**SECTION 22 05 00**

**COMMON WORK RESULTS FOR PLUMBING**

**BASED ON DFD MASTER SPECIFICATION DATED 11/01/2019**

***This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.***

**P A R T 1 - G E N E R A L**

**SCOPE**

This section includes information common to two or more technical plumbing specification sections or items that are of a general nature, not conveniently fitting into other technical sections. Included are the following topics:

PART 1 - GENERAL

 Scope

 Related Work

 Reference

 Reference Standards

 Lead Free Requirements

 Quality Assurance

 Continuity of Existing Services

 Protection of Finished Surfaces

 Sleeves and Openings

 Sealing and Fire Stopping

 Equipment Furnished By Others

 Provisions for Future

 Submittals

 Off Site Storage

 Codes

 Certificates and Inspections

 Operating and Maintenance Data

 Record Drawings

PART 2 - PRODUCTS

 Access Panels and Doors

 Identification

 Sealing and Fire Stopping

 Bedding and Backfill

PART 3 - EXECUTION

 Demolition

 Excavation and Backfill

 Sheeting, Shoring and Bracing

 Dewatering

 Rock Excavation

 Surface Repair

 Concrete Work

 Cutting and Patching

 Building Access

 Equipment Access

 Coordination

 Identification

 Lubrication

 Sleeves and Openings

 Sealing and Fire Stopping

 Agency Training

**RELATED WORK**

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 07 84 00 – Fire Stopping

**REFERENCE**

Applicable provisions of Division 1 govern work under this section.

This section applies to all Division 22 00 00 sections of plumbing.

**REFERENCE STANDARDS**

Abbreviations of standards organizations referenced in this and other sections are as follows:

ABMA American Boiler Manufacturers Association

ACPA American Concrete Pipe Association

AGA American Gas Association

AMCA Air Movement and Control Association

ANSI American National Standards Institute

ARI Air Conditioning and Refrigeration Institute

ASME American Society of Mechanical Engineers

ASPE American society of Plumbing Engineers

ASSE American Society of Sanitary Engineering

ASTM American Society for Testing and Materials

AWWA American Water Works Association

AWS American Welding Society

CISPI Cast Iron Soil Pipe Institute

CGA Compressed Gas Association

CS Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS

DSPS State of Wisconsin Dept. of Safety and Professional Services, State Plumbing Code

EPA Environmental Protection Agency

FS Federal Specifications, Superintendent of Documents, U.S. Government Printing Office

GAMA Gas Appliance Manufacturers Association

IAPMO International Association of Plumbing & Mechanical Officials

IEEE Institute of Electrical and Electronics Engineers

ISA Instrument Society of America

MCA Mechanical Contractors Association

MICA Midwest Insulation Contractors Association

MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.

NBS National Bureau of Standards

NEC National Electric Code

NEMA National Electrical Manufacturers Association

NFPA National Fire Protection Association

NSF National Sanitation Foundation

PDI Plumbing and Drainage Institute

SMACNA Sheet Metal and Air Conditioning Contractors' National Association. Inc.

STI Steel Tank Institute

UL Underwriters Laboratories Inc.

Standards referenced in this section:

ACI 614 Recommended Practice for Measuring, Mixing and Placing of Concrete

ASTM D1557 Standard Test Method for Moisture-Density Relations of Soils

ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops

ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

D.O.T. Standard Specifications for Road and Bridge Construction, State of Wisconsin, Dept. of Transportation

UL1479 Fire Tests of Through-Penetration Firestops

UL723 Surface Burning Characteristics of Building Materials

**LEAD FREE REQUIREMENTS**

All materials that contact potable water shall be lead free. Lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤0.25%

per the Federal Safe Drinking Water Act as amended January 4th 2011 Section1417.

This requirement applies to all the subsequent Plumbing Specification Sections and Plumbing Drawings and supersedes any part or model number that may conflict with this requirement.

**QUALITY ASSURANCE**

Substitution of Materials: Refer to Section GC - General Conditions of the Contract, Equals and Substitutions.

All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the intended performance from the system into which these items are placed.

**CONTINUITY OF EXISTING SERVICES**

Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

***The engineer is expected to discuss the interruption of any service with the occupants of the building to determine how these changes can best be made. If work is required on weekends, nights, or holidays, this must be indicated in the specifications and/or on the drawings. Add specifics including location, which service, hours when work is to be scheduled, required sequencing with other work, etc.***

**PROTECTION OF FINISHED SURFACES**

Refer to Division 1, General Requirements, Protection of Finished Surfaces.

