28.01.2021

EU-/FDA-Konformitätserklärung „Lebensmittel- und Pharma-Unbedenklichkeit“

Das Dichtungsmaterial **TEADIT TF 1590** eignet sich hervorragend für den direkten Kontakt mit Lebensmitteln und pharmazeutischen Wirkstoffen, und damit zur Anwendung in der pharmazeutischen Industrie.

Das Produkt wird in Übereinstimmung mit der Verordnung (EG) Nr. 2023/2006, über gute Herstellpraxis für Materialien und Gegenstände, die dazu bestimmt sind mit Lebensmittel in Berührung zu kommen, gefertigt und erfüllt zudem die Anforderungen folgender Richtlinien:

a) EU – Richtlinie

- EG Rahmen-Richtlinie 1935/2004
- EU Richtlinie Nr. 10/2011

b) US – Richtlinie

- U.S. regulations 21 CFR 177.1550

Entsprechende Zertifikate und Prüfberichte externer Prüfinstitute liegen vor und sind auf Anfrage erhältlich.

Gesamtmigration
Migrationstests wurden durchgeführt und haben gezeigt, dass unter Testbedingungen die Migrationsgrenzen nicht überschritten wurden.

Spezifischer Migrationswert (SML) und Restgehalt je mit Lebensmitteln in Kontakt stehender Fläche (QMA) oder (QM)
☐ Nicht zutreffend: Material beinhaltet keine Stoffe, welche eine Prüfung hinsichtlich SML / QMA / QM erfordern.
☒ Die folgenden Stoffe unterliegen Beschränkungen --> SML und/oder QMA, QM Grenzwerte werden unter Prüfbedingungen eingehalten.

Stoff Bezeichnung	Ref.	SML / QM / QMA
Tetrafluoroethylene	*EU 10/2011*	*SML 0,05 mg/kg*

TEADIT International Produktions GmbH
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e-Mail: austria@teadit.eu
www.teadit.eu

UniCredit Bank Austria in Woergl, Austria
IBAN: AT34 1100 0048 9323 6200 (EURO Konto/Account)
IBAN: AT04 1200 0048 9323 6202 (USD Konto/Account)
BIC/Swift-Address BKAUATWW

Basierend auf den Screening-Ergebnissen, einschließlich der analytischen Toleranz, entspricht die untersuchte Probe der Gesamtmigrationsgrenze bei Kontakt mit allen Arten von Lebensmitteln **bis 175 ° C**, gemäß Richtlinie 2002/72 / EG und 10/2011 / EG sowie den Extraktionsgrenzen gemäß bis 21 CFR 177.1550.

TEADIT verwendet in der Fertigung keine Stoffe tierischen Ursprungs (ADI). Das Produkt ist, nach derzeitigem Kenntnisstand, frei von BSE (Bovine Spongiform Encephalopathy) und TSE (Transmissible Spongiform Encephalopathy).

Diese Konformitätserklärung gilt für das von uns gelieferte Produkt und wie oben angegeben. Die in diesem Dokument enthaltenen Informationen gelten für die angegebenen Revisionsversionen und -daten und / oder bis dieses Dokument ersetzt wird.

Aufgrund möglicher Änderungen der zugrunde liegenden Gesetze und Vorschriften sowie möglicher Änderungen unserer Produkte können wir nicht garantieren, dass der Status dieses Dokuments unverändert bleibt. Wir empfehlen unseren Kunden daher, den regulatorischen Status regelmäßig zu überprüfen. Es wird erneuert, wenn die vorherige Konformität nicht mehr gewährleistet ist. Es liegt in der Verantwortung des Benutzers, die Eignung des Materials für eine bestimmte Anwendung zu bewerten und zu bestimmen. Teadit übernimmt keine Haftung, welcher Art auch immer.

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IBAN: AT34 1100 0048 9323 6200 (EURO Konto/Account)
IBAN: AT04 1200 0048 9323 6202 (USD Konto/Account)
BIC/Swift-Address BKAUATWW

BAM
Bundesanstalt für Materialforschung und -prüfung
12200 Berlin
Telefon: 030 8104-0
Telefax: 030 8112029

Bericht

über die Prüfung eines nichtmetallischen Materials
auf Reaktionsfähigkeit mit Sauerstoff

Aktenzeichen	2-671/2013
Ausfertigung	1. Ausfertigung von 2 Ausfertigungen
Auftraggeber	TEADIT International Produktions GmbH Rosenheimer Straße 10 6330 KUFSTEIN ÖSTERREICH
Auftrag vom	21. Februar 2013
Eingegangen am	26. Februar 2013
Prüf-/ Versuchsmaterial	TEADIT TF 1590, Charge 111749/035/02/114, für den Einsatz als Flachdichtung in Flanschverbindungen an/in Sauerstoffleitungen/-anlagenteilen und -armaturen für gasförmigen Sauerstoff bei 250 °C; BAM-Auftrags-Nr. 2.1/51 469
Eingegangen am	25. Februar 2013
Prüfdatum	30. April 2013 bis 9. August 2013
Prüfort	BAM - Arbeitsgebiet „Sicherer Umgang mit Sauerstoff", Haus 41, Raum 073
Prüfung bzw. Erfordernis gemäß	DIN EN 1797: 2002-02 „Kryo-Behälter – Verträglichkeit von Gas/Werkstoffen" ISO 21010: 2004-07 „Cryogenic Vessels - Gas/Material Compatibility" Anhang vom Merkblatt M034-1 (BGI 617–1) "Liste der nichtmetallischen Materialien, die von der Bundesanstalt für Materialforschung und -prüfung (BAM) zum Einsatz in Anlageteilen für Sauerstoff als geeignet befunden worden sind.", Berufsgenossenschaft Rohstoffe und chemische Industrie, Stand: März 2013; Berufsgenossenschaftlichen Regel BGR 500 Betreiben von Arbeitsmitteln, Teil 2, Kapitel 2.32 "Betreiben von Sauerstoffanlagen", Kapitel 3.17 "Gleitmittel und Dichtwerkstoffe" Stand: April 2008.

Alle im Bericht angegebenen Drücke sind Überdrücke.
Dieser Prüfbericht besteht aus Blatt 1 bis 5 und den Anhängen 1 bis 3.

PRÜFBERICHT

DIN-DVGW-Baumusterprüfzertifikat

DIN-DVGW type examination certificate

NG-5125BM0466
Registriernummer
registration number

Anwendungsbereich ***field of application***	Produkte der Gasversorgung *products of gas supply*
Zertifikatinhaber ***owner of certificate***	TEADIT® International Prod. GmbH Europastraße 12, A-6322 Kirchbichl
Vertreiber ***distributor***	TEADIT® International Prod. GmbH Europastraße 12, A-6322 Kirchbichl
Produktart ***product category***	Schmier-/Dicht-/Betriebsmittel: Flachdichtungswerkstoff auf Basis PTFE (5125)
Produktbezeichnung ***product description***	Flachdichtungswerkstoff auf Basis PTFE
Modell ***model***	TEADIT® TF 1590
Prüfberichte ***test reports***	Baumusterprüfung: 16/124/5125/2 vom 11.07.2016 (EBI)
Prüfgrundlagen ***test basis***	DIN 3535-6 (01.04.2019)
Ablaufdatum / AZ ***date of expiry / file no.***	05.10.2021 / 21-0121-GNU

70028-04-A-DE

16.03.2021 Rie A-1/2
Datum, Bearbeiter, Blatt, Leiter der Zertifizierungsstelle
date, issued by, sheet, head of certification body

DAkkS
Deutsche
Akkreditierungsstelle
D-ZE-16028-01-05

DVGW CERT GmbH
Zertifizierungsstelle
Josef-Wirmer-Str. 1-3
53123 Bonn
Tel. +49 228 91 88 - 888
Fax +49 228 91 88 - 993
www.dvgw-cert.com
info@dvgw-cert.com

Typ *type*	Technische Daten *technical data*	Bemerkungen *remarks*
TEADIT® TF 1590	Normbezeichnung: DIN 3535-TF	

Staatliche Materialprüfungsanstalt

Universität Stuttgart

MPA STUTTGART

Zertifikat

Die **PTFE-Flachdichtung** vom Typ **Tealon TF1590**

der **Teadit International Produktions GmbH**
Rosenheimer Str. 10
A-6330 Kufstein/Austria

wurde von uns nach den Vorgaben der VDI-Richtlinie 2440 (Ausgabe November 2000) geprüft. Nach 48-stündiger Auslagerung bei 150°C an Luft und anschließender Leckagemessung bei Raumtemperatur und 1 bar Druckdifferenz mittels Helium-Massenspektrometrie erfüllt sie mit

$1.1 \cdot 10^{-6}$ mbar l / (s·m)

das Leckageratenkriterium

10^{-4} mbar l / (s·m)

und gilt damit hinsichtlich des oben genannten Leckagekriteriums als

hochwertig im Sinne der TA Luft.

Dieses Zertifikat gilt nur in Verbindung mit unserem
Prüfungsbericht 950 822 003 Dr.Koc/Hh/Gd vom 17. April 2003
und den dort niedergelegten Prüf- und Randbedingungen.

UNIVERSITÄT STUTTGART * STAATL. MATERIALPRÜFUNGSANSTALT (10) *

Stuttgart, den 17.04.2003

Dipl.-Ing. R. Hahn
Fachgruppenleiter Dichtungstechnik

FH Münster
Forschungsbereich Dichtungstechnik
Bürgerkamp 3
48565 Steinfurt

Fachhochschule
Münster University of
Applied Sciences

Z e r t i f i k a t

Die Flachdichtung vom Typ **TF 1590** der Firma

TEADIT International
Rosenheimer Str.10
A-6330 Kufstein

wurde vom Forschungsbereich Dichtungstechnik der FH Münster nach den Vorgaben der VDI- Richtlinien 2200 (Ausgabe Juni 2005) hinsichtlich Ausblassicherheit geprüft. Die Untersuchung fand unter folgenden Randbedingungen statt:

Dichtungshöhe:	3 mm
Prüfflansch:	DN40/PN40
Ausgangsflächenpressung:	30,0 MPa
Auslagerung:	200 °C / 48h
Testbedingungen:	Umgebungstemperatur

Die Restflächenpressung betrug 6,8 MPa.

