

TECHNICAL SPECIFICATIONS
FOR
SPEAR INJECTOR
LCW PIPING AND RING FIRE PROTECTION
IS-439-420-05-R0

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DIVISION 1

GENERAL REQUIREMENTS

The following Specification broadly outlines the requirements to install low conductivity piping, compressed air piping, and an ordinary hazard wet sprinkler system in the Injector Ring, Injector Housing, and Beamline 17.

SECTION 01100 -- STATEMENT OF WORK1.1 LOCATION

Perform the work outlined in this specification at the Stanford Linear Accelerator Center, 2575 Sand Hill Road, Menlo Park, San Mateo County, California. The construction site is located in the Research Yard adjacent to the SPEAR Ring.

1.2 SCOPE OF WORK

The intent of the specifications is to prescribe the details for the construction and completion of the work which the Subcontractor undertakes to perform in accordance with the terms of the Subcontract. Where the plans or specifications describe portions of the work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the first quality are to be used, based upon submittals provided by the Subcontractor and subject to the approval of the University. Unless otherwise specified, the Subcontractor shall furnish all labor, materials, tools, equipment and incidentals, and do all the work involved in executing the Subcontract in a satisfactory and workmanlike manner.

The Subcontractor shall verify all dimensions and quantities in the field and shall furnish all construction surveys required for correct location and installation of all work.

1.3 DESCRIPTION

The work includes but is not limited to the following:

1. Piping installation consisting of new stainless steel and copper piping forming a complete low conductivity cooling system. System includes pressure reducing valves, temperature, pressure and flow monitoring.
2. Piping installation consisting of copper piping and fittings for a complete compressed air distribution system.
3. A complete ordinary hazard wet pipe fire protection system for the interior of the ring, injector, and Beamline 17. System to connect to existing system.

1.4 DRAWING LIST

All work covered by this specification shall be in strict accordance with the following subcontract drawings:

<u>Number</u>	<u>Title</u>
ID-439-420-03-CO	Spear Injector Project Mechanical Utilities LCW Piping System Piping Plan
ID-439-420-04-CO	Spear Injector Project Mechanical Utilities LCW Piping Systems Detail Drawing
ID-439-420-05-RO	Spear Injector Project Mechanical Utilities LCW Piping Sections
ID-439-420-06-CO	Spear Injector Project Mechanical Utilities Fire Protection Plan And Details

SECTION 01310 -- SAFETY, SECURITY, PROTECTION, AND
CLEANUP

1.1 SAFETY, SECURITY, PROTECTION, AND CLEANUP - RELATED CLAUSES

See General Conditions clauses titled "Safety and Health", "Cleanup", "Sanitary Conditions", and "Codes and Standards".

All work shall be done in accordance with the requirements of the California Administrative Code, Title 8, Division of Industrial Safety, Safety Orders, and Department of Labor Safety and Health Regulations for Construction (Part 1518) and the U.S. Department of Energy.

All materials and processes used must conform to the applicable Bay Area Air and Water Pollution requirements.

1.2 HAZARD COMMUNICATION STANDARD

THE SUBCONTRACTOR'S ATTENTION IS SPECIFICALLY DIRECTED TO THE FEDERAL O.S.H.A. "HAZARD COMMUNICATIONS" STANDARD (29 CODE OF FEDERAL REGULATION 1910.1200).

The Subcontractor is required to comply with this STANDARD in all respects, including, but not limited to furnishing to the University and appropriate posting at the job site, copies of the Material Safety Data Sheets (MSDS) for all hazardous materials brought onto the University premises.

Copies of the Material Safety Data Sheets shall be furnished to the Contract Administrator and approved by the Environmental Safety Office prior to any such materials being brought to the job site.

1.3 SUBCONTRACTOR RESPONSIBLE FOR SAFETY

It is the Subcontractor's responsibility to provide protection for SLAC property, SLAC personnel, other personnel and visitors, other Government property, and private property.

