

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

Form U-1

Customer Order No:

As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1 Fee Class: D

1. Manufactured and certified by CHART Heat Exchangers L.P. 2191 Ward Avenue La Crosse, WI, USA 54601  
(Name and address of Manufacturer)2. Manufactured for Air Liquide AGS GmbH  
(Name and address of Purchaser)Location of installation Germany  
(Name and address)4. Type: Vert HEAT EXCHANGER 509.8-9 15770A Rev. B 5126 2005  
(Horiz., vert., or sphere) (Tank, separator, jkt. vessel, heat exh., etc.) (Mfg's serial No.) (CRN) (Drawing No.) (Nat'l. Bd. No.) (Year built)5. ASME Code, Section VIII, Div. 1 2001 / 2003 2351, 1518-5 NONE  
Edition and Addenda (date) Code Case No. 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 multi-chamber vessels.

6. Shell (a) No. of course(s): N/A (b) Overall length (ft & in.):

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) N/A (b) N/A  
(Mat'l Spec. No., Grade or Type) H.T. - Time & Temp. (Mat'l Spec. No., Grade or Type) H.T. - Time & 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)													
(b)													

If removable, bolts used (describe other fastening)

N/A  
(Mat'l Spec. No., Grade, size, No.)8. Type of Jacket N/A Jacket Closure N/A  
(Describe as ogee & weld, bar, etc.)  
If bar, give dimensions N/A If bolted, describe or sketch.  
MAWP SEE U-4 SEE U-4 psi at max. temp. SEE U-4 SEE U-4 °F Min. design metal temp. U-4 °F at SEE U-4 psi.  
(internal) (external) (internal) (external)10. Impact test N/A  
(Indicate yes or no and the component(s) impact tested)11. Hydro., pneu., or comb. test press. SEE U-4 FORM Proof test

Items 12 and 13 to be completed for tube sections.

12. Tubesheet: N/A  
Stationary (Mat'l Spec. No.) Dia., in. (subject to press.) Nom. thk., in. Corr. Allow., in. Attachment (welded or bolted)Floating (Mat'l Spec. No.) Dia., in. Nom. thk., in. Corr. Allow., in. Attachment13. Tubes: N/A  
Mat'l Spec. No., Grade or Type O.D., in. Nom. thk., in. or gauge Number Type (Straight or U)

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): N/A (b) Overall length (ft & in.):

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

15. Heads: (a) N/A (b) N/A  
(Mat'l Spec. No., Grade or Type) H.T. - Time & Temp. (Mat'l Spec. No., Grade or Type) H.T. - Time & 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)													

If removable, bolts used (describe other fastening)

N/A  
(Mat'l Spec. No., Grade, Size, No.)

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FORM U-1 (Back)

16. MAWP N/A (internal) (external) psi at max. temp. (internal) (external) °F. Min. design metal temp. (internal) (external) °F at (internal) (external) psi.

17. Impact test N/A  
(Indicate yes or no and the component(s) impact tested)

hydro., pneu., or comb. test press. SEE U-4 Proof test (internal) (external)

Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or Size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
A IN F OUT	2	12.750	N/A	SB2415083	N/A	.375	N/A	N/A	16.1(a)	N/A	N/A
A OUT	1	8.625	"	"	"	.322	"	"	"	"	"
B IN&OUT	2	6.625	"	"	"	.432	"	"	"	"	"
C IN D OUT	2	4.500	"	"	"	.237	"	"	"	"	"
C OUT E OUT	2	3.500	"	"	"	.216	"	"	"	"	"

20. Supports: Skirt N/A (Yes or No) Lugs N/A (No.) Legs N/A (No.) Others ANGLES (2) (Describe) Attached SIDES, WELDED (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, mfg's. name and identifying number)

22. Remarks: MULTI STREAM (CHAMBER) VESSEL OF PLATE FINS CONSTRUCTION FOR NON-CORROSIVE SERVICE, SEE U-4 FORM FOR ITEM 9&11 AND OTHER DESIGN DETAILS (ITEM 22). CODE JURISDICTION ENDS AT THE NOZZLE TRIM LINE OR FIRST WELD PREP TO AN ATTACHED PIPE FITTING (ELBOW, FLANGE, REDUCER, ETC.) EXEMPTED FROM IMPACT TESTING PER UNF-65. PRESSURE RELIEF VALVES ARE NOT INSTALLED BY CHART Heat Exchangers, BUT ARE THE RESPONSIBILITY OF THE CUSTOMER OR THE INSTALLER.

