

设计制造检验与验收数据表					
DATA SHEET OF DESIGN FABRICATION, INSPECTION & ACCEPTANCE					
设计制造检验与验收标准 STANDARDS OF DESIGN FABRICATION, INSPECTION & ACCEPTANCE			设计数据 DESIGN DATA		
1. ASME SECTION VIII DIV 1 2021 ED		名称 DESIGNATION	壳程 SHELL SIDE	管程 TUBE SIDE	
2. TEMA Tenth Edition CLASS R		工作压力(NORMAL) OPERATING PRESSURE	29.0 [2.0]	50.0 [3.45]	
3. API 660-2020		设计压力(内/外/压力) DESIGN PRESSURE (INT/EXT)	220 [15.17] (+1.0/-0.500) 220 [15.17]	170 [11.72] /	
4. NACE MR-0103		最大允许工作压力 MAWP (INTERNAL)	454.6 [31.34] (limited by nozzle blank)	306.2 [21.25] (limited by nozzle blank)	
		最大允许工作压力 MAWP (EXTERNAL)	15 [1.03]	/	
		最大允许压力 MAP	600 [41.37] (limited by nozzle blank)	801.7 [55.27] (limited by channel cover)	
		工作温度 (Inlet / Outlet) OPERATING TEMPERATURE	*F/°C 110.2 [47.9] / 100 [37.8]	80 [26.7] / 36 [30.0]	
		设计温度 DESIGN TEMPERATURE	*F/°C 300 [148.9]	150 [65.6]	
NB REGISTRATION	YES	最低设计金属温度 MDMT	*F/°C 32 [0]	32 [0]	
ASME CERTIFICATE	YES (With U Designator)	工作介质 OPERATING FLUID	循环腐蚀性 Circulated Caustic	冷却水 Cooling Water	
换热器型式 EXCHANGER TYPE (TEMA)	AEU	介质密度 DENSITY OF FLUID	63.1 [0.07] / 63.9 [0.08]		62.4 [1000]
传热面积 HEAT TRANSFER SURFACE AREA (Effective)	47.428 [4.40m]	介质致死工况 FLUID LETHAL SERVICE	非致死 Nonlethal		非致死 Nonlethal
换热管与管板的连接 TUBE-TO-TUBESHEET JOINT	强度胀+密封焊 Expanded-Seal Weld	特殊工况/程度 SPECIAL SERVICE / SEVERITY	Wet Sour / High		NO
换热管间距/排列方式/数量 PITCH/PATTERN/NO.	1" [25.4] / 90° / 18U	腐蚀裕量 CORROSION ALLOWANCE	1/16 [1.5875]	1/8 [3.125] Channel, 0.016 [0.407] Tube-4	
换热管外径/壁厚/直段管长 TUBE O.D./WALL THK./LENGTH	3/4" [19.05] / 0.065" [1.65] Avg. 7 [213.6]	RT 检测类别 RT TYPE	RT-1	RT-4	
地震设计规范 SEISMIC DESIGN CODE	ASCE 7-2016 (NOTE 1)	焊接接头系数(筒体/封头) JOINT EFFICIENCY (SHELL/HEAD)	1.0 / 1.0	0.85 / -	
风载设计规范 WIND DESIGN CODE	ASCE 7-2016 Exposure category C	容积 CAPACITY	3.88 [0.11]	1.24 [0.035]	
基本风速 BASIC WIND VELOCITY	mph [m/s] 101 [45.2]	程数 NUMBER OF PASSES	1	4	
管口方位 NOZZLE ORIENTATION	按本图 AS PER THIS DWG	冲击试验 IMPACT TEST	不要/NO	要/YES (管板/TUBESHEET)	
制造重量 FABRICATED WEIGHT	Lb [kg] 1720 [780.2]	焊后热处理 POST-WELD HEAT TREATMENT	不要/NO	不要/NO	
空重 EMPTY WEIGHT	Lb [kg] 1720 [780.2]	焊后热处理 POST FORMING HEAT TREATMENT	要 / YES (封头 / HEAD)	要 / YES (U形管/U BEND)	
安装重量 ERECTED WEIGHT	Lb [kg] 1720 [780.2]	保温层厚度 INSULATION TYPE/THK	/	/	
操作重量 OPERATING WEIGHT	Lb [kg] 1595 [905.0]	工厂水压试验 SHOP HYDROSTATIC TEST Per UG-99C	780.0 [53.0]	1041.58 [57.2]	
水压试验(现场)重量 TEST WEIGHT (FIELD)	Lb [kg] 2000 [907.2]	现场水压试验 FIELD HYDROSTATIC TEST Per UG-99C	991.0 [40.7]	400.7 [27.5]	
管束重量 TUBE BUNDLE WEIGHT	Lb [kg] 337 [153]	气密试验 PNEUMATIC TEST	/	/	