Die Überprüfung der Ausblassicherheit ergab: Klasse C: 60 bar

Dieses Zertifikat ist nur in Verbindung mit dem Prüfbericht 06050201 vom 26.Juni 2006 gültig.

Steinfurt, den 26.06.2006 Prof. Dr. A. Riedl

Akkreditiert im Rahmen der DAP Akkreditierung durch den TÜV SÜD.

CERTIFICATE NUMBER	21-2063743-PDA
EFFECTIVE DATE	06-Jan-2021
EXPIRY DATE	05-Jan-2026
ABS TECHNICAL OFFICE	Hamburg Engineering Department

CERTIFICATE OF

Product Design Assessment

This is to certify that a representative of this Bureau did, at the request of

TEADIT INTERNATIONAL PROD. GMBH

located at

EUROPASTRASSE 12, A-6322 KIRCHBICHL, Austria

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product:	**Gasket**
Model:	**24SH, 30SH, TF1570, TF1574, TF1580, TF1590, NA1002, NA1005, NA1006, NA1100, NA1122, SWG 913/913M**
Endorsements:	
Tier:	**3 - Type Approved, unit certification not required**

This Product Design Assessment (PDA) Certificate remains valid until 05/Jan/2026 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau Of Shipping

Dimitrios Nikolakis,Engineer/Consultant

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Tier: 3 - Type Approved, unit certification not required

Product: **Gasket**
Model: **24SH, 30SH, TF1570, TF1574, TF1580, TF1590, NA1002, NA1005, NA1006, NA1100, NA1122, SWG 913/913M**
Endorsements:

Intended Service:
Marine & Offshore Application.

Description:
24SH is a large gasket sheet produced from 100% pure, multi-directionally expanded PTFE.
30SH is a large gasket sheet produced from 100% pure, multi-directionally expanded PTFE.
TF1570 and TF1574 are structured PTFE - Gasket - Sheet produced from virgin PTFE resin filled with hollow glass micro spheres.
TF1580 is a structured PTFE - Gasket - Sheet and produced from virgin PTFE resin filled with Barium Sulfate.
TF1590 is a structured PTFE - Gasket - Sheet and produced from virgin PTFE resin filled with Silica.
NA1002 is a compressed non-asbestos jointingsheet material produced from Aramid fibres, bonded with Nitrile rubber (NBR). It is being manufactured by means of a hot calender process under quality control standards which are registered under ISO 9001 certification.
NA1005 is a compressed non-asbestos jointingsheet material produced from Aramid fibres, bonded with Nitrile Rubber (NBR). It is being manufactured by means of a hot calender process under quality control standards which are registered under ISO 9001 certification.
NA1006 is a non-asbestos jointing-sheet material produced from cellulose fibres, bonded with Nitrile rubber (NBR). It is being manufactured by means of a hot calender process under quality control standards, registered and certified under ISO 9001.
NA1100 is a universal jointing sheet with high temperature and pressure resistance, manufactured from graphite and carbon fibre, bonded with Nitrile rubber (NBR). It is manufactured by means of a hot calender process under quality control standards which are registered and certified under ISO 9001.
NA1122 is a compressed non-asbestos sheet gasket material produced from a combination of inorganic fibers, bonded with nitrile rubber (NBR). It is being manufactured by means of a hot calender process under quality control standards which are registered under ISO 9001 certification.
Spiral-Wound Gaskets (SWG) 913/913M are made of a preformed metallic strip and a soft filler material (PTFE or graphite), wound together under pressure, and optionally with an inner and/or outer guide ring. The metal strip holds the filler.

Rating:
24SH
Temperature Min./continuous Max.: -240°C/270°C
Pressure: Max. 200 bar
Color: white
30SH
Temperature Min./continuous Max.: -268°C/260°C
Pressure: Max. 200 bar
Color: white
TF1570, T1574
Temperature Min./Max.: -210°C/260°C
Pressure: Max. 55 bar
Color: blue
TF1580:
Temperature Min./Max: -210°C/260°C
Pressure Max.: 83 bar
Color: Off-White
TF1590:

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Tier: 3 - Type Approved, unit certification not required

Temperature Min./Max: -210°/260°C
Pressure Max.: 83 bar
Color: Fawn
NA1002
Temperature Max./Continuous Max. 400°C / 260°C
Pressure Max./ Continuous Max: 110 bar / 80 bar
Color: Green
NA1005
Temperature Max./Continuous Max. 400°C / 240°C
Pressure Max./ Continuous Max: 110 bar / 50 bar
Color: Blue
NA1006
Temperature Max./Continuous Max. 450°C / 270°C
Pressure Max./ Continuous Max: 130 bar / 70 bar
Color: Black
NA1100
Temperature Max./Continuous Max. 450°C / 270°C
Pressure Max./ Continuous Max: 130 bar / 70 bar
Color: Black
NA1122
Temperature Max./Continuous Max. 550°C / 430°C
Pressure Max./ Continuous Max: 150 bar / 102 bar
Color: Black
Spiral-wound Gaskets (SWG) 913/913M
Max Temperature for PTFE filler material: 260°C
Max Temperature for Grafite filler material: 450°C
Max Temperature with steam and under inert conditions: 650°C

Service Restriction:
1) Unit Certification is not required for this product.
2) If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.
3) No to be used in the following systems:
a. for fire mains and hydrants unless adequately protected as per 4-7-3/1.11.1 of Marine Vessels Rules 2021.
b. for connection to the shell where the failure of the material in the vent of a fire would give rise to a danger of flooding as per 4-6-2/9.13.1 of Marine Vessels Rules 2021.
c. for remote closure of valves on fuel oil tanks unless protected adequately to ensure effective closure facility in the vent of fire as per 4-6-4/13.5.3 of Marine Vessels Rules 2021.

Comments:
1) The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.
2) Physical properties and manufacturer´s acceptance criteria are to meet the design/application requirements.
3) Chemical compatibility as per manufacturer´s recommendation.

Notes/Drawing/Documentation:
Drawing No. Declaration of conformity_signed, DoC, Revision: -, Pages: -
Drawing No. Spiral seals 913 M acc. ASME B 16, Standard Dimensions ASME B16.20, Revision: -, Pages: -
Drawing No. Spiral seals 913M acc. EN 1514-2 2005_DE, Standard Dimensions EN1514, Revision: -, Pages: -
Drawing No. Standards_Dimensions_V1-2019-293-293, Standard Dimensions, Revision: -, Pages: -
Drawing No. TA_ISO 14001_E, certificate, Revision: -, Pages: -
Drawing No. TA_ISO 9001_E, certificate, Revision: -, Pages: -
Drawing No. act on form alert, request, Revision: -, Pages: -

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Tier: 3 - Type Approved, unit certification not required

Terms of Validity:
This Product Design Assessment (PDA) Certificate remains valid until 05/Jan/2026 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

STANDARDS

ABS Rules:
- 2021 Rules for Building and Classing Marine Vessels: 1-1-4/7.7, 1-1-A3, 1-1-A4, 4-6-1/3.5, 4-6-1/7.5.2, 4-6-2/5.15, 4-6-2/9.5, 4-6-2/9.13.1, 4-6-2/9.15, 4-6-4/13.5.3, 4-6-4/15.3.2, 4-7-3/1.11.1
- 2021 Rules for Building and Classing Mobile Offshore Units:1-1-A2, 1-1-A3, 1-1-4/9.7.

National:
ASTM F36 (Edition 2015), F37 (Edition 2019), F38 (Edition 2018), F104 (Edition 2020), F152 (Edition 2017), F146 (Edition 2019), F1315 (Edition 2017), F495 (Edition 2019), D792 (Edition 2013).
DIN 28090-2 (Edition 2014), DIN 52913 (Edition 2002), DIN 3535 (Edition 2019).
EN 13555 (Edition 2014).

International:
NA

Government:
NA

EUMED:
NA

OTHERS:
NA

21-2063743-PDA

Attachment to 21-2063743-PDA covering
TEADIT Deutschland GmbH, Gaskets

Models:
24SH, 30SH, TF1570, TF1574, TF1580, TF1590, NA1002, NA1005, NA1006, NA1100, NA1122, SWG 913/913M

Issuance Date: 6-January-2021
Expiry Date: 5-January-2026

Intended Service:
Marine & Offshore Applications

Drawing List

Engineering Office:	Hamburg Engineering Department	
Submitter:	TEADIT INTERNATIONAL PROD. GMBH (444760)	
Drawing No	**Revision No**	**Drawing Title**
act on form alert	-	request
TA_ISO 14001_E	-	certificate
TA_ISO 9001_E	-	certificate
Declaration of conformity_signed	-	DoC
Standards_Dimensions_V1-2019-293-293	-	Standard Dimensions
Spiral seals 913 M acc. ASME B 16	-	Standard Dimensions ASME B16.20
Spiral seals 913M acc. EN 1514-2 2005_DE	-	Standard Dimensions EN1514

21-2063743-PDA

Drawing List as per 16-1549485-1PDA of October 2019:

Engineering Office:	Hamburg Engineering Department	
Submitter:	TEADIT DEUTSCHLAND GMBH (444760)	
Drawing No	**Revision No**	**Drawing Title**
PDA Request DOC200819-20082019092208	-	PDA Request DOC200819-20082019092208
Correspondence	-	Fee Confirmation

Drawing List as per 16-1549485-PDA of August 2016

Engineering Office:	Hamburg Engineering Department	
Submitter:	TEADIT DEUTSCHLAND GMBH (444760)	
Drawing No	**Revision No**	**Drawing Title**
Product information TEADIT NA 1122	-	Product information TEADIT NA 1122
Product Information TEADIT 30SH	-	Product Information TEADIT 30SH
Correspondence	-	Type approval request form

21-2063743-PDA

Drawing List as per 15-1455552-1-PDA of January 2016:

Engineering Office:	Hamburg Engineering Department	
Submitter:	TEADIT DEUTSCHLAND GMBH (444760)	
Drawing No	**Revision No**	**Drawing Title**
2015-11-23 Application Form	-	Application Form
2015-11-23 Declaration of Conformity	-	Declaration of Conformity
Correspondence	-	CorrespondenceNamenaenderung

Drawing List as per 15-1296050-PDA of January 2015:

Engineering Office:	Hamburg Engineering Department	
Submitter:	TEADIT DEUTSCHLAND GMBH (444760)	
Drawing No	**Revision No**	**Drawing Title**
1570_BAM_D_31	-	1570_BAM_D_31
1580_BAM_D_26	-	1580_BAM_D_26
Correspondence	-	2013-06-04 GL NA1002, Na1005, NA1100
2013-09-16 BAM TF1590	-	2013-09-16 BAM TF1590
24SH_BAM_D_31	-	24SH_BAM_D_31
Correspondence	-	ABSapplicationInclAsbFreeDecl
Correspondence	-	certificate_Teadit_24SH_TF1570_TF1580_TF1590_TF1510
Correspondence	-	CorrespondenceConfirmation
Correspondence	-	GL 5476708
Correspondence	-	GL 5476808
TEADIT_24SH_DE	-	TEADIT_24SH_DE
TEADIT_24SH_EN	-	TEADIT_24SH_EN
TEADIT_NA-1002_DE	-	TEADIT_NA-1002_DE
TEADIT_NA-1002_EN	-	TEADIT_NA-1002_EN
TEADIT_NA-1005_DE	-	TEADIT_NA-1005_DE
TEADIT_NA-1005_EN	-	TEADIT_NA-1005_EN
TEADIT_NA-1040_EN	-	TEADIT_NA-1040_EN
TEADIT_NA-1100_DE	-	TEADIT_NA-1100_DE
TEADIT_NA-1100_EN	-	TEADIT_NA-1100_EN
TEADIT_SWG_DE_2013345	-	TEADIT_spiral_wound_gaskets_DE_2013345
TEADIT_SWG_EN_2013345	-	TEADIT_spiral_wound_gaskets_EN_2013345
TEADIT_TF_1570_DE	-	TEADIT_TF_1570_DE
TEADIT_TF_1570_EN	-	TEADIT_TF_1570_EN
TEADIT_TF_1580_DE	-	TEADIT_TF_1580_DE
TEADIT_TF_1580_EN	-	TEADIT_TF_1580_EN
TEADIT_TF_1590_DE	-	TEADIT_TF_1590_DE
TEADIT_TF_1590_EN	-	TEADIT_TF_1590_EN

PRODUCT - INFORMATION

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Rev. 01/03052002

Teadit TEALON 1590 1.5 mm	
G_b	260 psi
a	0,351
G_s	6,3 psi
T_{Pmin}	1002
T_{Pmax}	27940
S_{100}	1308 psi
S_{1000}	2933 psi
S_{3000}	4312 psi
S_{10000}	6578 psi

Gasket constants are measured according to the room temperature tightness test (ROTT). The test procedure is documented in the proposed ASTM Draft No. 9 of the “Standard test method for gasket constants for bolted joint design”.

In addition to the standard gasket constants G_b, a and G_s, the following parameters are measured:

T_{Pmax}/T_{Pmin}: T_{Pmax} is the highest level of tightness achieved in the test. A high T_{Pmax} is favourable. T_{Pmin} is the lowest tightness found for a material in any part B (unload/reload) cycle. A high T_{Pmin} is also favourable.

S_{Tp}: Gasket stress required to achieve a given T_P value. It is measured for T_p = 100, 1000. 3000 and 10000.

Technical laboratory:

Tightness Testing and Research Laboratory, Ecole Polytechnique Montreal

CETIM
CENTRE TECHNIQUE DES INDUSTRIES MECANIQUES

The french version is legally acceptable.

Etablissement de Nantes
74, route de la Jonelière
BP 82326
44326 Nantes Cedex 3

Téléphone : +33 2 40 37 35 86
Télécopie : +33 2 51 86 00 73

For

TEADIT
558 Garden Oaks BLVD
TX770 HOUSTON
USA

To *M ROTH RODNEY*

Réf. of request Your oder by e-mail n°125256

TEST REPORT

Report n° 736219/6J1/c **Date :** 12/11/2002

Subject :

Final report :

HOBT - TEADIT 1590 1/8"

HL/MT

Specimens supplied by the customer :

TEADIT 1590 1/8"

- This report concerns only the tested objects.
- Reproduction of this report is permitted only in its integral form. The report includes 18 pages

"Conditions générales de vente et d'exécution des prestations" : see over leaf.

1 - AIM OF TEST

Increasing use of PTFE gasket products for difficult service and as substitute for asbestos and no-nasbestos fiber reinforced materials has fostered interest in developing standard test protocols that measure and qualify the performance of PTFE based gaskets on the basis of a direct measure of their margin of safety against blow-out. This has led to the development of a HOt Blow-out Test (HOBT) for gauging PTFE gasket tightness performance under extreme relaxation conditions.

The main goal of this test is to determine the gasket resistance to hot relaxation and the gross leakage susceptibility to blow-out conditions.

2 - HOBT TEST PROCEDURE

2.1 - HOBT without thermal cycles procedure

The HOt Blow-out Test consists in applying 5000-psi compressive stress to the gasket and holding it for 30 minutes. Then the rig is pressurized with a 750 (up to 1200) psig helium gas pressure and temperature is increased, up to 1200°F if required, at a 3°F/min rate until blow-out occurs.

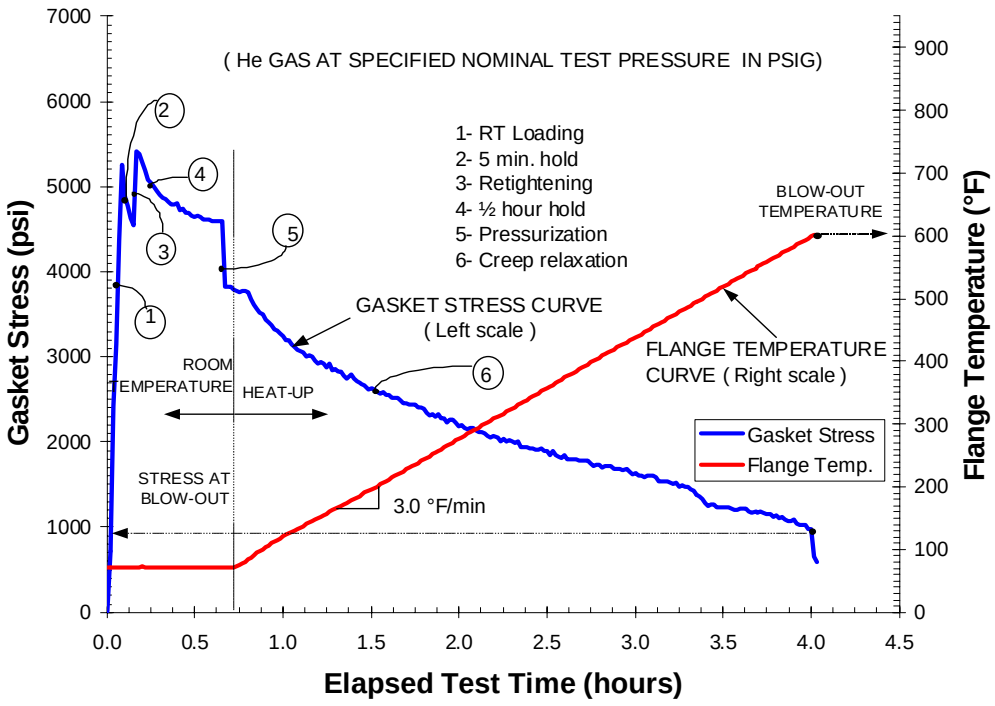


Figure 2.1.0.a - HOBT without thermal cycles test procedure sequence

The Hot Blow-out Test can be described as being a six steps procedure. The first step seats the gasket by conducting a sequential room temperature loading. The second step is short waiting period for gasket creep and relaxation. The third step reloads the gasket to the nominal gasket stress of 5000 psi. The fourth step is a second waiting period that allows the gasket to creep and relax. The fifth step is the helium pressurization of the gasket while the sixth and final step heats the gasket until a blow-out occurs or until the maximum temperature of the rig is reached.

•Step 1 - Gasket Seating

The ambient temperature should be 75 ± 5 °F. Open the system to the atmospheric pressure. Tighten the four bolts with a torque wrench using four levels: 30, 60, 75 and 80 lb-ft, to reach the nominal gasket stress of 5000 ± 250 psi. Make a one-pass crisscross pattern in about 15-30 seconds for each torque levels and wait one minute between each level. For the last one, reverse the pattern.

•Step 2 - Waiting time

Wait 5 minutes to allow for the initial gasket creep and relaxation

•Step 3 - Reloading to the target stress level

Retighten the bolts to adjust the gasket stress back to 5000 ± 250 psi.

•Step 4 - Waiting time

Wait 30 minutes to allow for the gasket creep and relaxation.

•Step 5 - Helium pressurization

Connect the pressurizing line to the pressure inlet and apply an internal helium pressure of 750 psig.

•Step 6 - Gasket heat-up

Turn on the electrical cartridge heater inside the central heating core at its maximum power until the core temperature reaches 180 °F. Then, continue to heat the gasket at a rate of 3.0 °F/min until a blow-out occurs or until the average temperature between the top and bottom flanges reaches 680 °F (maximum test temperature).

2.2 - HOBT with thermal cycles procedure

It is not safe to consider only the blow-out Temperature and gasket stress (Tbo and Sgbo) found with an HOBT without thermal cycles. It is more useful for service, to know the potential reserve that exists between typical operating service conditions and blow-out conditions.

Most gross leaks occur during or after thermal or pressure events such as: plant start-up (heat-up), plant shutdown (cool-down), thermal or pressure upset, rain or sun exposed joints because thermal cycling results in bolt load losses due to differential thermal expansion between flanges and gasket.

