

**SECTION 230500 – COMMON WORK RESULTS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

1.2 GENERAL CONDITIONS:

- A. The contractor shall carefully read the General Conditions of the Contract and all information to bidders which, with the following specifications for heating, cooling, plumbing, exhaust, ventilation, and temperature control are a part of the Contract.
- B. The Test and Balance Contractors shall submit their bids to the General Contractors.

1.3 WORK INCLUDED:

- A. The work to be done under this section includes the furnishing of all labor, materials, equipment, accessories required to complete all heating, air conditioning, ventilating, plumbing, and other mechanical systems as show on plans and described in these specifications or required to properly complete the entire work.

1.4 CODES AND ORDINANCES:

- A. The work shall be installed in accordance with the following codes: 2006 IBC, 2006 IMC, 2006 IPC, 2005 NEC, 90.1 Energy Code, 2004 Utah Pressure Vessel code, and any other state, local or government code or ordinance that governs the type of work covered by these specifications. Should the drawings conflict with the code, the code shall govern the proper installation of the work, and no extra charge shall be made for such change.

1.5 SUBSTITUTIONS AND PACKAGE PRICING:

- A. No substitutions or prior approvals are allowed for mechanical equipment. Suppliers who group products into packages for package pricing must breakout individual prices at the request of the contractor, engineer, or owner. Suppliers who refuse to breakout prices, especially those who may have a sole-source item, will not be allowed to submit prices to the contractors, and the engineer will issue an addendum to omit their products from the project.

1.6 FEES AND PERMITS:

- A. This contractor shall obtain all necessary permits and pay all fees required in connection with the work.

1.7 SITE INSPECTION AND EXAMINATION OF DRAWINGS:

- A. The contractor shall carefully study all drawings and specifications pertaining to the work. If any of the work as laid out, indicated, or specified is contrary or conflicts with any governing ordinances or regulations, the same shall be reported to the Owner's representative before submitting a bid. The Owner's representative will then issue instructions as to procedure. The contractor shall carefully examine the building site and

compare the drawings with existing conditions. By the act of submitting a bid, the contractor shall be deemed to have made such examination, and to have accepted such conditions, and to have made allowance therefore in preparing his bid.

1.8 RECORD DRAWINGS:

- A. The contractor shall provide and keep up to date a complete record set of ozalid prints which shall be corrected daily to show change from the original drawings and specifications, the size and kind of equipment, and runs of all pipes, etc. Prints for this purpose will be furnished by the Owner's Representative. This set of drawings shall be kept on the work and shall be used only as record set. Upon completion of the work, the set of record drawings shall be turned over to the Owner's Representative.

1.9 GUARANTEE:

- A. By the acceptance of the contract award for the work herein described, the contractor assumes the full responsibility imposed by the guarantee as set forth herein and should protect himself through proper guarantee from equipment and specialty manufacturers and subcontractors as their interests may appear.
- B. All materials and equipments provided and installed under this division of the specifications shall be guaranteed for a period of **one (1) year** from the date of substantial completion and acceptance by the Owner, unless specifically noted elsewhere in the specification. Should any trouble develop during this period due to defective materials to correct the trouble without any cost noticed at the time of installation and/or during the guarantee period shall be corrected immediately to the entire satisfaction of the Owner's Representative.

1.10 PAINTING:

- A. All equipment which is to be furnished in factory prefinished conditions by the mechanical contractor shall be left without mark, scratch, or impairment to finish upon completion of job. Any necessary refinishing to match original shall be done. Do not paint over nameplates, serial numbers, or other identifying marks. Paint all bare piping and bare steel brackets, etc. with one coat primer and two coats enamel. Color by Architect. Paint walls in all places where the mechanical contractor is called to do so on the plans because of new penetrations, etc.

1.11 SCHEDULES, MATERIALS, AND EQUIPMENT:

- A. As soon as practicable, and within 14 days after date of award of contract, and before commencement of work, a complete schedule of equipment and materials proposed for installation shall be submitted to the Owner's Representative. The schedule shall include catalogs, cuts, drawings, and such other descriptive data or samples that are requested by the Owner's Representative. Schedules shall include all items of equipment used. No partial submittals will be accepted. Provide four copies minimum.

