plant”**

<b>Sr #</b>	<b>Description</b>	<b>QTY</b>	<b>UOM</b>
1	Supply and installation of seamless Stainless steel 316L Sleeve (CPI Shield).Size: minimum 8”length, thickness: 0.020” to 0.024”.	552	No

### **TERMS AND CONDITIONS (TECHNICAL):-**

- a. The sleeve should be fit in tube having 1”ODX 0.1181”wall thickness. The detail specifications / Drawing dimensions of existing tube and exchanger are attached.
- b. Supplier shall be responsible for verifying provided Heat Exchanger drawings as per site so that Sleeves can be manufactured accordingly.
- c. The material of sleeves should be as per ASMESA 249 Stainless steel 316L specification.
- d. Material of sleeve should be resistant to any type of corrosion when installed in carbon steel tubes
- e. The sleeve should be able to work at minimum pressure of 97.5 psi and at minimum temperature 200°F with working fluid Hydrocarbon Lean Amine.
- f. Dimension of sleeve should be minimum 8” in length to fit in tube having 1” OD x 0.1181” wall thickness Carbon Steel material having Aluminum fins for 552 inlet tube ends of tube bundles of Lean Amine Air Cooler (EA-4401)
- g. The installed sleeve should be capable of providing sealing to at least 4 times of design pressure for tubes. Test certificate should be provided prior to delivery.
- h. Single sleeve piece should be capable of bearing hydro test pressure of 97.5 psi. Third party hydro test certificate to be provided before delivery.
- i. Sleeve material should be of foreign well known manufacturer having experience of at least 10 years, MTC of material must be provided before Delivery.
- j. Bidder shall prepare his own drawings for fabrication & same shall be handed over to OGDCL along with delivery of Sleeves.
- k. Supervision of supplier will be required during installation.
- l. Bidder should submit at least 03 work orders of similar nature job along with satisfactory work completion certificate.
- m. The supplier shall be responsible for safe transportation of the sleeves to the KPD-TAY Plant.
- n. In case of any non-conformance observed during inspection, Supplier shall immediately rectify / replace the same. Any delay in rectification will be liable to LDs as per OGDCL standard tender document.
- o. Delivery of material is to be completed in 90 days from the date of receipt of firm purchase order.

- p. The master set of tender documents (Local) available on OGDCL website (www.ogdcl.com) is the integral part of this tender.
- q. Installation of sleeves along with all required tools will be the responsibility of supplier and will complete the job in 60 days after delivery of material.
- r. All tools required for installation and testing of sleeves will be responsibility of supplier
- s. Removal of plugs and cleaning of tubes will be the responsibility of supplier.
- t. Hydro test will be responsibility of supplier / Contractor.
- u. In case of any damage to sleeve during installation and hydro testing the contractor will be responsible to provide and replace with new sleeve on free of cost /without additional charges.

### **OGDCL RESPONSIBILITIES:**

OGDCL will provide the following facilities during installation & hydro testing of tube bundles at KPD-TAY Plant.

- i. Isolation of the existing heat exchanger & purging.
- ii. Provide electricity & demineralized water for hydro testing of tube bundles.
- iii. Provide gaskets and plugs for Hydro testing of tubes.
- iv. All spiral wound gaskets for isolation & hydro testing of heat exchanger shall be arranged by OGDCL.
- v. Boarding and lodging of contractor staff.