**SLEEVES AND OPENINGS**

Refer to Division 1, General Requirements, Sleeves and Openings.

**SEALING AND FIRE STOPPING**

Sealing and firestopping of sleeves/openings between piping, etc. and the sleeve or structural opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 Fire Stopping.

**EQUIPMENT FURNISHED BY OTHERS**

***This article is intended to alert the Contractor that the Owner will be furnishing some equipment that will have to be received, stored, installed, and/or which will need final connections for the completed project. In some cases, it may be appropriate to refer to other sections for a more complete description of the equipment being furnished or the work involved in installation.***

**PROVISIONS FOR FUTURE**

***Explain what systems or subsystems have been sized for future expansion and what the Contractor must do to maintain these provisions. This article is not needed if equipment is the only item that has been sized for future and the future capacity of that equipment is indicated on schedules.***

**OFF SITE STORAGE**

Prior approval by DFD and the A/E will be needed. The contractor shall submit Storage Agreement Form AD-BDC-74 to DFD for consideration of off site materials storage. Generally, sleeves, pipe/pipe fittings and similar rough-in material will not be accepted for off site storage. No material will be accepted for off site storage unless shop drawings for the material have been approved.

***Limitations on material for off site storage are being imposed due to poor experience in maintaining the quality of materials stored.***

**CODES**

Comply with requirements of Wisconsin Administrative Code.

**CERTIFICATES AND INSPECTIONS**

Refer also to Division 1, General Conditions, Permits, Regulations, Utilities and Taxes.

Obtain and pay for all required State installation inspections except those provided by the Architect/Engineer. Deliver the originals of inspection certificates and test records to the Owner's Project Representative. Include copies of the certificates and test records in the Operating and Maintenance Instructions.

***On projects involving the use of Federal funds, inset "and Federal" after "State" in the first line above. Note that in accordance with Wis. Stats. 13.48(13), this project is not ". . . subject to the ordinances or regulations of the municipality in which the construction takes place except zoning, including without limitation because of enumeration, ordinances or regulations relating to materials used, permits, supervision of construction or installation, payment of permit fees, or other restriction of any nature whatsoever."***

**SUBMITTALS**

Refer to Division 1, General Conditions, Submittals.

Shop drawing submittals are to be bound, labeled, contain the project manual cover page and a material index list page showing item designation, manufacturer and additional items supplied with the installation. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Include wiring diagrams of electrically powered equipment.

The specific items that will be required for submittals shall be coordinated with the DFD Project Representative, the A/E, and the General Prime Contractor for inclusion in the project submittal log.

Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

* Operating and Maintenance Manuals 2 copies
* Division of Facilities Development 1 copy
* Architect/Engineer 1 copy

# OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

1. Records of tests performed a to certify compliance with system requirements
2. Manufacturer's wiring diagrams for electrically powered equipment
3. Certificates of inspection by regulatory agencies
4. Valve schedules
5. Lubrication instructions, including list/frequency of lubrication
6. Parts lists for fixtures, equipment, valves and specialties.
7. Manufacturers installation, operation and maintenance recommendations for fixtures, equipment, valves and specialties.
8. Additional information as indicated in the technical specification sections
9. ***[A/E and commissioning provider to define detailed operation and maintenance data requirements for equipment specifications added to this section.]***

**TRAINING OF OWNER PERSONNEL**

Instruct user agency personnel in the proper operation and maintenance of systems and equipment provided as part of this project. Include not less than \_\_\_ hours of instruction, using the Operating and Maintenance manuals during this instruction. Demonstrate startup, operation and shutdown procedures for all equipment. All training to be during normal working hours. Video record all instructions and provide Owner with copy.

***The requirement for video recording training sessions may be deleted on some projects but not the requirement for the training itself. Contact DFD engineering personnel if guidance is needed.***

**RECORD DRAWINGS**

Refer to Division 1, General Requirements, Record Drawings.

**P A R T 2 - P R O D U C T S**

**ACCESS PANELS AND DOORS**

***Verify that the following products are specified in the sections indicated. Coordinate the location of all access panels and doors with the Architect. Where special products are required to provide access, the products should be specified in the General Prime Contractor portion of the specifications and installed by him. Where the exact number and size of panels/doors cannot be established, consider obtaining unit prices; refer to Instructions to Bidders.***

Lay-in Ceilings:

Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Section 09500 are sufficient; no additional access provisions are required unless specifically indicated.