The Subcontractor is solely responsible for safe working methods and shall insure that SLAC workers and other personnel or visitors inside the buildings and out are not exposed to safety hazards.

1.4 NOISE CONTROL

The Subcontractor shall make use of latest techniques for abatement of construction noise. All construction equipment shall be contained in sound reducing enclosures and shall be fitted with mufflers as required so the noise level within 3 feet of the equipment does not exceed levels recommended by EPA for construction sites in occupied areas. Use pneumatic or electric tools designed for quiet operation.

1.5 PROTECTION OF EXISTING FACILITIES AND WORK IN PROGRESS

Existing facilities, including but not limited to buildings, equipment, materials, surfaces, pipes, conduits and appurtenances which are damaged by any operations under this Subcontract, shall be replaced or repaired, neatly patched and refinished, all as may be necessary to restore the damage to the original condition and to leave the work in a thoroughly complete, operable and finished condition.

Work and materials shall be protected against damage due to construction operations, weather, or other hazards. The Subcontractor shall provide suitable covering of all exposed trenches, excavations, and equipment to protect the work from damage.

Storm drains shall be used for clean water only.

See also General Conditions clauses titled "Protection of Existing Installations, Materials and Work", "Protection of Trees", and "Assumption of Risk Until Final Acceptance".

1.6 SECURITY

The Subcontractor is responsible for the safe keeping of all his materials, tools and equipment.

1.7 CLEANING UP

Each day, the Subcontractor will remove any material tracked, or otherwise introduced into SLAC buildings or other property by the Subcontractor's personnel. If not performed timely, the University will arrange for cleaning services and backcharge the Subcontractor. At the end of each work-day, the Subcontractor shall clean the work areas and remove all loose debris.

All areas used by the Subcontractor shall be restored to their original condition and the area left in a clean condition.

SECTION 01320 -- OTHER GENERAL REQUIREMENTS1.1 VISIT TO THE CONSTRUCTION SITE

All prospective bidders should plan to visit the work site prior to submission of bids. A pre-bid conference will be held at SLAC and all bidders should plan to attend. See Invitation for Bids for time and date. See Instructions to Bidders clause titled "Conditions Affecting the Work" and General Conditions clause titled "Site Investigations and Representations".

1.2 WORKING HOURS

The Subcontractor will be permitted to work in the work areas, and delivery of materials may be made, during normal working hours (7:30 am to 4:30 pm Monday through Friday) and, when authorized in advance by the Contract Administrator, after hours, on holidays, or weekends.

1.3 COOPERATION WITH OTHER SUBCONTRACTORS AND SLAC PERSONNEL

Other Subcontractors and SLAC technicians may be working in or occupying the area within and adjacent to the Subcontractor's work area. The Subcontractor shall cooperate with others in the scheduling of work to avoid undue inconveniences to all concerned.

The Subcontractor shall confine his activity to the areas designated. Other SLAC areas shall not be visited without specific permission and under no circumstances will the Subcontractor's personnel cause interruption of normal SLAC activities in other areas.

See also General Conditions clauses titled "Operations", "Other Work", and "Use and Possession Prior to Completion".

1.4 DIMENSIONS AND CONTROL POINTS

Reference General Provisions clause titled "Specifications and Drawings" and General Conditions clauses titled "Subcontract Drawings and Specifications" and "Base Line and Grades": The Subcontractor shall furnish all construction surveys required for correct location and installation of all work. The drawings are diagrammatic and indicate the general arrangement of the work. Drawings shall not be scaled for dimensions. Control points and dimensions shown on the drawings or otherwise furnished by the University shall be verified in the field by the Subcontractor. The Subcontractor shall be responsible for properly fitting materials and equipment at locations indicated without substantial alterations.

1.5 SUBMITTALS

Shop drawings and other submittals shall be provided to the University for review as required by the various sections of this specification and shall conform to the requirements of the General Conditions clauses titled "Specifications and Standards" and "Materials and Equipment".

