# GENERAL

## SECTION INCLUDES

### This section describes Basic Fire Suppression Requirements required to provide for a complete installation of all fire protection systems for this project. This section shall apply to all other Division 21 specification sections as well as all work shown on the drawings.

### It is the intent of the Fire Protection Division of the Specifications that all mechanical work specified herein is coordinated as required with the work of all other Divisions of the Specifications and Drawings so that all installations operate as designed.

### All systems shall be completely assembled, tested, adjusted and demonstrated to be ready for operation to the satisfaction of the and the Nebraska State Fire Marshall.

### The Contractor shall note that, in some cases, piping as shown on the Drawings provide general location and routing information only. The Contractor shall be responsible for providing interference-free systems with proper clearance to facilities and equipment.

### Where the word “provide” is used, it shall mean “furnish and install” ess otherwise noted or specified.

## RELATED SECTIONS

### Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section and all other sections of Division 21.

## DESCRIPTION OF WORK

### The work included under this section consists of providing all labor, materials, supervision, and construction procedures necessary for the installation of the complete fire protection systems required by these specifications and/or shown on the drawings of the contract.

### The Contract Drawings are shown in part diagrammatic intended to convey the scope of work, indicating the intended general arrangement of equipment, piping, etc.

## QUALITY ASSURANCE

### Installers shall have at least 2 years of successful installation experience on projects with fire protection installation work similar to that required by the project. All equipment and materials shall be installed in a neat and workmanlike manner and shall be aligned, leveled, and adjusted for satisfactory operation, unless noted otherwise in other fire protection sections.

### Manufacturer of equipment and materials must be regularly engaged in the manufacture of the specified equipment and material with similar construction and capacities and whose products have been in satisfactory use in similar service for not less than five (5) years, unless noted otherwise in other Fire Protection Sections.

### Qualify welding processes and operators for structural steel according to AWS D1.1. "Structural Welding Code - Steel.

### Quality welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

### Comply with provisions of ASME B31 Series "Code for Pressure Piping”, including all addenda.

### Comply with provisions of NFPA 13, NFPA 14, and NFPA 24, including all addenda.

### Contractor signed welder certificate(s) shall be submitted. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current. A record shall be maintained on the job site showing the date and results of qualification tests for each welder employed on the job. One certified copy of the qualification test for each welder so employed shall be furnished to the Owner’s representative.

## REFERENCES

### The design, manufacture, testing, and method of installation of all equipment and materials furnished under the requirements of this specification shall, at minimum, conform to the following as applicable:

#### Safety and Health Regulations for Construction.

#### Occupational Safety and Health Standards, National Consensus Standards and Established Federal Standards.

#### ACGIH - American Conference of Governmental Industrial Hygienists.

#### AIHA - American Industrial Hygiene Association.

#### AMCA - Air Movement and Control Association.

#### ANSI - American National Standards Institute.

#### ASA - Acoustical Society of American.

#### ASHRAE - American Society of Heating, Refrigerating, and Air-Conditioning Engineers.

#### ASME - The American Society of Mechanical Engineers.

#### ASTM - American Society of Testing and Materials.

#### CAGI - Compressed Air and Gas Institute.

#### CTI - Cooling Tower Institute.

#### EJMA - Expansion Joint Manufacturers Association.

#### ETL - Engineering Tests Laboratory.

#### HI - Hydraulic Institute.

#### HYD I - Hydronics Institute.

#### ICBO - International Conference of Building Officials.

#### ICC – International Code Council.

#### NEBB - National Environmental Balancing Bureau.

#### NEC - National Electrical Code.

#### NEMA - National Electrical Manufacturers Association.

#### NFPA - National Fire Protection Association.

#### NSF - National Sanitation Foundation.

#### SAE - Society of Automatic Engineers.

#### SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.

#### TEMA - Tubular Exchanger Manufacturers Association.

#### UL - Underwriters Laboratories, Inc.

#### International Plumbing Code.

#### International Mechanical Code.

#### Other governing, state, and local codes that apply.

## SUBMITTALS

### General: Follow the procedures specified in Division 1 Sections "General Conditions" and “Special Conditions”.

#### **See Section 21 13 13 for special submittal procedures for sprinkler/standpipe system submittals.**

### The Architect/Engineer’s review of submittals, including any corrections or comments made on the shop drawings during the review process, do not relieve Contractor from compliance with requirements of the Contract Documents. The review is only a review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The Contractor is responsible for confirming and correlating all quantities and dimensions; selecting fabrication process and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect/Engineer’s review of those drawings.