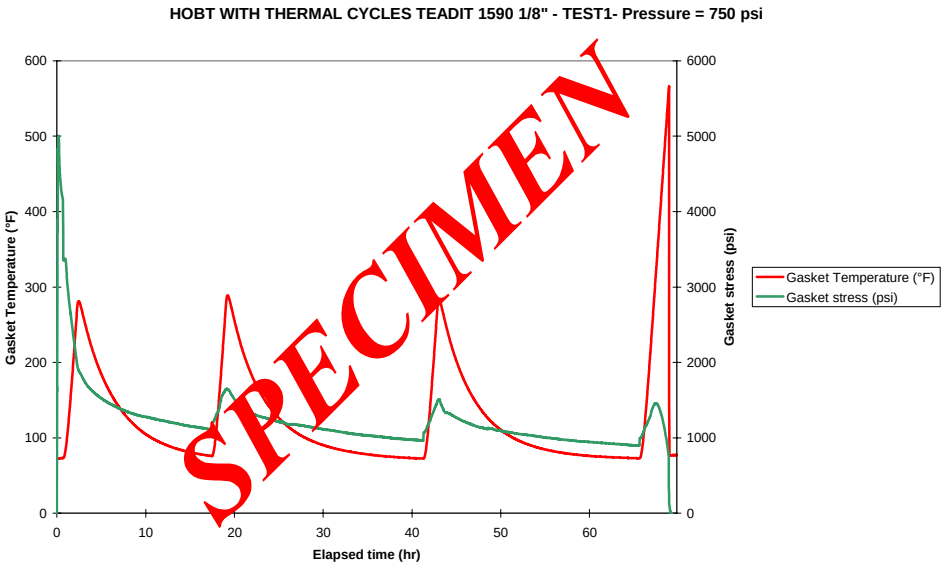


Figure 2.2.0.a - Typical HOBT with thermal cycles sequence

The full procedure involves three tests:

1) HOBT without thermal cycles to estimate cool down temperature (according to ASTM draft 5 standard "Test méthods for Hot Blow Out Performance of PTFE Sheet or Sheet Like Gaskets")

2) HOBT with 3 thermal cycles using cool down temperautre estimation from 1)

3) HOBT with 3 thermal cycles using cool down temperautre estimation from 2)

3 - TESTED SPECIMENS

The tests have been performed on the following specimen.

Gasket family	Gasket reference	Gasket Dimension
PTFE	1590	5" OD * 3.5" ID - thickness:1/8"

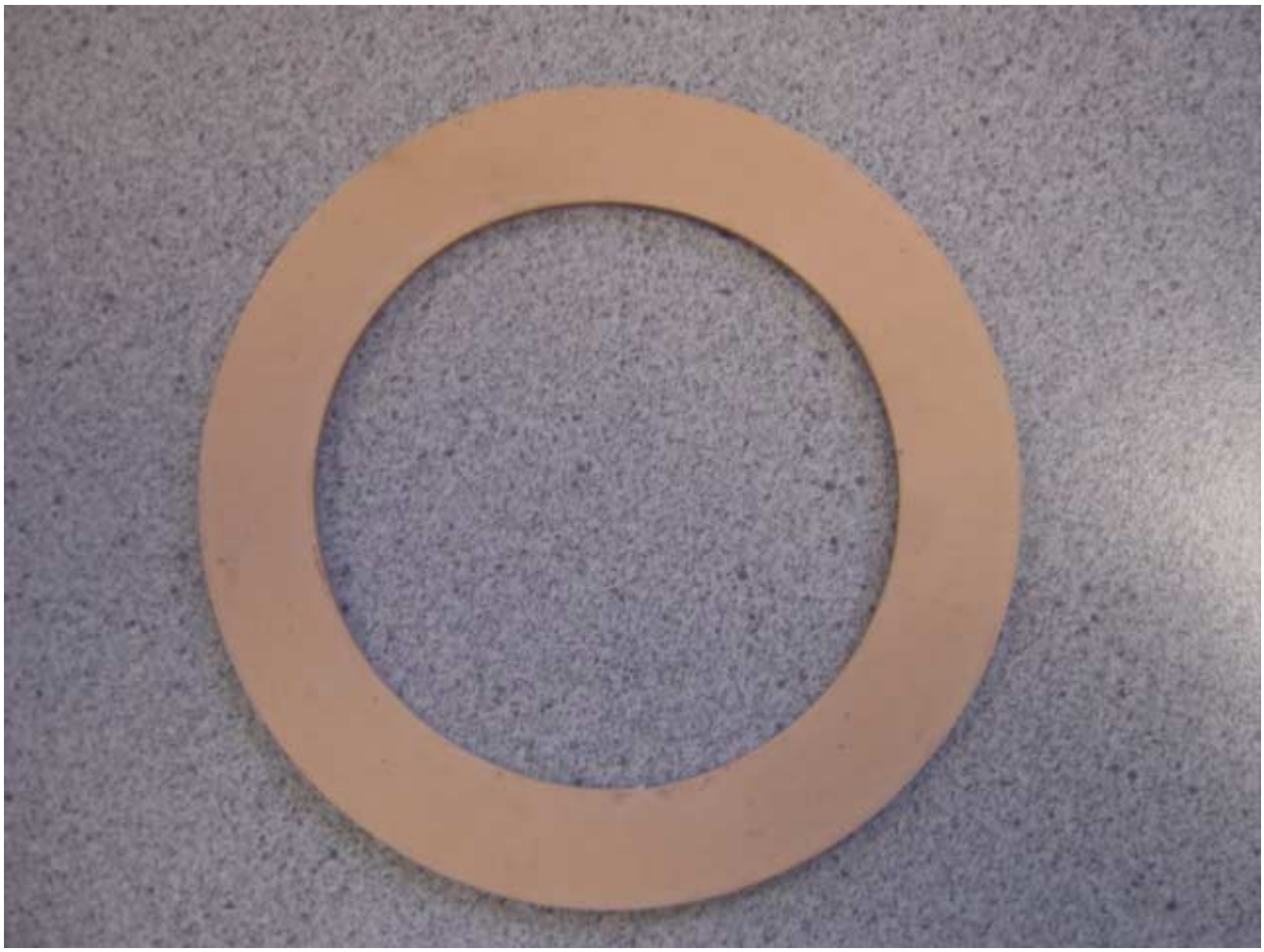


Photo 1 - Gasket before test - TEADIT - 1590 - 5" OD * 3.5" ID - thickness:1/8"

4 - TESTING EQUIPMENT AND MEASUREMENT INSTRUMENTS

The Hot Blow-out Test Rig is designed to reproduce hot blow-out conditions in a real gasketed flanged joint subjected to a maximum compressive load of 50000 lb, at a working temperature of up to 750 °F and with helium gas pressure up to 1000 psig. Tested gaskets are NPS 3", 3.5" ID x 5" OD for sheet gaskets, with a surface area of about 10 in^2.

The rig is composed of a pair of standard NPS 3" Class 150 flanges with raised faces.Both flanges are welded to schedule 80 pipes and are equipped with four 5/8" - 18 UNF high-strength steel bolts. The flange surface finish is in accordance with the ASME/ANSI B16.5 standard. The joint axial rigidity is evaluated to 4.4x106 lb/in.

Flanges are mounted on a steel cylindrical core welded to a steel base plate. Gasket loading is performed with a torque wrench, and the usual criss-cross sequence is used to torque the four bolts. These calibrated bolts are equipped with special extensometers to measure the bolt stretch that is converter to bolt load. Each extensometer consists of a pair of long ceramic rods that are spring loaded. The extensometers are compensated for thermal effects. To measure bolt strech, a displacement transducer is placed at the end of each extensometer. These transducers are placed at the bottom of the rig, well below the heated zone, and measure the relative displacement between the pair of ceramic rods.

The helium gas is supplied by a high-pressure gas cylinder.The pressure is adjusted with a precise manual pressure regulator and it is measured with an electronic pressure transducer.

The central heating core is embedded with a 2000 W electrical cartridge heater. An electronic temperature controller is used to achieve a constant temperature increase of 3.0 °F/min. Temperature is measured at three locations: in the solid core and inside the top and the bottom flanges at mid gasket diameter, close to the raised face surface.

The top and bottom parts of the fixture are insulated to minimize thermal gradients. The top insulation casing is removable to allow for gasket change and bolt torquing.

A manual relief valve permits gas purging during heating to prevent internal pressure increase.In order to minimize the gas flow when a blow-out occurs, the gas volume inside the fixture is minimized by the use of the solid central core and the gas flow from the pressure regulator is restricted by a micrometric valve. Gasket deflection and leakage are not measured during the HOBT test.

HOBT rig technical data summary

Rig flanges: NPS 3" Class 150 Slip-on

Rig bolts: 4 bolts 5/8"-18UNF

Pressurizing gas:Helium

Nominal gas pressures:4750 psig

Nominal initial gasket stress: 5000 ± 250 psi

Initial gasket temperature:75 ± 5 °F

Heating rate: 3.0 °F/min.

