SECTION 230515

HVAC PIPING, MATERIALS, EQUIPMENT AND METHODS

Part 1 GENERAL

1.1 STIPULATIONS

A. The General Conditions, drawings and all other attached documents form a part of this Section and all other Sections by reference thereto and have the same force and effect as if printed herewith in full. The Contractor shall be strictly accountable for the cognizance of carrying out the provisions thereof.

Part 2 PRODUCTS

2.1 GENERAL

A. Furnish and install pipe, fittings, valves and accessories as shown on plans and/or as specified herein.

B. Fittings and Joints

1. All fittings 2" and under, unless otherwise specified, shall be screwed or solder type. All fittings 2-1/2" and larger shall be welded pipe fittings.

2. All joints in pipe 2" and under unless otherwise specified, shall be screwed or solder couplings. All joints in pipe 2-1/2" and larger shall be butt welded.

3. All pipe 2-1/2" and larger shall have their final connections to apparatus made with companion flanges. Pipes 2" and smaller shall be connected with screwed ground joint unions, unless otherwise specified, or noted on plans.

4. The process known as "TEE DRILL" will not be an accepted method for the fitting and joining of piping.

C. Piping: All piping shall follow the general arrangement shown and shall be accurately cut to measurements established from the work by the Contractor and shall be installed in place without springing or forcing. The location of all piping shall be such that a neat and workmanlike installation shall be secured. Provisions for expansion and contraction of all piping shall be made with approved means of expansion compensation.

D. Piping Materials

1. Gas Piping (LPG and/or Natural): All gas piping within the building shall be schedule 40 black steel pipe (ASA B36.10) with banded or beaded malleable iron fittings (except stop cocks and valves). Running threads, right and left couplings, cast iron fittings, or solder type fitting shall not be used.

a. Any underground gas piping shall be mill coated or plastic coated, as approved by the gas supplier, schedule 40 black steel pipe with welded joints and welding fittings and bends.

b. The welding procedures and the quality of the welding shall conform to the procedures and processes in ASA Spec. B31-1.8-55 code for Pressure Piping for Welds on piping systems.

2.2 STEEL PIPING

A. Governing Code: All piping shall be designed, fabricated and installed in accordance with the American Standard Code for Pressure Piping ANSI B31.1.

B. Materials - Pipe: Welded or seamless pipe as required by the applicable section of the American Standard Code for Pressure Piping.

C. Welding Fittings: U.S.A. factory made wrought carbon steel butt welding fittings conforming to ASTM Spec. A234 and ANSI Standard B16.9.

D. Flanges: U.S.A. factory-forged flanges as follows: U.S.A. factory-forged flanges as follows: 150 lbs. and 300 lbs. classes per ASTM Spec. A181 and ANSI Standard B16.5

E. Welding Electrodes for all Sizes: Electrodes for welding shall conform to ASTM A233.

F. Gas Welding Rods for Sizes 4" and Smaller: Commercial steel gas welding rods per ASTM A251, GA60.

2.3 MATERIALS

A. General

1. Where specification numbers are indicated, they shall include the latest amendment in effect at the date of this contract.

2. Each length of pipe and each pipe fitting, valve, etc., or device, used in this contract shall have stamped, cast or indelibly marked on it the maker's name or mark, the weight, type and class of product, when such marking is required by the approved standard that applies.

B. Malleable Iron Fittings: Black or galvanized, IPS, conforming to ANSI Spec. B16.3.

C. Unions

1. 2" and smaller - unions shall be provided adjacent to all equipment or wherever necessary to facilitate the removal of equipment for repair or replacement. Flange Unions - 2-1/2" and larger - forged steel, 150 lbs. conforming to ANSI Spec. B16.5.

2. Unions for steel pipe shall be ground joint, iron body with brass or bronze to iron seats, 150 lbs. working pressure.

3. Unions for copper pipe shall be ground joint, cast bronze.

4. No lip type unions or long screws shall be permitted.

D. Sleeves, Floor Plates and Penetration Seals

1. All pipes passing through floors, walls or ceilings, shall be provided with a galvanized sheet steel sleeve and where exposed, shall have a chrome plated floor or ceiling plate securely fastened around each pipe as manufactured by Pipe Shields, Inc. or accepted equal.