### **ANNEXURE-A-1**

### **GENERAL TERMS AND CONDITIONS:**

- A. BIDS MUST BE SUBMITTED UNDER **SINGLE STAGE TWO ENVELOPES BIDDING SYSTEM** i.e. TECHNICAL & FINANCIAL BID SEPARATELY ON DUE DATE.
- B. FINANCIAL BIDS OF ONLY TECHNICALLY RESPONSIVE BIDDERS WILL BE OPENED PUBLICLY.
- C. AFTER TENDER OPENING "TECHNICAL BIDS" WILL BE REVIEWED. THE BIDS WILL BE BROUGHT TECHNICALLY AT PAR BY SEEKING CLARIFICATIONS. THE BIDDERS WILL **NOT** BE ASKED FOR ANY PRICE CHANGE IN THEIR FINANCIAL BIDS DUE TO CERTAIN CLARIFICATIONS AND SUBSEQUENT CHANGE IN THEIR TECHNICAL PROPOSALS. THE BIDDERS WILL **NOT** BE ALLOWED TO SUBMIT SUPPLEMENTARY PRICE PROPOSALS IN A SEPARATE SEALED ENVELOPE TO MAKE IT A PART OF THE ALREADY SUBMITTED UNOPENED FINANCIAL BIDS AND TO ADJUST THEIR QUOTED PRICE SUBSEQUENTLY AFFECTED DUE TO CHANGE IN TECHNICAL PROPOSALS.
- D. SEALED FINANCIAL BIDS OF TECHNICALLY NON-RESPONSIVE BIDDERS WILL BE RETURNED UN-OPENED.
- E. OGDCL RESERVES THE RIGHT TO REJECT ANY OR ALL THE BIDS WITHOUT ASSIGNING ANY REASON.
- F. PRICES MUST BE QUOTED IN PKR INCLUSIVE OF ALL TAXES AND DUTIES, INDICATING UNIT PRICE AND TOTAL BID PRICES. GST MUST BE QUOTED SEPARATELY ALONG WITH COPY OF GST CERTIFICATE.
- G. QUOTED PRICES SHALL BE VALID FOR **90 DAYS** FROM THE OPENING DATE OF THE TECHNICAL BID.
- H. OGDCL RESERVES THE RIGHT TO EVALUATE THE BID(S) EITHER ITEM-WISE OR FULL PASKAGE BASIS WITHOUT ASSIGNING ANY REASON. TO QOUTE COMPETITIVE PRICES FOR ALL OR ANY ITEMS ENABLE COMPANY TO DECIDE PURCHASE.
- I. BIDDERS TO SUBMIT THEIR COMPANY PROFILES, EXPERIENCE OF SIMILAR SUPPLIES IN PAKISTAN ALONG WITH TECHNICAL BIDS.

	<b>Project No.</b>	
	<b>Document No.</b>	A44-01-PRO-DAS-06

**Datasheet for Lean Amine Air Cooler**

**EA-4401 / EA-5401**

**AS-BUILT**

0	11-08-2015	AS-BUILT	WJH	ZY	SQ	GJF
0	23-04-2014	Approved	WJH	ZY	SQ	GJF
E	08-04-2014	For Approval	WJH	ZY	SQ	GJF
<b>Rev.</b>	<b>Date</b>	<b>Description</b>	<b>Prepared by</b>	<b>Checked by</b>	<b>Reviewed by</b>	<b>Approved by</b>

