



## **Design Guidelines for Facilities Construction:**

### **DESIGN GUIDELINE DG22-08 Commissioning of Plumbing**

#### **Part 1 - GENERAL**

##### 1.1 SUMMARY

- A. Section includes commissioning process requirements for plumbing systems, assemblies, and equipment.
- B. Related Sections:
  - 1. Division 01 Section “General Commissioning Requirements” for general commissioning process requirements.
  - 2. Division 21 Section “Commissioning of Fire Suppression System” for commissioning process activities for Fire Suppression systems, assemblies, equipment, and components.
  - 3. Division 23 Section “Commissioning of HVAC” for commissioning process activities for HVAC&R systems, assemblies, equipment, and components.
  - 4. Division 26 Section “Commissioning of Electrical” for commissioning process activities for Electrical systems, assemblies, equipment, and components.
  - 5. Division 28 Section “Commissioning of Fire Alarm” for commissioning process activities for Fire Alarm systems, assemblies, equipment, and components.

##### 1.2 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean “as-built” systems, subsystems, equipment, and components.

##### 1.3 CONTRACTOR’S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA as defined in the Commissioning Plan.
- B. Complete project-specific construction checklists and commissioning process test procedures for actual plumbing systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- C. Attend construction phase commissioning coordination meeting.
- D. Participate in plumbing systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- E. Provide information requested by the CxA for final commissioning documentation.
- F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.
- G. Provide training to Owner's personnel on system operations, preventative maintenance, sequence of operations, and general function on systems.

#### 1.4 CxA's RESPONSIBILITIES

- A. Prepare project-specific construction checklists and commissioning process test procedures for actual plumbing systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- C. Verifying testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.

#### 1.5 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
  - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
  - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
  - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for plumbing systems, assemblies, equipment, and components to be verified and tested.
  - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
  - 5. Certificate of readiness certifying that plumbing systems, subsystems, equipment, and associated controls are ready for testing.
  - 6. Test and inspection reports and certificates.
  - 7. Corrective action documents.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

## **Part 2 – PRODUCTS (Not Used)**

## **Part 3 - EXECUTION**

### **3.1 TESTING PREPARATION**

- A. Certify that plumbing systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.
- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- D. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

### **3.2 TESTING VERIFICATION**

- A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.
- B. Notify the CxA at least 10 days in advance of testing Work, and provide access for the CxA to witness testing Work.
- C. Provide technicians, instrumentation, and tools to verify testing of plumbing systems at the direction of the CxA.

### **3.3 GENERAL TESTING REQUIREMENTS**

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the plumbing installer shall prepare detailed testing plans, procedures, and checklists for plumbing systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.

- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the plumbing system, document the deficiency and report it to the Construction Manager, CxA, and Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

#### 3.4 PLUMBING SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Domestic Water Heater Testing and Acceptance Procedures: Testing requirements are specified in Division 22 water heater Sections. Provide submittals, test data, inspection record, and heater certification to the CxA.
- B. Domestic water pipe system cleaning, flushing, hydrostatic tests, and disinfecting requirements are specified in Division 22 piping Sections. Plumbing Installer shall prepare a pipe system cleaning, flushing, hydrostatic testing and disinfection plan. Provide cleaning, flushing, testing, and disinfection plan and final reports to the CxA. Plan shall include the following:
  - 1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and disinfection plan.
  - 2. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and disinfected.

**END OF SECTION 22 0800**