2. All pipes passing through fire and smoke-rated walls and floor, and any smoke partition shall use Pipe Shields, Inc. (PSI) fire and smoke-rated wall and floor units or accepted equal. All assemblies shall have a 1- and 2-hour rating in accordance with the ASTM E119 test procedures. Packing materials between annular space and piping shall be UL rated ceramic fiber, Flameseal as manufactured by Nelson, or 3M Brand Fire Barrier CP25 WB.

3. Unless other indicated, sleeves shall be of such size as to provide a minimum of 1/4 inch all around clearance between bare pipe and sleeves or between jacket over insulation and sleeves.

4. Bare Pipe - PSI Model F3000 series.

   Insulated Pipe
   Return - PSI Model F1000 series.
   Plastic Pipe - Bare or Insulated Lines - PSI Model F1800 series.

5. Where sleeves project slightly from floors, special deep-type escutcheons shall be used. Escutcheons shall be secured to pipe or pipe covering and shall be chromium-plated iron or chromium-plated brass, either one-piece or split pattern, held in place by internal spring tension or setscrew.

6. All pipes passing through fire-rated separations shall be sealed around sleeve and pipe with Flameseal as manufactured by Nelson or equal as accepted to provide a vapor tight seal and a 2 hour UL listed firestop.

7. All pipe through exterior wall or underground building penetrations shall be sealed with a positive hydrostatic seal. The modular mechanical seal assembly shall consist of interlocking rubber links shaped to fill the annular space between the pipe and steel wall sleeve. The seal shall be Link Seal Century Line Model CS100 with water stop and anchor plate at least 4" larger than the main outside diameter. The entire assembly seal and sleeve shall be sized and furnished by the Thunderline Corporation's authorized representative. The Link Seal shall be Model "C" for pipe design temperatures of +250 degrees Fahrenheit insulating type.

E. Pipe Hangers

1. Hangers for pipe up to 6" in diameter shall be carbon steel, electro-galvanized ASTM - Type LS, UL listed, FM approved, Model No. 10 as manufactured by Penn Construction Industries, ITT Grinnell Corporation or Milwaukee.

2. Where hangers support copper tubing, use Penn Construction Industries Fig. No. 10, with a complete polyvinyl coating bonded to and fused to ring to prevent contact with copper piping. Copper tubing lines shall not be (even temporarily) supported or secured to ferrous metals. Where copper tubing piping or fittings are anchored, supported, or may come in contact with metal construction, an insulating non-conductor spacer, similar to lead, rubber, fiber or an approved equal, shall be installed to assure prevention of electrolysis.

3. On pipe over 6" in diameter use Clevis ring Fig. 10WS or as required for copper piping.

4. Pipe hangers supporting insulated pipe shall be Penn Construction Industries No. 10WS.

5. Where two or more pipes run parallel the Contractor may use trapeze hangers made of 1-1/2" black steel pipe, ends capped. Hanger rods shall be 3/8" minimum for pipe sizes 1/2" to 1-1/4", 1/2" minimum for pipe sizes 1-1/2" to 3", 5/8" minimum for pipe 3-1/2" to 6", 7/8" minimum for pipe 8" to 12" and 1" for pipe 14" to 20".

6. All insulated piping will be protected at the point of support by pre-insulated pipe supports by Pipe Shields, Inc. (PSI), Insulshield or Uni-Grip. refrigerant lines - PSI Model CS-CW; all other insulated lines - PSI Model CS.

7. When pipe hangers span greater than 10' and for all pipe roller application use PSI, CSX and CSX-CW (heavy duty units).

F. Riser or Stack Clamps: Clamps shall be Grinnell 261, Michigan 510, Grabler 31 or accepted equal.

G. Anchors: Anchors shall consist of heavy steel collars with lugs and bolts for clamping and attaching anchor braces, unless otherwise indicated.

H. Electrolysis Control

1. When non-ferrous metallic tubing or piping is connected to ferrous piping, fittings or equipment, it shall be accomplished with the use of dielectric fitting or union, Model FX or GA as required as manufactured by Epco Sales, Inc., Clearflow fittings by Victaulic Co. of America, or accepted equal.

