

CRYOSIZER®



**ZERTIFIZIERTE TECHNIK
&
ZERTIFIZIERTES CRYOSIZER KONZEPT**



Konzipiert in Zusammenarbeit mit der Technischen Universität München (TUM)



Industrie Service

Druckgerät (für Gas verflüssigt, tiefkalt)

Betreiber

CRYOSIZER GmbH
Herr Dejan Blagojevic

Fürstenrieder Str. 279 a
81377 München

Bei Rückfragen:

Falko Golnik
Telefon: 0171 8605318
Telefax: 0711 7005-611
E-Mail: IS-AN1-STG@tuev-sued.de
TÜV Equipment: 2961588
PasswortNetinform:

Hersteller: Chart Ferrox
Fabriknummer: UNBEKANNT
Baujahr: 2018
max. zul. Temp: 20 / -196 °C
max. zul. Druck: 2,9 bar
Inhalt: 230 l

Beratungsumfang :Bespreehung der Aufstellungsbedingungen für einen Transportbehälter zur Lagerung von tiefkalten Stickstoff zur Versorgung einer Cryosauna.

Am 26.08.2019 erfolgte ein Vor-Ort-Termin unter Teilnahme von:
Frau Barbara von Kleist, Herr Dejan Blagojevic (Cryosizer-CEO), Herr Zelger
(Cryosizer-Gesundheitsberater).

Prüfgrundlage : - EN ISO 21029-2 Kryo Behälter-ortsbewegl. Behälter mit einem Fassungsraum von nicht mehr als 1000 L, Teil 2 Betriebsanforderungen Fassung 09/2015
- IGV Industriegaseverband e.V. Umgang mit tiefkalt verflüssigtem Stickstoff in ortsbeweglichen Kryobehältern

vorgelegte Unterlagen :

- Typenblatt Hersteller Kryo Behälter Chart-Ferrox, Decin (Czech Republic)
- (Bedienungsanleitung für o.a. Behälter, lag noch nicht vor)
- Gefährdungsbeurteilung Anlage / Betriebsanweisung der Anlage
- Grundriss des Aufstellungsraumes
- (Bedienungsanleitung Cryosauna ``Space Cabin``)

ZUSAMMENFASSUNG :

Die Aufstellung des Cryobehälter kann nur unter Berücksichtigung folgender Faktoren erfolgen :

- 1.) Der Behälter für kryogene Flüssigkeiten muß die entsprechende Zulassung verfügen (TPED).
- 1.1) absperzbare Rohrleitungsabschnitte sind mit Sicherheitsventil auszurüsten

Es wird hiermit keine vollständige Prüfung nach §§ 15 bzw. 16 BetrSichV dokumentiert, da für den vollständigen Umfang einer solchen Prüfung noch weitere Prüfschritte erforderlich sind.

Auftrags-Nr.: 20349445
Equipment-Nr.: 2961588
Material: 120-FPR
Datum: 26.08.2019

Zugelassene Überwachungsstelle
Seite 1 von 2

Telefon: 0711 7005-379
Telefax: 0711 7005-611
www.tuev-sued.de/is

TÜV[®]

TÜV SÜD Industrie Service GmbH
Niederlassung Stuttgart
Abteilung Anlagensicherheit
Gottlieb-Daimler-Str. 7
70794 Filderstadt



Industrie Service

Druckgerät (für Gas verflüssigt, tiefkalt)

2.) Es ist auf ausreichende Be- und Entlüftung des Aufstellungsraumes zu achten (s.a. Gefährdungsbeurteilung , Abschnitt ``Gefährdungen``). Der Lüfterlauf ist zu überwachen (Kontrollleuchte). Auf die Notwendigkeit der Überwachung der Raumluft wird auch in der Gefährdungsbeurteilung hingewiesen. Kontinuierliche Überwachung der Sauerstoffkonzentration durch einen Gassensor.

Das vorgestellte Gerät , Hersteller Fabr. seTools , kann diesbzgl. nicht bewertet werden. Die vorgelegte Bedienungsanleitung ist nicht vollständig.

3.) Die Treppe in das Untergeschoß ist durch eine entsprechende Tür zu verschließen (mit umlaufender Dichtlippe). Die Höhe der Tür ist der bestehenden Umschließungsmauer anzupassen. Der Zutritt zum UG ist einzuschränken.

4.) alle Mitarbeiter in dem Ladengeschäft sind in der Handhabung / Umgang mit der tiefkalten Flüssigkeit zu unterweisen

5.) Die Bedienungsanleitung des Kryobehälter ist zu beachten; ebenso die der Cryosauna.
Die Bedienungsanleitung der Cryosauna ist dem Betreiber in deutscher Sprache zur Verfügung zu stellen.

6.) Der Kryobehälter ist einer Prüfung vor Inbetriebnahme nach Betriebsicherheitsverordnung zu unterziehen

Die Zuluft über die Klimaanlage kann keine Berücksichtigung finden, da das bestehende Deckenkassettengerät nach dem Prinzip der Umlaufkühlung arbeitet, in seltensten Fällen mit Frischluft.

HINWEIS : die Gefährdungsbeurteilung ist nicht unterschrieben und somit kein rechtsgültiges Dokument

Ergebnis der Prüfung:

.....siehe oben.....

.....

Es wird hiermit keine vollständige Prüfung nach §§ 15 bzw. 16 BetrSichV dokumentiert, da für den vollständigen Umfang einer solchen Prüfung noch weitere Prüfschritte erforderlich sind.

Datum 26.08.2019

Sachverständige(r)

Falko Golnik



Industria Service

ZERTIFIKAT Certificate

Baumusterzulassung nach ADR/RID / Type approval according to ADR/RID

Zertifikat-Nr.: **0036-074-13 Rev. 0**
Certificate No.:

Gültigkeit / Validity: 2013-01-01 - 2022-12-31

Name und Anschrift des Antragstellers: Taylor-Wharton Germany GmbH, Mildstedter
Name and Postal Address of Applicant: Landstraße 1, D-25866 Mildstedt/Husum

Hiermit wird bescheinigt, dass der unten spezifizierte Typ die technischen Anforderungen des ADR/RID 2013 und der Richtlinie 2010/35/EU (TPED) erfüllt. / We herewith certify that the type specified below meets the technical requirements of ADR/RID 2013 and the directive 2010/35/EU (TPED).

Prüfbericht Nr.: P-IS-DDG-MUC-13-06-100006115-002-026,
Test Report No.: TÜV SÜD Industrie Service GmbH, 2013-09-26
RWTÜV-03/03/073-TWGE, RWTÜV-03/03/074-TWGE,
RWTUV (Malaysia) SDN.BHD, 3/31/2003,
RWTÜV/ENG-03/05-125, RWTUV (Malaysia)
SDN.BHD, 16 May, 2003

Typ, Norm, Zeichnung, Revision, Datum Kryo-Behälter / Cryogenic Receptacle EN 1251-2:2000
Type, Standard, Drawing, Revision, Date XL60/70/100/120/160/180 / TPED, Rev. 02, 12.07.13
(Anlage / Enclosure)

Fertigungsstätte Taylor Wharton Gas Equipment Sdn. Bhd.
Manufacturing Plant Lot Nos: Pt 5073, Jalan Jangur 28/43;
Hicom Industrial Estate, MAL-40400 Shah Alam

Anmerkung: Mit dieser Baumusterzulassung wird das Modul-B-Zertifikat 0036-025/03 nach
Richtlinie 1999/36/EG (TPED) weitergeführt.

Remark: By this type approval the module B certificate 0036-025/03 according
Directive 1999/36/EC (TPED) is continued.

(Ort, Datum)
(Location, Date)

München, 2013-10-02



TÜV SÜD Industrie Service GmbH
Inspection Body Xa / Notified Body 0036

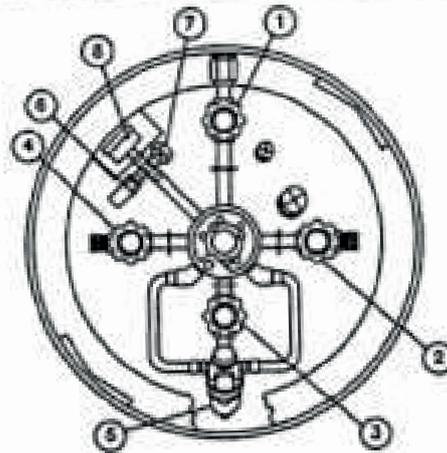
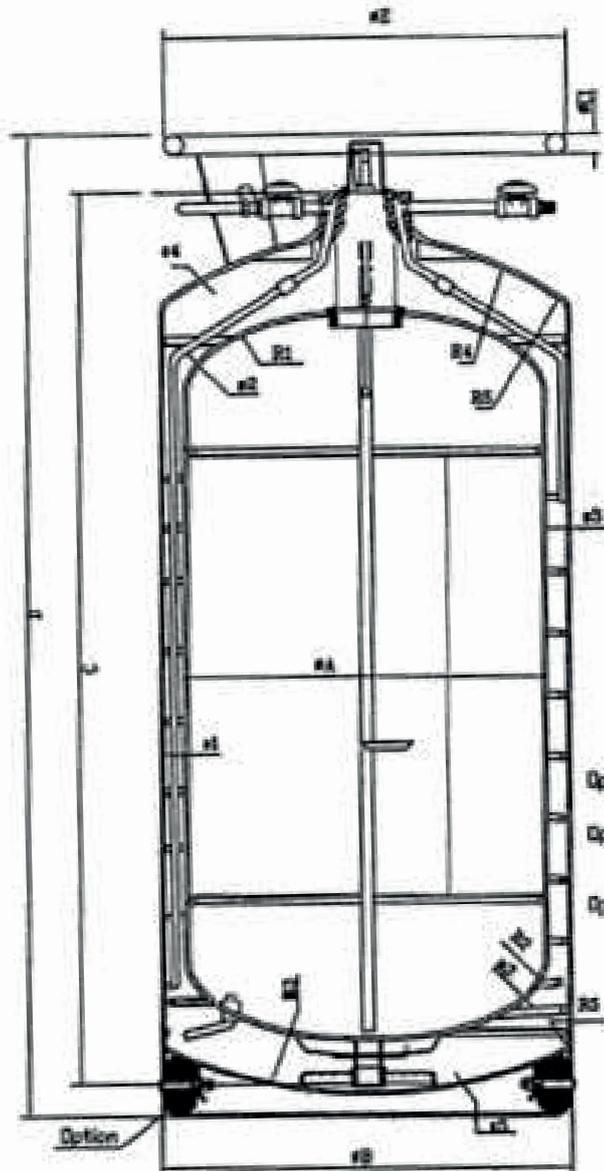
Klaus J. Meier

TÜV SÜD Industrie Service GmbH
Dampf- und Drucktechnik
Wiesendstraße 199
D-80000 München
Tel: +49 (0) 89 / 5791-1891
Fax: +49 (0) 89 / 5791-1810
www.tuv-sud.de



TUV®

ZERTIFIKAT ◆ CERTIFICATE ◆ CERTIFICADO ◆ CERTIFICAT ◆ ЗЕРТИФИКАТ ◆ 認証証書 ◆ CERTIFICATE ◆ ZERTIFIKAT



Werkstoffe:

Innenbehälter, Mantel und Boden

Stainless Steel Type 304 ASTM A-240

Note: "Single expert opinion", but with PMA and Inspection Certificate 32 acc. to EN 10004:2004 or 31C acc. to ISO 10474:1992, certified similar mechanical properties as per material 1.4301".

Außenbehältermantel und Boden

Stainless Steel Type 304 ASTM A-240

Stützen:

Stainless Steel Type 304 ASTM A-269 / A-312

Note: "Single expert opinion", but with PMA and Inspection Certificate 32 acc. to EN 10004:2004 or 31C acc. to ISO 10474:1992, certified similar mechanical properties as per material 1.4301".

- Option 1 Shut off valve, acc. to EN 1626 Cat. A, series of cash 2300 gas withdrawal.
- Option 2 Shut off valve, acc. to EN 1626 Cat. A, series of cash 2300 fluid withdrawal.
- Option 3 Shut off valve, acc. to EN 1626 Cat. A, series of cash 2300 pressure building.
- Option 4 Shut off valve, acc. to EN 1626 Cat. A, series of cash 2300 vent/overflow course.
- Option 5 Combined Pressure Building/Economizer regulator.
- Option 6 Safety valve Herose type 06-002.
- Option 7 Burst head.
- Option 8 Pressure gauge.

Maße	XL60	XL70	XL100	XL120	XL160	XL180
aA	457,2	457,2	457,2	457,2	457,2	457,2
aB	508	508	508	508	508	508
C	653	938	1016	1278	1277	1448
D	1043	1029	1293	1469	1464	1639
eA	498,5	498,5	498,5	498,5	498,5	498,5
eC1	28,6	28,6	28,6	28,6	28,6	28,6
s1	2,002,40	2,002,40	2,002,40	2,002,40	2,002,40	2,002,40
s2	2,002,40	2,002,40	2,002,40	2,002,40	2,002,40	2,002,40
s3	2,50	2,50	2,50	2,50	2,50	2,50
s4	2,50	2,50	2,50	2,50	2,50	2,50
s5	2,50	2,50	2,50	2,50	2,50	2,50
R1	411	411	411	411	411	411
R2	77,7	77,7	77,7	77,7	77,7	77,7
R3	609,6	609,6	609,6	609,6	609,6	609,6
R4	406,4	406,4	406,4	406,4	406,4	406,4
R5	36,32	36,32	36,32	36,32	36,32	36,32

() Maße sind alternativ Wandstärken

Betriebsüberdruck : 10bar/145psig

Prüfüberdruck : 14,3bar /207psig

min. Betriebstemperatur : -196°C /-321°F

XL60 / _____ XL70 / _____

XL100 / _____ XL120 / _____

XL160 / _____ XL180 / _____

Zulassungsnummer

Approval Number

0036-074-13

Bearb.

Gepr.

Norm

Datum

12.07.13

Name

sonus

Mass-Stab

(Gewicht)

Cryogenic receptacle in accordance with TPED 2010-35 EU, ADR/RSD 2013 for:

- refrigerated liquid Argon and Nitrogen (class 2, figure 3 A)
- refrigerated liquid Oxygen, class 2, figures 3 B

(Zeichnungsname)

XL60/70/100/120/160/180/ TPED

Revision

02

Ers. fuer:

Ers. durch:



TAYLOR-WHARTON MALAYSIA SDN. BHD.
SHAH ALAM, MALAYSIA

TÜV SÜD Industrie Service GmbH
0036 - 074 - 13 Rev. 0
Anlage 1/1 zum Zertifikat

Jase Europa

#1091950

1178010



Industrie Service

Prüfbescheinigung Druckgerät (für Gas verflüssigt, tiefkalt) Prüfung vor Inbetriebnahme nach §15 BetrSichV

Ordnungsprüfung, Technische Prüfung, gemäß TRBS 1201 Teil 2

Bei Rückfragen:

Falko Golnik
Telefon: 0171 8605318
Telefax: 0711 7005-611
E-Mail: IS-AN1-STG@tuev-sued.de

Cryosizer Kälteclub

TÜV Equipment: 2961588
Passwort Netinform: whg3sjek

Besch. Ident-Nr.: 2961588-120-AP-20191021
Hersteller: CHART FERROX
Fabriknummer: 31920525
Baujahr: 2019
max. zul. Temp: 20 / -196 °C
max. zul. Druck: 4,0 bar
Inhalt: 230,0 l
Raumbenennung: Hauptraum
Sich. Ausrüstg.: Generant ; 1,5 bar, A123494
Generant ; 4 bar , A121078
Beschickung: Stickstoff
Prüfdruck: 3,70 bar

Standort:

Cryosizer Kälteclub

Inventar-Nr.: CRYO-SAUNA

Die Prüfung konnte mängelfrei abgeschlossen werden.

Bemerkungen:

- A) Verbindungsschlauch zur Anlage : IBK, Nr. AB 394397 abgesichert mit Si-Ventil : HEROSE p = 16 bar, Ref-Nr. 1000627944/Ventil-Nr.: 10002551855
- B) -----> HINWEISE : entsprechend DIN EN ISO 21029-2 sind die Sicherheitseinrichtungen gegen Drucküberschreitung in Zeitabständen von unter 5 Jahren einer Funktionsprüfung zu unterziehen bzw. auszutauschen

Anlagenart bzw. Bezeichnung: Druckbehälteranlage (Kältesauna)

Nächste regelmäßig wiederkehrende Prüfungen: Äußere: Okt.2029. Festigkeit: Okt.2029. Druckanlage: Okt.2029.