1.12 OPERATING INSTRUCTIONS AND CATALOG INFORMATION:

- A. This contractor shall compile in loose-leaf binders catalogs containing the following: Master index, contractor and vendor list and phone numbers and addresses, general HVAC description, startup procedures, ATC schematics, maintenance instructions, balancing reports, and all equipment data sheets. Four copies shall be given to the Engineer for his approval.

1.13 EQUIPMENT, PIPE AND DUCT IDENTIFICATION:

- A. All plumbing, heating, air conditioning, automatic temperature control equipment (excluding thermostats and relays), and distribution systems shall be labeled. Electrical switches and starters for mechanical equipment shall also be labeled.
- B. Equipment labels shall be black face formica with white engraved lettering 3/16" high or larger, and shall be attached securely.
- C. Equipment nameplates shall include the following minimum information:
  - a. Plan identification
  - b. Capacity specified at designed operating conditions
  - c. Actual capacity as balanced at site operating conditions
  - d. Area or zone served
- E. All valves, regardless of size, shall have brass tags at least 1" by 3" in size and 0.051 inches thick. Lettering on the tag shall be engraved at least 1/8 inch high. Each valve on the drawing shall be identified separately, and valve tags shall match the drawing identification.
- F. Valve tags shall be connected to valve stems by steel rings and include the following minimum information:
  - a. Plan Identification
  - b. Normal Position
  - c. Duty
  - d. Area Served
  - e. Valve Type
- G. Additionally, Heating Water Valves, Steam Valves, and all Valves located in the secondary (low pressure) side of HTW Heat Exchangers shall include the Manufacturer, Size, Grade, and Pressure-Temperature service rating.
- H. All accessible duct and piping shall be color coded and identified with wording and arrows every 50 feet, at each riser, at each junction, at each access door, and where required to easily identify the medium transported.
- I. Duct and piping systems shall be identified by:
  - a. Background color
  - b. Lettering color, and
  - c. Flow Direction Arrow
- J. Duct and Piping Background Color shall be applied to all exposed piping (either over bare pipe or the insulation) in mechanical rooms. Identifying lettering and arrows shall then be added as indicated above, and as necessary to be visible from anywhere in the room.
  - a. For duct in mechanical rooms, chases, and other exposed areas, as well as piping routed in other exposed areas such as chases, background color shall be applied in a two foot (2'-0") wide band with identifying lettering and a flow direction arrow.
  - b. Background and lettering shall be semi-gloss enamel paint by DeVoe (Mirrolac), Pratt and Lambert, Glidden, Rust-Oleum, Sherwin Williams or approved equal. The colors specified herein shall not be varied.

Color	Sherwin Williams	Pratt & Lambert	Rust-Oleum
Red	SW4081 Safety Red	1007 Vibrant Red	964 Federal Safety Red
Orange	SW4083 Safety Orange	S4507 Safety Orange	956 Federal Safety Orange
Yellow	SW4084 Safety Yellow	1732 Spectrum Yellow	944 Federal Safety Yellow
Green	SW4085 Safety Green	Safety Green	933 Federal Safety Green
Blue	SW4086 Safety Blue	1228 Anchors Aweigh	925 Federal Safety Blue
Purple	SW4080 Plum	Bright Medium	Bright Medium
Silver (Aluminum)	B59S11 Silver Brite	--	--
Black	Black	Effecto Black	634 Black
White	White	Effecto White	2766 White
Brown	SW4001 Bolt Brown	2278 Char Brown	--

Note: Experience has shown that Mirrolac works well in this application, being durable with excellent coverage.

