Jefferson County School District, R-1
Support Services Division

TECHNICAL GUIDELINES

DIVISION 22 –PLUMBING

AUGUST 2022

Table of Contents

DIVISION 22 – PLUMBING

22 00 10 Plumbing Criteria and Systems – August 2022

- The Jefferson County School District, R-1 Educational Specifications contain criteria for plumbing systems and supplement these Guidelines.
- Install plumbing control devices in "Readily Accessible" locations as defined by Chapter 1, Article 100, of the applicable National Electrical Code.
  1. Operating plumbing equipment, such as pumps, is prohibited in ceiling spaces without approval of District Project Manager.
- When reusing or connecting to existing piping, the contractor is to clean and test the existing system.
- Connections to existing potable water supply piping shall be made with new isolation valves.
- Locate isolation valves in strategic areas throughout facility to isolate toilet groups, kitchens, and other areas with large water demands.
- When piping is located in crawl spaces or horizontal pipe and utility chases, bottom of piping shall be at least 4-feet from grade or slab below to allow for adequate maintenance access.
- Plumbing contractor is responsible for isolating and energizing isolation valves to accommodate plumbing work that is a part of the project. This is to be coordinated with the District Project Manager and Facilities Maintenance.
- In the absence of other information, standards of the following organizations apply:
  1. ADA – Americans With Disabilities Act
  2. AGA – American Gas Association
  3. ANSI – American National Standards Institute
  4. ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
  5. ASME – American Society of Mechanical Engineers
  6. AWWA – American Water Works Association
  7. IAPMO - International Association of Plumbing and Mechanical Officials
  8. IBC – International Building Code
  9. IFGC – International Fuel Gas Code
  10. IMC – International Mechanical Code
  11. IPC – International Plumbing Code
  12. NEC – National Electrical Code
  13. NEMA – National Electrical Manufacturers Association
  14. PDI - Plumbing and Drainage Institute
  15. UL – Underwriters Laboratories
  16. Local water and sewer districts
- All drinking water plumbing components provided shall be lead-free. Provide documentation/certification that components are lead-free.
- Tracer Wire:
  1. Reference Division 33 for type and size of tracer wire for underground utilities.
  2. Install warning caution tape above underground utility lines.
  3. Install at all underground utility lines, to run with each utility listed in this Division 22, including sanitary, water, gas, and other utilities

4. Standard Colors:
   a. Yellow: Natural Gas
   b. Green: Sanitary
   c. Blue: Potable water
   d. Purple: Reclaimed water, irrigation, or slurry lines

- All material listed to be delivered to the District at Final Acceptance of the project shall be documented in a single list to be signed as being accepted by the Jefferson County School District R-1 Construction Project Manager.

END SECTION 22 00 10

22 05 13 Common Motor Requirements for Plumbing Equipment – August 2015

- Motor Starters:
  1. Work is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1.
     a. Allen Bradley
     b. Cutler-Hammer
     c. Furnas
     d. S & S - Sprecher & Schuh
     e. Square D
  2. Provide motor starters by the manufacturer as an integral feature of motorized equipment.
  3. Standard magnetic contactor-type with HAND-OFF-AUTO switch, overload heaters, 120 volt control transformer, single phase protection, under voltage protection and spare normally open (NO) and normally closed (NC) contacts for control by Division 23 09 XX
     a. NEMA enclosure appropriate for the service or 3R for wet areas
  4. Use magnetic starters for motors 0.75 HP and larger.
- Electrical Motor Drives:
  1. Work is open to any product or material meeting the requirements of this Technical Guideline.
  2. Reference Divisions 23 and 26 for variable frequency drive requirements.
  3. Motor Characteristics:
     a. Motors 0.75 HP and larger:
        (1) 480 volt, three phase
     b. Motors smaller than 0.75 HP:
        (1) 120 volt, single phase
     c. Frequency:
        (1) 60 hz
     d. Voltage Rating:
        (1) NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
     e. Service factor:
        (1) 1.15 for Open Drip Proof (OPD) and Totally Enclosed Fan Cooled (TEFC)
     f. Enclosure:
        (1) Open Drip Proof (ODP)

g. Duty:
   (1) Continuous duty at ambient temperature of 105 F and at altitude of the project
h. Motor Efficiency:
   (1) Conform to IEEE-112 and NEMA MG1, Table 12-10.
i. Motor wiring:
   (1) Terminate in a NEMA terminal box mounted on the motor case and of the manufacturer's standard size.
   (2) The terminal box shall have a bolt type copper ground connector.

4. Polyphase Motors:
   a. Description:
      (1) NEMA MG1
      (2) Design B
      (3) Medium induction motor.
   b. Stator:
      (1) Copper windings.
   c. Bearings:
      (1) Double shielded, pre-lubricated ball bearings.
   d. Insulation:
      (1) Class F.
   e. Code Letter:
      (1) 15 HP and larger:
         (a) NEMA starting Code F or G
      (2) Smaller than 15 HP:
         (a) Manufacturers' standard
   f. Enclosure:
      (1) 7.5 HP and larger:
         (a) Cast iron
      (2) Smaller than 7.5 HP:
         (a) Rolled steel
5. Single Phase Motors:
   a. Type:
      (1) Permanent split capacitor (PSC)
      (2) Induction start, capacitor run (ISCR)
      (3) Capacitor start, capacitor run (CSCR)
      (4) Shaded pole (SP)
         (a) For motors 1/20 hp and smaller only
   b. Thermal protection:
      (1) Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating or motor insulation.
         (a) Thermal protection device shall automatically reset when motor temperature returns to normal range.
      (2) Bearings:
         (a) Ball type for belt connected motors and other motors with high radial forces on motor shaft.
         (b) Sealed, pre-lubricated sleeve type on other motors.

END SECTION 22 05 13

22 05 19 Meters and Gages for Plumbing Piping – August 2015

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Solar-Powered Digital Thermometers:
  1. Scale Range:
     a. Hot Water and Hot/Chilled Water:
        (1) 30 to 200 F, with 2 F scale divisions
  2. ASTM E1
  3. High impact ABS plastic housing with aluminum movable parts, NEMA 4 rating; minimum 2.5 inch by 4 inch display readout; adjustable angle; stem for separable socket (length to suit installation); solar powered with battery backup
  4. Install thermal conducting compound in well prior to installing thermometer.
  5. Manufacturers:
     a. Trerice: H. O. Trerice Co.
     b. Weiss Instruments, Inc.
     c. Winters Instruments
- Pressure Gages:
  1. ASME B40.1, phosphor-bronze bourdon-tube type with bottom connection; dry type; case: 4 ½" diameter with glass lens, connection: brass ¼" NPS, scale: white coated aluminum with permanently etched markings; accuracy: Grade A, plus or minus 1% of middle 50% of scale; range: 2 times operating pressure of connected equipment. Do not install needle valve or pet cock valve as isolation for gauge. Provide ball valve for gauge isolation.
  2. Manufacturers:
     a. Dresser Industries, Inc.
     b. Trerice: H. O. Trerice Co.
     c. Weiss Instruments, Inc.
- Test Plugs:
  1. Installation at inlets and outlets of each: hydronic coil in air handling systems, duct zone coil, inline coil pump, boiler, chiller, heat exchanger or hot water heater.
  2. Nickel-plated, brass body test plug with ½" NPS connection; 500 PSIG minimum pressure rating, core inserts: two, self-sealing valves, suitable for inserting 1/8" OD probe; core material: -30 F to 275 F range, rated for propylene glycol, with gasketed and threaded cap with retention chair or strap
  3. Manufacturers:
     a. FlowDesign, Inc.
     b. Peterson Equipment Co, Inc.
     c. Sisco Manufacturing Co.
     d. Trerice: H. O. Trerice Co.
- Venturi-Type Flow Elements and Meters:
  1. Orifice-type balancing devices are prohibited.
  2. Bore size shall be selected so that readout at specified flow is between 7.0 and 27.0" w.g.

