

09
DIVISION

FINISHES

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SECTION 092116

GYPSUM BOARD ASSEMBLIES

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for non-structural metal support assemblies for gypsum board and interior gypsum board, gypsum board assemblies, accessories, and trim.

1.2 QUALITY ASSURANCE

- A. Refer to "Recommended Specification on Levels of Gypsum Board Finish" as published by the Gypsum Association (and AWCI/CISCA/PDCA) for finish levels required.
- B. Recommended deflection limit for gypsum board assemblies is L/240.
 - 1. Tile finishes applied to cementitious backer units will require deflection limits of L/360 or less.

1.3 STEEL FRAMING

- A. Steel Framing, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Metal complying with ASTM C 645 requirements.
 - a. Protective Coating:
 - 1) Interior Applications: ASTM A 653, G40 (Z120), hot-dip galvanized zinc coating.
- B. Partition and Soffit Framing:
 - 1. Steel Studs and Runners
 - 2. Slip-Type Head Joints
 - a. Double Runner
 - b. Deflection Track
 - c. Firestop Track
 - 3. Flat Strap and Bracing Plate
 - 4. Cold-Rolled Channel Bridging
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 - 6. Cold-Rolled Furring Channels
 - 7. Z-Shaped Furring
- C. Suspension Systems
 - 1. Wire Hangers
 - 2. Flat Hangers
 - 3. Carrying Channels
 - 4. Furring Channels
 - 5. Grid Suspension Systems for Ceilings

FINISHES**CHAPTER 9: SPECIFICATIONS****1.4 PANEL PRODUCTS**

- A. **General:** Interior Gypsum Wallboard; 5/8 inch minimum thickness, Type X.
 - 1. **Abuse/Impact/Mold-Resistant Gypsum Panels:** *Panels shall comply with ASTM C 1629, Level 1 requirements.*
 - 2. Moisture and Mold Resistant Gypsum Wallboard: Moisture and mold-resistant core and surfaces. Gypsum board shall be designed to provide extra protection against mold and mildew compared to standard paper-faced wall board products. When tested by an independent lab per ASTM D 3273 ("Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber") gypsum board shall achieve an average panel score of 8 or greater out of a possible high score of 10.
- B. Tile-Backing Panels
 - 1. Cementitious Backer Units
 - a. Application: Provide as tile backer at all "wet walls".
 - 2. Glass-Mat, Water-Resistant Backing Board

1.5 TRIM ACCESSORIES

- A. Interior Trim
 - 1. Cornerbead: Use at outside corners.
 - 1. LC-Bead: Use at exposed panel edges.
 - 2. Expansion (Control) Joint: Maximum 30 ft. o/c.

1.6 JOINT TREATMENT MATERIALS

- A. Joint Tape
- B. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

1.7 AUXILIARY MATERIALS

- A. Sound Attenuation Blankets

LEED SUGGESTIONS

- 2.1 LEED for Schools provides a credit under Interior Environmental Quality for specifying low-emitting materials for gypsum board, insulation, acoustical ceiling systems, and wall coverings.

LESSONS LEARNED

- 3.1 Mold-related claims against building owners are increasing. Reasons asserted for the increase in mold-related lawsuits include tighter building envelopes that hinder the escape of moisture, the use of building materials with organic components that “feed” mold (such as paper facings on gypsum board), shorter construction schedules that sequence finish work before the interior environment is conditioned, and inadequate protection of construction materials before, during, and after installation. Requirements for installing interior gypsum products in semi-conditioned spaces need consideration.

END OF SECTION

FINISHES

CHAPTER 9: SPECIFICATIONS

SECTION 092400

PORTLAND CEMENT PLASTERING

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for interior and exterior plastic (stucco) finishes, including furring, lathing, accessories, and trim for plaster.

1.2 FRAMING/METAL LATH

- A. Lath and Plaster Support Systems
 - 1. Metal Supports for Suspended and Furred Ceiling: ASTM C 1063.
 - 2. Steel Studs and Runners, Nonload (Axial) Bearing: ASTM A 645-00, G60.
 - 3. Expanded Metal Lath: ASTM C 847, self-furring diamond mesh or rib lath; ASTM A 653 G60.
 - 4. Woven Wire Lath: ASTM C 1032, galvanized steel wire.
 - 5. Welded Wire Lath: ASTM C 933, galvanized steel wire.

1.3 PORTLAND CEMENT PLASTER

- A. Application
 - 1. 3 coats over metal lath type.
 - 2. 3 coats over concrete unit masonry type.

1.4 ACCESSORIES

- A. Accessories: ***Zinc-coated (galvanized) steel.***

END OF SECTION

SECTION 092513

ACRYLIC PLASTER CEILINGS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A.** Qualitative requirements for factory mixed acrylic emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates for use over sheathing for high humidity and abuse ceiling **and exterior soffit** applications.

1.2 SHEATHING

- A.** Glass-Mat Gypsum Backing Board.
- B.** Exterior Cement Board.
- C.** Tile Backer.

1.3 FINISH SYSTEM – MATERIALS

- A.** Reinforcing Mesh: Nominal 4.2 oz./sq.yd., symmetrical, interlaced open weave glass fiber fabric.
- B.** Base Coat: Acrylic based, fiber reinforced, flexible waterproofer.
- C.** Primer: A synthetic resin, pigmented, copolymer based primer. Tint to same shade as finish.
- D.** Finish Coat Materials: Manufacturer's siliconized acrylic based coating complying with the following requirements for material composition and method of combined materials:
 - 1. Factory mixed formulation of polymer emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 093000****TILING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for manufactured surfacing units of impervious, vitreous, semi-vitreous, and non-vitreous materials; glazed, unglazed, abrasive, and textured surfaces and related mortar, grout, trim, antifracture membranes and accessories.

1.2 QUALITY ASSURANCE

- A. Tile Council of North America (TCA) "Handbook for Ceramic Tile Installation" shall be used as a guide to assist in standardizing installation specifications.
- B. ANSI Ceramic Tile Standard: Provide tile that complies with A137.1, "Specifications for Ceramic Tile".
- C. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI Standards referenced in "Setting and Grouting Materials" Article.

1.3 UNGLAZED CERAMIC MOSAIC TILE

- A. Type: Porcelain factory-mounted flat tile with abrasive admixture at wet areas.
- B. Thickness: 1/4 inch nominal.
- C. Face: Plain face with cushion edges.

1.4 GLAZED CERAMIC MOSAIC TILE

- A. Type: Porcelain factory-mounted flat tile.
- B. Thickness: 1/4 inch nominal.
- C. Face: Plain face with cushion edges.

1.5 UNGLAZED QUARRY TILE

- A. Wearing Surface: Provide one of the following:
 - 1. Nonabrasive, smooth
 - 2. Nonabrasive, textured
 - 3. Abrasive aggregate embedded in surface
- B. Thickness: 1/2 inch nominal
- C. Face: Plain or patterned face

1.6 UNGLAZED PAVER TILE

- A. Composition: Porcelain
- B. Thickness: 3/8 inch nominal
- C. Face: Plain with square or cushion edges

1.7 GLAZED WALL TILE

- A. Type: Interior type body, flat tile.
- B. Thickness: 5/16 inch nominal.
- C. Face: Plain face with modified square or cushion edges.

1.8 SETTING MATERIALS

- A. Portland Cement Mortar: ANSI A 108.1A.
- B. Dry-Set Portland Cement Mortar: ANSI A 118.1.
- C. Latex-Portland Cement Mortar: ANSI A 118.4.
 - 1. Prepackaged dry mortar mix.
- D. Chemical-Resistant, Water-Cleanable, Tile-Setting and Grouting Epoxy: ANSI A 118.3.
- E. Water-Cleanable, Tile-Setting Epoxy Adhesive: ANSI A 118.3.

1.9 GROUT

- A. Sand-Portland Cement Grout: ANSI A 108.10.
- B. Polymer – Modified Tile Grout: ANSI A 118.7.
- C. Standard Sanded Cement Grout: ANSI A 118.6.
- D. Standard Unsanded Cement Grout: ANSI A 118.6.
- E. Chemical-Resistant, Water-Cleanable, Tile-Setting and Grouting Epoxy: ANSI A 118.3.

1.10 WATERPROOFING AND CRACK-SUPPRESSION MEMBRANES FOR THIN-SET TILE INSTALLATIONS

- A. Manufacturer's standard product that complies with ANSI A 118.10.

FINISHES**CHAPTER 9: SPECIFICATIONS****1.11 ACCESSORIES**

- A. Metal Edge Strips: Provide at tile transitions to protect edge of tile.
- B. Elastomeric Sealants: One-Part, Mildew-Resistant Silicone Sealant.

1.12 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A 108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

1.13 SETTING METHODS

- A. Method and typical detailing for tile work shall be in accordance with the following TCA alphanumeric method, listing from the "Handbook for Ceramic Tile Installation," latest edition, by the Tile Council of America.

WALL TILING INSTALLATION GUIDE

(Reprinted from the 2005 Handbook for Ceramic Tile Installation, 42nd Edition)

Simplest methods are indicated; those for heavier services are acceptable. Very large or heavy tiles may require special setting methods. Consult ceramic tile manufacturer.						
SERVICE REQUIREMENTS	WALL TYPE (numbers refer to Handbook method numbers)					
	Masonry or Concrete	Page	Woods Stud	Page	Metal Studs	Page
Commercial Construction – Dry or limited water exposure: dairies, breweries, kitchens	W202	41	W223	42	W223	42
	W221	42	W231	44	W241	44
	W223	42	W243	45	W242, W243	45
			W244	46	W244	46
			W246	47	W246	47
Commercial Construction – Wet: gang showers, tubs, showers, laundries	W202	41	W231	44	W241	44
	W211	43	W244	46	W244	46
	W221	42	W246	47	W246	47
			B411	50	B411	50
			B414	52	B414, B415	52
					B425	51
					B426	53

WALL TILING INSTALLATION GUIDE

(Reprinted from the 2005 Handbook for Ceramic Tile Installation, 42nd Edition)

Performance – Level Requirement Guide and Selection Table

Based on results from ASTM Test Method C-627 “Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson Type Floor Tester.” All methods are material dependent – performance rating should not exceed rating of weakest component – consult each material manufacturer for individual component rating.

SERVICE REQUIREMENTS Find required performance level and choose installation methods that meets or exceeds it. Performance results are based on ceramic tile meeting ANSI A137.1, or tile designated by tile manufacturer.	FLOOR TYPE – Numbers refer to Handbook Method numbers	
	Concrete	Page
Heavy: Shopping malls, stores, commercial kitchens, work areas, laboratories, auto showrooms and service areas, shipping/receiving, and exterior decks. (Passes ASTM C627 cycles 1 through 12)	F103, F111, F112 F113, F121	17, 18, 19 19, 22
Moderate: Normal commercial and light industrial use in public space of restaurants and hospitals. (Passes ASTM C627 cycles 1 through 10.)	F112, F115 F122 ^c , F200 RH110, RH111 RH115, RH116	19, 20 22, 21 26, 27 27, 28
Light: Light commercial use in office space, reception areas, kitchens, and bathrooms. (Passes ASTM C627 cycles 1 through 6.)	F122 ^c	22

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 095113****ACOUSTICAL PANEL CEILINGS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for ceiling panels and ceiling suspension assemblies.

1.2 QUALITY ASSURANCE

- A. Acoustical Panel Quality Standard: ASTM E 1264.
- B. Metal Suspension System Quality Standard: ASTM C 635.

1.3 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at levels for intended use.

1.4 MINERAL BASE PANELS, WATER FELTED

- A. Type, form and finish, provide one of the following:
 1. ASTM E 1264, Type III or IV, Form 1 or 2 with painted finish.

1.5 PANELS WITH SCRUBBABLE FINISH (CLEANABLE)

- A. Type: ASTM E 1264, Type XX or IV, or gypsum based panel.
 1. USDA approved kitchens.

1.6 CEMENTITIOUS FIBER BOARD CORE

- A. Type form and finish, provide one of the following:
 1. ASTM E 1264, Type XIV, Form 1 (No Backing) or Form 2 (Backed with mineral or glass fiber backing), pattern I (random swirl).

1.7 SUSPENSION SYSTEMS

- A. ***Metal Suspension Systems***
 1. ***Wire hangers, braces, and ties.***
 2. ***Angle hangers.***
 3. ***Seismic perimeter stabilizer bars, struts, and clips, if required by seismic zone.***
 4. ***Hold-down clips (vestibules, restrooms).***
 5. ***Impact clips.***
 6. ***Wide-face, capped, double-web steel: Intermediate duty.***
 7. ***Wide-faced, capped, double-web, hot-dip galvanized steel: Intermediate duty.***

LEED SUGGESTIONS

- 2.1 Acoustical Panel Ceilings if specified correctly can contribute to several LEED Credits.
- A. Construction Waste Management: Most manufacturers have a take-back program eliminating construction waste for these products.
 - B. Low-Emitting Materials: Ceiling products can be selected that will comply with California Section 01350 requirements for low emissions.
 - C. Daylight and Views: Highly reflective surfaces can increase daylighting effectiveness.
 - D. Minimum Acoustical Performance and Enhanced Acoustical Performance: Careful review of NRC, AC, and CAC can assist in obtaining the prerequisite as well as a credit.

