SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Equipment labels.
   2. Warning signs and labels.
   3. Pipe labels.
   4. Duct labels.
   5. Stencils.
   6. Valve tags.
   7. Valve chain tags.
   8. Warning tags.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:
   1. W. H. Brady Company, Signmark Division.
   2. Panduit Corporation.

3. Seton Name Plate Corporation.

2.2 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick and having predrilled holes for attachment hardware.
2. Letter and Background Colors: White letters with black background for non-powered equipment and color dictated by the electrical power block source for powered equipment.
   a. Electrical Power Block Source “A”: White letters with black background.
   b. Electrical Power Block Source “B”: White letters with red background.
   c. Electrical Power Block Source “C”: White letters with blue background.
   d. Electrical Power Block Source “D”: Black letters with white background.
   e. Electrical Power Block Source “E”: Black letters with yellow background.
   f. Electrical Power Block Source “F”: White letters with green background.
   g. Electrical Power Block Source “R”: White letters with purple background.
3. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
4. Minimum Label Size: Length and width vary for required label content, but not less than 3 inches by 1 inch for non-powered equipment and 6 inches by 4 inches for powered equipment.
5. Minimum Letter Size:
   a. Line 1: 1/2 inch high, Arial font.
   b. Line 2: 1/4 inch high, Arial font.
   c. Line 3: 1/4 inch high, Arial font.
   d. Line 4: 1/4 inch high, Arial font.
6. Fasteners: Stainless-steel rivets or self-tapping screws.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content:

1. Line 1: Equipment tag Drawing designation (unique equipment number)
2. Line 2: Primary electrical power source (Source 1: XXX-XXX-XX or Source: XXX-XXX-XX if equipment is single fed).
3. Line 3: Secondary electrical power source where specified (Source 2: XXX-XXX-XX or blank if equipment is single fed).
4. Line 4: Voltage, phase, wire count (example 460V / 3PH / 3W).
5. Refer to Part 4 of this specification section for an example of the Equipment Tag Identification Label.

C. Equipment Label Schedule: Provide an equipment list for each piece of equipment to be labeled, on 8-1/2-by-11-inch (A4) size paper (searchable pdf format). Tabulate equipment identification number, the electrical power source(s) and power supply data where specified. Equipment schedule shall be submitted for review and approval.

2.3 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16-inch-thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: Yellow.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

G. Fasteners: Stainless-steel rivets or self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information plus emergency notification instructions.

2.4 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as a separate unit on each pipe label to indicate flow direction. The flow arrows shall be located before and after the identification text.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.5 DUCT LABELS

A. Material and Thickness: Self-Adhesive printed plastic duct labels with contact-type, permanent-adhesive backing.

B. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

C. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

D. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

E. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

F. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as a separate unit on each duct label to indicate flow direction. The flow arrows shall be located before and after the identification text.
2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.6 VALVE TAGS

A. Description: Stamped or engraved with three lines of 3/8-inch high letters for piping system abbreviation, location, and valve number.

1. Tag Material:
   a. Exterior: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   b. Interior: Multilayer, multicolor, plastic tags for mechanical engraving, 1/16-inch-thick, 2-ply, and having predrilled holes for attachment hardware.
2. Fasteners: Brass wire-link chain or beaded chain.
3. Refer to Part 4 of this specification section for an example of the Valve Tags.

B. Valve Schedules: Provide a valve schedule for every valve on 11-by-17-inch (A3) size paper (searchable pdf format). Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses. The Valve Tage Identification Schedule shall be submitted for review and approval.

1. Refer to Part 4 of this specification section for an example of the Valve Tag Identification Schedule.

2.7 VALVE CHAIN LABELING AND SECUREMENT

A. Description: The chains attached to the overhead valves shall be stored and secured by one of three methods.

1. Bucket (Chucket): The valve chain to be stored inside bucket with identification label and suspended overhead to keep the chains elevated when not in use. A shower curtain hook with secondary valve tag to loop around the valve chain.

2. Wall hook: The valve chain to be attached to wall mount hook with identification label on wall. A shower curtain hook with secondary valve tag to loop around the valve chain.
3. Bungee strap. The valve chain to be secured to a nearby support with a bungee strap. A shower curtain hook with secondary valve tag to loop around the valve chain.