3. Flow measuring devices, 2" and smaller may be a combination measuring device and balancing/shutoff valve or separate venturi with separate remote balancing/shutoff valve.
   a. Non-ferrous pressure die-cast construction, 300 PSIG pressure rating at 250 F; accuracy: plus or minus 3%, venturi/ball valve with integral flow measuring taps, adjustable memory set and full size locking indicating handle.
4. Flow measuring devices, 2 ½" and larger shall consist of a venturi and separate balancing valve; venturi shall be cast steel with weld ends or machined steel for butt welding; pressure rating of 150 PSIG at 250 F; accuracy: plus or minus 3%

- Manufacturers:
  1. Barco
  2. FlowDesign, Inc.
  3. Gerand Engineering Co.
  4. Preso Meters Corp.

END SECTION 22 05 19

22 05 23 General-Duty Valves for Plumbing Piping – August 2022

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Comply with ANSI MSS SP-92-1999, MSS *Valve Users Guide.*
  1. Ball, butterfly, check and stop and drain valves
     a. Ball valves:
        (1) Two-piece, copper-alloy ball valves: Bronze body with full port, stainless steel ball; reinforced TFE seats; extended neck, 600 PSIG minimum CWP (cold working pressure) rating and blowout-proof stem. Apollo ball valve 77FLF-240 series SS ball and stem (lead free, solder ends). Apollo ball valve 77FLF-140 SS ball and stem (lead free, NPT threaded ends). Apollo 77WLF-140-A SS ball and stem (lead free, press ends) or approved equal. Do not use Apollo International valves.
     b. Check Valves:
        (1) Swing check valves, 2 ½" and smaller:
            (a) MSS SP-80; Class 125, 200 PSIG CWP; horizontal swing, Y-pattern, ASTM B62 cast-bronze body and cap, rotating bronze disc with rubber or composition seat, threaded or soldered end connections.
        (2) Swing Check Valves, 3" and larger:
            (a) MSS SP-71, Class 125, 200 PSIG CWP; ASTM A 126 cast iron body and bolted cap, horizontal swing bronze disc, flanged end connections.
     c. Stop and Drain Valves:
        (1) Nominal ¾": MSS SP-110; class 150, 400 PSIG CWP, ASTM B 584 cast-bronze body and bonnet, 2 piece construction; chrome plated ball, full port; blowout-proof; bronze or brass stem, EPDM seats and seals, garden hose thread (GHT) male and cap chained to valve, vinyl-covered steel lever handle.
     d. Butterfly valves:
        (1) Full flanged or lug
        (2) Wafer configuration is prohibited.

e. Ferrous-Alloy Butterfly Valves, General:
   (1) MSS SP-67, Type I for tight shutoff, extended neck, stainless steel stem, field replaceable EPDM sleeve and stem seals. Capable of bidirectional dead end service to full rated working pressure of the valve upon removal of the downstream flange.
   (2) Single-Flange, 175 PSGI CWP Rating: Wafer-lug type with one or two piece stem
   (3) Flanged, 175 PSGI, CWP Rating: Flanged-end type with one or two piece

- Fuel gas shut off solenoid valves:
  1. UL listed for intended use.
- All alloy compositions shall be lead-free.

END SECTION 22 05 23

22 05 53 Identification for Plumbing Piping and Equipment – August 2015

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Comply with ANSI/ASME A13.1, *Scheme for the Identification of Piping Systems*
- Provide markers and labels for plumbing pipes and equipment.
- Pipe Identification
  1. Identify service and direction of flow on all piping.
  2. Provide identification markings at valves, equipment, terminal points, both sides of piping passing through walls and floors and at approximately every 20 feet.
  3. Use an arrow with each pipe identification marker.
  4. The arrow shall always point away from the marker and in the direction of the flow.
  5. Color and height of arrow to be same as the marker.
- Include a list of the wording, symbols, letter size, and color coding used for plumbing identification in each maintenance manual.
- Pipe Markers (below grade):
  1. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service
  2. Install markers 6 inches to 8 inches below finished grade directly above buried pipe.
  3. Tracer tape required on non-metallic pipe.
- Pipe Markers (above grade): Use one of the following methods:
  1. Pressure sensitive markers:
     a. Brady type B-350 flexible film identification markers and tape
     b. Apply in accordance with manufacturer's recommendations. Marker adhesion will be tested for permanence.
     c. Replace any markers showing loose corners, bubbles, or other failings.
  2. Stenciled markings:
     a. Prohibited
  3. Plastic wrap around labels taped in place
     a. Install preformed and lettered plastic markers completely around pipe in accordance with manufacturer's instructions.
  4. Apply markers so lettering is in the most legible position.

   a. For overhead piping, apply on the lower half of the pipe where view is unobstructed and readable from floor level.
5. Valve tags are not required.
6. Provide pipe labels within 6-inches of valves.

- No piping over communications rooms, electrical closets and IDF rooms.
- Equipment Identification:
  1. Tags or labels shall match the equipment designation on the drawings.
  2. Tags:
     a. Shall match the equipment designation on the drawings.
     b. Aluminum, stainless steel or brass 1.5" diameter with edges ground smooth
     c. Evenly space and stamp 0.25 inch high letters and numbers into the metal surface
  3. Labels:
     a. Shall match the equipment designation on the drawings
     b. White plastic laminate with black engraving, black plastic laminate with white engraving, or standard brass bars
     c. Provide labels to uniform size commensurate with the size of the equipment to which attached.
     d. Minimum 0.5" high letters
     e. Pressure sensitive embossed labels are prohibited.
     f. Install with adhesive or stainless steel mechanical fasteners.
        (1) Installation on panels or cabinets containing line voltage shall be adhesive only.
     g. Adhesive labels:
        (1) Degrease and clean surfaces to receive adhesive.
        (2) Apply with sufficient adhesive to ensure permanent adhesion.
- Electric Power Controls:
  1. Identify switches, control panels, major control components magnetic starters, relays etc. with Equipment Labels attached outside the panels or cabinets.
  2. Include in the identification the connecting or controlled equipment drawing designation.
  3. Identify zone valve, pressure electric, electric pressure switches, relays and starters with Equipment Tags or Labels.
- Installation:
  1. Do not paint or insulate over nameplates or labels.
  2. Install tags with corrosion resistant chain or cable.
  3. Identify equipment above lay-in ceiling with colored tag affixed to the ceiling grid and offset toward the ceiling tile intended to be removed for service.
     a. RED: Fire protection
     b. BLUE: Plumbing
     c. YELLOW: HVAC
  4. Use following identification of services:
     a. Dual Temperature Water (2-pipe heating/cooling): Chilled/Hot Water Supply/Return (C/HWS and C/HWR)
     b. Hot Water Supply/Return (hydronic): HWS / HWR
     c. Chilled Water Supply/Return (hydronic): CHWS / CHWR
     d. Condenser Water Supply / Return: CWS / CWR
     e. Cold Water (domestic): CW
     f. Hot Water (domestic): HW

g. Hot Water Circulation (domestic): HWC
h. Condensate: Condensate.