LESSONS LEARNED

- 3.1 Light reflectances for most standard products fall within the top range of 0.75 LR or greater. Lower values are typical for some textured, embossed, or scored patterns; nonwhite units; and those covered with fabric. This lower reflectance is not necessarily significant, however, unless the ceiling is depended upon as a distributor of ambient illumination. Ceiling light reflectance performance is especially important in buildings with substantial levels of indirect lighting, and in building designs incorporating daylighting. Using daylight as a lighting source often requires directing a portion of the daylight toward the ceiling for subsequent re-reflection and diffusion. This strategy may be used to deliver uniform, usable light levels without glare throughout the illuminated space.
- 3.2 Resistance to humidity varies among acoustical ceiling components. Most regular composition tiles and panels deteriorate when exposed to high humidity or humidity fluctuation. High-density, ceramic ceiling panels are specifically recommended for high-humidity conditions, as are vinyl-film-faced and metal-foil-faced products. Acoustical units designed not to sag in high-temperatures as high as 104 degrees F (40 degrees C), and high-humidity (90% to 100% relative humidity) conditions, are available. Similar care must be exercised when selecting suspension system components for high-humidity areas, including areas such as saunas, shower rooms, indoor swimming pools, and kitchens. Also, to reduce moisture-related problems, make provisions for ventilating the ceiling plenum.
- 3.3 Installing thermal or acoustical insulation on the back of suspended acoustical panel ceilings is not recommended by manufacturers. Excessive loading caused by added insulation can cause sagging and unsafe installations. Condensation may occur if ceiling insulation places the dew point inside the plenum. Condensation within the plenum can damage both acoustical units and suspension systems. Uncovered mineral-fiber insulation in the plenum may increase particulate counts in air supplies and contribute to poor indoor air quality. If other considerations require that acoustical or thermal insulation be installed on top of the acoustical ceiling, manufacturers may not warrant installations or they may have weight restrictions, requirements for vapor retarders, and other limitations. Because blanket insulation rolls span multiple cross tees and contacts the backs of acoustical units less frequently, rolls are preferred to batts.

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 096400****WOOD FLOORING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for wood strip flooring and finish.

1.2 QUALITY ASSURANCE

- A. Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.
- B. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
- C. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

1.3 WOOD STRIP FLOORING FOR GENERAL USE (STAGE / PLATFORM)

- A. Solid-Wood, Strip Flooring.
 - 1. Species and Grade: Hardwood.
 - a. No. 2 common red oak
 - b. MFMA-RL Second and Better Grade hard maple
 - 2. Cut: Plain sawn, quarter/rift sawn, or edge grain
 - 3. Thickness: 25/32 inch minimum.
- B. Solid-Wood Plank Flooring:
 - 1. Species and Grade: Softwood.
 - a. C and better or D – Flooring Douglas Fir
 - 2. Cut: Plain sawn.
 - 3. Thickness: 3/4 inch nominal.
- C. Field-Applied Finish: Solvent-based, oil-modified, or water-based urethane finish system.

1.4 ACCESSORIES

- A. Wood Sleepers and Subfloor.
- B. Wood Underlayment.
- C. Cork Expansion Strip.
- D. Wood Trim.
- E. Vented Base.

1.5 PREPARATION

- A. Concrete Slabs: Verify that slabs are dry according to test methods recommended by flooring manufacturer or, if none, by test methods in NOFMA's "Installing Hardwood Flooring."
 - 1. When concrete slabs are tested according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 4-1/2 pounds of water/1000 sq.ft. of slab in a 24hour period is generally acceptable as a maximum moisture-emission level.

LEED SUGGESTIONS

- 2.1 ***LEED for Schools requires that a minimum of 50% of wood-based materials be certified as having been obtained from forests that comply with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship in order for a project to qualify for Credit MR7.***

LESSONS LEARNED

- 3.1 ***The Maple Flooring Manufacturers Association (MFMA) has noted that the use of water-based finishes has occasionally produced a side bonding effect, which may result in localized excessive cracks between boards. They recommend consulting an MFMA contractor and the manufacturer to obtain procedures for sealing and finishing maple strip flooring with water-based products.***

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 096466****WOOD ATHLETIC FLOORING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for wood sports-floor assemblies.

1.2 QUALITY ASSURANCE

- A. Maple Flooring: NFMA.

1.3 WOOD STRIP FLOORING FOR ATHLETIC APPLICATION

- A. Strip Flooring: Northern hard maple, kiln dried, random length, tongue and groove, and end matched.
 - 1. Grade: MFMA-RL, provide Second and Better Grade or Thirds for areas normally exposed to view in high schools only.
 - a. Provide Third Grade for areas under stacked portion of telescoping bleachers and at middle schools.
 - 2. Cut: Edge or Flat
 - 3. Thickness: 25/32 inch
 - 4. Face Width: 2-1/4 inches or 1-1/2 inches
 - 5. Backs: Channeled (kerfed) for stress relief
- B. Installation System: Provide one of the following:
 - 1. Maple, strip flooring on floating double layer, plywood subfloor.
 - 2. Maple, strip flooring on floating wood sleepers.
 - 3. Maple, strip flooring on fixed, wood sleepers and subfloor.
- C. Finish: High build gym floor finish and game markings, approved by Maple Flooring Manufacturers Association (MFMA).
 - 1. Type: MFMA Group 3, Gymnasium Type (Surface) Finishes; urethane-oil type or Group 5, Water Based Finishes; polyurethane
 - 2. Floor-Sealer Formulation: Pliable, penetrating type
 - 3. Finish-Coat Formulation: Formulated for gloss finish and multi-coat application
 - 4. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.

1.4 AUXILIARY MATERIALS

- A. Vented Cove Base: Semi-rigid plastic angle molding.

1.5 PREPARATION

- A. Where direct application of wood flooring to concrete substrate is indicated, test for dryness before proceeding with installation. Check levelness of concrete substrate to ensure not more than 1/8 inch deviation in any direction when checked with a 10 foot straight edge. Grind down high spots or fill in low spots to correct improper conditions.

- B. Concrete Slabs: Verify that slabs are dry according to test methods recommended by flooring manufacturer or, if none, by test methods in NOFMA's "Installing Hardwood Flooring."
 - 1. When concrete slabs are tested according to ASTM F1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 4-1/2 pounds of water/1000 sq.ft. of slab in a 24 hour period is generally acceptable as a maximum moisture-emission level.

LEED SUGGESTIONS

- 2.1 VOC restrictions of authorities having jurisdiction may affect the selection of installation adhesives and floor-finish systems. The Section Text places responsibility on the floor covering manufacturers for selecting appropriate adhesives and floor-finish systems for conditions indicated. The Section Text also includes requirements for low-emitting adhesives required for LEED Credit EQ 4.1 and low-emitting finish systems required for LEED Credit EQ 4.2.
- 2.2 LEED Credit MR 7 requires that a minimum of 50% of wood-based products be from forests certified by an FSC-accredited certification body to comply with FSC 1.2, Principles and Criteria.

LESSONS LEARNED

- 3.1 ***The Maple Flooring Manufacturers Association (MFMA) has noted that the use of water-based finishes has occasionally produced a side bonding effect, which may result in localized excessive cracks between boards. They recommend consulting an MFMA contractor and the manufacturer to obtain procedures for sealing and finishing maple strip flooring with water-based products.***

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 096500****RESILIENT FLOORING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for resilient tile flooring, resilient sheet flooring, resilient base, resilient stair treads and risers, resilient stair nosings, resilient edging, and transitions for carpet.

1.2 QUALITY ASSURANCE

- A. Fire Test Performance: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.
 - 1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq.cm. or greater, Class I.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
- B. Provide adequate testing of concrete slabs, including relative humidity testing.

1.3 TILE FLOORING

- A. ***Enhanced Tile: ASTM F 1066, Class II, homogeneous resilient tile, but with superior recovery from long-term indentation. Product shall comply with any of the following: a polymer binder, enhanced vinyl content, polyolefin fiber reinforcement, or polyvinyl esters and inorganic fillers (not including quartz) provide improved permanent indentation resistance. Factory-applied finish shall provide excellent cleaning properties.***
 - 1. ***Physical Properties: product must pass one of the following:***
 - a. ***Static Load (ASTM F 970): At a static load of 250 pounds, tile shall have a residual indentation of less than 0.005 inch.***
 - b. ***Indentation (ASTM F 1914): At the end of one minute the indentation must be less than .01 inch.***
 - 2. ***Size***
 - a. ***12 inch by 12 inch, minimum.***
 - b. ***Thickness: 0.120 inch minimum***
 - 3. ***Wearing Surface: Smooth.***
 - 4. ***Finish: Manufacturer's factory applied finish not requiring removal after installation, including but not limited to the following:***
 - a. ***UV/ceramic technology, Tritonite II.***
 - b. ***Polyurethane.***
 - c. ***Acrylic.***
- B. Rubber Tile: ASTM F 1344, Class 1-A or 1-B, 0.125 inch thick.
- C. Solid Vinyl Floor Tile: ASTM F 1700.
 - 1. Thickness: 0.120 inch minimum.
- D. ***Resilient Quartz Tile: ASTM F 1066, Class I, Type A or ASTM F 1700, Class II. Product shall be a combination of vinyl and quartz resulting in a higher static load limit than standard vinyl completion tile. Factory-applied finish shall provide excellent cleaning properties.***

1. **Physical Properties:**
 - a. **Static Load (ASTM F 970):** *At a static load of 2,000 pounds, tile shall have a residual indentation of less than 0.005 inch.*
2. **Size**
 - a. **12 inch by 12 inch, minimum.**
 - b. **Thickness: 0.080 inch minimum**
3. **Wearing Surface: Smooth.**
4. **Finish: Manufacturer's factory-applied finish not requiring removal after installation, including but not limited to the following:**
 - a. **UV/ceramic technology, Tritonite II.**
 - b. **Polyurethane.**
 - c. **Acrylic.**

1.4 VINYL SHEET FLOORING

- A. Unbacked Sheet Vinyl Floor Covering: ASTM F 1913, 0.080 inch thick.
- B. Sheet Vinyl Floor Covering with Backing: ASTM F 1303, 0.080 inch thick.

1.5 RUBBER SHEET FLOORING

- A. Provide three-layer construction rubber flooring sheets conforming to ASTM F-1860-98 Standard Specification for Rubber Sheet Flooring and Backing.
- B. Sheet Rubber Flooring: ASTM F 1859 Standard Specification for Rubber Sheet Flooring Without Backing.

1.6 RESILIENT BASE AND ACCESSORIES

- A. Resilient Base: Rubber wall base 4 or 6 inch height, 0.125 inch thick, complying with ASTM F 1861, Type TS or TP, Group I or II.
- B. Resilient Stair Treads, Risers, and Skirtings: Rubber accessories, complying with ASTM F 2169, Type TS or TP, Group II tread with contrasting color for visually impaired.
- C. Integral-Flash-Cove-Base Accessories:
 1. Cove Strip.
 2. Cap Strip.
- D. Resilient Molding Accessories.

1.7 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds.
- B. Adhesives.
- C. Stair-Tread-Nose Filler.
- D. Metal Edge Strips.
- E. Floor Polish
 1. Acrylic as recommended by membrane manufacturer.
 2. Clear topcoat (Aliphatic Polyurethane), non-immersible, high performance, zero VOC, coating.
 3. Static Coefficient of Friction – not less than 0.5

FINISHES**CHAPTER 9: SPECIFICATIONS****1.8 EXAMINATION**

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
 - a. When concrete slabs are tested according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, 3 pounds of water/1000 sq.ft. of slab in a 24-hour period is generally accepted in the resilient floor covering industry as a safe maximum moisture emission level. Some manufacturer's installation instructions state that up to 5 pounds of water/1000 sq.ft. in 24 hours is acceptable for **resilient tile flooring**.
 - 1) Alternative testing methods may be used when approved by flooring manufacturer.
2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.

1.9 Cleaning and Protection

A. Floor Polish:

1. Apply three to five coats with a minimum of 24 hours of drying time between each coat.
2. Coordinate type of polish with Owner's maintenance department.