[REDACTED]		[REDACTED]			[REDACTED]		[REDACTED]		
					Document No.		A44-01-PRO-DAS-06		
Doc. Name		Datasheet for Lean Amine Air Cooler			Unit	44/54	Sheet	1 of 1	
Client: OIL & GAS DEVELOPMENT COMPANY LTD.		Unit: 44 (Train-1)/54 (Train-2)							
Plant: Amine Sweetening Plant		No. of Unit: 2							
Req. No.:		Order No.:							
Bid:		Job No. : 165-4							
Bid Dwg. No.:		Model No.:							
1	Equipment Tag No.	EA-4401 / EA-5401		Manufacturer	Sichuan Jianyang Air Cooler Manufacturing Co., Ltd.				
2	Type forced draft	Bay Width/Length, ft.	19.685x28.796	Sq. ft/Unit (Bare)	15988.9	(Finned)	366756.3		
3	Bays per Unit 4	Bundles per Bay	2	Service	1				
<b>PERFORMANCE OF ONE UNIT</b>									
5	Operating Conditions		<b>TUBE SIDE</b>			<b>AIR SIDE</b>			
6	Fluid Circulated		<b>Hydrocarbon</b>			Flow, lb/hr	5291006 ALTITUDE., ft 69		
7			<b>Lean Amine</b>			Des. Temp., °F: In	118 Out 140.52		
8	Total Flow	lb/hr	674500 ×1.1			Ambient Temp, °F	36~118 Static Press., psi 0.034		
9	Vapor (In/Out)	lb/hr	0	0	Air flow Rate/FAN, ACFM 163176.5				
10	Liquid	lb/hr	674500 ×1.1		<b>MECHANICAL EQUIPMENT</b>				
11	Steam	lb/hr	0	0	Fan Manufacturer/Model	Cofimco/3600-4-24L/45UT			
12	Water	lb/hr	0	0	No. per Bay	2 Diameter, ft 11.811			
13	Density (Vapor/Liquid)	lb/ft3	62.57	63.77	No. Blades	4 Material aluminum alloy			
14	Mol. Wt., (Vapor/Liquid)		29.17	29.17	HP/Fan	32.18 Hub Material forged CS + Galvanized			
15	Thermal Cond. (Vapor/Liquid)	Btu/hr-ft-°F	0.233	0.221	RPM	300 Auto/Man Pitch 2.02			
16	Latent Heat (Vapor/Liquid)	Btu/lb			Pitch Min./Max. W/Air Fail				
17	Viscosity (Vapor/Liquid)	cP	1.335	2.5	Driver Model No.	M2JA 225M6A BP /M2JA 225M6A			
18	Specific Heat (Vapor/Liquid)	Btu/lb-°F	0.88	0.85	Manufacture	ABB Type			
19	Operating Temperature	°F	174.6 130		HP Each	40.23 RPM 980			
20	Dew Point Temperature	°F				Volts/pH/Hz	400/3/50 Enclosure IP55 EX d IIBT4		
21	Bubble Point Temperature	°F				Variable Speed	Yes 2 Speed		
22	Operating Pressure	psig	50		Fan Noise Level (Allow/Calc) dB(A)@ft 85/82.1db(a)@1m				
23	Fluid Velocity	ft/s	2.66			Speed Reducer Type			
24	Pressure Drop Allowable	psi	5			Manufactur	Model		
25	Pressure Drop Calculated	psi	4.14			HP Rating	Speed Ratio		
26	Atmospheric Pressure	psia	14.52			Support Type			
27	Fauling Factor	hr-ft2- F/Btu	0.002			Service Factor	Frame		
28	Heat Exchanged	MMBtu/hr	26.02 × 1.1			Insulation F			
29	EMTD	°F	20.94						
30	Heat Release Curve						Clean	Dirty	Service
31						Bare Tube	113.36		85.48
32						Finned Tube	4.94	3.79	3.73
<b>CONSTRUCTION</b>									
34	Tube Design Pressure, psig	75	Tube Bundle Size (ft) 9.449x28.796		<b>TUBES (per Bundle)</b>				
35	Test Pressure, psig	97.5	Tube Rows 6		Material: Carbon Steel				
36	Design Temp., °F	200			OD, inch	1	Thk., inch	0.1181	
37	Source Service		Corr./Eros. Due to		No.	276	Length, inch	326.77	
38	Wind Velocity, mph	100 (max.)	Mounted(PR/Grade)		Pitch (in)	2.4016 / 2.1139			
39	Design Code (ASME Sec VIII Div)	YES	Prov. Of		Fin Type	L-type tension Thk., inch 0.0157			
40	Code Symbol Req'd.	YES, U-Stamped	TEMA Class N/A		Fin OD, inch	2.2441 Material Aluminum 3003			
41	Other Specs.		API 661 YES		Fin Pitch, No./incl	11.02			
42	Seismic Zone 2A of Uniform Building Code- UBC-1997		Top/Btm. Access						
<b>TUBE BUNDLE (per Bay)</b>					<b>ACCESSORIES</b>				
44	Size, ft	9.449x28.796		No.	2		Bug Screens	Yes	Hail Screens No
45	No. Tube Rows	6		Frame			Auto Louvres	--	Turbulators No
46							Manual Louvres	Yes	Winterize No
<b>HEADER</b>					Temp. Controllers Galvanizing				
48	Type Plug	Corr. Allowance (in) 3 mm		Recirculation Type		Handrail Yes			
49	Material	CS + Galvanized		Plugs		Vibration Switch		Yes	Fan Guard Yes
50	Pipe	Nozzles		Steam Coil Self		No Ladders/Walkways Yes			
51	Gaskets	Slope (in/ft)		Draining Top/Btm		Yes Primer Yes			
52	No. Passes	6		Stress Relief/Radiography Area contact with amine.		Access Primer		Yes	Finish
53	Stock thickness (in)			Tube Hole		Shipping Area 19.685x28.796 ft <sup>2</sup> (per Bay)			
54	Slope			Total Shipping(lb)		291596.6		Bundle wt. (lb) 18099	
<b>STRUCTURE</b>					<b>NOTES</b>				
CS + Galvanized or Sand Blast + Coated (as per Tender Spec. 165-4-SPM-058, Rev.2)					1- Vibration switch on motor is to stop motor on high high vibration.				
<b>NOZZLE SCHEDULE</b>					2- Full Radiography and Joint Efficiency of 100 % is required.				
58	Mark	Size	Rating	Facing	3- The selection of fans has been optimized by the manufacturer.				
59	IN	8"	150#	RF	Lean Amine				
60	OUT	8"	150#	RF	Lean Amine				