B. Materials:

1. Bucket (Chucket): Orange plastic, cylindrical, bucket with metal stud and plastic handle.
   a. Babbitt model number BUCKET.
   b. Mount 9-feet above finished floor to bottom of bucket.
2. Shower Curtain Hook Material: Nickel plated silver brass hook, snap closure hook, 3-inch x 1-3/4-inch hook, maximum 1-1/2-inch rod diameter, five silver roller balls.
   a. Grainger model number 4EEW6.
3. Clothesline Wall Hook Material: Hot-rolled steel plate and steel wire, zinc plated silver for corrosion protection, 1-9/16-inch square back plate with four 1/4-inch diameter holes, 2-3/8-inch long x 1-11/16-inch high open loop hook, 140-lbs working load. Mount 6-feet 6-inches above the finished floor to center of hook with the hook pointing upwards.
   a. National Hardware model number N121-087.
4. Clothesline Wall Hook Label: Similar to equipment label.
   a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and self-adhesive back for attachment.
   b. Letter and Background Colors: White letters with green background (match valve tag).
   c. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
   d. Minimum Label Size: Width vary for required label content, but not less than 3 inches by 1 inch.
   e. Minimum Letter Size: Line 1: 1/2 inch high, Arial font.
   f. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
   g. Label Content: Valve tag name XXXY-ZZZZ-##.
   h. Mount 6-feet above finished floor to center of label and centered directly below the wall hook.
5. Valve Tag: Refer to valve tag section.
6. Exterior Valve Chain Strap: EPDM rubber bungee strap with corrosion resistant steel S-hook ends, length is application dependent, secure valve chain to prevent swaying in adverse weather conditions.

2.8 WARNING TAGS

A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.

1. Size: 6 by 4 inches minimum.
2. Fasteners: Brass grommet and wire.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Safety-yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Comply with the latest ASME A13.1 – 2020 Identification Standard for sizing.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with locations of access panels and doors.

D. Install identifying devices before installing acoustic ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

C. The equipment text labels shall be 1/16” thick, 2-ply, plastic acrylic. Use outdoor material for exterior installations.

D. Provide the equipment tag label schedule as part of a separate submittal package.

3.4 CONCEALED EQUIPMENT LABEL INSTALLATION

A. Labels: Provide self-adhesive markers on the ceiling grid or access door, to identify the concealed equipment located above suspended accessible ceiling tiles or access door. The marker labels shall be used to locate the equipment, such as, but not limited to: fan powered terminal boxes (FPB), variable air volume (VAV) terminal units, indoor VRF units (IDU), branch selector units (BSU), ceiling or inline exhaust fans, manual main isolation dampers, fire dampers (FD), combination fire / smoke dampers (FSD), and zone dampers (ZD). The marker label shall be self-adhesive, 1/2” wide tape, 1/4” high black text on a clear background, adhere to the concealed access point and include the equipment tag name with an arrow, before and after the text, pointing to the ceiling tile that should be removed to access the equipment above. No arrows required for access door labels.

B. Example: ↑ FPB5-100-01 ↑.

C. Manufacturer: Brother P-Touch, laminated label tape.

3.5 CONTROLS DEVICE LABEL INSTALLATION

A. Self-Adhesive Labels: Provide self-adhesive markers for thermostats, humidistats, differential pressure sensors and transmitters, air pressure inlet ports, and similar devices and components. The marker label shall be self-adhesive, 1/2” wide tape, 1/4” high black text on a clear or white background, adhered to the device, and include the equipment tag name.

B. Engraved Plastic Labels: Provide plastic engrave equipment labels for control panels with power source requirements.

3.6 PIPE LABEL INSTALLATION

A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where the flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
8. The pipe labels with arrows shall be self-adhesive type for insulated piping systems and pretensioned, coil or strap-on, for large diameter pipe, type for uninsulated piping systems.

B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.

1. The color to match the text label.
2. Provide dual set of arrows, upstream and downstream of text label.
3. The arrows to wrap around (band) the pipe.
4. The arrow to point in the direction of flow. On bi-directional flow piping segments, the arrows shall point away from the text label.

