STYRENE PARK OFFSITE

Document Title:

Hydrostatic Test Procedure

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Rev.	**Issued Date**	**DESCRIPTION**	**PREPARED**	**CHECKED**	**APPROVED**

REVISION RECORD SHEET

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1. Scope

This procedure describes the way Farnikan Co. carries out Hydrostatic test of Heat Exchanger in according to applicable code and specifications. The Hydrostatic Test is carried out to verify tightness and stability of equipment against internal pressure.

2. Reference Code and Standards

Test shall be performed in accordance to ASME VIII Div.1

3. Description

3.1. Test Equipment

The test equipment comprises a manually operated test pump, a water tank & two pressure gauges. For the respective measuring range and suitable connection material (flanges, blind flanges, Vent and drain connections, covers, bolts, gaskets) to comply with test Requirements shall be supplied. The calibration / test certificate form for relevant pressure gauges shall be attached to test report & the calibration expiry date must be valid.

3.2. Test Fluid

Test Fluid shall be fresh and clean and freshwater for the hydrostatic test. When carbon and low alloy steel materials are exposed to potable water, chloride content in the water shall be less than 50 ppm. In the case of stainless steel equipment or parts, the water shall have a maximum chloride content of 30 ppm @ PH 8. Hydrostatic test shall be done by water and at the temperature of at least 16°C above MDMT but not more than 48°C.

3.3. Safety Instruction

All flange connections shall be closed and relevant bolts to be tight before pressurizing. Repairs and rework are not allowed on pressurized equipment. If repairs are required, the test must be stopped & started again after repair work is completed.

3.4. Safety Zones

In case of test pressure less than 100 barg and test temperature greater than 48°C, staying in direct vicinity (2m zone) has to be avoided and for test pressure greater than 100 bar and less or equal to 350 bar, and test temperature greater than 48°C, the pressure test shall be carried out at a remote part of workshop, or the near vicinity (5 m zone) has to be barricaded by plastic strips and marked by information plates as danger zone and prohibited area.

3.5. Preparation for Pressure Test

Prior to starting the pressure test, the inner and outer and welded joint surface has to be cleaned from dust, rolling residues, dirt, oils, paint and other foreign material.

The pressure gauges must be installed that way the operating personnel can inspect it during pressurizing. Each equipment shall be equipped with min. 2 Numerical calibrated gauges with their valid calibration test certificate is available. (i.e. one pair on the highest point and another pair on the lowest point.)

3.6. Consider the following Notes

-Dial indicating pressure gages used in testing shall be graduated over a range of about the intended maximum test pressure, but in no case shall the range be less than 1 ½ nor more than 4 times that pressure.

-The test pressure shall be read at the top of the equipment, erected as for operation.

-Vertical equipment shall be hydrostatically tested at horizontal position.

-Equipment has to be properly vented at the highest point.

-The gasket shall be of the same type and material as the service gasket for not removable connection.

- Service bolting shall be used for pressure testing. Bolt and nuts shall be thoroughly inspected after testing and replaced whenever damaged. This inspection shall be witnessed by the inspection agency.

3.7. Testing Process

A fully detailed testing procedure shall be submitted to the Purchaser for approval prior to fabrication. The equipment shall be tested in the presence of the Inspection Agency, before being painted. Prior to testing, the equipment shall be thoroughly cleaned and free from dirt, debris, loose scale and slag, pieces of metal, weld spatter, oil and grease, etc.

- Tightness of welded attachments with telltale hole shall preliminarily be air and soapsuds tested.

- Service bolting shall be used for pressure testing; bolts and nuts shall be thoroughly inspected after testing and replaced whenever damaged. This inspection shall be witnessed by the Inspection Agency.

- Gaskets shall be the same as for the service type, dry or coated with graphite. Use of compounds, glue, lead, is not permitted. Rings gaskets shall be replaced after testing if damaged. All other gaskets shall be replaced with new ones after testing.

• All air shall be vented from the equipment before the pressure is applied.

• Test pressure shall be held at least one hour during visual examination of the equipment by the Inspection Agency.

All items should be tested according to Pressure Test Curve (Fig.1) and related pressure data(Table.1).

-The equipment shall be stand on suitable condition pressurized slowly and gradually to the half of the design pressure according to pressure schedule table. The holding time for a visual check at this stage is minimum 15min.

- The pressure shall be increased to design pressure and inspection shall be accomplished. The holding time for this stage is minimum 15 min.

- The pressure shall be increased to test pressure and a complete visual check for all connections (such as flanges, blind flanges, vent and drain connections, covers, bolts, gaskets) and weld joints shall be done for determining leakages or deformation. Hydrostatic test pressure shall normally be maintained for 1 hour. Then test pressure shall be decreased slowly and gradually to the 2/3 test pressure and inspection shall be accomplished. The holding time for this stage is minimum 15 min.

- After hydro testing the vent valve shall be gradually opened. After ensuring this valve is fully opened, the drain valve shall be slowly opened. At this stage care must be taken to avoid any vacuum in Equipment due to waters draining.

- For protection and preservation of corrosion after hydro testing, equipment must be fully drained.

- Both heat exchangers have been pressure tested .

4.Acceptance Criteria

-During the holding time, the test pressure shall not fall below the required value.

-A deformation of the pressure retaining parts into the plastic region (permanent deformation) is not allowed.

-If leakages are found at the weld joints, repairs shall be performed according to code and spec. All repair works shall be subject to approval by TPI and inspection shall be repaired and re-hydrostatic tested.