Concealed Spline Ceilings:

Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used will be provided under Section 09500.

Metal Pan Ceilings:

Removable sections of ceiling tile held in position by a pressure fit will be provided under Section 09500.

MASONRY WALLS, GYPSUM BOARD AND Plaster Walls and Ceilings:

16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public or secured areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the item needing service; minimum size is 12" by 12".

***The plumbing engineer must coordinate this item with the architect so installation responsibilities, quantities, sizes and locations are defined on the bidding documents.***

**IDENTIFICATION**

Stencils:

Not less than 1 inch high letters/numbers for marking pipe and equipment.

Engraved Name Plates:

White letters on a black background, 1/16 inch thick plastic laminate, beveled edges, screw mounting, Setonply Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by W. H. Brady.

ADHESIVE LABELS:

Pressure-sensitive, adhesive backed, vinyl pipe markers with applicable labeling, ¾” min. size for lettering and surrounding tape on both ends. With flow arrows on piping. Conforming to ANSI, ANSI and NFPA standards. Seton Opti-Code, MSI, Brady or approved equal. Clean piping before application.

SNAP-AROUND PIPE MARKERS:

One-piece, preformed, vinyl construction, snap-around or strap-around pipe markers with applicable labeling and flow direction arrows, ¾" min. size for lettering. Provide nylon ties on each end of pipe markers. Equal to Seton Setmark.

Valve Tags:

Round brass tags with 1/2 inch numbers, 1/4 inch system identification abbreviation, 1-1/4 inch minimum diameter, with brass jack chains, brass "S" hooks or one piece nylon ties around the valve stem, available from EMED Co., Seton Name Plate Company, or W. H. Brady.

Underground Warning Tape:

Detectable underground warning tape, 5.0 mil overall thickness, 6" width, .0035" thick aluminum foil core with polyethylene jacket bonded to both sides. Color code tape and print caution along with name of buried service in bold letters on face of tape. Thor Enterprises Magnatec or equal by Carlton, MSI Marking Services, Seton.

UNDERGROUND TRACER WIRE:

All underground non-metallic sewers/mains and water services/mains shall be provided with tracer wire installations. Tracer wire installations shall conform with Section 182.0715(2r) of Wisconsin Statutes and prevailing DSPS Chapter 384 requirements. Tracer wire shall be continuous solid copper or steel plastic coated with split bolt or compression-type connectors.

**BEDDING AND BACKFILL**

Bedding up to a point 12" inches above the top of the pipe shall be thoroughly compacted sand or crushed stone chips meeting the following gradations:

 Gradation for Bedding Sand Gradation for Crushed Stone Chip Bedding

Sieve Size % Passing (by Wt) Sieve Size % Passing (by Wt)

1 inch 100 1/2 inch 100

No. 16 45 - 80 No. 4 75 - 100

No. 200 2 - 10 No. 100 10 - 25

Backfill above the bedding in lawn areas shall be thoroughly compacted excavated material free of large stones, organic, perishable, and frozen materials.

Backfill above the bedding under existing and future utilities, paving, sidewalks, curbs, roads and buildings shall be granular materials, pit run sand, gravel, or crushed stone, free from large stones, organic, perishable, and frozen materials.

**SEALING AND FIRE STOPPING**

FIRE AND/OR SMOKE RATED PENETRATIONS:

Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 “Fire Stopping”.

***Whenever possible, avoid penetrations of fire and smoke rated partitions. When they cannot be avoided, verify that sufficient space is available for the penetration to be effectively fire and smoke stopped.***

***A/E must identify locations of smoke partitions, fire rated walls and their hourly rating on drawings.***

NON-RATED PENETRATIONS:

***Select from the following paragraphs as appropriate to the project; not all are needed on every project.***

In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve. The operating bolts of the mechanical type seal shall be accessible from the interior of the building.

At pipe penetrations of non-rated interior partitions, floors and exterior walls, use urethane caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood partitions where sleeve is not required use urethane caulk in annular space between pipe insulation and wall material

**P A R T 3 - E X E C U T I O N**

**DEMOLITION**

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.

