

## GENERAL DATA

Section A1, sheet 1 of 1

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-1810
Equip. tag No. and name	: Caustic Dilution Cooler		
Manufacturer's production order No.	: WHA22-031-1		
Applicable design code	: ASME SECTION VIII DIV.1 2021 ED.		
Year of manufacture	2023	Manufacturer's serial No. :	WHA22-031-1
Name of design org.	: Wuxi Chemical Equipment Co.,Ltd.		
Name of inspection org.	: Wuxi Chemical Equipment Co.,Ltd.		
Type of vessel	: Heat Exchange		
Design pres. int/ext	psig[Bar(g)]	: SHELL SIDE:150[10.342];TUBE SIDE:120/15[8.273/1.03]	
Design temperature	°F[°C]	: SHELL SIDE:190[87.78];TUBE SIDE:150[65.6]/300[148.9]	
ID	In[mm]	: 25[635]	
Wall thickness,	Actual In[mm]	: 0.472[12]/0.551[14]	
Corrosion allowance,	In.[mm]	: SHELL SIDE:1/8[3.175];TUBE SIDE:1/8[3.175]	
Overall length of vessel	In.[mm]	: 234.785[5963.5]	
Weight of vessel (empty)	Lb[Kg]	: 9760[4436]	
Weight of vessel incl. internals (empty)	: /		
Heat treatment	: YES When yes, type of heat treatment:Head/Tube bends/Channel/Shell side:Stress Relieving		
Pressure test date	: SHELL SIDE:2023-2-23;TUBE SIDE:2023-2-27		
Position	: Horizontal		
Test pressure	psig[Barg]	: SHELL SIDE:435[30];TUBE SIDE:435[30]	
Test medium	: Water		
Temperature of medium	°F[°C]	: SHELL SIDE:64.4[18];TUBE SIDE:64.4[18]	
NDE:	- radiography (X-ray/Gamma-ray)	: YES;FULL	
	- ultrasonic	: YES;100%	
	- magnetic/particle	: YES;100%	
	- dye penetrant	: YES;100%	
Joint efficiency	: SHELL SIDE:1.0;TUBE SIDE:1.0		
Type of equipment support	: LIFTING LUG		
Number(s) of approved drawing(s)	: WXCE6721-00	Rev. No.:	05
	: WXCE6721-00	Rev. No.:	05
	: WXCE6721-01	Rev. No.:	05
	: WXCE6721-02	Rev. No.:	05
	: WXCE6721-03	Rev. No.:	05
	: WXCE6721-04	Rev. No.:	05
	: WXCE6721-05	Rev. No.:	05
	: WXCE6721-06	Rev. No.:	04



\* Delete what does not apply

For manufacturer: WCE

Name: Xu Junhua

Position: QC Engineer

Place and date:

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



Mfr. Representative:

Date: Aug. 17, 2023

Authorized Inspector:

Date:

Aug. 17, 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 Huayi 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. WHA22-031-1  
(Horizontal, vertical, or sphere) (Tank, separator, jkt. vessel, heat exch., etc.) (Manufacturer's serial number)
- NA WXCE6721-00 Rev. 05 508 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) 2 (b) Overall length 177"

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 25"	98.425"	SA-516 Gr.70N	0.472"	1/8"	1	Full RT	1.0	1	Full RT	1.0	Remark 1	
1	ID 25"	78.575"	SA-516 Gr.70N	0.472"	1/8"	1	Full RT	1.0	1	Full RT	1.0	Remark 1	

## 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	25"	32.283"	3.743"	0.472"	SA-266 Gr.2N	Welded	Left	36Nos 1-1/8"-8UN-2A, L=15.945"	SA-193 Gr.B7	2.156", 1.188", 0.25"	ASME PCC-1 Type 1
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

7. Heads: (a) SA-516 Gr.70N, Remark 2 (b) NA

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

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

(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)	Right End	0.394"	1/8"	NA	NA	2:1	NA	NA	NA	NA	Yes	S	NA	1.0					
(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

8. Type of jacket NA Jacket closure NA

(Describe as ogee and weld, bar, etc.)

NA

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

9. MAWP 297psig NA at max. temp. 190°F NA Min. design metal temp. 32°F at 297psig  
(Internal) (External) (Internal) (External)

10. Impact test No, exempted per UG-20(f), UCS-66(a), (c) at test temperature of NA  
(Indicate yes or no and the component(s) impact tested)

11. Hydro., pneu., or comb. test pressure Hydro. at 424.7psig Proof test NA

Items 12 and 13 to be completed for tube sections.

12. Tubesheet SA-266 Gr.2N 25" 2.362" 1/4" Clamped  
(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-179 0.75" 0.083"(min.) 182 U  
(Material spec. no., grade or type) (O.D.) (Nominal thickness) (Number) (Type (straight or U))

Mfr. Representative:                      Date: Aug. 17, 2023Authorized Inspector:                      Date: Aug. 17, 2023

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Manufactured by Wuxi Chemical Equipment Co., Ltd.