C. Pipe Label and Color Schedule:

1. CHILLED WATER BYPASS: Green background, white letters.
2. CHILLED WATER RETURN: Green background, white letters.

3. CHILLED WATER SUPPLY: Green background, white letters.
4. CONDENSATE DRAIN: Black background, white letters.
5. DEIONIZED WATER: Green background, white letters.
6. DRIP PAN DRAIN: Black background, white letters.
7. HUMIDIFIER MAKEUP WATER: Green background, white letters.
8. NON-POTABLE WATER: Green background, white letters.
9. REFRIGERANT HOT GAS: Orange background, black letters.
10. REFRIGERANT LIQUID: Orange background, black letters.
11. REFRIGERANT SUCTION: Orange background, black letters.

3.7 DUCT LABEL INSTALLATION

A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following text labels and color codes:
   1. EXHAUST AIR: Yellow background, black letters.
   2. OUTSIDE AIR: Blue background, white letters.
   3. RETURN AIR: Green background, white letters.
   4. SUPPLY AIR: Blue background, white letters.

B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 20 feet in each space where ducts are exposed or concealed by removable ceiling system.

C. The ductwork system arrows shall be as follows:
   1. The color to match the text label.
   2. Provide a single set of arrows, downstream of text label.
   3. The arrows to be in-line with text.
   4. The arrow to point in the direction of flow, away from text.

3.8 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except valves within factory-fabricated equipment units unless indicated otherwise, faucets, and convenience and lawn-watering hose connections. Provide a Valve Tag Identification Schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
   1. Valve-Tag Size and Shape:
      a. Chilled Water: 2 inches round.
      b. Non-Potable Water: 2 inches round.
      c. Refrigerant: 2 inches round.
      d. Other: 2 inches round.
   2. Valve-Tag Colors:
      a. Toxic and Corrosive Fluids: Black letters on a safety-orange background.

b. Flammable Fluids: Black letters on a safety-yellow background.
c. Combustible Fluids: White letters on a safety-brown background.
d. Non-potable and Other Water: White letters on a safety-green background.
e. Defined by User: White letters on a safety-purple background, black letters on a safety-white background, white letters on a safety-gray background, and white letters on a safety-black background

3. Valve-Tag Material:
   a. Exterior: Natural brass tags, brass beads, and brass “S” hooks.
   b. Interior: Multilayer, multicolor, plastic tags.
4. Valve-Tag Text Height: 3/8” top line text, 3/8” middle line text, and 3/8” bottom line text.
5. The top line text for the valve tag labels shall be as follows:
   a. CHWB: Chilled Water Bypass.
   b. CHWR: Chilled Water Return.
   c. CHWS: Chilled Water Supply.
   d. DIW: Deionized Water.
   e. HUMW: Humidifier Water.
   f. NPW: Non-Potable Water.
   g. RHG: Refrigerant Hot Gas.
   h. RL: Refrigerant Liquid.
   i. RS: Refrigerant Suction.
6. The center line text for the valve tag labels shall identify what the valve serves.
7. The bottom line text for the valve tag labels shall be a 3-digit number, in sequential order.
8. Provide valve tag label schedule as part of a separate submittal package.

3.9 VALVE CHAIN LABELING AND SECUREMENT INSTALLATION

A. Interior Locations in Corridors: Tenant / Customer accessible spaces.
   1. Utilize valve chain buckets (Chuckets). The buckets shall be installed at accessible locations with the bottom of the buckets at 9-feet above the finished floor level. A shower curtain hook with a second plastic valve tag shall be provided around the chain to identify the valve (hook slides along chain as the chain is pulled). The primary plastic valve tag shall be installed on the valve handle with brass ball chains. A laminated, self-adhesive tape label with black text on white background, using the largest text height available to fit on the handle of the bucket (viewable from the floor level) shall be field provided on the buckets.

B. Interior Location in Mechanical Galleries: Facilities Engineer accessible spaces (not accessible by Tenant / Customer).
   1. Utilize a clothesline wall hook installed on the opposing wall of the DCA units and in alignment with the valve chainwheel, to secure the chain out of the walk path and installed at a readily accessible position at 6-feet 6-inches above the finished floor level. Provide a wall mounted, plastic engraved label to identify the valve located below the clothesline wall hook. If there is a unique location where a clothesline wall hook cannot be used, then use a valve chain bucket to match the

corridor installation described above. A shower curtain hook with a second plastic valve tag shall be provided around the chain to identify the valve (hook slides along chain as the chain is pulled). The primary plastic valve tag shall be installed on the valve handle with brass ball chains.