### No portion of the work requiring submission of a shop drawing, product data or sample shall be commenced until the submittal has been reviewed by the Architect/Engineer. All such portions of the work shall be in accordance with reviewed submittals and the associated manufacturer recommendations.

### Shop drawings shall include the minimum following information as applies. Additional specific information required is outlined in other Fire Protection Sections.

#### Certified performance and data with system operating conditions indicated.

#### All equipment items shall be marked with the same item number as used on drawings or schedules.

#### Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicating, weights (shipping, installed, and operating), furnished specialties and accessories; and installation and start-up instructions.

#### Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loading, required clearances, and methods of assembly of components.

#### Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to electrical equipment. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring required for final installation of electrical equipment and controls. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

#### Maintenance Data: Submit maintenance data and parts list for each fire protection equipment, control and accessory; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

### Coordination drawings

#### Drawings:

##### Provide coordination in determining adequate clearance and space requirements for fire protection equipment, mechanical equipment, electrical equipment, and other items/equipment in the project. The Architect/Engineer reserves the right to determine space priority of equipment in the event of interference between pieces of equipment, piping, conduit, ducts and equipment of the trades. The Architect/Engineer will only review conflicts and give an opinion but will not perform as a coordinator.

##### Provide coordination drawings indicating structural components, reflected ceiling layout, fire protection items, mechanical items, electrical items, and other systems. Indicate on the coordination drawings where components will be installed and how the service access area to such items shall be maintained. Illustrate items requiring access for maintenance or adjustment.

##### The Contractor will not be allowed any time extensions for participation in the coordination drawing process. The Contractor will not be allowed any contract cost extra for any additional fittings, rerouting or changes of duct size to equivalent sizes to those shown on the drawings that may be determined necessary through the coordination drawing process.

##### Deviations from the contract documents that are necessary for overall system installation and coordination shall be brought to the attention of the Architect/Engineer. Such necessary changes in the contract scope discovered through the coordination drawing process will be covered by the requirements of the “change order” process.

##### Access panels shall occur only in gypsum wallboard or plaster ceilings where indicated on the drawings or as needed to provide access to equipment, dampers, or valves. Access to fire suppression and other items shall be through accessible acoustical ceiling areas. Additional access panels will not be allowed without written approval from the Architect/Engineer at the coordination drawing stage and only after alternatives are reviewed. Layout changes shall be made to avoid additional access panels. If additional access panels are required, they shall be provided at no additional cost to the Owner.

##### Soffit penetrations and light alcoves shall be fully coordinated with hanging devices, studs, fire/smoke ratings, and structural support requirements.

#### The Contractor and subcontractors responsible for items of work located in or above ceilings shall participate in the coordination drawing process. Participation is mandatory. If the Contractor or subcontractor fails to participate in the coordination drawing process, the Owner reserves the right to do the following:

##### Stop construction progress payments for work performed by the Contractor. Payments will be reinstated only after the Contractor or subcontractor resumes participation in the coordination drawing process.

##### Require the relocation and resizing of components as necessary to ensure components will be installed as intended. In the event the Contractor did not participate in the coordination process, the Contractor will not be entitled to contract cost increases or time extensions due to Owner-initiated changes in the work.

##### The Contractor shall be held responsible for unnecessary rework that is attributable to failure to participate in the coordination process.

#### Drawings shall be prepared at 1/4 inch = 1 foot, 0 inches (minimum).

##### Coordination participants shall provide equipment installation and clearance requirements. This information shall be indicated on the coordination drawings.

##### Coordination drawings shall indicate the following major system components (including insulation, hub or connection widths with verification of turning radius):

###### Roof drain leaders

###### Large waste piping

###### Sprinkler mains

###### Equipment located above the ceiling

###### Heating hot water piping

###### Chilled water piping

###### Conduit runs 2 inches and larger

###### Cable tray

###### Bus duct

###### Recessed light fixtures

###### Building wiring or cable trays

###### Ceiling heights as shown in contract documents and thickness of system

###### Soffits (including framing of supports)

###### Access points and clearances required

###### Access panels

###### Valves

###### Dampers

###### Coils

###### Ductwork

###### Fire-rated wall, partition, and floor penetrations

###### Steam and condensate piping

###### Space allotted for future utilities

###### Equipment in mechanical and electrical spaces

##### Information shall be delineated to indicate distances from column centerlines, pipe/equipment size, and distance from finished floor to bottom of pipe/equipment and hangers.