Submittals are required for all specified items, as well as for "or equal" items proposed by the Subcontractor. See also the clause titled REQUEST FOR SPECIFIED ITEM SUBSTITUTE below.

A minimum of six (6) complete sets (or other number as specified elsewhere herein) of all submittals, including cover letters, transmittal letters, attachments, etc., shall be provided to the Contract Administrator.

The Subcontractor shall thoroughly review all submittals, including those from lower tiers, for conformance to Subcontract requirements prior to submittal for approval. This review shall include but shall not be limited to confirmation of conformance to dimensional, qualitative, and utilization requirements.

1.6 SUBMITTALS REQUIRED PRIOR TO ISSUANCE OF THE NOTICE TO PROCEED

Within five (5) calendar days, or other time period specified elsewhere herein, after award, and prior to issuance of the Notice to Proceed, the Subcontractor shall provide the Subcontract Agreement and acceptable Insurance Certificates, and, for Subcontracts over \$25,000, Performance and Payment Bonds.

1.7 TIMELY SUBMISSION OF SUBCONTRACT AGREEMENT, INSURANCE CERTIFICATES, AND PERFORMANCE & PAYMENT BONDS

No time extension will be granted for late submission of the Subcontract Agreement, Insurance Certificates, or Performance or Payment Bonds. In the event that any of the above items are received after the time frame specified, the University, at its sole option, may elect to issue the notice to proceed at that time. In such case, and notwithstanding any other provision in this Subcontract to the contrary, the specified performance period shall be increased by the time frame specified in the Subcontract for submission of these items. THE REQUIRED COMPLETION DATE SHALL THEN BE DETERMINED BY ADDING THE EXTENDED PERFORMANCE PERIOD TO THE AWARD DATE, RATHER THAN TO THE NOTICE TO PROCEED DATE. Nothing herein shall be construed to limit the rights of the University under the Subcontract clauses related to Default or Termination, or any other right of the University under the Subcontract or otherwise.

1.8 SUBMITTALS REQUIRED PRIOR TO INCEPTION OF ON-SITE WORK

Prior to inception of on-site work, the Subcontractor shall submit the following at or before the Project Kickoff Meeting:

1. Name of the Subcontractor's full-time on-site Superintendent.
2. List of Sub-Subcontractors and names of all persons who will be working within the Research Areas or after hours. (The purpose of this list is for issuing badges.)
3. Bar chart schedule showing projected start and finish dates for major milestones. The purpose of this schedule is to provide a basis for planning and coordination as well as a history of progress of the project. The number of milestones and level of detail is subject to the approval of the University.
4. In the event that the Subcontractor intends to request Progress Payments, he shall submit a price breakdown showing items of work and value for each item. The level of detail and value of each item is subject to the approval of the University for the purpose of determining whether the amount requested is commensurate with the progress of the work.

1.9 SUBMITTALS REQUIRED AFTER INCEPTION OF ON-SITE WORK

1. The Subcontractor shall update and resubmit the list of Sub-Subcontractors and individuals whenever personnel are assigned to or reassigned from the project.
2. At the request of the University representative, the Subcontractor shall update the schedule showing actual start date, actual milestone dates to date, projected milestone dates, and projected finish date.
3. The Subcontractor shall revise the number and level of detail of the milestones as indicated by the University representative as being necessary to fulfill the stated purpose of the schedule.
4. Weekly payroll reports.

1.10 SUBMITTALS REQUIRED PRIOR TO PROCESSING PROGRESS PAYMENT REQUESTS

All submittals cited above or required elsewhere herein shall be up to date. See especially General Conditions clause titled "Reports", subclauses titled "Progress Schedule" and "Purchase Orders".

1.11 SUBMITTALS REQUIRED PRIOR TO PROCESSING FINAL PAYMENT

1. Completion of the work
2. Final Inspection Report
3. Final Release and Waiver of Lien
4. As-Built Drawings and other submittals, if required elsewhere herein
5. Guarantee
6. Warranty documents for any equipment
7. Manuals and spare parts lists for any equipment
8. Payroll reports
9. Dosimeter Badges
10. Final Invoice

1.12 REQUEST FOR SPECIFIED ITEM SUBSTITUTE

Any proposed substitution shall be clearly identified as such on all submittals.