C. Exterior Locations:

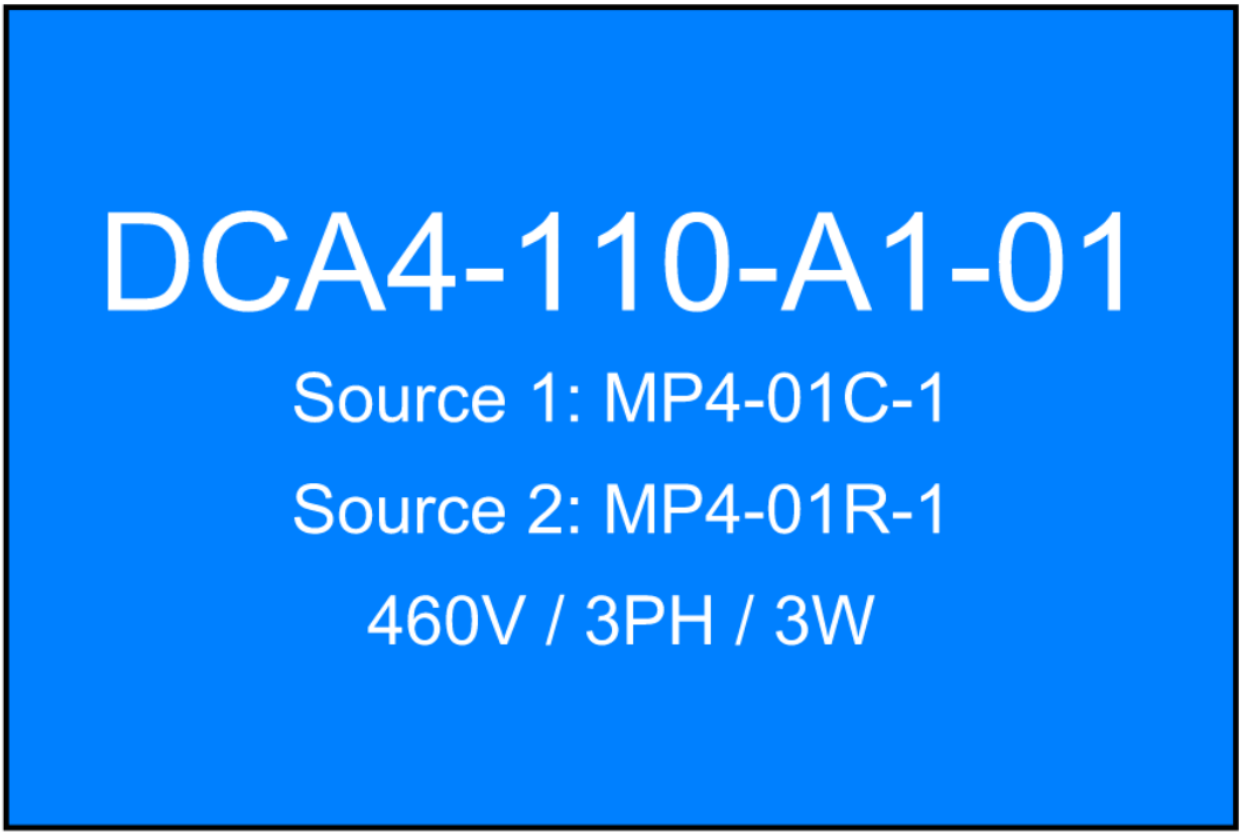
1. The valve chains shall be secured to the nearest steel support or provide an eye-bolt hook, at an accessible position, then using a rubber bungee strap with S-hooks to hold the chain in place. The goal is to prevent the chain from moving during adverse weather conditions and damaging the piping system. A shower curtain hook with a second brass valve tag shall be provided around the chain to identify the valve (hook slides along chain as the chain is pulled). The primary brass valve tag shall be installed on the valve handle with brass ball chains.