NOTE 1: ASCE 7-2016, S1=0.575g, Ss=1.616g SDes=1.077g, S01=0.995g, Site Class=D IMP. FACTOR=1.5, DESIGN CATEGORY=D
 SECTION 13.3.1 With ap=1.0, Rp=2.5, ap1=5 and z=0, Fa=1.0, Fv=1.721

The diagram illustrates a 3D perspective view of a nozzle attached to a main vessel. The nozzle is oriented vertically. A force vector 'FA' points upwards from the top of the nozzle. A moment vector 'MT' is shown as a curved arrow around the vertical axis of the nozzle. At the base of the nozzle, where it meets the vessel, there are two sets of force and moment vectors: 'FL' and 'MC' acting horizontally, and 'ML' and 'FC' acting along the longitudinal axis of the vessel.

管口载荷表 NOZZLES LOADS LIST								
NOZZLE	NPS	FORCES (UNIT: Lbf)			MOMENTS (UNIT: Lbf ft)			
		FA	FL	FC	MC	ML	MT	
T1	2"	720	900	900	500	640	800	
T2	2"	720	900	900	500	640	800	
S1	2"	720	900	900	500	640	800	
S2	2"	720	900	900	500	640	800	

2xAPI 300# nozzle loads on process nozzle considered. Flange rating changed to 600W and 1500# due to nozzle load impact on flange rating as required by UG-44 (b)

AIR PRODUCTS  world energy  FLUOR 																	
Air Products Project Number		/		Fluor Project Number		A8KM											
Project Name		World Energy Renewables Project		RFQ No		A8KM-4-110-RQ											
Purchase Order Number		40505688221		PO/Contract No		/											
Air Products Open Test document number		EN207122-WUXM-9V3-00182		Project Area		/											
Client		WORLD ENERGY PARAMOUNT		Client Doc No:		/											
05	竣工图 AS BUILT			Zhedong Zhang	Chengqian Yuan	Hu Yang	29-May-23										
04	供批图 / ISSUED FOR APPROVAL			Zhedong Zhang	Chengqian Yuan	Hu Yang	17-Apr-23										
03	供批图 / ISSUED FOR APPROVAL			Zhedong Zhang	Chengqian Yuan	Hu Yang	20-Feb-23										
02	供批图 / ISSUED FOR APPROVAL			Zhedong Zhang	Chengqian Yuan	Hu Yang	12-Dec-22										
01	供批图 / ISSUED FOR APPROVAL			Zhedong Zhang	Chengqian Yuan	Hu Yang	22-Sep-22										
00	供批图 / ISSUED FOR APPROVAL			Zhedong Zhang	Chengqian Yuan	Hu Yang	09-Jun-22										
版本: REV	版次说明/DESCRIPTION			设计 / PREPARED		审核 / REVIEWED	批准 / APPROVED	日期/DATE									
本图纸版权为无锡化工装备股份有限公司财产, 未经本公司许可不得复制或复装第三方的。 The copyright of this drawing is the property of China Wuxi Chemical Equipment Co., Ltd. (WCE) unauthorized disclosure or duplication to the third party is not permitted.																	
WCE 无锡化工装备股份有限公司 WUXI CHEMICAL EQUIPMENT CO., LTD.				设计项目 World Energy 设计阶段 Remediable Project DESIGN PHASE 详细设计 设备代号 Detail Design ITEM NO 图号 DWG NO WXCE8830-00-1 <tr><td>设计 PREPARED</td><td>审核 CHECKED</td><td>批准 APPROVED</td><td colspan="6">比例: 1:8 SCALE: 1:8</td></tr>					设计 PREPARED	审核 CHECKED	批准 APPROVED	比例: 1:8 SCALE: 1:8					
设计 PREPARED	审核 CHECKED	批准 APPROVED	比例: 1:8 SCALE: 1:8														