END SECTION 22 05 53

22 07 00 Plumbing Insulation – October 2021

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Management.
  1. Certainteed
  2. Knauf
  3. Manville
  4. Owens-Corning
- Provide materials with flame spread index of 25 or less and smoke development index of 50 or less as tested in accordance with ASTM E84 (NFPA 255).
  1. Use fiberglass insulation products only. Polyethylene foam is prohibited
- Insulate roof drain bowls with fiber glass with all-service jacket and a heavy coat of brushed on vapor barrier.
  1. Insulate the roof drain bowl fasteners.
- Insulate hot and cold services and horizontal portions of roof drains to conform to current edition of ASHRAE Fundamentals Handbook.
- Field-applied Jackets:
  1. ASTM C921, Type 1; Standard PVC fitting covers: factory-fabricated fitting covers manufactured from 20-mil thick, high impact, ultraviolet-resistant PVC
- Equipment and tank insulation:
  1. All-service jacket indoors
  2. Aluminum cladding outdoors
  3. Either flexible fiberglass blanket meeting ASTM C 553, Type 1 or rigid fiberglass board meeting ASTM C 612, Class 1A
  4. Do not insulate pumps or expansion tanks.
- Install insulation per manufacturer's recommendation as a minimum standard.
- Self-sealing laps on cold water pipes and horizontal portions of roof drains:
  1. Staple at 6 inches o.c.
  2. Paint with vapor proof sealant.

END SECTION 22 07 00

22 11 00 Facility Water Distribution – August 2022

- Where noted, work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
- The potable water supply system including specialties, valves, pipe and fixtures shall meet the requirements of the Safe Drinking Water Act (SDWA), current edition of *Colorado Primary Drinking Water Regulations*, IPC or these Technical Guidelines, whichever is more restrictive.
  1. Drinking water supply system shall be 100% lead-free.
  2. Manufacturer must be able to provide certifications or other information indicating water supply system components are lead-free.

- Size domestic water pipe in accordance with Plumbing Code and with a maximum pressure drop of 6.0 feet per 100 feet.
- Because of the significant cost of tap and sewer connection fees, careful consideration must be given to plumbing system design and sizing.
    1. For example, elementary schools are normally served with a 2" service, middle schools with a 2.5" service, and high schools with a 3" service.
    2. Irrigation usage is not additive to the total water demand.
    3. Renovations may require retrofitting existing plumbing fixtures to maintain the smallest service size.
- Provide water hammer arresters (shock absorbers) in potable water lines in accordance with the IPC.
- Water piping below slabs–on-grade is prohibited.
- Provide shut-off valves and unions to isolate each item of equipment, branch circuit or section of piping. Required locations include:
    1. On water main inside the building at the point where it enters the building.
        a. Clearly label it as "Water Main Shut Off".
    2. On water lines before they enter and after they leave a basement, crawl space or trench
    3. On plumbing groups of more than four fixtures and wall hydrants (freeze proof hose bibs)
    4. Isolation valves will be provided for groups of 4 or more fixtures to accommodate service.
- Pressure Reducing Valve is required at all main water service lines into the building. Set the maximum set point in coordination with the District Project Manager.
- Faucets or Hose Bibs are required at:
    1. Bathrooms with more than four fixtures
    2. Heated mechanical penthouses
    3. Boiler rooms
- Wall hydrants with inside ball shut-off valve are required at:
    1. Every 200 feet of exterior perimeter
    2. Kitchen service entrance
    3. All hydrants and bibs shall be keyed type.
    4. Deliver keys to District Project Manager.
- Use air gap fitting connection from the potable water lines to any service that contains glycol antifreeze or water treatment chemicals even if that connection is protected by a back-flow preventer.
- Utility extension for future Temporary Facilities: See 33 05 16
- Solder containing lead is categorically prohibited.
- Valves which are installed above ceilings are to be only over minimally occupied areas and not above classrooms.
- Pipe in a horizontal chase with one or more exterior surfaces.
    1. Provide forced ventilation from one conditioned area to another area. System will consist of an exhaust fan, 1 temperature sensor per 100 linear feet of chase and current switch for fan status. Exhaust fan operation is regulated from the temperature control system as provided in Division 23. An alarm will be generated when outdoor temperature is below 35 F and upon sensing either a chase temperature of below 40 F or loss of exhaust fan status 60 seconds after the fan has been commanded to start.

Alarm will be a Category 1 and directed to Jefferson County School District Security at 809 Quail, Building 1.

- Pipe in exterior walls is not recommended.
  1. If required, provide heat or warm air circulation.
- Potable water piping:
  1. Above grade: Type L Copper. ASTM B88M, type B
  2. Below grade less than 5 feet from building lines:
     a. Type K copper ASTM B88M, type A
     b. Polyethylene ASTM D3350
  3. Below grade more than five feet beyond building lines: AWWA approved PVC
- Drains and Condensate piping:
  1. Type DWV ASTM-B306 or Type L hard ASTM B88
- Backflow Preventer:
  1. Open to any product or material meeting the requirement of this Technical Guideline.
  2. Reduced pressure type backflow preventer (backflow assembly) approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California
  3. Preventer to be lead-free in sizes as are commercially available
     a. Sizes 0.75” to 1.0”
        (1) Replacement parts must be in stock and readily available without special order.
        (2) Manufacturer:
            (a) Wilkins, Model 375
            (b) Febco
            (c) Ames
            (d) Watts
            (e) Approved Equivalent
  4. Air gap fittings are the preferred method of preventing backflow.
     a. If a preventer is required on other than building service, discuss with the District Engineer and District Project Manager.
  5. Building and irrigation services:
     a. Reduced pressure type as required by water purveyor
     b. Lead-free
     c. Comply with all water purveyor requirements
  6. At existing exterior locations provide protection by means of a cage or other fabrication/device.
  7. At new construction all backflow preventers shall be interior installation.
  8. Auto Shut-Offs must be provided at locations where the floor elevation in the room housing the backflow preventer is below adjacent floor elevations or below exterior grade.
- Expansion Tanks:
  1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  2. Manufacturers:
  a. Armtrol
  b. Armstrong
  c. Bell & Gossett

