

This is to Certify That the

Mechanically Attached Tube fittings (MAF)

Manufacturer By

PMT VAVES PVT. LTD.

Located at the Ahmedabad City Gujarat state, Country INDIA has been assessed with respect

To ASTM F1387

All the Testing has been carried out by GLIS Is mentioned below as per the clause 4.2.2 of ASTM F1387 spec and carrying of ALL SS316 Grade Materials.

Testing Specifications

Tube Outside Diameter by Wall Thickness Combinations		
Tube Size (inch)	Tube Rate Pressure (psig / bar)	Tube Hardness (HRB)
1/4 x 0.049	7,500 / 517	75 ~ 78
3/8 x 0.049	4,800 / 331	75 ~ 78
1/2 x 0.065	4,700 / 324	70 ~ 77
3/4 x 0.095	4,900 / 338	75 ~ 80
1 x 0.109	4,200 / 290	75 ~ 79
1 ¼ X 0.156	4,800 / 331	75 ~ 79
1 ½ X 0.188	4,800 / 331	75 ~ 79
2 X 0.188	3,500 / 245	75 ~ 79
Tests Based on ASTM F1387 – Mandatory Tests		
ASTM 1387 Section No.	Procedure	Comments
A2	Examination of Specimen	Done
A3	Pneumatic Proof Test	Done
A4	Hydrostatic Proof Test	Done
A5	Impulse Test	Done
A6	Flexure Fatigue Test	Done
A7	Tensile Test	Done
A8	Hydrostatic Burst Test	Done
A9	Repeated Assembly Test	Done
A10	Rotary Flex Test	Done
A11	Mercurous Nitrate Test	-
Tests Based on ASTM F1387 – Supplemental Tests		
ASTM 1387 Section No.	Procedure	Comments
S2	Thermal Cycling Test	Done
S3	Elevated Temperature Soak Test	-
S4	Stress-Corrosion Test	-
S5	Torsion Test	-
S6	Shock Test	-
S7	Fire Test	-
S8	Vibration Test	Done



(Handwritten signature and date)
 26/08/2021
 Gulf Lloyds Industrial Services (India) Pvt. Ltd.
 LLOYDS
 1947
 GLIS-IN-008

ASTM (American Society of Testing and Materials) F1387 establishes the performance characteristics required for mechanically attached fittings (MAF) for use in piping and tubing systems.

All tests witnessed by GLIS no failure observed.

We hereby confirm that the Above all tests have been performed as per the Procedure laid out in procedure Specification and were found to be satisfactory as per Standard requirements. Below the Procedures are in Details.

Pneumatic Proof Test Results – 3X F-1387 Requirements

All test data was measured and recorded with calibrated Gauges in accordance with ASTM F-1387 requirements.

Each spool containing specimens was submerged under water.

Each spool was pressurized to 100 psi using Nitrogen (N₂) for 5 minutes.

The first minute allowed for the dissipation of surface bubbles.

After 5 minutes observing no leakage, the pressure was gradually increased to 125% of the rated working pressure of the tube, and held for 5 minutes.

No leakage was observed.

After completing the first Pneumatic Proof, each specimen was disassembled and reassembled two times.

Steps 1 through 6 were repeated a second and third time with no leakage.

The Pneumatic Proof test was conducted three times. ASTM F-1387 only requires one run. Additionally, the test was conducted at 125% of the rated working pressure of the tube. ASTM F-1387 only requires 125% of the rated working pressure of the tube or 500 PSI – WHICHEVER IS LOWER.

Size / Test Pressure	Tube Rate Pressure	Pressure
1/4" T x .049"	7,500 PSI x 125%	9,375 PSI
3/8" T x .049"	4,800 PSI x 125%	6,000 PSI
1/2" T x .065"	4,700 PSI x 125%	5,875 PSI
3/4" T x .095"	4,900 PSI x 125%	6,125 PSI
1" T x .109"	4,200 PSI x 125%	5,250 PSI
1 1/4" X 0.156	4,800 x 125%	6000 PSI
1 1/2" X 0.188	4,800 x 125%	6000 PSI
2" X 0.188	3,500 x 125%	4375 PSI

Hydrostatic Proof Test Results – 3X F-1387 Requirements

All test data was measured and recorded with calibrated Gauges in accordance with ASTM F-1387 requirements.

Each spool containing specimens was mounted in the test chamber with one end free to move.

Each spool was filled with water.

Each spool was pressurized to 100 PSI for 5 minutes.

After observing no leakage, the pressure was gradually increased to 150% of the rated working pressure of the tube, and held for an additional 5 minutes.

After observing no leakage, the spool was depressurized and drained.

Each specimen was disassembled and reassembled two times.

Steps 1 through 6 were then repeated with no leakage.

Steps 1 through 4 were then repeated. The Hydrostatic Proof test was conducted three times. After the third run, no make and break was conducted as the spools were then subjected to the Hydrostatic Burst Test.

