



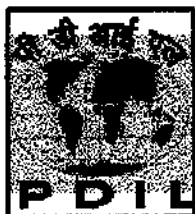
## TYPE TEST REPORT $\Delta$

### 1. Compression Tube Fittings (DFDC)

As per BS 4368 Part IV, Technical Specification & Approved Drawings of M/s Panam Engineers Pvt. Ltd for SS316 Compression Tube Fittings (DFDC)

For PANAM ENGINEERS PVT. LTD.





### ANNEXURE III

#### **SUBJECT: DETAILS OF PRESSURE GAUGES CALIBRATION STATUS**

Date : 01<sup>st</sup> to 14<sup>th</sup> March 2006 & Rev.1 dated April 15,2006



Sr. No.	Device Used	Gauge / Instrument ID	Device Range	Type of Check	Calibration Agency	Date of Calibration
1	Pressure Gauge	8K-2864	0-1060 kg/cm.sq	Hydraulic Pressure Test	Precision Industries	01.08.2005
2	Pressure Gauge	3G-4147	0-420 kg/cm.sq	Pressure Impulse & Cycling Test	Precision Industries	01.08.2005
3	Pressure Gauge	2E-3446	0-210 kg/cm.sq	Pneumatic Pressure Test	Precision Industries	01.08.2005
4	Pressure Gauge	2E-3432	0-210 kg/cm.sq	Pneumatic Pressure Test	Precision Industries	01.08.2005
5	Vaccum Gauge		0-720 mm of Hg	Vaccum Test	A lot Hi-tech Pvt Ltd	15-01-2006

#### **GENERAL REMARKS:**

1. No tightening of any nuts was done throughout the test.
2. All the test were carried by Panam Engineers Pvt. Ltd. & witnessed by PDIL.

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## ANNEXURE II

### SUBJECT: DESCRIPTION OF TEST LOOPS

Date : 01<sup>st</sup> to 14<sup>th</sup> March 2006 & Rev.1 dated April 15,2006  $\Delta$

Sr. No	Test Loop	Description (Size) – Qty.	Qty
<b>TUBE FITTINGS</b>			
1	½" OD	Male Connector (1/4" OD x ½" NPTM) + Tubing (1/4" OD x 0.035" WT) + Union (1/4" OD) + Tubing (1/4" OD x 0.035" WT) + Tee (1/4" OD) + Tubing (1/4" OD x 0.035" WT) + Female Connector (1/4" OD x ½" NPTF) + Male Connector (1/4" OD x ½" NPTM) + Tubing (1/4" OD x 0.035" WT) and End Plug (1/4" OD) in one Test loop.	2 Nos A,B
2	3/8" OD	Male Connector (3/8" OD x 3/8" NPTM) + Tubing (3/8" OD x 0.049" WT) + Union (3/8" OD) + Tee (3/8" OD) + Tubing (3/8" OD x 0.049" WT) + Female Connector (3/8" OD x 3/8" NPTF) + Male Connector (3/8" OD x 3/8" NPTM) + Tubing (3/8" OD x 0.049" WT) and End Plug (3/8" OD) in one Test loop.	2 Nos C,D
3	½" OD	Male Connector (1/2" OD x ½" NPTM) + Tubing (1/2" OD x 0.065" WT) + Union (1/2" OD) + Tubing (1/2" OD x 0.065" WT) + Tee (1/2" OD) + Female Connector (1/2" OD x ½" NPTF) + Male Connector (1/2" OD x ½" NPTM) + Tubing (1/2" OD x 0.065" WT) and End Plug (1/2" OD) in one Test loop.	2 Nos E,F

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**Readings :-**

Loops	B	D	F
Required Displacement	0.96	0.55	0.44
Actual Displacement	0.80	0.35	0.40

**Observation :-** After 2.1 Billion Vibration Cycles & 500700 Impulses Cycles, the displacement was within the permissible limits

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**For Loop of 3/8" marked 'D'**

$$\text{Displacement } \Delta = \frac{2 SL^2}{3 ED}$$

$\Delta$  = displacement

S = 0.25 of Tensile yield value of tube - Kg/mm<sup>2</sup>

$$\text{Tensile yield of Tubing} = 535.61 \text{ N/mm}^2 / 9.80 = 54.654 \text{ Kg/mm}^2 \quad \Delta$$

$$S = 0.25 \times 54.654 \text{ Kg/mm}^2$$

$$S = 13.66 \text{ Kg/mm}^2$$

E = Modulus of elasticity of tube material kN/mm<sup>2</sup>

$$E = 210 \text{ kN/mm}^2$$

$$E = 210 \times 10^3 \text{ N/mm}^2$$

$$E = 210 \times 10^3 / 9.8 \text{ Kg/mm}^2 \quad \Delta$$

L = Distance from coupling - 500 mm

D = Diameter of tube - 9.52 mm

$$\Delta = \frac{2 \times 13.66 \text{ Kg/mm}^2 \times (500 \text{ mm})^2}{3 \times (210 \times 10^3 / 9.8 \text{ Kg/mm}^2) \times 9.52 \text{ mm}}$$

