

# GENERAL DATA

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Name and address of manufacturer	:	Wuxi Chemical Equipment Co.,Ltd.	
		Huayi road,Hua Zhuang Town,Wuxi, Jiangsu. China.	
Principal's purchase order No.	:	4505600575	Item No.: 18-X-1805
Equip. tag No. and name	:	T-20003 Recirculating Exchanger	
Manufacturer's production order No.	:	WHA22-029-1	
Applicable design code	:	ASME SECTION VIII DIV.1 2021 ED &TEMA Tenth Edition CLASS R&API660-2020	
Year of manufacture	:	2023	Manufacturer's serial No. : WHA22-029-1
Name of design org.	:	WUXI CHEMICAL EQUIPMENT CO.,LTD.	
Name of inspection org.	:	WUXI CHEMICAL EQUIPMENT CO.,LTD.	
Type of vessel	:	Heat exchanger	
Design pres. int/ext      psig[barg]	:	shell side:220/15 [15.17/1.03];tube side: 232/15 [16/1.03]	
Design temperature (INT./EXT.) ° F[° C]	:	shell side:430 [221.1]/300 [148.89];tube side:430 [221.1]/400 [204.44]	
ID                                  In.[mm]	:	12.25" [311.1]	
Wall thickness,                  Actual In.[mm]	:	shell side:0.63" [16]/tube side:0.551" [14]	
Corrosion allowance,                  In.[mm]	:	shell side:1/16 [1.588];tube side:1/8 [3.175]	
Overall length of vessel                  In.[mm]	:	149.4" [3794.8]	
Weight of vessel (empty)                  lb[kg]	:	3363[1529]	
Weight of vessel incl. internals (empty)	:	/	
Heat treatment	:	YES      When yes, type of heat treatment:	Solution (HEAD AND U-BENDS)
Pressure test date	:	shell side:2023.3.8;tube side:2023.3.10	
Position	:	Horizontal	
Test pressure                  Bar(g)[pisg]	:	shell side:54[786.24];tube side:60[873.6]	
Test medium	:	Water	
Temperature of medium                  °C[°F]	:	16[60.8]	
NDE:    -    radiography (X-ray/Gamr[°C]	:	SPOT	
-    ultrasonic	:	100%	
-    magnetic/particle	:	100%	
-    dye penetrant	:	100%	
Joint efficiency      (SHELL/HEAD)	:	shell side:0.85/1.0;tube side:0.85/1.0	
Type of equipment support	:	Saddle	
Number(s) of approved drawing(s)	:	WXCE6719-00      Rev. No.: 4	
	:	WXCE6719-01      Rev. No.: 4	
	:	WXCE6719-02      Rev. No.: 4	
	:	WXCE6719-03      Rev. No.: 4	
	:	WXCE6719-04      Rev. No.: 4	
	:	WXCE6719-05      Rev. No.: 4	
	:	WXCE6719-06      Rev. No.: 3	

\* Delete what does not apply

For manufacturer: WCE

Name: 杨高亮

Position: QC Engineer

Place and date: 2023.3.25

Huayi road,Hua Zhuang Town,Wuxi,Jiangsu,China



Signature and stamp

For inspection organization:

Name:

Position:

Name of company:

Place and date:

Signature and stamp

Mr. Representative: 黄世军

Date: Aug. 15, 2023

Authorized Inspector: 张Date: Aug. 15, 2023

## FORM U-1 MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS

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As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by Wuxi Chemical Equipment Co., Ltd.  
36 Huayl Road, Binhu District, Wuxi, Jiangsu Province 214131, P. R. China.  
(Name and address of Manufacturer)

2. Manufactured for Air Products Manufacturing LLC., 1940 Air Products Blvd., Allentown PA 18106-5500, USA.  
(Name and address of Purchaser)

3. Location of installation Not Known  
(Name and address)

4. Type Horizontal Heat exch. WHA22-029-1  
(Horizontal, vertical, or sphere) (Tank, separator, jkt. vessel, heat exch., etc.) (Manufacturer's serial number)  
NA WXCE6719-00 Rev. 04 507 2023  
(CRN) (Drawing number) (National Board number) (Year built)

5. ASME Code Section VIII, Div. 1 2021 NA NA  
(Edition and Addenda, if applicable (date)) (Code Case number) [Special Service per UG-120(d)]

Items 6-11 incl. to be completed for single wall vessels, jackets of jacketed vessels, shell of heat exchangers, or chamber of multichamber vessels.

