Type Test Reports

1) ASTM F1387-99 For Tube Fittings (SS 316)
2) ASTM F1387-99 For Tube Fittings (UNS 32750)
3) ASTM F1387-99 For Tube Fittings (6Mo-UNS 31254)
4) ASTM F1387-99 For Tube Fittings (UNS N04400)
5) Torsion, High Impact Shock & Fire Test as per ASTM F-1387-99 For Tube Fittings
6) CE-PED Certificate For Fittings
7) CE-PED Certificate For Valves
8) ATEX Certificate For Fittings & Valves
9) Interchangeability Compliance Report with Swagelok Tube Fittings
10) Interchangeability Compliance Report with Parker Tube Fittings
11) Fire Safe Test Certificate For Valves by GLIS (SS316 & UNS S32205)
12) Fire Safe Test Certificate For Valves by DNV-GL (ASTM A105)
13) Burst Pressure Test Of Fittings By CSA Group (USA)
14) MSS SP-99-2016a Type Test Certificate For Instrument Valves & Manifolds
15) Helium Leak Test Reports For Fittings & Valves
16) Lloyd's Type Approval Certificate For Tube Fittings

DNV Report No.:
Ref:- PUN/14/JJ/219 Rev. 1
Revision issued for addressing the latest standard edition highlighted as △.
No changes / amendments to tests or acceptance criteria.

DET NORSKE VERITAS AS

PERFORMANCE TESTING COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra, Dist – Sabarkantha, Gujarat 383120

COMPLIANCE STANDARD: As per ASTM F1387 – 99 (Reapproved 2012 △)

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable) – *(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)* – Type IV as per Clause 4.1.4 of ASTM F1387 – Sizes: ¼" OD, 3/8", ½" OD, ¾" OD, 1" OD

MATERIAL GRADE: Grade B – Stainless Steel (316) as per Clause 4.2.2 of ASTM F1387 *Test Certificates Reviewed, Confirmed with Positive Material Identification (PMI)*

TESTS WITNESSED:

ASTM Test ID	Test Description	No. of Samples Tested per Size	PANAM Clause No.
A2	Examination of Specimen	28	1.5
A3	Pneumatic Proof Test	28	1.4.1
A4	Hydrostatic Proof Test	28	1.4.2
A5	Impulse Test	6	1.4.3
A6	Flexure Fatigue Test	6	1.4.4
A7	Tensile Test	6	1.4.5
A8	Burst Test (Hydrostatic Test)	4	1.4.6
A9	Repeated Assembly	6*	1.4.7 Included in 1.4.3 & 1.4.4
A10	Rotary Flexure Test	6	1.4.8
S2	Thermal Cycling Test	10	1.4.9.3
S3	Elevated Temperature Soak Test	5	1.4.9.1
S4	Stress Corrosion Test	5	1.4.9.4
S8	Vibration Test	5	1.4.9.2

**: 3 each after Impulse and Flexure Fatigue Test*

CONCLUSION: We hereby confirm that the fittings satisfactorily met the performance requirements as per the procedure laid out in the compliance standard.

DET NORSKE VERITAS * 1864 * PUNE

Place and Date:
Pune, 2014-12-08

Jaison Jose
Inspection Surveyor
to Det Norske Veritas AS

DNV Report No.:
Ref:- PUN/15/JJ/133

DET NORSKE VERITAS AS

PERFORMANCE TESTING COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra, Dist–Sabarkantha, Gujarat 383120

COMPLIANCE STANDARD: As per ASTM F1387 – 99 (Reapproved 2012)

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable) – *(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)* – Type IV as per Clause 4.1.4 of ASTM F1387 – Sizes: ¼" OD, 3/8", ½" OD, ¾" OD, 1" OD

MATERIAL GRADE: Grade B – Super Duplex Stainless Steel (UNS 32750) as per Clause 4.2.2 of ASTM F1387 *Test Certificates Reviewed, Confirmed with Positive Material Identification (PMI)*

TESTS WITNESSED:

ASTM Test ID	Test Description	No. of Samples Tested per Size	PANAM Clause No.
A2	Examination of Specimen	28	1.5
A3	Pneumatic Proof Test	28	1.4.1
A4	Hydrostatic Proof Test	28	1.4.2
A5	Impulse Test	6	1.4.3
A6	Flexure Fatigue Test	6	1.4.4
A7	Tensile Test	6	1.4.5
A8	Burst Test (Hydrostatic Test)	4	1.4.6
A9	Repeated Assembly	6*	1.4.7 Included in 1.4.3 & 1.4.4
A10	Rotary Flexure Test	6	1.4.8
S2	Thermal Cycling Test	10	1.4.9.3
S3	Elevated Temperature Soak Test	5	1.4.9.1
S4	Stress Corrosion Test	5	1.4.9.4
S8	Vibration Test	5	1.4.9.2

: 3 each after Impulse and Flexure Fatigue Test

CONCLUSION: We hereby confirm that the fittings satisfactorily met the performance requirements as per the procedure laid out in the compliance standard.

DET NORSKE VERITAS * 1864 * PUNE

Place and Date:
Pune, 2015-10-26

Jaison Jose
Inspection Surveyor
to Det Norske Veritas AS

DNV Report No.:
Ref:- PUN/15/JJ/132

DET NORSKE VERITAS AS

PERFORMANCE TESTING COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra, Dist–Sabarkantha, Gujarat 383120

COMPLIANCE STANDARD: As per ASTM F1387 – 99 (Reapproved 2012)

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable) –
(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube) –
Type IV as per Clause 4.1.4 of ASTM F1387 –
Sizes: ¼" OD, 3/8", ½" OD, ¾" OD, 1" OD

MATERIAL GRADE: Grade B – Super Austenitic Stainless Steel (6Mo – UNS 31254)
as per Clause 4.2.2 of ASTM F1387
Test Certificates Reviewed, Confirmed with Positive Material Identification (PMI)

TESTS WITNESSED:

ASTM Test ID	Test Description	No. of Samples Tested per Size	PANAM Clause No.
A2	Examination of Specimen	28	1.5
A3	Pneumatic Proof Test	28	1.4.1
A4	Hydrostatic Proof Test	28	1.4.2
A5	Impulse Test	6	1.4.3
A6	Flexure Fatigue Test	6	1.4.4
A7	Tensile Test	6	1.4.5
A8	Burst Test (Hydrostatic Test)	4	1.4.6
A9	Repeated Assembly	6*	1.4.7 Included in 1.4.3 & 1.4.4
A10	Rotary Flexure Test	6	1.4.8
S2	Thermal Cycling Test	10	1.4.9.3
S3	Elevated Temperature Soak Test	5	1.4.9.1
S4	Stress Corrosion Test	5	1.4.9.4
S8	Vibration Test	5	1.4.9.2

***: 3 each after Impulse and Flexure Fatigue Test*

CONCLUSION: We hereby confirm that the fittings satisfactorily met the performance requirements as per the procedure laid out in the compliance standard.

DET NORSKE VERITAS * 1864 * PUNE

Place and Date:
Pune, 2015-10-26

Jaison Jose
Inspection Surveyor
to Det Norske Veritas AS

DNV Report No.:
Ref:- PUN/16/JJ/506

DET NORSKE VERITAS AS

PERFORMANCE TESTING COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra, Dist–Sabarkantha, Gujarat 383120

COMPLIANCE STANDARD: As per ASTM F1387 – 99 (Reapproved 2012)

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable) – *(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)* – Type IV as per Clause 4.1.4 of ASTM F1387 – Sizes: ¼" OD, 3/8", ½" OD, ¾" OD, 1" OD (For Pressure Class, refer Manufacturer's test reports for different rated pressures within the size range.)

MATERIAL GRADE: Grade C – Nickel-Copper Alloy (UNS N04400) as per Clause 4.2.2 of ASTM F1387 *Test Certificates Reviewed, Confirmed with Positive Material Identification (PMI)*

TESTS WITNESSED:

ASTM Test ID	Test Description	No. of Samples Tested per Size	PANAM Clause No.
A2	Examination of Specimen	28	1.5
A3	Pneumatic Proof Test	28	1.4.1
A4	Hydrostatic Proof Test	28	1.4.2
A5	Impulse Test	6	1.4.3
A6	Flexure Fatigue Test	6	1.4.4
A7	Tensile Test	6	1.4.5
A8	Burst Test (Hydrostatic Test)	4	1.4.6
A9	Repeated Assembly	6*	1.4.7 Included in 1.4.3 & 1.4.4
A10	Rotary Flexure Test	6	1.4.8
S2	Thermal Cycling Test	10	1.4.9.3
S3	Elevated Temperature Soak Test	5	1.4.9.1
S4	Stress Corrosion Test	5	1.4.9.4
S8	Vibration Test	5	1.4.9.2

: 3 each after Impulse and Flexure Fatigue Test

CONCLUSION: We hereby confirm that the fittings satisfactorily met the performance requirements as per the procedure laid out in the compliance standard.

DET NORSKE VERITAS 1864 PUNE

Place and Date:
Pune, 2016-02-11

Jaison Jose
Inspection Surveyor
to Det Norske Veritas AS

DNV·GL

Certificate No.: GLIS/AHD/PANAM/NV/18-01

TYPE TEST COMPLIANCE REPORT

MANUFACTURER: **M/s. Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra, Dist – Sabarkantha, Gujarat 383120

COMPLIANCE STANDARD: As per ASTM F1387 – 99 (Reapproved 2012)

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable) – *(Consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)* – Type IV as per Clause 4.1.4 of ASTM F1387 –Sizes: ¼" OD, 3/8", ½" OD, ¾" OD, 1" OD

MATERIAL GRADE: Grade B – Stainless Steel (316), as per Clause 4.2 of ASTM F1387. *Test Certificates Reviewed, Confirmed with Positive Material Identification (PMI)*

TESTS WITNESSED:

ASTM Test ID	Test Description	No. of Samples Tested per Size	PANAM Clause No.
-	Specimen checked	-	1.5
S5	Torsion Test	05	1.4.11.3
S6	High Impact Shock test	05	1.4.11.4
S7	Fire Test	05	1.4.12.1

CONCLUSION: We hereby confirm that the fittings satisfactorily met the performance requirements as per the procedure laid out in thecompliance standard.

For Germanischer Lloyd Industrial Services GmbH.