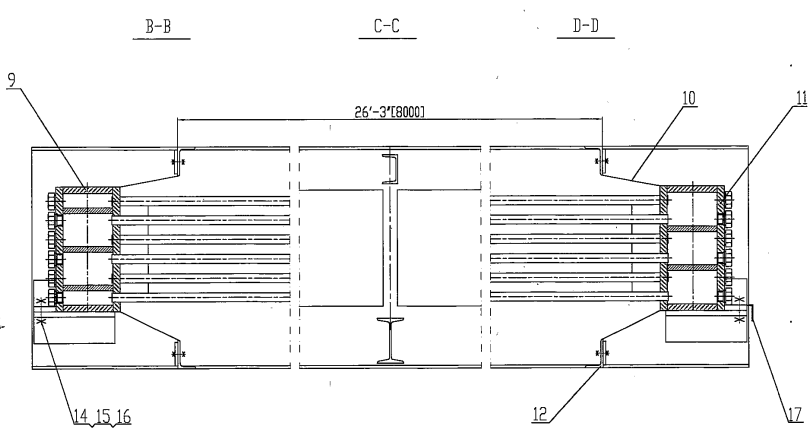
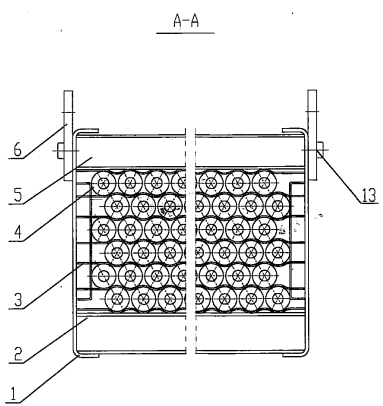
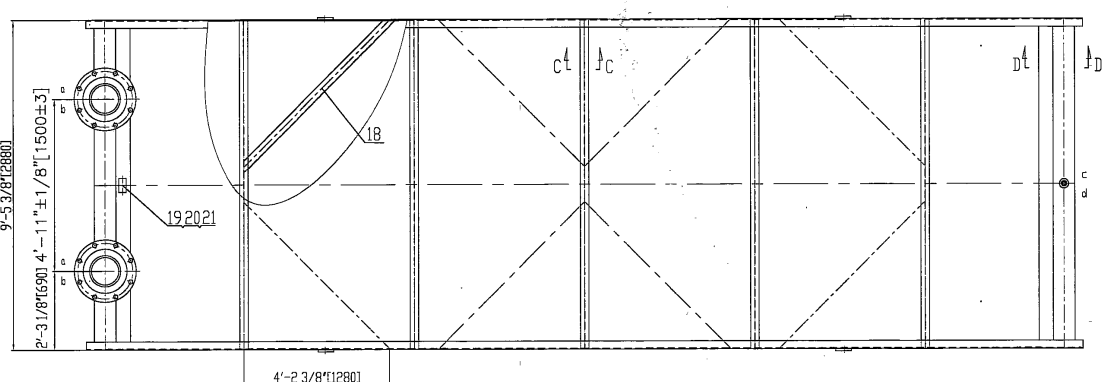
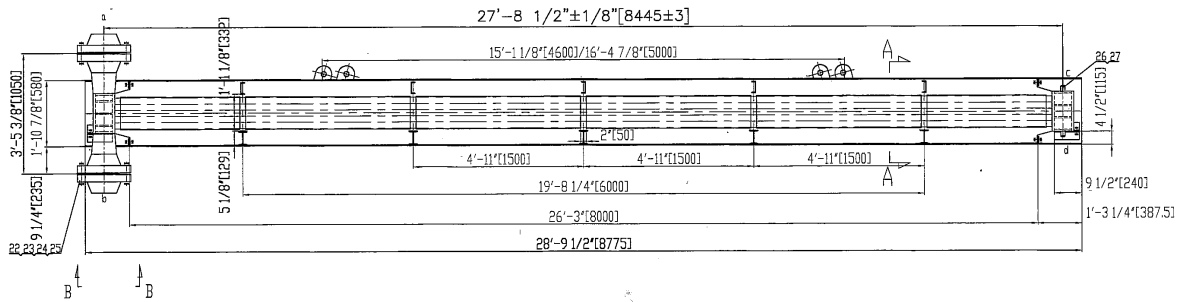