Manufacturer's Serial No. WHA22-031-1 CRN                      NA                      National Board No. 508

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 27.559"

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 25"	27.559"	SA-516 Gr.70N	0.551"	1/8"	1	Full RT	1.0	1	Full RT	1.0	Remark 3	
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				
									Nut & Size	Bolting Material	Washer (OD, ID, Thk)	Washer Material	
1	Integral	25"	32.283"	3.74"	0.551"	SA-266 Gr.2N	Welded	Left	36Nos 1-1/8"-8UN-2A, L=12.992"	SA-193 Gr.B7	2.156", 1.188", 0.25"	ASME PCC-1 Type 1	
1	Integral	25"	32.283"	3.74"	0.551"	SA-266 Gr.2N	Welded	Right	36Nos 1-1/8"-8UN-2A, L=15.945"	SA-193 Gr.B7	2.156", 1.188", 0.25"	ASME PCC-1 Type 1	

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.)

(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	2.953"	1/8"	NA	NA	NA	NA	NA	32.283"	Yes	Yes	S	NA	1.0
(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 214.88psig FV at max. temp. 150°F 300°F Min. design metal temp. 32°F at 214.88psig

(Internal)

(External)

(Internal)

(External)

17. Impact test No, exempted per UG-20(f), UCS-66(a), (c) at test temperature of NA

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

18. Hydro., pneu., or comb. test pressure Hydro. at 424.7psig 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 6	CL 300 WN/RF	SA-106 Gr. B	SA-105N	Sch80	1/8"	SA-516 Gr.70N	Fig. UW-16.1(d)	None RT, eff. 1.0	
T2, TS Outlet	1	NPS 6	CL 300 WN/RF	SA-106 Gr. B	SA-105N	Sch80	1/8"	SA-516 Gr.70N	Fig. UW-16.1(d)	None RT, eff. 1.0	
S1, SS Inlet	1	NPS 3	CL 600 LWN/RF	SA-105N	SA-105N	0.803"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
S2, SS Outlet	1	NPS 3	CL 600 LWN/RF	SA-105N	SA-105N	0.803"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
V, Vent	1	NPS 2	CL 300 LWN/RF	SA-105N	SA-105N	0.653"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
D, Drain	1	NPS 2	CL 300 LWN/RF	SA-105N	SA-105N	0.654"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
Aux 1-2, Auxiliary	2	NPS 2	CL 300 LWN/RF	SA-105N	SA-105N	0.654"	1/8"	Inherent	Fig. UW-16.1(c)	NA	
Aux 3-4, Auxiliary	2	NPS 2	CL 300 WN/RF	SA-266 Gr.2N	SA-105N	Sch80	1/8"	Inherent	Fig. UW-16.1(c)	None RT, eff. 1.0	

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.



Mfr. Representative: [Signature]

Date: Aug. 17, 2023

Authorized Inspector: [Signature]

Date: Aug. 17, 2023

FORM U-1

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Manufactured by Wuxi Chemical Equipment Co., Ltd.

Manufacturer's Serial No. WHA22-031-1 CRN NA National Board No. 508

## 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. 17, 2023 Name Wuxi Chemical Equipment Co., Ltd. Signed [Signature]  
(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 13, 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. 17, 2023 Signed [Signature] 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)



**FORM U-4 MANUFACTURER'S DATA REPORT SUPPLEMENTARY SHEET**  
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 Huayi 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. WHA22-031-1  
 (Horizontal, vertical, or sphere) (Tank, separator, heat exch., etc.) (Manufacturer's serial number)

NA WXCE6721-00 Rev. 05 508 2023  
 (CRN) (Drawing number) (National Board number) (Year built)

Data Report  
Item Number

Remarks

22. Remarks:

1. The shell was performed PWHT at 1166~1184°F, holding 1hr.
2. The shell side head is cold formed by others with certification indicating SR heat treatment after cold forming was performed at 1166~1184°F, holding 30mins.
3. The channel was performed PWHT at 1166~1184°F, holding 1hr.
4. Nozzle(V/D/Aux 1/ Aux 2/ Aux 3/ Aux 4) blind flange: 6Nos, SA-105N, ASME B16.5-2017 NPS 2 CL.300 BL/RF, fixed with full thread studs SA-193 Gr. B7, 5/8"-11 UNC-2A, L=5.91", 8 pcs for each nozzle, and heavy hex nuts SA-194 Gr. 2H, 5/8"-11UNC-2B, 16 pcs for each nozzle.
5. The U-tube bends were performed SR at 1166~1175°F, holding 0.5hr.
6. Inspection openings are omitted according to UG-46(a)(2).
7. The overpressure protection system not supplied by the vessel Manufacturer.

Certificate of Authorization: Type U No. 30,972 Expires April 16, 2026

Date Aug. 17, 2023 Name Wuxi Chemical Equipment Co., Ltd. Signed [Signature]  
 (Manufacturer) (Representative)

Date Aug. 17, 2023 Signed [Signature] Commission NB15677  
 (Authorized Inspector) (National Board Authorized Inspector Commission number)