无 损 检 验 NONDESTRUCTIVE EXAMINATION								
焊接接头型式或焊缝编号 JOINT TYPE OR WELD SEAM NO		焊接接头系数 JOINT EFFICIENCY	射线探伤 RT	超声波探伤 UT	磁粉探伤 MT	着色探伤 PT	备 注 REMARK	
		检测比例 EXAM RATE	合格级别 CLASS OF ACC	Appendix 12	Appendix 6	Appendix 8		
A,B类 CATEGORY A,B	壳程 SHELL SIDE	1.0	FULL	UW-51	/	/	100%	
	管程 TUBE SIDE	0.85	SPOT	UW-52	/	100%	/	
C类 CATEGORY C	壳程 SHELL SIDE	设备法兰与壳体 GIRTH FLANGE TO SHELL	1.0	FULL	UW-51	/	/	100%
	管程 TUBE SIDE	接管与法兰 NOZZLE TO FLANGE	/	/	/	/	/	100%
	壳程 SHELL SIDE	设备法兰与壳体 GIRTH FLANGE TO SHELL	0.85	SPOT	UW-52	/	100%	/
	管程 TUBE SIDE	接管与法兰 NOZZLE TO FLANGE	/	/	/	/	100%	/
D类 CATEGORY D	壳程 SHELL SIDE	接管与壳体 NOZZLE TO SHELL	/	/	/	/	100%	
	管程 TUBE SIDE	接管与壳体 NOZZLE TO SHELL	/	/	/	/	100%	
	壳管与管板的连接接头 TUBE TO TUBESHEET JOINT	/	/	/	/	/	100%	
	注/NOTE: 无损检测要求是“其他要求和说明第5条” For requirements of NDT, see clause 5 of "Other Requirements and Notes"							

2023.5.29

10

其他要求和说明:

Other Requirements and Notes:

1. 一般要求 / General requirements

1.1 除注明外, 所有尺寸均以英制为准。括号内标注来制尺寸为参考。

Unless otherwise specified, all dimensions shall be in US customary unit as primary unit and metric unit shown in bracket for reference.

1.2 除非另外说明, 法兰螺栓孔应跨中设备中心线或其平行线。

Unless otherwise indicated, all bolt holes of flange shall straddle the center line or parallel line of the equipment.

1.4 除特殊注明外, 所有承压密封面粗糙度要求为Ra3.2~Ra6.4。

Facing for pressure connections shall be 125-250 AARH unless otherwise specified on the drawing.

2. 材料/Materials

2.1 受压元件和与受压元件相焊的非受压元件材料应符合ASME Section II, 项目文件SPEC-ENG-MQ042, A8KM-PP-000-500530-A和MPS文件。

Material of pressure and welded with pressure retaining parts shall be in accordance with ASME Section II, Project specification SPEC-ENG-MQ042, A8KM-PP-000-500530-A and Material Purchasing Specification

2.2 所有材料应提供EN10204中3.1类证书, 且需按照项目规范SPEC-ENG-MQ042的附录A进行复验。

All materials shall be delivered with Certificates 3.1 acc. to EN 10204 and it shall be subjected to retesting per Appendix A of SPEC-ENG-MQ042

2.3 材料按照项目文件A8KM-PP-000-500512-A进行PM。

PM shall be performed in accordance with specification A8KM-PP-000-500512-A.

2.4 所有换热管应为无缝管, 并不得拼接。

All tubes shall be one piece without circumferential & Longitudinal weld seams.

2.5 所有SA-106 Gr.B、SA-105N、SA-266 Gr.2N 材料应正火+细晶粒状态供货。

The all material of SA-106 Gr.B、SA-105N、SA-266 Gr.2N shall be supply with normalized and Fine grain practice.

3. 制造与检验/Fabrication and inspection

3.1 设备的制造与检验应符合项目规范A8KM-PP-000-500530-A的要求。

Fabrication and inspection shall confirm to the requirements of ASME code and Project specification A8KM-PP-000-500530-A.

