

PD 64645

FL 300710P

21854

WESTERN FORGE & FLANGE CO.



687 COUNTY ROAD 2201
CLEVELAND, TX 77327
PH (281) 727-7000 FAX (281) 727-7062

CERTIFIED MATERIAL TEST REPORT

CERTIFIED IAW EN10204 3.1 (MADE IN USA)

| | |
|---|----------------------|
| TO: T.W. METALS INC. | WFF SO NO: 22622-3 |
| PO: D75113087 | HEAT NO: 2650 2 6826 |
| SPECIFICATIONS: ASTM B564-11, B446-03 N06625 GRADE-2 (SOLUTION ANNEALED) FORGED PER B564 PRACTICE H.T. (GRADE 2) & MECH. PER B446 DIM/TOL PER ASME B16.5-2009 | |

| QTY | ITEM DESCRIPTION |
|-----|-------------------|
| 2 | 4" 600# WN RF S80 |
| | |
| | |
| | |
| | |
| | GAYESCO PO# 64645 |

| TYPE | C | MN | P | S | SI | NI | CR | MO | NB+TA |
|--------------|------|-----|------|-------|-----|-------|-------|------|-------|
| N06625 | .031 | .28 | .009 | <.002 | .17 | 60.59 | 21.63 | 8.63 | 3.55 |
| MILL | FE | AL | TI | | | | | | |
| Haynes Int'l | 4.42 | .16 | .29 | | | | | | |

| HEAT NO. | YIELD .2% OFF-PSI | TENSILE-PSI | % ELONG | % RED AREA | HARDNESS | GRAIN SIZE (ASTM) |
|-------------|-------------------|-------------|---------|------------|----------|-------------------|
| 2650 2 6826 | 55,250 | 122,740 | 62.0 | 60.9 | 194 HBW | |
| | GMI Lab# | 58498 | | | | |
| | | | | | | |

- NO WELDING PERFORMED ON THE FORGINGS OF THIS ORDER.
- MATERIAL HEREIN IS CERTIFIED FREE FROM ANY FORM OF MERCURY, RADIUM OR ALPHA PARTICLE CONTAMINATION THROUGHOUT ALL PHASES OF MANUFACTURE AND SHIPMENT.
- Solution annealed for 1-1/2 hours @ 2050°F and water quenched.
- The forgings on this order conform to the specified dimensional requirements.
- The forgings on this order were manufactured IAW WFF QA Program WF08.10 Rev. 04 dated 04/17/13 as audited & approved by DNV (Notified Body) IAW PED Annex-I Section 4.3.

WE CERTIFY THE MATERIAL DESCRIBED HEREIN HAS BEEN MANUFACTURED, TESTED AND EXAMINED IAW AND MEETS ALL THE REQUIREMENTS OF ABOVE PURCHASE ORDER AND REFERENCED SPECIFICATIONS.

Rose Kay

09/05/2013

DATE

ROSE KAY, QUALITY ASSURANCE ASSISTANT
WESTERN FORGE & FLANGE CO.

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RECERTIFIED
TO ASME

SB564

PMI

9/13/13

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS

CUSTOMER COPY

| | | | | |
|---|--|---|---|--|
| Sales Order No Reference Commande Bestellungs Nr 672946003-0 | Date Entered Date De Commande Bestelldatum 12/21/12 | Customer Reference Reference Client Kundenbestelldaten 10591 | Report No. Rapport No Zeugnis Nr 20121228063 | Pages of Pages Page de Pages Anzahl der Seiten 1 Of 3 |
|---|--|---|---|--|

HAYNES
International

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

| | | |
|--|---|---|
| Sold To • Client • Bestellanschrift WESTERN FORGE AND FLANGE CO PO BOX 1788 CLEVELAND TX 77328 USA | Ship To • Destinataire • Bestellmenge WESTERN FORGE AND FLANGE CO 687 COUNTY RD 2201 CLEVELAND TX 77327 USA | Product Description • Description Produit • Material Beschreibung 8 x 8 x 149.625 MELT: ELECTRIC FCE/AOD/ESR HAYNES(R) 625 ALLOY RCS - - BILLET FOR SALE Nadcap Materials Testing Accredited GE# 19762, S400 10/10/2011, S1000 8/1/2011, EN 10204 3.1, AS9100 |
|--|---|---|