6. Shell: (a) Number of course(s) 1 (b) Overall length 104.055"

Course(s)			Material	Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter	Length	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	ID 12.25"	104.055"	SA-182 F316L	0.63"	1/16"	S	NA	0.85	1	Spot RT	0.85	None	None
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Body Flanges on Shells										Bolting			
No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location		Num & Size	Bolting Material	Washer (OD, ID, Thk)	Washer Material
1	Integral	12.25"	20.079"	3.346"	0.63"	SA-182 F316L	Welded	Left		15Nos 1"-8UN-2A, L=14.173" 5Nos 1"-8UN-2A, L=14.961"	SA-193 Gr.B7	1.968", 1.063, 0.25"	ASME PCC-1 Type 4
NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA

7. Heads: (a) SA-240 316L, Remark 1, 2 (b) NA										(Material spec. number, grade or type) (H.T. — time and temp.)			
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A	
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full Spot, None
(a)	Right End	0.256"	1/16"	NA	NA	2:1	NA	NA	NA	Yes	Yes	S	NA
(b)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Body Flanges on Heads										Bolting			
	Location	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached		Num & Size	Bolting Material	Washer (OD, ID, Thk)	Washer Material
(a)	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA
(b)	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA

8. Type of jacket NA Jacket closure NA  
(Describe as ogee and weld, bar, etc.)

If bar, give dimensions; If bolted, describe or sketch

NA

9. MAWP 412psig FV at max. temp. 430°F 300°F Min. design metal temp. 32°F at 412psig  
(Internal) (External) (Internal) (External)

10. Impact test No, exempted per UHA-51 at test temperature of NA  
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneu., or comb. test pressure Hydro. at 779.5psig Proof test NA

Items 12 and 13 to be completed for tube sections.

12. Tubesheet SA-182 F60 12.25" 2.756" Bolted  
(Stationary (material spec. no.)) (Diameter (subject to press.)) (Nominal thickness) (Corr. allow.) (Attachment (welded or bolted))  
NA NA NA NA NA  
(Floating (material spec. no.)) (Diameter) (Nominal thickness) (Corr. allow.) (Attachment)  
13. Tubes SA-789 S32205 0.75" 0.065"(avg.) 36 U  
(Material spec. no., grade or type) (O.D.) (Nominal thickness) (Number) [Type (straight or U)]



Mfr. Representative: 黄子林

Date: Aug. 15, 2023

Authorized Inspector: SSDate: Aug. 15, 2023

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Manufactured by Wuxi Chemical Equipment Co., Ltd.

Manufacturer's Serial No.

WHA22-029-1

CRN

NA

National Board No.

507

Items 14-18 incl. to be completed for inner chambers of jacketed vessels or channels of heat exchangers.

14. Shell: (a) No. of course(s)

1

b) Overall length

21.654"

Course(s)			Material	Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter	Length	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	ID 12.25"	21.654"	SA-516 Gr.70N	0.551"	1/8"	1	Spot RT	0.85	1	Spot RT	0.85	None	None
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Body Flanges on Shells

No.	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Location	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, Thk)	Washer Material
1	Integral	12.25"	20.079"	2.48"	0.551"	SA-182 F316L	Welded	Left	20Nos 1"-8UN-2A, L=10.236"	SA-193 Gr.B7	1.968", 1.063, 0.25"	ASME PCC-1 Type 4
1	Integral	12.25"	20.079"	2.48"	0.551"	SA-182 F316L	Welded	Right	15Nos 1"-8UN-2A, L=14.173" 5Nos 1"-8UN-2A, L=14.961"	SA-193 Gr.B7	1.968", 1.063, 0.25"	ASME PCC-1 Type 4

15. Heads: (a)

SA-266 Gr.2N, No H.T.

(b)

NA

(Material spec. number, grade or type) (H.T. — time and temp.)