LEED SUGGESTIONS

- 2.1 Floor coverings manufactured from post-consumer recycled rubber are available. For products advertised as having recycled content, contact manufacturers to determine the percentages of post-consumer and industrial waste used in manufacturing process.
- 2.2 When installing adhesives, manufacturers and installers must comply with VOC restrictions of authorities having jurisdiction. However, if the project is requiring a LEED credit for Low-Emitting Materials, the product should also meet the requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from From Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

LESSONS LEARNED

- 3.1 Although resilient floor coverings resist moisture, installations can fail if the bond between the floor tile or sheet floor covering and the substrate is weakened or destroyed by moisture on the surface seeping through the joints between units. Heat welding or chemically bonding the seams eliminates these joints. Generally, resilient sheet flooring manufacturers, installers, and end-users prefer the appearance and performance of heat-welded seams over chemically bonded seams. Some sheet manufacturers also offer alternative, proprietary seamless installation techniques. Although sheet products are usually specified for seamless installations, some large-size tiles can be heat welded or chemically bonded. If a seamless installation is required, verify availability and installation methods with manufacturers.

END OF SECTION

SECTION 096516

LINOLEUM FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for linoleum sheet flooring.

1.2 SUBMITTALS

- A. Maintenance Procedures: To seal linoleum, manufacturers generally recommend an initial application of floor polish. This floor polish is usually different from the products used with resilient products. To inform the Owner about linoleum's maintenance requirements the specifications need to include a requirement for submitting maintenance data and review maintenance procedures.

1.3 QUALITY ASSURANCE

- A. Fire Test Performance: Unless otherwise indicated, provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory.
 - 1. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class I.
 - 2. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.
- B. ASTM F 2034 "Specification for Sheet Linoleum Floor Covering".
- C. Provide adequate testing of concrete slabs, including relative humidity testing.

1.4 LINOLEUM SHEET FLOORING

- A. Sheet linoleum flooring complying with ASTM F 2034.
- B. Roll Size: Manufacturer's standard length by not less than 78 inches wide.
- C. Thickness: 0.10 inch (2.5 mm), minimum.
 - 1. 0.08 (2.0 mm) is not acceptable.
- D. Seams: Heat welded or cold bonded.

1.5 AUXILIARY MATERIALS

- A. Heat Welding Bead.
- B. Adhesive.
- C. Trowelable Underlayments and Patching Compounds.
- D. Floor Polish.

FINISHES**CHAPTER 9: SPECIFICATIONS****1.6 EXAMINATION**

- A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by **flooring and adhesive** manufacturer(s). **Conduct two tests for every 1000 sq. ft. of concrete slab: one for moisture transmission from the surface of the concrete and one for internal relative humidity of the concrete slab.**
 - a. **Test concrete slabs** according to ASTM F 1869, Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subflooring Using Anhydrous Calcium Chloride. 3 pounds of water/1000 sq.ft. of slab in a 24-hour period is generally accepted in the linoleum floor covering industry as a safe maximum moisture emission level, **but must be verified against the flooring and/or adhesive manufacturer's specific requirements for the product to be used.**
 - b. **Test concrete slabs according to ASTM F 2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes. 75% - 85% internal relative humidity is generally regarded as acceptable, but must be verified against the flooring and/or adhesive manufacturer's specific requirements for the product to be used.**

LESSONS LEARNED

- 2.1 Manufacturers caution against using excessive amounts of liquid during maintenance procedures. Maintenance solutions that are abrasive or that measure more than 10 pH may damage linoleum.
- 2.2 Products generally have a factory-applied finish that provides temporary protection during installation. After installation, manufacturers typically recommend an initial application of two or three coats of liquid polish to seal the surface. Verify the recommendations of manufacturers for the products selected. Liquid floor polish is generally used for linoleum floor covering applications instead of paste wax.
- 2.3 ***Review concrete curing methods specified to confirm that liquid curing compound is dissipating type.***
- 2.4 ***In renovations require removal of all residual adhesives to clean bare concrete by shot blasting concrete slabs to receive linoleum flooring.***
- 2.5 ***A below-slab vapor retarder and conditioning the space to its design level for temperature and humidity with the permanent mechanical system prior to moisture testing and flooring installation will provide the best conditions for a successful installation.***

END OF SECTION

SECTION 096566

RESILIENT ATHLETIC FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for adhered sheet vinyl athletic flooring and athletic flooring with pad and accessories including game lines.

1.2 SHEET VINYL ATHLETIC FLOORING

- A. Materials and Construction: ASTM F 1303, Type I (minimum binder content of 90 percent) requirements, Class C (foamed plastic) backing.
- B. Applied Finish: Factory applied UV urethane.
- C. Overall Thickness: 0.25 inch, minimum.
- D. Seaming Method: Heat welded.

1.3 ACCESSORIES

- A. Trowelable Leveling and Patching Compound.
- B. Adhesives.
- C. Heat Welding Bead.
- D. Game Line and Marker Paint.

1.4 EXAMINATION

- A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.
 - a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.

END OF SECTION

FINISHES

CHAPTER 9: SPECIFICATIONS

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SECTION 096723

RESINOUS FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Resinous flooring system **with optional cove base**. Applied as a self-leveling slurry with broadcast aggregates.
 - 1. **Epoxy body coats**
 - 2. **Urethane body coats (kitchen)**

1.2 RESINOUS FLOORING

- A. **Epoxy System Components**
 - 1. Body Coat(s)
 - a. Epoxy.
 - b. Formulation Description: 100 percent solids.
 - c. Application Method: Self leveling slurry with broadcast aggregates.
 - 1) Thickness: 3/16 inch minimum.
 - d. Aggregates: Colored quartz (ceramic coated silica) or vinyl flakes.
- B. **Urethane System Components (Kitchen)**
 - 1. **Body Coast(s)**
 - a. **Resin: Urethane**
 - b. **Formulation Description: Water-based**
 - c. **Application Method: Self-leveling slurry with broadcast aggregates.**
 - 1) **Thickness: 1/4 inch, minimum.**
 - d. **Aggregates: Natural silica.**
- C. Topcoat (Optional): UV-resistant sealing or finish coat(s).
 - 1. Resin: Urethane.
 - 2. Formulation Description: 100 percent solids.
 - 3. Type: Clear.
- D. Accessories
 - 1. Primer.
 - 2. Waterproof Membrane.
 - 3. Reinforcing Membrane.
 - 4. Patching and Fill Material.
- E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
 - 1. Compressive Strength (ASTM C579): 6,000 psi.
 - 2. Tensile Strength (ASTM C307): 1,500 psi.
 - 3. Water Absorption (ASTM C413): 1.0 percent maximum.
 - 4. Coefficient of Thermal Expansion (ASTM C531): 0.00004 inch per inch times deg. F.
 - 5. Abrasion Resistance (ASTM D4060): 0.023 gram loss.
 - 6. Tensile Elongation Percent (ASTM D638): 2-4.

FINISHES**CHAPTER 9: SPECIFICATIONS**

1.3 EXAMINATION

- A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:**
- 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.**
 - a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.**

END OF SECTION

SECTION 096766

FLUID-APPLIED ATHLETIC FLOORING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for fluid-applied athletic flooring with pad and accessories including game lines.

1.2 FLUID-APPLIED ATHLETIC FLOORING

- A. Polyurethane Flooring over Resilient, Base Mat (PFR)
 - 1. Resilient, Base Mat: Manufacturer's standard base-mat underlayment of granulated rubber in polyurethane binder.
 - a. Thickness: 5/32 inch, minimum
 - 2. Base-Mat Adhesive: Manufacturer's standard two-component polyurethane.
 - 3. Base-Mat Sealer: Manufacturer's standard two-component polyurethane compound formulated for sealing base mat.
 - 4. Elastomeric Resin: Two-component, solid, self-leveling, pigmented, zero-mercury polyurethane containing no rubber fillers.

1.3 ACCESSORIES

- A. Trowelable Leveling and Patching Compound.
- B. Adhesives.
- C. Heat Welding Bead.
- D. Game Line and Marker Paint.

1.4 EXAMINATION

- A. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond, moisture, and pH tests recommended in writing by flooring manufacturer.
 - a. Moisture Content of Slab: 3 pounds per 1,000 sq.ft. or less per RMA test method.

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS**

SECTION 096813**TILE CARPETING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for tile carpeting.

1.2 QUALITY ASSURANCE

- A.** Carpet shall comply with requirements of the CRI's "Green Label Plus" Indoor Air Quality Testing Program.

1.3 PROJECT CONDITIONS

- A. Concrete subfloors must meet the following requirements before carpet may be installed:
 - 1. pH range of 5 to 9
 - 2. Moisture-emission rate of 3 lb/1000 sq.ft. per 24 hours or less.

1.4 WARRANTY

- A. Carpet Tile: 10 years (minimum).

(continued on next page)

CHAPTER 9: SPECIFICATIONS

FINISHES

1.5 MATERIALS

A. Carpet Tile

SCHOOL CARPET MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	Minimum Specifications	Test Method
Type Yarn	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Multi-Level Loop, Textured Loop, or Cut & Loop	--
Static	3.5kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification “Green Label Plus”	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (dry)	8 lbs, all products (16-20 lbs suggested for unitary backing)	ASTM D-1335
Delamination	Secondary backed products, 3.5 lbs	ASTM D-3936
Dimensional Stability	Removable modular products, 0.2% or less	ISO 2551
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Soil Resistant Treatment	Minimum average of 350 ppm fluorine on pile fiber of 3 separate tests	CRI TM-102

1.6 INSTALLATION

- A. Installation Method: Glue down with releasable adhesive or partial glue down with releasable adhesive.

LEED SUGGESTIONS

- 2.1 LEED credit for Indoor Environmental Quality (low-emitting materials) requires that carpet tile and installation adhesive meet or exceed the requirements for the Carpet and Rug Institute's (CRI) “Green Label Plus” program. **LEED-for-Schools 2009 IEQc4.1 and IEQc4.3 can be satisfied by LEED NC 2009 EQc4.1 and EQc4.2. For LEED-NC 2009 EQc4.1 and EQc4.3, carpet adhesive only needs to satisfy Green Label requirements and not Green Label Plus.**

- 2.2 Compared with broadloom carpet, carpet tiles may have some unique advantages for environmental considerations. Expectations for a high-quality life-cycle for most carpet tiles and capabilities for spot or area replacement, flexibility, and access may be factors to consider. Carpet tiles can be spot glued effectively, reducing adhesive use without diminishing the quality of a commercial carpet tile installation. They are easier to transport, store, and handle compared to broadloom, which makes carpet tiles a more likely applicant for alternatives to land-fill disposal.

- A. If carpet is being removed, contact carpet suppliers for carpet recycling programs.

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 096816
SHEET CARPETING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for carpet materials and accessories for a direct-glue down or pre-applied adhesive installation of one of the following:
1. Tufted Broadloom
 2. Variable Cushion Tufted Textile (VCTT)

1.2 QUALITY ASSURANCE

- A. Chemical Emission/Indoor Air Quality: All carpet specified must be in compliance with the Carpet and Rug Institute (CRI) "Green Label Plus" Indoor Air Quality Carpet Testing Program. The program label and registration number serve as evidence of compliance.

1.3 PROJECT CONDITIONS

- A. Concrete subfloors must meet the following requirements before carpet may be installed:
1. pH range of 5 to 9.
 2. Moisture-emission rate of 3 lb/1000 sq.ft. per 24 hours or less.