DNV·GL INSPECTION SERVICES

Nikhil Vasva

Inspection Engineers- Inspection Services

Place: Prantij, Himmatnagar
Date : 27.10.2018

Equinox Busniess Park, 6th Floor,Tower 3, L.B.S Marg, Off. Bandra Kurla Complex, Kurla (W) Mumbai – 400 070

DNV GL Headquarters, Veritasveien 1, P.O.Box 300, 1322 Hovik, Norway. Tel: +47 67 57 99 00. www.dnvgl.com

Germanischer Lloyd Industrial Services GmbH India Branch trading as DNV GL
Company Registration No F03285

DNV·GL

ACKNOWLEDGEMENT OF RECEIPT – EU

Acknowledgement Number: **14195-2019-CE-IND** **Issue 0**

This Acknowledgement consists of 2 pages

This is to confirm that the Technical File for the following product(s):

Instrumentation Fittings and Valves

With the type designation(s): **See page 2**

Manufactured by: **Panam Engineers Limited**
6 Survey No 192, Near Sujal AGRO NH – 8,
AT Post Piludra, Dist – Sabarkantha,
Gujarat 383120, INDIA

has been received and stored according to the conformity assessment procedure described in Article 13, 1.(b).(ii), the Council Directive 2014/34/EU of 26 February 2014, category 2 non-electrical equipment.

Further details are given overleaf.

Jurisdiction:
DNV GL Presafe AS is appointed by the Norwegian Directorate for Civil Protection as Notified Body (No. 2460) under the terms of Article 21 of the Council Directive 2014/34/EU of 26 February 2014.

Date of issue:
2019-03-20
Validity end date:
2022-03-20

Ståle Sandstad
For DNV GL Presafe AS
The document has been digitally signed.
See www.dnvgl.com/digitalsignatures for info

DNV GL Presafe AS, Veritasveien 3, 1363 Høvik, Norway, Tel +47 67 57 88 00, www.dnvgl.com

DNV·GL

Acknowledgement Number 14195-2019-CE-IND Issue 0

Product description
The following types are covered by the Acknowledgement:

Product Description	Type Designations	Category	Product Group
Instrumentation Fittings and Valves	Instrumentation Tube/ Pipe fittings, Needle Valves, Check Valves, Ball Valves, 2, 3 & 5-Way Valve Manifolds, Pressure relief Valves, Pressure Regulators, Double block & bleed valves	2	Non-electrical Ex equipment

Technical documentation:

The following documentation has been received and stored:

Document No	Document Name
PEL/ATEX/ INSTRUMENTATION FITTINGS & VALVES - REV: 00	TCF AS PER DIRECTIVE ATEX/2014/34/EU FOR PANAM ENGINEERS LIMITED INSTRUMENTATION FITTINGS & VALVES

Terms and conditions
The product liability rests with the manufacturer, his representative or, in the absence of a representative, the importer, in accordance with the General Product Safety Directive 2001/95/EC
The following conditions may render this acknowledgement invalid:

- Changes in the design or construction of the product.
- Changes or amendments to the referenced directive(s).
- Changes or amendments in the standards which form the basis for documenting compliance with the essential requirements of the directive(s).

Conformity declaration and marking of product
In order to fully meet with the requirements of the Directive and legally affix the CE mark, the manufacturer must take all measures necessary to ensure that the manufactured product comply with the technical documentation and with the requirements of the Directive and finally draw up an EU declaration of conformity.

Acknowledgement History:

Issue	Description	Issue date
0	Original acknowledgement	2019-03-20

END OF ACKNOWLEDGEMENT

DNV GL Presafe AS, Veritasveien 3, 1363 Høvik, Norway, Tel +47 67 57 88 00, www.dnvgl.com

DNV Report No.:
Ref:- PUN/14/JJ/225

DET NORSKE VERITAS AS

INTERECHANGEABILITY COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH–8, At Post Piludra, Sabarkantha, Gujarat 383120

SCOPE OF TEST: To establish interchangeability of Tubing Fittings manufactured by Manufacturer with Tubing Fittings of similar size and rating of a different Make.
The other make used for this test purpose is M/s Swagelok (Identified with SWAGELOK marking on the fitting components.

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable)
(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)

MATERIAL GRADE: Stainless Steel (316), *Test Certificates Reviewed, Confirmed with PMI*

FITTINGS USED FOR TESTING:

Panam Part No	*Description*	*Quantity*
PMC-04-04-SS	*1/4"OD X 1/4"NPT Male Connector*	*5*
PMC-06-06-SS	*3/8"OD X 3/8"NPT Male Connector*	*5*
PMC-08-08-SS	*1/2"OD X 1/2"NPT Male Connector*	*5*
PMC-12-12-SS	*3/4"OD X 3/4"NPT Male Connector*	*5*
PMC-16-16-SS	*1"OD X 1"NPT Male Connector*	*5*
PU-04-SS	*1/4"OD Union*	*5*
PU-06-SS	*3/8"OD Union*	*5*
PU-08-SS	*1/2"OD Union*	*5*
PU-12-SS	*3/4"OD Union*	*5*
PU-16-SS	*1"OD Union*	*5*
PTC-04-SS	*1/4"OD Tube Cap*	*5*
PTC-06-SS	*3/8"OD Tube Cap*	*5*
PTC-08-SS	*1/2"OD Tube Cap*	*5*
PTC-12-SS	*3/4"OD Tube Cap*	*5*
PTC-16-SS	*1"OD Tube Cap*	*5*

TEST METHOD: The above Fittings were assembled in different configuration of both the makes (i.e. Panam and Swagelok) with identically rated fitting as indicated in the attached interchangeability test report. The Fittings were then assembled with suitably rated tube and each fitting was subjected to a hydrostatic test to applicable pressure as per the attached report for 5 minutes.

CONCLUSION: M/s Panam Fittings were found compatible with M/s Swagelok Fittings while fitment with respect to tube gripping and threads matched identically.
Pressure testing was satisfactory with no visible signs of leakage or pressure drop.

ATTACHMENTS: Interchangeability Test Report of M/s Panam Engineers Limited.

Place and Date:
Pune, 2014-12-08

Jaison Jose
Inspection Surveyor to Det Norske Veritas AS

DNV Report No.:
Ref:- PUN/16/JJ/542

DET NORSKE VERITAS AS

INTERECHANGEABILITY COMPLIANCE REPORT

MANUFACTURER: **M/s Panam Engineers Limited**

TESTS CONDUCTED AT: Survey No 192, Near Sujal Agro, NH–8, At Post Piludra, Sabarkantha, Gujarat 383120

SCOPE OF TEST: To establish interchangeability of Tubing Fittings manufactured by M/s Panam Engineers Limited with Tubing Fittings of similar size and rating of a different Make. The other make used for this test purpose is M/s PARKER (Identified with PARKER marking on the fitting components.

PRODUCTS COVERED: Grip-type Mechanically Attached Tubing Fittings (Separable)
(consists of Body, Nut, Front & Rear Ferrule radially compressed on Tube)

MATERIAL GRADE: Stainless Steel (316), *Test Certificates Reviewed*

FITTINGS USED FOR TESTING:

Panam Part No	*Description*	*Quantity*
PMC-04-04-SS	*1/4"OD X 1/4"NPT Male Connector*	*5*
PMC-06-06-SS	*3/8"OD X 3/8"NPT Male Connector*	*5*
PMC-08-08-SS	*1/2"OD X 1/2"NPT Male Connector*	*5*
PMC-12-12-SS	*3/4"OD X 3/4"NPT Male Connector*	*5*
PMC-16-16-SS	*1"OD X 1"NPT Male Connector*	*5*
PU-04-SS	*1/4"OD Union*	*5*
PU-06-SS	*3/8"OD Union*	*5*
PU-08-SS	*1/2"OD Union*	*5*
PU-12-SS	*3/4"OD Union*	*5*
PU-16-SS	*1"OD Union*	*5*
PTC-04-SS	*1/4"OD Tube Cap*	*5*
PTC-06-SS	*3/8"OD Tube Cap*	*5*
PTC-08-SS	*1/2"OD Tube Cap*	*5*
PTC-12-SS	*3/4"OD Tube Cap*	*5*
PTC-16-SS	*1"OD Tube Cap*	*5*

TEST METHOD: The above Fittings were assembled in different configuration of both the makes (i.e. Panam and Parker) with identically rated fitting as indicated in the attached interchangeability test report. The Fittings were then assembled with suitably rated tube and each fitting was subjected to a hydrostatic test to applicable pressure as per the attached report for 5 minutes.

CONCLUSION: M/s Panam Fittings were found compatible with M/s Parker while fitment with respect to tube gripping and threads matched identically.
Pressure testing was satisfactory with no visible signs of leakage or pressure drop.

ATTACHMENTS: Interchangeability Test Report of M/s Panam Engineers Limited.

DET NORSKE VERITAS * 1864 * PUNE

Place and Date:
Pune, 2016-11-30

Jaison Jose
Inspection Surveyor to Det Norske Veritas AS

Fire Safe Test Certificate For Valves by GLIS (SS 316 & UNS S32205)

GLIS

Certificate No: GLIS/AHD/2013-14/CR-208 GLIS. Ref. No: 101-010-51004-226

FIRE SAFE TEST CERTIFICATE

This certificate is issued to

PANAM ENGINEERS.
R628, TTC Industrial Area
M.I.D.C. Rabale, Navi Mumbai.
St.:Maharashtra.

to certify that at their request the undersigned surveyor to GLIS-India, attended their works at R628, TTC Industrial Area M.I.D.C. Rabale, Navi Mumbai on 06th February- 2014, for the purpose of witness of fire safe test of DBB valves. The scopes of Inspection & Approval are as bellow.

FIRE SAFE TEST STANDARD SPECIFICATION	**: API 6FA, IV Edition, 2010**
TECHNICAL SPECIFICATION	
Design Standard	**: BS 5351/ANSI B 16.34/ANSI B 16.5**
Construction	**: DOUBLE BLOCK AND BLEED VALVE**
Size	**: 2" (DN 50)**
Class	**: 1500# ,2500#**
Valve Serial No.	**: 14010001890.**
Valve Drg. No.	**: PDBB-DSS-FB-50-1500-FF**
MATERIAL OF CONSTRUCTION	
Body	**: ASTM A 182 GRF60/ UNS 32205**
Ball	**: ASTM A 182 GRF60/ UNS 32205**
Stem	**: ASTM A 182 GRF60/ UNS 32205**
Seats	**: PEEK**
Gasket	**:PEEK / Grafoil**

Conclusion: DBB Valve Sr. no. 14010001890 punched on flange had successfully passed fire safe test as per procedure outlined in API 6FA, IV Edition, 2010 and witnessed by undersigned GLIS-India Surveyor on February 06th 2014. Temperature report, Test report and other calculation sheets are enclosed herewith after endorsement by us.

GLIS-India, is to be notified of any changes in Design of this Certificate that may affect the validity of this certificate.

Other Sizes Qualified : 2" & Below, 2-1/2", 3", 4"

Other Pressure Class Qualified : 1500# & 2500#

Date of Issue : 06th February, 2014

Issued at:
Ahmedabad 06.02.2014.