d. Taco
e. Thrush
f. Wessels
g. Wilkins

3. Closed hydro-pneumatic diaphragm or bladder type, ASME labeled, designed for potable water systems

- Wall Hydrants:
  1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  a. Outside sillcocks:
  (1) Manufacturers:
  (a) Josam
  (b) Woodford
  (c) Zurn
  b. Freeze proof wall hydrants for outdoor service:
  (1) Manufacturer:
  (a) Woodford
  (b) Zurn
- Relief Valves:
  1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  a. Bell & Gossett.
  b. Farris
  c. Kunkle
  d. McDonnell-Miller
  e. Watts
  2. Bronze or iron body, bronze trim, bronze lifting gear, ASME rated direct spring loaded type, lever operated, non-adjustable factory set discharge pressure
- Pressure Reducing Valve:
  1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  a. Armstrong
  b. A.W. Cash
  c. Bell & Gossett
  d. Fisher
  e. Taco
  f. Zurn
  2. All bronze, adjustable spring and diaphragm; integral strainer, female thread connections
- Shock Absorbers (water hammer arresters):
  1. Work is restricted to specific products or specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  a. Josam - Absorbotron II
  b. Sioux Chief – Hydra-Rester
  c. Zurn - Shoktrol
- Circulating pumps:

1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
a. Amtrol
b. Armstrong
c. Bell & Gossett
d. Grundfos
e. Oberdorfer
f. Taco
2. All bronze in-line centrifugal or cartridge pumps with motors 0.5 HP or less constructed for domestic water service shall be used as circulators
3. Pump:
a. Certified dimensional drawings including locations, sizes and types of each piping connection, mounting details and electrical connections
b. Installation, maintenance, disassembly, operating and parts-list manuals
c. Recommended spare parts list
d. Characteristic design curve
e. Standard manufacturer's catalog data
4. Place isolation valves on pump suction and discharge.
a. Pump shall have integral mechanical connections so it may be removed for service without cutting the piping.
5. Include pressure gauges in the suction and discharge lines in locations that will provide a reasonably accurate check of pump performance.

- Pipe Material and Manufacturers Markings:
1. When reviewing submittals, include a careful check that pipe origin, manufacture and markings meet criteria in the International Plumbing Code.
- Sanitize potable water piping in accordance with current edition of AWWA Standard C651-86, *Disinfecting Water Mains*, and subsequent addenda or these Technical Guidelines, whichever is more restrictive.
- Test water pipe at 120 psig or 1.5 times service static pressure, whichever is greater, for two hours with no sign of leaks or pressure loss.
1. Test shall be witnessed by Jefferson County School District, R-1 Project Manager, Commissioning Engineer, and/or Design Engineer.
- Test all operating devices.
1. Keep written records of all tests, including at a minimum:
a. The date of the test
b. System or subsystem tested
c. Test medium and pressure used
d. Duration of test
e. Test results
f. Name and signature of individual performing test

END OF SECTION 22 11 00

22 13 00 Facility Sanitary Sewerage - August 2019

- Work is open to any product or material meeting the requirements of this Technical Guideline.
- Line Size:

1. All lines shall be a minimum of 2 inches.
2. All lines greater than 20 feet in length shall be a minimum of 3 inches.

- Cleanout locations:
  1. Interior:
  a. Wall cleanouts. Bottom of cleanout cover shall be 1 inch minimum above top of baseboard and 6 inches above floor.
  b. Floor cleanouts at 50 feet maximum intervals for all pipe sizes or when pipes change direction more than 135º in the horizontal.
  2. Exterior
  a. First clean out 10 feet from perimeter wall and every 100 feet thereafter.
  b. Set heavy cast iron tractor cover set in 2 feet x 2 feet x 6 inches concrete block.
  c. 4 inch size acceptable in pipes 4 inches and larger
- Cleanouts shall be cast iron with full size brass cleanout plugs.
  1. Floor cleanout covers scored brass installed flush with the floor
  2. Wall cleanouts are preferred in carpeted areas.
- Floor drains or floor sinks less than 3 inches shall include integral cleanouts.
- Utility extension for future Temporary Facilities
  1. See 33 05 16
- Vents shall be terminated with vandal proof caps.
- Floor Sinks:
  1. Facility needs a riding type floor cleaning machine.
     a. These require a floor sink in a janitorial closet on each level accessible by the cleaning machine.
     b. Architect to provide a 48” wide door at that closet location to allow the cleaning machine to access the floor sink.
- Floor Drains minimum locations:
  1. Mechanical Rooms
  2. Mechanical Penthouses
  3. All toilet rooms, emergency drench showers and/or eye wash stations, and other critical locations.
     a. Floor drains shall be set so the top of drain is flush with finished floor.
     b. Floor drains located in kitchen areas shall be coordinated with the Kitchen Equipment Contractor. The intent is to prevent equipment legs or stands from being located over floor drains or floor drain covers.
- Building Drainage and Sewer Lines:
  1. Locate lines not closer than 10 feet horizontally from potable water lines except that if the top level of the drain line is 3 feet or more below the bottom level of the water line, the horizontal distance between the lines may be reduced to 6 feet.
  2. Where lines cross potable water the horizontal distance between lines shall not be less than 3 feet.
     a. Joints shall not be less than 5 feet from water line.
     b. The drainage or sewer line shall be constructed of service weight cast iron.
  3. When encountering unstable soil or when the line excavation is through solid shale, slate, sandstone or similar hard material, bed the pipe in gravel 6 inches all around the pipe.
  4. Minimum 1/4-inch per foot slope.
- Sewerage Piping:

1. Pipe, Cast Iron, Service weight:
    a. No-hub:
        (1) No-hub with heavy duty stainless steel clamps
    b. Bell & spigot:
        (1) Bell and spigot with neoprene compression gaskets
        (2) Locations: Kitchen and Food Prep Areas
2. Buried drainage and vent pipe under structure or concrete walks and drives:
    a. Cast iron bell & spigot
    b. No-hub with heavy duty stainless steel clamps.
    c. PVC Schedule 40
3. Buried drainage and vent pipe not under structure or concrete walks and drives:
    a. Cast iron bell & spigot
    b. No-hub with heavy duty stainless steel clamps.
    c. PVC Schedule 40
4. Above grade interior drainage and vent pipe:
    a. Cast iron no-hub stainless steel clamps.
    b. Cast iron bell & spigot
    c. PVC Schedule 40
5. All waste lines shall slope a minimum of 3/8" per foot.