Das Druckgerät befindet sich hinsichtlich des Betriebs soweit ersichtlich in ordnungsgemäßem Zustand, bezogen auf das Gefahrenfeld Druck. Bei Einhaltung der vorgesehenen Betriebsweise ist ein Betrieb bis zur nächsten wiederkehrenden Prüfung zulässig.

Sachverhalte, die die Eignung und Funktion der technischen bzw. organisatorischen Schutzmaßnahmen in Frage stellen, wurden nicht festgestellt.

Prüfung abgeschlossen am: 21.10.2019

Sachverständige(r)
Falko Golnik



Zugelassene Überwachungsstelle
Equipmentnr.: 2961588 (AnKa: ATH88HLYG6)
Material: 120-AP Kat.4/Anh.2(4)7.15
Datum: 21.10.2019
- Seite 1 von 1 -

Telefon: 0711 7005-379
Telefax: 0711 7005-611
www.tuev-sued.de/is



TÜV SÜD Industrie Service GmbH
Niederlassung Stuttgart
Abteilung Anlagensicherheit
Gottlieb-Daimler-Str. 7
70794 Filderstadt

Echtheitsüberprüfung über den aufgedruckten QR-Code in Verbindung mit der App TÜV SÜD Verify.

580001002950203

Prüfbescheinigung Überwachungsbedürftige Druckanlage (Druckbehälteranlage) Prüfung vor Inbetriebnahme nach §15 BetrSichV



Industrie Service

Ordnungsprüfung, Technische Prüfung, gemäß TRBS 1201 Teil 2

Bei Rückfragen:

Falko Golnik
Telefon: 0171 8605318
Telefax: 0711 7005-611
E-Mail: IS-AN1-STG@tuev-sued.de

Cryosizer Kälteclub

TÜV Equipment: 2961588
Passwort Netinform: sgx72var

Standort:

Cryosizer Kälteclub

Besch. Ident-Nr.: 2961588-120-ANL-20191021
Anlagenart: Druckbehälteranlage
Bezeichnung: Kältesauna
Herstell-Nr.: 31920525
Baujahr: 2019
Zugehörige Anlagenteile: siehe Berichtstext

Inventar-Nr.: CRYO-SAUNA

Die Prüfung konnte mängelfrei abgeschlossen werden. Bemerkungen:

- A) Eine Gefährdungsbeurteilung ist vorhanden
- B) Technische Lüftung mit Gassensor** zur Raumüberwachung. Absaugung an der Kammer und in Bodennähe. (**Fa. Oppermann; Inbetriebnahmeprotokoll vorhanden)
- C) Hinweis : Abnahmegrenze ist der Verbindungsschlauch zur Cryosauna ``Cryomed pro``. Die Kältesauna selbst war nicht Gegenstand der Abnahme
- D) Die Fristen für die wiederkehrenden Prüfungen wurden zusammen mit dem Betreiber Herrn M. Scherer festgelegt.

Nächste regelmäßig wiederkehrende Anlagenprüfung: Okt. 2029.

Die überwachungsbedürftige Druckanlage befindet sich hinsichtlich des Betriebs soweit ersichtlich in ordnungsgemäßem Zustand, bezogen auf das Gefahrenfeld Druck. Bei ordnungsgemäßer Betriebsweise ist ein Weiterbetrieb bis zur nächsten wiederkehrenden Prüfung zulässig.

Sachverhalte, die die Eignung und Funktion der technischen bzw. organisatorischen Schutzmaßnahmen in Frage stellen, wurden nicht festgestellt.

Prüfung abgeschlossen am: 21.10.2019

Sachverständige(r)

Falko Golnik



Zugelassene Überwachungsstelle
Equipmentnr.: 2961588
Material: 120-ANL Kat.4/Anh.2(4)7.15
Datum: 21.10.2019
- Seite 1 von 1 -

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Telefax: 0711 7005-611
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70794 Filderstadt

Echtheitsüberprüfung über den aufgedruckten QR-Code in Verbindung mit der App TÜV SÜD Verify.
58100002250303



Ferox Documentation Package

Model Description	EURO CYL 230/4 SB	
Serial Number	31920941-31920958	
Sales Order #	1582232	
Customer's PO# (if applicable)	03667150	
Declaration of Conformity		
Oxygen Clean Certificate		
Radiography Test Report		
Mechanical Test Report		
Relief Valve C of C		
Rupture Disc C of C		
Globe Valve C of C		
Material Test Report-Inner Shell	HT#	A53R
Material Test Report-Inner Top Head	HT#	A28E
Material Test Report-Inner Bottom Head	HT#	A28E
Weld Wire—long seam	HT#	553001
Weld Wire-attachments	HT#	278199
		276666
		552555



Ball Ground Facility
Phone: (770) 479.6531 Fax: (770) 479.4603

**Transportable Pressure Equipment
Declaration of Conformity**

Description of Pressure Equipment:

Manufacturer: CHART INC.

Model/type: Eurocyl 230/4 bar with plumbing

Serial #: **31920941-31920958**

Address: 1300 Airport Drive, Ball Ground, GA 30107, USA
Authorized Representative: CHART Ferox, a.s.,
Ustecka 30, 405 30 Decin, Czech Republic

Hereby declares that, the Transportable Pressure Equipment specified above has been designed, manufactured and tested in accordance with the requirements of the Transportable Pressure Equipment Regulations European Directive 2010/35/EU and ADR/2017/ECE/TRANS/257.

The following transposed European Harmonized standards and other technical specifications have been used: EN 1251-2

The following EC type examination certificate has been issued by the Notified Body:

Certificate No.: 128229
Certificate No.: 12-US-2928

Type of Approval
Notified Body Authorization

Notified Body: The Notified Body which inspected the manufacturer's Quality Assurance system:

**Apragaz
Chaussee de Vilvorde, 156
Bruxelles, Belgium B-1120
Notified Body Identification No. 0029**

Printed Name: Brittany Townsend **Date:** 8/5/19
Signed: Brittany Townsend **Date:** 8/5/19
Quality Records Coordinator



Ball Ground Facility
1300 Airport Drive
Ball Ground, GA 30107
770.479.6531 * fx: 770.479.4603

CERTIFICATE OF OXYGEN COMPATIBILITY COMPLIANCE

Chart Inc. certifies that the Cylinders with serial number range:

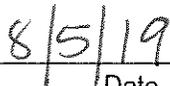
31920941-31920958

were manufactured in accordance with Charts internal specifications and procedures. The cylinders have been manufactured for Oxygen Service to meet the requirements and specifications of the Compressed Gas Association Pamphlet CGA G-4.1.

Signed,



Quality Records Coordinator



Date



Weld Test TPED/PED

Report No.: 26924-19

Part No.:	<u>14792459</u>	Material Heat No.:	<u>A53R</u>
Model:	<u>Eurocyl 230/4</u>	Welder No.:	<u>103269</u>
W/O No(s):	<u>2746842</u>	Wire Heat No.:	<u>553001</u>
		Long Seam Date:	<u>6/27/2019</u>
		Testing Operator:	<u>250024</u>

All reports are in compliance to referencing code under ISO certificate

Code/Standard/Edition: EN 4136 & EN 5173 / EN ISO6892-1, EN 9017-2013 Code for Manufacture and Inspection of Cryogenic Cylinders

Test conducted in accordance with:

1. Joint Tensile Test: EN 4136, EN 6892-1
2. Surface Bending Test: EN 5173
3. Rear Face Bend Test: EN 5173
4. Welded Part Impact Test: EN 21028-1, EN ISO 148-1

Joint Tensile Results Type 2 Test Piece

Sample	Dimensions (mm)	Area (sq.mm.)	Yield Strength @.2% (MPa)	Yield Strength @1% (MPa)	Ultimate Tensile Strength (MPa)	Fracture Location
26924	0.985*0.115	0.113	50800/350	57600/397	98100/676	Base Metal

Chart Requirement Values Unless Otherwise Specified	
Minimum Tensile Strength	Minimum Yield Strength
580 MPa	290 MPa @ .2%
	320 MPa @ 1%

Equipment Used	Calibration Due
Tinius Olsen SN# 323960	5/2020



Guided Bend Test Results

	Sample #	Dimension LxW	Former Dia	Distance between rollers	Bend angle	Original gauge length	Elongation	Remarks
Face bend	1	58.14*38.59	12.7	20.04	180	18.02	27.64	N/A
Root bend	2	58.14*38.28	12.7	20.04	180	18.02	27.64	N/A

Equipment Used	Calibration Due
Fischer BT1D SN# 809011335	5/2020

Reviewed By: _____

Date: _____

7/8/2019



Weld Test TPED/PED

Report No.: 26918-19

Part No.:	<u>14792459</u>	Material Heat No.:	<u>A53R</u>
Model:	<u>Eurocyl 230/4</u>	Welder No.:	<u>103269</u>
W/O No(s):	<u>2746842</u>	Wire Heat No.:	<u>553001</u>
		Long Seam Date:	<u>6/26/2019</u>
		Testing Operator:	<u>250024</u>

All reports are in compliance to referencing code under ISO certificate

Code/Standard/Edition: EN 4136 & EN 5173 / EN ISO6892-1, EN 9017-2013 Code for Manufacture and Inspection of Cryogenic Cylinders

Test conducted in accordance with:

1. Joint Tensile Test: EN 4136, EN 6892-1
2. Surface Bending Test: EN 5173
3. Rear Face Bend Test: EN 5173
4. Welded Part Impact Test: EN 21028-1, EN ISO 148-1

Joint Tensile Results Type 2 Test Piece

Sample	Dimensions (mm)	Area (sq.mm.)	Yield Strength @.2% (MPa)	Yield Strength @1% (MPa)	Ultimate Tensile Strength (MPa)	Fracture Location
26918	0.988*0.116	0.115	48500/335	55100/380	96000/662	Base Metal

Chart Requirement Values Unless Otherwise Specified	
Minimum Tensile Strength	Minimum Yield Strength
580 MPa	290 MPa @ .2%
	320 MPa @ 1%

Equipment Used	Calibration Due
Tinius Olsen SN# 323960	5/2020



Guided Bend Test Results								
	Sample #	Dimension LxW	Former Dia	Distance between rollers	Bend angle	Original gauge length	Elongation	Remarks
Face bend	1	58.19*39.39	12.7	20.09	180	19.18	25.13	N/A
Root bend	2	58.19*37.91	12.7	20.09	180	18.12	26.93	N/A

Equipment Used	Calibration Due
Fischer BT1D SN# 809011335	5/2020

Reviewed By: 

Date: 6/28/2019



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: March 29, 2019

Company: Chart Industries, Inc.

P.O. No.: 3643427

Lot No.: 187871

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 174489

Date Code: C19

% of Lot Tested.: 100

Serial No: A117830-A117929

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)

Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone for 22-49 Psig (-85° to 350° F (-65° to 176°C))	
K – PCTFE for Above 50 Psig (-320° to 165° F (-196° to 74° C))	

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠ WARNING

Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reset performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional 3/4 to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: May 14, 2019

Company: Chart Industries, Inc.

P.O. No.: 3648897

Lot No.: 188486

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 1746023

Date Code: E19

% of Lot Tested.: 100

Serial No: A121042-A121091

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company

GENERANT

Valves & *BJ-Lok* Fittings

TRANSPORTABLE PRESSURE EQUIPMENT DIRECTIVE (TPED) DECLARATION OF CONFORMITY

Manufacturer:

We hereby declare that the safety accessories specified below has been designed, manufactured and tested in accordance with the requirements of the:

Transportable Pressure Equipment Directive 2010/35/EU, 2008/68/EC, 2014/103/EU and ADR (Sections 1.8.7.2 and 1.8.7.6)

Authorized Representative:

Drukon GmbH
Hauptstrasse 29
02794 Spitzkunnersdorf
Germany

Description of Pressure Equipment:

Model: LCV-250B-K-58

Work Order #: 0297393

Sales Order: 188486

Date of Manufacture Code: E19

Body Material Lot Code: QCE

Serial #: A121042 to A121091

Conformity assessment procedure followed:

Type Approval: ADR Section 1.8.7.2

Quality Assurance: ADR Section 1.8.7.6

The Notified Body has issued the following EC certificates:

EU Type: Examination Certificate No.: 16-1008709-100

Product Quality Assurance: 16-1008709-101

Notified Body:

The Notified body that carried out the inspection and is involved in monitoring the Quality Assurance System:

Inspecta

P.O. Box 401 (Höjdrodergatan 12)

SE-201 24 Malmö, Sweden

Notified Body Identification Number: 0409

Note:

Products labeled "Cleaned for Oxygen Service" are "EN-12300-O2" and meet or exceed CGA G-4.1 Cleaning Equipment for Oxygen Service.

Standard Cleaned Products are "EN-12300".

User Instructions Included

Signed: _____

S. C. Samanli
Authorized Quality Representative

Date: _____

05-13-2019

QC-FR-049
Rev. I
DCR4247



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)

Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone	for 22-49 Psig (-85° to 350° F (-65° to 176°C))
K – PCTFE	for Above 50 Psig (-320° to 165° F (-196° to 74° C))

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠ WARNING

Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reseal performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional ¼ to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: May 29, 2019

Company: Chart Industries, Inc.

P.O. No.: 3650502

Lot No.: 188657

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 1746023

Date Code: E19

% of Lot Tested.: 100

Serial No: B72439-B72463

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company



Valves & *BJ-Lok* Fittings

**TRANSPORTABLE PRESSURE EQUIPMENT DIRECTIVE (TPED)
DECLARATION OF CONFORMITY**

Manufacturer:

We hereby declare that the safety accessories specified below has been designed, manufactured and tested in accordance with the requirements of the:

Transportable Pressure Equipment Directive 2010/35/EU, 2008/68/EC, 2014/103/EU and ADR (Sections 1.8.7.2 and 1.8.7.6)

Authorized Representative:

Drukon GmbH
Hauptstrasse 29
02794 Spitzkunnersdorf
Germany

Description of Pressure Equipment:

Model: LCV-250B-K-58

Work Order #: 0298094

Sales Order: 188657

Date of Manufacture Code: E19

Body Material Lot Code: QCE

Serial #: B72439 to B72463

Conformity assessment procedure followed:

Type Approval: ADR Section 1.8.7.2

Quality Assurance: ADR Section 1.8.7.6

The Notified Body has issued the following EC certificates:

EU Type: Examination Certificate No.: 16-1008709-100

Product Quality Assurance: 16-1008709-101

Notified Body:

The Notified body that carried out the inspection and is involved in monitoring the Quality Assurance System:

Inspecta
P.O. Box 401 (Höjrodergatan 12)
SE-201 24 Malmö, Sweden

Notified Body Identification Number: 0409

Note:

Products labeled "Cleaned for Oxygen Service" are "EN-12300-O2" and meet or exceed CGA G-4.1 Cleaning Equipment for Oxygen Service.

Standard Cleaned Products are "EN-12300".

User Instructions Included

Signed: S. C. Ganguli
Authorized Quality Representative

Date: 05-29-2019

QC-FR-049
Rev. I
DCR4247



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

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Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
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48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone for 22-49 Psig (-85° to 350° F (-65° to 176°C))	
K – PCTFE for Above 50 Psig (-320° to 165° F (-196° to 74° C))	

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠️WARNING: Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

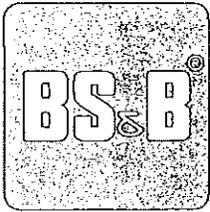
1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reseal performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional ¾ to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.

Generant Company, Inc.
1865 Route 23 South P.O. Box 768 Butler, New Jersey 07405 Phone 973.838.6500 Fax 973.838.4888
www.generant.com

EN-FR-014
Rev F
DCR4020



CERTIFICATE OF CONFORMANCE

04/09/2019

BS&B SAFETY SYSTEMS, L.L.C.

Customer: BS&B INVENTORY MGMT. SYS LLC
Certified To: BS&B INVENTORY MGMT. SYS LLC
ATTN: KEN RICHARDSON
PO BOX 470590
TULSA
OK 74147-0590
P.O.Number: STOCK MAS/CON/STOCK
S.O.Number: 18006050B01-1

We certify that the items described in this document have been manufactured, inspected and tested in accordance with the standards applicable to our industry. The original test data is on file and available for your examination. CE Marked in accordance with the EU Pressure Equipment Directive 2014/68/EU, MODULES B+D. EN ISO 4126-2.

