

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: C

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 509.1-1 15772A Rev. A 5068 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

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.

9. MAWP SEE U-4 SEE-U4 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. Attachment

13. 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)														
(b)														

If removable, bolts used (describe other fastening)

N/A

(Mat'l Spec. No., Grade, Size, No.)

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

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

18. Hydro., pneu., or comb. test press. SEE U-4 Proof test N/A

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	1	14.000	N/A	SB2095083	N/A	.375	N/A	N/A	16.1(a)	N/A	N/A
A OUT	1	10.750	"	SB2415083	"	.365	"	"	"	"	"
A VENT	1	1.315	"	"	"	.133	"	"	16.1(k)	"	"

20. Supports: Skirt N/A (Yes or No) Lugs N/A (No.) Legs N/A (No.) Others PEDESTAL (Describe) Attached BOTTOM, 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)

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.

A IN NOZZLE MACHINED TO .250 WALL. A OUT NOZZLE MACHINED TO .158 WALL.

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.

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

Date 2/17/05

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 2-11-05, 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 FEB 17 2005

Signed [Signature]
(Authorized Inspector)

Commissions NB 11873A W1100115
(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. Expires

Date Name
(Assembler)

Signed
(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 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 ASME Code, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of 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 Signed
(Authorized Inspector)

Commissions
(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 1

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)

3. Location of installation Germany
(Name and address)

4. Type: Vert. HEAT EXCHANGER 509.1-1
(Horiz., vert., or sphere) (Tank, separator, heat exh., etc.) (Mfg's. Serial No.)

(CRN) 15772A Rev. A 5068 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.)
<u>A</u>	<u>109</u>	<u>164</u>

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. .039 Width 48.00 Length 96.00

(d) Outside Sheets: Mat'l. SB209 -3003 Nom. Thk. .250 Width 48.00 Length 96.00

(e) Core Joints: Type: VACUUM Brazed Longitudinal Lgth. 96.00 Girth Lgth. 48.00

Side/End Bars: Mat'l SB221 -3003 Nom. Width .81

(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 A VENT	1	12.750	"	"	"	"	"	"	"

(i) Nozzle Permanent End Closures

Stream/Purpose (Inlet, Outlet, Drain, etc.)	No.	Diam. or Size	Type	Mat.	Nom. Thk.
A IN	1	14.000	FLAT	SB2095083	1.000
A OUT	1	10.750	FLAT	SB2095083	.750

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

(j) Remarks: MAWP EXTERNAL = 47 PSIG (NOT TESTED BY CHART).

License of Authorization: Type 'U' No. 20,954 Expires JANUARY 6, 2007

Date 2/17/05 Name CHART Heat Exchangers L.P. Signed [Signature]
(Manufacturer) NB 11873A (Representative)

Date FEB 17 2005 Name [Signature] Commission WI 100115
(Authorized Inspector) (Nat'l. Board Incl. endorsement, State, Province and No.)

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:

C

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 509.1-2 15772A Rev. A 5069 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.

WP 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.

Attachment

13. 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.)

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

17. Impact test N/A

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

18. Hydro., pneu., or comb. test press. SEE U-4 Proof test _____

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	1	14.000	N/A	SB2095083	N/A	.375	N/A	N/A	16.1(a)	N/A	N/A
A OUT	1	10.750	"	SB2415083	"	.365	"	"	"	"	"
A VENT	1	1.315	"	"	"	.133	"	"	16.1(k)	"	"

20. Supports: Skirt N/A Lugs N/A Legs N/A Others PEDESTAL Attached BOTTOM, WELDED
(Yes or No) (No.) (No.) (Describe) (Where and now)

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)

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. A IN NOZZLE MACHINED TO .250 WALL. A OUT NOZZLE MACHINED TO .158 WALL.

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.

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

Date 2/17/05

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 2-11-05, 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 FEB 17 2005

Signed [Signature]
(Authorized Inspector)

Commissions NB 11873A WI 100115
(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. _____ Expires _____

Date _____ Name _____
(Assembler)

Signed _____
(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 _____ 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 ASME Code, Section VIII, Division 1. The described vessel was inspected and subjected to a hydrostatic test of _____ 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 _____ Signed _____
(Authorized Inspector)

Commissions _____
(Nat'l Board incl. endorsement, State, Province and No.)

FORM U-1 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 1

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)

3. Location of installation Germany
(Name and address)

4. Type: Vert. HEAT EXCHANGER 509.1-2
(Horiz., vert., or sphere) (Tank, separator, heat exh., etc.) (Mfg's. Serial No.)

15772A Rev. A 5069 2005
(CRN) (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.)
<u>A</u>	<u>109</u>	<u>164</u>

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. .039 Width 48.00 Length 96.00

(d) Outside Sheets: Mat'l. SB209 -3003 Nom. Thk. .250 Width 48.00 Length 96.00

(e) Core Joints: Type: VACUUM Brazed Longitudinal Lgth. 96.00 Girth Lgth. 48.00

Side/End Bars: Mat'l SB221 -3003 Nom. Width .81

(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 A VENT	1	12.750	"	"	"	"	"	"	"

(i) Nozzle Permanent End Closures

Stream/Purpose (Inlet, Outlet, Drain, etc.)	No.	Diam. or Size	Type	Mat.	Nom. Thk.
A IN	1	14.000	FLAT	SB2095083	1.000
A OUT	1	10.750	FLAT	SB2095083	.750

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

(j) Remarks: MAWP EXTERNAL = 47 PSIG (NOT TESTED BY CHART).

ificate of Authorization: Type 'U' No. 20,954 Expires JANUARY 6, 2007

Date 2/17/05 Name CHART Heat Exchangers L.P. Signed [Signature]
(Manufacturer) (Representative)

Date FEB 17 2005 Name [Signature] Commission NB 11873A
(Authorized Inspector) (Nat'l. Board Incl. endorsement, State, Province and No.)