B.Jaykumar
INDUSTRIAL SERVICES GL-05

Place **Date** **General Manager**

Branch Office:Director,Gulf Lloyds Industrial Services-India.
184/A,Jayant Park Society,Nr.Yuganda Society,Memnagar, Ahmedabad –380052, Gujarat, India.
Telefax : (91)79-22773522, gulflloyds.india@gmail.com glis.india@yahoo.com
Office : (الخدمات الصناعية اللويدز الخل) Bur Dubai, Dubai,Contact no: +971 55 9098935 ,Email id : gulfloyd@cim.ae

Fire Safe Test Certificate For Valves by GLIS (SS 316 & UNS S32205)

GLIS

Certificate No: GLIS/AHD/PE/2013/CR-120 GLIS. Ref. No: 101-010-51003-120

FIRE SAFE TEST CERTIFICATE

This certificate is issued to

M/s.PANAM ENGINEERS.

R628, TTC INDUSTRIAL AREA
MIDC, RABALE,
NAVI MUMBAI.

to certify that at their request the undersigned surveyor to Gulf Lloyds –India attended their works at Navi Mumbai, on 30th May- 2013, for the purpose of witness of fire safe test of DBB valves.
The scopes of Inspection & Approval are as below.

STANDARD SPECIFICATION	**: API 6FA, Edition ,2008**
TECHNICAL SPECIFICATION	
Design Standard	**: BS 5351 / ANSI B16.34/ANSI B16.5**
Construction	**: DOUBLE BLOCK & BLEED VALVE**
Size	**: 2" (DN 50)**
Class	**: 1500#**
Valve Serial No.	**: 13060122050**
Valve Drg. No.	**: PDBB-SS-FB-50-1500-FF**
MATERIAL OF CONSTRUCTION	
Body	**: SS316**
Ball	**: SS316**
Stem	**: SS316**
Seats	**: PEEK**
Gasket & Packing	**: PEEK/Grafoil**

Conclusion: Ball Valve Sr. no. **13060122050** punched on flange had successfully passed fire safe test as per procedure outlined in **API 6FA, Edition ,2008** and witnessed by undersigned GLIS Surveyor on 30thMay- 2013. Temperature report, Test report and other calculation sheets are enclosed herewith with endorsement by us.

Note : GLIS-India, is to be notified of any changes in design of this Valve that may affect the validity of this certificate.

Other Sizes Qualified : 2", 2 ½", 3" & 4".
Other Pressure Class Qualified : 1500# & 2500#.

Date of Issue: 30th May, 2013

Issued at:
Ahmedabad **30.05.2013.** **B.Jaykumar**
INDUSTRIAL SERVICES

Place Date General Manager

BranchOffice:Director,GulfLoydsIndustrialServices-India..
184/A,Jayant Jark Society,Nr.Yugand Soc.Memnagar ,Ahmedabad – 380052, Gujarat, India.
Telefax : (91)79-27493158, gulflloyds.india@gmail.com,glis.india@yahoo.com
Head Office : (الخدمات الصناعية اللويدز الخليج)
Bur Dubai, Dubai,Contact no: +971 54 9099935 ,Email id : gulfloyds@eim.ae

Fire Safe Test Certificate For Valves by DNV-GL (ASTM A105)

DNV·GL

Certificate No.: GLIS/AHD/PANAM/NV/18-02

FIRE SAFE TEST CERTIFICATE

This certificate is issued to

M/s. Panam Engineers Limited
Survey No 192, Near Sujal Agro, NH – 8, At Post Piludra,
Dist – Sabarkantha, Gujarat 383120

We hereby certify that the fire safe test on below valve has been conducted at the Panam Engineers Limited works and witnessed by DNV-GL surveyor according to requirement of API 607 7th ED:2016

STANDERD SPECIFICATION	:	**API 607 7TH ED:2016**
TECHNICAL SPECIFICATION		
Design STD	:	**API 6D:24th ED/API 698/ASME B16.34/ASME B16.5**
Construction	:	**3 Piece Design Full Bore Flanged End Double Block and Bleed Ball Valves**
Size	:	**50MM (2")**
Class	:	**600#**
Production No.	:	**1810P37531**
Valve Drg. No.	:	**PDBB-BNB-FB-CS-01-15-600-RF-8NF-8N Rev No.00**
MATERIAL OF CONSTRUCTION		
Body	:	**ASTM A 105(NACE)**
Trims	:	**ASTM A 276/ASTM A479 316L**
Seats	:	**PTFE**
Stud & Nut	:	**ASTM A193 Gr.B7 & ASTM A194 Gr.2H**
Date of Test	:	**29.10.2016**

QUALIFIED RANGE OF VALVE

Qualified Size	:	**2" and Below, 2 ½" , 3", 4"**
Qualified Pressure Rating	:	**600#, 800#, 900#**

Conclusion: This certificate is issued according to The above valve complies to the fire safe requirement as per API 607: 2016 7th Edition.

This Certificate is in conjunction with Inspection Report No.-DNVGL/AHD/PANAM/18-02.

For Germanischer Lloyd Industrial Services GmbH.

Place: Prantij, Himmatnagar
Date : 27.10.2018

DNV·GL INSPECTION SERVICES 52-081

Nikhil Vasva
Inspection Engineers- Inspection Services

Equinox Busniess Park, 6th Floor,Tower 3, L.B.S Marg, Off. Bandra Kurla Complex, Kurla (W) Mumbai – 400 070
DNV GL Headquarters, Veritasveien 1, P.O.Box 300, 1322 Høvik, Norway. Tel: +47 67 57 99 00. www.dnvgl.com

Burst Pressure Test Of Fittings By CSA Group (USA)

CSA Group

CSA Group
Laboratory Test Data - Hydrostatic Test

Testing performed in CSA Group Cleveland office laboratories: 8503 E. Pleasant Valley Rd. Independence, OH 44131
ORIGINAL TEST DATA

Date	2017-11-27	Project	70162731		FC Code	807201
Contact	Umang Vekariya Marketing Manager		Company	Panam Engineers Ltd Mumbai, India		
Standard(s):	Reference to ASTM F1387-99 (R2012) A7 Hydrostatic Proof Test & A8 Hydrostatic Burst Test					
Page number	1 of 15	Reviewed by: Title	Project Manager	Signature:		

The results relate only to the items tested

Test Description:

1. Place the test specimens into a burst chamber and secure them into place in accordance with the manufacturer's recommended procedures. Fill the test specimens with water or hydraulic fluid, bleeding air out. One end must be free to move.
2. Equip the chamber with calibrated pressure gages to permit visual readings of actual pressure being applied.
3. Perform the hydrostatic test at ambient temperature.
4. Proof Pressure Test: Initially pressurize the test specimens to 0.690 MPa (100 psi) +/- 5 %. There shall be no evidence of leakage. If there is no evidence of leakage, gradually increase the pressure at an average rate not to exceed 172 MPa/min (25,000 psig/min) to 150 +/- 5 % of the rated pressure of the tube. Maintain this pressure for an additional period of 1 min. If leakage occurs, discontinue the test. If there is no evidence of leakage, during both pressurized periods, the test specimens have passed the hydrostatic proof test.
5. Burst Pressure Test: Subject the test specimens to a gradual increase of pressure at an average rate not to exceed 127MPa/min (25,000psig/min; 416 psig/sec) to four times the rated pressure of the specimen assembly and hold for minimum of 1min. If tube burst occurs below four times the rated pressure of the specimen assembly, discontinue the test. The affected tubing test specimen has failed the test. If leakage occurs below four times the rated pressure of the specimen assembly, the affected fitting test specimen has failed the burst test.
6. The fitting and tubing test specimens have passed the hydrostatic burst test when four times the rated pressure of the specimen assembly has been attained.

Assembly #	1
Part #/Brand#	201
Description	¼ x .035

Results:

Tube MAWP (PSI)	Tube Pressure 1.5X (PSI)	Tube MAWP 4X (PSI)	Rate (PSI/SEC)	Actual Burst Pressure (PSI)	Pass/Fail Both
5,130	7,695	20,520	416	28,417	PASS
Pass/Fail 1 minute hold	PASS	PASS			
Comment:	Burst			Torque in FT Lbs.	Cap 20 Body 20

Test equipment used

Item	Manufacturer	Asset No.	Last Cal.	Next Cal.
CSA Hydraulic Chamber	Hydro-pac	CH-92		
Pressure Transducer	Viatran	Z000001141	2017/09/18	2018/09/18
Pressure Gauge	Astraguage	PG-187	2017/02/26	2018/02/26

Burst Pressure Test Of Fittings By CSA Group (USA)

CSA Group

CSA Group
Laboratory Test Data - Hydrostatic Test

Testing performed in CSA Group Cleveland office laboratories: 8503 E. Pleasant Valley Rd. Independence, OH 44131
ORIGINAL TEST DATA

Date	2017-11-27	Project	70162731		FC Code	807205
Contact	Umang Vekariya MarketingManager		Company	Panam Engineers Ltd Mumbai, India		
Standard(s):	Reference to ASTM F1387-99 (R2012) A7 Hydrostatic Proof Test & A8 Hydrostatic Burst Test					
Page number	5 of 15	Reviewed by: Title	Project Manager	Signature:		

The results relate only to the items tested

Test Description:

1. Place the test specimens into a burst chamber and secure them into place in accordance with the manufacturer's recommended procedures. Fill the test specimens with water or hydraulic fluid, bleeding air out. One end must be free to move.
2. Equip the chamber with calibrated pressure gages to permit visual readings of actual pressure being applied.
3. Perform the hydrostatic test at ambient temperature.
4. Proof Pressure Test: Initially pressurize the test specimens to 0.690 MPa (100 psi) +/- 5 %. There shall be no evidence of leakage. If there is no evidence of leakage, gradually increase the pressure at an average rate not to exceed 172 MPa/min (25,000 psig/min) to 150 +/- 5 % of the rated pressure of the tube. Maintain this pressure for an additional period of 1 min. If leakage occurs, discontinue the test. If there is no evidence of leakage, during both pressurized periods, the test specimens have passed the hydrostatic proof test.
5. Burst Pressure Test: Subject the test specimens to a gradual increase of pressure at an average rate not to exceed 127MPa/min (25,000psig/min; 416 psig/sec) to four times the rated pressure of the specimen assembly and hold for minimum of 1min. If tube burst occurs below four times the rated pressure of the specimen assembly, discontinue the test. The affected tubing test specimen has failed the test. If leakage occurs below four times the rated pressure of the specimen assembly, the affected fitting test specimen has failed the burst test.
6. The fitting and tubing test specimens have passed the hydrostatic burst test when four times the rated pressure of the specimen assembly has been attained.