All pipe, fixtures, equipment, wiring and associated conduit, insulation and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the user agency for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

***Where demolition work is extensive or complex, separate details or drawings are required [rather than notes on the construction drawings] to accurately illustrate the extent of the work. Reproduction of photographs on the demolition drawings may be appropriate. Do not specify demolition work "as required" - it does not give the Contractor sufficient information for proper bid preparation. Identify each piece of equipment that is to be given to the user agency.***

**EXCAVATION AND BACKFILL**

Perform all excavation and backfill work necessary to accomplish indicated plumbing systems installation. Excavate to bottom of pipe and structure bedding, 4" in stable soils, 6" in rock or wet trenches and 8" in unstable soil. Finish bottoms of excavations to true, level surface.

Tunnel or remove sidewalk and curb in areas of excavation to the nearest joint. Remove pavements, curbs and gutters to neat and straight lines to the limits of removal. Make sawcut lines parallel to existing joints, or parallel or perpendicular to pavement edges to form a neat patch. Carefully remove remaining pavement within the sawcut area. Leave existing base materials between the area disturbed by the work and the sawcut line undisturbed by the sawcutting, pavement removal, or pavement replacement processes.

Strip topsoil from area to be excavated, free from subsoil and debris, and store for later respreading.

At no time place excavated materials where they will impede surface drainage unless such drainage is being safely rerouted away from the excavation.

Excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work. Remove debris and rubbish from excavations before placing bedding and backfill material.

Remove surplus excavated materials from site.

Verify the locations of any water, drainage, gas, sewer, electric, telephone or steam lines which may be encountered in the excavation. Underpin and support all lines. Cut off service connections encountered which are to be removed at the limits of the excavation and cap.

Provide and maintain all fencing, barricades, signs, warning lights, and/or other equipment necessary to keep all excavation pits and trenches and the entire subgrade area safe under all circumstances and at all times. No excavation shall be left unattended without adequate protection.

Elevations shown on the plans are subject to such revisions as may be necessary to fit field conditions. No adjustment in compensation will be made for adjustments up to two (2) feet above or below the grades indicated on the plans.

Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete and insure there is no disturbance of bearing soil.

Bed pipe up to a point 12" above the top of the pipe. Take care during bedding, compaction and backfill not to disturb or damage piping.

Mechanically compact bedding and backfill to prevent settlement. The initial compacted lift to not exceed 24" compacted to 95% density per Modified Proctor Test (ASTM D-1557). Subsequent lifts under pavements, curbs, walks and structures are not to exceed 12" and be compacted to 95% density per Modified Proctor Test. In all other areas where construction above the excavation is not anticipated within 2 years, mechanically compact backfill in lifts not exceeding 24" to 90% density per Modified Proctor Test. Route the equipment over each lift of the material so that the compaction equipment contacts all areas of the surface of the lift.

**SHEETING, SHORING AND BRACING**

Provide shoring, sheet piling and bracing in conformance with the Wisconsin Administrative Code to prevent earth from caving or washing into the excavation. Shore and underpin to properly support adjacent or adjoining structures. Abandon in place shoring, sheet piling and underpinning below the top of the pipe, or, if approved in advance by the engineer, maintained in place until other permanent support approved by the engineer is provided.

**DEWATERING**

Provide, operate and maintain all pumps and other equipment necessary to drain and keep all excavation pits, trenches and the entire subgrade area free from water under all circumstances. Obtain general permit from the Wisconsin Department of Natural Resources district office for discharge of construction dewatering effluent. Obtain well permit from the Wisconsin Department of Natural Resources district office for dewatering wells discharging more than 70 GPM. Comply with permit requirements.

**ROCK EXCAVATION**

Remove rock encountered in the excavation to a minimum dimension of six (6) inches outside the pipe. Rock excavation includes all hard, solid rock in ledges, bedded deposits and unstratified masses, all natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock; which material is so hard or so firmly cemented that in the opinion of the Engineer it is not practical to excavate and remove same with a power shovel except after thorough and continuous drilling and blasting. Rock excavation includes rock boulders of 1/2 cubic yard or more in volume.

Rock excavation will be computed on the basis of the depth of rock removed and a trench width two (2) feet larger than the outside diameter of the pipe where one (1) pipe is laid in the trench and three (3) feet larger than the combined outside diameter where two (2) pipes are laid in the trench. Include 6" pipe and structure bedding in rock excavation. Include rock excavation shown on the plans in the Base Bid.