1.4 WARRANTY

- A. Tufted Broadloom: 10 years (minimum).
B. Variable Cushion Tufted Textile: 15 years (minimum)

1.5 CARPET

- A. Carpet, Tufted Broadloom: Shall meet or exceed the following CRI guidelines:

SCHOOL CARPET MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	Minimum Specifications	Test Method
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Multi-Level Loop, Textured Loop, or Cut & Loop	--
Static	3.5 kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification "Green Label Plus"	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (dry)	8 lbs, all products (16-20 lbs suggested for unitary backing)	ASTM D-1335
Delamination	Secondary backed products, 3.5 lbs	ASTM D-3936
Dimensional Stability	Removable modular products, 0.2% or less	ISO 2551
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Soil Resistant Treatment	Minimum average of 350 ppm fluorine on pile fiber of 3 separate tests	CRI TM-102

- B. Carpet, Variable Cushion Tufted Textile (VCTT): Shall meet or exceed the following guidelines:

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FINISHES

- B. Carpet, Variable Cushion Tufted Textile (VCTT): Shall meet or exceed the following guidelines:

SCHOOL VCTT MINIMUM AVERAGE SPECIFICATIONS		
Carpet Property/Characteristic	Minimum Specifications	Test Method
Type Yard	Solution or Yarn Dyed	--
Color	Multi-Colored Products (select colors complimentary to soil type/color in region)	--
Surface/Style	Level Loop, Textured Loop	--
Static	3.0 kv (max – not to exceed)	AATCC-134 Step Method
Indoor Air Quality (IAQ)	CRI IAQ Certification “Green Label Plus”	CRI Test Program ASTM D-5116
In glue-down installation, include CRI IAQ Testing Program label for installation adhesives. Carpet over cushion, include CRI IAQ Testing Program label for carpet cushion.		
Flammability – Radiant Panel Test	Class I	ASTM E-648
NBS Smoke	<450 Flaming Mode	ASTM E-662
Tuft Bind (wet or dry)	11 lbs, all products	ASTM D-1335
Delamination	No delamination	ASTM D-3936
Colorfastness: light	4 or better (60 AFU 3 cycles)	AATCC 16-E
Colorfastness: ozone	4 or better after 2 cycles	AATCC 129
Colorfastness: crocking	4 or better (wet & dry)	AATCC 165
Colorfastness: water	4 or better, AATCC Transference Scale (only yarn dyed carpet) (grade change in color and staining)	AATCC 107
Backing	<ul style="list-style-type: none"> • Thermoplastic vinyl composite • Fully fused to provide for no delamination • Closed cell, vinyl backing • Backing system to provide a barrier to moisture penetration • Product to provide for chemically welded seam 	--

1.6 AUXILIARY MATERIALS

- A. Vinyl or rubber edge guard between carpet and sealed concrete.
B. Vinyl or rubber reducer strip between carpet and resilient flooring.

1.7 INSTALLATION

- A. Comply with CRI 104, Section 9: “Direct Glue Down” or Pre-applied Adhesive Installation, Section 11.4 (Peel and Stick).
B. VCTT: Chemically weld seams.

LEED SUGGESTIONS

- 2.1 LEED Credit for Indoor Environmental Air Quality (low-emitting materials) requires that carpet tile and installation adhesive meet or exceed the requirements for the Carpet and Rug Institute’s (CRI) “Green Label Plus” Program. **LEED-for-Schools 2009 IEQc4.1 and IEQc4.3 can be satisfied by LEED NC 2009 EQc4.1 and EQc4.2. For LEED-NC 2009 EQc4.1 and EQc4.3, carpet adhesive only needs to satisfy Green Label requirements and not Green Label Plus.**

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 096900****ACCESS FLOORING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for access flooring panels and understructure.

1.2 PERFORMANCE REQUIREMENTS

- A. CISCA A/F, "Recommended Test Procedures for Access Floors"
 - 1. Concentrated Loads: Provide floor panels, including those with cutouts, capable of withstanding a concentrated design load of 1000 lbf, with a top-surface deflection under load and a permanent set not to exceed, respectively, 0.080 inch and 0.010 inch according to CISCA A/F, Section I, "Concentrated Loads".
 - 2. Ultimate Loads: Provide access flooring systems capable of withstanding a minimum ultimate concentrated load of 2500 lbf without failing, according to CISCA A/F, Section II, "Ultimate Loading".
 - 3. CISCA A/F Wheel 2 Rolling Load: 500 lbf.
 - 4. Pedestal Axial-Load Performance: Provide pedestal assemblies, without panels or other supports in place, capable of withstanding a 5000 lbf axial load per pedestal, according to CISCA A/F, Section V, "Pedestal Axial Load Test".

1.3 FLOOR PANELS AND UNDERSTRUCTURE

- A. Floor Panels, General: Provide modular panels complying with the following requirements that one person, using a portable lifting device, can interchange with other field panels without disturbing adjacent panels or understructure.
 - 1. Panel Attachment to Understructure: By gravity for main field areas bolted of pedestal may be necessary at perimeters and high-traffic areas.
- B. Formed-Steel Panels
 - 1. Solid.
 - 2. Grates With or Without Dampers.
 - 3. Perforated With or Without Dampers.
- C. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel or aluminum or a combination of both.
- D. Floor Panel Coverings
 - 1. Solid Vinyl Tile: Static dissipative.
 - 2. Carpet: Antistatic modular, adhesively bonded.

1.4 ACCESSORIES

- A. Cutouts.
- B. Service Outlets.
- C. Diffusers.
- D. Cavity Dividers.
- E. Vertical Closures.
- F. Ramps.
- G. Railings.

END OF SECTION

SECTION 098000

ACOUSTIC TREATMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for sound absorbing wall units and mounting accessories, and acoustical sound absorbing and diffusing units.

1.2 QUALITY ASSURANCE

- A. Fire Test Response Characteristics
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.

1.3 MATERIALS

- A. Core Materials: Glass-fiber board; mineral-fiber board; tackable, impact-resistant, high-density face layer; or impact-resistant, acoustically transparent, copolymer face-sheet layer for high-abuse applications.
- B. Spline-Mounted Acoustical Wall Panels with Perforated Mineral-Fiber Board Core
 - 1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
 - 2. Nominal Panel Thickness: 3/4 inch minimum.
 - 3. NRC: NRC 0.50 to NRC 0.90.
- C. Spline-Mounted Acoustical Wall Panels with Glass-Fiber Board Core
 - 1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
 - 2. Nominal Panel Thickness: 3/4 inch minimum.
 - 3. Noise Reduction Coefficient: NRC 0.20 minimum.
- D. Back-Mounted Acoustical Wall Panels with Perforated Mineral-Fiber Board Core
 - 1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
 - 2. Nominal Core Thickness and System NRC: 1/2 inch and not less than NRC 0.35
- E. Back-Mounted, Edge-Reinforced Acoustical Wall Panels with Glass-Fiber Board Core
 - 1. Facing Material: Woven polyester, nonwoven polyester, polyolefin, or acoustically transparent vinyl fabric.
 - 2. Nominal Core Thickness and System NRC: 3/4 inch and not less than NRC 0.65

FINISHES**CHAPTER 9: SPECIFICATIONS**

- F. Abuse-Resistant Acoustical Panels, General
 - 1. Flame spread of panels shall be 25 or less under the ASTM E 84.
 - 2. Panels are Class A.
 - 3. Panels shall consist of wood fibers and a hydraulic cement binder formed under controlled conditions of heat and pressure.
 - 4. Prime Painted Panels
- G. Wall Sound Diffusers
 - 1. Standard barrel shaped units with the following properties:
 - a. WDS, Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30 – 0.40.
- H. Back-Mounting Devices: Adhesive, hook-and-loop tape, impaling chips, or metal “Z” clips.

1.4 ACOUSTICAL CEILING PANELS

- A. Acoustical Baffles
 - 1. Polyester, polyvinyl, or nylon fabric- wrapped panels, with core of 6 to 7 pcf fiberglass; seamless and bonded to panels
- B. Ceiling-Mounted Diffusers
 - 1. Manufacturer’s standard asymmetric pyramidal units with properties as follows:
 - a. CD – Standard: Glass fiber mat core laminated with fire retardant resin; NRC 0.12 – 0.17.
 - b. CDA – Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30-0.40.
 - c. CDL – Sound Reflective: Glass fiber mat core lined with resin hardener; NRC 0.03 – 0.08.
- C. Ceiling-Mounted Reflectors
 - 1. Manufacturer’s standard panels for ceiling suspension, designed to reflect sound energy, and with properties as follows:
 - a. CR – Standard: Glass fiber mat core laminated with fire-retardant resin; NRC 0.15-0.25.
 - b. CRA - Low Frequency Absorption: Glass fiber mat core laminated with 1.5 inches, 1.5 pcf sound absorbing glass matting; NRC 0.30-0.40.
 - c. CRL – Sound Reflective: Glass fiber mat core lined with resin hardener; NRC 0.03 – 0.08.

LEED SUGGESTIONS

- 2.1 LEED for Schools includes a prerequisite for “Minimum Acoustical Performance”. By using sound absorptive panels, both background noise and sound transmission can be decreased, thus assisting in compliance with the “Minimum Acoustical Performance”.

END OF SECTION

SECTION 099100 PAINTING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for exterior and interior painting with opaque finishes, including painted mechanical and electrical identification, primers, sealers, and finish paints.

1.2 SYSTEM DESCRIPTION

- A. To establish a level of quality, the guide references the Master Painters Institutes (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.
- B. All materials used shall be lead and mercury free and VOC compliant with local authorities with jurisdiction.

1.3 EXTERIOR PAINTING SCHEDULE

- A. Concrete, Stucco, and Masonry (Other Than Concrete Masonry Units) (Satin): (Latex System). Similar to MPI EXT 3.1A.
- B. Concrete Masonry Units: (Latex System), similar to MPI EXT 4.2A.
- C. Metal - Ferrous: (Latex System), similar to MPI EXT 5.1M.
- D. Metal - Galvanized: (Latex System), similar to MPI EXT 5.3A.
- E. Metal - Heat Resistant: (Maximum Temperature 1,000 degrees F.), similar to MPI #21.

1.4 INTERIOR PAINTING SCHEDULE

- A. Concrete Surfaces: (Latex), similar to MPI INT 3.1M.
- B. Concrete Masonry Surfaces, similar to MPI INT 4.2E.
- C. Metal - Ferrous: (Latex System), similar to MPI INT 5.1S.
- D. Metal - Ferrous: (Dry-Fall System), similar to MPI INT 5.1CC.
- E. Metal - Galvanized: (Latex System), similar to MPI INT 5.3N.
- F. Metal - Galvanized: (Dry Fall System), similar to MPI INT 5.3H.
- G. Wood - Painted: (Latex System), similar to MPI INT 6.3V.
- H. Gypsum Board: (Latex System), similar to MPI INT 9.2M.
- I. Plaster Surfaces: (Latex System), similar to MPI INT 9.2M.

LEED SUGGESTIONS

- 2.1 As of July 7, 2008, the USGBC allows for Performance/Intent Equivalent Alternate Compliance Paths for obtaining Low-Emitting Materials Credit EQ 4. LEED for Schools Project Teams may substitute LEED for New Construction v2.2 EQc4 Low-Emitting Materials credits in place of corresponding LEED for Schools EQc4 Low-Emitting Materials credits.

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 099300****STAINING AND TRANSPARENT FINISHING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for exterior and interior painting with transparent and semi-transparent finishes.

1.2 SYSTEM DESCRIPTION

- A. To establish a level of quality, the guide references the Master Painters Institute's (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.

1.3 EXTERIOR STAIN SCHEDULE

- A. Wood trim, provide one of the following:
 - 1. Semi-transparent, oil or alkyd resin base stain, 2 coats, similar to MPI EXT 6.D.
 - 2. Solid color, oil or alkyd resin base wood stain, 2 coats, similar to MPI EXT 6.3C.

1.4 INTERIOR STAIN SCHEDULE

- A. Wood Trim
 - 1. Polyurethane varnish finish: 2 finish coats of polyurethane varnish over clear sanding sealer and an optional oil stain, similar to MPI INT 6.1J.
 - a. Provide wood filler on open grain wood before applying first varnish coat.

END OF SECTION

SECTION 099419

MULTICOLORED COATING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for interior multi-colored coating system for high traffic areas.

1.2 QUALITY ASSURANCE

- A. Fire-Performance Characteristics: Provide coatings with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction. Identify coatings with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 450 or less.
- B. Owner Training: Applicator must provide adequate training of Owner's personnel in repair procedures, along with verification that proper equipment is available to Owner's personnel.
- C. To establish a level of quality, the guide references the Master Painters Institutes (MPI) categories. The MPI categories listed are to assist in providing general guidelines for paint type selection. Use of MPI's "Approved Product List" is optional.

1.3 INTERIOR PAINTING SCHEDULE

- A. Concrete, similar to MPI #112.
 - 1. Prime Coat: Latex primer sealer
 - 2. Finish Coat: Multi-color as recommended by manufacturer
 - 3. Surfaces: Concrete walls and ceiling
- B. Concrete Masonry Surfaces, similar to MPI #112.
 - 1. Concrete masonry block filler
 - 2. Prime Coat: Latex primer sealer
 - 3. Finish Coat: Multicolored as recommended by manufacturer

END OF SECTION

FINISHES**CHAPTER 9: SPECIFICATIONS****SECTION 099600****HIGH PERFORMANCE COATINGS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Surface preparation and application of high-performance coating systems.

1.2 QUALITY ASSURANCE

- A. Quality Standards: "MPI Approved Products List" and "MPI Architectural Painting Specifications Manual."

1.3 MATERIALS

- A. Undercoats
 - 1. Block Fillers.
 - 2. Interior Primers/Sealers.
 - 3. Metal Primers.
 - 4. Wood Stains.
- B. Topcoats
 - 1. Water-Based, Light-Industrial Coatings.
 - 2. Epoxy Coatings.
 - 3. Polyurethane Coatings.
 - 4. Interior High-Performance Architectural Latex Coatings.