Type: S/K A-1 FRB
Quantity: 441
Attachments: CERT PACKAGE FROM ORIGINAL CSS ORDER (18006050B01-1)

Tab Marking: 20632414



A handwritten signature in black ink, appearing to read 'Ken Richardson', is written over a horizontal line.

QA/QC DEPARTMENT



BURST TEST CERTIFICATE & DECLARATION OF CONFORMITY

Customer: Chart Canton
Certified to: Chart Canton
Tulsa, OK

Date: 4/1/2019
P.O. Number: Stock Mas/Con/Stock
BS&B Lot#: 18006050B01-1
CSS Lot #: 18990155B01-1
Size: 0.375"
Type: S/K A-1 FRB

Quantity Shipped: 441 pcs
Quantity Tested: 14 pcs

Disk Material: 316 SS
Heat Number: V2J2

We certify that the items described in this document have been manufactured, inspected and tested in accordance with the standards applicable to our industry. The original test data is on file and available for your examination. CE marked in accordance with the EU Pressure Equipment Directive 2014/68/EU, Module B + D. EN ISO 4126-2.

BURST TEST RESULTS

Numerical Value	Pressure Unit	@ Temperature
6.14, 6.02, 6.07, 5.83, 5.76, 5.83, 5.97	Barg	22 °C
6.05, 5.89, 6.01, 5.87, 6.09, 6.04, 5.87		

RATED RUPTURE

Numerical Value	Pressure Unit	@ Temperature
5.42 min, 6.30 max	Barg	22 °C
Est 4.23	Barg	400 °C

Other Details:

Part marking: 20632414, Est 4.23 barg @ 400°C

QC Inspector: Doug Sitko CQE

Attachments: Mill test report
Declaration of Conformity

Manufactured in Minneapolis, MN – USA
EN ISO 4126-2, YR2019, 0496

Custom Safety Solutions LLC

Doug Sitko

Quality Department

4/1/2019

7664 West 78th Street • Minneapolis MN 55439
(952) 941-0146 • Fax: (952) 941-0646



Custom Safety Solutions, LLC

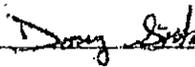
Declaration of Conformity EU Pressure Equipment Directive 2014/68/EU

Custom Safety Solutions LLC. declares that the products described below have been assessed by the Notified Body, DNV-GL, under conformity assessment Annex III Module B of the Directive and have been certified by the Notified Body DNV-GL as conforming to the Pressure Equipment Directive 2014/68/EU. Other technical standard used: EN 4126-2.

Bursting Disk Type	EC Type Examination Certificate Number
FRB	PED-B-147

Custom Safety Solutions, LLC. declares that our quality system had been assessed by the Notified Body, DNV-GL Business Assurance Italia, under conformity assessment Module D of the Directive and has been certified by the Notified Body as conforming to the Pressure Equipment Directive 2014/68/EU under certificate number 9457-2017-CE-USA-ACCREDIA.

Signed on behalf of Custom Safety Solution, LLC.



Doug Sitko
Quality Engineer

April 1, 2019

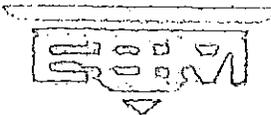
Date



Custom Safety Solutions, LLC
7664 78th Street
Minneapolis, MN 55439
USA
Tel: 952-600-9865
Fax: 952-941-0846
Email: sales@customsafetysolutions.com

Notified Body 0498

Det Norske Veritas-GL
DNV GL Business Assurance Italia
S.r.l.
Via Energy Park, 14
20871 Vimercate (MB)
Italy



ELGILOY SPECIALTY METALS
 1685 FLEETWOOD DRIVE
 ELGIN, IL 60123
 Phone: (847)885-1800
 Fax: (847)883-0169
 http://www.elgiloy.com

WORK ORDER NO.
 NO D'ORDRE
 KOM. NR
 161765

LOT CODE
 213459

Page No.
 1 of 1

Material Testing Performed by
 Elgiloy Specialty Metals
 1685 Fleetwood Drive
 Elgin, Illinois 60123

INSPECTION CERTIFICATE / CERTIFICAT DE RECEPTION / ABNAHMEPRUFZEUGNIS
 EN 10204:2004 - 3.1

CUSTOMER / CLIENT / BESTELLER	PRODUCT / PRODUIT / PRODUKT	SPECIFICATION / SPECIFICATION / SPEZIFIKATION
CUSTOM SAFETY SOLUTIONS LLC 7884 W 78TH STREET BLOOMINGTON, MN 55439	316L BAZ ANNEALED COIL Thickness(In.): .003+/- .0002(.0028/.0032) Width: 1.250+/- .005 Cust.Part #01-082-08K-01	ASTM A240 Rev# 18a

CUSTOMER REFERENCE COMMANDE NO. AUFTRAGS - NR.	QUANTITY SHIPPED QUANTITE Lbs	HEAT NUMBER NUMERO DE COULEE CHARGEN - NR.	MILL SOURCE MOULIN MUHLE	ORIGIN COUNTRY ORIGINE URSPRUNG
2115	107.01	V22	NORTH AMERICAN STAINLESS	USA

CHEMICAL ANALYSIS % PULLED FROM ORIGINAL MILL CERTIFICATION / ANALYSE CHIMIQUE / CHEMISCHE ANALYSE

C	Mn	P	S	Si	Cr	Ni	Mo	Cu	N
0.0141	1.377	0.028	0.008	0.244	18.88	10.04	2.007	0.422	0.0442

Physical Properties at RT / Propriétés Physiques à Temp. Ambiante / Physikalische Eigenschaften bei RT

Tensile Res. à la Trac. Zugfestigkeit PSI ASTM E8	0.2% Yield Strength Limit Elast. à 0.2% 0.2% Streckgrenze PSI ASTM E8	Elong. Along Dehnung % ASTM E8	%R.A. ASTM E8	Grain Size Grossueur de Grain Korngrösse ASTM E112	Hardness Dureté Haerte ASTM E284/E18	Conditions
T 89000 L	T 61000 L	T 64 L			T 76 HRBW (500gr) L (138 HV (800gr))	(As Supplied)

Tensile Test at Elevated Temp / Essai de Traction à Hts. Temp / Warm Zugversuch			Stress Rupt / Essai de Pliage / Zugschadenversuch				
Test Essai Versuch Temp F	Tensile Res. à la Trac. Zugfestigkeit PSI	0.2% Yield Strength Limit Elast. à 0.2% 0.2% Streckgrenze PSI	Elong. Along Dehnung %	Test Essai Versuch Temp F	Stress Constrained Spannung PSI	Hours Heures Stunde	Elong. Along Dehnung %

WRAP TEST / ESSAI DE PLAGES / WICKELTEST	BEND TEST / ESSAI D'ENROULEMENT / BIEGETEST	IGA	IGO	MICROSTRUCTURE

Testing Source
 Etchant Type
 R-Factor
 Comments: CHEM. FROM ORIGINAL MILL CERT, HV PER ASTM E834.

Received 2/23/17
 DRS



WE HEREBY CERTIFY THE MATERIAL SHIPPED TO THE ABOVE-SPECIFIED SPECIFICATION CONFORMS TO THE STATED CHEMICAL AND PHYSICAL REQUIREMENT TERMS AND PROCESSED FREE OF MERCURY (UNLESS OTHERWISE STATED).
 NOUS CERIFIONS QUE LA LIVRAISON A ETE VERIFIEE ET EST CONFORME AUX STIPULATIONS DE L'ACCEPTION DE LA COMMANDE.
 ES WIRD BESTAETIGT, DASS DIE LIEFERUNG GEPRUEFT WURDE UND DEN VEREINBARUNGEN BEI DER BESTELLANNAHME.

MARK OF THE MANUFACTURER / SIGLE DU PRODUCTEUR / ZEICHEN DES HERSTELLERS
 INSPECTORS STAMP / PROINCON DE L'INSPECTEUR / ZEICHEN DES SACHVERST AENDIGEN
 AUTHORIZED SIGNATURE: *Glenn Aquino*
 GLENN AQUINO, LABORATORY SUPERVISOR
 DATE / DATE / DATUM: 02-22-17

THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELGILOY SPECIALTY METALS. THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OF ENTRIES ON THIS DOCUMENT MAY BE A PUNISHABLE OFFENCE UNDER FEDERAL AND STATE LAW



**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Chem, NY 41045-9615
(502) 347-6800

Customer: 0018 001 Part No: 6/01/2015 Page: 1
 Order No: 64144 01 Part No: 316716
 Order No: 0018 001 Part No: 316716

Your Order: 01026769 Lab Order: AX 0654832 01 Corrosion: AXN 12/16/2015/11/20/15-01

PRODUCT DESCRIPTION

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

316L SS COIL, C.A. METALOID & WICKED, DIM 31600/31609

Product ID	Supplier ID	Thickness	Width	Weight	Length	Mark	Placer	Inventory Code
03V202 B	* 81V282	.0300	48.4000	28.050	0000	3173.7	11	1 3171A

CHEMICAL ANALYSIS (Capacity of Lab) (Specify) (United States) (Approx) Chemical analysis per ASTM A711/08

Lab Supplier ID	C %	N %	CO %	SI %	MN %	P %	S %	NI %	CR %	MO %	CU %	NI %	SI %	P %	S %
V202 V202	0.041	0.000	0.028	1.3770	2.0770	0.042	16.0400	0.030							
Lab Check:	0.043	0.001	0.048	1.4082	2.0880	0.038	16.0173	0.0275							
Lab Check:															

MECHANICAL PROPERTIES

Product ID	Supplier ID	Y %	TS %	YS %	20C %	30C %	40C %	50C %	60C %	70C %	80C %	90C %	100C %	Red	Hard	D Per	P.R.
03V202 B	81V282	58.34	49.34	59.05	60.52	64.50	68.00	72.00	76.00	80.00	84.00	88.00	92.00			2.17	

779353, 779353

JUN 28 2015

AX 0654832 01

6/01/2015

Kyle Lunsford

UNITED PERFORMANCE METALS
 This is only valid if purchased with the metals
 and the metal shipped on your purchase order
 unless to be shipped

Lab Order No
 P.O. Order No
 Date of Order

Customer Order No
 Order Entry Order No
 Lab Order No



MUELLER BRASS CO.

LOCATIONS:

2199 LAPEER AVENUE
PORT HURON, MICHIGAN 48860

302 ASHFIELD STREET
BELDING, MICHIGAN 48809

Control No: 1043366



In let

CERTIFIED TEST REPORT

Sold: 00062063
To: COPPER AND BRASS SALES
ATTN ACCOUNTS PAYABLE
P.O. BOX #5116
SOUTHFIELD, MI 48086-5116

Ship: 00060085
To: COPPER & BRASS SALES
3001 ALOUETTE DR
GRAND PRAIRIE, TX 75052

Cust PO: 5400398166
Cust Part: CUHEX00116
Type/Size: ROD HEX 1.1250
Cust Spec: ASTM B16/16M-10

MBCo SO: 484799 Ln 60 Cert Lvl: 4
Part Nbr: 3600129 FC
Qty Shpd: 4,412 UM: Lbs
BOL: 50696978 Shpd: 05/01/18

Mechanical Properties			
Lot Number: L653247	Temp: R02 1/2 H BRA	CDA Alloy: C36000	
Yield Strength (Ksi)	Tensile Strength (Ksi)	Elongation % in 2 Inches	Hardness Rb
34	53	52	60

HgNO3: pass per ASTM B154-12

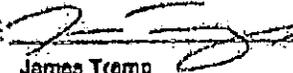
Chemical Analysis (%)							
	Cu	Pb	Fe	Zn			
ASTM B16/16M-10	60.0-63.0	2.5-3.0	0.35 Max	REM			
Lot Number: L653247	61.4	2.7	0.17	REM			

TOTAL OTHER ELEMENT MAX: .50

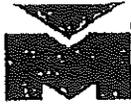
We hereby certify to the chemical and mechanical properties reported herewith and to the fact that they were determined in conformance with the specification noted above or any exceptions to this specification we have granted. We also hereby certify that the material furnished on this order is free from mercury contamination and that no mercury bearing equipment was used in the manufacture of these items.

Melted and Manufactured in USA

Conflict Minerals Compliant
Produced in Compliance with:
EN 10204 3.1
EU Directives
2011/65/EU (RoHS 2 Compliant)
2000/53/EC

By:  05/01/18
James Tromp
Metallurgist

outlet



MUELLER BRASS CO.

LOCATIONS:

2109 LAPEER AVENUE
PORT HURON, MICHIGAN 48060

302 ASHFIELD STREET
BELDING, MICHIGAN 48809

Control No: 1043360



CERTIFIED TEST REPORT

Sold: 00062063
To: COPPER AND BRASS SALES
ATTN ACCOUNTS PAYABLE
P.O. BOX #5116
SOUTHFIELD, MI 48086-5116

Ship: 00060085
To: COPPER & BRASS SALES
3001 ALOUETTE DR
GRAND PRAIRIE, TX 75052

Cust PO: 5400398166
Cust Part: CURD00992
Type/Size: ROD RND 1.1250
Cust Spec: ASTM B16/16M-10

MBCo SO: 484799 Ln 120 Cert Lvl: 4
Part Nbr: 3600516 FC
Qty Shpd: 2,102 UM: Lbs
BOL: 50696978 Shpd: 05/01/18

Mechanical Properties			
Lot Number: L657232	Temp x1 RR02 1/2 H BRN	CDA Alloy: C36000	
Yield Strength (Ksi)	Tensile Strength (Ksi)	Elongation % in 2 Inches	Hardness Rb
35	54	32	55

HgNO3: PASS per ASTM B154-12

Chemical Analysis (%)						
	Cu	Pb	Fe	Zn		
ASTM B16/16M-10	80.0-83.0	2.5-3.0	0.35 Max	REM		
Lot Number: L657232	61.3	2.7	0.16	REM.		

TOTAL OTHER ELEMENT MAX: .50

We hereby certify to the chemical and mechanical properties reported herewith and to the fact that they were determined in conformance with the specification noted above or any exceptions to this specification we have granted. We also hereby certify that the material furnished on this order is free from mercury contamination and that no mercury bearing equipment was used in the manufacture of these items.

Mined and Manufactured in USA

Conflict Minerals Compliant

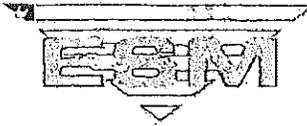
Produced in Compliance with:
EN10204 3.1
EU Directives:
2011/85/EU (RoHS 2 Compliant)
2000/53/EC

By:

James Tremp
Metallurgist

05/01/18





ELGILOY SPECIALTY METALS
 1565 FLEETWOOD DRIVE
 ELGIN, IL 60123
 Phone: (847)895-1900
 Fax: (847)895-0169
 http://www.elgiLOY.com

WORK ORDER NO. NO D'ORDRE KOM. NR	LOT CODE	Page No.
198260	319208	2 of 2

Material Testing Performed by
 ElgiLOY Specialty Metals
 1565 Fleetwood Drive
 Elgin, Illinois 60123

INSPECTION CERTIFICATE / CERTIFICAT DE RECEPTION / ABNAHMEPRUFZEUGNIS
 CERTIFICATE OF CONFORMANCE / CERTIFICAT DE CONFORMITÉ / KONFORMITÄTSBESCHEINIGUNG
 EN 10204:2004 - 3.1

WRAP TEST / ESSAI DE PLIAGE / WICKELTEST	BEND TEST / ESSAI D'ENROULMENT / BIEGETEST	IGA	IGO	MICROSTRUCTURE
Tail:				
Grain Size at Grain Size Magnification	Hardness Test Method	IGA/IGO Test Mag.	Micro Mag.	Alpha Case Test
at	E384			
Chemistry is original from mill	Y	Inclusion Rating Test Method		
ESR is original from mill				
ASTM A262 Method A:		Type A	Type B	Type C
ASTM A262 Method B:		Thin	Thin	Thin
ASTM A262 Method C:		Thick	Thick	Thick
ASTM A262 Method E:				
Elevated Temp Test is Periodic				
Elevated temp conformance based on 1 test				
Stress Rupture Test is Periodic				
Stress Rupture conformance based on 1 test				
NON-Conforming Use As Is Waiver Approved by				
OK to slit and pack only approved by				
Complete Cert. of Conformance to follow, Customer approval				
Testing Source				
Etchant Type				
R-Factor				
Comments	Chem from original mill, HV per ASTM E384			

Received 1-26-18
 Approved DRS



WE HEREBY CERTIFY THE MATERIAL SHIPPED TO THE ABOVE-SPECIFIED SPECIFICATION CONFORMS TO THE STATED CHEMICAL AND PHYSICAL REQUIREMENT TERMS AND PROCESSED FREE OF MERCURY (UNLESS OTHERWISE STATED).