#### The coordination drawings shall be submitted to the Architect/Engineer and Owner’s representative for review. The submitted coordination drawings shall indicate which contractors participated in the process and where conflicts appear to occur even after the priority ranking of utility routing has been utilized. In the event that conflicts require input from the Architect/Engineer, recommended solutions will be provided with the coordination drawings for review by the Architect/Engineer. The Architect/Engineer will review and return an opinion to the contractors for implementation. All contractors shall agree to the final coordinated layout by signing off on the coordination drawings before any construction can begin.

#### Maintain an updated set of coordination drawings at the job site reflecting changes, modifications and adjustments. Changes shall be reflected and sets or new sheets reissued to the Architect/Engineer and the Owner for review on a monthly basis with changes “clouded” and brought to the attention of the Architect/Engineer and the Owner.

#### When a change order request is issued, the affected subcontractors shall review the coordination drawings and bring to the attention of the Contractor and the Architect/Engineer revisions necessary to the work of others not directly affected by the change order.

#### Contractors that fail to cooperate in the coordination drawing effort shall be responsible for all costs incurred for adjustments to the work made necessary to accommodate installations. Provide adequate clearance and access through accessible ceilings. Conflicts that result after the coordination drawings are signed off will be the responsibility of the Contractor or subcontractor who did not properly identify their work or installed the work improperly.

### Provide separate shop drawing submittals for the following items:

#### Section 21 05 00:

| **Submittal Requirement:** | **Date Submitted:** |
| --- | --- |
| Permits |  |
| Welding certificates |  |
| Warranties |  |
| As-built documents |  |
| Pipe pressure test logs |  |
| Operation and maintenance manuals (electronic copies integrated into EMCS) |  |
| Close-out / walk-through documentation |  |
| Training seminar documentation |  |

#### Section 21 05 19:

| **Submittal Requirement:** | **Date Submitted:** |
| --- | --- |
| Pressure gauges |  |

#### Section 21 05 29:

| **Submittal Requirement:** | **Date Submitted:** |
| --- | --- |
| Pipe supports, anchors, sleeves, and hangers |  |
| Equipment curbs, supports, and hangers |  |
| Mechanical seals |  |
| Fire sealants |  |

#### Section 21 05 53:

| **Submittal Requirement:** | **Date Submitted:** |
| --- | --- |
| Fire protection identification materials |  |
| Valve schedule |  |

#### Section 21 13 13:

| **Submittal Requirement:** | **Date Submitted:** |
| --- | --- |
| Fire protection equipment and materials |  |
| Sprinklers |  |
| Standpipe hose connections and hose connection cabinets |  |
| Fire protection piping and sprinkler location plan(s) |  |
| Hydraulic calculations |  |
| Hydrostatic test report(s) |  |

## SUBSTITUTES

### All proposals shall be based on providing and installing the materials or items of equipment which are hereinafter specified. The Contractor’s options in selecting materials and equipment are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects.

### Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing. Associated fire protection and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are to be increased accordingly, but all recommended manufacturer clearances, etc., are to be maintained within the allotted fire protection spaces. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

### Where the terms "or equivalent" is used, the Contractor may substitute alternate equipment, materials, etc. subject to review by the Architect/Engineer and the UNL FPC Engineering representative during the submittal phase of the project.

### Where the term "or approved equivalent" is used, the Contractor may not substitute alternate equipment, materials, etc. unless requesting approval at least ten (10) days before the bid date. Notifications of any such approvals by the Architect/Engineer shall only be made in writing by Addendum.

### Where the term "no equivalent" is used, the Contractor must provide the specified or scheduled equipment, materials, etc.

### Final determination regarding substitutions shall be by the Architect/Engineer.

## WARRANTY

### Refer to the General Conditions section of this Specification for general warranty requirements and information. Additional warranty requirements are specified in subsequent Fire Protection Sections.

## CLOSE OUT AND OPERATION INSTRUCTIONS

### Operate each system and item of equipment in a test run of appropriate duration, but no less than 7 days, to demonstrate sustained, satisfactory performance. Adjust and correct operations as required for proper performance.