1.4 INTERIOR PAINTING SCHEDULE

- A. Concrete Surfaces (Gloss): (Water Based Epoxy System), similar to MPI INT 4.1G.
 - 1. Primer: Latex Wall Primer, 1.0 - 1.2 mils DFT/coat.
 - 2. Finish Coats: Water Based Catalyzed Epoxy (Gloss) (55-75 units at 60 degrees F.), 2.5 - 3.0 mils DFT/coat.
 - 3. Surfaces: Floors, stairs, striping on floors.
- B. Gypsum Board (Semi-Gloss): (Water Based Epoxy System), similar to MPI INT 9.2F.
 - 1. Primer: Vinyl Acrylic Latex, 1.1 mils DFT/coat.
 - 2. Finish Coats: Water Based Catalyzed Epoxy, Semi-Gloss (20-30 units at 60 degrees F.), 2.5 - 3.0 mils DFT/coat.
 - 3. Surfaces: Gypsum walls, ceiling, bulkheads, graphics.

END OF SECTION

10 DIVISION SPECIALTIES

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DIVISION 10: SPECIALTIES

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SECTION 101100

VISUAL DISPLAY SURFACES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for markerboards and visual aid boards, framing systems, and accessories.

1.2 MARKERBOARDS

- A. **Porcelain Enamel** Face Sheet.
- B. Core: 3/8 inch thick particleboard.
- C. Backing: .005 inch thick aluminum foil.
- D. Trim: Anodized extruded aluminum with tray and 1 inch map rail with natural cork insert.
- E. Trim: Factory applied anodized extruded aluminum.
 - 1. **Marker** tray: Box type.
 - 2. Map Rail: 1 inch display rail with cork insert and a map hook and clips for every 48 inches of map rail and fraction thereof.

1.3 TACK ASSEMBLIES

- A. Material, provide one of the following:
 - 1. Natural cork.
 - 2. Plastic impregnated cork sheet.
 - 3. Vinyl fabric faced industrial fiberboard.
- B. Trim: Factory-applied anodized extruded aluminum.

1.4 PEGBOARDS

- A. Material: Tempered hardboard with holes punched on one inch centers.

1.5 VISUAL DISPLAY RAILS

- A. Cork, Vinyl-Fabric, or Polyester-Fabric Faced Visual Display Device.

1.6 SUPPORT SYSTEM (optional)

- A. Support System for Visual Display Boards: Rail or modular supports.

1.7 SLIDING VISUAL DISPLAY UNITS

- A. Horizontal-Sliding Units.

SPECIALTIES

CHAPTER 9: SPECIFICATIONS

1.8 ACCESSORIES

- A. Provide the following accessories for each individual chalkboard and markerboard unit:
1. 2 map rail ends.
 2. 1 flag holder (one per room).
 3. Special-purpose graphics.

END OF SECTION

SECTION 101200

DISPLAY CASES

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for an illuminated display case with its accessories.

1.2 QUALITY ASSURANCE

- A. *Composite wood products made without urea formaldehyde.*

1.3 PRODUCTS**A. Bulletin Boards**

1. *Cabinet: Aluminum or wood framed.*
2. *Glazed Doors: Sliding or hinged.*
3. *Illumination System: (optional).*
4. *Tack Surface: Natural cork, plastic-impregnated-cork, vinyl-fabric-faced, or polyester-fabric-faced tackboard assembly.*
5. *Mounting: Surface mounted or recessed.*

B. Display Cases

1. *Recessed Cabinets: Extruded aluminum or hardwood-veneer-plywood box.*
 - a. *Cabinet Frame and Trim: Aluminum or hardwood species.*
2. *Surface-Mounted Cabinets: Extruded-aluminum or hardwood-veneer-plywood box.*
 - a. *Cabinet Frame and Trim: Aluminum or hardwood species.*
3. *Glazed Doors: Sliding or hinged.*
4. *Adjustable Tempered-Glass Shelves.*
5. *Tack Surface: Natural cork, plastic-impregnated-cork, vinyl-fabric-faced, or polyester-fabric-faced tack assembly.*
6. *Illumination System: (optional).*

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 101400****SIGNAGE****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for directional items, letters, signage, and plaques used in establishing identity, communication, or way finding.

1.2 QUALITY ASSURANCE

- A. Comply with signage requirements indicated in the Americans with Disabilities Act.

1.3 PANEL SIGNS

- A. Type: Unframed.
- B. Material: ***Zinc, laminated polycarbonate-faced sheet; acrylic sheet; high pressure decorative laminate, photopolymer sheet; laminated, engraved sheet; laminated, etched photopolymer sheet with raised graphics and Braille; or laminated, sandblasted polymer sheet with raised graphics and Braille.***
- C. Copy: Raised text, Braille and pictograms.

1.4 PLAQUES

- A. Plaques.
 - 1. Metal: Bronze.
 - 2. Border Style: Plain bevel.
 - 3. Background Texture: Manufacturer's standard pebble texture.
 - 4. Background Finish: Provide dark statuary finish to comply with the requirement specified for bronze finishes, except provide background texture specified above in lieu of mechanical finish indicated.

1.5 DIMENSIONAL CHARACTERS

- A. Cast Characters.**
- B. Aluminum Extrusions.**
- C. Fabricated Channel Characters.**
- D. Molded Plastic Characters.**
- E. Cutout Characters.**

1.6 INSTALLATION

- A. Wall-Mounted Signs: Mechanical fasteners.**
 - 1. Mounted on glass with matching opaque plate on opposite side of glass.**
- B. Dimensional Characters: Flush or projected mount.**
- C. Cast-Metal Plaques: Concealed or face mounting.**

DEDICATION PLAQUE

John Smith Elementary School

Lincoln Logs Local School District



(Date)

(Name), Board President

(Name), Board Member

(Name), Board Member

(Name), Board Member

(Name), Board Member

(Name), Superintendent

(Name), Treasurer

(Firm Name), Architect

(Firm Name), Construction Manager

(Other Contractors)

Funded through a partnership with the

OHIO SCHOOL FACILITIES COMMISSION

John Kasich, Governor

Richard Hickman, Executive Director

Elements

Group 1: Name of School, Name of District, and OSFC Seal. **Use of the Seal is mandatory. A copy is available from the OSFC.**

Group 2: Date of Dedication, District Officials (including Board Members and Administrators), Architectural firm, and Construction Management firm. Contractors may be included as the Board of Education deems appropriate.

Group 3: State of Ohio participation. Wording should be consistent with above. Placement of Group 3 may be above Group 2 at option of the District.

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 101426****POST AND PANEL / PYLON SIGNAGE****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for non-illuminated post and panel signs.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC A117.1.

1.3 WARRANTY

- A. Materials and Workmanship: 5 years.

1.4 PRODUCTS**A. Panel Signs**

- 1. Message Panel Sign Materials: Aluminum sheet or composite aluminum-faced sheet.
 - a. Edge Condition: Square cut or bullnose.
 - b. Corner Condition: Square or rounded to radius indicated.
- 2. Panel Sign Frames: Extruded aluminum mitered with concealed anchors and welded.
 - a. Profile: Square or rounded.
 - b. Corner Condition: Square or rounded to radius indicated.
 - c. Frame Type: Mounted on posts.
- 3. Hollow-Box-Type Panel Signs
 - a. Message Panel Material: Aluminum sheet or composite aluminum-faced panel.
 - b. Corner Condition: Square or rounded to radius indicated.

B. Posts

- 1. Aluminum: Square, rectangular, semicircular, or rounded-end.

END OF SECTION

SECTION 101453

TRAFFIC SIGNAGE

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for traffic signs.

1.2 QUALITY ASSURANCE

- A. Comply with US Manual on Uniform Traffic Control Devices for signs within public rights-of-way.

1.3 POST-MOUNTED SIGNS

- A. Exterior “Accessible Parking” Signs
 - 1. 12 by 18 inch, 18 gauge steel with 1 inch radius corners. Bolt through top and bottom of sign face into 2 by 2 inch square steel post by 11 foot long (3.65 pounds/foot) with vandal-resistant fasteners.
 - 2. Finish: Baked enamel finish. Color of sign face is to be blue with white graphics. Color of post is to be selected by the Design Professional.
- B. Stop and other traffic regulatory signs.
- C. Visitor parking signs.
- D. Breakaway post supports for signs within the rights-of-way.

END OF SECTION

SPECIALTIES

CHAPTER 9: SPECIFICATIONS

SECTION 102113

TOILET COMPARTMENTS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for compartments and cubicles appropriate for toilet rooms, including hardware and accessories.

1.2 QUALITY ASSURANCE

- A. *Flame-Spread Index: 75 or less.*

1.3 COMPONENTS

- A. *Phenolic-Panel Core: Dark color or through-color matching face sheet.*
- B. *Solid-Polymer Units: Either high-density polyethylene (HDPE) or polypropylene (PP) panel material.*
- C. *Solid Color Reinforced Composite.*
- D. *Brackets (fittings)*
 - 1. *Stirrup Type: Stainless steel.*
 - 2. *Full-Height (continuous) Type: Stainless steel or polymer.*
- E. *Hardware and Accessories: Clear-anodized aluminum or stainless steel.*
 - 1. *Fasteners: Stainless steel.*
 - 2. *Shoes: Stainless steel or polymer.*
 - 3. *Hinges: Self-closing.*
 - 4. *Latch and Keeper: Emergency access and accessibility requirements.*

1.4 INSTALLATION

- A. General: Install panels with either three stirrup brackets or continuous type.
- B. Install with vandal-resistant fasteners.

END OF SECTION

SECTION 102123

CUBICLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for medical treatment curtains, tracks, and other hardware.

1.2 MATERIALS

- A. Curtains
 - 1. Curtain Fabric: 100 percent polyester, flame-resistant.
 - 2. Mesh Top: No. 50.
 - 3. Curtain Drop: Beaded chain.
- B. Curtain Tracks: ***Surface-mounted, aluminum box channel type.***
- C. Curtain Carriers: One piece nylon, breakaway.

END OF SECTION

SPECIALTIES

CHAPTER 9: SPECIFICATIONS

SECTION 102213

WIRE MESH PARTITIONS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for fixed partitions used as enclosures, dividers, partitions, ***storage lockers, and equipment barriers*** fabricated of wire mesh.

1.2 STANDARD-DUTY WIRE MESH PARTITIONS

- A. Wire Mesh: 0.135 steel woven wire, 1-1/2 inch diamond mesh or 1 by 2 inch rectangular.
1. ***Doors: Swinging, swinging dutch, or sliding.***
 2. ***Service Windows.***
 3. ***Accessories***
 - a. ***Sheet Metal Base.***
 - b. ***Adjustable Filler Panels.***
 - c. ***Wall Clips.***
 4. ***Finishes: Shop primed, baked enamel, or powder coated.***
- B. Framing: Cold rolled "C" section channels and angles.

END OF SECTION

SECTION 102226

OPERABLE PARTITIONS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for track supported, operable panels and partitions, top hung and floor supported, manually operated.

1.2 SYSTEM DESCRIPTION

- A. Sound Transmission Class: 50 minimum or as determined for compliance with LEED for Schools, Indoor Environmental Air Quality, "Minimum Acoustical Performance", prerequisite 3.
- B. Flame-Spread Index: 25 or less.

1.3 OPERABLE ACOUSTICAL PANELS

- A. Panel Types
 - 1. Manually operated, individual or paired acoustical panel partitions.
 - 2. Electrically operated, continuously hinged acoustical panel partitions.
 - 3. Manually operated, individual or paired glass panel partitions.
- B. Operation: Manual, unless otherwise noted.
- C. Frame: Steel or aluminum.
- D. Face/Liner Sheets: Steel or steel with gypsum board.
- E. Finish Facing: Vinyl coated fabric wall covering, carpet wall covering, fabric wall covering, or paint.
- F. Accessories
 - 1. Panel mounted **markerboards**.
 - 2. Minimum 3/16 inch thick tackable cork surface beneath finish material.
 - 3. Pass doors.
 - 4. Windows.

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 102813****TOILET ACCESSORIES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for grab bars, towel dispensers, soap dispensers, toilet paper dispensers, shower accessories, metal framed mirrors, mop holder with shelf, shower curtain and rod, towel hooks, napkin disposals and vendors, hand dryers, and other accessories.
- B. Accessories mounted on or recessed in walls and toilet compartments.