3.2 设备的制造公差应按照ASME VIII-1、API-660 和 TEMA R级中严格的执行。对于外压设备筒体的椭圆度应按ASME VIII-1 UG-80检查。

Most Stringent tolerances out of ASME Sec.VIII Div.1, API-660 and TEMA Class-R shall be applicable and followed. The out-of-roundness of shell with external pressure shall be inspected according to UG-80.

3.3 开孔和附件(包括补强板和垫板)到焊缝的间距应至少2英寸。经买方批准, 如果无法满足以上要求, 则在将接管或附件焊接至换热器之前, 应将焊缝打磨平整, 并对开孔两侧4英寸的距离或附件覆盖的全长加上两侧4英寸的距离进行RT检测。Openings and attachments (including reinforcing and support pads) shall clear weld seams by at least 2 inches. Subject to approval of the purchaser, if this construction is not possible, the seam weld shall be ground flush and radiographed for a distance of 4 inches on either side of the opening or for the full length covered by an attachment plus 4 inches on both sides prior to welding the nozzle or attachment to the exchanger.

3.4 SS116L不锈钢制圆头应整版冷成形, 成形后进行固溶处理。封头形状偏差还应满足UG-81 (b) 的要求。最大的成型偏差e为2.4mm。

The ellip.head of SS316L shall be of Clod-formed one piece, and to be solution annealed after clod-forming. The forming shape tolerance of the head shall meet the requirement of UG-81 (b). The maximum permissible deviation e is 2.4mm.

3.5 公称直径≤12"的接管必须是无缝管料。公称直径>12"的接管可用板材卷焊, 但其纵缝须经100% RT检测。

Nozzle necks up to 12 NPS made from pipe material shall be seamless, for Nozzle greater than 12 NPS made from plate & Longitudinal weld seams will be full radiographed.

3.6 除非已表明, 接管应与容器内表面轮廓齐平, 其接管端部应打磨至最小5mm的圆角。

Unless specified otherwise, nozzles shall finish flush with the internal contour of the vessel. All inside edges of nozzle shall be radiused to 5 mm minimum.

3.7 所有承压紧固件上紧应按项目文件4WPI-670210进行。

All tightening of pressure fastener shall be according to the specification 4WPI-670210.

3.8 换热管孔胀接槽应为去除毛刺的90度直边, 并与管孔保持同轴。

TUBE HOLE GROOVES SHALL BE SQUARE EDGED, CONCENTRIC AND FREE FROM BURRS.

3.9 换热管的强度胀接减薄量应不超过5%。

MAXIMUM ALLOWABLE TUBE WALL THICKNESS REDUCTION SHALL BE 5%.

3.10 所有换热管孔边缘距管板上相邻的台阶应不小于1.5mm。

DISTANCE BETWEEN EDGE OF TUBE HOLES AND EDGE OF ALL GASKET GROOVES (INCLUDING PP GROOVES) SHALL NOT BE LESS THAN 1.5 MM.

3.11 所有U形管弯制后, 压扁率应不超过换热管外径的10%。

FLATTENING TOLERANCES AFTER BENDING OF U-TUBES SHALL NOT EXCEED 10 % OF THE TUBE OUTSIDE DIAMETER.

3.12 所有双相钢U形管段应进行固溶退火处理。热处理应采用电加热的方式。其工艺程序须提交业主批准。加热炉加热的方式是不允许的。

Tube U-bends for duplex SS shall receive post bend solution annealing heat treatment. Heat treatment shall use electric resistance methods, and the procedure shall be submitted to Buyer for review (Final responsibility is of Vendor). Furnace heat treatments are not allowed.

4. 焊接/Welding

4.1 设备的焊接规程和焊工资质应符合ASME IX以及项目文件4WEQ-1051和A8KM-PP-000-500550-A 6.0节的要求。

Welding procedure qualification and welders' performance qualifications shall confirm to the requirements of Section IX of the ASME Code and Project specification 4WEQ-1051, part 6.0 of A8KM-PP-000-500550-A.

4.2 所有承压焊接接头应采用全截面焊接接头形式。

All holding pressure welding joints shall be full penetration weld.

4.3 对接焊缝应在背面清根后再进行焊接, 不能清根时应采用氩弧焊打底。

All butt welded joints shall be back chipped and welded. Wherever back chipping is not possible root run shall be welded by GTAW.

4.4 未注角焊缝焊脚高度为较薄板厚度。

The fillet weld height not dimensioned shall be equal to the thickness of thinner plate.