Diagram for welding of the heat exchange tube and the tube plate

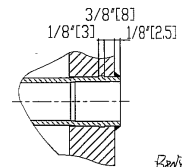
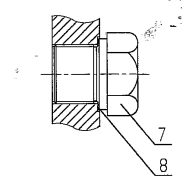


Diagram for connection of the plug and the plug plate



Building standards and specifications		ASME VIII-1 2003 + API 661 06 ed.	
medium	Lean Amine	Special Environment	Corrosion, nonlethal
Operating Pressure	psi 50	design pressure	psi 75
Operating Temperature	F 174.6/130	design temperature	F 200
Minimum Operating Pressure	psi 75	psi @ 200 F	NM
joint efficiency (L <sub>y</sub> /S <sub>y</sub> )	emp. 507/eb. 0.72/1.0	Corrosion allowance	in 0.0000 (base tube & nozzle)
tube rows	6	surface/base tube	ft <sup>2</sup> 1991
tube passes	VI	surface/fining	ft <sup>2</sup> 46597
hydrostatic test W/F	F 39.2-122	hydrostatic test pressure	psi 97.5
NDE REQ.	SEE TECHNICAL REQ.	impact test requirements	not need
heat treatment regime	need	Surface treatment requirement	Acc. customer specification
NB register	not need	volun	ft <sup>3</sup> 32.5
ASME stamp	need	weight	lb 20571

list of nozzles

Symbol	Name	nominal diameter	pressure rating	standard for connection	flange	REMARKS
a	medium inlet	8"	class150	ASME B16.5-2009	WN/RF	
b	medium outlet	8"	class150	ASME B16.5-2009	WN/RF	
c	vent	RC3/4"	class150		thread	plug
d	drain point	RC3/4"	class150		thread	plug