- Above grade interior vent, stand pipes, and equipment drains:
    1. Cast iron no-hub
    2. Copper, DWV type L
    3. PVC Schedule 40
- Grease Interceptors:
    1. Design to conform to IPC Appendix H.
    2. Colorado State Plumbing jurisdiction has defined school kitchens as "single service kitchens".
        a. Architect to provide District with written acceptance of grease interceptor sizing from local sanitation district prior to CD drawing phase.
    3. Interceptor design shall include tank vent.
    4. All equipment, drains, sinks, fixtures, in the kitchen will be discharged through the interceptor.
        a. Garbage disposers and toilet facilities will be discharged directly through the building sanitary sewerage piping, not the grease interceptor.
    5. All interior piping shall be Cast-iron or Copper, DWV type L
- Sump Pumps:
    1. Evaluate if pumps are required for the following areas:
        a. Boiler room
        b. Mechanical room
        c. Elevator pit
        d. Orchestra area
    2. Sumps may be installed during construction without requiring a sump pump.
        a. These types of installation need to have empty electrical conduits for power wiring and remote alarm wiring.
    3. Sumps with pumps require remote alarming to be tied into the Building Automation system, Division 23 09 13
        a. Local alarming of high sump water level is discouraged as these areas typically are not attended on a daily basis.

b. Remote alarming may be considered a Category I as identified in Division 23 09 13.
c. This will be determined on an individual project basis.

- Sanitary Sewer lift stations
  1. Lift stations are considered on a project by project basis
     a. Generally discouraged in school facilities
  2. Remote alarming may be considered a Category I, as identified in Division 23 09 13.
  3. Local alarming, when provided, will have alarms on exterior of building.

END SECTION 22 13 00

22 14 00 Facility Storm Drainage – October 2016

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline unless noted otherwise.
- Provide flexible connections to risers.
- Cleanouts
  1. Locations:
  a. Interior Wall cleanouts:
     (1) Bottom of cleanout cover shall be 1 inch minimum above top of baseboard or minimum of 6 inches above floor whichever is dimension is greater.
  b. At bottom of vertical drops from ceiling spaces
  2. Exterior:
     a. 10 feet from perimeter wall and every 100 feet thereafter
     b. Heavy cast iron tractor cover set in 2 feet x 2 feet x 6 inch concrete
     c. 4 inch size cleanout is acceptable in pipes 4 inches and larger.
     d. Cast iron with full size brass cleanout plugs
- Roof Drains:
  1. Restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1 Facilities Management.
  a. Josam
  b. Jay R Smith
  c. Wade
  d. Zurn
  2. Cast iron body with:
  a. Removable cast iron or aluminum dome strainer
     (1) Plastic domes are prohibited.
  b. Flashing clamp device
  c. Under-deck clamp
  d. Gravel stop
  3. 4 inch drains are preferred.
  a. 3 inch drains are permitted with approval of Jefferson County School District, R-1 Facilities Management.
  4. Controlled flow drains are prohibited.
  5. Sump all drains.
  6. Overflow piping shall be a separate drain to a minimum 5 feet beyond the building.
  7. Drain to storm sewer or on-site above grade drainage.

8. Roof drain discharge over sidewalks or at the tops of embankments is prohibited.
9. Locate roof drains at mid-spans of the roof structure, not a bearing.
10. Each major roof area or level should have dedicated separate piping to the storm drain.
    a. Do not permit water to flow from level to level.
11. Minimum two or more widely separated drains per roof section

- Building Storm Drainage Piping:
  1. Buried under structure or concrete walks and drives:
     a. Cast Iron Service weight:
        (1) Hub and spigot with neoprene compression gaskets
     b. Gasketed SRD35 pipe and connections
  2. Above grade and buried not under structure, concrete walks or drives:
     a. Cast Iron Service weight:
        (1) No-hub with stainless steel clamps or hub and spigot with neoprene compression gaskets
     b. Gasketed SRD35 pipe and connections
  3. When encountering unstable soil or when the drainage pipe excavation is through solid shale, slate, sandstone or similar hard material, bed the pipe gravel 6 inches all around the pipe.

END SECTION 22 14 00

22 15 00 General-Service Compressed-Air Systems - October 2010

- Prior to specifying General-Service Compressed-Air Systems, verify capacity with District Mechanical Engineer and District Project Manager.
  1. Maximum of 20% diversity will be allowed.
- Compressor:
  a. Manufacturers:
  b. Gardner Denver, Inc.
  c. General Air Products, Inc.
  d. Ingersoll-Rand Company; Air Compressor Group.
  e. Quincy Compressor.
  2. Type: Duplex receiver mounted compressor unit consisting of air cooled compressor, air receiver, after cooler, refrigerated air dryer, spring isolators, and Operating controls.
  3. Reciprocating Compressors:
     a. Unit: Reciprocating compressor with positive displacement oil pump lubrication system, suction inlet screen, discharge service valves, on cast iron or welded steel base for motor and compressor with provision for V-belt adjustment.
        (1) Automatic Capacity Reduction Equipment: Suction valve un-loader with lifting mechanism operated by oil pressure. Provide for unloaded compressor start.
        (2) Motor: Constant speed 1000 rpm with electronic overheating protection in each phase, full voltage starting.
  4. Controls:
     a. Control Panel: Factory wired, steel, containing power and control wiring, molded case disconnect switch, factory wired for single point power connection.
     b. Starter: Full with manual reset current overload protection, starter relay, control power transformer, terminal strip for connection to interface equipment.

c. Safety Controls: Manually reset low oil pressure cutout.
d. Panel Face: Compressor run light, start-stop switch, elapsed time meter.
e. Receiver: 120 gallon capacity, horizontal, built to ASME regulations for working pressure of 125 psi. threaded inlet and outlet connections.
f. Fittings: Adjustable pressure regulator, safety valve, pressure gage, drain cock, and electronic drain valve.

5. Finish: Factory primed and painted.
6. Capacity: As scheduled on the drawings.
7. Electrical Characteristics: As detailed on the drawings.
8. 460 volts, three phase, 60 Hz.
   a. Refer to Section 262717.
   b. Motor: Refer to Section 220513.
   c. Controls:
      (1) Pressure Switch: Line voltage contactor to break at 100 psi with minimum differential of 20 psi.
      (2) Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal H.
      (3) Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.
      (4) Disconnect Switch: Factory mount disconnect switch in control panel.

- Air Dryer
  1. Manufacturers:
     a. Gardner Denver, Inc.
     b. General Air Products, Inc.
     c. Ingersoll-Rand Company; Air Compressor Group.
     d. Quincy Compressor.
     e. SpeedAire Compressors, Inc.
     f. Type: Self-contained mechanical refrigeration type complete with heat exchanger, refrigeration compressor, automatic controls, moisture removal trap, internal wiring and piping, and full refrigerant charge.
     g. Air Connections: Inlet and outlet connections at same level, factory insulated.
     h. Heat Exchangers: Air to air and refrigerant to air coils. Provide heat exchangers with automatic control system to bypass refrigeration system on low or no load condition.
  2. Moisture Separator: Centrifugal type located at discharge of heat exchanger.
     a. Refrigeration Unit: Hermetically sealed type to operate continuously to maintain specified 21 degrees F dew point. House unit in steel cabinet provided with access door and panel for maintenance and inspection.
     b. Accessories: Air inlet temperature gage, air inlet pressure gage, on/off switch, high temperature light, power on light, refrigerant gage, air outlet temperature gage, air outlet pressure gage.
  3. Capacity: As scheduled on the drawings.
- Pressure Reducing Valves
  1. Air-Main Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 250-psig inlet pressure, unless otherwise indicated.
     a. Type: Pilot operated.