1.2 MATERIALS

- A. Stainless Steel: ***AISI Type 304.***
- B. Sheet Steel: ***ASTM A 1008.***
- C. ***Galvanized – Steel Sheet: ASTM A 653, G60.***
- D. ***Galvanized Steel Mounting Devices: ASTM A 153.***
- E. ***Chrome Plating: ASTM B 456.***
- F. ***Mirrors: ASTM C 1503.***
- G. ***ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.***

1.3 COMPONENTS

- A. Grab Bars: Stainless Steel.
- B. Towel Dispensers: Folded or roll towels.
- C. Combination Towel Dispenser / Waste Receptacle: Roll or folded towels.
- D. Folding Shower Seat
- E. Soap Dispenser
- F. Toilet Paper Dispenser: Roll or combination, roll.
- G. Mirror
 - 1. Stainless Steel Framed Mirror: Mirror shall have a one piece, ***stainless steel angle frame.***
- H. Mop and Broom Holders

CHAPTER 9: SPECIFICATIONS

SPECIALTIES

- I. Shower Rods
 - 1. Shower curtains: Vinyl.
- J. Towel Hooks
- K. Sanitary Napkin Disposals and Vendors
- L. Diaper Changing Stations
- M. Child-Protective Seat
- N. Hand Dryers
 - 1. Regulations: NFPA 70, UL, and ADA compliant.
 - 2. Operation: Touch button or electronic sensor activated with timed power cut-off switch.
 - 3. Cover Material and Finish: Cast-iron or steel with enamel finish; or stainless steel, no. 4 finish.

1.4 INSTALLATION

- A. Install accessories with vandal-resistant fasteners.

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 104400****FIRE PROTECTION SPECIALTIES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for fire fighting devices and storage cabinets, except items or devices connected to a fire protection system.

1.2 QUALITY ASSURANCE

- A. Integrity of fire rated walls must be maintained with installation of recessed or semi-recessed fire extinguisher cabinet.

B. *Fire Extinguishers: NFPA 10.***1.3 FIRE EXTINGUISHERS**

- A. Type
 - 1. Class K fires, potassium acetate kitchen.
 - 2. Multipurpose dry chemical type in all other locations.

B. Public Area Mounting: Cabinet mounted.**C. Service Area Mounting: Metal brackets.****1.4 CABINETS****A. Cabinet Material: Steel****B. Door Style**

- 1. Vertical duo panel with frame, unless otherwise indicated.
 - a. ***Door Glazing: Tempered glass.***
 - 1) ***Acrylic bubbles are not acceptable.***
- 2. Solid panel at gymnasium.

C. Accessories

- 1. ***Door locks (optional).***
- 2. ***Alarm (optional).***

END OF SECTION

SECTION 105113

LOCKERS

GENERAL GUIDELINES**1.1** SECTION INCLUDES

- A. Qualitative requirements for storage facilities providing temporary security of contents; related hardware and locking devices; athletic and school lockers.

1.2 METAL LOCKERS

- A. Type: Corridor (wardrobe) lockers, sheet steel, 0.0209 inch thick back and sides, 0.0528 inch thick doors and frame.
 - 1. Provide knock-down (mechanically assembled) standard locker construction.
 - 2. **Material: Cold-rolled or metallic-coated steel sheet.**
 - 3. **Door Style: Louvered vents at top and bottom, security vents, perforated vents, or concealed vents.**
 - 4. **Hinges: Knuckles or continuous.**
 - 5. **Locks.**
 - 6. Recessed Latching: Provide either three-point latching or single point spring actuated latch. Single point gravity is not acceptable.
- B. Type: Athletic lockers, all welded.
 - 1. Body
 - a. Tops and Bottoms: 0.0528 inch unperforated, cold-rolled steel sheet.
 - b. Backs
 - 1) 0.0428 inch solid
 - 2) 0.0528 inch perforated (exposed)
 - 3) 0.0897 inch expanded (exposed)
 - c. Sides
 - 1) 0.0528 inch solid
 - 2) 0.0528 inch perforated
 - 3) 0.0897 inch expanded
 - 2. Doors
 - a. 0.0677 perforated
 - b. 0.0897 expanded
 - 3. Recessed Latching: Provide either three-point latching or single point spring actuated latch. Single point gravity is not acceptable.
 - a. Provide strike and eye for padlock.
- C. Tops: Sloped.
- D. Number Plates: Aluminum plates with minimum 3/8 inch high etched, embossed or stamped numbers.
- E. **Locker Benches**

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****LESSONS LEARNED**

- 2.1** *Storage provisions of the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" (hereafter, ADA-ABA Accessibility Guidelines) and ICC/ANSI A117.1, "Accessible and Usable Buildings and Facilities", apply to metal lockers.*
- 2.2** *Special lockers that comply with accessibility requirements are available from most locker manufacturers. Considerations in selecting accessible metal lockers include hardware requirements and locations of shelves, hooks, and coat rods. Also, the locker layout must be designed to accommodate requirements for clear floor space.*
- A.** *According to ADA-ABA Accessibility Guidelines, "Where lockers are provided, at least 5 percent, but no fewer than one of each type, shall comply" with accessibility requirements for clear floor space, reach ranges, and operable parts. Requirements are as follows:*
- 1.** *Clear Floor Space: A minimum clear floor space of 30 by 48 inches must be provided in front of each accessible locker. The long dimension may be either parallel or perpendicular to the locker. Clear space must be free of obstructions such as benches and overlapping door swings.*
 - 2.** *Reach Ranges: For an unobstructed approach, the maximum forward and side reach is 48 inches above the floor. Shelves and equipment may not be mounted higher than the maximum reach permitted. The lowest shelf must be at least 15 inches above the floor. Mounting heights of interior equipment, such as coat hooks and coat rods, are determined by dimensions of metal lockers and locations of the equipment within them, but all mounting heights must be within reach ranges.*
 - 3.** *Operable Parts: Parts such as latches and locks must be placed within the reach ranges indicated above. Also, "Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum."*
- B.** *Special latches, keys, card-controlled electronic locks, and other accommodations complying with this requirement are available from locker manufacturers and are required, if locks are to be used.*

END OF SECTION

SECTION 105613

METAL STORAGE SHELVING

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for open manufactured shelving for general storage.

1.2 PERFORMANCE REQUIREMENTS

- A. ***Structural Performance for Four-Post Metal Storage Shelving: MH 28.1.***
- B. ***Structural Performance for Post-and Beam Metal Storage Shelving: MH 28.2.***

1.3 PRODUCTS

- A. ***Four-Post Metal Storage Shelving: Metal storage shelving system with shelves that span between and are supported by corner posts.***
1. ***Open or Closed Type***
 - a. ***Load-Carrying Capacity per Shelf: 350 lb (minimum).***
 - b. ***Posts: Steel.***
 - c. ***Bracing: Single or double diagonal cross bracing at back and ends.***
 - d. ***Shelves: Metallic-coated steel sheet or metallic-coated steel wire.***
 - e. ***Base: Open, with exposed post legs or closed, with base strips fabricated from same material and with same finish as shelving.***
 - f. ***Accessories: Finished end panels, shelf dividers, bins, and shelf-label holders.***
 - g. ***Finish: Baked enamel or powder coat.***
- B. ***Post-and-Beam Metal Storage Shelving***
1. ***Load-Carrying Capacity per Shelf: 400 lb (minimum).***
 2. ***Posts: Steel.***
 3. ***Shelves: Particleboard, steel sheet, metallic-coated steel sheet, or ribbed-metal decking.***
 4. ***Accessories: Tie plates, supports back-to-wall and back-to-back, letter-/legal-size record boxes, letter-size record boxes, and record box support rails.***
 5. ***Finish: Baked enamel or powder coat.***

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 105626****MOBILE STORAGE SHELVING****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for mechanically-assisted, carriage-mounted, high-density mobile storage units, support rails, fabrication, and installation including leveling of support rails.

1.2 SYSTEM DESCRIPTION

- A. Carriage System Design and Features: The carriage system consists of a formed structural steel frame with hardened steel wheel riding on steel rails recessed-mounted to the floor. Rails shall be types selected by the manufacturer to ensure smooth operation and self-centering of mobile storage units during travel without end play or binding. Rail types, quantities, and spacing shall be selected by the manufacturer to suit installation conditions and requirements. All bearings used in the drive mechanism shall be permanently shielded and lubricated.

1.3 QUALITY ASSURANCE

- A. Ease of Movement: Provide mechanically-assisted units capable of being moved by exerting a maximum horizontal force of 5 pounds on the operating wheel.

1.4 COMPONENTS

- A. Rails:
 1. Material: ASTM/AISI Type 1035 or 1045 steel, manufacturer's selection.
 2. Capacity: 1,000 pounds per lineal foot of carriage, minimum.
 3. Minimum Contact Surface: 5/8 inch wide, minimum.
 4. Provide rail sections in minimum 6-foot lengths.
 5. Rail configuration shall permit attachment to top of structural floor system with provision for leveling rails to compensate for variations in floor surface level.
 6. Provide rail connections designed to provide horizontal and vertical continuity between rail sections, to gradually transfer the concentrated wheel point load to and from adjoining rail sections. Butt joints are not permitted.
- B. Carriages:
 1. Provide manufacturer's design movable carriages fabricated of welded or bolted steel construction. Galvanized structural components and/or riveted carriages are unacceptable.
 2. Provide fixed carriages of same construction and height as the movable carriages, anchored to rails. Setting fixed shelving directly on floors is not permitted.
 3. When required, provide bolted carriage splices designed to maintain proper unit alignment and weight load distribution.
 4. Design carriages to allow the shelving uprights to recess and interlock into the carriages a minimum of 3/4 inch. Top-mounted carriages are unacceptable.
 5. Provide each carriage with two wheels per rail.

CHAPTER 9: SPECIFICATIONS

SPECIALTIES

- C. Drive/Guide System:
 - 1. Design: Provide drive system which prevents carriage whipping, binding, and excessive wheel/rail wear under normal operation.
 - a. If line shafts are used, all wheels on one side of carriage shall drive.
 - b. If synchronized drives are used, a minimum of one wheel assembly driving both sides of carriage at center location is required. Drive shaft shall exhibit no play or looseness over the entire length of that assembly.
 - 2. Shafts: Solid steel rod or tube.
 - 3. Shaft Connections: Secured couplings.
 - 4. Bearing Surfaces: Provide rotating load bearing members with ball or roller bearings. Provide shafts with pillow block or flanged self-aligning type bearings.
- D. Wheels:
 - 1. Materials: Type 1045 solid steel. Minimum load capacity per wheel: 3200 lbs.
 - 2. Size: Minimum 5 inches, outside diameter drive wheels.
 - 3. Guides: Determined by manufacturer; minimum 2 locations.
- E. Face Panels:
 - 1. Materials: Plastic laminate clad particle board with plastic edging on vertical edges.
 - 2. Finishes: Selected from manufacturer's standard available colors and patterns.
- F. Accessories:
 - 1. Waist High Carriage Locks: Provide manufacturer's standard.

END OF SECTION

SPECIALTIES**CHAPTER 9: SPECIFICATIONS****SECTION 107500****FLAGPOLES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for flagpoles.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide flagpole assemblies, including anchorages and supports, capable of withstanding the effects of wind loads, determined according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles".
 - 1. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.
 - 2. Basic Wind Speed: 90 mph; 3-second gust speed at 33 feet aboveground, unless otherwise noted as a greater wind speed.

1.3 PRODUCTS

- A. Flagpoles
 - 1. Aluminum Flagpoles: Cone or Entasis tapered.
- B. Mounting Type
 - 1. Foundation Tube.
 - 2. Vertical Wall Mount.
 - 3. Outrigger Wall Mount.
- C. Fittings:
 - 1. Finial.
 - 2. Halyard
 - a. Internal, winch system where pole is over 40 feet.
 - b. External with locking cleat cover and halyard cover, where pole is under 40 feet.

END OF SECTION

11 DIVISION EQUIPMENT

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118226	Waste Compactors and Destructors
119200	Art Room Equipment - Kilns

SECTION 111300

LOADING DOCK EQUIPMENT

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for equipment and material for the protection of service docks and for the loading and unloading of various types of service vehicles including:
 - 1. Dock bumpers.
 - 2. Dock levelers.
 - 3. Dock lifts (scissors lifts).
 - 4. ***Truck restraints.***

1.2 QUALITY ASSURANCE

- A. Dock Leveler Standard: MH 30.1.
- B. Dock Lifts Standard: MH 29.1.
- C. ***Truck Restraints: MH 30.3.***

1.3 DOCK BUMPERS

- A. Type: Molded rubber or laminated tread.
- B. Mounting: Horizontal, vertical, or integral to leveler.

1.4 DOCK LEVELERS

- A. Type: Mechanical or hydraulic, recessed in dock or edge of dock.
- B. Rated Capacity: 25,000 pounds.
- C. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
- D. Safety Device: Truck restraint designed to hold vehicle at load dock, if grade would allow vehicle to roll away.