Assembly #	5
Part #/Brand#	205
Description	½ x .065

Results:

Tube MAWP (PSI)	Tube Pressure 1.5X (PSI)	Tube MAWP 4X (PSI)	Rate (PSI/SEC)	Actual Burst Pressure (PSI)	Pass/Fail Both
5,090	7,635	20,360	416	25,027	PASS
Pass/Fail 1 minute hold	PASS	PASS			
Comment:	Burst			Torque in FT Lbs.	Cap 30 Body 25

Test equipment used

Item	Manufacturer	Asset No.	Last Cal.	Next Cal.
CSA Hydraulic Chamber	Hydro-pac	CH-92		
Pressure Transducer	Viatran	Z000001141	2017/09/18	2018/09/18
Pressure Gauge	Astraguage	PG-187	2017/02/26	2018/02/26

Burst Pressure Test Of Fittings By CSA Group (USA)

CSA Group

CSA Group
Laboratory Test Data - Hydrostatic Test

Testing performed in CSA Group Cleveland office laboratories: 8503 E. Pleasant Valley Rd. Independence, OH 44131
ORIGINAL TEST DATA

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Date	2017-11-27	Project	70162731		FC Code	807207
Contact	Umang Vekariya Marketing Manager		Company	Panam Engineers Ltd Mumbai, India		
Standard(s):	Reference to ASTM F1387-99 (R2012) A7 Hydrostatic Proof Test & A8 Hydrostatic Burst Test					
Page number	7 of 15	Reviewed by: Title	Project Manager	Signature:		

The results relate only to the items tested

Test Description:

1. Place the test specimens into a burst chamber and secure them into place in accordance with the manufacturer's recommended procedures. Fill the test specimens with water or hydraulic fluid, bleeding air out. One end must be free to move.
2. Equip the chamber with calibrated pressure gages to permit visual readings of actual pressure being applied.
3. Perform the hydrostatic test at ambient temperature.
4. Proof Pressure Test: Initially pressurize the test specimens to 0.690 MPa (100 psi) +/- 5 %. There shall be no evidence of leakage. If there is no evidence of leakage, gradually increase the pressure at an average rate not to exceed 172 MPa/min (25,000 psig/min) to 150 +/- 5 % of the rated pressure of the tube. Maintain this pressure for an additional period of 1 min. If leakage occurs, discontinue the test. If there is no evidence of leakage, during both pressurized periods, the test specimens have passed the hydrostatic proof test.
5. Burst Pressure Test: Subject the test specimens to a gradual increase of pressure at an average rate not to exceed 127MPa/min (25,000psig/min; 416 psig/sec) to four times the rated pressure of the specimen assembly and hold for minimum of 1min. If tube burst occurs below four times the rated pressure of the specimen assembly, discontinue the test. The affected tubing test specimen has failed the test. If leakage occurs below four times the rated pressure of the specimen assembly, the affected fitting test specimen has failed the burst test.
6. The fitting and tubing test specimens have passed the hydrostatic burst test when four times the rated pressure of the specimen assembly has been attained.

Assembly #	7
Part #/Brand#	207
Description	3/8 x .049

Results:

Tube MAWP (PSI)	Tube Pressure 1.5X (PSI)	Tube MAWP 4X (PSI)	Rate (PSI/SEC)	Actual Burst Pressure (PSI)	Pass/Fail Both
4,790	7,185	19,160	416	21,958	PASS
Pass/Fail 1 minute hold	PASS	PASS			
Comment:	Burst			Torque in FT Lbs.	Cap 70 Body 70

Test equipment used

Item	Manufacturer	Asset No.	Last Cal.	Next Cal.
CSA Hydraulic Chamber	Hydro-pac	CH-92		
Pressure Transducer	Viatran	Z000001141	2017/09/18	2018/09/18
Pressure Gauge	Astraguage	PG-187	2017/02/26	2018/02/26

CSA Group

CSA Group
Laboratory Test Data - Hydrostatic Test

Testing performed in CSA Group Cleveland office laboratories: 8503 E. Pleasant Valley Rd. Independence, OH 44131
ORIGINAL TEST DATA

Date	2017-11-27	Project	70162731		FC Code	807213
Contact	Umang Vekariya Marketing Manager		Company	Panam Engineers Ltd Mumbai, India		
Standard(s):	Reference to ASTM F1387-99 (R2012) A7 Hydrostatic Proof Test & A8 Hydrostatic Burst Test					
Page number	13 of 15	Reviewed by: Title	Project Manager	Signature:		

The results relate only to the items tested

Test Description:

1. Place the test specimens into a burst chamber and secure them into place in accordance with the manufacturer's recommended procedures. Fill the test specimens with water or hydraulic fluid, bleeding air out. One end must be free to move.
2. Equip the chamber with calibrated pressure gages to permit visual readings of actual pressure being applied.
3. Perform the hydrostatic test at ambient temperature.
4. Proof Pressure Test: Initially pressurize the test specimens to 0.690 MPa (100 psi) +/- 5 %. There shall be no evidence of leakage. If there is no evidence of leakage, gradually increase the pressure at an average rate not to exceed 172 MPa/min (25,000 psig/min) to 150 +/- 5 % of the rated pressure of the tube. Maintain this pressure for an additional period of 1 min. If leakage occurs, discontinue the test. If there is no evidence of leakage, during both pressurized periods, the test specimens have passed the hydrostatic proof test.
5. Burst Pressure Test: Subject the test specimens to a gradual increase of pressure at an average rate not to exceed 127MPa/min (25,000psig/min; 416 psig/sec) to four times the rated pressure of the specimen assembly and hold for minimum of 1min. If tube burst occurs below four times the rated pressure of the specimen assembly, discontinue the test. The affected tubing test specimen has failed the test. If leakage occurs below four times the rated pressure of the specimen assembly, the affected fitting test specimen has failed the burst test.
6. The fitting and tubing test specimens have passed the hydrostatic burst test when four times the rated pressure of the specimen assembly has been attained.

Assembly #	13
Part #/Brand#	213
Description	1 x .095

Results:

Tube MAWP (PSI)	Tube Pressure 1.5X (PSI)	Tube MAWP 4X (PSI)	Rate (PSI/SEC)	Actual Burst Pressure (PSI)	Pass/Fail Both
3,630	5,445	14,520	416	16,651	PASS
Pass/Fail 1 minute hold	PASS	PASS			
Comment:	Burst			Torque in FT Lbs.	Cap 270 Body 250

Test equipment used

Item	Manufacturer	Asset No.	Last Cal.	Next Cal.
CSA Hydraulic Chamber	Hydro-pac	CH-92		
Pressure Transducer	Viatran	Z000001141	2017/09/18	2018/09/18
Pressure Gauge	Astraguage	PG-187	2017/02/26	2018/02/26

DNV·GL

TYPE TEST COMPLIANCE REPORT

Certificate No.: BDA/2018/470B — Date: 2018-08-08

MANUFACTURER:	**M/s Panam Engineers Limited**
TESTS CONDUCTED AT:	Survey No 192, Near Sujal Agro, NH-8, At & Post:Piludra, Sabarkantha, Gujarat 383120
SCOPE OF TEST:	To establish Type Test of Instrument Valves manufactured by M/s PanamEngineers Limited with Different type of Instrument Valves Size and Rating [Needle Valve, Ball Valve, Check Valve, Manifold Valve, Block and bleed valve, Gauge Root Valve, Relief Valves].
COMPLIANCE STANDARD:	MSS SP-99-2016a For Instrument Valves& PEL Test Procedure Doc. No. WI/5.7.1.5/2-40, Rev. 00, Dated:03/10/2013, Total Page 04.
MATERIAL GRADE:	Stainless Steel (316 / 316L), *Test Certificates Reviewed*

INSTRUMENT VALVES USED FOR TESTING:

Refer Attached Annexure A to Type Testing Compliance Report No. BDA/2018/470B, Dated: 2018-08-08.

TEST METHOD:	The above Instrument Valves were assembled in different configuration of Panam with Identically rated Instrument Valves as indicated in the attachedtest report. The Instrument Valves were then assembled with suitably rated and each Instrument Valves was Subjected to a hydrostatic Proof test [Shell, Seat]Pneumatic test [Shell, Seat] &Burst Test [Except Relief Valve]to applicable pressure as per the attached report for 1 minutes.
CONCLUSION:	M/s Panam Instrument Valves were Pressure testing was satisfactory with no visible signs of leakage or pressure drop.
ATTACHMENTS:	1] Quality Certificate / Mill Certificate No. PEL/MTC-TYPE TEST/18-19, Dated: 16/07/2018, Page No. 1 to 7 of M/s Panam Engineers Limited. 2] Pressure Test Report [Witness] No. PEL/TEST REPORT/18-19, Dated: 20/07/2018 Page No. 1 to 03 of M/s Panam Engineers Limited. 3] Final Inspection Report [Witness] No. PEL/FIR-007-18-19, Dated: 27/07/2018, Page No. 1 to 27 of M/s Panam Engineers Limited.

For DNV GL Business Assurance India

Issued at **Vadodara** on **2018-08-08**

(Narpat R. Ravalji / Nikunj Patel)
Surveyor

1203, BUTTERCUP, HIRANANDANI MEADOWS,
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THANE (WEST) - 400 610.
TEL - 21739269 • 26795611.
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Email: stechndt@gmail.com

SCIENTIFIC TECHNICAL NDT SERVICES

HELIUM LEAK TESTING REPORT.

CLIENT	: Panam Engineers, Rabale, Navi Mumbai.	Report No.: 1062/18-19.
CUSTOMER	: ISRO Propulsion Complex	Date: 22 & 23.03.2019.
Ref P.O.No.	: IPRC-PUR-2018E023270201	P.O.Date: 31.12.2018
Description	: As per Annexure (Item Description / MOC / Panam Part No.)	
EQUIPMENT	: Make/Model MSLD – Pfeiffer Vacuum Adixen ASM 310 - Made in France	
TECHNIQUE USED	: Detector Probe (Sniffer Probe)	
TRACER GAS	: Helium Gas Purity 99.995%.	
PRESSURE	: Helium 0.15 kg/cm^2	
CALIBRATION DONE	: 1.3 x 10^{-7} mbar/ l/ sec.	
REF. PROCEDURE	: ASME Sec V, Article10,Appendix IV,Test pressure of 0.1 MPa(g) with a leak rate not exceeding 1E-06 std cm3/s.	
ACCEPTANCE	: **1.0 x 10^{-6} mbar-cc/sec.**	
PRESSURE GUAGE	: 0 – 1 Kg Serial No: UCS 51 & 52	
Test Conducted by	: K. Shivaji. Level II	
OBSERVATION	: As per the annexure attached	

Scientific Technical NDT Services

Authorized Signatory

SCIENTIFIC TECHNICAL NDT SERVICES ★ THANE (W) ★

Test Witnessed by

M.S.Naim, QCD,
PANAM Engineers

★ **Specilised Services in NDT : Ultrasonic Flaw Detection • Ultrasonic Thickness Gauging Survey • Magnetic Particle Inspection • Eddy Current Testing • Digital Hardness Testing • Dye Penetrant Testing • Radiography Inspection • In-situ Metallography • Positive Material Identification (PMI) • Helium Leak Testing • DF Thickness • Material Segregations • Pre & Post Heat Treatment • Boroscopy, Fibroscopic & Videoscopic • Ferrite Measurement • Surface Roughness • Metallurgical & Engineering Consulting**

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SCIENTIFIC TECHNICAL NDT SERVICES

CLIENT : Panam Engineers, Rabale, Navi Mumbai.