In addition, the Subcontractor shall submit a written request for approval of each proposed substitution via letter separately from the related submittal(s). The request must show clearly what is proposed, and must include:

1. Product specifications in the same level of detail or greater than that provided in the specifications,
2. Certifications and other submittals otherwise required for the specified item,
3. Additional information and rationale as necessary to establish that the quality of the proposed substitution and that it is equal to the item specified, without recourse to other information.

This implies no right of the Subcontractor to use other materials or methods unless approved in advance in writing by the University. The determination of the University shall govern as to whether the proposed item is equivalent to that specified, but the burden of proof shall be upon the Subcontractor. See also General Provisions clause titled "Materials and Workmanship".

1.13 MATERIALS AND WORKMANSHIP

Reference General Provisions clauses titled "Materials and Workmanship" and "Inspection and Acceptance".

Only quality workmanship will be accepted. Haphazard or poor practice will be cause for rejection of the work by the University.

Materials and equipment:

1. Must be new, first quality commercial stocks.
2. Shall be free from structural, visual, or operational defects upon completion of the work.
3. Of the same types and kinds shall be essentially the standard product of the same manufacturer throughout the work.
4. Shall be fabricated and installed in accordance with the applicable standards referred to throughout this speci-

ation, or where standards are not specified, in accordance with best commercial practice.

5. For which detailed specifications or installation instructions are not established hereby but which are required to meet the intent of the work shall be provided by the Subcontractor based on University approval of a submittal by the Subcontractor of proposed items and methods of the class, grade, and type proper for the work.

Each component of a system under this Subcontract shall be compatible with the other parts of component products and with operating conditions as shown, specified, or encountered.

Work noted as deficient during Final Inspection must be repaired and corrected by the Subcontractor, and made ready for reinspection, within five (5) working days, but not later than the required Subcontract completion date.

1.14 MATERIALS ACCESS

Access to the work site for delivery of materials and equipment shall be through the Main Gate at 2575 Sand Hill Road east of the intersection with Interstate Highway 280.

No material deliveries will be accepted by the University on behalf of Subcontractors. All deliveries shall be properly labeled or identified as follows:

--- (Subcontractor) ---
 c/o SLAC Jobsite Office, near Shelter 140
 2575 Sand Hill Road
 Menlo Park, CA 94025

See also SECTION 01310 -- SAFETY, SECURITY, PROTECTION, AND CLEANUP, clause titled HAZARD COMMUNICATION STANDARD.

1.15 DISPOSAL OF WASTE MATERIAL

Waste material shall be disposed of by the Subcontractor off the SLAC site. See also General Conditions clause titled "Trash Disposal".

1.16 UTILITIES

Water and electricity are available near the work area at no cost to the Subcontractor. See General Conditions clause titled "Utilities".

1.17 UTILITY AND EQUIPMENT OUTAGES

All required utility outages, including power, domestic water, fire protection, sanitary sewer, gas, ventilation, air conditioning, etc., shall be scheduled 72 hours in advance. Certain electrical outages may require additional notice. All outage requests shall be scheduled and coordinated through the Contract Administrator

1.18 PROPOSED CHANGES

Reference General Provisions clause titled "Changes": The Subcontractor shall furnish an itemized price breakdown in conjunction with any proposed modification of the Subcontract price or performance period.

The breakdown shall specifically identify cost data sources and shall be in sufficient detail to permit independent verification and analysis of all quantities and unit prices of all labor, material, equipment, Subcontract, and other direct costs, overhead and other indirect costs, and profit, and shall cover all work involved to accomplish the modification, whether deleted, added, or changed.

Sufficient detail shall normally be the same level of detail used in the preparation of the initial bid. A formal presentation format is not required; legible copies of worksheets, from which totals and subtotals cited in the proposal for modification were derived, are acceptable as a basis for evaluation of the proposal for modification.