1.5 DOCK LIFTS

- A. Scissors-type hydraulic dock lift of capacity, size, and construction indicated; complete with controls, safety devices, and accessories required.
 - 1. Mounting: Recessed.
 - 2. Type: Stationary.
 - 3. Lift Capacity: Not less than 5,000 pound axle load at ends and 5,000 pound axle load at sides.
 - 4. Vertical Travel: Maximum of 60 inches from lowered height of 12 inches.

END OF SECTION

EQUIPMENT**CHAPTER 9: SPECIFICATIONS****SECTION 113100****RESIDENTIAL EQUIPMENT****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for residential type equipment.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements
1. NFPA 70
 2. UL and NEMA
 3. AGA and ANSI
 4. NAEAC
 5. ANSI A117.1

1.3 EQUIPMENT

- A. Items funded by the OSFC:
1. Cooktop
 2. Range
 3. Oven
 4. Microwave
 5. Exhaust Hood
 6. Refrigerator/Freezer
 7. Dishwasher
 8. **Washer**
 9. **Dryer**

END OF SECTION

SECTION 114000

FOOD SERVICE EQUIPMENT

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for equipment used for liquid and solid food storage, preparation, display, serving and cleanup in commercial kitchens.
- B. Kitchen hood provided in Division 25.

1.2 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. NSF Seal of Approval.
 - 2. Underwriters' Laboratories Label.
 - 3. NFPA 54, National Fuel Gas Code.
 - 4. NFPA 70, National Electrical Code.
 - 5. NFPA 96, Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment.
 - 6. ASME Boiler Code.
 - 7. Public Health Service Publication "Food Service Sanitation Manual".

1.3 FOOD SERVICE EQUIPMENT MATERIALS

- A. Stainless Steel: AISI Type 302 or Type 304, No. 4 polished finish.
 - 1. Unexposed finish shall be No. 2B.
- B. Tops, Sinks, Dishtables and Drainboards: 14 gauge stainless steel.
- C. Cabinet Bodies and Doors: 16 gauge stainless steel.
- D. Drawers: 18 gauge stainless steel body with 16 gauge stainless steel front.
- E. Shelves: 14 gauge stainless steel.
- F. Cold Pans: 14 gauge stainless steel.

END OF SECTION

EQUIPMENT**CHAPTER 9: SPECIFICATIONS****SECTION 115123****LIBRARY STACK SYSTEMS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for library shelving and accessories.

1.2 QUALITY ASSURANCE

- A. Quality Standard: Steel bracket shelving to comply with ANSI Z39.73.

1.3 LIBRARY SHELVING

- A. Steel Bracket Units
 - 1. Type: Single- or double-faced units.
 - 2. Frame Style: Upright post, display, or wall hung.
 - 3. Panels: End panels, countertops, canopy tops, and back panels.
 - a. Face: Wood veneer or high-pressure decorative laminate.
- B. Steel Case Shelving
 - 1. Panels: At top, back, and ends of units over steel panels.
 - a. Face: Wood veneer or high-pressure decorative laminate.
- C. Wood Case Shelving
 - 1. Type: Single- or double-faced units.
 - 2. Panels: At top, back, and ends.

LEED SUGGESTIONS

- 2.1 *LEED materials and resources credits, from the U.S. Green Building Council's (USGBC) LEED Rating System are usually awarded for construction of the base building prior to the installation of fixtures, furniture, and equipment (FFE). Because bookstacks are often considered FFE items, optional specification language for LEED credits has not been included in this Section.***
- 2.2 *If the designer does not wish to classify library shelves as FFE items, USGBC should be contacted for an interpretation on the specific project. In such cases, this Section may be altered by adding language similar to that found in the "LEED Submittals" Paragraph in Part I of the "Interior Architectural Woodwork" Section, and then by altering Part 2 "Wood Materials" Article in this Section's Text to require low-emitting materials. Other requirements can be added to suit the Project.***

END OF SECTION

SECTION 115213

PROJECTION SCREENS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for projection screens, their accessories, and necessary mounting and installation hardware.

1.2 FRONT PROJECTION SCREENS

- A. Material and Viewing Surface of the Front Projection Screens: Provide screens manufactured from mildew and flame-resistant fabric of type indicated for each type of screen specified:
 - 1. Matte white viewing surface. Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
 - 2. Material: Vinyl coated glass fiber fabric.
 - 3. Size of Viewing Surface
 - a. At classrooms; 60 inches by 80 inches. (100 inches diagonal)
- B. Manually Operated Screens: Fabricated for wall installation and consisting of case, screen, and mounting accessories.
- C. Electrically Operated Screens: UL labeled units consisting of case, screen, motor, controls, mounting accessories, and other components.

LESSONS LEARNED

- 2.1 Coordinate layout and installation of projection screens with adjacent construction, including ceiling frame, light fixtures, HVAC equipment, fire-suppression system, and partitions.
 - A. Coordinate with location of ***ultra-short throw interactive projectors***.

END OF SECTION

SECTION 115313

LABORATORY FUME HOODS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for bench-top laboratory fume hoods, floor-mounted laboratory fume hoods, and piping and wiring within fume hoods.

1.2 PERFORMANCE REQUIREMENTS

- A. Containment: Tested according to ASHRAE 110.

1.3 QUALITY ASSURANCE

- A. Product Standard: SEFA.

1.4 PRODUCTS

A. Fume Hoods

- 1. Exterior: Steel with chemical-resistant finish or fiberglass.
- 2. Interior Lining: Glass-fiber cement board, glass-fiber cement board with acid-resistant finish, steel sheet with epoxy coating, glass-fiber-reinforced polyester, epoxy, glass-fiber-reinforced epoxy, stainless steel, phenolic composite, or polypropylene.

B. Accessories

- 1. Airflow indicator.
- 2. Airflow alarm.
- 3. Sash alarm.

1.5 FIELD QUALITY CONTROL

- A. Hoods field tested according to "Flow Visualization and Velocity Procedure" requirements in ASHRAE 110.

1.6 FUME HOOD SCHEDULE

A. Bench Top Fume Hood Type

- 1. Ventilation Type: Constant volume, constant volume with variable-air-volume control, bypass, auxiliary-air bypass, or restricted bypass with variable-air-volume control.
- 2. ASHRAE 110 As-Manufactured (AM) Rating: AM 0.05 maximum.
- 3. ASHRAE 110 As-Installed (AI) Rating: AI 0.10 maximum.
- 4. Work Top: Epoxy or phenolic composite.
- 5. Cup Sinks: Epoxy, polypropylene, or stainless steel.
- 6. Service Fittings.

B. Floor-Mounted Fume Hood Type

- 1. Ventilation Type: Constant volume, constant volume with variable-air-volume control, bypass, auxiliary-air bypass, or restricted bypass with variable-air-volume control.
- 2. ASHRAE 110 As-Manufactured (AM) Rating: AM 0.05 maximum.
- 3. ASHRAE 110 As-Installed (AI) Rating: AI 0.10 maximum.
- 4. Floor: Epoxy or phenolic composite.
- 5. Cup Sinks: Epoxy, polypropylene, or stainless steel.
- 6. Service Fittings.

END OF SECTION

SECTION 116143

STAGE CURTAINS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for stage curtains and tracks.

1.2 QUALITY ASSURANCE

- A. ***Flame-Resistant Rating: NFPA 701.***

1.3 MATERIALS**A. Curtain Fabrics**

1. Main Curtain
 - a. 25 oz. per lineal yard woven cotton velour fabric; 54-inch minimum width.
2. Intermediate Curtain and Side Leg Drops
 - a. 20 oz. per lineal yard woven cotton velour fabric; 54-inch minimum width.
3. Rear Curtain
 - a. Muslin: Shear, plain woven fabric of 100 percent uncounted cotton weighing not less than 6 oz. per lineal yard; 100-inch minimum width.

B. Rigging

1. ***Curtain Battens: Steel pipe.***
2. ***Trim and Support Cable: Steel air craft cable.***
3. ***Trim and Support Chain: Grade 80 hardened alloy steel chain.***

C. Curtain Tracks: With pulleys, blocks, carriers, and operating line.

1. ***Aluminum, straight or curved, for walk-along operation.***
2. ***Steel, medium duty.***

END OF SECTION

EQUIPMENT**CHAPTER 9: SPECIFICATIONS****SECTION 116623****GYMNASIUM EQUIPMENT****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for equipment intended for use in athletic activities including:
 - 1. Basketball backstops
 - 2. Volleyball equipment
 - 3. Gym dividers
 - 4. Miscellaneous gymnasium equipment

1.2 QUALITY ASSURANCE

- A. Standards: National Federation of State High School Associations (**NFHS**)
- B. *Electrical Components, Devices, and Accessories: NFPA 70, Article 100.***

1.3 BASKETBALL BACKSTOPS

- A. Frame Assembly
 - 1. Elementary School: Adjustable goal height.
- B. Backboards: 3 feet 6 inches by 6 feet 0 inches
 - 1. Tempered glass at main court and overhead supported units at side courts.
 - a. Provide fiberglass or wood backboards at wall-mounted side courts.
- C. Goal: Front mount direct to frame assembly. Provide breakaway type rim.
- D. Operation: Electric winch at overhead-supported folding backstops only.
- E. Backstop Safety Lock: One on each overhead-supported backstop.
- F. Backboard padding.

1.4 VOLLEYBALL EQUIPMENT

- A. Volleyball Floor Plates and Sleeves
 - 1. Floor Plate: Cast brass with flush hinged type.
 - 2. Sleeve: Steel construction with concrete base flange and predrilled top flange to receive floor plate.
- B. Volleyball Standards and Net
 - 1. Extruded aluminum or extruded high strength steel standards.
 - a. Provide minimum of 10 height adjustments.
 - 2. Net: Provide 4-inch square mesh fabricated from #24 nylon and vinyl-coated steel top cable.
- C. ***Accessories (optional): Net tensioning system, bottom net lock tightener, judges' stands, safety pads, post standard transporter, wall storage rack, and storage cart.***

1.5 GYM DIVIDERS

- A. Type: Fold up, roll up, or walk draw.
- B. Curtain Material
 - 1. Lower Section: 18 ounce solid vinyl polyester reinforced fabric, flame resistant.
 - 2. Upper Section: Open polyester grid weave, coated with PVC, flame resistant.
- C. Operation: Electric or manual.
- D. Suspension System: Anchored to structural framing.
- E. Accessories
 - 1. Wall-mounted key switch control.

1.6 MISCELLANEOUS GYMNASIUM EQUIPMENT

- A. **Safety** Padding
 - 1. Flame, puncture, and tear-resistant vinyl coated nylon fabric over foam filler adhered to plywood backing board.
 - 2. Cover Material: 14 oz. minimum.
 - 3. Flame-resistant rating: Passes NFPA 701.
 - 4. Fabric cover to be treated with fungicide for mildew resistance.
- B. Mat Hoist (optional)
 - 1. Stationary overhead-supported mat hoist capable of hoisting one 45 by 45 foot mat.
- C. Chinning Bar (**optional**)
 - 1. Bar shall be 1-1/16 inch diameter by 3 feet 6 inches in length, supported by formed brace supports approximately 1 foot 5 inches from wall.

END OF SECTION

EQUIPMENT

CHAPTER 9: SPECIFICATIONS

SECTION 116643

INTERIOR SCOREBOARDS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for interior scoreboard and accessories.

1.2 MATERIALS

- A. Unit to score volleyball, basketball, and wrestling.
- B. Wall mounted unit.
- C. Tenth of a second timing for last 50 seconds.
- D. Control console for each board installed.
- E. Carrying case.
- F. *Shot clocks at high schools.***

1.3 INSTALLATION

- A. Provide console control outlet in spectator bleachers.

END OF SECTION

SECTION 118226

WASTE COMPACTORS AND DESTRUCTORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for waste compactors, component fittings, and accessories.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Waste Compactor Standards: Comply with ANSI Z245.2, "Equipment Technology and Operations for Wastes and Recyclable Materials—Stationary Compactors—Safety Requirements," and NFPA 82, "Incinerators and Waste and Linen Handling Systems and Equipment."
- C. Waste Bin and Hopper Standard: Comply with ANSI Z245.30, "Refuse Collection, Processing, and Disposal Equipment—Waste Containers—Safety Requirements."

1.3 WASTE COMPACTORS

- A. Self-Contained Horizontal (Liquid Wastes) Compactors: Manufacturer's standard packaged units with components, options, and accessories needed to comply with requirements and provide complete functional systems.
 - 1. Minimum WASTEC Rating/NSWMA Base Size: 1.00 cu.yd (0.765 cu.m).
 - 2. Controls
 - a. Provide fully enclosed doghouse with side door, to be fed from ground.
 - b. Key-controlled motor.