2. Air-Line Pressure Regulators with Pressure Gauge: Aluminum alloy or plastic body, diaphragm operated, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200-psig minimum inlet pressure, unless otherwise indicated.
3. Air Pressure Gauge: 0-300 psig gauge with metal housing and plastic bezel.

- Specialties
  1. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet safety valve for compressed-air service.
  2. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.
  3. Mechanical Filters: Two-stage, mechanical-separation-type, air-line filters in sizes and ratings required by equipment supplied. Equip with deflector plates, resin-impregnated-ribbon-type filters with edge filtration, and drain cock.
  4. Automatic Drain Valves: Corrosion-resistant metal body and internal parts, rated for 200-psig minimum working pressure, capable of automatic discharge of collected condensate.

END SECTION 22 15 00

22 34 00 Fuel-Fired Domestic Water Heaters – August 2017

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Potable Water Heaters
  1. Natural gas-fired, natural draft or powered burners
     a. Water heaters are required to be independent of the building heat.
     b. No side stream heat exchangers fed from the building heating boilers without approval of District Project Manager.
     c. Limit fuel input capacity to 199 MBTUH.
     d. Manufactured acid neutralization condensate traps as required and installed as per manufacture's written installation instructions.
  2. Instantaneous gas or electric booster heaters may be acceptable for kitchens or other special applications.
     a. Discuss application with Jefferson County School District, R-1 Engineer.
  3. Vertical storage tanks preferred over horizontal
  4. Combined storage tank and burner assembly preferred over split systems
  5. High efficiency insulation over glass lined tank
- Design separate systems for kitchens and the remainder of the school.
- Building system is to generate, store and deliver 140°F water to a mixing valve that will control the water temperature supplied to points of use in the facility (not including kitchen) at 110°F.
  1. Mixing valves required at:
     a. All sinks and fixtures used by students
     b. All hand sinks as per IPC
  2. Acceptable mixing valve manufacturer for large main building mixing valves 1.5" or larger: Bradley
- Kitchen system is to generate, store and deliver 140°F domestic water to kitchen.

1. Kitchen lavatories require tempering valves at the lavatory to reduce water temperature to 110°F.

- Installation:
  1. Water heaters to be located on 4 inch concrete pad or slab
  2. Valves, pumps, thermometers and accessories to be readily accessible and no higher than 6 feet 6 inches above finished floor
  3. Thermometers
- Provide re-circulation systems with all bronze circulator pumps.
  1. Pump shall be controlled from temperature control system
     a. See Division 23 09 93.
- Water heaters shall be removable without removing valves, pumps, etc.
- Manufacturers:
  1. Rheem
  2. American Standard
  3. A.O. Smith
  4. Bock

END SECTION 22 34 00

22 34 36 High Efficiency Fuel-Fired Domestic Water Heaters – August 2017

- General
  1. Tank: Glass-or ceramic-lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
  2. Venting Type: Power Vent, Power Direct Vent, Direct Vent, Balanced, or Unbalanced
  3. Venting/Flue System/Vent Kit: Multiple pass, Standard PVC, CPVC and ABS pipe, or Stainless Steel.
  4. IECC Section C404 – Service Water Heating
  5. Thermal Efficiency: ASHRAE 90.1 Chapter 7 – Service Water Heating. Min. 95%.
  6. Performance: 199MBtu/h, maximum.
  7. Maximum Temperature Setting: 180 Deg. F.
  8. Heat Exchanger: 100% submerged
  9. Minimum turndown ration of 10:1
  10. Tank Lining: Glass or Ceramic Lining
  11. Burners:
      a. Power burner or direct spark-to-ignition
      b. Stainless Steel or other non-corrosive material
- Anode Rods: Protective Magnesium or Powered
- Hand Hole Cleanout.
- Hot and cold water Inlets and outlets on both sides of the unit provide installation flexibility.
- High Altitude Models, depending in location of facility in the district.
- Sediment reduction system.
- Automatic, Natural Gas-Fired Water Heater:

1. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
2. Control System: UL 1998 main controller with thermistors at the inlet, outlet and inside the heat exchanger, flow sensor and electronically controlled mixing valve. Ignition shall occur upon flow or thermostatic change. Self-diagnostic controls capable of code display for component failure or improper operating conditions.
3. Water Connections, Dip Tube, and Drain Valve: Brass
4. Anode Rods: Protective Magnesium or Powered
5. Temperature and Pressure Relief Valve: ASME Labeled.
6. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.
7. Manufacturers:
   a. A.O. Smith
   b. Bradford White
   c. Approved Equivalent

- Automatic, Forced-Draft Gas-Fired Water Heater:
  1. Combustion System: Low emission, full modulation burner, fan assisted injection design with 500 step modulating gas control valve. Low temperature exhaust gases for installation with plastic venting systems.
  2. Heat Exchanger: Helical fire tube design with baffled stainless steel tubes. Stainless steel construction holding no more than 6.4 gallons of water in storage.
  3. Blower: Variable-speed, DC centrifugal fan to operate during burner firing sequence and pre-purge the combustion chamber.
  4. Ignition: Ignition shall be via spark ignition with 100 percent main-valve shutoff and electronic flame supervision.
  5. Controls: Automatic water thermostat with temperature range adjustable from120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple.
  6. Condensate: Condensate neutralization system.
  7. Manufacturers:
     a. AERCO International
     b. Lochnivar Corp.
     c. Approved Equivalent
- Warranties:
  1. 1 year warranty on parts
  2. 3 year warranty on heat exchanger
  3. 5 year warranty on tank

END SECTION 22 34 36

22 42 00 Commercial Plumbing Fixtures – August 2022

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1.
- Gang type lavatories, urinals, and showers are prohibited.
- Fittings (Faucets):
  1. Acceptable manufacturers
     a. American Standard
     b. Chicago Faucet
     c. Delta – Commercial Series
     d. Elkay
     e. Fisher
     f. Symmons
  2. Fixtures piping exposed to view:
     a. Brass chrome finish and finished with chrome escutcheons where pipe penetrates walls and floors
  3. All wall stop valves and other valves accessible to building occupants shall be keyed type.
     a. Deliver keys to District Project Manager.
  4. Provide vacuum breakers at all outlets with hose connections.
  5. Lavatories:
     a. Use 4 inch hot to cold spacing.
     b. Faucets (Standard Manual) Preferred:
        (1) Delta, 4-inch center, Model #21C133, 1.5 gpm
        (2) Faucets ((Selected Mountain Facilities Only) with approval of District Project Manager: Automatic faucets – Model: Symmons S-6080
  6. Kitchen and mop sinks:
     a. Use 8 inch hot to cold spacing.
  7. Single-handle mixing faucets are restricted to:
     a. FACS rooms
     b. Staff Lounges
  8. Faucets with wrist blades are required in:
     a. Art rooms
     b. Shops
     c. Food Service
     d. Clinics
  9. Finish:
     a. Polished chrome plated brass in kitchens and exposed areas
     b. Polished chrome plated brass for custodial service areas and mechanical spaces
  10. Gooseneck faucets with top vacuum breakers and tapered serrated hose connections at lab sinks
  11. Except for washers, all internal parts shall be metal.
      a. Plastic and composite parts are prohibited.
- Fixtures:
  1. Acceptable manufacturers for water closets, urinals, lavatories, kitchen sinks, janitor sinks and non-refrigerated drinking fountains:
     (1) American Standard
     (2) Crane