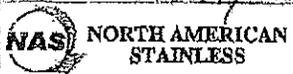
NOUS CERTIFIONS QUE LA LIVRAISON A ETE VERIFIEE ET EST CONFORME AUX STIPULATIONS DE L'ACCEPTION DE LA COMMANDE.
 ES WIRD BESTAETIGT, DASS DIE LIEFERUNG GEPRUEFT WURDE UND DEN VEREINBARUNGEN BEI DER BESTELLANNAHME.

All hardness conversions for Cobalt based alloys are to be considered as approximations only as no standard hardness conversion table exists in ASTM E140 for this alloy family. ESM uses Table 1 or Table 3 of ASTM E140 depending on hardness to provide an approximate conversion.

ROHS COMPLIANT; REACH COMPLIANT; FREE OF CONFLICT MINERALS AS PER DODD-FRANK ACT; MATERIAL FREE OF MERCURY, RADIUM and ASBESTOS; RADIOACTIVE FREE

MARK OF THE MANUFACTURER / SIGLE DU PRUDUCTEUR / ZEICHEN DES HERSTELLERS	
INSPECTORS STAMP / PPOINCON DE L'INSPECTEUR / ZEICHEN DES SACHVERST AENDIGEN	
AUTHORIZED SIGNATURE:	DATE / DATE / DATUM: 01-22-18
 GLENN AQUINO, LABORATORY SUPERVISOR	

THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELGILOY SPECIALTY METALS. THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OF ENTRIES ON THIS DOCUMENT MAY BE A PUNISHABLE OFFENCE UNDER FEDERAL AND STATE LAW



Abnahmeprüfzeugnis
INSPECTION CERTIFICATE
ACCORDING TO: EN 10204 - 3.1
NACH:

5870 Highway 42 East
Ghent, KY 41049-9613
Tel: 502-347-6000
Fax: 502-347-6001

Besteller - Customer: ELCHLO SPECIALTY METALS DIV. OF COMBINED METALS OF CHICAGO, INC ONE MAUR ROAD HAMPSHIRE, IL 60140	Probe Nr. - Inspection: 120386 02 Bestellung Nr.-cus: Order: 51189H NAS Auftrag Nr.-NAS Order: AM 076190J Pos Nr. -Item: 02	Datum - Date: 8/07/2017 Werkbez. - Works Order: 316/316L Zeugnisform -Product: 2D
Nachstoff Nr. und Lieferzustand - Material No. and Condition of Delivery: STAIN S7L COIL, C.N. UNSALED & PICKLED; UNS 31600/31603 EN10028-7 1.4401/1.4404 / EN 13204 3.1 / Pkt 97/23/0C ASTM A240/15a, A300/15b, A666/15; ASME SA240/15, SA400/15, SA666/15 MIN. SOLUT/TON ANNEAL TEMP 1300F, WATER QUENCHED 1389 - BSHH 316Lb V 316L ANNEALED		
Anforderungen - Technical Requirements: PM 97/23/0C		

Abnahme Nr. - Heat:	Prüfgegenstand - Article:	Abmessung - Dimension: M / B	Probe Nr. - Test:	Stückzahl - Quantity:	Gewicht - Mass/ty:
476T 476H	COIL COIL	.8600 X 953.0000 X 1000.1 .8600 X 953.0000 X 1307.3	03476T BA 01476T BB 08476T B 08476T B	1 1	6,21 2,36

Chemische Analyse - Chemical Composition

Schmelz Nr. - Heat:	Lab. Accreditation Bureau, ISO/IEC 17025, Certified (333)										
	EN (Germany)					US (United States)					SA (South Africa)
Anforderungen - Requirements:	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Nb	Co
Heat	0.035	0.060	0.005	0.005	0.030	16.000	10.000	0.000	0.000	0.000	0.000
476T	0.030	0.060	0.005	0.005	0.030	16.030	10.000	0.000	0.000	0.000	0.000

Mechanische Eigenschaften - Mechanical Properties

Probe Nr. - Test:	Prob. Lage - Pos. of Test:	Zug - Tensile				Bruch - Elong.		Zugfestigkeit - Yield	
		Rm	Rm	Rm	Rm	A	B	ReH	ReL
Anforderungen - Requirements:		483	172	40	6				
		590	440	80	13				
03476T BA	03476T BA	579.50	903.83	417.00	48.71	89.50	85.00	9.00	OK 576554
08476T B	08476T B	576.45	368.81	191.29	46.63	84.00	85.00	9.00	OK 576555
		98,575	58,516	60,504					
		98,154	53,514	56,776					

Beachtung und Maßkontrolle wurden durchgeführt. D.H. Visual dimensional inspection was objective. Der Werkstoff ist beständig gegen intermetallische Korrosion gemäß EN ISO 3651-2 / ASTM A262 Practice B. The material is resistant to intergranular corrosion test according to: EN ISO 3651-2 / ASTM A262 Practice B Spektroskopische Identifizierung: O.B. Spectroscopic identity test: O.K. Wärmebehandlung: Glühen bei: 1100 - 1100°C Heat treatment: 1010 - 1100°C and Abkühlen mit Luft Cooling with air/Bezugszustand: - Stechprüfung Prozess EAF + AOD + CC	Qualitätssicherungssystem zertifiziert nach AD 2000 W0 und ENR 97/23/EN; Anhang 1, par. 4.3, TÜV SÜD INDUSTRIE SERVICE GmbH, Bonnstraße 100b, 50829 Köln. Quality System certified according to AD 2000 W0 and ENR 97/23/EN, Annex 1, par. 4.3, by TÜV SÜD INDUSTRIE SERVICE GmbH, Brunnenstraße 100b, 50829 Köln.	WERKSACHVERSTÄNDIGER WORKS INSPECTOR: KRIST LARK, Technical Dept. Mgr. Im Übereinstimmen mit dem TÜV SÜD Industrie Service GmbH wird auf eine Gegenüberstellung mit Schreiber vom 28. Februar 2017 durch TÜV SÜD Industrie Service GmbH verzichtet. In agreement with TÜV SÜD Industrie Service GmbH, the counterchecking obligation has been waived according to a letter by TÜV SÜD Industrie Service GmbH dated February 28th 2017.
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Certificate of Conformance

Date: 06/05/2019

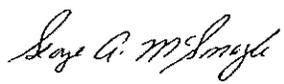
Customer: CHART INC.- CANTON

Customer P.O. Number: 3656656

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
T009464DAG			650		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336)226-3244 Fax (336)226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 856478

Date: 6/05/19

Sold to: CHART INC.- CANTON
ACCOUNTS PAYABLE
P.O. BOX 7267
PHILADELPHIA PA 19

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

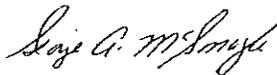
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following Items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
650	T009464DAG	VLV, SHUT OFF ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH



Certificate of Conformance

Date: 05/09/2019

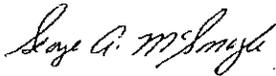
Customer: CONSIGNMENT - CHART INC.

Customer P.O. Number: 3652321--CONSIGNMENT

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
TES008464DAB	11769595	VALVE BRS BH 3/8 FPT*3/8 SCH10	70		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336)226-3244 Fax (336)226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 851999

Date: 5/09/19

Sold to: CONSIGNMENT - CHAR
ACCOUNTS PAYABLE
1300 AIRPORT DRIVE
BALL GROUND GA 301

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

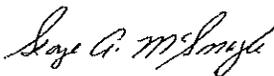
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following Items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
70	TES008464DAB	VLV,CRYO EXT STEM ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH



REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336) 226-3244 Fax (336) 226-6294

V.P. of Quality Assurance

George A. McLaughlin

Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany.

Is the authorized representative of ECII established within the European Union.

Freddy Dayk, Operations-Manager, RegO GmbH

F. Dayk

Certificate of Conformance

Date: 06/14/2019

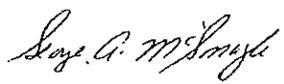
Customer: CHART INC. - CANTON

Customer P.O. Number: 3661722

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
T009464DA	11905956	Valve 3/8 FPT BY 3/8 SCH 10	150		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336) 226-3244 Fax (336) 226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 858420

Date: 6/14/19

Sold to: CHART INC.- CANTON
ACCOUNTS PAYABLE
P.O. BOX 7267
PHILADELPHIA PA 19

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

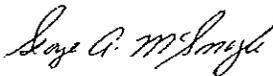
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
150	T009464DA	VLV, SHUT OFF ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH





**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 469756 02 Mail To:
Customer: 0045 704
KLOECKNER METALS CORPORATION
GRANT PLANT
ONE WHITEHORSE ROAD
GREENVILLE, SC 29605

Ship To:
KLOECKNER METALS CORPORATION
GRANT PLANT
ONE WHITEHORSE ROAD
GREENVILLE, SC 29605

Date: 12/19/2018 Page: 1
Steel: 304
Finish: 2B

Your Order: GRN-7321599

NAS Order: AN 0827853 01

Corrosion: ASTM A262/15 A;180Bend-0

PRODUCT DESCRIPTION:

STNLS STL COIL, C.R. ANNEALED & PICKLED; UNS 30400
EN10028-7 & EN10088-2, 1.4301
ASTM A240/17,A480/16b,A666/15;ASME SA240/17,SA480/17,SA666/17
AMS5513J XMRK; MIL-S-5059D AMD3(X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07;QSS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001
RoHS Directive 2002/95/EC
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	REQ. NO.
05A53R AA	* 05A53R AA	.1200	23.8750	12,220	COIL	1312.8	4	1

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)
ANAB, ISO/IEC 17025, Certificate# I2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A53R	US	.0467	18.1120	.4810	1.7040	.3435	.0565	8.0385	.0330	.0010
SI %										
.2380										

MECHANICAL PROPERTIES

Product ID #	Coil #	F T	94.52	43.02	52.06	52.01	86.00	86.00	86.00
05A53R AA	05A53R AA	20C .2% YS 20C 1% YS 20C ELONG		20C	20C	20C	20C	20C	20C
		KSI		KSI	KSI	%	%	%	%
		UTS		RB	RB	RB	RB	RB	RB
		Tail		Hard					

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical
Dept. Mgr.

KRIS LARK

12/20/2018



**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502)-347-6000

Certificate: 461371 02 Mail To:
Customer: 0540 014

TRYSSENKROPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO TRYSSEN PARK
DETROIT, MI 48210

Ship To:

TRYSSENKROPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO TRYSSEN PARK
DETROIT, MI 48210

Date: 11/12/2018 Page: 1

Steel: 304

Finish: ERAP

Your Order: 5400423057

NAS Order: AN 0828731 01

Corrosion: ASTM A262/15;18Bend-OK

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, ERAP; UNS 30400
ENL0028-7 & EN10088-2, 1.4301
ASTM A240/17, A480/16B, A666/15; ASME SA240/17, SA480/17, SA666/17
AMS5513J XTRK; MIL-S-5059D AMD3(X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07; Q05766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900E, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg. by a Quality Mgt.Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DEARs Compliant
*Melted & Manufactured in the USA; Mat'l is DEARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	COMMODITY CODE
06A28E A	* 06A28E A	.1090	36.0000	8,260	COIL	579.50	1	SSFLR21833

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) ANAB, ISO/IEC 17025, Certificate# I2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A28E	US	.0464	18.0265	.3870	1.6305	.3175	.0507	8.0175	.0315	.0011
SI %										
.2540										

MECHANICAL PROPERTIES

Product ID #	Coil #	F T	97.23	47.07	56.85	48.09	87.00	89.50
06A28E A	06A28E A	F T	97.23	47.07	56.85	48.09	87.00	89.50
		UTS	20C	.2% YS	20C 1% YS	20C ELONG	% Hard	Tail
		KSI	KSI	KSI	%-2"	RB	RB	Hard

ENTERED

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr.
KRAIS LARK 11/12/2018



**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 461371 02 Mail To:
Customer: 0540 014
TEXSENKRUPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO THYSSEN PARK
DETROIT, MI 48210

Ship To:
TEXSENKRUPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO THYSSEN PARK
DETROIT, MI 48210

Date: 11/12/2018 Page: 1
Steel: 304
Finish: HRRP

Corrosion: ASTM A262/15;18Bread-OK

Your Order: 5400423057

NAS Order: AN 0828731 01

P.R.O.D.U.C.T D.E.S.C.R.I.P.T.I.O.N.:

STAINLESS STEEL COIL, HRRP; UNS 30400
ENL0028-7 & ENL0088-2, 1.4301
ASTM A240/17, A480/16b, A666/15; ASME SA240/17, SA480/17, SA666/17
AMS5513J XMRK; MIL-S-5059D AMD3 (X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07; Q00S766D-A X MAG FERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

R.E.M.A.R.K.S.:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; ROHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg. by a Quality Mgt. Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	COMMODITY CODE
06A28E A	* 06A28E A	.1090	36.0000	8,260	COIL	579.50	1	SSFLR21833

C H E M I C A L A N A L Y S I S CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) ANAB, ISO/IEC 17025, Certificate# L2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A28E	US	.0464	18.0265	.3870	1.6305	.3175	.0507	8.0175	.0315	.0011
SI %										
-2540										

M E C H A N I C A L P R O P E R T I E S

Product ID #	Coil #	F T	97.23	47.07	56.85	48.09	87.00	89.50
06A28E A	06A28E A							
		YS	20C	1% YS	20C	ELONG	%	Hard
		KSI	KSI	KSI	%-2"	RE	RE	Hard

ENTERED

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical
Dept. Mgr.

KRIS LARK

11/12/2018

11/19



ESAB

MATERIAL CERTIFICATE

982 Griffin Pond Rd, Clarks Summit, PA US 18411, Ph: 570-585-7500

Cert#: 190009454

Page 1

Plant Location: 982 Griffin Pond Road, Clarks Summit, PA 18411

Sold To: 20122352	Ship To:
AIRGAS USA, LLC	AIRGAS-Mableton
MARIETTA GA	MABLETON GA
Customer Order No: 4514918397	Certification Date: 20190401
ESAB Order No: 366639/1	
Work Order/Lot: 291464	

AWS A5.9:2012, ASME Section II Part C SFA-5.9, 2015 EDITION
 EN 10204 Type 3.1
 Stainless Steel Welding Wire
 Type ER308Si/ER308LSi

Size: .045"
 Heat: 553001

Analysis %

Heat	C	Si	Mn	P	S	Cr	Ni
	.015	.75	1.98	.024	.013	19.66	9.06
	Mo	Cu	Ta	N	*FD	*FS	*FW
	.25	.23	.005	.085	11	14	11

*FD = Delta Ferrite (FN) from the Delong Diagram
 *FS = Delta Ferrite (%) from the Schaeffler Diagram
 *FW = Delta Ferrite (FN) from ASME Fig. NB 2433.1-1 (WRC 1992 Diagram)

Country Of Origin: United States

The following mechanical test results are typical values representative of this grade of material.

Tensile (psi): 85000

Elongation-% : 45

The Heat analysis is an actual Chemistry Analysis.

CWB (Canadian Welding Bureau) approval has been attained for the following steel grades: ER308L, ER308LSi, ER309L, ER309LSi, ER316L, ER316LSi, ER317L, ER347, ER2209
 The material has not come in contact with mercury or mercury containing compounds and as such is certified mercury free.
 Material has been manufactured/supplied in accordance with a quality system certified to ISO 9001.

The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of ESAB. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious, or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in Section 6 of EN 10204:2004. Contravention of this notice will be prosecuted to the fullest extent of applicable law.

This is to certify that the contents of this certificate are correct and accurate as contained in ESAB's records, and that all above test results and operations performed are in compliance with the requirements of the purchase order.