| | | |
|---|--|---|
| Specification • Specification • Spezifikation ASME-SB-446, 10, UNS# N06625, Gr. 1; ASME-SB-564, 10, UNS# N06625; ASTM-B-446, 10, UNS# N06625, Gr. 1; ASTM-B-564, 10, UNS# N06625 | Quantity Ordered Quantite Commandee Bestellemenge 5302 LB | Quantity Shipped Quantite Expediee Liefermenge 5302 LB |
|---|--|---|

| Heat Number Numero De Coulce Charge Nr | Chemical Analysis • Analyse Chimique • Chemische Analyse | | | | | | | | | | | | | | | | | |
|--|--|----|-------|------------------|------|-------|---------------------|------|------|------|-------|-------|--------|-------|-------|-------|---|--------------|
| | Al | B | C | Cb+Ta (Nb+Ti) | Co | Cr | Cu | Fe | Mn | Mo | Ni | P | S | Si | Ti | V | W | |
| 2650 2 6826 | 0.16 | | 0.031 | 3.55 | 0.21 | 21.63 | | 4.42 | 0.28 | 8.63 | 60.59 | 0.009 | <0.002 | 0.17 | 0.29 | | | BUTT END *04 |
| | Al(Nb) | Ta | Zr | Bi | Se | La | C-N-Cb ⁹ | Pb | Mg | Y | Ag | N | Ca | Al+Ti | Ni+Co | Ni+Mo | | BUTT END *04 |
| 2650 2 6826 | | | | | | | | | | | | | | | | | | BUTT END *04 |

Certified By • Certifie Par • Bescheinigt Durch: **Chuck Stansell**
Certification Technician
Chuck J. Stansell

12/28/2012

WFF
QA REVIEW
Approved: *Rk*
Date: *01/11/13*

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS

CUSTOMER COPY

Sales Order No
Reference Commande
Bestellungs Nr
672946003-0

Date Entered
Date De Commande
Bestelldatum
12/21/12

Customer Reference
Reference Client
Kundenbestelldaten
10591

Report No.
Rapport No
Zeugnis Nr
20121228063

Pages of Pages
Page de Pages
Anzahl der Seiten
2 Of 3

HAYNES
International

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

| Tensile Test at Room Temperature • Essai De Traction A Temp. Ambiante • Zugversuch Bei Raum Temp. | | | | | | Tensile Test at Elevated Temperature • Essai De Traction A Hte.Temp. Warm Zugversuch | | | | | | Stress Rupture Temperature • Essai A Charge De Rupture Zeitstandversuch | | | | | |
|---|---|---|--|------|------|--|---------------------------|---|---|--|-----|---|--------------------------|-----------------------------------|----------------------------|--|------|
| Ultimate Zugfestigkeit | 1% Yield Lim. Elast. A 1% 1% Strickgrenze | 0.2% Yield Lim. Elast. A 0.2% 0.2% Strickgrenze | % Elong In % Allong EN % Dehnung | %RA | | Test Essai Versuch | Ultimate Zugfestigkeit | 1% Yield Lim. Elast. A 1% 1% Strickgrenze | 0.2% Yield Lim. Elast. A 0.2% 0.2% Strickgrenze | % Elong In % Allong EN % Dehnung | %RA | | Test Essai Versuch | Stress Constrainte Spannung | Hours Heures Stunden | % Elong In % Allong EN % Dehnung | % RA |
| 138000 PSI | | 77000 PSI | 41 % | 46 % | 1)A) | | | | | | | | | | | | |

| Annealed Hardness Durete Recuit Gegluht Haerte | Aged Hardness Durete Vieilli Gealtert Haerte | Grain Size Grosueur De Grain Korngroesse | | | | | | IGA | Uniformity | Corrosion Rate | | Oxidation Rate | Charpy Impact Test | | | | Creep Rupture | | | | |
|---|--|--|---------------------------|--------------|---------------------|-----|-------------------------|-----|------------|----------------|-----------|----------------|--------------------|------------------|----------------|----------------|----------------|--------------------------|-----------------------------------|----------------------------|--|
| | | Grain Size | Predominant Grain Size | Recry. Grain | Unrecry. Grain % | ALA | P&W Figure Number | | | Attack Depth | Corrosion | | Test Method | Toughness Avg | Toughness 1 | Toughness 2 | Toughness 3 | Test Essai Versuch | Stress Constrainte Spannung | Hours Heures Stunden | % Elong In % Allong EN % Dehnung |
| 98 HRBW | 1)A) | 7 | | | | | | | MPY | | | Ft. Lbs. | Ft. Lbs. | Ft. Lbs. | Ft. Lbs. | Temp: | PSI | | | | |