$$\Delta = 11.17 \text{ mm}$$

$$\text{Required Displacement} = 5\% \text{ of } \Delta = 0.55 \text{ mm}$$

**For Loop of 1/2" marked 'F'**

$$\text{Displacement } \Delta = \frac{2 SL^2}{3 ED}$$

S = 0.25 of Tensile yield value of tube - Kg/mm<sup>2</sup>

$$\text{Tensile yield of Tubing} = 574.14 \text{ N/mm}^2 / 9.80 = 58.585 \text{ Kg/mm}^2 \quad \Delta$$

$$S = 0.25 \times 58.585 \text{ Kg/mm}^2$$

$$S = 14.64 \text{ Kg/mm}^2$$

E = Modulus of elasticity of tube material kN/mm<sup>2</sup>

$$E = 210 \text{ kN/mm}^2$$

$$E = 210 \times 10^3 \text{ N/mm}^2$$

$$E = 210 \times 10^3 / 9.8 \text{ Kg/mm}^2 \quad \Delta$$

L = Distance from coupling - 500 mm

D = Diameter of tube - 12.7 mm

$$\Delta = \frac{2 \times 14.64 \text{ Kg/mm}^2 \times (500 \text{ mm})^2}{3 \times (210 \times 10^3 / 9.8 \text{ Kg/mm}^2) \times 12.7 \text{ mm}}$$

$$\Delta = 8.96 \text{ mm}$$

$$\text{Required Displacement} = 5\% \text{ of } \Delta = 0.44 \text{ mm}$$

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## 7) Hydraulic Impulse & Vibration Test :-

**Procedure :-** Three loops marked B, D & F were used for this test.  
 Mineral Oil was used as testing fluid. The test pressure was 4000 PSI.  
 Impulse Cycle / Min :- 30 – 35 cycles / min  
 Motor Speed :- 1440 RPM  
 Vibration Amplitude :- 5mm  
 No of Vibration / Hr :- 60 x 1440 = 86400 cycles

### Readings :-

Date	03/03	04/03	05/03	06/03	07/03	08/03	09/03	10/03	11/03	12/03	13/03	14/03
Time	10:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	09:00 AM	04:00 PM
Meter Reading	0	46920	95880	144840	193690	242250	290900	339650	388560	437460	486420	500700
Stop Time	5.00 P.M.											

### Calculation:-

Total Impulse Cycle 500700  
 Total No. of Hrs :- 246 Hrs  
 Vibration Cycles :- 246 x 86400 = 21254400 Cycles

### For Loop of 1/4" Marked 'B'

$$\text{Displacement } \Delta = \frac{2SL^2}{3ED}$$

$\Delta$  = displacement

S = 0.25 of Tensile yield value of tube - Kg/mm<sup>2</sup>

$$\text{Tensile Yield of Tubing} = 616 \text{ N/mm}^2 / 9.8 = 62.857 \text{ Kg/mm}^2 \quad \Delta$$

$$S = 0.25 \times 62.857 \text{ Kg/mm}^2$$

$$S = 15.71 \text{ Kg/mm}^2$$

E = Modulus of elasticity of tube material kN/mm<sup>2</sup>

$$E = 210 \text{ kN/mm}^2$$

$$E = 210 \times 10^3 \text{ N/mm}^2$$

$$E = 210 \times 10^3 / 9.8 \text{ Kg/mm}^2 \quad \Delta$$

L = Distance from coupling – 500 mm

D = Diameter of tube – 6.35 mm

$$\Delta = \frac{2 \times 15.71 \text{ Kg/mm}^2 \times (500 \text{ mm})^2}{3 \times (210 \times 10^3 / 9.8 \text{ Kg/mm}^2) \times 6.35 \text{ mm}}$$

$$\Delta = 19.23 \text{ mm}$$

Required Displacement = 5% of  $\Delta = 0.96 \text{ mm}$

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## ANNEXURE IA

### **SUBJECT: TYPE TEST ON SS 316 COMPRESSION TUBE FITTINGS (DFDC)**

Date : 01<sup>st</sup> to 14<sup>th</sup> March 2006 & Rev.1 dated April 15,2006



#### **TEST: OBSERVATION / RESULTS**

**REFERENCE TEST LOOPS: 6 TEST LOOPS AS PER APPROVED DRAWING AND LISTED IN ANNEXURE II**

#### **1) Visual & Dimensional Inspection:-**

All the loops were checked for their overall finish, workmanship, burrs, & dimensionally checked. Threads were checked using calibrated Thread Gauges, Go-No-Go gauges. All the fittings checked were found to be in accordance to the approved drawings.