### Systems shall not be used for temporary operation during construction without written approval from the Architect/Engineer and the Authority Having Jurisdiction. If approved and used during construction, all systems must be properly maintained and operated according to manufacturer recommendations. Immediately prior to turnover to the Owner, the contractor shall perform all necessary preventative maintenance according to all manufacturer recommendations.

### Any system placed in temporary operation for testing during construction shall be properly maintained and operated by the Contractor.

### All systems shall be protected against freezing, flooding, corrosion or other forms of damage prior to acceptance by the Owner.

### Material or equipment damaged, shown to be defective or not in accordance with the Specifications shall be repaired or replaced to the satisfaction of the Owner’s representative.

### All tests shall be made after notification to and in the presence of the Owner’s representative.

### Before starting up any system, each piece of equipment comprising any part of the system shall be checked for proper lubrication and any other condition which may cause damage to the equipment or endanger personnel.

### After systems have been demonstrated to be satisfactory for 7 consecutive days and ready for permanent operation, all permanent pipe line strainers shall be cleaned, valve and packings properly adjusted, lubrication checked and replenished if required. Temporary piping, etc. shall be removed and openings restored in a permanent manner acceptable to the Owner’s representative.

### Conduct a walk-through instruction seminar for the Owner's personnel pertaining to the continued operation and maintenance of fire protection equipment and systems. Explain the identification system, maintenance requirements, operational diagrams, temperature control provisions, sequencing requirements, security, safety, efficiency and similar features of the systems. Walk through must be documented as to those attending and subjects covered. Walk through document(s) shall be signed and dated by the contractor's representative and the owner's representative.

#### Provide instruction seminar, minimum 6 hours each (approximately 3 hours classroom training and 3 hours hands-on training), for each of the following items:

##### Fire Pump (if applicable)

#### Training sessions shall be recorded by video camera by the contractor and the recording shall be turned over to the owner in DVD format.

### At the time of substantial project completion, turn over the prime responsibility for operation of the fire protection equipment and systems to the Owner's operating personnel. Until the time of final acceptance, provide full time operating personnel, who are completely familiar with the work, to consult with and continue training the Owner's personnel.

#### If any systems are operated prior to substantial completion, the contractor shall perform all necessary preventative maintenance according to all manufacturer recommendations.

## AS-BUILT DOCUMENTS

### Prepare as-built documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in above, indicate the following installed conditions:

#### The Fire Suppression Contractor shall provide the Owner with as-built drawings for pipe mains and branches, size and location, for both exterior and interior; locations of control valves and supervisory switches; drain valves; and indicate all devices requiring periodic maintenance or repair.

#### All fire protection systems as described in the Specifications and/or shown on the drawings.

#### Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located. Valve location diagrams, complete with valve tag chart. Refer to Division 21 Section "Fire Protection Identification." Indicate actual inverts and horizontal locations of underground piping.

#### Equipment/material locations (exposed and concealed), dimensioned from prominent building lines.

#### All items must be dimensioned in horizontal and vertical plans to allow Architect/Engineer to update Building Information Model (BIM) file for Owner.

## MAINTENANCE MANUALS

### Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, include the following information for equipment items:

#### Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

#### Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

#### Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

#### Servicing instructions and lubrication charts and schedules.

# PRODUCTS (NOT APPLICABLE).

# EXECUTION

## DELIVERY, STORAGE, AND HANDLING

### Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

### Store and handle material and equipment in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

### Use proper lifting equipment where size/weight requires handling by such means.

### Comply with manufacturer's rigging and moving instructions for loading material and equipment, and moving them to final location.

### Equipment requiring disassembly for access purposes shall be disassembled and reassembled as required for movement into the final location following manufacturer's written instructions.

### Deliver material and equipment as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

### Fire Protection Contractor shall schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

### Any material that is damaged during delivery, storage, handling, or installation shall be brought to the attention of the Architect/Engineer for review of its acceptability in the project.

#### The Architect/Engineer shall be the sole and final judge as to the suitability of damaged items.

## ROUGH-IN

### Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

### Refer to equipment specifications in Divisions 2 through 26 for rough-in requirements.

## COORDINATION

### Sequence, coordinate, and integrate installations of fire protection materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

### Coordinate the fire protection work with work of the different trades so that:

#### Interferences between fire protection, mechanical, electrical, architectural, and structural work, including existing services, will be avoided.