If the proposal for modification includes a time extension, a rationale therefore shall be furnished and shall specify the projected impact on any final critical path.

Any amount claimed for Sub-Subcontracts shall be supported by a similar price breakdown.

SECTION 01330 -- SPECIAL REQUIREMENTS

1.1 SUBMITTALS REQUIRED PRIOR TO INCEPTION OF ON-SITE WORK

Reference Section 01320 clause titled SUBMITTALS REQUIRED PRIOR TO INCEPTION OF ON-SITE WORK:

- A Materials list as specified in Division 15500, Section 15.3 B.
- B All materials used in Division 15600 excluding pipe.

1.2 SUBMITTALS REQUIRED AFTER INCEPTION OF ON-SITE WORK

Reference Section 01320 clause titled SUBMITTALS REQUIRED AFTER TO INCEPTION OF ON-SITE WORK:

As-built drawings (red-lined blueprints) are required.

The Subcontractor shall maintain two complete sets of Subcontract documents at the job site showing all as-built conditions. As the work progresses, the Subcontractor shall record on the drawings in red pencil the actual locations of all items where there is a variance from the drawings.

Approval must be received from the University before any item is relocated. Upon the completion of the work, the Subcontractor shall forward the as-builts to the University.

1.3 UTILITIES

Reference Section 01320 clause titled UTILITIES:

Water is available at the fire hydrant near the work area at no cost to the Subcontractor.

120/208 Volt construction power will be made available at no cost to the Subcontractor.

1.4 TOILET FACILITIES

Toilet facilities are available in Shelter 140.

1.5 DOSIMETER BADGES

Reference General Conditions clause titled "Identification of Employees": Dosimeter badges that measure exposure to ionizing radiation will be issued by the University to all Subcontractor personnel working in the Research Areas. Although no personal radiation exposure above natural background radiation is anticipated, the badges are required for compliance with Department of Energy regulations and for site security. These badges will be issued at the Sector 30 Gate by the guard on duty. Radiation dosimeters are to be carried at all times while inside the Research Areas. Persons entering the area will be required to show their badge to the guard at the gate house.

The Subcontractor shall maintain a list of badgeholders. A copy of the list shall be submitted to the University representative whenever a change is made.

The Subcontractor is responsible for the return of each dosimeter to the guard at the Sector 30 Gate when each individual completes his activity under this Subcontract. All badges must be returned or otherwise accounted for in writing prior to final payment.

1.6 HISTORICAL AND SCIENTIFIC SPECIMENS

All articles of historical or scientific value, including but not limited to fossils and archaeological artifacts which may be uncovered by the Subcontractor during the progress of the work, shall become the property of the University. Such findings shall be reported immediately to the University Representative who will determine the method of removal, where necessary, and the final disposition thereof.

DIVISION 15

MECHANICALSECTION 15500 -- FIRE PROTECTIONPART I -- GENERAL15.1 SCOPE OF WORK

Fire Protection shall consist of, but not be limited to, design and installation of wet pipe system for the Injector Ring, Injector Housing, and Beamline 17, Ordinary Hazard classification.

15.2 APPLICABLE DOCUMENTS

Work under this section shall be governed by the following codes and standards:

1. American National Standards Institute:
 - ANSI B16.9 Malleable Iron Screwed Fittings
Class 300
 - ANSI B18.2 Square and Hexagon Bolts & Nuts
(incl. Appendix 5)
2. National Fire Protection Association:
 - NFPA No. 13 Sprinkler Systems
 - NFPA No. 90A Air Conditioning & Ventilating Systems
of Other than Residence Type
 - NFPA No. 75 Standard for the Protection of
Electronic Computer/Data Processing
Equipment

3. Factory Mutual Laboratories:
F.M.I. List of Approved Equipment, Fire Protection Devices & Devices Involving Fire Hazard
4. Underwriters' Laboratories, Inc.:
U.L. Fire Protection Equipment List
5. American Society for Testing and Materials:
ASTM A120-76 Spec. for Black and Hot-Dipped Zinc-Coated (Galv'd) Welded & Seamless Steel Pipe for Ordinary Uses
ASTM A307-76b Spec. for Low-Carbon Steel Externally & Internally Threaded Standard Fasteners
6. United States Department of Labor:
Part 1910 Occupational Safety & Health Standards.