Melt Source: AB Sandvik MT, Sweden

Electronically Generated Certificate-Valid without signature

B. Meyers, Quality Engineer

15 (A5.9 STD 33#SPL R38) (15) (BOPR)



INSPECTION CERTIFICATE
EN10204 3.1
M0030

AMERICAN WIRE RESEARCH CO. LTD
 1005 AIRBRAKE AVENUE
 Wilmerding PA, 15148

Customer	AMERICAN WIRE RESEARCH, INC		Commodity	AWT-308LSi	Mfg. Date	2018/07	Lot No.	18718095										
Specification & Classification	AWS A5.9 ER308LSi		Dimension	1/16" X 10 LBS	Issue Date	2018/7/25	Certificate No.	EXP1860089 1										
<input checked="" type="checkbox"/> Chemical Composition for Solid Electrode and Rod(%) / <input type="checkbox"/> Weld Metal Chemical Composition(%)																		
Element	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	N								
Requirement	0.03 max	1.0 2.5	0.65 1.00	0.03 max	0.03 max	0.75 max	9.0 11.0	19.5 22.0	0.75 max	-								
Test Result	0.017	1.76	0.84	0.025	0.016	0.13	10.41	20.21	0.09	0.055								
Category	Tensile Test					Impact Test					Welding Condition							
	Yield * Strength N/mm ²	Yield ** Strength N/mm ²	Tensile Strength N/mm ²	Elongation %	Reduction of Area %	Test Temp. °C	Charpy V-Notch Absorbed Energy J(AVE.)	NR	NR	NR	NR	NR	NR	Type of Current	Welding Current A	Arc Voltage V	Shielding Gas	Post weld Heat Treatment
Deposited Metal Requirement																		
Test Result																		
Bend Test	Hardness Test		Fillet Weld Test		Radiographic Test		Moisture %		Diffusible Hydrogen mL/100gDM(AVE.)		Heat No.							
	Face	Root	NR	NR	NR	ACCEPTABLE	NR	NR	NR	NR	276666							
We hereby certify that this report is correct and that all test results are in compliance with the specification described herein. The material described above is free irradiation and free mercury.												Remarks weight: 1670LBS Melt mill/Country of origin: TAIWAN *0.2 offset P/O No.: 3PO15-18060003 **Lower Yield point 1992 WRC FERRITE: 9.7FN De long Ferrite: 12.2% Schaeffler Ferrite: 10.8% NS=not specified NR=not required C1=100%CO ₂ M21=Ar+20~25%CO ₂						
Manager of Quality Assurance																		



INSPECTION CERTIFICATE
EN10204 3.1
M0030

AMERICAN WIRE RESEARCH CO. LTD
 1005 AIRBRAKE AVENUE
 Wilmerding PA, 15148

Customer	AMERICAN WIRE RESEARCH, INC		Commodity	AWT-308LSi		Mfg.Date	2018/06		Lot No.	18615035		
Specification & Classification	AWS A5.9 ER308LSI		Dimension	1/16*36" X 10 LBS		Issue Date	2018/6/20		Certificate No.	EXP1850138 7		
<input checked="" type="checkbox"/> Chemical Composition for Solid Electrode and Rod(%) / <input type="checkbox"/> Weld Metal Chemical Composition(%)												
Element	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	N		
Requirement	0.03 max	1.0 2.5	0.65 1.00	0.03 max	0.03 max	0.75 max	9.0 11.0	19.5 22.0	0.75 max	-		
Test Result	0.012	1.68	0.82	0.024	0.012	0.15	10.27	19.98	0.07	0.055		
Category	Tensile Test						Impact Test					
	Yield * Strength N/mm ²	Yield ** Strength N/mm ²	Elongation %	Reduction of Area %	Test Temp. °C	Charpy V-Notch Absorbed Energy J(AVE.)	NR NR NR NR NR NR		Type of Current	Welding Current A	Arc Voltage V	Shielding Gas
Deposited Metal Requirement												
Test Result	Hardness Test			Radiographic Test			Moisture %			Diffusible Hydrogen mL/100gDM(AVE.)		
	Face NR	Root NR	Filler Weld Test NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Heat No. Manganese + Nickel + Chromium + Molybdenum + Vanadium: Mn+Ni+Cr+Mo+V 278199												
We hereby certify that this report is correct and that all test results are in compliance with the specification described herein. The material described above is free irradiation and free mercury.												
Remarks weight: 1750LBS Melt mill/Country of origin: TAIWAN *0.2 offset P/O No.: 3PO15-18050006 **Lower Yield point 1992 WRC FERRITE: 10.1FN NS=not specified DeLong Ferrite: 12.2% NR=not required Schaeffler Ferrite: 11.1% C1=100%CO ₂ M21=Ar+20~25%CO ₂												
Manager of Quality Assurance												

Del 8085991128



ESAB

MATERIAL CERTIFICATE

982 Griffin Pond Rd, Clarks Summit, PA US 18411, Ph: 570-585-7500

Cert#: 190004706

Page 1

Plant Location: 982 Griffin Pond Road, Clarks Summit, PA 18411

Sold To: 20122352	Ship To:
AIRGAS USA, LLC	AIRGAS-Mableton
MARIETTA GA	MABLETON GA
Customer Order No: 4514639133	Certification Date: 20190214
ESAB Order No: 364700/1	
Work Order/Lot: 290357	

AWS A5.9:2012, ASME Section II Part C SFA-5.9, 2015 EDITION
 EN 10204 Type 3.1
 Stainless Steel Welding Wire
 Type ER308Si/ER308LSi

Size: .045"
 Heat: 552555

Analysis %								
Heat	C	Si	Mn	P	S	Cr	Ni	
	.019	.79	2.06	.027	.014	19.83	9.10	
	Mo	Cu	Ta	N	*FD	*FS	*FW	
	.37	.24	.005	.088	12	14	11	

*FD = Delta Ferrite (FN) from the Delong Diagram
 *FS = Delta Ferrite (%) from the Schaeffler Diagram
 *FW = Delta Ferrite (FN) from ASME Fig. NB 2433.1-1 (WRC 1992 Diagram)

Country Of Origin: United States
 The following mechanical test results are typical values representative of this grade of material.

Tensile (psi): 85000
 Elongation % : 45

The Heat analysis is an actual Chemistry Analysis.
 CWB (Canadian Welding Bureau) approval has been attained for the following steel grades: ER308L, ER308LSi, ER309L, ER309LSi, ER316L, ER316LSi, ER317L, ER347, ER2209
 The material has not come in contact with mercury or mercury containing compounds and as such is certified mercury free.
 Material has been manufactured/supplied in accordance with a quality system certified to ISO 9001.

The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of ESAB. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious, or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in Section 6 of EN 10204:2004. Contravention of this notice will be prosecuted to the fullest extent of applicable law.

This is to certify that the contents of this certificate are correct and accurate as contained in ESAB's records, and that all above test results and operations performed are in compliance with the requirements of the purchase order.

Melt Source: AB Sandvik MT, Sweden
 Electronically Generated Certificate-Valid without signature
 B. Meyers, Quality Engineer
 15 (A5.9 STD 33#SPL R38) (15) (BOPR)



Ferox Documentation Package

Model Description	EURO CYL 230/4 SB	
Serial Number	31920941-31920958	
Sales Order #	1582232	
Customer's PO# (if applicable)	03667150	
Declaration of Conformity		
Oxygen Clean Certificate		
Radiography Test Report		
Mechanical Test Report		
Relief Valve C of C		
Rupture Disc C of C		
Globe Valve C of C		
Material Test Report-Inner Shell	HT#	A53R
Material Test Report-Inner Top Head	HT#	A28E
Material Test Report-Inner Bottom Head	HT#	A28E
Weld Wire-long seam	HT#	553001
Weld Wire-attachments	HT#	278199 276666 552555



Ball Ground Facility
Phone: (770) 479.6531 Fax: (770) 479.4603

**Transportable Pressure Equipment
Declaration of Conformity**

Description of Pressure Equipment:

Manufacturer: CHART INC.

Model/type: Eurocyl 230/4 bar with plumbing

Serial #: **31920941-31920958**

Address: 1300 Airport Drive, Ball Ground, GA 30107, USA
Authorized Representative: CHART Ferox, a.s.,
Ustecka 30, 405 30 Decin, Czech Republic

Hereby declares that, the Transportable Pressure Equipment specified above has been designed, manufactured and tested in accordance with the requirements of the Transportable Pressure Equipment Regulations European Directive 2010/35/EU and ADR/2017/ECE/TRANS/257.

The following transposed European Harmonized standards and other technical specifications have been used: EN 1251-2

The following EC type examination certificate has been issued by the Notified Body:

Certificate No.: 128229	Type of Approval
Certificate No.: 12-US-2928	Notified Body Authorization

Notified Body: The Notified Body which inspected the manufacturer's Quality Assurance system:

**Apragaz
Chaussee de Vilvorde, 156
Bruxelles, Belgium B-1120
Notified Body Identification No. 0029**

Printed Name: Brittany Townsend Date: 8/5/19
Signed: Brittany Townsend Date: 8/5/19
Quality Records Coordinator



Ball Ground Facility
1300 Airport Drive
Ball Ground, GA 30107
770.479.6531 * fx: 770.479.4603

CERTIFICATE OF OXYGEN COMPATIBILITY COMPLIANCE

Chart Inc. certifies that the Cylinders with serial number range:

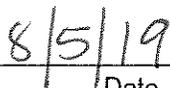
31920941-31920958

were manufactured in accordance with Charts internal specifications and procedures. The cylinders have been manufactured for Oxygen Service to meet the requirements and specifications of the Compressed Gas Association Pamphlet CGA G-4.1.

Signed,



Quality Records Coordinator



Date



Weld Test TPED/PED

Report No.: 26924-19

Part No.:	14792459	Material Heat No.:	A53R
Model:	Eurocyl 230/4	Welder No.:	103269
W/O No(s):	2746842	Wire Heat No.:	553001
		Long Seam Date:	6/27/2019
		Testing Operator:	250024

All reports are in compliance to referencing code under ISO certificate

Code/Standard/Edition: EN 4136 & EN 5173 / EN ISO6892-1, EN 9017-2013 Code for Manufacture and Inspection of Cryogenic Cylinders

Test conducted in accordance with:

1. Joint Tensile Test: EN 4136, EN 6892-1
2. Surface Bending Test: EN 5173
3. Rear Face Bend Test: EN 5173
4. Welded Part Impact Test: EN 21028-1, EN ISO 148-1

Joint Tensile Results Type 2 Test Piece

Sample	Dimensions (mm)	Area (sq.mm.)	Yield Strength @.2% (MPa)	Yield Strength @1% (MPa)	Ultimate Tensile Strength (MPa)	Fracture Location
26924	0.985*0.115	0.113	50800/350	57600/397	98100/676	Base Metal

Chart Requirement Values Unless Otherwise Specified	
Minimum Tensile Strength	Minimum Yield Strength
580 MPa	290 MPa @ .2%
	320 MPa @ 1%

Equipment Used	Calibration Due
Tinius Olsen SN# 323960	5/2020



Guided Bend Test Results								
	Sample #	Dimension LxW	Former Dia	Distance between rollers	Bend angle	Original gauge length	Elongation	Remarks
Face bend	1	58.14*38.59	12.7	20.04	180	18.02	27.64	N/A
Root bend	2	58.14*38.28	12.7	20.04	180	18.02	27.64	N/A

Equipment Used	Calibration Due
Fischer BT1D SN# 809011335	5/2020

Reviewed By: 

Date: 7/8/2019



Weld Test TPED/PED

Report No.: 26918-19

Part No.:	<u>14792459</u>	Material Heat No.:	<u>A53R</u>
Model:	<u>Eurocyl 230/4</u>	Welder No.:	<u>103269</u>
W/O No(s):	<u>2746842</u>	Wire Heat No.:	<u>553001</u>
		Long Seam Date:	<u>6/26/2019</u>
		Testing Operator:	<u>250024</u>

All reports are in compliance to referencing code under ISO certificate

Code/Standard/Edition: EN 4136 & EN 5173 / EN ISO6892-1, EN 9017-2013 Code for Manufacture and Inspection of Cryogenic Cylinders

Test conducted in accordance with:

1. Joint Tensile Test: EN 4136, EN 6892-1
2. Surface Bending Test: EN 5173
3. Rear Face Bend Test: EN 5173
4. Welded Part Impact Test: EN 21028-1, EN ISO 148-1

Joint Tensile Results Type 2 Test Piece

Sample	Dimensions (mm)	Area (sq.mm.)	Yield Strength @.2% (MPa)	Yield Strength @1% (MPa)	Ultimate Tensile Strength (MPa)	Fracture Location
26918	0.988*0.116	0.115	48500/335	55100/380	96000/662	Base Metal

Chart Requirement Values Unless Otherwise Specified	
Minimum Tensile Strength	Minimum Yield Strength
580 MPa	290 MPa @ .2%
	320 MPa @ 1%

Equipment Used	Calibration Due
Tinius Olsen SN# 323960	5/2020



Guided Bend Test Results								
	Sample #	Dimension LxW	Former Dia	Distance between rollers	Bend angle	Original gauge length	Elongation	Remarks
Face bend	1	58.19*39.39	12.7	20.09	180	19.18	25.13	N/A
Root bend	2	58.19*37.91	12.7	20.09	180	18.12	26.93	N/A

Equipment Used	Calibration Due
Fischer BT1D SN# 809011335	5/2020

Reviewed By: 

Date: 6/28/2019



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: March 29, 2019

Company: Chart Industries, Inc.

P.O. No.: 3643427

Lot No.: 187871

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 174489

Date Code: C19

% of Lot Tested.: 100

Serial No: A117830-A117929

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)

Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone for 22-49 Psig (-85° to 350° F (-65° to 176°C))	
K – PCTFE for Above 50 Psig (-320° to 165° F (-196° to 74° C))	

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠ WARNING

Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reset performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional 3/4 to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: May 14, 2019

Company: Chart Industries, Inc.

P.O. No.: 3648897

Lot No.: 188486

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 1746023

Date Code: E19

% of Lot Tested.: 100

Serial No: A121042-A121091

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company

GENERANT

Valves & *BJ-Lok* Fittings

TRANSPORTABLE PRESSURE EQUIPMENT DIRECTIVE (TPED) DECLARATION OF CONFORMITY

Manufacturer:

We hereby declare that the safety accessories specified below has been designed, manufactured and tested in accordance with the requirements of the:

Transportable Pressure Equipment Directive 2010/35/EU, 2008/68/EC, 2014/103/EU and ADR (Sections 1.8.7.2 and 1.8.7.6)

Authorized Representative:

Drukon GmbH
Hauptstrasse 29
02794 Spitzkunnersdorf
Germany

Description of Pressure Equipment:

Model: LCV-250B-K-58

Work Order #: 0297393

Sales Order: 188486

Date of Manufacture Code: E19

Body Material Lot Code: QCE

Serial #: A121042 to A121091

Conformity assessment procedure followed:

Type Approval: ADR Section 1.8.7.2

Quality Assurance: ADR Section 1.8.7.6

The Notified Body has issued the following EC certificates:

EU Type: Examination Certificate No.: 16-1008709-100

Product Quality Assurance: 16-1008709-101

Notified Body:

The Notified body that carried out the inspection and is involved in monitoring the Quality Assurance System:

Inspecta

P.O. Box 401 (Höjdrodergatan 12)

SE-201 24 Malmö, Sweden

Notified Body Identification Number: 0409

Note:

Products labeled "Cleaned for Oxygen Service" are "EN-12300-O2" and meet or exceed CGA G-4.1 Cleaning Equipment for Oxygen Service.

Standard Cleaned Products are "EN-12300".

User Instructions Included

Signed: _____

S. C. Jaramila
Authorized Quality Representative

Date: _____

05-13-2019

QC-FR-049
Rev. I
DCR4247



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)
Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter
Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone	for 22-49 Psig (-85° to 350° F (-65° to 176°C))
K – PCTFE	for Above 50 Psig (-320° to 165° F (-196° to 74° C))

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠WARNING

Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reseal performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional ¼ to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: May 29, 2019

Company: Chart Industries, Inc.

