# 2015 Consultant’s Handbook
## Division 23 HVAC
### 2113 PIPING METHODS AND MATERIALS

## 1 Pipe pressure testing table

<table>
<thead>
<tr>
<th>Type of Pipe</th>
<th>Pressure Requirement</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>LP steam and condensate</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>HP steam and condensate</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Heating water</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Condenser water</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Chilled water</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Interior domestic water</td>
<td>125 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Drain, waste, and storm drain</td>
<td>standing water 10 feet of head</td>
<td>1 Hour</td>
</tr>
<tr>
<td>Sanitary and storm sewers</td>
<td>standing water, 10 feet of head</td>
<td>1 Hour</td>
</tr>
<tr>
<td>Fire lines</td>
<td>200 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Natural gas</td>
<td>90 psig air</td>
<td>2 Hours</td>
</tr>
<tr>
<td>Compressed air</td>
<td>150 psig air</td>
<td>2 Hours</td>
</tr>
<tr>
<td>Vacuum</td>
<td>24 in. Hg</td>
<td>2 Hours</td>
</tr>
<tr>
<td>Medical gas</td>
<td>150 psig hydrostatic</td>
<td>2 Hours</td>
</tr>
<tr>
<td>Deionized water</td>
<td>100 psig hydrostatic</td>
<td>6 Hours</td>
</tr>
<tr>
<td>Refrigerant - High side</td>
<td>275 psig dry nitrogen</td>
<td>24 Hours</td>
</tr>
<tr>
<td>Refrigerant - Low side</td>
<td>150 psig dry nitrogen</td>
<td>24 Hours</td>
</tr>
</tbody>
</table>

## 2 Testing Procedure

2.1 All tests are to be held for the minimum time with no loss of pressure.

2.2 All gravity tests are to be held long enough to visually inspect each joint with no visible loss of water for 15 minutes.

2.3 Any visible leakage or measured pressure drop is a cause for test failure. Additional tests will be required after corrective measures have been taken until satisfactory results are obtained.

## 3 Testing Records

3.1 Specify a signed and dated affidavit of testing to be provided to the owner’s representative within 72 hours of completion of testing.

3.2 Each affidavit should contain, as a minimum:
   - the date of the test
   - system or subsystem tested
   - test medium and pressure
   - duration of test
   - test results
   - name and signature of individual performing test
   - name and signature of witness to the test
   - whether the portion of pipe tested meets state and local regulations and Purdue requirements for leak testing

3.3 Copies of the affidavits are to be included in the Operation and Maintenance Manuals.

## 4 Cleaning of Steam Piping

4.1 Specify that for the first three (3) days of operation, condensate is to be discharged and not returned to the campus system.

4.1.1 Exceptions should be at the discretion of the owner’s representative.

## 5 Cleaning of Chilled Water Piping

5.1 The entire system is to be hydraulically flushed with potable water through a backflow prevention device to remove construction debris.

5.2 All construction debris is to be disposed of in an appropriate manner as approved by the owner’s representative.

5.3 Scale and chemical contaminants is to be collected in a suitable container for disposal as instructed by the owner’s representative.

5.4 Remove, clean, and replace all strainers in the system.

5.5 Add de-greasing / de-scaling / de-rusting chemical specifically designed for compatibility with campus chilled water to the system, such as Grace Dearborn Ferrosol 345.
6 Welding and Soldering

6.1 Welders Testing and Certification

6.1.1 All pipe fitters, plumbers, or other craftsmen must pass an ASME or Pipe Welding Bureau welding test and present proof of current ASME certification before doing any welding on this job.

6.1.2 The owner’s representative shall approve all welders.

6.1.3 Welders should also be required to present a Continuity Record the shows continuity in each welding process from the time of the original test to the current date at a six month interval.

6.2 All pipe fitters and plumbers must pass a soldering test before doing any soldering for this job.

6.3 Approval Period

6.3.1 Solderers shall be approved for a period not exceeding five years. After five years, or sooner, if soldering appears to be below standards, the welder/solderer will be required to retake the test.

6.3.2 If the ASME certification is used for approval, then a current certification must be presented for each job.

6.4 Identification Code

6.4.1 When a welder or solderer has been approved, he will be given an identification code number or letter.

6.3.2 For welds, this identification code must be stamped on all work welded by this welder.

6.3.3 1/4" stamp dies must be used at each weld.

6.3.4 The markings are to be clear and deep in the pipe so that the welder/solderer can always be identified.

6.3.5 For solder joints, the identification number shall be written on the pipe surface with permanent marker.

6.4 Improperly Identified Connections

6.4.1 Any weld not properly identified with a die stamped identification code number shall be removed and remade.

6.5 Testing and Replacing Connections

6.5.1 When directed by the owner's representative the contractor will cut out sections of piping containing welds or solders for inspection and testing purposes. If a connection does not pass the Owner's approved standards, the Contractor will be required to replace the test section of piping at no additional cost to the Owner.

6.5.2 When a connection is found to be acceptable and meets the owner's approved standards, the owner will reimburse the Contractor for the replacement costs, and the Contractor will replace the test section of piping as directed by the owner's representative. All time and material cost slips must be signed by the owner's representative.