Certified By • Certifie Par • Bescheinigt Durch: **Chuck Stansell**
Certification Technician

12/28/2012

1) 136536321

Chuck J. Stansell

WFF
QA REVIEW
Approved: *PK*
Date: 01/10/13

CERTIFICATION OF TESTS • RAPPORT D'ESSAIS CERTIFIE • WERKSZEUGNIS

| | | | | |
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|---|--|---|---|--|

HAYNES
International

CUSTOMER COPY

Haynes International
1020 West Park Avenue
PO Box 9013
Kokomo, Indiana, 46902

All tests and inspections have been performed and results meet specification requirements.
THIS MATERIAL IS FREE FROM MERCURY, CADMIUM, RADIUM, AND ALPHA SOURCE CONTAMINATION.
THIS MATERIAL WAS MELTED AND MANUFACTURED IN THE UNITED STATES.
When microstructure analysis is performed, the etchant used is H2O2 and HCl. Samples were viewed at 100-500x magnification. Grain size evaluation is performed to the requirements of ASTM E112- 96(2004)e2 Plate 1. Samples are prepared per ASTM E3-01. The material has been evaluated for alloy depletion .
No welding performed on this material.
This material was air melted followed by consumable remelting.
Material has NOT been annealed.
Test results were obtained from an upset forged sample.
Supplied billet stock is capable of meeting mechanical and chemistry requirements of ASTM-B-564.
Mill Orders Used: 1365363211 (5302 LB)
A) 1700 °F to 1900 °F
Method of Chemistry Analysis for Heat# 26826 BUTT END *04: O.E. (Al,P,Si); LECO (C,S); XARL LINFIT (CBTA,Co,Cr,Fe,Mn,Mo,Ni,Ti);

Certified By • Certifie Par • Bescheinigt Durch: Chuck Stansell 12/28/2012
Certification Technician

Chuck J. Stansell

WFF
QA REVIEW
Approved: *Rk*
Date: *01/11/13*



GILL Metallurgical Inc.

691 County Road 2201
Cleveland, TX 77327
Ph. 281-593-0807 Fax 281-593-0907
WWW.GILLMET.COM



ISO 9001:2008

CERTIFIED TEST REPORT

Customer: Western Forge & Flange Co.
687 County Road 2201
Cleveland, TX 77327
Attention: Rose Kay

Test Report No: 58498
Revision: A
Report Date: 09/05/13
Customer PO No: M33777

Specification: B564-11, B446-03
Material: N06625
Heat ID: 2650 2 6826
Description: Item 3: 4" 600#WN
Reference: T. W. Metals Inc. PO# D75113087

TENSILE TEST RESULTS

| S/N | DIMENSIONS | | YIELD | | TENSILE | | ELONGATION | | REDUCTION AREA | |
|-----------------------|--------------|-------------------------------|------------|------------|------------|----------------------|------------|------|----------------|------|
| | WIDTH (INCH) | AREA (INCH ²) | LOAD (LBS) | Y.S. (PSI) | LOAD (LBS) | T.S. (PSI) | INCH | % | RED WIDTH | % |
| 1 | .502 | .198 | 10934 | 55250 | 24291 | 122740 | 3.241 | 62.0 | .314 | 60.9 |
| MAXIMUM REQUIREMENT: | | | | | | | | | | |
| MINIMUM REQUIREMENT: | | | | 40,000 | | 110,000 | | 30 | | |
| LOCATION: AS SUPPLIED | | YIELD STRENGTH AT: .2% OFFSET | | | | GAGE LENGTH: 2" (4D) | | | | |

HARDNESS TEST RESULTS

| | |
|--------------------|--------------------------|
| HARDNESS REQUIRED: | ACTUAL HARDNESS: 194 HBW |
|--------------------|--------------------------|

Hardness results are an average of at least three readings. Where applicable, hardness results were converted using ASTM E140.

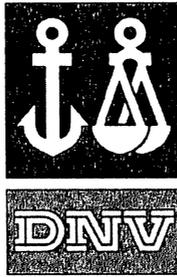
QMS Rev. 3 dated 04/27/12; ISO 9001:2008 Registered; ABS Q.E. Certificate No: 47342; also audited and approved by WFF on 10/20/12 applies.

MATERIAL CONFORMS TO SPECIFICATION



Certified by: Janet Casey
Janet M. Casey
Assistant Quality Manager

The information contained in this certification represents only the material submitted and is certified only for the quantities tested. Reproduction except in full is reserved pending written approval. All test specimens and testing conforms to applicable ASTM test methods in effect at the time of testing, unless otherwise stated. The recording of false, fictitious, or fraudulent statements or entries on the certificate may be punishable as a felony under federal law. All testing was performed in a mercury free environment.