(3) Toto

2. Lavatories will mount in floor set cabinets or wall set counter tops.
3. Water closets shall be floor mounted or wall mounted with extra heavy floor mounted carriers.
   a. Use highest volume per gallon flush capacity available that meets code.
4. Urinals shall be wall mounted with extra heavy floor mounted carriers.
5. Water closets:
   a. 1.6 gpm class IV
   b. For school use only:
      (1) Standard water closet:
         (a) Toto CT705 UN Series
            1. Standard toilet with seat, wax ring and closet bolts
      (2) ADA water closet:
         (a) Toto CT705 ULN Series
            1. ADA handicapped toilet with seat, wax ring and closet bolts
      (3) Wall mounted water closet
         (a) Toto CT708E
      (4) Pre-School and Kindergarten water closet:
         (a) American Standard Baby Devoro 2282.001
         (i) FloWise 10-inch high round front with seat, wax ring, and closet bolts
   c. For temporary building use only:
      (1) ADA handicap toilet and tank
         (i) Toto, CST-744EL01
6. Water closet seats:
   a. Open front
   b. Elongated
   c. No seat cover
7. Urinals:
   a. For school use only:
      (1) Toto UT447E
8. Flush Valves (Standard Manual) Preferred:
   a. Manufacturer:
      (1) Sloan – Model: Regal #111-1.28-XL
      (2) Toto – Model:TMT1LN32#CP
      (3) Toto – Model: TMU1LN12#CP
         (a) For use with urinals
9. Flush valves (Selected Mountain Facilities Only) with approval of District Project Manager:
   a. Manufacturer:
      (1) Sloan – Model: G2 Optima Plus
      (2) Zurn – Model: AquaSense
      (3) Toto – Model: TET1LN32
         (a) For use with standard, ADA handicap and wall mounted water closets.
      (4) Toto – Model: TEU1LN12CP
         (a) For use with urinals
   b. Battery powered, automatic flush valves
      (1) AC electrical wired flush valves are prohibited.
10. Custodial service sinks:

a. Cast iron with rim guards and P-trap

11. Mop Sink:
    a. Fiber Glass or Precast terrazzo
    b. 12" deep
    c. Stainless steel guards on threshold
12. Science sinks:
    a. Pre-cast terrazzo, epoxy resin or stainless steel with acid resistant coating
13. Art, Science, Wood shops and FACS sinks:
    a. Optional manufacturer:
        (1) CHG, anti-microbial treated sinks

- Photo Lab Developing sink:
  1. Manufacturer:
     a. Leedal, Inc.; Chicago, IL
     b. Approved equivalent
        (1) Verify with District Purchasing to ensure consistency.

END SECTION 22 42 00

22 43 00 Healthcare Plumbing Fixtures – October 2010

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Clinic
  1. Wall mounted mixing valve
     a. With hand held shower on 6 foot hose
        (1) Coordinate hose length and location of floor drain to ensure any wheelchair bound occupant when located above the floor drain can be completely rinsed.
     b. Hand operated normally closed on-off lever
  2. Locate floor drain near wall out of normal traffic pattern.
  3. Verify with Architect for acceptable wall surfaces in the area of the shower.

END OF SECTION 22 43 00

22 45 00 Emergency Plumbing Fixtures – October 2019

- Work in this section is restricted to specific products of specific manufacturers that have been previously approved by Jefferson County School District, R-1.
- Water service to Emergency Shower or Eyewash shall be tempered to tepid.
  1. Temperature range as specified in ANSI Z358.1 – 2004
- Showers and eyewashes:
  1. Comply with ANSI Z358.1, Current edition.
  2. Drench shower:
     a. Free standing galvanized steel with stainless steel head and grab handle
     b. Manufacturer:
        (1) Bradley #S19-110
  3. Combination shower and eyewashes:
     a. Manufacturer:
        (1) Bradley, #S19-300
- Eyewash:

1. Locate eyewashes preferably no more than 20 feet from any point in the lab but in no case more than 50 feet.
   a. Coordinate with code requirements.
2. Counter-top swing away
   a. Flow rate not less than 0.4 gpm for a minimum of 15 minutes
   b. Stay open valve with a paddle handle operable with most any part of the body
   c. Mounting height to accommodate occupant ages
   d. Conspicuously label each eyewash or shower with a plastic sign: "EMERGENCY EYEWASH [AND/OR SHOWER]"
   e. Manufacturers:
      (1) Bradley #S19-200B with S19-2000
      (2) Bradley #S19-270B or S19-270BL mounted next to a sink
      (3) Flinn – Model SE1010 mounted next to a sink

- Floor Drains:
  1. Include a drain with each Emergency fixture that does not discharge into an approved fixture.
  2. Drains shall be:
  a. Oversized, with small openings in the grate (to reduce vandalism)
  b. Include integral clean out.
  c. Secure with tamper proof screws.

END OF SECTION 22 45 00

22 47 00 Drinking Fountains and Water Coolers – August 2022

- Work in this section is restricted to specific manufacturers that have been previously approved by Jefferson County School District, R-1.
  1. Elkay
  2. Halsey Taylor
  3. Haws
- All drinking fountains shall conform to the following:
  1. Unit constructed to be vandal-resistant
  2. Child or adult ADA compliant
  3. Vandal-resistant bubblers, lead-free stainless steel with an integrally designed non-squirt feature.
  4. Vandal-resistant button, chrome plated brass pushbutton using less than 5 pounds of force to operate.
  5. Basin shall be constructed from 304 stainless steel and have an integral drain.
- Cabinet shall be 304 stainless steel and louvers shall have a stainless steel protective screen.
- Refrigerated Water Cooling Option:
  1. Cooling system shall use R-134A refrigerant and be capillary tube controlled.
  2. An adjustable thermostat with an "OFF" position shall control the refrigeration system.
  3. Unit shall be listed UL (or other acceptable NRTL) for both U.S. and Canada, compliant to the Air Conditioning, Heating, and Refrigeration Institute Standard 1010.
- Selected drinking fountains shall have bottle fill stations

1. Manufacturers
   a. Elkay EZH20 Electric Water Cooler with Bottle Filling Station
      (1) Model: VRCGRN8WSK (Single)
      (2) Model: VRCGRNTL8WSK (Double Bi-Level - Left-High)
      (3) Without Filters
2. Optional recessed fixtures. Use only if standard models cannot be installed because of physical constraints. Approval required from District Project Manager:
   a. Elkay LZWS Electrical Water Cooler with Bottle Filling Station
      (1) Model: LZWS-LRPBM28K (Single)
      (2) Model: LZWS-SFGRN28K (Double Bi-Level – Left-High)
      (3) Without Filters
3. Optional split system fixtures. Use only if standard models cannot be installed because of physical constraints. Approval required from District Project Manager.
   a. Elkay EZH20 Surface Mount with ELKECH8 Chiller, 8GPH
   b. Without Filters
4. ADA Compliant
5. Locations:
   a. Reference Educational Specifications
6. Water filters are prohibited on all fountains.