The original specimens were subjected to all three Pneumatic Proof Tests and all three Hydrostatic Proof Tests (including 10 repeat assemblies), concluding with the Hydrostatic Burst Test (destructive test). New specimens were introduced for each of the remaining test

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Size / Hydro Pressure	Tube Rate Pressure	Pressure
1/4" T x .049"	7,500 PSI x 150%	11,250 PSI
3/8" T x .049"	4,800 PSI x 150%	7,200 PSI
1/2" T x .065"	4,700 PSI x 150%	7,050 PSI
3/4" T x .095"	4,900 PSI x 150%	7,350 PSI
1" T x .109"	4,200 PSI x 150%	6,300 PSI
1 1/4" X 0.156	4,800 x 150%	7,200 PSI
1 1/2" X 0.188	4,800 x 150%	7,200 PSI
2" X 0.188	3,500 x 150%	5,250 PSI

Hydrostatic Burst Test Results

All test data was measured and recorded with calibrated Gauges in accordance with ASTM F-1387 requirements.

The spools, having completed the third Hydrostatic Proof, were immediately subjected to the Hydrostatic Burst.

The spool pressure was gradually increased from 150% of the rated working pressure of the tube to 4 times the rated working pressure of the tube and held for 1 minute.

After observing no leakage for 1 minute at 4 times the rated working pressure of the tube, the test pressure was gradually increased until the spool ruptured.

All ruptures took place in the tube sections.

All specimens held as promoted and expected to the rupture of the tube.

Tensile Pull Test Results

The significance of this test is to apply a tensile load at a controlled separation speed to establish how much load is needed to separate the test specimen.

The amount of tensile load applied depends upon the cross-section area and the yield strength of the tube.

Calculated tensile load = $(K_t) \times (A_p) \times (S_y)$

Where K_t = tensile constant of 1.0;

Where A_p = actual cross-section area of the tube, mm² (in.²) based on wall thickness;

Where S_y = minimum specified yield strength of the tube.

The specimens pass this test when the calculated tensile load is achieved without separation of the joint. Movement within the area of the joint is acceptable as long as

actual separation does not occur. This test is useful in determining the strength of the tube or MAF joint. Based upon the strength of the joint, the tube material and wall thickness can be tailored to withstand failure within the adverse environments present in fluid systems for which MAF is designed.

Rotary Flex Test Results

All test data was measured and recorded with calibrated gauges and properly located strain gauges in accordance with ASTM F-1387 requirements.

The test spool containing specimens filled with water.

A bending moment equivalent to a minimum of 35% of the ultimate tensile strength (of the tubing material) was introduced and locked into place.

Each spool was pressurized to 500 PSI.

The specimen was flexed in a rotary motion at a minimum of 1750 rpm for 1,000,000 cycles while maintaining the bending moment and 500 PSI pressure rating.

After 1,000,000 cycles were completed with no leakage, the specimens were then subjected to a Hydrostatic Proof test. With no leakage after completion of the Hydrostatic Proof Test, the specimens passed the Rotary Flex Test.

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Flex Fatigue Test Results

All test data was measured and recorded with calibrated gauges and properly located strain gauges in accordance with ASTM F-1387. Each spool containing specimens was filled with water.

Each spool was subjected to flexure while pressurized to the maximum rated working pressure of the tube.

The specimen was subjected to a bi-directional flexure in the same plane for 30,000 cycles to a distance range derived from the formula provided in ASTM F-1387 Section A6.3.5.

A complete cycle consisted of travel from neutral (zero strain) to the maximum positive strain position in one direction, to the maximum negative strain position in the opposite direction, and return to neutral.

At each 7,500 cycles, the spool was depressurized with the specimen being rested was disassembled and reassembled two times.

After 30,000 cycles were completed with no leakage, the specimens were then subjected to a Hydrostatic Proof test. With no leakage after completion of the Hydrostatic Proof Test, the specimens passed the Flexure Fatigue Test.

Vibration Test Results

All test data was measured and recorded with calibrated gauges and properly located strain gauges in accordance with ASTM F-1387 requirements.

The test spool containing specimens was filled with water.

The test fixture was equipped with supports, to be attached to the test specimen during testing. The supports were spaced in accordance with ASTM F-1387 requirements per OD size.

The test was conducted in each of the three principal directions (X, Y, and Z).

Each spool was pressurized to the maximum rated working pressure of the tube.

Perform the following tests: Exploratory Vibration test, Variable Frequency test, and Endurance test.

The specimens successfully passed the Vibration Test after meeting the test requirements and passing the subsequent Hydrostatic Proof Test. No leakage was observed.

The certificate is subject to terms and conditions. Any significant changes in design or construction may render this certificate invalid. All Product Liability rests with Manufacturer, in case of damages caused by defective or Non Conformity of products. This certificate issued on sole responsibility of manufacturer only. Gulf Lloyds does not accept any liabilities and claims rise due to this certificate.

For verification visit our registrar www.gulfloyds.info

Date of Issue: 26/08/2021
Date of Expiry: 25/08/2024

Issued at:
Ahmedabad



26.08.2021



K.R. Patel

Place

Date

Sr. Inspection Engineer

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