2. An acceptable dielectric union, similar to Model GH as manufactured by Epco Sales, Inc., Clearflow fittings by Victaulic Co. of America, or acceptable, shall be installed on all copper pipelines leaving or entering building to arrest and retard electrolytic action.

3. All dielectric unions shall contain Epconite #5 gaskets rated at 286°F indefinite time and 299°F for a ten-minute time limit.

2.4 VALVES

A. General

1. All valves shall be products regularly produced for the specified service and rating in accordance with the manufacturer's catalog or engineering data. All valves shall be marked with the manufacturer's name or trademark, the recommended service, pressure, and size by letters and figures, cast on the body of the valves. Valve descriptions are taken from the Milwaukee Valve Company catalog or as otherwise noted equivalent products meeting the minimum standard of performance as set forth in the following.

2. Valve packing containing asbestos material will not be permitted.

3. Bronze gate and globe valve shall be equipped with an hexagon gland follower.

4. Valves, except check valves, shall be capable of being packed under pressure when wide open by means of a beveled back seat and bonnet.

5. Bronze valves shall be manufactured in U.S.A. to the extent possible and at least 90% of the manufacturer's total production. Manufacturers that do not own a U.S. foundry will not be considered as a United States manufacturer.

B. Materials

The following is a composite list of valves, all valves may not be used on this project.

1. Natural Gas

a. 2 inch and smaller

(1). Class 175; semi-steel body; semi-steel, lubricated plug; wrench operated; screwed end.

Resun	R-1430
Nordstrom	142
Milwaukee	BB2-100

Part 3 EXECUTION

3.1 TESTING

A. General

1. This work shall include the testing of all piping and apparatus in the system for leaks, faulty joints, improper connections, etc. This Contractor shall notify the Department in sufficient time so that he can be represented for all tests.

3.2 GAS PIPING

A. Unions shall be ground joint type and center punched to prevent loosening. Final connection to gas equipment may be made with AGA listed flexible or semi-rigid connectors and fittings. Where pipe is to be installed concealed in partitions or other generally inaccessible areas, the number of fittings shall be minimum. Unions and swing joints made of a combination of fittings shall not be used.

1. An approved cock or stop shall be accessibly installed ahead of each gas burning piece of equipment.

2. All piping shall be in accordance with the recommendations and requirements of the AGA, ASA Z21.30, and the gas supplier. This Contractor shall confer with the gas supplier before starting work and their instructions or recommendations on installation details shall be followed.

3.3 STEEL PIPING

A. All pipe, fittings, and flanges shall be cleaned and thoroughly degreased before assembly.

3.4 MATERIALS

A. Expansion Joints: Piping shall have guides on either side, four (4) pipe diameters and eighteen (18) pipe diameters from the joint.

B. Sleeves, Floor Plates and Penetration Seals

1. All pipes passing through floors, walls or ceilings, shall be provided with a galvanized sheet steel sleeve and where exposed, shall have a chrome plated floor or ceiling plate securely fastened around pipe as manufactured by Pipe Shields, Inc.

2. Pipes passing through concrete or masonry wall or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. Sleeves shall not be installed in structural members except where indicated or approved. Each sleeve shall extend through its respective wall, floor, or roof, and shall be cut flush with each surface. Unless otherwise indicated, sleeves shall be of such size as to provide a minimum of 1/4 inch all around clearance between bare pipe and sleeves or between jacket over insulation and sleeves. Sleeves in bearing walls, waterproofing membrane floors, and wet areas shall be steel pipe or cast-iron pipe. Sleeves in non-bearing walls, floors, or ceilings may be steel pipe, cast iron pipe, galvanized

sheet metal with lock-type longitudinal seam and of the metal thickness indicated, or moisture resistant fiber or plastic. Except in pipe chases or interior walls, the annular space between pipe and sleeve or between jacket over insulation and sleeve shall be sealed as indicated and specified. Pipes passing through wall waterproofing membrane shall be sleeved as specified above, and a waterproofing clamping flange shall be installed.