Technical Requirements

- 1) The ASME SA516 Gr 70 materials for fabrication of channels shall comply with the provisions stated in ASME SA516 and shall be used in the as-rolled condition.
- 2) Forgings shall comply with the provisions stated in ASME SA105 and shall be used in the as-rolled condition.
- 3) No cracking, buckling or collapse is allowed for fins; the bolt holes of flanges shall be evenly distributed along the centerline of channel.
- 4) In winter, when a bundle is not used, the standing liquid inside must be removed to prevent frozen tubes from cracking due to freezing.
- 5) For field installation, the lifting shall be operated slowly, avoiding an abrupt rise and fall.
- 6) GPe plugs shall be fabricated with molybdenum disulfide before installed after completion of hydrostatic test, the liquid inside then shall be thoroughly removed and dried with compressed air.
- 7) After completion of field installation of bundles and before commissioning, the connecting bolts shall be removed from mobile channels according to the requirements stated on the signboard.
- 8) The seal surfaces of flanges shall conform to the provisions stated in ASME B16.5-2009.
- 9) The tolerances not marked in all drawings and those not specifically required by applicable standards and specifications shall comply with class II of ISO 13700.
- 10) The lifting eye shall be located equally as per the internal and external dimensions in bracket as stated in drawings and the remaining dimensions of them shall not be altered.
- 11) Strength calculation according to ASME VIII-1 2003.

27		tube plug	RC3/4"	2	SA105	2.2	4.4	
26		tube noz	RC3/4"	2	SA105	2.2	4.4	L=2'
25	ASME B16.20-2007	spiral wound gasket	NPS 8 class 150 RF	4	SS316L-F.G			
24	ASME B18.2.2-2010	nut	3/4" UNC	64	SA194 Gr.7		39.5	
23	ASME B18.2.1-2010	all threaded stud bolts	3/4" UNCL-8.8	32	SA193-B7		67	
22	ASME B16.5-2009	flange	WN 8"-150 RF	8	SA105	42.1	1336.8	
21		rivet	Ø2X5	4	AL	0.0220	0.088	
20		name plate support		1	Q235-B		0.44	
19	JKL-DGDCLO1-10-07	name plate		1	S31608		0.35	
18		inclined strct	L75x75x7	8	Q235-B	28.7	229.4	L=6'-2'
17	JKL-TLMM6-10-07	sign plate		2	AL			borrow
16		gasket	d5/8"1161	20	65Mn		0.07	
15		nut	Ø5/8"1161	20	SA194 Gr.7		0.022	
14		bolt	M5/8"X1.5"Ø116440	20	SA193-B7		3.1	
13		bolt	M3/4"X2"Ø20150	16	SA193-B7	0.44	7.04	
12	JKL-DGDCLO1-10-06	ring beam		4	unit	43	172	
11	JKL-DGDCLO1-10-05	floor header		1	unit		1127	
10	JKL-DGDCLO1-10-04	wind screen		4	Q235-B	31	124	
9	JKL-DGDCLO1-10-03	Regular header		1	unit		1314	
8	SKL-J.B.1-02	gasket		552	copper	0.011	6.072	
7	SKL-J.B.1-01	hex head plug	M30x2	552	SA105	0.3	165.6	L=3/4"
6	JKL-SWL09-10-03	lifting eye		4	Q235-B	11	44	borrow
5		upper beam	F-10	5	Q235-B	64	320	L=9'-4 3/4"
4	JKL-DGDCLO1-10-02	firing tube		276	unit	50	13800	
3		bottom		35	Q235-B	9.7	339.3	L=9'-4 3/4"
2		support beam	IPH	5	Q235-B	90.4	452	L=9'-4 3/4"
1	JKL-DGDCLO1-10-01	side beam		2	unit	1007.5	2015	

REV.	CODE	NO.	DENOMINATION	OUT.	MATERIAL	WEIGHT	TOTAL	REMARKS

Lean Amine - Fr Cooler  
 items EA-440/EA-5401  
 DRAWING SHEET NUMBER IN SCALE  
 S1-14 A1 205711-22  
 TOTAL SHEET SHEET OF



S.N	Name	Specification	Qty
Lean Amine Cooler EA-4401/EA-5401			
1	Flange Gasket	D8"-Class150 SS316L-F.G.	32
2	Threaded Bolt	3/4", L=110 SA193-B7	64
3	Nut	3/4" SA194-2H	128
4	Plug	M30×2 L=20 SA105	50
5	Plug Gasket	d36/d30.5×1.5 (Copper)	100
6	Narrow V-Belt	15J-5 L=3180	3