P.O. No.: 3650502

Lot No.: 188657

Product: LCV-250B-K-58

Chart, Inc. Part No.: 20582328

Material Heat No.: 1746023

Date Code: E19

% of Lot Tested.: 100

Serial No: B72439-B72463

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)

Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material	
Seal Material	
FS – Fluorosilicone for 22-49 Psig (-85° to 350° F (-65° to 176°C))	
K – PCTFE for Above 50 Psig (-320° to 165° F (-196° to 74° C))	

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠️WARNING: Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

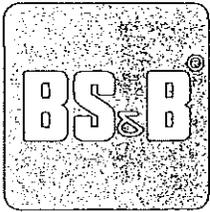
1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reseal performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, do not apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional ¾ to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.

Generant Company, Inc.
1865 Route 23 South P.O. Box 768 Butler, New Jersey 07405 Phone 973.838.6500 Fax 973.838.4888
www.generant.com

EN-FR-014
Rev F
DCR4020



CERTIFICATE OF CONFORMANCE

04/09/2019

BS&B SAFETY SYSTEMS, L.L.C.

Customer: BS&B INVENTORY MGMT. SYS LLC
Certified To: BS&B INVENTORY MGMT. SYS LLC
ATTN: KEN RICHARDSON
PO BOX 470590
TULSA
OK 74147-0590
P.O.Number: STOCK MAS/CON/STOCK
S.O.Number: 18006050B01-1

We certify that the items described in this document have been manufactured, inspected and tested in accordance with the standards applicable to our industry. The original test data is on file and available for your examination. CE Marked in accordance with the EU Pressure Equipment Directive 2014/68/EU, MODULES B+D. EN ISO 4126-2.

Type: S/K A-1 FRB
Quantity: 441
Attachments: CERT PACKAGE FROM ORIGINAL CSS ORDER (18006050B01-1)

Tab Marking: 20632414



A handwritten signature in black ink, appearing to read 'Ken Richardson', is written over a horizontal line.

QA/QC DEPARTMENT



**BURST TEST CERTIFICATE &
DECLARATION OF CONFORMITY**

Customer: Chart Canton
Certified to: Chart Canton
Tulsa, OK

Date: 4/1/2019
P.O. Number: Stock Mas/Con/Stock
BS&B Lot#: 18006050B01-1
CSS Lot #: 18990155B01-1
Size: 0.375"
Type: S/K A-1 FRB

Quantity Shipped: 441 pcs
Quantity Tested: 14 pcs

Disk Material: 316 SS
Heat Number: V2J2

We certify that the items described in this document have been manufactured, inspected and tested in accordance with the standards applicable to our industry. The original test data is on file and available for your examination. CE marked in accordance with the EU Pressure Equipment Directive 2014/68/EU, Module B + D. EN ISO 4126-2.

BURST TEST RESULTS

Numerical Value	Pressure Unit	@ Temperature
6.14, 6.02, 6.07, 5.83, 5.76, 5.83, 5.97	Barg	22 °C
6.05, 5.89, 6.01, 5.87, 6.09, 6.04, 5.87		

RATED RUPTURE

Numerical Value	Pressure Unit	@ Temperature
5.42 min, 6.30 max	Barg	22 °C
Est 4.23	Barg	400 °C

Other Details:

Part marking: 20632414, Est 4.23 barg @ 400°C

QC Inspector: Doug Sitko CQE

Attachments: Mill test report
Declaration of Conformity

Manufactured in Minneapolis, MN – USA
EN ISO 4126-2, YR2019, 0496

Custom Safety Solutions LLC

Doug Sitko

Quality Department

4/1/2019

7664 West 78th Street • Minneapolis MN 55439
(952) 941-0146 • Fax: (952) 941-0646



Custom Safety Solutions, LLC

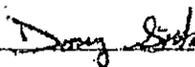
Declaration of Conformity EU Pressure Equipment Directive 2014/68/EU

Custom Safety Solutions LLC. declares that the products described below have been assessed by the Notified Body, DNV-GL, under conformity assessment Annex III Module B of the Directive and have been certified by the Notified Body DNV-GL as conforming to the Pressure Equipment Directive 2014/68/EU. Other technical standard used: EN 4126-2.

Bursting Disk Type	EC Type Examination Certificate Number
FRB	PED-B-147

Custom Safety Solutions, LLC. declares that our quality system had been assessed by the Notified Body, DNV-GL Business Assurance Italia, under conformity assessment Module D of the Directive and has been certified by the Notified Body as conforming to the Pressure Equipment Directive 2014/68/EU under certificate number 9457-2017-CE-USA-ACCREDIA.

Signed on behalf of Custom Safety Solution, LLC.



Doug Sitko
Quality Engineer

April 1, 2019

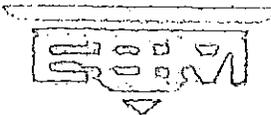
Date



Custom Safety Solutions, LLC
7664 78th Street
Minneapolis, MN 55439
USA
Tel: 952-600-9865
Fax: 952-941-0846
Email: sales@customsafetysolutions.com

Notified Body 0498

Det Norske Veritas-GL
DNV GL Business Assurance Italia
S.r.l.
Via Energy Park, 14
20871 Vimercate (MB)
Italy



ELGILOY SPECIALTY METALS
 1685 FLEETWOOD DRIVE
 ELGIN, IL 60123
 Phone: (847)885-1800
 Fax: (847)883-0169
 http://www.elgiloy.com

WORK ORDER NO.
 NO D'ORDRE
 KOM. NR
 161765

LOT CODE
 213459

Page No.
 1 of 1

Material Testing Performed by
 Elgiloy Specialty Metals
 1685 Fleetwood Drive
 Elgin, Illinois 60123

INSPECTION CERTIFICATE / CERTIFICAT DE RECEPTION / ABNAHMEPRUFZEUGNIS
 EN 10204:2004 - 3.1

CUSTOMER / CLIENT / BESTELLER	PRODUCT / PRODUIT / PRODUKT	SPECIFICATION / SPECIFICATION / SPEZIFIKATION
CUSTOM SAFETY SOLUTIONS LLC 7884 W 78TH STREET BLOOMINGTON, MN 55439	316L BAZ ANNEALED COIL Thickness(In.): .003+/- .0002(.0028/.0032) Width: 1.250+/- .005 Cust.Part #01-082-08K-01	ASTM A240 Rev# 18a

CUSTOMER REFERENCE COMMANDE NO. AUFTRAGS - NR.	QUANTITY SHIPPED QUANTITE Lbs	HEAT NUMBER NUMERO DE COULEE CHARGEN - NR.	MILL SOURCE MOULIN MUEHLE	ORIGIN COUNTRY ORIGINE URSPRUNG
2115	107.01	V22	NORTH AMERICAN STAINLESS	USA

CHEMICAL ANALYSIS % PULLED FROM ORIGINAL MILL CERTIFICATION / ANALYSE CHIMIQUE / CHEMISCHE ANALYSE

C	Mn	P	S	Si	Cr	Ni	Mo	Cu	N
0.0141	1.377	0.028	0.008	0.244	18.88	10.04	2.007	0.422	0.0442

Physical Properties at RT / Propriétés Physiques à Temp. Ambiante / Physikalische Eigenschaften bei RT

Tensile Res. à la Trac. Zugfestigkeit PSI ASTM E8	0.2% Yield Strength Limit Elast. à 0.2% 0.2% Streckgrenze PSI ASTM E8	Elong. Along Dehnung % ASTM E8	%R.A. ASTM E8	Grain Size Grossueur de Grain Korngrösse ASTM E112	Hardness Dureté Haerte ASTM E28/E18	Conditions
T 89000 L	T 61000 L	T 64 L			T 76 HRBW (500gr) L (138 HV (800gr))	(As Supplied)

Tensile Test at Elevated Temp / Essai de Traction à Hts. Temp / Warm Zugversuch			Stress Rupt / Essai de Pliage / Zugschadenversuch				
Test Essai Versuch Temp F	Tensile Res. à la Trac. Zugfestigkeit PSI	0.2% Yield Strength Limit Elast. à 0.2% 0.2% Streckgrenze PSI	Elong. Along Dehnung %	Test Essai Versuch Temp F	Stress Constrained Spannung PSI	Hours Heures Stunde	Elong. Along Dehnung %

WRAP TEST / ESSAI DE PLAGES / WICKELTEST BEND TEST / ESSAI D'ENROULEMENT / BIEGETEST IGA IGO MICROSTRUCTURE

Testing Source: _____
 Etchant Type: _____
 R-Factor: _____
 Comments: CHEM. FROM ORIGINAL MILL CERT, HV PER ASTM E884.

Received 2/23/17
 DRS



WE HEREBY CERTIFY THE MATERIAL SHIPPED TO THE ABOVE-SPECIFIED SPECIFICATION CONFORMS TO THE STATED CHEMICAL AND PHYSICAL REQUIREMENT TERMS AND PROCESSED FREE OF MERCURY (UNLESS OTHERWISE STATED).
 NOUS CER TIFONS QUE LA LIVRAISON A ETE VERIFIEE ET EST CONFORME AUX STIPULATIONS DE L'ACCEPTION DE LA COMMANDE.
 ES WRD BESTAETIGT, DASS DIE LIEFERUNG GEPRUEFT WURDE UND DEN VEREINBARUNGEN BEI DER BESTELLANNAHME.

MARK OF THE MANUFACTURER / SIGLE DU PRDUTEUR / ZEICHEN DES HERSTELLERS
 INSPECTORS STAMP / POINCON DE L'INSPECTEUR / ZEICHEN DES SACHVERST AENDIGEN

DATE / DATE / DATUM: 02-22-17

AUTHORIZED SIGNATURE: *Glenn Aquino*
 GLENN AQUINO, LABORATORY SUPERVISOR

THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELGILOY SPECIALTY METALS. THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OF ENTRIES ON THIS DOCUMENT MAY BE A PUNISHABLE OFFENCE UNDER FEDERAL AND STATE LAW



**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Chem, NY 41045-9615
(502) 347-6800

Customer: 0018 001
Part: 6/01/2015
Spec: 316/106
Finish: 24

Order: 01026769
Part: 6/01/2015
Spec: 316/106
Finish: 24

Product ID: 03V202 B
Supplier ID: 81V202
Part: 3173.7 11 1 3171A

Product ID: 03V202 B
Supplier ID: 81V202
Part: 3173.7 11 1 3171A

CHEMICAL ANALYSIS

Element	CS %	C %	SI %	MN %	NI %	MO %	P %	S %
V202 V202	0.041	16.8900	0.028	1.3770	2.0770	0.042	16.0400	0.030
Lab Check:	0.043	16.8071	0.048	1.4082	2.0880	0.038	16.0173	0.0275
SI %								
Lab Check:	.2448							
Lab Check:	.2097							

MECHANICAL PROPERTIES

Product ID	Supplier ID	Y %	R %	TS 20C	YS 20C	TS 30C	YS 30C	TS 40C	YS 40C	TS 50C	YS 50C	TS 60C	YS 60C	TS 70C	YS 70C
03V202 B	81V202	17.2	59.34	49.34	59.05	60.52	64.50	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00

779353, 779355
JUN 28 2015
Y1500 06.1.15

Lab Order: 01026769
Part: 6/01/2015
Spec: 316/106
Finish: 24

Product ID: 03V202 B
Supplier ID: 81V202
Part: 3173.7 11 1 3171A

Product ID: 03V202 B
Supplier ID: 81V202
Part: 3173.7 11 1 3171A

Product ID: 03V202 B
Supplier ID: 81V202
Part: 3173.7 11 1 3171A

Kyle Lunsford

UNITED PERFORMANCE METALS
This is only valid if purchased with the metals
Order for metals shipped on your purchase order
Please do not return

UNITED PERFORMANCE METALS
This is only valid if purchased with the metals
Order for metals shipped on your purchase order
Please do not return

UNITED PERFORMANCE METALS
This is only valid if purchased with the metals
Order for metals shipped on your purchase order
Please do not return

6/01/2015



MUELLER BRASS CO.

LOCATIONS:

2199 LAPEER AVENUE
PORT HURON, MICHIGAN 48860

302 ASHFIELD STREET
BELDING, MICHIGAN 48809

Control No: 1043366



In let

CERTIFIED TEST REPORT

Sold: 00062063
To: COPPER AND BRASS SALES
ATTN ACCOUNTS PAYABLE
P.O. BOX #5116
SOUTHFIELD, MI 48086-5116

Ship: 00060085
To: COPPER & BRASS SALES
3001 ALOUETTE DR
GRAND PRAIRIE, TX 75052

Cust PO: 5400398166
Cust Part: CUHEX00116
Type/Size: ROD HEX 1.1250
Cust Spec: ASTM B16/16M-10

MBCo SO: 484799 Ln 60 Cert Lvl: 4
Part Nbr: 3600129 FC
Qty Shpd: 4,412 UM: Lbs
BOL: 50696978 Shpd: 05/01/18

Mechanical Properties			
Lot Number: L653247	Temp: R02 1/2 H BRA	CDA Alloy: C36000	
Yield Strength (Ksi)	Tensile Strength (Ksi)	Elongation % in 2 Inches	Hardness Rb
34	53	52	60

HgNO3: pass per ASTM B154-12

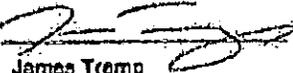
Chemical Analysis (%)							
	Cu	Pb	Fe	Zn			
ASTM B16/16M-10	60.0-63.0	2.5-3.0	0.35 Max	REM			
Lot Number: L653247	61.4	2.7	0.17	REM			

TOTAL OTHER ELEMENT MAX: .50

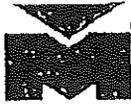
We hereby certify to the chemical and mechanical properties reported herewith and to the fact that they were determined in conformance with the specification noted above or any exceptions to this specification we have granted. We also hereby certify that the material furnished on this order is free from mercury contamination and that no mercury bearing equipment was used in the manufacture of these items.

Melted and Manufactured in USA

Conflict Minerals Compliant
Produced in Compliance with:
EN 10204 3.1
EU Directives
2011/65/EU (RoHS 2 Compliant)
2000/53/EC

By:  05/01/18
James Tromp
Metallurgist

outlet



MUELLER BRASS CO.

LOCATIONS:

2109 LAPEER AVENUE
PORT HURON, MICHIGAN 48060

302 ASHFIELD STREET
BELDING, MICHIGAN 48809

Control No: 1043360



CERTIFIED TEST REPORT

Sold: 00062063
To: COPPER AND BRASS SALES
ATTN ACCOUNTS PAYABLE
P.O. BOX #5116
SOUTHFIELD, MI 48086-5116

Ship: 00060085
To: COPPER & BRASS SALES
3001 ALOUETTE DR
GRAND PRAIRIE, TX 75052

Cust PO: 5400398166
Cust Part: CURD00992
Type/Size: ROD RND 1.1250
Cust Spec: ASTM B16/16M-10

MBCo SO: 484799 Ln 120 Cert Lvl: 4
Part Nbr: 3600516 FC
Qty Shpd: 2,102 UM: Lbs
BOL: 50696978 Shpd: 05/01/18

Mechanical Properties			
Lot Number: L657232	Temp x1 RR02 1/2 H BRN	CDA Alloy: C36000	
Yield Strength (Ksi)	Tensile Strength (Ksi)	Elongation % in 2 Inches	Hardness Rb
35	54	32	55

HgNO3: PASS per ASTM B154-12

Chemical Analysis (%)						
	Cu	Pb	Fe	Zn		
ASTM B16/16M-10	80.0-83.0	2.5-3.0	0.35 Max	REM		
Lot Number: L657232	61.3	2.7	0.16	REM.		

TOTAL OTHER ELEMENT MAX: .50

We hereby certify to the chemical and mechanical properties reported herewith and to the fact that they were determined in conformance with the specification noted above or any exceptions to this specification we have granted. We also hereby certify that the material furnished on this order is free from mercury contamination and that no mercury bearing equipment was used in the manufacture of these items.