HOBT rig – general view

HOBT rig – detail

HOBT rig – upper flange 3 ‘’ 150 lbs-

HOBT rig – PTFE Gasket Blow Out example

Photo 2 - HOBT test rig

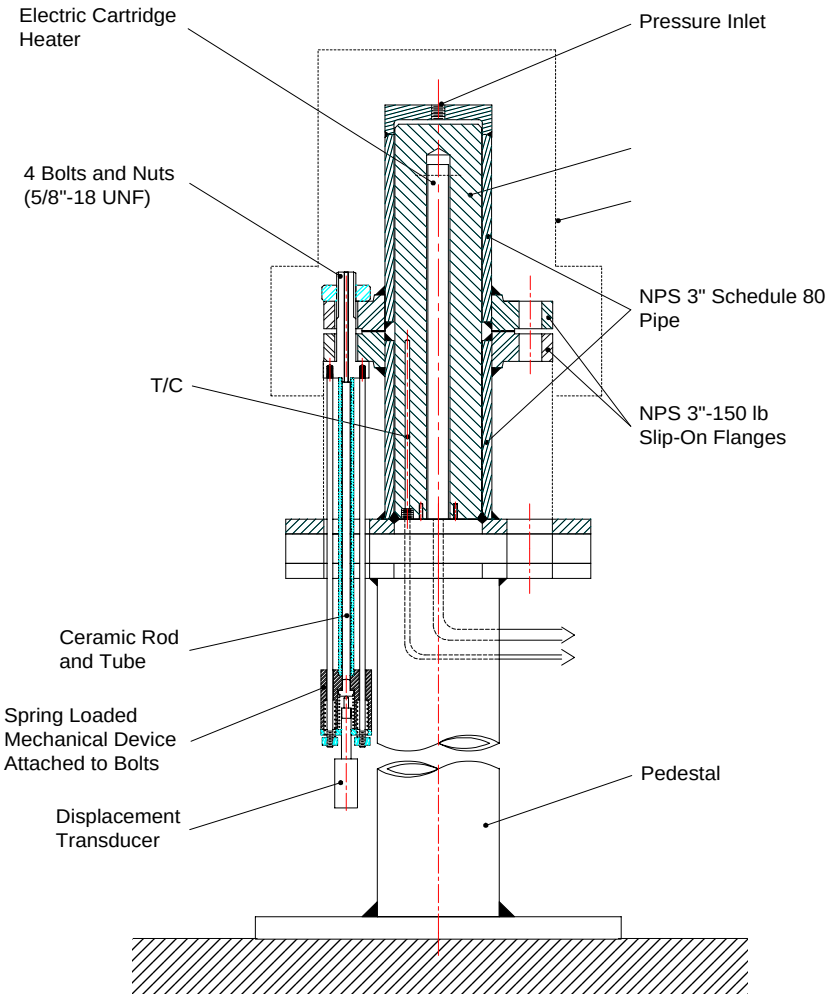


Figure 4.0.0.a - HOBT test rig principle

5 - RESULTS

5.1 - Gasket thicknesses

Gasket reference	test reference	Initial gasket thickness (in.)	Final gasket thickness (in.)
TEADIT 1590	1590_1	0.111	0.091
TEADIT 1590	1590_2	0.123	0.093
TEADIT 1590	1590_3	0.120	0.090

5.2 - HOBT results

Gasket reference	Thermal cycles	Test reference	BLOW OUT VALUES			Cool down Temp. (°F)
			Blow out Temp. (°F)	Blow out Stress (psi)	Blow out Pressure (psig)	
TEADIT 1590	NO	1590_1	554	847	760	288
TEADIT 1590	YES	1590_2	559	757	772	281
TEADIT 1590	YES	1590_3	568	670	745	299

The first HOBT test without thermal cycles leads to a first cool down temperature of **Tc1=288°F**. This cool down temperature is computed following ASTM draft for HOBT)

Conduction of the second test with this new temperature (Tc1) as cool down temperature leads to a new predicted cool down temperatrure: **Tc2=281° F**.

Conduction of a third test with this new temperature (Tc2) as cool down temperature leads to a new predicted cool down temperatrure: **Tc3=299° F**.

5.3 - Conclusion

According to the HOBT test results, the safe cool-down reserve temperature for TEADIT 1590 1/ 8" is **281°F** lowest value from safe cool-down reserve temperature from 3 tests.

6 - APPENDICES LIST

- APPENDIX 1: Gasket after test
- APPENDIX 2: HOBT without thermal cycles
- APPENDIX 3: HOBT with thermal cycles (1)
- APPENDIX 4: HOBT with thermal cycles (2)

In charge of testing	Business Engineer
Cédric BOULBEN	Hubert LEJEUNE

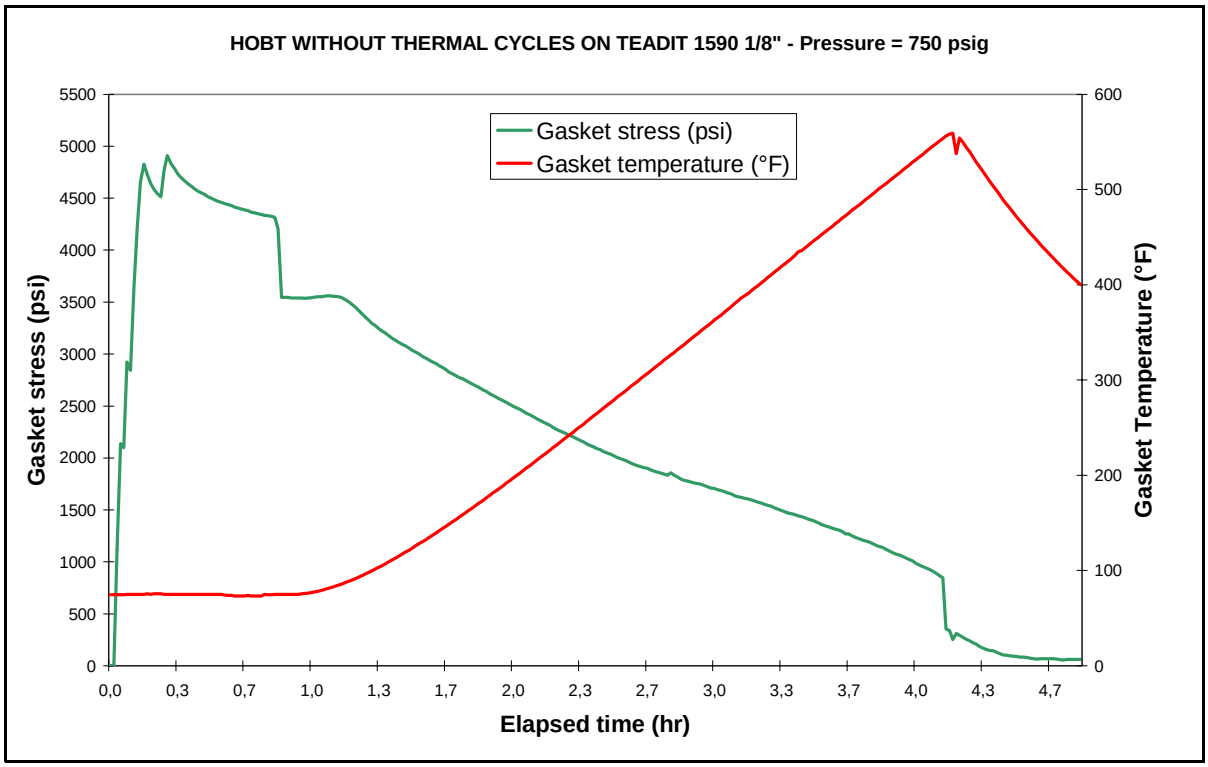
Appendix I : GASKET PICTURES AFTER TEST

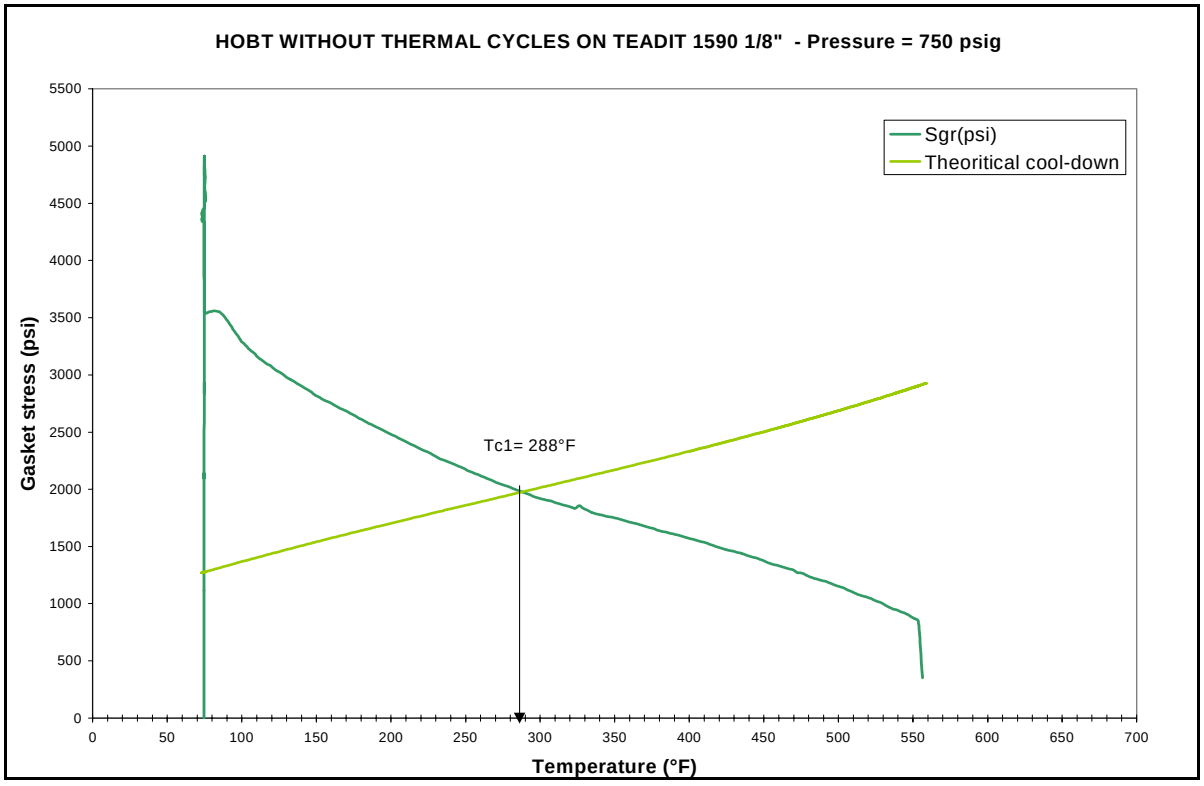
Photo 1 - Gasket after test 1 (without thermal cycle)

Photo 2 - Gasket after test 2 (with thermal cycle)