3.10 WARNING-TAG INSTALLATION

A. Write the required message on, and attach warning tags to, equipment and other items where required.

PART 4 - SUPPLEMENTAL INFORMATION - EXAMPLES

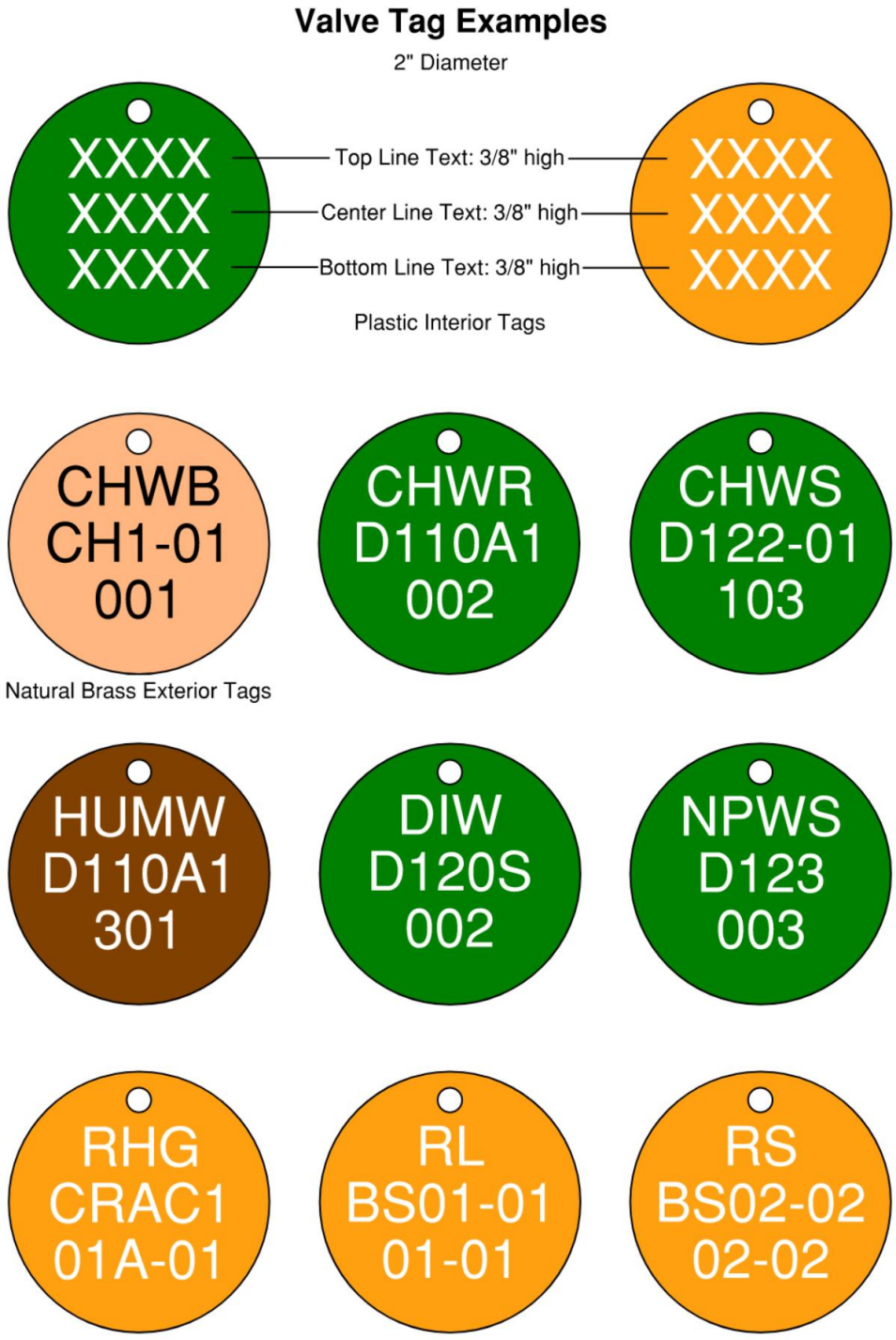
4.1 EQUIPMENT TAG IDENTIFICATION LABEL



Delta Cube Array Fan Coil Wall Unit Equipment Tag Label Above

Thermal Energy Storage Tank Equipment Tag Label Above

4.2 VALVE TAG EXAMPLES



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