5. Pneumatic Test

Pneumatic test for reinforcing pads shall be done in following conditions:

- Dial indicating pressure gages used in testing shall be graduated 5 Bar.
- The calibration / test certificate form for relevant pressure gauges shall be attached to test report.
- Test pressure: 2 barg
- Test media: Compressed air
- Holding Time: 5 Min
- All reinforcing pads for nozzles (welds of each pad or segment) shall be air tested at 2barg. Afterwards, the pressure must be reduced to 0.5 barg and all welds must be tested for leaks with

soap solution. Vent holes will be left open after testing. After hydro-test, the holes must be filled with stiff grease and plugged.

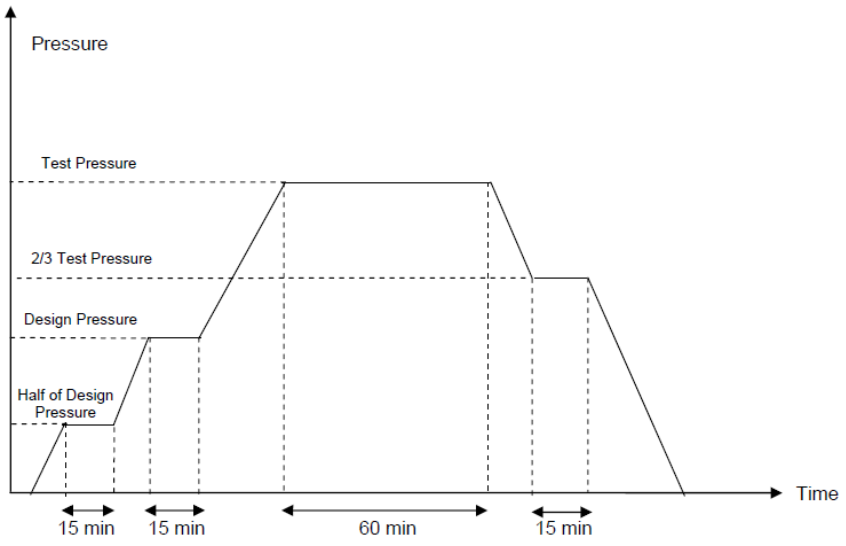
6. Documentation

After satisfactory performance of pressure test, the hydrostatic test report shall be approved and signed by relevant inspectors (according to inspection test plan).

Table 1. Pressure Schedule

ITEM NO.	DESIGN PRESSURE (barg)		TEST PRESSURE (barg)	
	Shell Side	Tube Side	Shell Side	Tube Side
EVAPORATOR	22	6.8	28.6	8.84

Fig. 1: Hydrostatic Test Curve



NOTE: Increasing/decreasing Pressure rating should not be greater than 5 bar/min.

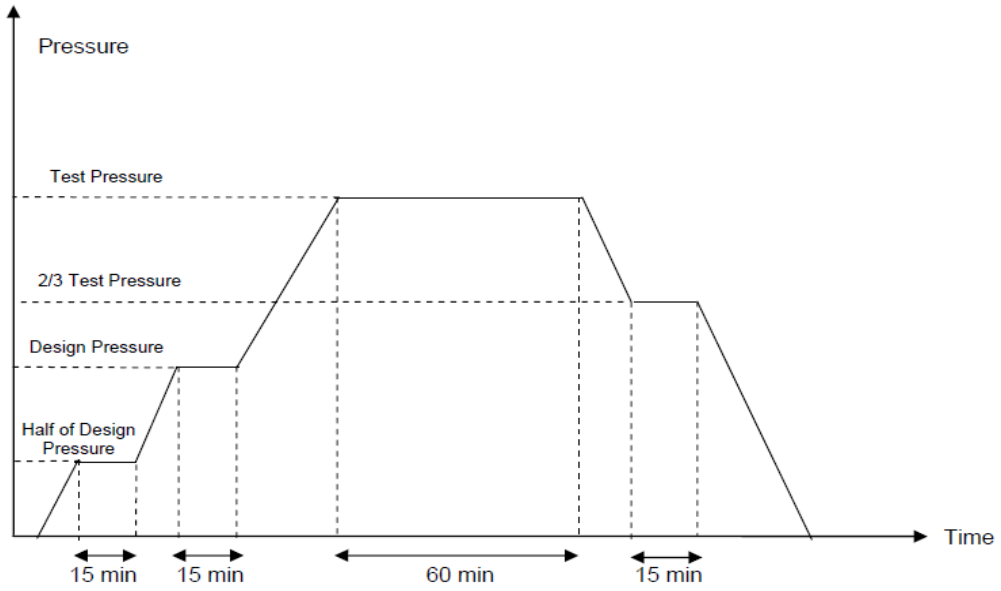
	HYDROSTATIC TEST REPORT		REPORT NO.:
			DATE:
			PAGE OF

ITEM NO.:	**REFERENCE CODE:**
TEST PRESSURE :	
DESIGN PRESSURE:	
PROCEDURE APPLIED :	
TEST FLUID **Tap Water**	

HOLDING TIME	**D. P.:**	**T.P.:**	**FLUID TEMP.:**
METAL SURFACE TEMP (°C):		**EXTERNAL TEMP.(°C):**	**AMBIENT TEMP.(°C):**
GAUGES EMPLOYED		**GAUGE No1**	**GAUGE No2**
CALIBRATION FORM NO.:			**TERMOMETER:**

TEST RESULT : ACCEPTED ☐ **NOT ACCEPTED** ☐

REMARK :



VENDOR	TPI	OWNER
NAME	**NAME**	**NAME**
DATE	**DATE**	**DATE**
SIGN.	**SIGN.**	**SIGN.**