- c. Identifying lettering shall be painted or stenciled on duct or pipe over the background color. Self-adhesive or glue-on type labels are acceptable. Letters shall be 2" high for duct and larger piping 3" or more, 1" high for 1-1/4" to 2-1/2" pipe, and 1/2" high for 1" pipe and smaller.
- d. Arrows to indicate direction of flow shall be painted over the background color in the same color as the lettering. The arrow shall point away from the lettering. On duct and large piping 3" or more in diameter, the "shaft" of the arrow shall be 2" long and 1" wide. Smaller piping, 2-1/2" or less, shall have arrows with a shaft 1/2" wide and 2" long. Use a double-headed arrow if the flow can be in either direction.
- e. Piping and duct shall be identified with the following colors:

<b>Medium in Pipe or Duct</b>	<b>Background Color</b>	<b>Identifying Lettering</b>	<b>Lettering Color</b>
Natural Gas	Brown	Natural Gas	Yellow

Refrigerant:

Freon	Black	Freon	White
Water:			
Boiler Blow-Off	Yellow	Blow-Off Water	Black
Cold Water (Potable)	Green	Domestic Cold Water	White
Non Potable	Green	Unsafe Water	Black
Domestic (Potable)	Green	Domestic Hot Water	White
Domestic Hot Water Return	Green	Domestic Hot Water Return	White
Fire Protection Water	Red	Fire Protection	White
Glycol Solution	Purple	Glycol Solution	White
Roof Drain System Make-up Treated Water	Green Green Green	Roof Drain Make-up Water Treated Water	White White Black
Waste:			
Building Waste	(unpainted or Black)	Waste	White
All Equipment or Piping Located Outside Bldgs.	Brown	-	-

**PART 2 - PRODUCTS**

**2.1 MATERIALS, EQUIPMENT AND ACCESSORIES:**

A. Unless otherwise specified, all equipment, accessories, and materials shall be new and undamaged, and the workmanship shall be of the best quality for the use intended and shall be acceptable to the Owner's Representative. Equipment, accessories, and materials shall be essentially the standard products of the manufacturer, or as specified herein. Where two or more units of the same class of new equipment are required, these units shall be products of a single manufacturer.

**2.2 MAGNETIC STARTERS:**

A. Contractor furnishing packaged equipment with ½ HP and larger in size (except fan coils) shall furnish factory-mounted magnetic starters on all motors. Magnetic starters shall provide both overload and under voltage protection and shall have integral hand-off-auto switch, auxiliary contacts, and pilot. Starters for all motors furnished under the mechanical section of the work will be furnished and installed by the electrical contractor. Provide heater index for all starters furnished under this division.

2.3 SLEEVES AND BOXES:

- A. For pipes passing through masonry or concrete construction, provide sleeves at least two pipe sizes larger than the pipe passing through and made from selections of steel pipe. Provide galvanized iron sleeves with collar on each side of wall for all ducts passing through similar constructions.
- B. For pipes passing through finished partitions, or ceilings, provide galvanized sheet iron sleeves of suitable size. The sleeves shall be fastened to construction to prevent creep along pipe and the sleeve ends shall be flush with finished surfaces. Provide escutcheon plates at each side of finish wall or floor or ceiling for all pipes passing through same.

2.4 ACCESS DOORS:

- A. Install access doors at all fire/smoke dampers and fire dampers. Access doors to be 12" x 12" minimum clear opening size.

PART 3 - EXECUTION

3.1 FUNCTIONING AND OPERATION OF EQUIPMENT:

- A. The Engineer will spend time with the Contractors prior to the final inspection to verify the operation of the system. Each Contractor is to be prepared to show the actual operation of each piece of equipment in its completed working condition. The final inspection, which the Owner will attend, will not take place until the Engineer is satisfied that the systems are 100% complete and functional. When the system is ready for the Engineer to witness the various functions, notify the Engineer to schedule time on the project.

3.2 CLEANING BY MECHANICAL CONTRACTOR:

- A. The contractor shall remove all stains or grease marks on walls or elsewhere caused by his workman or for which he is responsible. He shall also remove all rubbish resulting from his work, shall remove all stickers on fixtures, adjust all valves, etc., and leave the premises in first-class order.

3.3 SAFETY REGULATION:

- A. The contractor shall comply with all State, Utah National Guard, local, and OSHA safety requirements in performance with this work. (See General Conditions). This contractor shall be required to provide equipment, supervision, construction, procedures, and all other necessary items to assure safety to life or property.

END OF SECTION 230500