**SURFACE RESTORATION**

Completely restore the surface of all disturbed areas to a like condition of the surface prior to the work. Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.

Lawns: Topsoil with 4" of clean, friable, fertile topsoil conforming to D.O.T. Section 625, free from debris, lumps, rocks, roots, plants and seeds. Grade surfaces to match adjacent elevations. Rake smooth, free of lumps and debris. Sod with good quality nursery sod conforming to D.O.T. Section 631, be uniform, dense, free from weeds and consist of approximately 60% Kentucky blue grass and the balance perennial rye, fescue and white clover. Place sod with joints staggered and abutting. Maintain lawn areas for one month after installation. Contractor ***(user agency)*** will be responsible for necessary watering and mowing. Do necessary weeding, repair, reseeding or resodding until uniform catch is obtained.

***If seeding is used in lieu of sod, insert the following: Fertilize topsoiled areas with fertilizer conforming to D***

Curb and Gutter: Concrete curb and gutter conforming to city requirements and D.O.T. Section 601, Type D or L.

Sidewalk and Walkways: Non-reinforced concrete conforming to D.O.T. Section 602, thickness to match existing, cross slope of one-fourth inch per foot, scored into squares approximately equal to width.

Bituminous Concrete Pavements: 4" thick crushed stone base course conforming to D.O.T. Section 304 (excluding 304.2.4) and two pass bituminous concrete pavement conforming to D.O.T. Section 407, first course 1-1/2" binder, second course 1-1/2" surface.

**CONCRETE WORK**

Cast-in-place concrete within the building will be performed by the Division 3 Contractor unless otherwise noted. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for support or installation of plumbing piping, fixtures, specialties and equipment. Coordinate locations of equipment, pipe penetrations in wet areas, etc. with the Division 3 Contractor.

Plumbing related cast-in-place concrete on the exterior of the building to be provided by this Contractor in conformance with requirements of Division 3. This includes piping thrust restraints, pipe supports, hydrant supports, manholes, catch basins, grease traps, septic tanks, distribution boxes, valve pits, meter pits, cleanout cover pads, yard hydrant pads, etc.

***For minor concrete work where Division 3 is not available, use the following: Provide cast in place concrete for equipment pads, manhole bases and thrust blocks. Concrete to be 3,000 psi at 28 days, 3/4 inch aggregate, five bags cement, three inch slump, air entraining admixture. The ACI 614 Recommended Practice for Measuring, Mixing and Placing of Concrete shall constitute the execution requirements.***

***Concrete work will require editing for each project. In general, concrete work should be performed by Division 3 to reduce cost and trade jurisdiction conflicts. Some projects may have interior concrete work which is more appropriately performed by Plumbing Contractor.***

***Coordinate the quantity and location of cast-in-place concrete work with the architectural drawings. This includes equipment pads, piping and equipment supports, raised floor pipe penetrations in wet areas, concrete floor or wall replacement and similar work.***

***Exterior plumbing related concrete work not normally shown on architectural drawings should be left as the responsibility of the plumbing Contractor.***

**CUTTING AND PATCHING**

Refer to Division 1, General Requirements, Cutting and Patching.

**BUILDING ACCESS**

Arrange for the necessary openings in the building to allow for admittance or removal of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

**EQUIPMENT ACCESS**

Install all piping, conduit and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Prime Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Plumbing Contractor and installed by the General Prime Contractor.

***The Plumbing engineer must coordinate access doors with the architect so installation responsibilities, quantities, sizes and locations are defined on the bidding documents.***

Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

**COORDINATION**

Coordinate all work with other contractors prior to installation. Any work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

**IDENTIFICATION**

Identify equipment in mechanical equipment rooms by stenciling equipment number and service with one coat of black enamel against a light background or white enamel against a dark background. Use a primer where necessary for proper paint adhesion.

Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

Identify interior piping not less than once every 30 feet, not less than once in each room, adjacent to each access door or panel, and on both side of the partition where accessible piping passes through walls or floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel against a light background or white enamel against a dark background.

Identify all exterior buried piping for entire length with underground warning tape except for sewer piping which is routed in straight lines between manholes or cleanouts. Place tape 6"-12" below finished grade along entire length of pipe. Extend tape to surface at building entrances, meters, hydrants and valves. Where existing underground warning tape is broken during excavation, replace with new tape identifying appropriate service and securely spliced to ends of existing tape.