Report No.: 1062/18-19.

CUSTOMER: ISRO Propulsion Complex

Date: 22 & 23.03.2019.

Ref P.O.No. : IPRC-PUR-2018E023270201

P.O.Date: 31.12.2018.

NO.	ITEM DESCRIPTION	MOC	PANAM PART NO	Background (A) m.bar cc/sec	Observed Reading (B) m.bar cc/sec	Leak Rate (B-A)	Remark
1	SS Union:8mm	SS316	PU-M08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
2	SS Union:12.7mm (1/2")	SS316	PU-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
3	Adapters:1/4" Male NPT X 8mm Tube	SS316	PMA-M08-4N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
4	Adapters:1/2" Male NPT X 8mm Tube	SS316	PMA-M08-8N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
5	Adapters:3/8" Male NPT X 8mm Tube	SS316	PMA-M08-6N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
6	Adapters:1/8" Male NPT X 8mm Tube	SS316	PMA-M08-2N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
7	Adapters:1/4" Male NPT X 12.7mm Tube (1/2")	SS316	PMA-08-4N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
8	Adapters:1/2" Male NPT X 12.7mm Tube (1/2")	SS316	PMA-08-8N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
9	Adapters:3/8" Male NPT X 12.7mm Tube (1/2")	SS316	PMA-08-6N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
10	Adapters:1/8" Male NPT X 12.7mm Tube (1/2")	SS316	PMA-08-2N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
11	SS Male Elbow:1/2" Male NPT X 8mm Tube	SS316	PME-M08-8N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
12	SS Male Elbow:3/8" Male NPT X 8mm Tube	SS316	PME-M08-6N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
13	SS Male Elbow:1/8" Male NPT X 8mm Tube	SS316	PME-M08-2N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
14	SS Male Elbow:1/4" Male NPT X 12.7mm Tube (1/2")	SS316	PME-08-4N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
15	SS Male Elbow:1/2" Male NPT X 12.7mm Tube (1/2")	SS316	PME-08-8N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
16	SS Male Elbow:3/8" Male NPT X 12.7mm Tube (1/2")	SS316	PME-08-6N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
17	SS Male Elbow:1/8" Male NPT X 12.7mm Tube (1/2")	SS316	PME-08-2N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
18	SS Reducing Union:12.7mm (1/2") X 6mm Tube	SS316	PRU-M06-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
19	SS Reducing Union:12.7mm (1/2") X 8mm Tube	SS316	PRU-M08-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
20	SS Reducing Union:12.7mm (1/2") X 12mm Tube	SS316	PRU-M12-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
21	SS Union Tee:12.7mm (1/2")	SS316	PUT-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
22	SS Union Tee:8mm	SS316	PUT-M08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
23	Conversion Adapters:1" Male NPT X 8mm Tube	SS316	PMA-M08-16N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
24	Adapters:1"Male NPT X 12.7mm Tube (1/2")	SS316	PMA-08-16N-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
25	End closer:6mm cap	SS316	PTC-M06-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
26	End closer:6mm plug	SS316	PTP-M06-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
27	End closer:8mm cap	SS316	PTC-M08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
28	End closer:8mm plug	SS316	PTP-M08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
29	End closer:12.7mm cap (1/2")	SS316	PTC-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable
30	End closer:12.7mm plug (1/2")	SS316	PTP-08-SS	5.0×10^{-8}	5.0×10^{-8}	No Changes	Acceptable

Scientific Technical NDT Services

Authorized Signatory

SCIENTIFIC TECHNICAL NDT SERVICES ★ THANE (W) ★

Test Witnessed by

M.S.Naim, QCD,
Panam Engineers

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★ Approved by well known inspection Agencies and Reputed Users.

MANOJ INDUSTRIES,
NAVI MUMBAI – 400 705

REPORT NO.	MI/PEL/2019/01/204
DATE	09-01-2019
PAGE NO.	01 of 02

HELIUM LEAK TEST REPORT (VACUUM / TRACER GAS METHOD)

Customer	M/s. Panam Engineers Ltd., Mumbai - India		
Inspecting Authority	M/s. Panam Engineers Ltd., Mumbai - India		
Project / Customer :	M/s. Oil India Ltd., PO Number 7120597/JFS Dtd. 12/10/2018		
Product / Equipment Description	**Stainless Steel Coupling (Size : ½" NPT – Male, 2" Long)**	**Qty :**	**02 Nos.**
Job Number.	Not Applicable		
Drawing No.	Panam Part Number - PHLN-8N-SS-L2		
Material of Construction:	Stainless Steel AISI 316		
Job Dimension's / Thickness :	As per Approved / Panam Engineers Ltd., Drawing.		
Reference Standards / Documents :	ASME Section V Article 10, Edition 2010.		
Scope	Helium Leak Testing of Stainless Steel Nipple (1/2" NPT – Male, 2" Long) by Tracer Gas / Vacuum Method.		
Helium Leak Test Proc. No.	As per Standard Helium Leak Testing Procedure.		
Examination Stage	After Final Assembly & Successful Hydro-Test.	**Helium Test Mode**	Vacuum Method
Acceptable Limit	4.0×10^{-9} atm-cc/sec.	**Date of Examination**	09/01/2018.
Test Condition :	After Successful Pneumatic Strength Test of of Stainless Steel Nipple (1/2" NPT – Male, 2" Long)		

HELIUM LEAK DETECTOR EQUIPMENT DETAILS :

Make	ALCATEL ADIXEN, FRANCE	**Model**	ASM 310
Helium Leak Detector Serial Number :	HLD1501032	**Helium Leak Detector Part Number :**	BSAA0000MM9A
Required Helium Leak Detector Machine Sensitivity :		1.0×10^{-9} atm-cc/sec.	
Actual Helium Leak Detector Machine Sensitivity used for Leak Testing :		5.0×10^{-12} atm-cc/sec.	

HELIUM LEAK DETECTOR CALIBRATION DETAILS AT THE START OF HELIUM LEAK TEST:

Manufacturer	M/s. Cincinnati Test Systems, USA	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	G01062	**Calibration Certificate Number :**	----------
Calibration Date :	30/07/2018	**Next Calibration Due Date :**	30/07/2019
Depletion Rate	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

CALIBRATION OF HELIUM LEAK DETECTOR	LEAK RATE VALUE	UNIT
Leak rate of calibrated Leak – In Vacuum	1.3×10^{-9}	mbar ltr / sec in Vacuum
Target Leak Rate – In Vacuum	1.3×10^{-9}	mbar ltr / sec in Vacuum
Actual Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak in Vacuum Condition	1.4×10^{-9}	mbar ltr / sec in Vacuum
Background Leak Rate Value – In Vacuum	5.4×10^{-11}	mbar ltr / sec in Vacuum

ACCESSORIES / EQUIPMENT DETAILS

Tracer Gas	HELIUM GAS (99.995% Pure or 4.5 Grade Gas)	**Tracer Gas Concentration**	99.995% Pure Helium.

TYPICAL SKETCH OF THE STAINLESS STEEL NIPPLE – SIZE – ½" NPT (MALE), 2" LONG.

..... Continuation Sheet

D-17/5, Sahyadri CHS, Plot 50, Sector 8, Sanpada, Navi Mumbai – 400 705 Contact Number : 9820119880 / 9820718901

MANOJ INDUSTRIES, **NAVI MUMBAI – 400 705**	REPORT NO.	MI/PEL/2019/01/204	
	DATE	09-01-2019	
	PAGE NO.	01 of 02	

HELIUM LEAK TEST REPORT (TRACER GAS / VACUUM METHOD) – CONTINUATION SHEET

MEASUREMENT OF SYSTEM SENSITIVITY AT THE START OF THE HELIUM LEAK TEST :

01	Background Reading displayed on HLT during Test with Standard Leak Valve Closed.	A	6.2×10^{-10}	atm-cc/sec
02	Leak Rate of Calibrated Leak	B	1.3×10^{-10}	atm-cc/sec
03	Leak Rate Displayed on HLT (Sensing Calibrated Leak Connected on Test Component / Standard Leak Valve Opened)	C	7.5×10^{-10}	atm-cc/sec
04	Response Time	T	< 10	Seconds
05	Duration for Stable Reading	--	> 10	Seconds
06	Initial System Calibration Factor (ICSF)	ICSF = {B/(C-A)}	1	---

HELIUM LEAK TEST RESULTS FOR STAINLESS STEEL NIPPLE (SIZE – ½" NPT MALE, 2" LONG) TAG NO. 01 :

01	Background Reading before start of Helium Leak Test	X	6.2×10^{-10}	atm-cc/sec
02	Maximum Leak Rate Observed after 10 Min Hold Time.	W	8.2×10^{-10}	atm-cc/sec
03	Actual Maximum Leak Rate	(W-X) x ICSF	2.0×10^{-10}	atm-cc/sec
04	Allowable / Acceptable Helium Leak Rate	-	4.00×10^{-9}	atm-cc/sec

HELIUM LEAK TEST RESULTS FOR STAINLESS STEEL NIPPLE (SIZE – ½" NPT MALE, 2" LONG) TAG NO. 02 :

01	Background Reading before start of Helium Leak Test	X	6.2×10^{-10}	atm-cc/sec
02	Maximum Leak Rate Observed after 10 Min Hold Time.	W	8.2×10^{-10}	atm-cc/sec
03	Actual Maximum Leak Rate	(W-X) x ICSF	2.0×10^{-10}	atm-cc/sec
04	Allowable / Acceptable Helium Leak Rate	-	4.00×10^{-9}	atm-cc/sec

RESULT: - THE OBSERVED HELIUM LEAK RATE ARE WITHIN THE SPECIFIED LIMITS OF 4.0×10^{-9} atm-cc/sec.
HELIUM LEAK TEST OF STAINLESS STEEL NIPPLE, SIZE – ½" NPTM, 2" LONG (QTY – 02 NOS.) FOUND SATISFACTORY.