4.5 除特别说明外, 所有焊缝均为连续焊。

Unless specified, all welds shall be continuous.

4.6 禁止使用不可拆卸的焊接背部垫板。

Non-removable welding backing strips or rings are prohibited.

4.7 双相钢换热管与管板的焊接及胀接应满足项目规范A8KM-PP-000-500530-A Rev.0第7.0条要求。

For duplex stainless steel tube-to-tubesheet welding and rolling, the article 7.0 of Project specification A8KM-PP-000-500530-A Rev.0 shall be compiled.

4.8 换热管与管板之间的焊接应采用GTAW工艺, 并添加填充金属。焊喉(最小泄漏路径)不得小于换热管壁厚。

Tube-to-tubesheet welds shall be made using the GTAW process with the addition of filler metal. The weld throats (minimum leak paths) shall not be less than the thickness of the tube wall.

4.9 换热管与管板分两道焊接, 两道焊缝的起点应错开180°, 焊接完成后应对焊接接头进行100%PT检测, 合格后再进行胀接, 胀接完成后再进行100%PT检测。

Tube-to-tubesheet joints shall be welded in two welding layers, the start arc welding point for layer shall be stagger 180 degree, and the final layer shall be examined by 100% PT. After the test, expansion should be performed. 100% PT shall be performed after expansion.

4.10 所有双相钢焊接接头外表面均应按照Magne-Gage或Fischer Ferrite进行铁素体检测, 按照AWS A4.2进行校准。每1.7m (5英尺) 长度最少检测3个点。每条焊接接头铁素体含量的平均值应为30%至70%。

The ferrite content of all accessible completed external surfaces of duplex SS production welds shall be checked using either a Magne-Gage or Fischer Ferrite Scope calibrated in accordance with AWS A4.2. A minimum of three tests shall be made on each 1.7 m (5 feet) of weld. The average value of the tests on each weld shall be 30-70% ferrite.

4.11 设备制造完成后, 对每种焊接工艺的焊缝应进行至少一组硬度检测。每组检测应包含焊缝两侧母材、热影响区及焊缝金属5个点。

检测处焊缝余高应磨平。硬度检测必须用HV10方法。其余硬度检测的要求应符合A8KM-PP-000-500550-A Rev.0B中11.2条。

On the finished vessel a minimum of one hardness test set is required per weld procedure. A set of hardness readings shall consist of at least five measurements including measurements of 1) the base metal on both sides of the weld, 2) the heat-affected zone (HAZ) on both sides of the weld, and 3) the weld metal. The weld profile shall be ground flat across the weld to perform the tests. The hardness must be measured using theHV10 method. The other requirement of of hardness test shall comply the item 11.2 of A8KM-PP-000-500550-A Rev.0B.

4.12 低合金钢焊缝金属和热影响区热处理后硬度应不超过230HB。

The hardness of weld metal and heat-affected zones of low-alloy steels after stress relief shall not exceed 230 Brinell hardness.

5. 无损检测/Nondestructive examination

5.1 所有NDE应满足项目文件A8KM-PP-000-500550-A的要求第10条的要求

NDE requirements shall meet the article 10 of Project specification A8KM-PP-000-500550-A.

5.2 设备主体的无损检测要求见“无损检测表”。

The NDE requirement of main parts according to table "NONDESTRUCTIVE EXAMINATION".

5.3 所有无损检测 (NDE) 应满足以下要求: a) 焊接后至少48小时内不得进行, 且 b) 焊后热处理 (PWHT) 后进行。

All nondestructive examination (NDE) shall: a) Not be performed until at least 48 hours after welding and b) Be performed after postweld heat treatment (PWHT).

5.4 所有板材制成的接管及管件, 其焊缝应进行100% RT检测。

Welded fittings (nozzles, etc.) made from plate shall be 100% RT examined at the fitting fabricator's shop.

5.5 应在焊后热处理前对高应力附件(如吊耳)进行射线照相或超声波检查, 焊后热处理后应进行磁粉或渗透检测。不允许有裂纹。

Highly-stressed attachments, such as lifting lugs, shall be radiographed or ultrasonically checked before post-weld heat treatment and magnetic particle inspection after post-weld heat treatment. No crack indication is allowed.