Mined and Manufactured in USA

Conflict Minerals Compliant

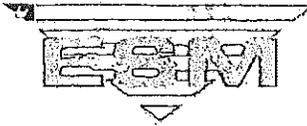
Produced in Compliance with:
EN10204 3.1
EU Directives:
2011/85/EU (RoHS 2 Compliant)
2000/53/EC

By:

James Tremp
Metallurgist

05/01/18





ELGILOY SPECIALTY METALS
 1565 FLEETWOOD DRIVE
 ELGIN, IL 60123
 Phone: (847)895-1900
 Fax: (847)895-0169
 http://www.elgiLOY.com

WORK ORDER NO. NO D'ORDRE KOM. NR	LOT CODE	Page No.
198260	319208	2 of 2

Material Testing Performed by
 ElgiLOY Specialty Metals
 1565 Fleetwood Drive
 Elgin, Illinois 60123

INSPECTION CERTIFICATE / CERTIFICAT DE RECEPTION / ABNAHMEPRUFZEUGNIS
 CERTIFICATE OF CONFORMANCE / CERTIFICAT DE CONFORMITÉ / KONFORMITÄTSBESCHEINIGUNG
 EN 10204:2004 - 3.1

WRAP TEST / ESSAI DE PLIAGE / WICKELTEST	BEND TEST / ESSAI D'ENROULMENT / BIEGETEST	IGA	IGO	MICROSTRUCTURE
Tail:				
Grain Size at Grain Size Magnification	Hardness Test Method	IGA/IGO Test Mag.	Micro Mag.	Alpha Case Test
at	E384			
Chemistry is original from mill	Y	Inclusion Rating Test Method		
ESR is original from mill				
ASTM A262 Method A:		Type A	Type B	Type C
ASTM A262 Method B:		Thin	Thin	Thin
ASTM A262 Method C:		Thick	Thick	Thick
ASTM A262 Method E:				
Elevated Temp Test is Periodic				
Elevated temp conformance based on 1 test				
Stress Rupture Test is Periodic				
Stress Rupture conformance based on 1 test				
NON-Conforming Use As Is Waiver Approved by				
OK to slit and pack only approved by				
Complete Cert. of Conformance to follow, Customer approval				
Testing Source				
Etchant Type				
R-Factor				
Comments	Chem from original mill, HV per ASTM E384			

Received 1-26-18
 Approved DRS



WE HEREBY CERTIFY THE MATERIAL SHIPPED TO THE ABOVE-SPECIFIED SPECIFICATION CONFORMS TO THE STATED CHEMICAL AND PHYSICAL REQUIREMENT TERMS AND PROCESSED FREE OF MERCURY (UNLESS OTHERWISE STATED).

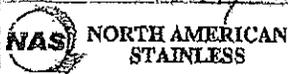
NOUS CERTIFIONS QUE LA LIVRAISON A ETE VERIFIEE ET EST CONFORME AUX STIPULATIONS DE L'ACCEPTION DE LA COMMANDE.
 ES WIRD BESTAETIGT, DASS DIE LIEFERUNG GEPRUEFT WURDE UND DEN VEREINBARUNGEN BEI DER BESTELLANNAHME.

All hardness conversions for Cobalt based alloys are to be considered as approximations only as no standard hardness conversion table exists in ASTM E140 for this alloy family. ESM uses Table 1 or Table 3 of ASTM E140 depending on hardness to provide an approximate conversion.

ROHS COMPLIANT; REACH COMPLIANT; FREE OF CONFLICT MINERALS AS PER DODD-FRANK ACT; MATERIAL FREE OF MERCURY, RADIUM and ASBESTOS; RADIOACTIVE FREE

MARK OF THE MANUFACTURER / SIGLE DU PRUDCTEUR / ZEICHEN DES HERSTELLERS	
INSPECTORS STAMP / PPOINCON DE L'INSPECTEUR / ZEICHEN DES SACHVERST AENDIGEN	
AUTHORIZED SIGNATURE:	DATE / DATE / DATUM: 01-22-18
 GLENN AQUINO, LABORATORY SUPERVISOR	

THIS DOCUMENT SHALL NOT BE REPRODUCED, EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF ELGILOY SPECIALTY METALS. THE RECORDING OF FALSE, FICTITIOUS OR FRAUDULENT STATEMENTS OF ENTRIES ON THIS DOCUMENT MAY BE A PUNISHABLE OFFENCE UNDER FEDERAL AND STATE LAW



Abnahmeprüfzeugnis
INSPECTION CERTIFICATE
ACCORDING TO: EN 10204 - 3.1
NACH:

5870 Highway 42 East
Ghent, KY 41049-9613
Tel: 502-347-6000
Fax: 502-347-6001

Besteller - Customer: EIGHTON SPECIALTY METALS DIV. OF COMBINED METALS OF CHICAGO, INC ONE MAUR ROAD HAMPSHIRE, IL 60140	Probe Nr. - Inspection: 120386 02 Bestellung Nr.-cus: Order: 51189H NAS Auftrag Nr.-NAS Order: AM 076190J Pos Nr. -Item: 02	Datum - Date: 8/07/2017 Werkbez. - Works Grade: 316/316L Prüfzeugnisform -Product: 2D
Nachstoff Nr. und Lieferzustand - Material No. and Condition of Delivery: STAIN S77 COIL, C.N. UNSALED & PICKLED; UNS 31600/31603 EN10028-7 1.4401/1.4404 / EN 13204 3.1 / Pkt 97/23/0C ASTM A240/15a, A480/15b, A666/15; ASME SA240/15, SA480/15, SA666/15 MIN. SOLU/TION ANNEAL TEMP 1300F, WATER QUENCHED 1389 - BSHV 316Lb V 316L ANNEALED		
Anforderungen - Technical Requirements: PM 97/23/0C		

Seitens Nr. - Heat:	Prüfgegenstand - Article:	Abmessung - Dimension: M / B	Probe Nr. - Test:	Stückzahl - Quantity:	Gewicht - Mass/ty:
476T 476H	COIL COIL	.8600 X 953.0000 X 1000.1 .8600 X 953.0000 X 1307.3	03476T BA 01476T BB 08476T B 08476T B	1 1	6,21 2,36

Chemische Analyse - Chemical Composition

Schmelz Nr. - Heat:	Lab. Accreditation Bureau, ISO/IEC 17025, Certified (333)											
	CN(Country of Origin)					ES(Spain)			US(United States)			SA(South Africa)
Anforderungen - Requirements:	EN	SA	US	SA	EN	EN	EN	EN	EN	EN	EN	EN
Heat												
476T	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

Mechanische Eigenschaften - Mechanical Properties

Probe Nr. - Test:	Prob. Lage - Pos. of Test:	Mechanical Properties										
		YS	TS	EL	EL	EL	EL	EL	EL	EL	EL	EL
Anforderungen - Requirements:		483	172	40	6							
		590	446	80	13							
03476T BA	03476T BA	579.50	903.83	417.00	48.71	89.50	88.00	9.00	OR 57655			
08476T B	08476T B	576.45	368.81	191.29	46.63	84.00	85.00	9.00	OR 57655			
		98,575	58,516	60,504								
		98,154	53,514	56,776								

Beachtung und Maßkontrolle wurden durchgeführt. D.H. Visual dimensional inspection was objective. Der Werkstoff ist beständig gegen intermetallische Korrosion gemäß EN ISO 3651-2 / ASTM A262 Practice B. The material is resistant to intergranular corrosion test according to: EN ISO 3651-2 / ASTM A262 Practice B Spektroskopische Identifizierung: O.B. Spectrometric identity test: O.K. Wärmebehandlung: Glühen bei: 1150 - 1100°C Heat treatment: 1010 - 1100°C and Abkühlen mit Luft Cooling with air/Bezugsstandard - Stehrichtig process EAF + AOD + CC	Qualitätssicherungssystem zertifiziert nach AD 2000 W0 und ENR 97/23/EN; Anhang 1, par. 4.3, TÜV SÜD INDUSTRIE SERVICE GmbH, Bonnstraße 106b, 50829 Köln. Quality System certified according to AD 2000 W0 and ENR 97/23/EN, Annex 1, par. 4.3, by TÜV SÜD INDUSTRIE SERVICE GmbH, Brunnenstraße 106b, 50829 Köln.	WERKSACHVERSTÄNDIGER WORKS INSPECTOR: KRIST LARK, Technical Dept. Mgr. Im Übereinstimmung mit dem TÜV SÜD Industrie Service GmbH wird auf eine Gegenüberstellung mit Schreiber vom 28. Februar 2017 durch TÜV SÜD Industrie Service GmbH verzichtet. In agreement with TÜV SÜD Industrie Service GmbH, the counterchecking obligation has been waived according to a letter by TÜV SÜD Industrie Service GmbH dated February 28th 2017.
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Certificate of Conformance

Date: 06/05/2019

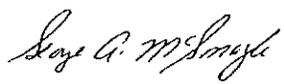
Customer: CHART INC.- CANTON

Customer P.O. Number: 3656656

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
T009464DAG			650		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336)226-3244 Fax (336)226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 856478

Date: 6/05/19

Sold to: CHART INC.- CANTON
ACCOUNTS PAYABLE
P.O. BOX 7267
PHILADELPHIA PA 19

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

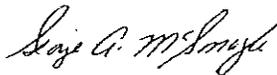
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following Items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
650	T009464DAG	VLV, SHUT OFF ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH



Certificate of Conformance

Date: 05/09/2019

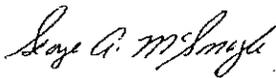
Customer: CONSIGNMENT - CHART INC.

Customer P.O. Number: 3652321--CONSIGNMENT

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
TES008464DAB	11769595	VALVE BRS BH 3/8 FPT*3/8 SCH10	70		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336) 226-3244 Fax (336) 226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 851999

Date: 5/09/19

Sold to: CONSIGNMENT - CHAR
ACCOUNTS PAYABLE
1300 AIRPORT DRIVE
BALL GROUND GA 301

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

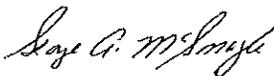
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following Items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
70	TES008464DAB	VLV,CRYO EXT STEM ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH



REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336) 226-3244 Fax (336) 226-6294

V.P. of Quality Assurance

George A. McLaughlin

Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany.

Is the authorized representative of ECII established within the European Union.

Freddy Dayk, Operations-Manager, RegO GmbH

F. Dayk

Certificate of Conformance

Date: 06/14/2019

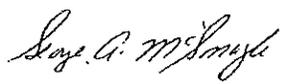
Customer: CHART INC. - CANTON

Customer P.O. Number: 3661722

Engineered Controls International, LLC certifies that all materials used to manufacture the equipment and/or parts listed below, conform to the material requirements and specifications established by Engineered Controls International, LLC.

Engineered Controls International, LLC further certifies that no changes in design or materials have been made without change to the revision letter.

ECI P/N	Customer P/N	Description	Qty	Lot Number	Date Code
T009464DA	11905956	Valve 3/8 FPT BY 3/8 SCH 10	150		



Q.C. Approval _____

REGO CRYO-FLOW PRODUCTS

Division of Engineered Controls International, Inc. 3181 Lear Drive Burlington, NC 27215 USA Phone (336) 226-3244 Fax (336) 226-6294

Declaration of Conformity to Transportable Pressure Equipment Directive 2010/35/EU

Pick # 858420

Date: 6/14/19

Sold to: CHART INC.- CANTON
ACCOUNTS PAYABLE
P.O. BOX 7267
PHILADELPHIA PA 19

We hereby declare that Cryogenic Shut-off Valves of DN 15 and below were designed and manufactured in full compliance with the Transportable Pressure Equipment Directive 2010/35/EU.

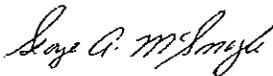
These piping components are intended for Group 1 (dangerous) gases for pressures of 42 bar maximum, and are in accordance with TPED 2010/35/EU Category IV, Module B. The conformity assessment is in compliance with Module D.

Notified Body:

TUV SUD Industrie Service GmbH, Dudenstrasse 28, 68167 Mannheim, Germany
Notified Body identification No. 0036

This declaration of conformity covers the following items:

<u>QTY</u>	<u>REGO PART #</u>	<u>DESCRIPTION</u>
150	T009464DA	VLV, SHUT OFF ASM



Engineered Controls Int. Inc.

RegO GmbH, Industriestraße 9, D-35075, Gladenbach/Germany,

Is the authorized representative of ECII established within the European Union.

Freddy Deyk, Operations-Manager, RegO GmbH





**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 469756 02 Mail To:
Customer: 0045 704
KLOECKNER METALS CORPORATION
GRANT PLANT
ONE WHITEHORSE ROAD
GREENVILLE, SC 29605

Ship To:
KLOECKNER METALS CORPORATION
GRANT PLANT
ONE WHITEHORSE ROAD
GREENVILLE, SC 29605

Date: 12/19/2018 Page: 1
Steel: 304
Finish: 2B

Your Order: GRN-7321599

NAS Order: AN 0827853 01

Corrosion: ASTM A262/15 A;180Bend-0

PRODUCT DESCRIPTION:

STNLS STL COIL, C.R. ANNEALED & PICKLED; UNS 30400
EN10028-7 & EN10088-2, 1.4301
ASTM A240/17, A480/16b, A666/15; ASME SA240/17, SA480/17, SA666/17
AMS5513J XMRK; MIL-S-5059D AMD3(X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07; QSS766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg. by a Quality Mgt. Sys. in Conf. w/ISO 9001
RoHS Directive 2002/95/EC
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	REQ. NO.
05A53R AA	* 05A53R AA	.1200	23.8750	12,220	COIL	1312.8	4	1

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) ANAB, ISO/IEC 17025, Certificate# I2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A53R	US	.0467	18.1120	.4810	1.7040	.3435	.0565	8.0385	.0330	.0010
SI %										
.2380										

MECHANICAL PROPERTIES

Product ID #	Coil #	F T	94.52	43.02	52.06	52.01	86.00	86.00
05A53R AA	05A53R AA	20C .2% YS 20C 1% YS 20C ELONG %		Hard	Hard	Hard	Hard	Hard
		KSI		KSI	%-2"	RB	RB	RB
		UTS		YS	20C	1% YS	20C	ELONG
		Tail						

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical
Dept. Mgr.

KRIS LARK

12/20/2018



**NORTH AMERICAN
STAINLESS**

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502)-347-6000

Certificate: 461371 02 Mail To:
Customer: 0540 014

TRYSSENKROPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO TRYSSEN PARK
DETROIT, MI 48210

Ship To:

TRYSSENKROPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO TRYSSEN PARK
DETROIT, MI 48210

Date: 11/12/2018 Page: 1

Steel: 304

Finish: ERAP

Your Order: 5400423057

NAS Order: AN 0828731 01

Corrosion: ASTM A262/15;18Bend-OK

PRODUCT DESCRIPTION:

STAINLESS STEEL COIL, ERAP; UNS 30400
ENL0028-7 & EN10088-2, 1.4301
ASTM A240/17, A480/16B, A666/15; ASME SA240/17, SA480/17, SA666/17
AMS5513J XTRK; MIL-S-5059D AMD3 (X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07; Q05766D-A X MAG PERM
MIN. SOLUTION ANNEAL TEMP 1900E, WATER QUENCHED

REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; RoHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg. by a Quality Mgt. Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DEARs Compliant
*Melted & Manufactured in the USA; Mat'l is DEARs Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	COMMODITY CODE
06A28E A	* 06A28E A	.1090	36.0000	8,260	COIL	579.50	1	SSFLR21833

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) ANAB, ISO/IEC 17025, Certificate# I2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A28E	US	.0464	18.0265	.3870	1.6305	.3175	.0507	8.0175	.0315	.0011
SI %										
.2540										

MECHANICAL PROPERTIES

Product ID #	Coil #	F T	97.23	47.07	56.85	48.09	87.00	89.50
06A28E A	06A28E A	F T	97.23	47.07	56.85	48.09	87.00	89.50
		UTS	20C	.2% YS	20C 1% YS	20C ELONG	% Hard	Tail
		KSI	KSI	KSI	%-2"	RB	RB	Hard

ENTERED

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.