LT PERFORMED BY (ASNT -LT- Level-2)	WITNESSED / APPROVED BY
MANOJ INDUSTRIES, NAVI MUMBAI	M/S. PANAM ENGINEERS LTD., MUMBAI

Encl :

1. Calibration Certificate for Vacuum Type Helium Calibrated Leak.
2. ASNT Level II Certificate of Mr. Subhash Boiwar

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INSPECTION & TESTING

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TEST REPORT - HELIUM LEAK TESTING

Report No :	PITS/07/001	Report Date :	04-07-2019
Client :	LPSC, ISRO	Testing Equipment :	LEYBOLD QUADRO
Manufacturer :	PANAM ENGINEERS LTD	Calibrated Leak :	17480
Item :	Needle Valve - PNV-SB-S-06-MF-G	Code / Standard :	ISRO specification
P O Reference:	PO NO. TL05-20180319170101-LO Dated :-12-02-2019	Qualification :	He Leak Rate <1.0x10^{-4} std cc/ s at body-bonnet joint,gland seal, seat

Leak Detector and Probe Calibration

	Standard Leak Value	Observed Leak Value	Instrument Sensitivity
1	2.87x 10^{-9} std cc/s	~ 2.7 x 10^{-9} std cc/s	CF = 1.0 Response < 5 s
2	Test Pressure : 5 Kg/cm2 He		Soaking Time : 10 Minutes

3						Leak Rate (std cc/s)		
PR SR NO.	Serial No	Size	Material	Class	Type	Body/Bonnet Joint	Seat	Gland Seal
1	1906P19894	3/8" BSPP (MXF)	ASTM A 479 - 316	MAX WP - 50BAR	Needle Valve - PNV-SB-S-06-MF-G	< 10^{-8}	1.2 x 10^{-8}	< 10^{-8}
2	1906P19897	3/8" BSPP (MXF)	ASTM A 479 - 316	MAX WP - 50BAR	Needle Valve - PNV-SB-S-06-MF-G	< 10^{-8}	1.1 x 10^{-8}	< 10^{-8}

Final Remarks : **The Helium leak rate observed was within acceptable limit**
(Note : 1 std cc/s = 1 mbar l/s = 0.1 Pa m3/s = 1 (atm) cc/s = 0.76 Torr l/s)

Testing Agency | Manufacturer | Inspection Authority | Client

PURVA INSPECTION & TESTING SERVICES

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Ranip, Ahmedabad 382480

MANOJ INDUSTRIES, **NAVI MUMBAI – 400 705**	REPORT NO.	MI/PEL/2019/01/205
	DATE	09-01-2019
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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD)

Customer	M/s. Panam Engineers Ltd., Mumbai - India		
Inspecting Authority	M/s. Panam Engineers Ltd., Mumbai - India		
Customer / Project :	M/s. Oil India Ltd.		
Product / Epmt Description	STAINLESS STEEL NEEDLE VALVE **MATERIAL – AISI 316, SIZE : ½" NPT - FEMALE**	**Qty. :**	**02 Nos.**
Job Number.	M/s. Oil India Ltd., PO Number 7120597/JFS Dtd. 12/10/2018		
Drawing No.	Panam Needle Valve Part Number : PNV-UB-S-08-FF		
Material of Construction:	Stainless Steel AISI 316		
Thickness :	Not Applicable		
Reference Standards / Documents :	ASME Section V Article 10, Edition 2010.		
Scope	Helium Leak Testing of Needle Valve (Size – ½" NPT Female).		
Helium Leak Test Proc. No.	As per Standard Helium Leak Testing Procedure.		
Examination Stage	After Final Assembly and Pneumatic Testing.	**Helium Test Mode**	DETECTOR PROBE METHOD.
Acceptable Limit	1×10^{-6} std-cc/sec	**Date of Examination**	09.01.2019

HELIUM LEAK DETECTOR EQUIPMENT DETAILS :

Make	ALCATEL ADIXEN, FRANCE	**Model**	ASM 310
Helium Leak Detector Serial Number :	HLD1501032	**Helium Leak Detector Part Number :**	BSAA0000MM9A

HELIUM LEAK DETECTOR CALIBRATION DETAILS :

Manufacturer	M/s. Laco Technologies, USA	**Model Number :**	CM511.081111v0/4
Calibrated Stad. Leak Sr. No.	14822	**Calibration Certificate Number :**	970455
Calibration Date :	10/04/2018	**Next Calibration Due Date :**	10/04/2019
Depletion Rate	0.1% per Year	**Temp. Coefficient**	0.1 per Deg C.

CALIBRATION OF HELIUM LEAK DETECTOR	**LEAK RATE VALUE**	**UNIT**
Leak rate of calibrated Leak	1.08×10^{-8} at 23°C.	mbar ltr / sec
Calculated Leak rate arrived after considering above Depletion rate of 0.1% year	1.078×10^{-8}	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	1.087×10^{-8} at 32°C.	mbar ltr / sec
Uncertainty after age and temperature correction as per calibration certificate ± 8%	1.0×10^{-8} to 1.17×10^{-8} at 32°C	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak in Vacuum Condition	1.2×10^{-8} at 32°C	mbar ltr / sec
Machine sensitivity as recorded on HLT IN VACUUM MODE	5.0×10^{-12}	mbar ltr / sec

SYSTEM / SNIFFER PROBE CALIBRATION DETAILS :

Manufacturer	M/s. Laco Technologies, USA	**Model Number :**	CM519.0630DA0/4
Calibrated Stad. Leak Sr. No.	14828	**Calibration Certificate Number :**	970468
Calibration Date :	12/04/2018	**Next Calibration Due Date :**	12/04/2019
Depletion Rate :	Not Applicable	**Temp. Coefficient**	0.1 per Deg C.

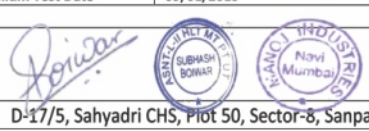
SYSTEM CALIBRAION DETAILS :	**LEAK RATE VALUE**	**UNIT**
Leak rate of Sniffer Calibrated Leak @ 21.6 Deg C	3.5×10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	3.6×10^{-5} at 32 Deg C.	mbar ltr / sec
Uncertainty after age and temperature correction as per calibration certificate ± 10%	3.45×10^{-5} to 4.21×10^{-5} at 32 Deg C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak by HLD Sniffer Probe.	3.4×10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Response Time :	< 1 Minute.	

Note: Above noted Response time is derived after keeping Sniffer Probe Calibrated Leak with Value of 3.8 x 10-5 mbar-ltr/sec with Helium Reservoir (filled at 50 psig pressure) is kept in similar volume of Polythene bag to be used for HLD Exchanger Test for the test Hold time of 12 hrs similar to the U-Tube Heat Exchanger Helium Leak Detection Test Condition.

ACCESSORIES / EQUIPMENT DETAILS

Tracer Gas	HELIUM (99.995% Pure or 4.5 Grade Gas)	**Tracer Gas Concentration**	100% Helium.
Test Pressure	20 kg/cm^2	**Soaking Time**	Minimum 30 Minutes.
Helium Filling Date	09/01/2019	**Time & Atm. Room Temp**	4.30 PM & 30 Deg C
Helium Test Date	09/01/2019	**Time & Atm. Room Temp.**	5.30 PM & 30 Deg C.

..... Continuation Sheet



D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

MANOJ INDUSTRIES, **NAVI MUMBAI – 400 705**		REPORT NO.	MI/PEL/2019/01/205
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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD) – CONTINUATION SHEET

TYPICAL SKETCH OF PANAM NEEDEL VALVE :

NOTE: PLASTIC HOOD WRAPED ON TEST LOCATION AND KEPT UPTO MIN. 30 MINUTES AFTER PRESSURING WITH HELIUM GAS.

Location Area.	AREAS UNDER INSPECTION	Initial Background Reading before start of Helium Leak Test (std-cc/sec)	Helium Leak Rate Reading observed during Leak Testing (std-cc/sec)	Observed Leak Rate (100% Helium Pressure)) (std-cc/sec)	Acceptable Helium Leak Rate (std-cc/sec)	RESULT
		A	B	(B-A)		
1	Body, Bonnet, Stem and End Joints Etc. – SR. NO. 01	2.7×10^{-6}	2.9×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-6}	Acceptable
2	Body, Bonnet, Stem and End Joints Etc. – SR. NO. 02	2.7×10^{-6}	3.1×10^{-6}	$0.4 \times 10^{-6} = 4.0 \times 10^{-7}$		

RESULT: - HELIUM LEAK TEST OF NEEDLE VALVE ARE WITHIN ACCEPTABLE LIMIT OF 1.0×10^{-6} ATM-CC/SEC.

LT PERFORMED BY (ASNT -LT- Level-2)	WITNESSED / APPROVED BY
MANOJ INDUSTRIES, NAVI MUMBAI	M/S. PANAM ENGINEERS LTD., MUMBAI

Encl :

1. **Calibration Certificate for Vacuum Type Helium Calibrated Leak.**
2. **Calibration Certificate for Sniffer Type Helium Calibrated Leak.**
3. **ASNT Level II Certificate of Mr. Subhash Boiwar.**

D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

MANOJ INDUSTRIES, **NAVI MUMBAI** – 400 705		**REPORT NO.**	MI/PEL/2019/09/146
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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD)

Customer	M/s. Panam Engineers Ltd., Mumbai - India		
Inspecting Authority	M/s. Panam Engineers Ltd., Mumbai - India		
Customer / Project :	M/s. Krohne Engineering LLC. – Russia		
Product / Epmt Description	STAINLESS STEEL MALE CONNECTOR **MATERIAL – AISI 316,** **SIZE : 12MM OD X 1/2" NPTM**	**Qty. :**	**316 Nos.**
Job Number.	M/s. Krohne Engineering LLC. – Russia, PO Number 2601/1-716 Dtd. 12/08/2018		
Drawing No.	MALE CONNECTOR Part Number : PMC-M12-8N-SS		
Material of Construction:	Stainless Steel AISI 316		
Thickness :	Not Applicable		
Reference Standards / Documents :	ASME Section V Article 10, Edition 2010.		
Scope	Helium Leak Testing of MALE CONNECTOR 12MM OD X 1/2" NPTM		
Helium Leak Test Proc. No.	As per Standard Helium Leak Testing Procedure.		
Examination Stage	After Final Assembly and Pneumatic Testing.	**Helium Test Mode**	DETECTOR PROBE METHOD.
Acceptable Limit	1 X 10^{-4} std-cc/sec	**Date of Examination**	23-09-2019

HELIUM LEAK DETECTOR EQUIPMENT DETAILS :			
Make	ALCATEL ADIXEN, FRANCE	**Model**	ASM 310
Helium Leak Detector Serial Number :	HLD1501032	**Helium Leak Detector Part Number :**	BSAA0000MM9A

HELIUM LEAK DETECTOR CALIBRATION DETAILS :			
Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

CALIBRATION OF HELIUM LEAK DETECTOR	**LEAK RATE VALUE**	**UNIT**
Leak rate of calibrated Leak	1.3 x 10^{-9} at 21.8°C.	mbar ltr / sec
Calculated Leak rate arrived after considering above Depletion rate of 0.1% year	1.224 x 10^{-9}	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	1.318 x 10^{-9} at 36°C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak in Vacuum Condition	1.4 x 10^{-9} at 36°C	mbar ltr / sec
Machine sensitivity as recorded on HLT IN VACUUM MODE	5.0 x 10^{-12}	mbar ltr / sec

SYSTEM / SNIFFER PROBE CALIBRATION DETAILS :			
Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate :	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

SYSTEM CALIBRAION DETAILS :	**LEAK RATE VALUE**	**UNIT**
Leak rate of Sniffer Calibrated Leak @ 21.6 Deg C	3.5 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	3.6 x 10^{-5} at 32 Deg C.	mbar ltr / sec
Uncertainty after age and temperature correction as per calibration certificate ± 10%	3.45 X 10^{-5} to 4.21 X 10^{-5} at 32 Deg C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak by HLD Sniffer Probe.	3.4 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Response Time :	< 1 Minute.	

