

PFI Standard ES-4
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HYDROSTATIC TESTING OF FABRICATED PIPING

Prepared by
Pipe Fabrication Institute Engineering Committee



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HYDROSTATIC TESTING OF FABRICATED PIPING

1.0 Scope

- 1.1 To establish a standard for hydrostatic of fabricated piping.

2.0 Time of Tests

- 2.1 Hydrostatic testing of fabricated piping assemblies is usually accomplished after installation when the completed system is tested. Testing of sub-assemblies in the fabricator's shop may be necessary when the completed system is designed and/or supported so that it cannot be filled with water or when the system cannot be readily dried and traces of the test medium cannot be tolerated in the system. In any case, piping assemblies are hydrostatically tested in the shop only when so specified in the contract documents.

3.0 Preparation for Testing

- 3.1 All joints, including welds, shall be left uninsulated and exposed for examination during the test.
- 3.2 All openings should be sealed using plugs, blind flanges, weld caps, or other suitable material which can be readily and completely removed after completion of the test.
- 3.3 Means shall be provided to isolate the assembly being tested from the fill piping and pump by using a valve, suitable for the test pressure, and located as close to the assembly as possible.

4.0 Testing Procedure

- 4.1 Assemblies shall be purged of air pockets while being filled.
- 4.2 Water, at the temperature and chemical content of the available source, shall normally be used for the hydrostatic test fluid. Any special requirements as to chemical content of the water, the use of other test mediums and/or temperature shall be so specified in the contract documents.
- 4.3 The test equipment shall be examined before pressure is applied to ensure that it is tight and that

all low-pressure filling lines and other appurtenances, that should not be subjected to the test pressures, have been disconnected or isolated by valves or other suitable means.

- 4.4 Following the application of the test pressure, examination for leakage shall be made of all joints and connections.

5.0 Test Pressure Requirements

- 5.1 The assembly shall be subjected to a hydrostatic test pressure not less than 1.5 times the design pressure or as specified by the applicable code.
- 5.2 The hydrostatic test pressure shall not exceed the maximum allowable test pressure of any non-isolated component in the assembly.
- 5.3 The hydrostatic test pressure shall be maintained for a minimum total time of ten minutes or as specified.

6.0 Pressure Test Gages

- 6.1 Pressure test gages used in pressure testing shall be indicating pressure gages and shall be connected directly, where possible, to the component.
- 6.2 Pressure gages used in testing shall preferably have dials graduated over a range of about double the intended maximum test pressure, but in no case shall the range be less than 1-1/2 nor more than 4 times the test pressure.
- 6.3 Pressure gages shall be calibrated prior to use.

7.0 Acceptance Standards

- 7.1 If no indication of leakage is observed, the assembly is considered acceptable.
- 7.2 If any leakage is observed, the location shall be marked. The assembly shall then be depressurized and the leaks repaired. After repairs have been made, the assembly shall be retested.

8.0 Records

- 8.1 A record of each hydrostatic test shall be made.
These records shall include:
- (A) Date of Test
 - (B) Identification of Fabricated Piping Assemblies Tested
 - (C) Test Medium Used
 - (D) Test Pressure and Holding Time
 - (E) Signatures of the Company's Inspector and the Authorized Inspector and Customer's Inspector when applicable.
- 8.2 These records need not be retained after completion of the project unless required by Code or contract.

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