#### Within the limits indicated on the drawings, the maximum practicable space for operation, maintenance repair, removal and testing of fire protection and other equipment will be provided.

#### All Contractors shall establish utility elevations prior to fabrication and shall coordinate their material and equipment with other trades. When a conflict arises, priority is as follows:

##### Light fixtures.

##### Gravity flow piping, including steam and condensate.

##### Equipment requiring access, including terminal units, fire/smoke dampers, and piping valves.

##### Ductwork.

##### Electrical busduct.

##### Electrical cable trays, including access space.

##### Piping (hydronic and plumbing).

##### Sprinkler/standpipe piping.

##### Electrical conduits and wireway.

#### Pipes, ducts, and similar items shall be kept as close as possible to ceiling, walls, and columns, to take up a minimum amount of space. Pipes, ducts, and similar items shall be located so that they will not interfere with the intended use of other equipment.

### Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.

### Furnish and install, without additional expense to the Owner, all offsets, fittings and similar items necessary in order to accomplish the requirements of coordination.

## FIRE PROTECTION INSTALLATIONS

### All dimensions and clearances affecting the installation of work shall be verified in the field in relation to established datum, to building openings and to the work of other trades.

### The location of all equipment and systems shall be coordinated to preclude interferences with other construction.

### Should interferences occur which will necessitate deviations from layout or dimensions shown on the Drawings, the Architect/Engineer and the Owner’s representative shall be notified and any changes approved before proceeding with the work.

### Arrange for chases, slots, and openings in other building components during progress of construction to allow for fire protection installations.

### Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum possible headroom.

### Coordinate connection of fire protection systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

### Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect/Engineer.

### Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.

### Install fire protection equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

### Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

### Welding, sweating, or brazing operations

#### All cutting, welding, brazing, or sweating operations carried on in the vicinity of, or accessible to, combustible material shall be adequately protected to make certain that a spark or hot slag does not reach the combustible material and start a fire.

#### When it is necessary to do cutting, welding, brazing, or sweating close to wood construction, in pipe shafts, or other locations where combustible materials cannot be removed or adequately protected, employ fireproof blankets and proper fire extinguishers. Position another individual nearby to guard against sparks and fire.

#### Whenever combustible material has been exposed to molten metal or hot slag from welding or cutting operations, or spatter from electric arc operations, a guard shall be kept at the place of work for at least one hour after completion to verify that smoldering fires have not been started.

#### Whenever welding or cutting operations are carried on in a vertical shaft or where floor openings exist, a fire guard shall be employed to examine all floors below the point of the welding or cutting operation. The fire guard shall be kept on duty for at least one hour after completion to verify that smoldering fires have not been started.

#### Before any work involving cutting, welding, brazing, or sweating operations is started, consult with the Architect/Engineer as to particular safety precautions to be employed on the work.

## ACCESSIBILITY

### All work shall be installed so as to be accessible for operation, maintenance and repair with particular attention given to locating valves, controls and equipment requiring periodic lubrication, cleaning, adjusting or servicing of any kind.

## LUBRICATION AND TOOLS

### Provide for each piece of equipment any special tools and a list of such tools required for the operation or adjustment of the equipment and turn over to the Owner’s representative prior to final acceptance of the equipment.

## START-UP

### PIPING SYSTEMS PRESSURE TESTING

#### The following personnel in the order listed shall be considered acceptable witnesses of all piping pressure testing:

##### Local Authority Having Jurisdiction

##### UNL FPC Engineering Representative

##### Mechanical Engineer / Architect

##### General Contractor’s Foreman

#### Removal of pressure charge and associated drain down shall also be witnessed.

#### Fire protection contractor shall provide a minimum of 24-hour notice to at least one of the above listed parties before commencing any piping systems pressure test.

#### Pressure gauge requirements: Provide recently calibrated gauge with 4” face and a range such that test pressure is between 50% and 100% of gauge range. For example, a gauge with a 15 psig range is acceptable for a 10 psig pressure test, whereas a gauge with a 30 psig range is unacceptable in this application. Gauge resolution shall be suitable for type of testing, system size and test media. Gauge shall have been recently calibrated.

#### All piping pressurizing equipment (i.e., air compressor) shall be disconnected before test is commenced and shall remain disconnected for the entire duration of the test.

