

SECTION 230592 PRESSURE TESTING OF PIPING ASSEMBLIES

PART 1 – GENERAL

1.1. SCOPE OF WORK

- A. This specification describes the pressure testing requirements of piping assemblies and associated components.

1.2. REFERENCES

- A. ASME B31.9 Latest Edition.
- B. ASME Section I Latest Edition.

1.3. RELATED WORK

- A. Piping and Valve Materials Specification.
- B. Piping Materials Installation Specification.
- C. Pipe Hangers, Supports, Guides and Anchors Specification.
- D. Protective Painting Specification.
- E. Protective Coating Specification.
- F. Piping Insulation Specification.

PART 2 - PRODUCTS

- NOT APPLICABLE -

PART 3- EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Subassemblies: When conducted in accordance with the requirements of this specification, the pressure testing of piping systems to ensure leak tightness shall be acceptable for the determination of any leaks in piping subassemblies.
- B. Temperature of Test Medium: The temperature of the test medium shall be that of the available source unless otherwise specified by the Engineer. The test pressure shall not be applied until the system and the pressurizing medium are approximately at the same temperature. When conducting pressure tests at low metal temperatures, the possibility of brittle fracture shall be considered.

- C. Personnel Protection: Suitable precautions in the event of piping system rupture shall be taken to eliminate hazards to personnel in the proximity of lines being tested.
- D. Maximum Stress During Test: At no time during the pressure test shall any part of the piping system be subjected to a stress greater than that permitted.
- E. Testing Schedule: Pressure testing shall be performed following the completion of post-weld heat treatment, nondestructive examinations, and all other fabrication, assembly and erection activities required to provide the system or portions thereof subjected to the pressure test with pressure retaining capability.

3.2 PREPARATION FOR TESTING

- A. Exposure of Joints: All joints including welds not previously pressure tested shall be left uninsulated and exposed for examination during the test. By prior agreement, the complete system or portions thereof subject to test may be insulated prior to the test period provided an extended holding time pressurization to the system is performed to check for possible leakage through the insulation barrier.
- B. Addition of Temporary Supports: Piping systems designed for vapor or gas shall be provided with additional temporary supports if necessary to support the weight of the test liquid. Such supports shall meet the requirements for testing and system cleanup procedures.
- C. Restraint or Isolation of Expansion Joints: Expansion joints shall be provided with temporary restraint if required for the additional pressure load under test, or they shall be isolated during the system test.
- D. Isolation of Equipment and Piping Not Subjected to Pressure Test: Equipment that is not to be subjected to the pressure test shall be either disconnected from the system or isolated by a blank or similar means. Valves may be used for this purpose provided that valve closure is suitable for the proposed test pressure. The Subcontractor shall be aware of the limitations of pressure and temperature for each valve subject to test conditions. Isolated equipment and piping must be vented.
- E. Treatment of Flanged Joints Containing Blanks: Flanged joints at which blanks are inserted to blank off other equipment during the test need not be tested after removal of the blank provided the requirements of Section 4.7.1 are subsequently performed.
- F. Precautions Against Test Medium Expansion: If a pressure test is to be maintained for a period of time during which the test medium in the system is subject to thermal expansion, precautions shall be taken to avoid excessive pressure. A pressure relief device set at 1-1/3 times the test pressure is recommended during the pressure test.

3.3 SYSTEMS TO BE TESTED

- A. The following piping systems shall be tested:
 - 1. Hot Water - Hydrostatic Testing

3.4 REQUIREMENTS FOR SPECIFIC PIPING SYSTEMS

- A. All piping defined in section 3.03 of this specification shall be hydrostatically tested in accordance with Section 3.05. Lines open to the atmosphere, such as vents or drains downstream of the last shutoff valve, need not be tested.

3.5 HYDROSTATIC TESTING

- A. **Material:** When permitted by the Material Specification, a system hydrostatic test may be performed in lieu of the hydrostatic test required by the material specifications for material used in the piping subassembly or system provided the minimum test pressure required for the piping system is met.
- B. **Provision of Air Vents at High Points:** Vents shall be provided at all high points of the piping system in the position in which the test is to be conducted to purge air pockets while the component or system is filling. Venting during the filling of the system may be provided by the loosening of flanges having a minimum of four bolts or by the use of equipment vents.
- C. **Test Medium:** Water shall normally be used as the test medium unless otherwise specified by the Engineer. Test water shall be clean and shall be of such quality as to minimize corrosion of the materials in the piping system.
- D. **Check of Test Equipment Before Applying Pressure:** The test equipment shall be examined before pressure is applied to ensure that it is tightly connected. All low-pressure filling lines and all other items not subject to the test pressure shall be disconnected or isolated by valves or other suitable means.
- E. **Required Hydrostatic Test Pressure:** The hydrostatic test pressure at any point in the piping system shall not be less than 1.5 times the design pressure but shall not exceed the maximum allowable test pressure of any non-isolated components, such as vessels, pumps, or valves. The pressure shall be continuously maintained for a minimum time of 10 minutes and may then be reduced to the design pressure and held for such time as may be necessary to conduct the examinations for leakage. Examinations for leakage shall be made of all joints and connections. The piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of weeping or leaking.

3.6 INITIAL SERVICE TESTING

- A. When specified by the Engineer, an initial service test and examination is acceptable when other types of tests are not practical or when leak tightness is demonstrable due to the nature of the service. One example is piping where shut-off valves are not available for isolating a line and where temporary closures are impractical. Others may be systems where during the course of checking out of pumps, compressors, or other equipment, ample opportunity is afforded for examination for leakage prior to full scale operation. An initial service test is not applicable to boiler external piping.
- B. When performing an initial service test, the piping system shall be gradually brought up to normal operating pressure and continuously held for a minimum time of 10 min.

Examination for leakage shall be made of all joints and connections. The piping system exclusive of possible localized instances at pump or valve packing shall show no visual evidence of weeping or leaking.

END OF SECTION 230592