**CERTIFICATE OF SHOP COMPLIANCE**

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME Code for Pressure Vessels, Section VIII, Division 1.

Certificate of Authorization No. 20,954 Expires JANUARY 6, 2007

Date 4/4/05 Name CHART Heat Exchangers L.P.  
(Manufacturer)

Signed (Signature)  
(Representative)

**CERTIFICATE OF SHOP INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of WISC. and employed by HSB CT of HARTFORD, CONN.

have inspected the pressure vessel described in this Manufacturer's Data Report on 3-31-05, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME Code, Section VIII, Division 1. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his 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 APR 04 2005 Signed (Signature) Commissions NB11873A W1100115  
(Authorized Inspector) (Nat'l Board incl. endorsement, State, Province and No.)

**CERTIFICATE OF FIELD ASSEMBLY COMPLIANCE**

We certify that the statements on this report are correct and that the field assembly construction of all parts of this vessel conforms with the requirements of ASME Code, Section VIII, Division 1.

U Certificate of Authorization No. (blank) Expires (blank)

Date (blank) Name (blank) Signed (blank)  
(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/or the State or Province of (blank) and employed by (blank)

have compared the statements in this Manufacturer's Data Report with the described pressure vessel and state that parts referred to as data items (blank), 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 ASME Code, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of (blank) psi. By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his 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 (blank) Signed (blank) Commissions (blank)  
(Authorized Inspector) (Nat'l Board incl. endorsement, State, Province and No.)

**FORM U-4 MANUFACTURER'S DATA REPORT SUPPLEMENTARY SHEET**  
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

Form U-4  
PAGE 1 OF 2

1. Manufactured and certified by CHART Heat Exchangers L.P. 2191 Ward Avenue La Crosse, WI, USA 54601  
(Name and address of Manufacturer)

2. Manufactured for Air Liquide AGS GmbH  
(Name and address of Purchaser)

Location of installation Germany

4. Type: Vert. HEAT EXCHANGER 509.8-9  
(Horiz., vert., or sphere) (Tank, separator, heat exh., etc.) (Mfg's. Serial No.)

(CRN) 15770A Rev. B 5126 2005  
(Drawing No.) (Nat'l. Bd. No.) (Year Built)

11. Working/test conditions: Working Temp. +150 F Max. -320 F Min. (All Streams/Chambers)  
(Horizontally tested)

Stream/Chamber MAWP (P.S.I.) Hydro., (Pneu) or Combination Test Pressure (P.S.I.)

A	109	164
B C	914	1005
D	580	638
E	435	479
F G	29	44

20. (a) Heat Exchanger for Service:

(b) Max. allowable working pressure of plate fin core determined by structural and proof tests:

(c) Parting Sheets: Mat'l SB209 -3003 Nom. Thk. NOTE 1 Width 48.00 Length 204.00

(d) Outside Sheets: Mat'l. SB209 -3003 Nom. Thk. .250 Width 48.00 Length 204.00

(e) Core Joints: Type: VACUUM Brazed Longitudinal Lgth. 204.00 Girth Lgth. 48.00

Side/End Bars: Mat'l SB221 -3003 Nom. Width 1.00 / 1.50

(f) Fins: Mat'l SB209 -3003

(g) Headers (Half Cylinders) (h) Header Ends

Stream/Purpose (Inlet, Outlet, Drain, etc.)	No.	Diam. or Size	Matl.	Nom. Thk.	End Type	Nom. Thk.	End Matl.	End Bracing Size/Type	End Bracing Matl.
A IN	1	16.000	SB2095083	.375	FLAT	1.000	SB2095083	N/A	N/A
A OUT	1	10.000	"	.250	"	.500	"	"	"
B IN	1	13.000	"	1.000	MITER	1.000	"	"	"
B OUT C IN	2	10.750	"	.750	"	.750	"	"	"
C OUT	1	5.563	"	.375	FLAT	.625	"	"	"
D IN	1	6.625	"	"	"	"	"	"	"
D OUT	1	10.750	"	.500	"	1.000	"	"	"
E IN	1	2.875	SB2415083	.203	"	.375	"	"	"
E OUT	1	10.750	SB2095083	.375	"	1.000	"	"	"
F IN	1	"	"	.250	"	.375	"	"	"

(i) Nozzle Permanent End Closures

Stream/Purpose (Inlet, Outlet, Drain, etc.)	No.	Diam. or Size	Type	Matl.	Nom. Thk.
A OUT	1	8.625	FLAT	SB2095083	.625

Headers, Ends, End Bracing  
and Nozzle Permanent  
End Closures  
Attached by Welding.

(j) Remarks: NOTE 1: .039 / .059 / .079

Articulate of Authorization: Type "U" No. 20,954 Expires JANUARY 6, 2007

Date 4/4/05 Name CHART Heat Exchangers L.P. Signed [Signature]  
(Manufacturer) (Representative)

Date APR 04 2005 Name [Signature] Commission NB 11873A WI100115  
(Authorized Inspector) (Nat'l. Board Incl. endorsement, State, Province and No.)

**FORM U-4 MANUFACTURER'S DATA REPORT SUPPLEMENTARY SHEET**  
As Required by the Provisions of the ASME Code Rules, Section VIII, Division 1

Form U-4  
PAGE 2 OF 2

1. Manufactured and certified by CHART Heat Exchangers L.P. 2191 Ward Avenue La Crosse, WI, USA 54601  
(Name and address of Manufacturer)

Manufactured for Air Liquide AGS GmbH  
(Name and address of Purchaser)

3. Location of installation Germany  
(Name and address)

4. Type: Vert. HEAT EXCHANGER 509.8-9  
(Horiz., vert., or sphere) (Tank, separator, heat exh., etc.) (Mfg's. Serial No.)

15770A Rev. B 5126 2005  
(CRN) (Drawing No.) (Nat'l. Bd. No.) (Year Built)

Additional Headers from page 1 of U4 form:

Stream/Purpose (Inlet, Outlet, Drain, etc.)		No.	Diam. or Size	Matl.	Nom. Thk	Header Ends: End Type	Nom. Thk.	Material	End Bracing Size/Type	End Bracing Matl
F OUT G IN	2	14.000	SB2095083	.250	FLAT	.375	SB2095083	N/A	N/A	
G OUT	1	18.000	"	"	"	.500	"	"	"	

Additional Nozzles, inspection, and safety valve openings from page 2 of U1 form:

Purpose (inlet, Outlet, Drain, etc.)	Diameter No. or Size	Flange type	Material Nozzle	Material Flange	Nozzle Thickness Nom. Corr	Reinforcement Material	How Attached Nozzle Flange	Location (Insp. Open.)
D IN	1	2.375	N/A	SB2415083	N/A	.154	N/A	N/A
E IN	1	1.900	"	"	"	.145	"	16.1(k)
F IN	1	10.750	"	"	"	.365	"	16.1(a)
G IN&OUT	2	14.000	"	"	"	.250	"	"

Remarks: \_\_\_\_\_

Certificate of Authorization: Type 'U' No. 20,954 Expires JANUARY 6, 2007  
 at 4/4/05 Name CHART Heat Exchangers L.P. Signed [Signature]  
 (Manufacturer) (Representative)

Date APR 04 2005 Name [Signature] Commissions NB NR 11873A WI100115  
 (Authorized Inspector) (Nat'l. Board Incl. endorsement, State, Province and No.)