Note: Above noted Response time is derived after keeping Sniffer Probe Calibrated Leak with Value of 3.8 x 10-5 mbar-ltr/sec with Helium Reservoir (filled at 50 psig pressure) is kept in similar volume of Polythene bag to be used for HLD Exchanger Test for the test Hold time of 12 hrs similar to the U-Tube Heat Exchanger Helium Leak Detection Test Condition.

ACCESSORIES / EQUIPMENT DETAILS

Tracer Gas	HELIUM (99.995% Pure or 4.5 Grade Gas)	**Tracer Gas Concentration**	100% Helium.
Test Pressure	7 kg/cm^2	**Soaking Time**	Minimum 10 Minutes.
Helium Filling Date	23/09/2019	**Time & Atm. Room Temp**	14.00 PM & 36 Deg C
Helium Test Date	23/09/2019	**Time & Atm. Room Temp.**	15.00 PM & 36 Deg C.

..... **Continuation Sheet**

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SNT-TC-1A LEVEL-II HLT MT PT UT SUBHASH BOIWAR

PANAM ENGINEERS LTD. QC Dept. PALUDRA, GUJARAT

Technical Inspection Services TÜV India 22/09/2019 Subhash Boiwar

MANOJ INDUSTRIES,
NAVI MUMBAI – 400 705

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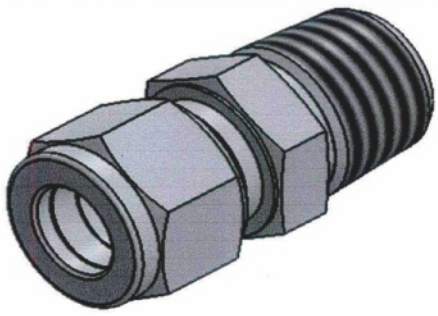
HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD) – CONTINUATION SHEET

TYPICAL SKETCH OF PANAM FLANGE ADAPTOR:



NOTE: PLASTIC HOOD WRAPED ON TEST LOCATION AND KEPT UPTO MIN. 10 MINUTES AFTER PRESSURING WITH HELIUM GAS.

Location Area.	AREAS UNDER INSPECTION	Initial Background Reading before start of Helium Leak Test (std-cc/sec)	Helium Leak Rate Reading observed during Leak Testing (std-cc/sec)	Observed Leak Rate (100% Helium Pressure)) (std-cc/sec)	Acceptable Helium Leak Rate (std-cc/sec)	RESULT
		A	B	(B-A)		
1	Body and End Joints Etc.	1.1×10^{-6}	1.3×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-4}	Acceptable

RESULT: - HELIUM LEAK TEST OF MALE CONNECTOR ARE WITHIN ACCEPTABLE LIMIT OF 1.0×10^{-4} ATM-CC/SEC.

LT PERFORMED BY (ASNT -LT- Level-2)	WITNESSED / REVIEWED BY	WITNESSED / APPROVED BY
MANOJ INDUSTRIES, NAVI MUMBAI	M/S. PANAM ENGINEERS LTD.PRANTIJ	M/S. TUV INDIA PVT.LTD , AHMEDABAD

Encl :

1. Calibration Certificate for Vacuum Type Helium Calibrated Leak.
2. Calibration Certificate for Sniffer Type Helium Calibrated Leak.
3. ASNT Level II Certificate of Mr. Subhash Boiwar.

D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

MANOJ INDUSTRIES, **NAVI MUMBAI** – 400 705		**REPORT NO.**	MI/PEL/2019/09/147
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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD)

Customer	M/s. Panam Engineers Ltd., Mumbai - India		
Inspecting Authority	M/s. Panam Engineers Ltd., Mumbai - India		
Customer / Project :	M/s. Krohne Engineering LLC. – Russia		
Product / Epmt Description	STAINLESS STEEL **FLANGE ADAPTOR** **MATERIAL – AISI 316,** **SIZE : 12MM OD X 1/2" X 2500 # , RTJ**	**Qty. :**	**72 Nos.**
Job Number.	M/s. Krohne Engineering LLC. – Russia, PO Number 2601/1-716 Dtd. 12/08/2018		
Drawing No.	FLANGE ADAPTOR Part Number : PFLA-M12-F08-2500-RTJ-SS		
Material of Construction:	Stainless Steel AISI 316		
Thickness :	Not Applicable		
Reference Standards / Documents :	ASME Section V Article 10, Edition 2010.		
Scope	Helium Leak Testing of FLANGE ADAPTOR 12MM OD X 1/2" X 2500 # , RTJ		
Helium Leak Test Proc. No.	As per Standard Helium Leak Testing Procedure.		
Examination Stage	After Final Assembly and Pneumatic Testing.	**Helium Test Mode**	DETECTOR PROBE METHOD.
Acceptable Limit	1 X 10^{-4} std-cc/sec	**Date of Examination**	23-09-2019

HELIUM LEAK DETECTOR EQUIPMENT DETAILS :

Make	ALCATEL ADIXEN, FRANCE	**Model**	ASM 310
Helium Leak Detector Serial Number :	HLD1501032	**Helium Leak Detector Part Number :**	BSAA0000MM9A

HELIUM LEAK DETECTOR CALIBRATION DETAILS :

Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

CALIBRATION OF HELIUM LEAK DETECTOR	**LEAK RATE VALUE**	**UNIT**
Leak rate of calibrated Leak	1.3 x 10^{-9} at 21.8°C.	mbar ltr / sec
Calculated Leak rate arrived after considering above Depletion rate of 0.1% year	1.224 x 10^{-9}	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	1.318 x 10^{-9} at 36°C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak in Vacuum Condition	1.4 x 10^{-9} at 36°C	mbar ltr / sec
Machine sensitivity as recorded on HLT IN VACUUM MODE	5.0 x 10^{-12}	mbar ltr / sec

SYSTEM / SNIFFER PROBE CALIBRATION DETAILS :

Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate :	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

SYSTEM CALIBRAION DETAILS :	**LEAK RATE VALUE**	**UNIT**
Leak rate of Sniffer Calibrated Leak @ 21.6 Deg C	3.5 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	3.6 x 10^{-5} at 32 Deg C.	mbar ltr / sec
Uncertainty after age and temperature correction as per calibration certificate ± 10%	3.45 X 10^{-5} to 4.21 X 10^{-5} at 32 Deg C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak by HLD Sniffer Probe.	3.4 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Response Time :	< 1 Minute.	

Note: Above noted Response time is derived after keeping Sniffer Probe Calibrated Leak with Value of 3.8 x 10-5 mbar-ltr/sec with Helium Reservoir (filled at 50 psig pressure) is kept in similar volume of Polythene bag to be used for HLD Exchanger Test for the test Hold time of 12 hrs similar to the U-Tube Heat Exchanger Helium Leak Detection Test Condition.

ACCESSORIES / EQUIPMENT DETAILS

Tracer Gas	HELIUM (99.995% Pure or 4.5 Grade Gas)	**Tracer Gas Concentration**	100% Helium.
Test Pressure	7 kg/cm^2	**Soaking Time**	Minimum 10 Minutes.
Helium Filling Date	23/09/2019	**Time & Atm. Room Temp**	14.00 PM & 36 Deg C
Helium Test Date	23/09/2019	**Time & Atm. Room Temp.**	15.00 PM & 36 Deg C.

..... **Continuation Sheet**

D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

SNT-L-II HLT MT PT UT SUBHASH BOIWAR

QC Dept.

TUV India Inspection Services 25/09/2019 Subhash Patel

MANOJ INDUSTRIES,
NAVI MUMBAI – 400 705

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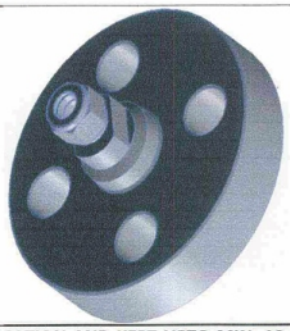
HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD) – CONTINUATION SHEET

TYPICAL SKETCH OF PANAM FLANGE ADAPTOR:



NOTE: PLASTIC HOOD WRAPED ON TEST LOCATION AND KEPT UPTO MIN. 10 MINUTES AFTER PRESSURING WITH HELIUM GAS.

Location Area.	AREAS UNDER INSPECTION	Initial Background Reading before start of Helium Leak Test (std-cc/sec)	Helium Leak Rate Reading observed during Leak Testing (std-cc/sec)	Observed Leak Rate (100% Helium Pressure)) (std-cc/sec)	Acceptable Helium Leak Rate (std-cc/sec)	RESULT
		A	B	(B-A)		
1	Body and End Joints Etc.	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable

RESULT: - HELIUM LEAK TEST OF FLANGE ADAPTOR ARE WITHIN ACCEPTABLE LIMIT OF 1.0×10^{-4} ATM-CC/SEC.

LT PERFORMED BY (ASNT -LT- Level-2)	WITNESSED / REVIEWED BY	WITNESSED / APPROVED BY
MANOJ INDUSTRIES, NAVI MUMBAI	M/S. PANAM ENGINEERS LTD.PRANTIJ	M/S. TUV INDIA PVT.LTD , AHMEDABAD

Encl :

1. Calibration Certificate for Vacuum Type Helium Calibrated Leak.
2. Calibration Certificate for Sniffer Type Helium Calibrated Leak.
3. ASNT Level II Certificate of Mr. Subhash Boiwar.