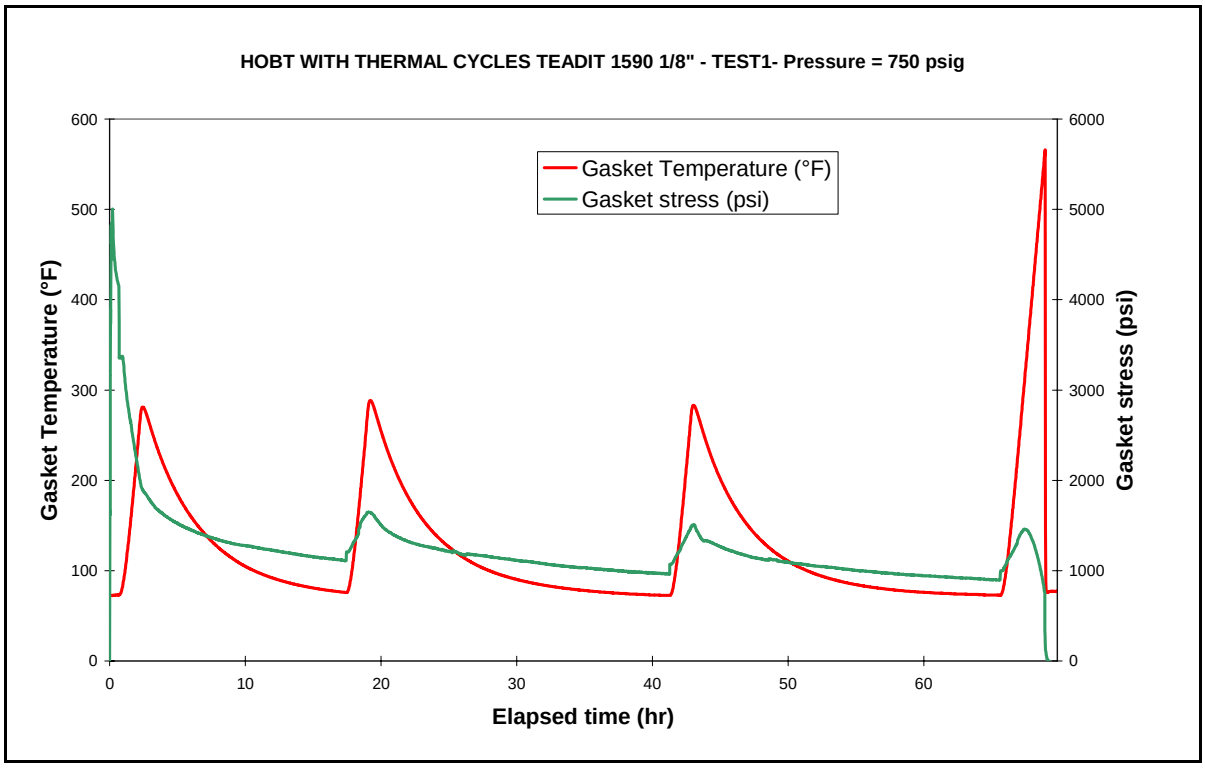
Photo 3 - Gasket after test 3 (with thermal cycle)

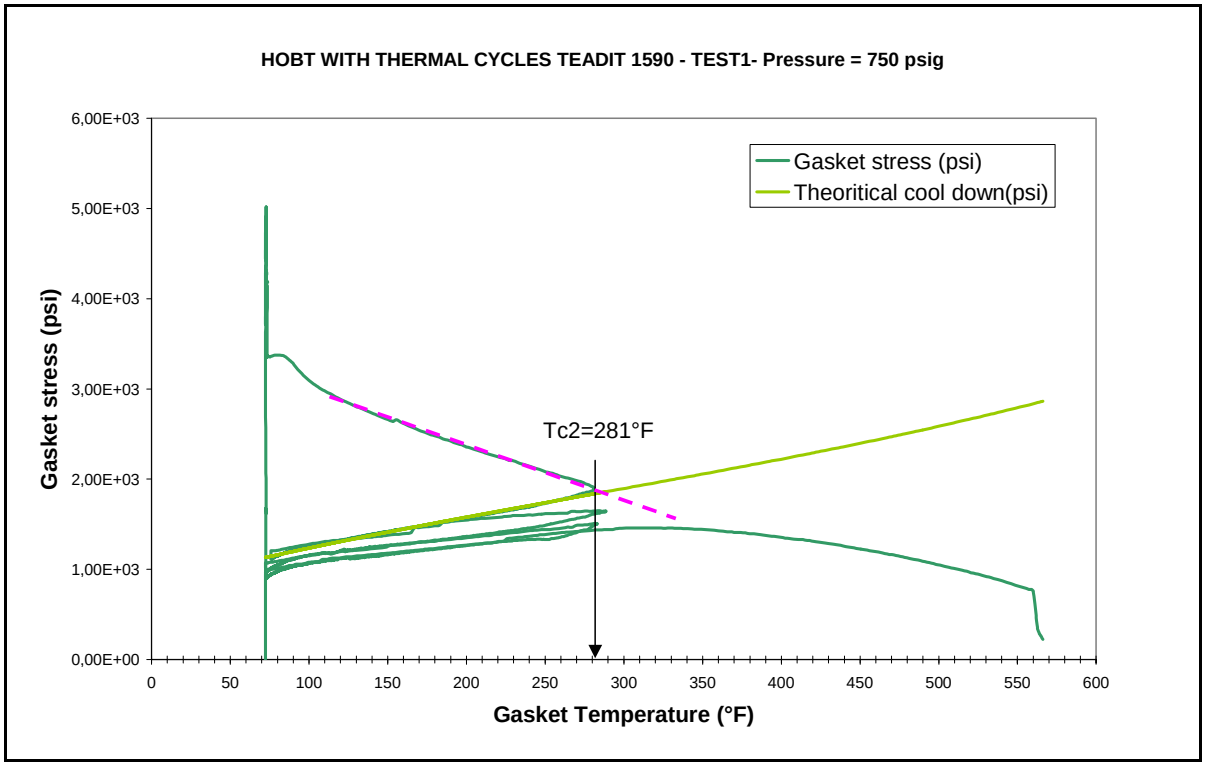
Appendix 2 : HOBT WITHOUT THERMAL CYCLES