#### Entire system shall be properly vented before test is commenced.

#### For specific piping pressure testing requirements and procedures, see applicable piping systems specification sections. At minimum, however, pipe systems should be tested at the following pressures and all installed components must be rated at this pressure at the actual operating temperature:

##### Sprinkler and/or standpipe piping 200 psig

#### Submit completed pipe pressure test log for each pressure test before final project closeout. Test log shall also be included in operation and maintenance manuals.

### **NOTE: USE MULTIPLE FORMS IF NECESSARY**

## GENERAL CONTRACTOR - FIRE PROTECTION EXTENT OF WORK

### Access Panels

#### Furnish and install panels for access to all valves and flow switches and similar items where no other means of access, such as readily removable, sectional ceiling is shown or specified.

#### The plans indicate the location of all anticipated access panels. The Division 21 Contractor shall make every effort to locate all material and equipment requiring service and maintenance above accessible ceilings or utilize the indicated access panels. Material and equipment requiring service and maintenance that is shown above inaccessible ceilings shall be relocated to accessible or exposed areas whenever possible. When these items are located in exposed areas, the Division 21 Contractor is to verify with the Architect/Engineer that the installation will not affect the aesthetics of the building. However, when it is not possible to locate these items in accessible or exposed areas due to the configuration of the actual installation of the fire protection and other trade systems or aesthetic reasons, additional access panels shall be provided. The contractor shall be equitably compensated for the additional access panels.

#### Refer to Section 08 31 13 – Access Doors and Panels for specific information on type and size of panels

### Cutting and Patching

#### General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:

#### The Division 21 Contractor shall coordinate all cutting and patching of holes, in existing building and new construction which are required for the passage of fire protection work.

#### Division 21 Contractor is to notify the General Contractor prior to submitting his bid, the number, size and location of all cutting and patching requirements. The Division 21 Contractor shall be liable for all associated costs of cutting and patching for fire protection work upon failure to notify the General Contractor prior to bid submission.

#### Under no circumstances shall any structural members, load-bearing walls or footings be cut without first obtaining written permission from the Engineer.

#### Cut, channel, chase and core drill floors, walls, partitions, ceilings, and other surfaces necessary for fire protection installations. Perform cutting by skilled mechanics of the trades involved.

#### Patching of concrete openings shall be filled with grout and finished smooth with the adjacent surface.

#### All below-grade openings for pipe shall be sealed with interlocking synthetic rubber line assembly, Link-Seal by Thunderline Corporation or equal.

#### **All penetrations through the walls, floor, or structure of laboratory spaces, laboratory support spaces, corridors or other areas in which relative pressurization relationships are important shall be sealed airtight. Refer to the drawings for additional information regarding rooms in which maintaining pressurization is important.**

#### Repair cut surfaces to match adjacent surfaces.

#### Perform cutting, fitting, and patching of fire protection equipment and materials required to:

##### Uncover work to provide for installation of ill-timed work.

##### Remove and replace defective work.

##### Remove and replace work not conforming to requirements of the Contract Documents.

##### Remove samples of installed Work as specified for testing.

##### Install equipment and materials in existing structures.

##### Upon written instructions from the Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

### Excavation and Backfilling

#### Division 21 Contractor shall perform all excavation and backfilling necessary to install the required fire protection work. Coordinate the work with other excavating and backfilling work in the same area.

#### Except as indicated otherwise, comply with the applicable sections in Division 2 of these specifications, excavation filling and backfilling (for structures) to 5' outside the building line, and exterior utilities sections for beyond 5' from the building line.

#### Trenching: Trench width shall be no more than required for shoring, bracing and performance of the work. All necessary shoring and bracing shall be installed to insure worker safety, proper installation of fire protection work, and protection of adjacent structures. Provide all dewatering as required. Depth shall not exceed that required to achieve the specified depth of cover and overdig will be permitted for bedding material only. All trenches shall be open cut from the surface.

#### Bedding: All work shall be properly bedded whether on virgin soil or on granular bedding as specified. All granular bedding shall be laid on undisturbed soil. PVC and copper piping shall have a 4" crushed stone bed conforming to specification for granular material in Division 2. If rock is encountered, excavate to a point 4" below installed bottom elevation of piping and provide bedding as called for above.