D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

MANOJ INDUSTRIES, NAVI MUMBAI – 400 705	REPORT NO.	MI/PEL/2019/09/145
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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD)

Customer	M/s. Panam Engineers Ltd., Mumbai - India		
Inspecting Authority	M/s. Panam Engineers Ltd., Mumbai - India		
Customer / Project :	M/s. Krohne Engineering LLC. – Russia		
Product / Epmt Description	STAINLESS STEEL MONOFLANGE TYPE SINGLE BLOCK AND BLEED **MATERIAL – AISI 316, SIZE : 1/2" X 2500 # RTJ X 12MM OD X 1/4"NPTF VENT**	**Qty. :**	**14 Nos.**
Job Number.	M/s. Krohne Engineering LLC. – Russia, PO Number 2601/1-716 Dtd. 12/08/2018		
Drawing No.	MONOFLANGE TYPE SINGLE BLOCK AND BLEED Part Number : PSBB-NB-SS-01-15-2500-RTJ-M12-4NF-H		
Material of Construction:	Stainless Steel AISI 316		
Thickness :	Not Applicable		
Reference Standards / Documents :	ASME Section V Article 10, Edition 2010.		
Scope	Helium Leak Testing of MONOFLANGE TYPE SINGLE BLOCK AND BLEED, **SIZE : 1/2" X 2500 # RTJ X 12MM OD X 1/4"NPTF VENT.**		
Helium Leak Test Proc. No.	As per Standard Helium Leak Testing Procedure.		
Examination Stage	After Final Assembly and Pneumatic Testing.	**Helium Test Mode**	DETECTOR PROBE METHOD.
Acceptable Limit	1 X 10^{-4} std-cc/sec	**Date of Examination**	23-09-2019

HELIUM LEAK DETECTOR EQUIPMENT DETAILS :

Make	ALCATEL ADIXEN, FRANCE	**Model**	ASM 310
Helium Leak Detector Serial Number :	HLD1501032	**Helium Leak Detector Part Number :**	BSAA0000MM9A

HELIUM LEAK DETECTOR CALIBRATION DETAILS :

Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

CALIBRATION OF HELIUM LEAK DETECTOR	**LEAK RATE VALUE**	**UNIT**
Leak rate of calibrated Leak	1.3 x 10^{-9} at 21.8°C.	mbar ltr / sec
Calculated Leak rate arrived after considering above Depletion rate of 0.1% year	1.224 x 10^{-9}	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	1.318 x 10^{-9} at 36°C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak in Vacuum Condition	1.4 x 10^{-9} at 36°C	mbar ltr / sec
Machine sensitivity as recorded on HLT IN VACUUM MODE	5.0 x 10^{-12}	mbar ltr / sec

SYSTEM / SNIFFER PROBE CALIBRATION DETAILS :

Manufacturer	M/s. CINCINNATI TEST SYSTEMS,INC.	**Model Number :**	9GPHKF25
Calibrated Stad. Leak Sr. No.	-	**Calibration Certificate Number :**	G010622
Calibration Date :	28/07/2019	**Next Calibration Due Date :**	26/07/2020
Depletion Rate :	0.1% per Year	**Temp. Coefficient**	4.0% per Deg C.

SYSTEM CALIBRAION DETAILS :	**LEAK RATE VALUE**	**UNIT**
Leak rate of Sniffer Calibrated Leak @ 21.6 Deg C	3.5 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Calculated Leak Rate arrived after considering above Temp Coefficient of 0.1% per Deg C.	3.6 x 10^{-5} at 32 Deg C.	mbar ltr / sec
Uncertainty after age and temperature correction as per calibration certificate ± 10%	3.45 X 10^{-5} to 4.21 X 10^{-5} at 32 Deg C.	mbar ltr / sec
Leak rate displayed on Helium Leak Detector Sensing Calibrated Leak by HLD Sniffer Probe.	3.4 x 10^{-5} @ Helium Inlet Pressure of 50 psig	mbar ltr / sec
Response Time :	< 1 Minute.	

Note: Above noted Response time is derived after keeping Sniffer Probe Calibrated Leak with Value of 3.8 x 10-5 mbar-ltr/sec with Helium Reservoir (filled at 50 psig pressure) is kept in similar volume of Polythene bag to be used for HLD Exchanger Test for the test Hold time of 12 hrs similar to the U-Tube Heat Exchanger Helium Leak Detection Test Condition.

ACCESSORIES / EQUIPMENT DETAILS

Tracer Gas	HELIUM (99.995% Pure or 4.5 Grade Gas)	**Tracer Gas Concentration**	100% Helium.
Test Pressure	7 kg/cm^2	**Soaking Time**	Minimum 10 Minutes.
Helium Filling Date	23/09/2019	**Time & Atm. Room Temp**	11.30 PM & 36 Deg C
Helium Test Date	23/09/2019	**Time & Atm. Room Temp.**	14.30 PM & 36 Deg C.

..... Continuation Sheet

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SUBHASH BOIWAR

QC Dept.

TUV India

23/09/2019

Subhash Patel

MANOJ INDUSTRIES,
NAVI MUMBAI – 400 705

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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD) – CONTINUATION SHEET

TYPICAL SKETCH OF PANAM MONOFLANGE TYPE SINGLE BLOCK AND BLEED:

NOTE: PLASTIC HOOD WRAPED ON TEST LOCATION AND KEPT UPTO MIN. 10 MINUTES AFTER PRESSURING WITH HELIUM GAS.

Location Area.	AREAS UNDER INSPECTION	Initial Background Reading before start of Helium Leak Test (std-cc/sec)	Helium Leak Rate Reading observed during Leak Testing (std-cc/sec)	Observed Leak Rate (100% Helium Pressure)) (std-cc/sec)	Acceptable Helium Leak Rate (std-cc/sec)	RESULT
		A	B	(B-A)		
1	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31148	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
2	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31149	1.1×10^{-6}	1.3×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-4}	Acceptable
3	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31150	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
4	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31151	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
5	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31152	1.1×10^{-6}	1.3×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-4}	Acceptable
6	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31153	1.1×10^{-6}	1.4×10^{-6}	$0.3 \times 10^{-6} = 3.0 \times 10^{-7}$	1×10^{-4}	Acceptable
7	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31154	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
8	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31155	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
9	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31156	1.1×10^{-6}	1.3×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-4}	Acceptable
10	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31157	1.1×10^{-6}	1.5×10^{-6}	$0.4 \times 10^{-6} = 4.0 \times 10^{-7}$	1×10^{-4}	Acceptable
11	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31158	1.1×10^{-6}	1.4×10^{-6}	$0.3 \times 10^{-6} = 3.0 \times 10^{-7}$	1×10^{-4}	Acceptable
12	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31159	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable
13	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31160	1.1×10^{-6}	1.3×10^{-6}	$0.2 \times 10^{-6} = 2.0 \times 10^{-7}$	1×10^{-4}	Acceptable
14	Body, Bonnet, Stem and End Joints Etc. - SR. NO. 1909P31161	1.1×10^{-6}	1.2×10^{-6}	$0.1 \times 10^{-6} = 1.0 \times 10^{-7}$	1×10^{-4}	Acceptable

RESULT: - HELIUM LEAK TEST OF MONOFLANGE TYPE SINGLE BLOCK AND BLEED VALVE ARE WITHIN ACCEPTABLE LIMIT OF 1.0×10^{-4} ATM-CC/SEC.

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QC Dept.

TUV India

Subhash Boiwar

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HELIUM LEAK TEST REPORT (DETECTOR PROBE METHOD / SNIFFER METHOD) – CONTINUATION SHEET

LT PERFORMED BY (ASNT -LT- Level-2)	WITNESSED / REVIEWED BY	WITNESSED / APPROVED BY
MANOJ INDUSTRIES, NAVI MUMBAI	M/S. PANAM ENGINEERS LTD.PRANTIJ	M/S. TUV INDIA PVT.LTD , AHMEDABAD

Encl :

1. Calibration Certificate for Vacuum Type Helium Calibrated Leak.
2. Calibration Certificate for Sniffer Type Helium Calibrated Leak.
3. ASNT Level II Certificate of Mr. Subhash Boiwar.

D-17/5, Sahyadri CHS, Plot 50, Sector-8, Sanpada, Navi Mumbai – 400 705, Tel : 9820119880, E-mail : prasoma@yahoo.com

Lloyd's Register

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

This certificate is issued to:

PRODUCER	Panam Engineers Ltd.
PLACE OF PRODUCTION	Survey No. 192, Near Sujal Agro, NH-8, At & Post - Piludra, Taluka-Prantij, District - Sabarkantha, Gujarat – 383120, India
DESCRIPTION	Stainless steel double ferrule compression type tube fittings, inch and metric sizes
TYPE	PANAM Tube Fitting
APPLICATION	High pressure tube connections for use in marine, offshore and industrial piping systems with hydraulic system fluids, fuel oil, lubricating oil, fresh water, salt water, sanitary, gas, steam and condensate.
STANDARD	Lloyd's Register's Rules and Regulations for the Classification of Ships, Part 5, Chapter 12 – July 2017 ASTM F-1387–99(2012): Standard Specification for Performance of Piping and Tubing Mechanically Attached Fittings

Certificate No.	17/10025
Issue Date	27 November 2017
Expiry Date	26 November 2022
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N. Terashita
Yokohama Technical Support Office
Lloyd's Register Group Limited

Lloyd's Register Group Limited
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Lloyd's Register

RATINGS

Imperial Tubing:-

Tube O.D. (inch)	Nominal pressure ratings (psi)
1/8″	8,500 to 10,900
3/16″	5,400 to 10,200
1/4″	4,800 to 10,200
5/16″	4,000 to 8,000
3/8″	3,300 to 6,500
1/2″	2,400 to 6,200
5/8″	2,900 to 6,000
3/4″	2,400 to 5,800
7/8″	2,000 to 4,800
1″	2,400 to 4,700

Metric Tubing:-

Tube O.D(mm)	Nominal pressure ratings (psi)
3	10,800 to 15,300
4	7,900 to 14,400
6	5,000 to 12,700
8	4,700 to 9,300
10	3,700 to 7,300
12	3,000 to 11,100
16	2,500 to 6,800
18	2,800 to 6,700
20	2,500 to 6,000
22	2,300 to 5,400
25	2,000 to 5,200

Pressure-temperature ratings : see the producer's catalogue

OTHER CONDITIONS

1) The fittings are to be installed in accordance with the manufacturer's instructions.
2) Attention is drawn to Section 1.3.6 of IMO MSC/Circ.1321 – Guidelines for Measures to prevent Fires in Engine–Rooms and Cargo Pump-Rooms which describes that compression couplings require careful attention to tightening procedures and torques to avoid leaks or damage to the pipe when subjected to over-tightening and they should not be used in the fuel supply line of the (oil engine) injection pumps and spill system.

Certificate No. 17/10025

Issue Date 27 November 2017

Expiry Date 26 November 2022

Sheet 2 of 3

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"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register Group Limited of any modification or changes to the equipment in order to obtain a valid certificate."

The Design Appraisal Document No. and its supplementary Type Approval Terms and Conditions form part of this Certificate.

Certificate No.	17/10025
Issue Date	27 November 2017
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