- Provide accessible water shut-offs at or near each drinking fountain. Protect from public access.

END OF SECTION 22 47 00

22 60 00 Facility Gas Distribution – August 2022

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Install wrench-operated, iron body, lubricated plug type with square nut actuator and matching nut wrench:
  1. Outside where gas enters building
  2. Entry and exit to basements, crawl spaces or trenches
  3. On gas branch line serving temporary facilities outside where line exits the building
- Install approved transition fitting on plastic underground gas pipe per IPC
- Utility extension for future Temporary Facilities:
  1. See Section 33 05 16
- Install gas service and enclosure to conform to current Xcel Energy installation standards.
- Install gas meter and building isolation valve within protective enclosure.
- Give careful consideration when placing gas meter immediately adjacent to a low level roof where either the gas piping or the gas meter enclosure presents an easy means for vandals to access the roof.
- Gas piping will be buried a minimum of 18” below finished grade.
- Natural gas piping
  1. Pipe:
     a. ASTM-A53, Grade B, Schedule 40
        (1) ASTM A120 is prohibited.

b. Below grade:
(1) PE (polyethylene) pipe as allowed by the IPC
c. Above grade
(1) Schedule 40 steel
2. Solenoid valve bodies:
a. Iron, steel or natural gas compatible brass.
3. Fittings:
a. Steel pipe:
(1) 2 inches and smaller:
(a) Threaded class 150 black malleable iron
(2) 2.5 inches and larger:
(a) Flanged or butt weld, ASTM B31
4. Pressure regulator vent piping:
a. Schedule 40 steel or rigid copper
(1) Soft copper or aluminum is prohibited.
5. Kitchen gas shutoff shall be by mechanical valve only
a. Electric solenoid valve or a combination mechanical and electric solenoid valve is not permitted.

END OF SECTION 22 60 00

22 63 13 Gas Systems for Laboratory and Healthcare Facilities – October 2010

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Science Classroom subsystem:
1. Normally includes piping from the boiler room to the gas outlets in the classrooms
2. May need to be flooded with a liquid chemical solution.
a. To accommodate this possibility, the subsystem shall be separated into multiple sections that can be isolated, flooded and drained.
3. Arrange all piping to drain to identified low points.
4. Provide capped tees at low points.
5. Install pipe at a minimum of 6 inches above floor.
6. Weld pipe above the ceiling
7. Install valves, capped tees, etc. in enclosures isolated from the above ceiling space with grills to make them a part of the occupied space.
8. Review piping arrangement with Jefferson County School District, R-1 Engineer.
- Gas Safety Valve (GSV):
1. The gas supply to any classroom requires a manual shut off valve at the branch connection to main, Gas Safety Valve (GSV), and wall mounted Control Panel upstream of all points of use.
2. 120 VAC, UL listed, solenoid with iron, steel or natural gas compatible brass body
3. Mount GSV in an air tight enclosure open to the occupied space and separated from the return air plenum.
a. Within the enclosure, install unions on either side of the GSV and a manual isolation valve upstream of the inlet side union.
4. Control Panel:
a. 120 VAC, keyed on, push button off, red pilot light to indicate valve open

b. Push button shall be large red with "OFF" engraved in the face.
c. Key shall be removable in any position.
d. Locate Control Panel at the primary classroom exit.
e. Control Sequence:
   (1) "Key On" energizes pilot light and valve to open.
   (2) "Push Button Off" de-energizes pilot and normally closed valve.
f. Manufacturers:
   (1) ASCO
   (2) Warwick

END OF SECTION 22 63 13

22 63 19 Gas Storage Tanks for Laboratory and Vocational Uses – October 2010

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Summary
  1. Piping infrastructure for distribution of gasses from tanks or building systems
- Coordination
  1. Section 22 63 13
  2. Section 22 60 00
  3. Section 22 05 53
- Submittals
  1. Product Data
  2. Certifications
  3. Test Results
- Materials Summary
  1. Natural gas piping
     a. ASTM-A53, Grade B, Schedule 40
        (1) ASTM A120 is prohibited.
     b. Below grade:
        (1) PE (polyethylene) pipe as allowed by the IPC
     c. Above grade
        (1) Schedule 40 steel
  2. Copper piping
     a. Type K or Type L, ASTM B819
- Execution Summary
  1. NFPA Standard No. 99, Health Care Facilities, Chapter 4, Gas and Vacuum Systems
  2. All connections in copper lines for Oxygen shall be brazed.
     a. Specification for Brazing Filler Metal, ANSI/AWS A5.8
- Installation
  1. Use Medical Gas (Med-Gas) Certified personnel for work on all piping that will transport Oxygen and Acetylene, or other flammable gases.
  2. Permanently marked identification on each pipe showing type of gas and direction of gas flow
- Field Quality Control
  1. Cleaning
     a. CGA Pamphlet G-4.1, Cleaning Equipment for Oxygen Service

2. Testing

END OF SECTION 22 63 19

22 66 00 Chemical-Waste Systems for Laboratory and Healthcare Facilities – October 2021

- Work in this section is open to any product or material meeting the requirements of this Technical Guideline.
- Install a dilution trap beneath every sink of each science room.
  1. Manufacturer:
     a. IPEX Inc.
        (1) Model: W611 with clear base.
     b. Orion Fittings, Inc; a division of Watts Water Technologies, Inc.
     c. Georg Fischer Piping Systems
     d. Spears Manufacturing Company
  2. Trap size to have 1.0 to 2.0 gallon capacity depending upon manufacturer
  3. Trap must have IAPMO stamp.
  4. Installation to include acid resistant piping between the outlet of the sink and the inlet to the trap.
  5. Piping from the outlet of the trap can be cast iron and that can be connected into the building sanitary.
  6. Some trap selections cannot be supported from the piping alone.
  7. Limestone Chips: 1-inch to 2-inches gradation, 94% $CaCO_3$.
- Stagecraft Area:
  1. Solids interceptors are prohibited.
- Art Classrooms
  1. Under cabinet solids interceptors for art classrooms.
  2. Coordinate basket removal clearance requirements with clearance under cabinet.
     a. Solids Interceptor:
        (1) Zurn - Model Z-1180

END OF SECTION 22 66 00