3. Pipes passing through roof or floor waterproofing membrane shall be installed through a pipe portal curb. Portal shall be suitably formed, and skirt or flange shall extend not less than 8 inches from the pipe and shall be set over the roof or floor membrane and sealed in a manner approved by the roof membrane manufacturer. The flashing sleeve shall extend up the pipe a minimum of 2 inches above highest flood level of the roof or a minimum of 10 inches above the floor. The annular space between the sleeve and the bare pipe or between the sleeve and the metal-jacket-covered insulation shall be sealed.

4. Escutcheons shall be provided at all finished surfaces where exposed piping, bare or insulated, passes through floors, walls, or ceilings except in boiler, utility, or equipment rooms.

5. This Contractor shall determine the required inside diameter of each wall opening or sleeve to fit the pipe and link seal. The link seal size and model shall be as recommended by the manufacturer to fit the pipe and wall opening. The Contractor shall install in strict accordance with the manufacturer's instructions. Ground side contact annular space around sleeve shall be grout sealed; interior or service side annular space around sleeve shall be caulked shut.

C. Piping: Piping shall be properly anchored to direct the expansion to bends or expansion joints.

D. Riser or Stack Clamps: Shall be installed wherever piping lines pass from one floor to another. Risers to be supported independently of connected horizontal piping.

E. Anchors: Anchors shall be provided where necessary or indicated to localize expansion or prevent undue strain on piping. Anchor braces shall be installed in the most effective manner to secure the desired results, using turnbuckles where required. Supports, anchors, or stays shall not be attached in places where they injure the construction during installation, or by the weight of or expansion of the pipeline.

F. Anchor Braces: The anchors shall be suitably fastened to the building construction so that they will not pull out of place nor impose adverse loads on the building structural members. Steel for anchors shall be provided by this Contractor.

3.5 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

Nominal Diameter	Steel Pipe Spacing	Rod Size	Copper Tubing	
			Spacing	Rod Size
1/2"	5'-0"	3/8"	5'-0"	3/8"
3/4"	6'-0"	3/8"	6'-0"	3/8"
1	7'-0"	3/8"	6'-0"	3/8"
1-1/4"	8'-0"	3/8"	7'-0"	3/8"
1-1/2"	10'-0"	3/8"	8'-0"	3/8"
2"	10'-0"	3/8"	9'-0"	3/8"

Nominal Diameter	Steel Pipe Spacing	Rod Size	Copper Tubing	
			Spacing	Rod Size
2-1/2", 3"	10'-0"	1/2	10'-0"	1/2"

B. Where unusually concentrated loads of valves and fittings occur, closer spacing shall be required. Submit specific cases for review and comments.

C. Where piping changes direction, supports shall be placed in each direction adjacent to joints and no more than 12" from the joint.

D. Piping larger than 16" shall be supported according to the details on the drawings.

E. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.

F. Place a hanger within 12 inches of each horizontal elbow.

G. Use hangers with 1-1/2-inch minimum vertical adjustment.

H. Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers. Hanger spacing shall be as scheduled above for the smallest pipe on the trapeze.

I. Hangers shall be securely fastened to building construction. Where necessary, beam clamps, expansion bolts or through bolts and plates or concrete hooks shall be used. Wooden plugs shall not be permitted.

3.6 ELECTROLYSIS CONTROL

A. The installation of non-ferrous metallic tubing on piping shall be accomplished in such a manner as to prevent it from coming in contact with ferrous metals. Where non-ferrous metallic tubing, piping or fittings are anchored, supported or may come in contact with ferrous metals, an insulating non-conducting spacer similar to rubber, fiber or other approved material, shall be installed to assure the prevention of electrolysis.

B. Hangers supporting non-ferrous metallic tubing or piping shall be large enough to accommodate the insulation pipe covering. Non-ferrous metallic tubing or piping shall not be (even temporarily) supported or secured to ferrous metals.

3.7 VALVES

A. General

1. Provide valves as shown on the drawings, herein specified or as required by code. To the extent possible, all valves shall be of one manufacturer.

2. Valves shall be located and arranged to ensure proper accessibility and operation.

END OF SECTION