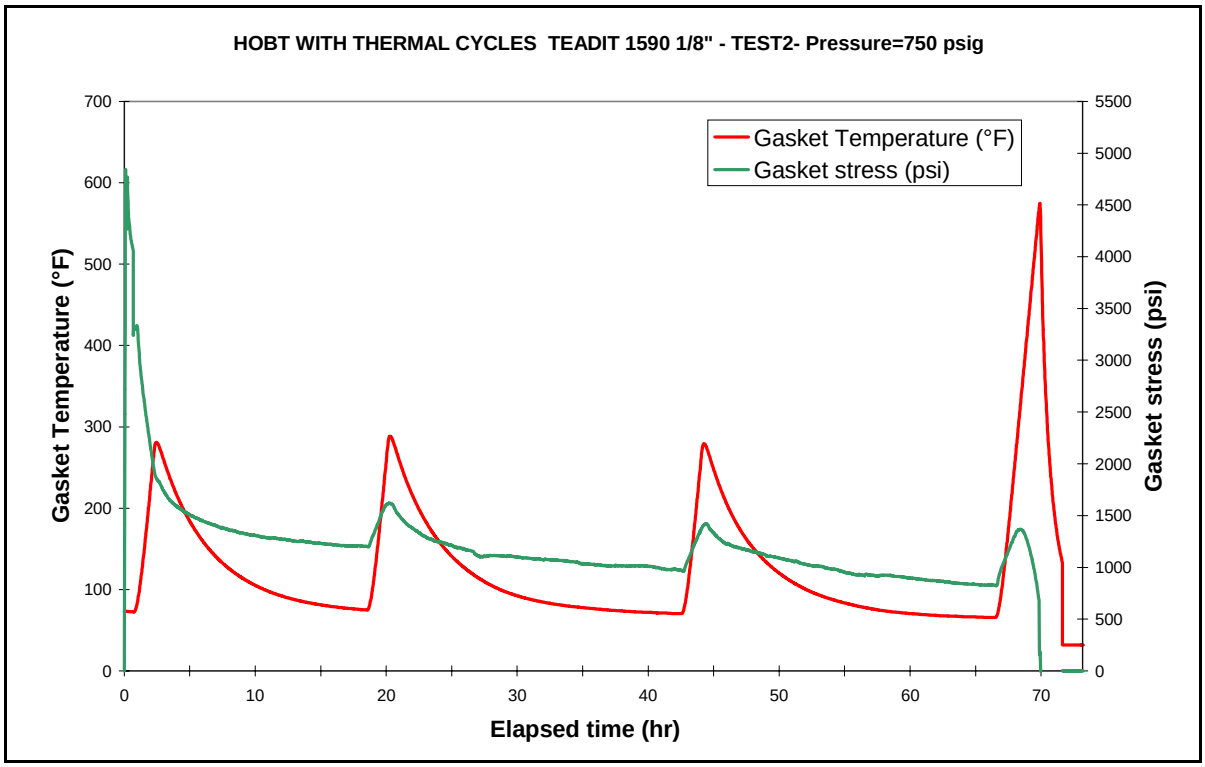


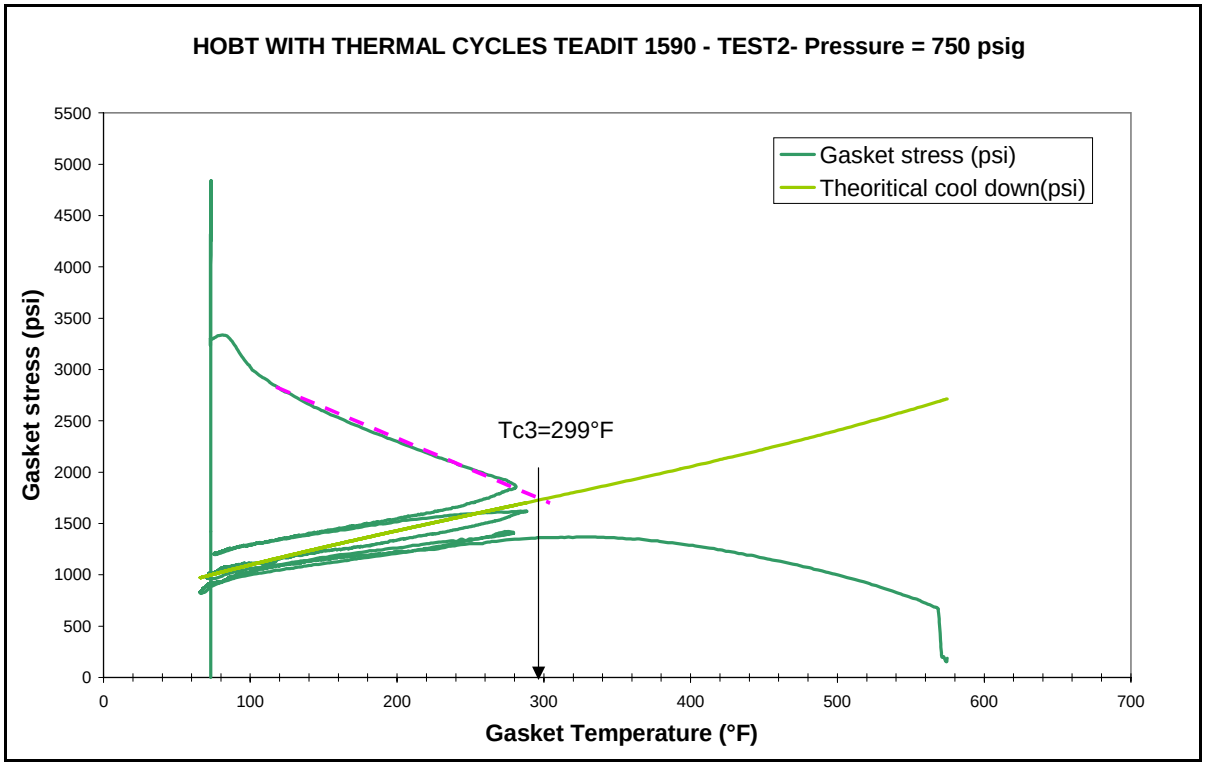
Appendix 3 : HOBT WITH THERMAL CYCLES (1)





Appendix 4 : HOBT WITH THERMAL CYCLES (2)





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TTRL
Tightness Testing and Research Laboratory

TECHNICAL REPORT

Quotation	:	S250501-A1
Item No.02	:	HOBT2 without thermal cycle, Helium at 435 psig on Teadit special PFTE-based with silica gasket sheet, 3½"ID x 5"OD x 1/16" thick.
Gasket Ref.	:	TD10

Client	:	Teadit Indústria e Comércio Ltda. Av. Automóvel Clube, 8939 - Colégio 21530-010 Rio de Janeiro – RJ, Brazil
Contact	:	Denise Simão

Test Technician	:	Thierry Lafrance, jr eng.
Report Prepared by	:	Thierry Lafrance, jr eng.
	:	Luc Marchand, P. eng.
Report Date	:	January 13th , 2002 (version 1.01)
Total Nb of pages	:	12

Le génie sans frontières

Technical Report

Hot Blow-out Test – Without thermal cycle

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Technical Report

Hot Blow-out Test – Without thermal cycle

Test Purpose

Increasing use of PTFE gasket products for difficult service and as substitute for asbestos and nonasbestos fiber reinforced materials has fostered interest in developing standard test protocols that measure and qualify the performance of PTFE based gaskets on the basis of a direct measure of their margin of safety against blow-out. This has led to the development of a Hot Blow-out Test (HOBT) for gauging PTFE gasket tightness performance under extreme relaxation conditions.

The main goal of this test is to determine the gasket resistance to hot relaxation and the gross leakage susceptibility to blow-out conditions.

Test Procedure Summary

The test consists to slowly heat the compressed gasket under a fixed internal helium pressure until a blow-out occurs. The test is performed twice for results repeatability evaluation. The whole description of the procedure is presented in Appendix 2. For quick reference, the procedure is summarized as follows:

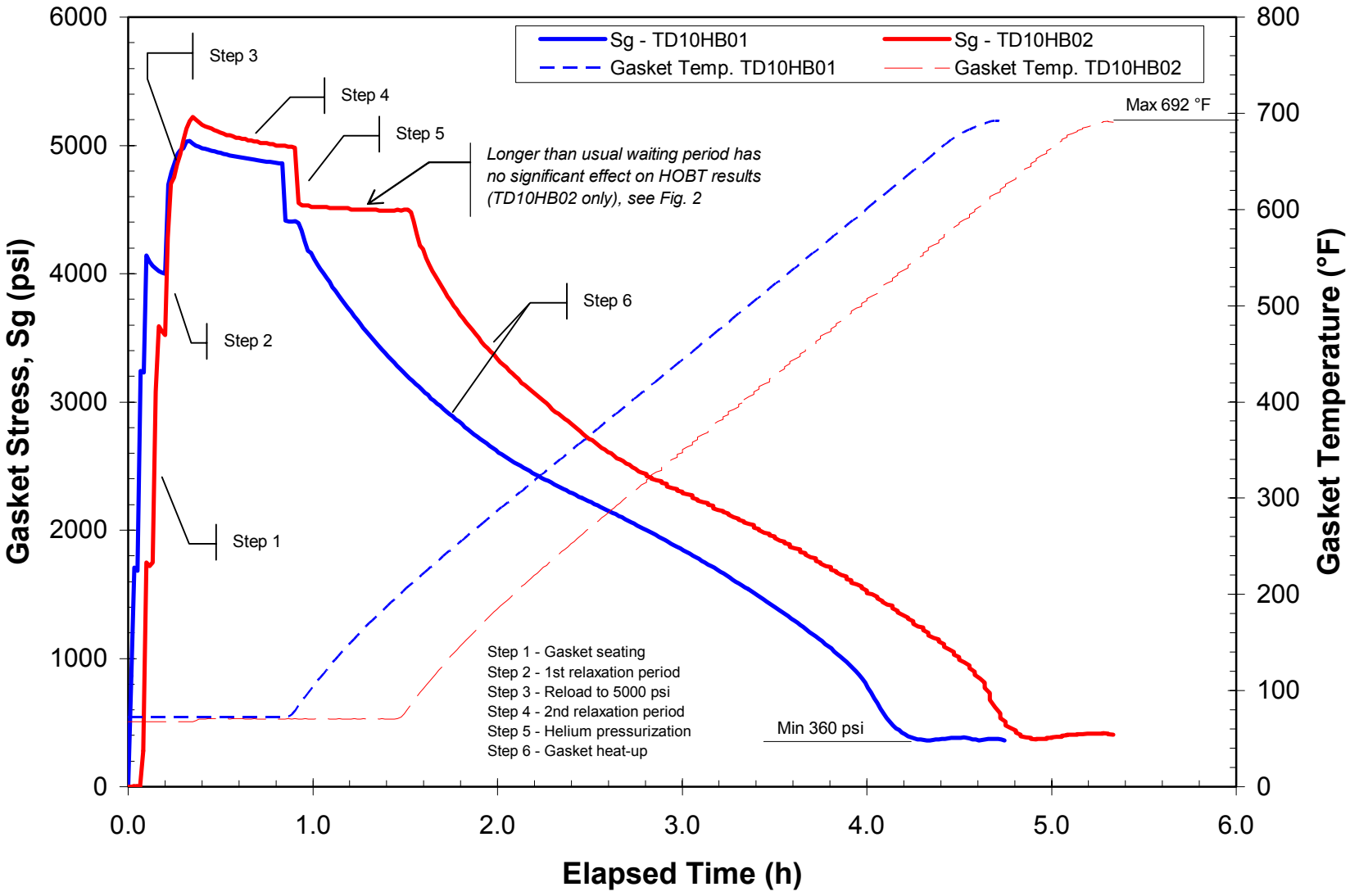
- Testing rig : Hot Blow-out Test Rig
- Rig flanges : NPS 3" Class 150 Slip-on
- Rig bolts : 4 bolts 5/8"-18UNF
- Pressurizing gas : Helium 4
- Nominal gas pressures : 435 psig
- Nominal initial gasket stress : 5000 ± 250 psi
- Initial gasket temperature : 75 ± 5 °F
- Heating rate : 3.0 °F/min.