5.6 设备焊制完成后, 其上所有形式的焊接接头均应进行100%PT检测。

All accessible completed production welds shall be examined by PT. PT examination (100%) is required of butt, seal, fillet, socket, weldolet and branch welds and at all pipe support connection welds.

6. 试验/Testing

6.1 在压力试验期间, 工艺管口使用的垫片可由供应商选择通用类型, 但对于人孔或带法兰盖的管口, 垫片应与正式垫片的类型相同。试验后, 当接头因为任何原因被拆开后, 应更换新的正式垫片并重做水压试验。

The gaskets used during pressure testing for process piping connections may be of a generic type, but for the connections that service gasket is supplied, shall be the same type as the service gaskets. When equipment is dismantled for any cause, it shall be reassembled with the new gaskets of the same type & material and re-hydrotested.

6.2 用于水压试验的水应为冷凝水、软化水或可溶氯化物含量小于50ppm (按体积计) 的饮用水。

Water used for hydrostatically testing shall be condensate, demineralized, or potable with a soluble chloride content of less than 50ppm by volume.

6.3 水压试验用水温度应为62.6°F (17 °C) 到118.4°F (48°C) 之间。

The minimum temperature of the fluid used for hydrostatic test shall be 62.6°F (17 °C) to 118.4°F (48°C).

6.4 所有补强圈上的焊缝应在水压试验前进行气密试验。

The welds of each reinforcing pad shall be given an air-and-soap solution test before pressure testing the exchanger.

6.5 胀接完成后, 水压试验前, 应对换热管与管板连接接头进行氢检漏试验。试验时壳程通入低压氢气, 壳程与管程压差至少为1 barg。最大允许泄漏率为1x10⁻⁵ bar cm³/s。

Helium leak test of tube-to-tubesheet joint integrity after final expansion of the tubes before pressure test. The shell side of the exchanger shall be pressurized with low pressure helium. The pressure difference between the pressurized shell side and tube side of the exchanger shall be at least 1 barg. The maximum allowable leak rate of helium or halogen shall be 1x10⁻⁵ standard cubic centimeters per second (0.76x10⁻⁵ torr liters per second) at a minimum pressure difference of 1 barg.

6.6 试验后, 应彻底干燥换热器。不允许通过蒸发进行热空气烘干。

Exchangers shall be thoroughly dried after testing. Hot air drying by evaporation is not permitted.

7. 表面处理/Surface treatment

7.1 设备的油漆按照项目文件A8KM-PP-000-50520-A 和油漆工艺。

Surface preparation and painting shall be carried out per Air Products specification A8KM-PP-000-50520-A and Painting procedure.

7.2 装运前, 热交换器应无异物。每个换热器的内部和外部均应彻底清洁, 且应无油脂、焊接飞溅物、氧化皮、熔渣、铁锈和其他异物。Heat exchangers shall be free of foreign matter prior to shipment. Each exchanger shall be thoroughly cleaned inside and outside, and shall be free of grease, weld spatter, scale, slag, rust, and other foreign matter.

7.3 所有紧固件螺纹应涂金属基防水润滑油, 以防止试验、运输、储存过程中的腐蚀。

Threads of bolts including exposed parts shall be coated with a metallic base waterproof lubricant to prevent aqueous corrosion during testing, shipping, and storage.

8. 包装、标记和运输/Packing, Marking & Shipping

8.1 设备、备件和松散件的运输准备应符合项目文件4WGN-10001 的相关要求。

Preparation for shipping of equipment, spares, and any loose items shall be in accordance with Air Products specifications 4WGN-10001

8.2 所有补强圈上试验孔及其它垫板上透“气”孔, 应在压力试验后, 运输前用油脂封堵。

All test holes on reinforcing pad and vent on other pad shall be filled with grease after pressure test and prior to shipment.

8.3 换热器应使用0.34 bar g (5 psig) 干燥无油空气或氮气, 露点为-40C或更低, 总油含量 (气溶胶、液体、蒸汽)<5mg/m³。开口应正式垫片及全螺栓连接进行密封, 以保持运输压力。

Vessels shall be pressurized with 0.34 bar g (5 psig) of dry, oil-free air or nitrogen: with a dew point of -40C or lower and a total oil content (aerosol, liquid, vapor) < 5mg/m³. Openings shall be fully bolted in conjunction with service gaskets, to hold the shipping pressure.