#### Haunching: Haunching shall be brought up on both sides of the pipe for a distance of 1/3 the pipe diameter and shall be of the same material used for bedding.

#### Backfill: Backfilling shall not begin until installation has been tested for leaks.

#### Final Backfill shall be as follows:

##### Outside Building Under Paved Areas: Granular material specified in Division 2.

##### Outside Building and Not Under Paved Areas: Clean soil free of vegetable matter and foreign material or crushed limestone. In planted areas backfill to a point 6" below finished grade. Owner will provide topsoil to finished grade.

#### Placement: Place all granular material in lifts of 12" maximum compacted to 100% of maximum dry density as determined as ASTM D698. Place soil in 6" lifts compacted to 95% of maximum density as determined by ASTM D698. Do not place any backfill until excavations have been cleaned of all water, debris and loose or soft soil.

#### Protection: At least 72 hours prior to excavating, for each phase, Contractor shall contact the Owner's Representative to arrange for utility locates in the construction area.

#### Contractor shall provide temporary supports for all underground utilities crossing an excavation.

#### Provide all required barricades, fencing, signs, lights, etc. as necessary for the protection of the workers and of the general public.

#### Excess Material: All excess earth and other material resulting from the excavation shall be removed from site daily by the Contractor.

#### Landscape work, pavement, flooring and similar exposed finish work that is disturbed or damaged by excavation shall be repaired and restored to their original condition by the Fire Protection Contractor.

### Concrete Bases

#### Minimum 4" high concrete housekeeping pads shall be provided under all floor-mounted fire suppression equipment, regardless of whether explicitly shown on the Drawings. Concrete inertia pads with spring isolators shall be provided for all base-mounted pumps and air compressors installed on any floors which are not slab-on-grade. Inertia pads and isolators shall be sized by the equipment manufacturer if specific information is not provided in the Contract Documents.

#### Division 21 Contractor is to notify the General Contractor prior to submitting his bid, the number, size and location of all fire protection equipment bases. The Division 21 Contractor shall be liable for all associated costs to install the fire protection equipment bases upon failure to notify the General Contractor prior to bid submission.

#### Construct concrete equipment bases a minimum 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000 psi, 28-day compressive strength concrete, reinforcement and forms as specified in Division 3 Section "Cast-In-Place Concrete." Coordinate final equipment base size with General Contractor.

#### All equipment shall be mechanically fastened to concrete bases.

### Roof curbs, roof support for fire protection equipment and roof penetrations.

#### Verify, prior to submitting bid, the number, size, and location of all roof curb and roof supports and the location of all roof penetrations. Provide all roof deck-mounted equipment, pipe supports, and pipe penetrations. Cut roof deck for pipe and duct penetrations, ess noted otherwise. Provide all roof covering/membrane mounted equipment and pipe supports and roof drains, ess noted otherwise.

#### Contractor shall be liable for all associated costs to install the roof curbs, roof supports and roof penetrations not shown on the roof plan or added after the roof system has been installed. Coordinate with the General Contractor prior to construction the number size and location of all roof penetrations.

#### All roof curbs, supports, and rails shall be sized to keep equipment a minimum of 24” above the roof insulation membrane in order to limit snow accumulation at or near equipment.

### Painting

#### The General Contractor is to field paint fire protection equipment and materials in specified areas as noted on the fire protection plans, fire protection schedules and in the specifications. Division 21 Contractor is to coordinate the painting of these items with the General Contractor. The Fire Protection Contractor is to provide materials in these areas that are suitable for accepting paint. The clean and preparation of the materials to reach paint is the responsibility of the General Contractor ess noted specifically to be responsibility of the Division 21 Contractor.

#### In concealed locations, field-fabricated bare iron or steel items required for installation of work under this Division shall have rough or sharp edges removed and shall be painted with one coat of zinc rich paint.

#### In exposed locations, field-fabricated bare iron or steel items required for installation of work under this Division shall have rough or sharp edges removed and shall be painted in accordance with Section 09 91 00.

## ELECTRICAL-FIRE PROTECTION EXTENT OF WORK

### The responsibility of work specified under Division 21 and 26 is clarified under Section 21 05 13, "Electrical Requirements for Fire Protection Equipment. Division 21 Contractor is to coordinate all electrical requirements prior to ordering powered fire protection equipment.

END OF SECTION 21 05 00