DET NORSKE VERITAS

MATERIAL MANUFACTURE CERTIFICATE

*Application of the Council Directive 97/23/EC of 29 May 1997 on Pressure Equipment,
as amended.*

CERTIFICATE NO. 50137-2009-CE-HOU-DNV REV. 1

This Certificate consists of 5 pages

This is to verify that

WESTERN FORGE AND FLANGE COMPANY

691 County Road 2201,
Cleveland, TX 77327, USA

*has implemented and is maintaining a certified quality assurance system
which has undergone a*

SPECIFIC ASSESSMENT FOR MATERIALS

*for applications covered by Council Directive 97/23/EC of 29 May 1997
on Pressure Equipment, and is found to comply with Annex 1, section 4.3, for*

ACCEPTANCE OF TYPE 3.1 MATERIAL CERTIFICATES ACCORDING TO EN 10204:2004

The specific assessment for materials has been carried out according to
Det Norske Veritas AS' Technical Information No. MT 05:01E/C

Applications/Limitations:

See page 2

Place and date:

Høvik, 2012-04-16

This Certificate is valid until:

2015-04-16

DET NORSKE VERITAS AS

Giorgio Saia

Acting Head of Section NACNO378

Michael D. Norman
Technical Reviewer

Notice: The certificate is subject to terms and conditions overleaf. Any significant changes in design or construction may render this certificate invalid.

The digitally signed and electronically distributed document is the original and valid certificate. Ref.: www.dnv.com/digitalsignatures

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 300,000. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Quality Management System of:

Western Forge & Flange Co.

687 County Road 2201

Cleveland, TX 77327

U.S.A.

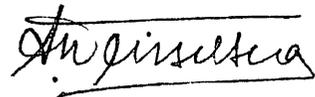
has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 9001:2008

The Quality Management System is applicable to:

MANUFACTURER OF FORGINGS AND FLANGES

Certificate No: 48137
Effective Date: 18 May 2013
Expiration Date: 17 May 2016
Revision Date: 18 May 2013



Alex Weisselberg, President



Validity of this certificate is based on the periodic audits of the management system defined by the above scope and is contingent upon prompt, written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 16855 Northchase Drive, Houston, TX 77060, U.S.A.

Validity of this certificate may be confirmed at www.abs-qe.com/cert_validation.

Receiving Inspection / PMI
Report



TEMPERATURE SPECIALISTS

VC: JUMET Date: 9/12/13 Time In: 11:15 AM
 Gayesco PO #: 64645 SO#: _____ Customer or Stock: BR 194463P, FLO5099SP

Description: 1) Bar Round 6 5/8 Forging A625 Grade 2 Heat treated (3) Flange 1/2" 600# RFWN Sch 80 PED
A625 (4) Flange 4" 600# RFWN Sch 80 A625 Grade 2 Heat treated PED

| Item | Qty | Log # | Brief Description | Specified Alloy | Heat # | Read # | Cr | Ni | Mn | Fe | Nb | Mo | Ti | PMI/Grade Results PMI Instrument used Niton XRF, XL3t S/N 84931 | % Done |
|------|-----|-------|-----------------------|-----------------|-------------|--------|-------|-------|----|----|------|------|----|---|--------|
| 1 | 10" | 21852 | Ro Bar 6 5/8 | A625 | 2650 2 6826 | 9-10 | 21.75 | 61.36 | | | 3.50 | 8.20 | | PMI | 100 |
| 3 | 2 | 21853 | Flange 1/2" 600# RFWN | A625 | 2650 2 6827 | 11-12 | 21.50 | 61.60 | | | 3.54 | 8.50 | | PMI | 100 |
| 4 | 2 | 21854 | Flange 4" 600# RFWN | A625 | 2650 2 6826 | 13-14 | 21.25 | 61.10 | | | 3.62 | 8.40 | | PMI | 100 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

MTRs Reviewed Yes No
 Radiation Check Per Procedure WI-10017 ≤ 3μ Sv/hr. Pass Fail
 Dimensional and/or Visual Inspection performed Yes No
 By: [Signature]
 Date: 9/13/13

List Any Discrepancies or Nonconformances: N/A

Action Taken: N/A

Status: (Circle One) Accepted Rejected Accept As Is Return to vendor Pending

Comments: _____
 Inspector: [Signature] Date: 9/13/13 Time Out: 10:00 AM