Technical Report

Hot Blow-out Test – Without thermal cycle

Figure 1

Evolution of Tests Parameters



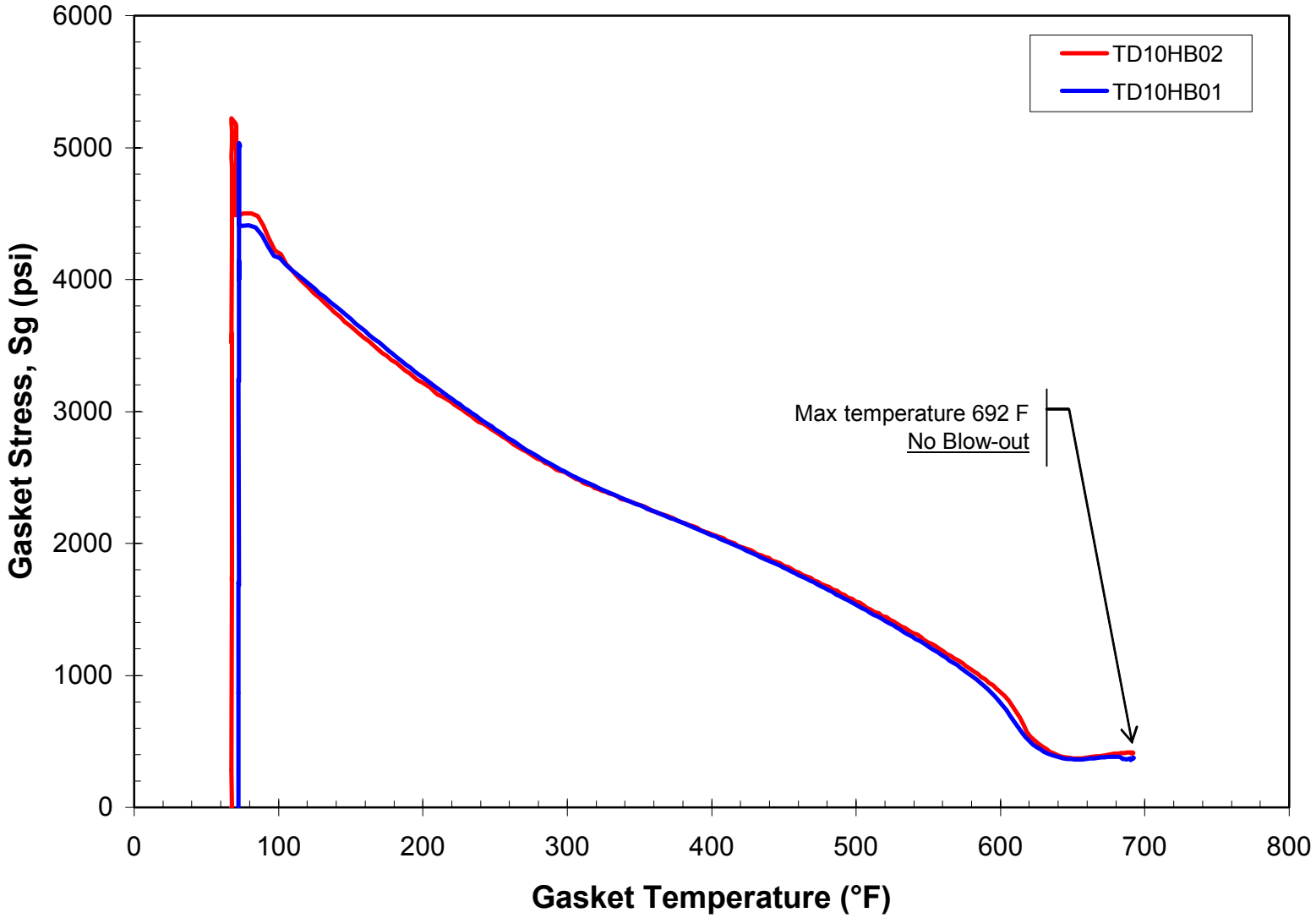
Quotation No. : S250501-A1
Item No. : 02 – HOBT2 without thermal cycle, nominal helium pressure of 435 psig
Specimen : Teadit special PTFE-based with silica gasket sheet, 3½"ID x 5"OD x 1/16" thick

Technical Report

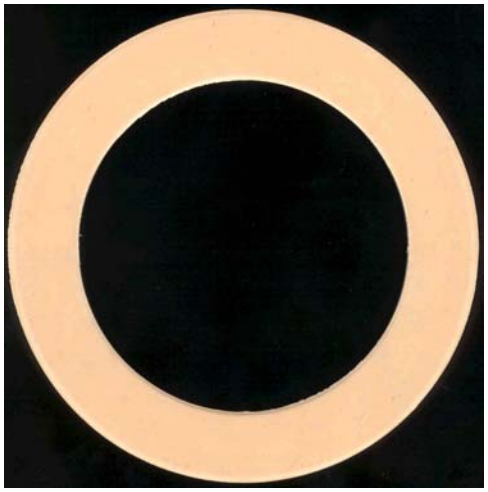
Hot Blow-out Test – Without thermal cycle

Figure 2

Gasket Stress VS Gasket Temperature



Quotation No. : S250501-A1
Item No. : 02 – HOBT2 without thermal cycle, nominal helium pressure of 435 psig
Specimen : Teadit special PTFE-based with silica gasket sheet, 3½"ID x 5"OD x 1/16" thick



Photography 1
Untested gasket sample

Photography 2
Tested gasket sample TD10HB01

Photography 3
Tested gasket sample TD10HB02

Appendix 1

Testing Equipment and Measurement Instruments

- Testing rig : Hot Blow-out Test Rig
- Leak measurement : Pressure transducer OMEGA, model PX303-2KG10V
- Data acquisition : AGILENT Data acquisition / Switch unit, model 34970A
- Temperature : Type J and K thermocouples
- Temperature controller : OMEGA Engineering, model CN77342-C2
- Bolt load and gasket stress : Instrumented bolts with strain gages
- Gasket dimensions : Mitutoyo calliper, model CD-8"P

Appendix 2

Hot Blow-out Test Description

Summary of Test Method

The Hot Blow-out Test can be described as being a six steps procedure. The first step seats the gasket by conducting a sequential room temperature loading. The second step is short waiting period for gasket creep and relaxation. The third step reloads the gasket to the nominal gasket stress of 5000 psi. The fourth step is a second waiting period that allows the gasket to creep and relax. The fifth step is the helium pressurization of the gasket while the sixth and final step heats the gasket until a blow-out occurs or until the maximum temperature of the rig is reached.

Apparatus

The Hot Blow-out Test Rig per figure 1 is designed to reproduce hot blow-out conditions in a real gasketed flanged joint subjected to a maximum compressive load of 50000 lb, at a working temperature of up to 750 °F and with helium gas pressure up to 1000 psig. Tested gaskets are NPS 3", 3.5" ID x 5" OD for sheet gaskets, with a surface area of about 10 in^2.

The rig is composed of a pair of standard NPS 3" Class 150 flanges with raised faces. Both flanges are welded to schedule 80 pipes and are equipped with four 5/8" – 18 UNF high-strength steel bolts. The flange surface finish is in accordance with the ASME/ANSI B16.5 standard. The joint axial rigidity is evaluated to 4.4×10^6 lb/in.

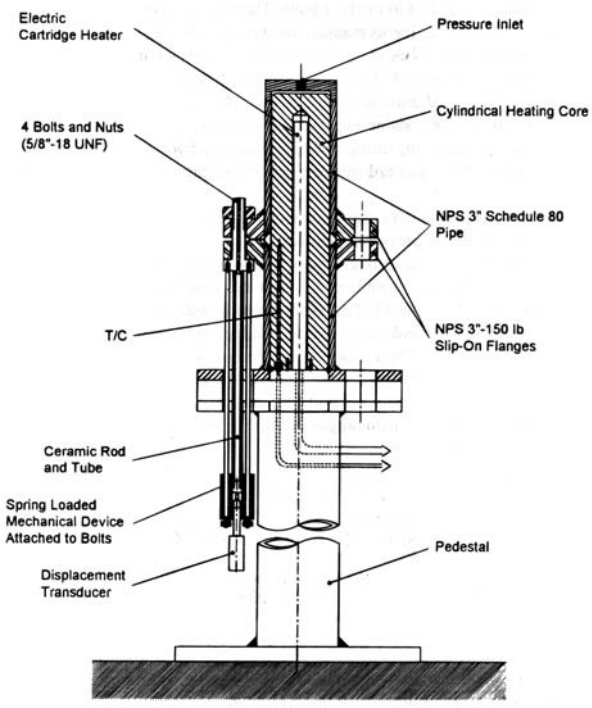


Figure 3 Hot Blow-out Test Rig

Flanges are mounted on a steel cylindrical core welded to a steel base plate. Gasket loading is performed with a torque wrench, and the usual criss-cross sequence is used to torque the four bolts. These calibrated bolts are equipped with special extensometers to measure the bolt stretch that is converter to bolt load. Each extensometer consists of a pair of long ceramic rods that are spring loaded. The extensometers are compensated for thermal effects. To measure bolt strech, a displacement transducer is placed at the end of each extensometer. These transducers are placed at the bottom of the rig, well below the heated zone, and measure the relative displacement between the pair of ceramic rods.

The helium gas is supplied by a high-pressure gas cylinder. The pressure is adjusted with a precise manual pressure regulator and it is measured with an electronic pressure transducer.

The central heating core is embedded with a 2000 W electrical cartridge heater. An electronic temperature controller is used to achieve a constant temperature increase of 3.0 °F/min. Temperature

is measured at three locations: in the solid core and inside the top and the bottom flanges at mid gasket diameter (not shown on the figure), close to the raised face surface.

The top and bottom parts of the fixture are insulated to minimize thermal gradients (not shown on the figure). The top insulation casing is removable to allow for gasket change and bolt torquing.

A manual relief valve permits gas purging during heating to prevent internal pressure increase. In order to minimize the gas flow when a blow-out occurs, the gas volume inside the fixture is minimized by the use of the solid central core and the gas flow from the pressure regulator is restricted by a micrometric valve. Gasket deflection and leakage are not measured during the HOBT test.

Test Procedure

Step 1 – Gasket Seating

The ambient temperature should be 75 ± 5 °F. Open the system to the atmospheric pressure. Tighten the four bolts with a torque wrench using four levels: 30, 60, 75 and 80[1] lb-ft, to reach the nominal gasket stress of 5000 ± 250 psi. Make a one-pass crisscross pattern in about 15-30 seconds for each torque levels and wait one minute between each level. For the last one, reverse the pattern.

Step 2 – Waiting time

Wait 5 minutes to allow for the initial gasket creep and relaxation

Step 3 – Reloading to the target stress level

Retighten the bolts to adjust the gasket stress back to 5000 ± 250 psi.

Step 4 – Waiting time

Wait 30 minutes to allow for the gasket creep and relaxation.

Step 5 – Helium pressurization

Connect the pressurizing line to the pressure inlet and apply an internal helium pressure of 435 psig.

Step 6 – Gasket heat-up

Turn on the electrical cartridge heater inside the central heating core at its maximum power until the core temperature reaches 180 °F. Then, continue to heat the gasket at a rate of 3.0 °F/min until a blow-out occurs or until the average temperature between the top and bottom flanges reaches 680 °F (maximum test temperature).

[1] 80 lb-ft is a suggested value. The final torque value will depend on the gasket type and on the lubrication of the bolts. The experimenter must select the appropriate torque to achieve a gasket stress of 5000 ± 250 psi.