8.4 充氮的设备应在每个盲板连接处贴上警告通知, 清楚地表明该装置是用空气或氮气加压的。

Equipment that has been pressurized for shipping shall carry a warning notice at each blinded connection clearly indicating that the unit is pressurized with either air or nitrogen.

8.5 所有临时盲板和螺栓应涂上“发光黄色”RAL 1026或类似涂料。

All temporary shipping plugs, metal or plywood cover plates and bolting shall be painted 'luminous yellow' RAL 1026 or similar.

9. 其它/Others

9.1 建造, 调试和开车备品备件。

-垫片: 200%

-容器法兰及带法兰盖的管口用螺栓螺母垫圈: 10% (至少2套)

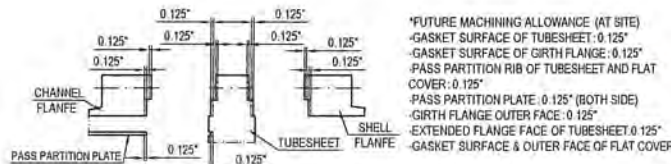
Spare parts for construction, commissioning, and start-up

-Gaskets for girth flanges and blinded nozzles: 200%

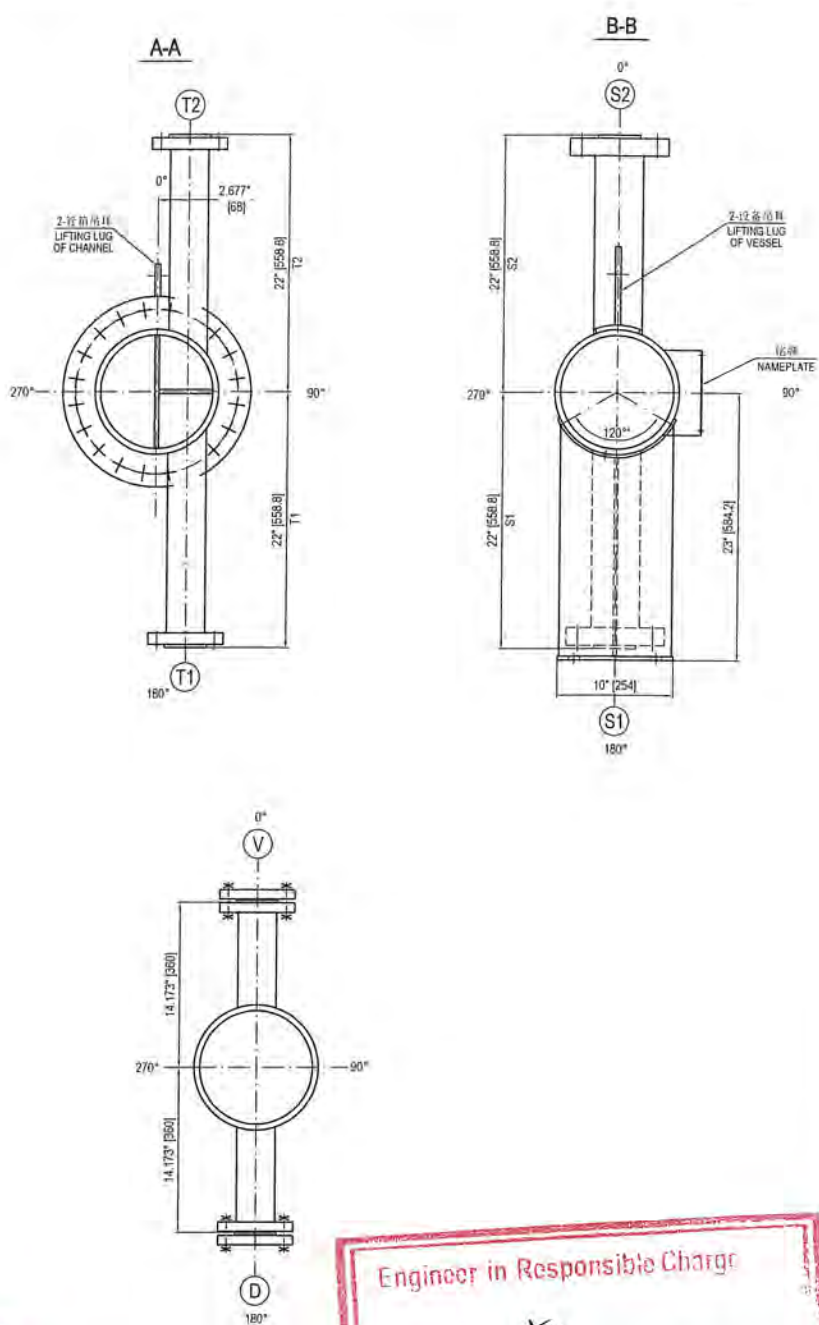
-Stud boltnuts for girth flanges and blinded nozzles: 10% (min 2 sets)