15.3 SUBMITTALS

A Shop Drawings

1. Shall be submitted in accordance with NFPA No. 13 for all work furnished under this Section, showing all layouts and related details.
2. Shall include complete sprinkler system layouts at a minimum of scale of 1/8" per foot.
3. Shall include one set of reproducible drawings upon final completion.

B Materials Lists

1. Submit for all materials furnished under this Section. List shall be complete and submitted at one time.
2. The list shall identify all the materials by the respective numbers of the specifications sections and paragraphs, and shall also describe them by manufacturer, catalog number and size.
3. The list must definitely indicate which particular make the Subcontractor intends to furnish for this installation. The phrase "as specified" is not sufficient.

15.4 TESTS AND INSPECTION

- A All tests required shall be paid for by the Subcontractor, including all retests due to failure of the work or non-compliance with the requirements for the work.
- B Water for tests shall be furnished by the University at no cost to the Subcontractor.
- C Test procedure shall be in accordance with the requirements of NFPA No. 13. The University representative shall be notified not less than 24 hours prior to time of test, and all tests shall be witnessed by a University representative.
- D Certification of Testing Work
1. Upon completion of the testing, written certification, signed by the Subcontractor, shall be furnished that such work has been accomplished and that all parts and phases of the work have proved operable and are in accordance with the requirements herein specified.
 2. Furnish two copies to the University.

15.5 DESIGN AND CONSTRUCTION

- A Design and construction shall be by licensed fire protection engineering contractors, California State License C-16.
- B The sprinkler system shall cover the entire structure and shall be wet pipe. The design shall be in accordance with the requirements set forth in NFPA No. 13 for ordinary hazard. The system shall be complete in all respects. When the specifications call for materials or construction of a better quality than required by the rules and regulations specified above, the provisions of the specifications shall take precedence over the requirement of the said rules and regulations.
- C The installation shall include all gate valves, sprinkler heads, pipes, fittings, hangers and supports, and other accessories or appurtenances required for a complete installation.
- D Piping and sprinkler heads shall be located so as to not interfere with or obstruct the operating area of the future equipment.

PART II -- PRODUCTS15.6 MATERIAL AND EQUIPMENTA Pipe, Valves and Fittings

1. Steel pipe shall conform to ASTM A120, and shall be Schedule 40, black.
2. Short or close nipples shall be cut from extra strong pipe.
3. Malleable iron fittings for IPS threaded or flanged connections shall be malleable iron sprinkler-type fittings for 175 psi working water pressure, ANSI B16.3.
4. Unions: 2" in size and smaller shall be screwed; 2 1/2" and larger shall be standard flanged, or grooved end pipe with gasket and clamp such as Victaulic or equal.
5. Riser connection shall be as shown on the drawings.

B Valves, Bolts and Gaskets

1. Drain valves for sprinkler lines shall be 150 lb. bronze screwed, with renewable composition disc, angle globe, Crane No. 17, Jenkins No. 108A, Kennedy No. 90, or approved equal.
2. Flanged check valves shall be Crane No. 375, Kennedy No. 126, Darling No. 22Hc, or approved equal.
3. Shut-off valves shall be flanged gates OS&Y and double disc, Jenkins No. 875, Darling No. 52M, Kennedy No. 68, or approved equal.
4. Gasket material shall be Crane's "Cranite", or approved equal, 1/16" asbestos sheet packing. Gaskets shall be coated with thread lubricant when being installed.
5. Flange bolts shall be carbon steel conforming to ASTM A307, with square heads with hexagonal nuts of the same material. Both shall be fabricated per ANSI B18.2.