Technical Dept. Mgr.
KRAIS LARK 11/12/2018



NORTH AMERICAN STAINLESS

METALLURGICAL TEST REPORT

6870 Highway 42 East
Ghent, KY 41045-9615
(502) 347-6000

Certificate: 461371 02 Mail To: Ship To:
Customer: 0540 014 TEXSENKRUPP MATERIALS NA
KEN-MAC METAL DIVISION
TWO THYSSEN PARK
DETROIT, MI 48210
Date: 11/12/2018 Page: 1
Steel: 304
Finish: HRRP

Your Order: 5400423057
NAS Order: AN 0828731 01
Corrosion: ASTM A262/15;18Bread-OK

R E M A R K S :
STAINLESS STEEL COIL, HRRP; UNS 30400
ENL0028-7 & ENL0088-2, 1.4301
ASTM A240/17, A480/16b, A666/15; ASME SA240/17, SA480/17, SA666/17
AMS5513J XMRK; MIL-S-5059D AMD3 (X CRN MEAS); MIL-S-4043B
NACE MR0175/ISO 15156-3:2009 A, MR0103/07; QSS766D-A X MAG FERM
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED
Mat'l is Free of Mercury Contamination. No weld repairs.
EN 10204:2004 3.1; ROHS 1 & 2 Compliant
Material is Free of Radioactive Contamination
Steel Making Process: EAF, AOD, & Cont. Casting
Product Mfg. by a Quality Mgt. Sys. in Conf. w/ISO 9001
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant
*Melted & Manufactured in the USA; Mat'l is DFARS Compliant

Product ID #	Coil #	Thickness	Width	Weight	Length	Mark	Pieces	COMMODITY CODE
06A28E A	* 06A28E A	.1090	36.0000	8,260	COIL	579.50	1	SSFLR21833

CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan) ANAB, ISO/IEC 17025, Certificate# L2323
Chemical Analysis per ASTM A751/14a

HEAT	CM	C %	CR %	CU %	MN %	MO %	N %	NI %	P %	S %
A28E	US	.0464	18.0265	.3870	1.6305	.3175	.0507	8.0175	.0315	.0011
SI %										
-2540										

MECHANICAL PROPERTIES

Product ID #	Coil #	F T	97.23	47.07	56.85	48.09	87.00	89.50
06A28E A	06A28E A							
		YS	20C	1% YS	20C	ELONG %	Hard	Trail
		KSI	KSI	KSI	KSI	%-2"	RE	Hard

ENTERED

NAS hereby certifies that the analysis on this certification is correct. Based upon the results and the accuracy of the test methods used, the material meets the specifications stated. These results relate only to the items tested and this report cannot be reproduced, except in its entirety, without the written approval of NAS.
Technical Dept. Mgr.
KRIS LARK 11/12/2018



INSPECTION CERTIFICATE
EN10204 3.1
M0030

AMERICAN WIRE RESEARCH CO. LTD
 1005 AIRBRAKE AVENUE
 Wilmerding PA, 15148

Customer	AMERICAN WIRE RESEARCH, INC		Commodity	AWT-308LSi	Mfg. Date	2018/07	Lot No.	18718095										
Specification & Classification	AWS A5.9 ER308LSi		Dimension	1/16"X36" X 10 LBS	Issue Date	2018/7/25	Certificate No.	EXP1860089 1										
<input checked="" type="checkbox"/> Chemical Composition for Solid Electrode and Rod(%) / <input type="checkbox"/> Weld Metal Chemical Composition(%)																		
Element	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	N								
Requirement	0.03 max	1.0 2.5	0.65 1.00	0.03 max	0.03 max	0.75 max	9.0 11.0	19.5 22.0	0.75 max	- -								
Test Result	0.017	1.76	0.84	0.025	0.016	0.13	10.41	20.21	0.09	0.055								
Category	Tensile Test					Impact Test					Welding Condition							
	Yield * Strength N/mm ²	Yield ** Strength N/mm ²	Tensile Strength N/mm ²	Elongation %	Reduction of Area %	Test Temp. °C	Charpy V-Notch Absorbed Energy J(AVE.)	NR	NR	NR	NR	NR	NR	NR	Type of Current	Welding Current A	Arc Voltage V	Shielding Gas
Deposited Metal Requirement																		
Test Result																		
Bend Test	Hardness Test		Fillet Weld Test		Radiographic Test		Moisture %		Diffusible Hydrogen mL/100gDM(AVE.)		Heat No.							
	Face	Root	NR	NR	NR	ACCEPTABLE	NR	NR	NR	NR	276666							
We hereby certify that this report is correct and that all test results are in compliance with the specification described herein. The material described above is free irradiation and free mercury.												Remarks weight: 1670LBS Melt mill/Country of origin: TAIWAN P/O No.: 3PO15-18060003 **Lower Yield point NS=not specified NR=not required C1=100%CO ₂ M21=Ar+20~25%CO ₂						
Manager of Quality Assurance																		



INSPECTION CERTIFICATE
EN10204 3.1
M0030

AMERICAN WIRE RESEARCH CO. LTD
 1005 AIRBRAKE AVENUE
 Wilmerding PA, 15148

Customer	AMERICAN WIRE RESEARCH, INC		Commodity	AWT-308LSi		Mfg.Date	2018/06		Lot No.	18615035		
Specification & Classification	AWS A5.9 ER308LSI		Dimension	1/16*36" X 10 LBS		Issue Date	2018/6/20		Certificate No.	EXP1850138 7		
<input checked="" type="checkbox"/> Chemical Composition for Solid Electrode and Rod(%) / <input type="checkbox"/> Weld Metal Chemical Composition(%)												
Element	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	N		
Requirement	0.03 max	1.0 2.5	0.65 1.00	0.03 max	0.03 max	0.75 max	9.0 11.0	19.5 22.0	0.75 max	-		
Test Result	0.012	1.68	0.82	0.024	0.012	0.15	10.27	19.98	0.07	0.055		
Category	Tensile Test						Impact Test					
	Yield * Strength N/mm ²	Yield ** Strength N/mm ²	Elongation %	Reduction of Area %	Test Temp. °C	Charpy V-Notch Absorbed Energy J(AVE.)	Type of Current		Welding Current A	Arc Voltage V	Shielding Gas	Post weld Heat Treatment
Deposited Metal Requirement												
Test Result							NR	NR	NR	NR	NR	
Bend Test	Hardness Test		Filllet Weld Test		Radiographic Test		Moisture %		Diffusible Hydrogen mL/100gDM(AVE.)		Heat No.	
	Face	Root	NR	NR	NR	NR	NR	NR	NR	NR	NR	Mn+Ni+Cr+Mo+V
We hereby certify that this report is correct and that all test results are in compliance with the specification described herein. The material described above is free irradiation and free mercury.												
Remarks weight: 1750LBS Melt mill/Country of origin: TAIWAN *0.2 offset P/O No.: 3PO15-18050006 **Lower Yield point 1992 WRC FERRITE: 10.1FN NS=not specified DeLong Ferrite: 12.2% NR=not required Schaeffler Ferrite: 11.1% C1=100%CO ₂ M21=Ar+20~25%CO ₂												
Manager of Quality Assurance												

Del 8085991128



ESAB

MATERIAL CERTIFICATE

982 Griffin Pond Rd, Clarks Summit, PA US 18411, Ph: 570-585-7500

Cert#: 190004706

Page 1

Plant Location: 982 Griffin Pond Road, Clarks Summit, PA 18411

Sold To: 20122352	Ship To:
AIRGAS USA, LLC	AIRGAS-Mableton
MARIETTA GA	MABLETON GA
Customer Order No: 4514639133	Certification Date: 20190214
ESAB Order No: 364700/1	
Work Order/Lot: 290357	

AWS A5.9:2012, ASME Section II Part C SFA-5.9, 2015 EDITION
 EN 10204 Type 3.1
 Stainless Steel Welding Wire
 Type ER308Si/ER308LSi

Size: .045"
 Heat: 552555

Analysis %

Heat	C	Si	Mn	P	S	Cr	Ni
	.019	.79	2.06	.027	.014	19.83	9.10
	Mo	Cu	Ta	N	*FD	*FS	*FW
	.37	.24	.005	.088	12	14	11

*FD = Delta Ferrite (FN) from the Delong Diagram
 *FS = Delta Ferrite (%) from the Schaeffler Diagram
 *FW = Delta Ferrite (FN) from ASME Fig. NB 2433.1-1 (WRC 1992 Diagram)

Country Of Origin: United States

The following mechanical test results are typical values representative of this grade of material.

Tensile (psi): 85000
 Elongation % : 45

The Heat analysis is an actual Chemistry Analysis.

CWB (Canadian Welding Bureau) approval has been attained for the following steel grades: ER308L, ER308LSi, ER309L, ER309LSi, ER316L, ER316LSi, ER317L, ER347, ER2209

The material has not come in contact with mercury or mercury containing compounds and as such is certified mercury free. Material has been manufactured/supplied in accordance with a quality system certified to ISO 9001.

The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of ESAB. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious, or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in Section 6 of EN 10204:2004. Contravention of this notice will be prosecuted to the fullest extent of applicable law.

This is to certify that the contents of this certificate are correct and accurate as contained in ESAB's records, and that all above test results and operations performed are in compliance with the requirements of the purchase order.

Melt Source: AB Sandvik MT, Sweden

Electronically Generated Certificate-Valid without signature
 B. Meyers, Quality Engineer

15 (A5.9 STD 33#SPL R38) (15) (BOPR)

T498056



CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: August 26, 2019	Company: Chart Ferox a.s.
P.O. No.: 3672659OP	Lot No.: 191695
Product: LCV-250BFS21.75 ✓	Ferox Part Number: 20582325
Serial No.: B80115-B80154 ✓	Quantity: 40 ✓

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy.

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,
Mark Good
Generant Company



T498056 [Signature]



TRANSPORTABLE PRESSURE EQUIPMENT DIRECTIVE (TPED)
DECLARATION OF CONFORMITY

Manufacturer:

We hereby declare that the safety accessories specified below has been designed , manufactured and tested in accordance with the requirements of the:

Transportable Pressure Equipment Directive 2010/35/EU and ADR (Sections 1.8.7.2 and 1.8.7.6)

Authorized Representative:

Drukon GmbH, Hauptstrasse 29, 02794 Spitzkunnersdorf, Germany

π 0409

Description of Pressure Equipment:

Model: LCV-250BFS21.75

Work Order #: 0302696

Sales Order: 191695

Date of Manufacture Code: H19

Body Material Lot Code: QG5

Serial #: B80115 to B80154

Conformity assessment procedure followed:

Type Approval: ADR Section 1.8.7.2

Quality Assurance: ADR Section 1.8.7.6

The Notified Body has issued the following EC certificates:

EU Type: Examination Certificate No.: 16-1008709-100

Product Quality Assurance: 16-1008709-101

Notified Body:

The Notified body that carried out the inspection and is involved in monitoring the Quality Assurance System :

Kiwa Inspecta AB, Box 7178, Råsundavägen 12, 170 07 Solna, Sweden

Notified Body Identification Number: 0409

Referenced Harmonized Standards and/or Technical Specifications to which the conformity is declared:

EN 13648-1, BS EN ISO 4126-1, EN 12300

Note:

Products labeled "Cleaned for Oxygen Service" are "EN-12300-O2" and meet or exceed CGA G-4.1 Cleaning Equipment for Oxygen Service.

Standard Cleaned Products are "EN-12300".

User Instructions Included

Signed: *Carmy O'Keefe*
Authorized Quality Representative

Date: 8-22-19

QC-FR-049
Rev. J
DCR4435



Series LCV, Liquid Cylinder Valve User Instructions

Scope:

These user instructions are applicable for all Series LCV Liquid Cylinder Valves.

Intended Use:

The Generant Series LCV is a direct acting, spring reference, factory preset pressure relief valve for inert gas, oxygen and potential oxidizer gases > 21% @ less than 500 psi MOP (34.48 bar). This product is specifically for use on portable cryogenic liquid cylinders up to 450 liters.

Technical Data:

LCV Series valves are supplied preset, 100% factory tested and permanently staked to prevent any adjustment of the pressure setting. All LCV valves are engraved with the full part number, set pressure, material lot code and date of manufacture. Operating parameters are listed below:

Temperature Range: -320° to 348° Fahrenheit (-195°C to 176°C)

Nominal Set Pressure Range: 22 – 500 psi (1.52 – 34.48 bar)

Orifice: .250 Diameter

Set Pressure Tolerance:

Nominal Set Pressure	Tolerance
0.50-28.90 psig	± 5%
29.00-48.30 psig	± 1.45 psi
48.40 + psig	± 3%

Operating Temperature Per Seal Material
Seal Material
FS – Fluorosilicone for 22-49 Psig (-85° to 350° F (-65° to 176°C))
K – PCTFE for Above 50 Psig (-320° to 165° F (-196° to 74° C))

Maintenance:

These valves are factory preset and are NOT to be tampered with in the field. These products do not require maintenance. If valve becomes visibly damaged or corroded, or if the inlet orifice becomes contaminated with particulate, the valves should be discarded and replaced.

⚠ WARNING

Generant Liquid Cylinder Valves are supplied Cleaned for Oxygen Service and are shipped from the factory individually heat-sealed in poly bags. Once removed from the bag, integrity of this cleaning has been compromised. Proper handling should be used to ensure the integrity and cleanliness of the entire system.

Installation Instructions:

1. All Series LCV relief valves are 100% factory tested for leakage before crack, flow and reseal performance.
2. Ensure that the cylinder relief valve connection port is free of particulate contamination. This should be accomplished by purging with a clean dry media. Visually inspect the port for cleanliness.
3. Teflon tape should be used to seal the connection. Beginning with the first thread, wrap tape in the direction of the male tapered thread spiral, and join with a slight overlap. Ensure that the tape does not overhang the first thread. If any additional pipe sealant is being used, **do not** apply it to the first thread of the valve.
4. Thread the valve into the connection port hand tight. Using a 7/8" open-end wrench, tighten the valve an additional ¾ to 1 full turn.
5. The connection should be tested for leaks using an oxygen-approved leak detector.

Safe Component Selection

The LCV Series is intended to be used on DOT 4L Liquid Cylinders. However, when selecting a component, the total system design must be considered to ensure safe, trouble free performance. Component function, materials compatibility, adequate ratings, proper installation, operation, cleanliness and maintenance are the responsibility of the system designer and user.

Generant Company, Inc.
1865 Route 23 South P.O. Box 768 Butler, New Jersey 07405 Phone 973.838.6500 Fax 973.838.4888
www.generant.com

EN-FR-014
Rev F
DCR4020



T490832

CERTIFICATE OF COMPLIANCE & CONFORMANCE

(Quality Assurance Statement of Fit Form & Function)

Date: July 9, 2019

Company: Chart Ferox a.s.

P.O. No.: 3662953OP

Lot No.: 190242

Product: LCV-250BFS21.75 ✓

Ferox Part Number: 20582325 ✓

Serial No.: A123464-A123503

Quantity: 40 ✓

It is hereby certified that all applicable order/contract/product specification, standards and requirements have been met and that all of the items are of identical configuration as described in Specifications, Catalogs, Work Instructions, or other reference documents from which the part numbers are derived.

The products were subjected to the same controls and QA programs as originally utilized. The original equipment qualification is not compromised by the use of these parts.

The products were cleaned and protected per CGA-4.1 specifications for oxygen service. These valves have been set to standard catalog tolerances of +/- 5% of nominal crack pressure on increasing pressure with Nitrogen and in accordance with Generant standard work instructions policy. ✓

The Purchase Order and all other Purchase Order line items to which this statement is applied have been referenced.

This statement is signed by a person who is responsible for the Quality Assurance function associated with this order.

Sincerely,

Mark Good

Generant Company



T490832

15-07-2019

[Signature]



TRANSPORTABLE PRESSURE EQUIPMENT DIRECTIVE (TPED)
DECLARATION OF CONFORMITY

Manufacturer:

We hereby declare that the safety accessories specified below has been designed , manufactured and tested in accordance with the requirements of the:

Transportable Pressure Equipment Directive 2010/35/EU, 2008/68/EC, 2014/103/EU and ADR (Sections 1.8.7.2 and 1.8.7.6)

Authorized Representative:

Drukon GmbH
Hauptstrasse 29
02794 Spitzkunnersdorf
Germany

Description of Pressure Equipment:

Model: LCV-250BFS21.75 ✓ Work Order #: 0300081
Sales Order: 190242 Date of Manufacture Code: G19 Body Material Lot Code: QF3
Serial #: A123464 to A123503 ✓

Conformity assessment procedure followed:

Type Approval: ADR Section 1.8.7.2
Quality Assurance: ADR Section 1.8.7.6

The Notified Body has issued the following EC certificates:

EU Type: Examination Certificate No.: 16-1008709-100
Product Quality Assurance: 16-1008709-101

Notified Body:

The Notified body that carried out the inspection and is involved in monitoring the Quality Assurance System :

Inspecta
P.O. Box 401 (Höjdrodergatan 12)
SE-201 24 Malmö, Sweden

Notified Body Identification Number: 0409

Note:

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Standard Cleaned Products are "EN-12300".

User Instructions Included

Signed: [Signature]
Authorized Quality Representative

Date: 07/09/2019

QC-FR-049
Rev. I
DCR4247



Series LCV, Liquid Cylinder Valve User Instructions

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