9.2 As per API-660 Clause no. 9.1.2, For removable-bundle heat exchangers, the permissible out-of-roundness of a completed shell, after all welding and any required heat treatment, shall allow a metal template to pass through the entire shell length without binding. The template shall consist of two rigid disks (each with a diameter equal to the diameter of the transverse baffle or support plate) rigidly mounted perpendicularly on a shaft and spaced not less than 300 mm (12 in.) apart.

油漆要求/PAINING REQUIREMENT							
	油漆系统 PAINTING SYSTEM	底漆 1st COAT		中间漆 2nd COAT		面漆 3rd COAT	
		油漆名称 PAINT NAME	干膜厚度 DFT (mil)	油漆名称 PAINT NAME	干膜厚度 DFT (mil)	油漆名称 PAINT NAME	干膜厚度 DFT (mil)
壳程 SHELL SIDE	NA	NA	NA	NA	NA	NA	NA
管程 TUBE SIDE	1	2	2.5-4.0	3H	4.0-10.0	PU	2.5-3.0



*FUTURE MACHINING ALLOWANCE (AT SITE)
-GASKET SURFACE OF TUBESHEET: 0.125"
-GASKET SURFACE OF GIRTH FLANGE: 0.125"
-PASS PARTITION RIB OF TUBESHEET AND FLAT COVER: 0.125"
-PASS PARTITION PLATE: 0.125" (BOTH SIDE)
-GIRTH FLANGE OUTER FACE: 0.125"
-EXTENDED FLANGE FACE OF TUBESHEET 0.125"
-GASKET SURFACE & OUTER FACE OF FLAT COVER



AIR PRODUCTS		world energy		FLUOR	
Air Products Project Number		Floor Project Number		A8KM	
Project Name		RFQ No.		A8KM-4-410-RQ	
Purchase Order Number		PO/Contract No.		/	
Air Products Open Test document number		Project Area		/	
Client		Client Doc No.		/	
05	竣工/AS BUILT	Zhedong Zhang	Chengqian Yuan	Hu Yang	29-May-23
04	供批准/ISSUED FOR APPROVAL	Zhedong Zhang	Chengqian Yuan	Hu Yang	17-Apr-23
03	供批准/ISSUED FOR APPROVAL	Zhedong Zhang	Chengqian Yuan	Hu Yang	20-Feb-23
02	供批准/ISSUED FOR APPROVAL	Zhedong Zhang	Chengqian Yuan	Hu Yang	12-Dec-22
01	供批准/ISSUED FOR APPROVAL	Zhedong Zhang	Chengqian Yuan	Hu Yang	22-Sep-22
00	供批准/ISSUED FOR APPROVAL	Zhedong Zhang	Chengqian Yuan	Hu Yang	09-Jun-22
版本/REV	版本/DESCRIPTION	设计/PREPARED	审核/REVIEWED	批准/APPROVED	日期/DATE
The copyright of this drawing is the property of Wuxi Chemical Equipment Co., Ltd. (WCE) and unauthorized disclosure or duplication to the third party is not permitted.					
WCE 无锡化工装备股份有限公司				设计项目	World Energy Renewables Project
WUXI CHEMICAL EQUIPMENT CO., LTD.				设计阶段	详细设计
设计	张勤	2023.5.29	设备位号	18-X-256	
审核	王守	2023.5.29	图号	WXCE830-00-II	
批准	王守	2023.5.29	比例	1:1	
批准	王守	2023.5.29	SCALE	1:1	
第 2 页 共 2 页					PAGE 2 OF 2