Identify valves with brass tags bearing a system identification and a valve sequence number. Identify medical gas and vacuum valves with brass tags and wall or cabinet mounted color coded engraved nameplate with the following "(Type of Gas) Shutoff Valve for (Location or Zone)". Valve tags are not required at a terminal device unless the valves are greater than ten feet from the device, located in another room or not visible from device. Provide a typewritten valve schedule and pipe identification schedule indicating the valve number and the equipment or areas supplied by each valve and the symbols used for pipe identification; locate schedules in mechanical room and in each Operating and Maintenance manual. Schedule in mechanical room to be framed under clear plastic.

**LUBRICATION**

Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the manufacturer's instructions until the work is accepted by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

**SLEEVES AND OPENINGS**

Pipe penetrations in new poured concrete horizontal construction requiring F and T rating: Form opening using hole form or core drill opening. Alternatively provide cast in place fire stopping devices/sleeves.

Pipe penetrations in new poured concrete horizontal construction requiring F rating but no T rating: Same as pipe penetrations in new poured concrete construction requiring F and T ratings except that schedule 40 steel sleeves may also be used.

Pipe penetrations in new poured concrete horizontal construction that do not require F or T ratings: Provide schedule 40 steel pipe sleeve, form opening using hole form or core drill opening.

Pipe penetrations in existing concrete floors: Core drill openings.

Pipe penetrations through existing floors located in food service areas that do not require a T rating: Core drill sleeve opening large enough to insert schedule 40 sleeve, extend sleeve 2 inches above the floor and grout area around sleeve with hydraulic setting, non-shrink grout. Size sleeve to allow insulated pipe to run through sleeve and paint the sleeve.

***Edit the above list for each project. Add other locations where appropriate.***

Where penetrating pipe or conduit weight is supported by floor, provide manufactured product or structural bearing collar designed to carry load.

**SEALING AND FIRE STOPPING**

FIRE AND/OR SMOKE RATED PENETRATIONS:

Provide all fire stopping of fire rated penetrations and sealing of smoke rated penetrations in compliance with section 07 84 00 Fire Stopping.

NON-RATED PARTITIONS:

***Select from the following paragraphs as appropriate to the project; not all are needed on every project.***

In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the pipe and tighten in place, in accordance with manufacturer's instructions. . The bolt heads for the mechanical seal shall face the inside of the building to facilitate repair or replacement of the seal.

At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve or cored opening and the pipe or insulation is completely blocked.

PENETRATIONS SUBJECT TO WATER INTRUSION:

For penetrations (both rated and non-rated) in floors subject to water intrusion or in rooms housing electrical equipment (but not within walls) provide one of the following:

* Pipe penetration where steel pipe sleeve is used extend steel sleeve 2” above the floor.
* Pipe penetration where cast in place fire stopping device/sleeve is used, extend device/sleeve 2” above the floor (provided it meets the device’s UL listing).
* Pipe penetration where there is no steel sleeve or cast in place fire stopping device/sleeve, provide 2”x 2” x 1/8” galvanized steel angles fastened to floor surrounding the penetration or group of penetrations to prevent water from getting to penetration. Provide urethane caulk between angles and floor and fasten angles to floor minimum 8”on center. Seal corners water tight with urethane caulk.

Floors subject to water intrusion or rooms housing electrical equipment include the following locations:

* Food Service/Kitchen Areas
* Walk In Coolers/Freezers
* Laundries
* Restrooms
* Locker/Shower Rooms
* Janitor Rooms w/ Sinks
* Wet Laboratories
* Mechanical/Plumbing Equipment Rooms
* Swimming Pool Rooms/Pool Equipment Rooms
* Chemical/Hazardous Waste Storage
* Maintenance/Industrial Shops
* Vehicle Storage and Parking Ramps
* Greenhouses
* Data/Telecommunications Rooms
* Electrical Equipment Rooms

***Edit the above list for each project. Add other locations where appropriate.***

***Consultant shall coordinate details on drawings with the above sleeve specification.***

Provide waterproof caulk sealant top coating on fire stopping system (or other approved means to protect the fire stopping system from water) in areas subject to wash down such as Food Service and Dish Washing Areas.

# AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 01 91 01 or 01 91 02.

Contractor to provide factory authorized representative and/or field personnel knowledgeable with the operations, maintenance and troubleshooting of the system and/or components defined within this section for a minimum period of [XX] hours.

END OF SECTION