(Material spec. number, grade or type) (H.T. — time and temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)	Left End	2.086"	1/8"	NA	NA	NA	NA	NA	20.079"	Yes	Yes	S	NA	0.85
(b)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Body Flanges on Heads

	Location	Type	ID	OD	Flange Thk	Min Hub Thk	Material	How Attached	Bolting			
									Num & Size	Bolting Material	Washer (OD, ID, Thk)	Washer Material
(a)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(b)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

16. MAWP 512.1psig FV at max. temp. 430°F 400°F Min. design metal temp. 32°F at 512.1psig

(Internal)

(External)

(Internal)

(External)

17. Impact test

Yes, tubesheet

at test temperature of

-40°F

(Indicate yes or no and the component(s) impact tested)

18. Hydro., pneu., or comb. test pressure

Hydro. at 832.1psig

Proof test

NA

19. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
T1, TS Inlet	1	NPS 3	CL 600 LWN/RF	SA-105N	SA-105N	0.803"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
T2, TS Outlet	1	NPS 3	CL 600 LWN/RF	SA-105N	SA-105N	0.803"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
S1, SS Inlet	1	NPS 6	CL 900 WN/RF	SA-312 TP316L	SA-182 F316L	0.562"	1/16"	SA-240 316L	Fig. UW-16.1(c)	None RT, eff. 1.0	
S2, SS Outlet	1	NPS 6	CL 900 WN/RF	SA-312 TP316L	SA-182 F316L	0.562"	1/16"	SA-240 316L	Fig. UW-16.1(c)	None RT, eff. 1.0	
TV, Vent	1	NPS 2	CL 300 LWN/RF	SA-105N	SA-105N	0.653"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
Aux1-2, Auxiliary	2	NPS 2	CL 300 WN/RF	SA-106 Gr. B	SA-105N	Sch80	1/8"	Inherent	Fig. UW-16.1(c)	None RT, eff. 0.85	
Aux3-4, Auxiliary	2	NPS 2	CL 300 LWN/RF	SA-182 F316L	SA-182 F316L	0.653"	1/16"	Inherent	Fig. UW-16.1(c)	NA	

20. Supports: Skirt

No

Lugs

NA

Legs

NA

Others

2Nos Saddles

Attached

Welded to shell

(Yes or no)

(Number)

(Number)

(Describe)

(Where and how)

21. Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report (list the name of part, item number, Manufacturer's name, and identifying number):

None

22. Remarks

See attached Form U-4.



Mr. Representative: 黄付强Date: Aug. 15, 2023Authorized Inspector: 88Date: Aug. 15, 2023

FORM U-1

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Manufactured by Wuxi Chemical Equipment Co., Ltd.

Manufacturer's Serial No.

WHA22-029-1

CRN

NA

National Board No.

507

## CERTIFICATE OF SHOP COMPLIANCE

We certify that the statements in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization Number

30,972

Expires

April 16, 2026

Date

Aug. 15, 2023

Name

Wuxi Chemical Equipment Co., Ltd.

Signed

黄付强

(Manufacturer)

(Representative)

## CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by

APAVE SA

of

/

have inspected the pressure vessel described in this Manufacturer's Data Report on

April 06, 2023

, and

state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date

Aug. 15, 2023

Signed

88

Commissions

NB15677

(Authorized Inspector)

(National Board Authorized Inspector Commission number)

## CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE

We certify that the statements in this report are correct and that the field assembly construction of all parts of this vessel conforms with the requirements of ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. U Certificate of Authorization Number

Expires

Date

Name

Signed

(Assembler)

(Representative)

## CERTIFICATE OF FIELD ASSEMBLY INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by

of \_\_\_\_\_, have compared the statements in this Manufacturer's Data Report with the described pressure vessel and state that parts referred to as data items \_\_\_\_\_, not included in the certificate of shop inspection, have been

inspected by me and to the best of my knowledge and belief, the Manufacturer has constructed and assembled this pressure vessel in accordance with the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of \_\_\_\_\_. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date

Signed

Commissions

(Authorized Inspector)

(National Board Authorized Inspector Commission number)

(07/17)