15.7 PIPE HANGERS AND SUPPORTS

- A Pipe hangers and supports shall be Grinnell, Carpenter & Peterson, Inc. "Witch", or approved equal, and equal to Grinnell's catalog numbers given in the following schedule. All hangers furnished for this installation shall be of one make, where possible.

<u>Suspended or Supported from</u>	<u>Structure Attachments</u>	<u>Rods</u>	<u>Pipe Hangers</u>
Steel Roof Purlins	Grinnel 87, with clip Elcen 29A, with clip	See below	104 (swivel) or 260 (clevis)
Riser Clamps	Grinnell 261 Clamp Elcen 40 Clamp		None

- B Rod sizes and spacing shall be in accordance with NFPA No. 13.

15.8 SPRINKLER SYSTEM ACCESSORIESA Automatic Sprinkler Heads

1. Sprinklers shall be Gem Model F950, upright type or approved equal.
2. All sprinklers shall be rated for 165 degrees F, or as required by NFPA No. 13.

- B Water Flow Switch shall be suitable for pipe mounting and two sets of N.O. contacts, Gamewell Co. Model No. PRS-9304, or approved equal, in sizes as required.

- C One Reserve Cabinet shall be furnished and installed near the alarm valve with six extra sprinkler heads and a wrench, all in accordance with NFPA No. 13, Section 3660, except that space for more than six heads is not required.

15.9 MISCELLANEOUS MATERIALS

- A Pipe sleeves shall be fabricated from Schedule 40 steel pipe.

B Escutcheon Plates shall be:

1. Furnished and installed for all pipes passing through floors, walls and ceilings.
2. Primed, suitable for finish painting.

3. Beaton & Carbin Mfg. Co. "Beacor" Plate 13 for steel pipe, or approved equal, stamped steel split type plates with set screws.

PART III -- EXECUTION

15.10 FABRICATION AND INSTALLATION

A Fire Sprinkler Piping

1. All piping shall be run true to line and grade, so that the finished work will present a neat and workmanlike appearance.
2. Locate all sprinkler heads as symmetrically as possible with the room dimensions, lighting fixtures and air outlets.
3. All pipes shall be installed to clear all obstructions and sized to conform to NFPA No. 13.
4. Pipe support hangers shall not be clamped to only one side of flanges of structural steel members unless mechanical restraints independent of clamping friction are also provided. One sided clamps are acceptable on C and Z shaped members with stiffening lip.
5. Piping shall be supported and laterally braced in accordance with the following:
 - a. The lateral bracing shall withstand a minimum force due to earthquake in accordance with the Uniform Building Code (UBC), 1985 Edition, for Earthquake Zone 4, times two.
 - b. The lateral bracing shall be in accordance with NFPA Standard 13 except as follows:
 - i. Feed and cross mains shall be braced to withstand a force under tension or compression equal to 100% of the weight of water-filled piping, utilizing a two-way sway brace in 2 1/2" and larger pipe.
 - ii. The Kl/r value for bracing shall not exceed 200.
 - iii. The allowable compressive stress for bracing shall be reduced in accordance with the Kl/r value as scheduled in the American Institute

of Steel Construction Specifications, 8th Ed., Section 1.5.1.3 and associated tables.