#### **2) Pneumatic Test :-**

**Procedure :-** All six loops were subjected to Pneumatic Test. Nitrogen Gas was used as Testing Fluid. The test pressure was 3000 PSI & withhold timing was 15 minutes. Soap Water was used as indicating solution.

**Observation :-** No Leakage was found.

#### **3) Hydraulic Proof pressure Test :-**

**Procedure :-** All the six loops after pneumatic test were subjected to hydraulic proof pressure test. Mineral oil was used as testing fluid. The test pressure was 4500 PSI & withhold timing was 15 minutes.

**Observation :-** No Leakage, Burst or Damage was found.

#### **4) Hydraulic Burst pressure Test :-**

**Procedure :-** Three loops marked A,C & E were used for this test. Mineral oil was used as testing fluid. The test pressure was 12000 PSI & withhold timing was 15 minutes.

**Observation :-** No Leakage, Burst or Damage was found.

#### **5) Minimum Static Gas Pressure (Vaccum )Test :-**

**Procedure :-** Three loops marked B,D & F are individually provided with a negative pressure of 700mbar from the vaccum pump and then isolated and maintained test pressure for 15 minutes.

**Observation :-** The total exhausted volume was found not exceeding that of the total assembly of more than 20%.

#### **6) Maximum Static Gas Pressure Test :-**

**Procedure :-** Three loops marked B,D & F were used for this test. Nitrogen Gas was used as testing fluid. The test pressure was 1000 PSI & withhold timing was 15 minutes.

**Observation :-** No Leakage, Burst or Damage was found.

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For PDIL





## ANNEXURE A

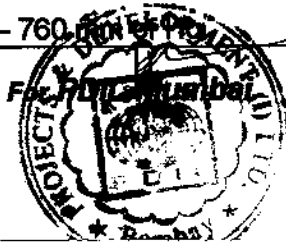
**SUBJECT: TYPE TEST ON SS COMPRESSION TUBE FITTINGS (DFDC),**

Date: 01<sup>st</sup> to 14<sup>th</sup> March 2006 & Rev.1 dated April 15,2006



1	Scope	"Technical Specification of Panam Engineers Pvt Ltd. For SS-316 Compression Tube Fitting (DFDC)" & Approved Drawings 1) Test - Loop -04 dated 05.10.2005. 2) Test - Loop - 06 dated 05.10.2005. 3) Test - loop - 08 dated 05.10.2005
2	Type Test Conducted By	<b>M/s. PANAM ENGINEERS PVT LTD.</b> Office :- 203 Jaisingh Business Center, Sahar Road, Andheri East Mumbai 400 099 Factory :- R-639, TTC Industrial Area MIDC Rabale Navi Mumbai 400 705
3	Type Test Witnessed By	<b>Mr. PAWAN KUMAR, D.Y.C.E. (I)</b> PROJECT & DEVELOPMENT OF INDIA LTD - MUMBAI.
4	Final Test Conducted On	14 <sup>th</sup> March 2006
5	Resources Used For The Test's	Qty./Make as listed below
a	Pressure Gauges	As per Annexure III.
B	Test Fluid	Mineral Oil - ISO VG 32 & Nitrogen Gas
c	Test Temperature	Ambient conditions of 35°C + /-5°C
d	Test Specification	1. "Technical Specification of M/s. <b>PANAM ENGINEERS PVT. LTD</b> for SS-316 Compression Tube Fittings (DFDC)" 2. Approved drawing no: Dtd: 17.10.2005 3. <b>BS 4368 part IV</b> - Test Standard for Compression Couplings for tubes.
e	Details Of Test Equipment Used	1. Hydrostatic Test Pump (Range,0-15000psi) Make: Mercury Pneumatics 2. Reciprocating Pump For Pressure Impulse. Make: Mercury Pneumatics Pvt. Ltd. 3. Vibration Test Bench Make: Designed & assembled by <b>PANAM ENGINEERS PVT. LTD</b> 4. Pneumatic Test Cylinder (Range:0 to 160 kg/cm <sup>2</sup> ) Make: Nitrogen Cylinder. 5. Temperature Oven (Range: Ambient to 350°C) Make: Designed & assembled by <b>PANAM ENGINEERS PVT. LTD</b> 6. Vaccum pump - Range 0 - 760 mm Hg

For **PANAM ENGINEERS PVT. LTD.**





Type test has been conducted on SS compression Tube fittings, in full accordance with Technical Specification of M/s Panam Engineers Pvt Ltd, BS 4368 Part IV, and approved Drawing Dt 17-10-2005 as per enclosed Annexures.

1. Annexure 1A (Type Test on SS Compression Tube Fittings (DFDC))

For PANAM ENGINEERS PVT. LTD.