- c. Prior to final acceptance of any piping or sprinkler system, the bracing and supports shall be inspected and approved by the University representative.
- d. Care shall be taken to see that no valve or piece of apparatus is supporting the weight of any pipe.
6. Wherever changes in sizes of pipe occur, the changes shall be made with reducing fittings as the use of bushings will not be permitted.
7. The use of more than one piece of pipe when distance between fittings is less than 16' 0" will not be permitted.
8. Unions shall be installed on the downstream side of each screwed valve and at all points where necessary to facilitate disassembly of piping.
9. American Standard pipe threads shall be used throughout for IPS threaded work. No screwed joints shall be caulked or screwed up with rope or packing of any kind. In making up screwed joints, Crane or Kay White thread lubricant, or approved equal, shall be used and applied to male threads only.
10. Burrs formed by cutting tools shall be reamed out, and before installing, each section of the pipe shall be examined to see that it is clean and clear. All openings in the piping shall be closed during construction to keep the pipe free from dirt.
11. Steel pipe sleeves shall be installed and properly secured in place at all points where pipes pass through masonry or concrete and except where indicated otherwise on the drawings, shall be of sufficient diameter to provide approximately 1/2" clearance around the pipe. After installation of the pipe, the space between pipe and sleeves shall be packed with hemp and sealed watertight. Pipe sleeves and other penetrations of waterproof membranes shall be provided with integral flashing flange, clamping device and flashing shield.
12. Where pipes pass through walls, ceilings or floors, they shall be fitted with steel plates as specified hereinbefore. Plates must be securely held in position, allowing enough clearance to provide for expansion.
13. Pipe hangers shall be sized and spaced per NFPA No. 13.

14. Do not attach any pipe support or equipment directly to the metal roof deck. Piping shall be supported by hangers from structural members. In no case shall the support channel stresses exceed the unit fiber stress allowed by the Uniform Building Code, Chapter 27.

15. All valved branch connections to the sprinkler piping system used for low point drainage, high point venting or system testing shall have their discharge piping conform to NFPA Pamphlet No. 13, Section 3-11.4 with special attention to paragraph 3-11.4.1.

B Sprinkler Water Service and Outside Lines

Underground water service main and riser is existing.

C Valve Signs

Drain valves, inspector test valves, and control valves shall be fitted with approved enameled signs indicating their purpose and use.

15.11 CLEANING AND PRESERVATION

A The Subcontractor shall thoroughly clean all equipment, piping and all other materials installed under this Section, free from rust, scale, grease, thread lubricant, and all other dirt before the system is put in operation.

B All openings into pipes shall be effectively capped to keep out foreign matter during construction.

DIVISION 15

MECHANICALSECTION 15600 -- PIPINGPART I -- GENERAL15.1 SCOPE OF WORK

Piping work shall consist of, but not be limited to, the following items:

1. Stainless steel low conductivity water supply piping suitable for a working pressure of 250 psig at 100 degrees.
2. High pressure low conductivity water stainless steel distribution piping suitable for a working pressure of 200 psig at 100 degrees F.
3. Low pressure low conductivity water stainless steel and copper distribution piping suitable for 100 psig at 100 degrees F working pressure.
4. Low conductivity water pressure reducing station.
5. Low conductivity water temperature, pressure, and flow monitoring elements.
6. Copper 120 psi compressed air distribution.

15.2 APPLICABLE DOCUMENTS

Work under this Section and (other sections as applicable) shall be covered by the following codes and standards:

1. ANSI - American National Standards Institute
 - B 1.1 Unified Screw Threads
 - B 2.1 Pipe Threads
 - B31.1 Code for Pressure Piping
2. ASME - American Society of Mechanical Engineers
 - Boiler and Pressure Vessel Code, Sects. VIII and IX
3. ASTM - American Society for Testing and Materials
 - A182 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges
 - A193 Alloy-Steel Bolting Materials for High Temperature Service
 - A194 Carbon Steel and Alloy-Steel Nuts for High Pressure and High Temperature Service
 - A312 Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe
 - A403 Standard Specification for High Alloy Steel Welding Fittings
 - B 88 Type L-Copper Pipe
4. AWS - American Welding Society
 - A 5.4 Specification for Cover Corrosion Resisting Chromium and Chromium Nickel Steel Welding Electrodes
 - A10.4 Austenitic Chromium Nickel Stainless Steel Piping and Tubing

PART II -- PRODUCTS15.3 MATERIALSA Stainless Steel

1. Threaded Pipe: 304L stainless steel, Schedule 40, ASTM A312.
2. Welded Pipe: 304 L stainless steel, Schedule 10, ASTM A312.
3. Welded fittings: 304L stainless steel, Schedule 10 ASTM A403.