LEED SUGGESTIONS

- 2.1 LEED certification of a project requires documentation that all prerequisite requirements (prerequisites) have been met, plus a minimum number of Credit points. The U.S. Green Building Council's MR-Prerequisite 1, "Storage and Collection of Recyclables," requires "an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals." Most other LEED rating systems have a similar requirement. Waste compactors are generally an essential part of efficient collection and storage of waste for recycling.**

- A. **Recycling significantly reduces the volume of waste to be transported and can improve sanitation where the waste originates. Presorting and separating waste materials as part of a recycling program requires temporary on-site storage of recyclable waste. Separating and compacting materials such as cardboard and other paper products reduces storage space necessary between collections.**

END OF SECTION

EQUIPMENT**CHAPTER 9: SPECIFICATIONS****SECTION 119200****ART ROOM EQUIPMENT - KILNS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for kilns and accessories.

1.2 QUALITY ASSURANCE

- A. UL / CSA Listed.

1.3 KILN FEATURES

- A. Dimensions: Minimum 23.5-inch width and 27-inch depth.
- B. Power Supply: Gas or 208V electric.
- C. Temperature: 10 cone or 2350 degree Fahrenheit minimum.
- D. Automatic Controller.

1.4 ACCESSORIES

- A. Vent
- B. 3-inch Brick
- C. Furniture kit

END OF SECTION

12

DIVISION

FURNISHINGS

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SECTION 122113

HORIZONTAL LOUVER BLINDS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for horizontal louver blinds with aluminum slats.

1.2 PRODUCTS

- A. Horizontal Louver Blinds, Aluminum Slats
 - 1. Coating: Reflective.
 - 2. Maximum Light-Blocking Type.
 - 3. Tilt Control: Manual with wand or manual with cord.
 - 4. Lift Operation: Manual with cord.
 - 5. Valance.

END OF SECTION

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****SECTION 122413****ROLLER WINDOW SHADES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for roller window shades.

1.2 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Passes NFPA 701.
- B. Motorized Operators: UL listed.
- C. Comply with WCMA A 100.1.

1.3 PRODUCTS

- A. Shade Band Material: PVC-coated fiberglass, PVC-coated polyester, PVC-coated fiberglass and polyester blends, or fiberglass and acrylic blend.
- B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube.
- C. Top: Fascia and end caps; fascia, end caps, and top/back cover; pocket-style headbox with bottom cover or pocket with ceiling slot opening.
- D. Shade Type: Audiovisual light blocking or skylight.
- E. Shade Operation: Manual with spring roller; manual with continuous-loop bead chain, clutch, and cord tensioner and bracket; manual with gear and crank; or motorized operator.
- F. Valance.

LEED SUGGESTIONS

- 2.1 *Shading coefficient (SC) and the more recently preferred solar heat gain coefficient (SHGC) are values derived from the solar-optical properties of the glass or other glazing, the in-between air space, and the fenestration covering assembly. The relationship of glazing, shading, and fenestration energy flow is well-documented in the 2001 ASHRAE HANDBOOK – Fundamentals, Ch. 30. Both coefficients measure how well a glazed opening blocks heat caused by sunlight; the lower the SC or SHGC, the less heat gained in the protected space. The optimum solar-optical property levels for lowering SC and SHGC and reducing heat gain are as follows:***
- A. *Transmittance – Low***
 - B. *Absorptance – Low***
 - C. *Reflectance – High***

- 2.2** *Roller shades with metalized fabric backings can lower the solar heat gain through glazed openings by blocking transmission of and reflecting incoming solar radiation. Low absorptance of metalized fabrics minimizes heat gain caused by radiant heat. Metallized shades mounted in front of a single pane will reduce directly transmitted solar energy by at least 80%. Besides reflecting heat, metallized fabrics reflect light and control glare.*
- 2.3** *SC and SHGC values for light- or dark-colored roller shades vary significantly. Reducing heat gain through glazed openings from solar exposure is best accomplished with light-colored shades because light-colored surfaces reflect light more efficiently and absorb less heat than dark-colored surfaces. Solar-optical values for the shade material and color should be obtained from the manufacturer and considered when calculating HVAC cooling loads.*
- 2.4** *Fixed lites with tinted or coated glazing assemblies with low SC and SHGC ratings may not require shading devices. Internal shading devices can only affect solar radiation that has passed through the tinted or coated glass and can reduce only that portion of the heat gain than can be reflected back through the glass again. According to the 2001 ASHRAE HANDBOOK – Fundamentals, “the energy benefit of a shade decreases as the SC of the unshaded glass decreases, due to the low transmittances and the inability of the occupant to change this factor.”*
- 2.5** *In cold climates, roller shades can be manipulated to admit heating solar radiation when opened or to help retain room heat when fully closed. Depending on the building orientation, site conditions, outside-air temperature, and glazing assembly characteristics, it is possible for solar heat gain to offset heat loss through glazed openings during heating operations.*
- 2.6** *Designed use of daylighting is an issue that is increasingly being considered by Design Professionals. Daylighting can be used in building design in lieu of or as a supplement to electric lighting, with consequent reduction in energy consumption. Given constantly changing and widely variable conditions, predicting daylight distribution and glare in actual buildings can be complex. Integrating the effects of daylighting with those of electric lighting so adequate illumination levels can be achieved and maintained may also be complicated. Computer programs are currently being developed to aid in the design and analysis of daylighting. Because blinds and shades can be easily and effectively used to manipulate daylighting, they may play an important role in practical lighting design decisions.*

END OF SECTION

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****SECTION 123550****EDUCATIONAL CASEWORK****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for educational casework including open casework, modular casework, and music casework, manufactured with plastic laminate facing and countertops.

1.2 QUALITY ASSURANCE

- A. Casework Grade: Provide plastic laminate faced casework complying with the referenced quality standard and the following grade:
 - 1. Grade: custom ***per Architectural Casework Quality Standards.***
- B. Design Requirements for Educational Casework
 - 1. Design system of cabinets which will be chip and abrasion-resistant under normal usage and will protect student clothing, materials, musical instruments and cases from damage under normal use.
 - 2. Design shelving to withstand continuous use without surface or front edge breakdown.
 - 3. Hanger rods or hooks to support a minimum vertical load of 200 pounds applied anywhere.
 - 4. Full-height door to support a minimum vertical load of 200 pounds applied at outer edge.

1.3 MATERIALS

- A. Low-Emitting Materials: Adhesives and composite wood products shall not contain urea formaldehyde.
- B. Plastic laminates, provide one of the following:
 - 1. High pressure decorative laminate complying with NEMA LD3, Grade GP-28.
 - 2. High pressure decorative laminate complying with NEMA LD3, Grade CL-20.
 - 3. High pressure decorative laminate complying with NEMA LD3, Grade BK-20.
- C. Edge Banding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3mm thick at doors and drawer fronts, 1mm thick elsewhere.
- D. Melamine Faced Particleboard: Medium density particleboard complying with ANSI A208.1, Grade M-2, with decorative surface of thermally fused, melamine impregnated web complying with ALA 1992.
- E. Particleboard: ANSI A208.1, Grade M-2.
- F. Hardboard: AHA A135.4, Class 1 tempered.

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- G. Plywood: Hardwood plywood of any species similar in color and grain to exposed wood. HPVA HP-1, Grade C faces and Grade J crossbands. Semi-exposed backs of plywood with exposed faces shall be the same species as faces.
- H. Epoxy Tops and Sinks (Science Rooms): Factory molded of modified epoxy-resin formulation, uniform mixture throughout full thickness with smooth, nonspecular finish.
- I. Hardware and Accessories
1. Batt Hinges: BHMA A 156.9.
 - a. Frameless, concealed (European type) are not acceptable.
 2. Pulls.
 3. Door Catches.
 4. Drawer Slides: BHMA A 156.9.
 5. Drawer and Door Locks on all doors and drawers.
 6. Adjustable Shelf Supports.
 7. Grommets.
 8. Tote Trays.
 9. Articulating Keyboard Trays.
 10. Glass: 1/4 inch laminated safety glass.
 11. Coat Rods.
 12. Mirrors.

PLASTIC LAMINATE CASEWORK CONSTRUCTION
(Dimensions are minimum)

	CORE	SURFACE	EDGE	CONSTRUCTION/ JOINERY	HARDWARE
Cabinet Boxes - Base and Wall					
*Exposed vertical surfaces	All front and Sides: 3/4" Particleboard Base bottom: 3/4" plywood Wall top and Bottom: 3/4" Particleboard Back: entrapped - 3/8" particleboard or 1/4" tempered hardboard	GP28	Finish all exposed edges (including wall cabinet top and bottom with 1mm (PVC)).	<i>Join using concealed dado, dowels, assembly screws, or interlocking mechanical fasteners. Where the concealed dado or dowel method are employed, cases shall be assembled utilizing glue and pressure.</i>	
*Semi-exposed parts (interior of open cabinets, not including drawer bodies)		CL20 or melamine			
*Concealed surfaces		CL20 or melamine			
*Panel ends		GP28			
Countertops (wet areas)	1" exterior grade veneer core plywood or phenolic resin particleboard	GP50 balanced with backing sheet	3mm PVC	Apply silicone sealant to joint between HPL top and backsplash. Field joints >48" apart and >48" from end of top.	

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	CORE	SURFACE	EDGE	CONSTRUCTION/ JOINERY	HARDWARE
Countertops	1" particleboard 1" epoxy resin (science rooms)	GP50 balanced with backing sheet	GP50	Apply silicone sealant to joint between HPL top and backsplash. Field joints >48" apart and >48" from end of top.	
Cabinet Doors	3/4" particleboard	GP28 with CL20 liner on back.	3mm PVC		Heavy duty, 5 knuckle, 2-3/4" institutional type hinge (no concealed hinges).
Drawer Fronts	3/4" particleboard	GP28 with CL20 liner on back.	3mm PVC	<i>Dovetailed, lock shoulder or doweled, glued under pressure.</i>	Wire design pulls.
Drawer Sides and Backs	1/2" particleboard or 5/8" medium density fiberboard	Melamine on all visible surfaces with drawer in normal open position.			Combination epoxy coated steel and nylon roller bearing drawer slides. Self-closing. Full extension for file drawers.
Drawer Bottoms	Fully captured Construction - Minimum thickness: 1/4". Platform construction - minimum thickness: 1/2".	Melamine panel product or particle- board.			Platform construction; must use wrap around drawer slide.
Shelves	1" particleboard	GP28	1mm PVC on front and back edges.	Multiple holes (minimum 5mm diameter at 1-1/4" O.C.).	

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1.4 COMPONENTS

- A. Open Casework for Coats: Open plastic laminate units with either coat rods or coat hooks and shelves or divided shelf space into smaller spaces (i.e. 12 inches **wide** by 72 inches **high** by 12 inches deep) for children's personal storage. Exact dimensions **and design may** vary depending on shape of room. ***Design should be "age appropriate". For example, lower grade classrooms could include 12 inches wide by 48 inches high by 12 inches deep "cubbies" with a 12" x 12" x 12" shelf above. A seat/shelf may be included as well. Design should be coordinated with District to meet student needs.***
- B. Tall Wardrobe: Coat and personal belonging storage for staff. Cabinet should be 24 inches deep, 84 inches tall, and range from 18 to 24 inches wide. Some wardrobe units have a file drawer in bottom depending on staff needs.
- C. Tall Storage: Cabinet with door in various depths and widths, and either 72 to 84 inches high. Interior configuration will vary from adjustable and fixed shelves to built-in files or tote tray bin storage depending on specific needs.
- D. Mail Cubicles: Plastic laminate unit with either removable or fixed divider shelves for staff mail. Mail slots are usually about 12 to 14 inches deep, 10-1/2 to 12 inches wide, and 2 to 3 inches high.
- E. Worksurface: Plastic laminate countertop with grommets and grommet holes for card access to electrical receptacles and computer ports below worksurface. Worksurface would be placed at required height for specific tasks with kneespace under it and structural supports to the floor. There would be no backsplash at a worksurface.
- F. Bookcases: Plastic laminate open (no doors) 12-inch deep units in various widths and heights with adjustable shelves. Units would have a plastic laminate countertop on it.
- G. Deep Tall Shelving: Plastic laminate open units (no doors) that are either 72 or 84 inches high and deeper than 12 inches. Widths will vary. Units should not be over 36 inches wide to avoid warping of shelves under weight of books.
- H. Circulation Desk Casework: Plastic laminate unit (could have wood edges) designed specifically for the function of checking in and out books in a media center, reference assistance from staff to students, and work area for media center staff. Unit needs to be ADA accessible, and should include space for computers, file storage, minimal book storage, worksurface for writing, and space for the return of books. Size, shape, and specifics of this unit should be based on shape of room, size of media center, type of school, and school programs. Include grommet and grommet holes for cord access to computer ports and electrical receptacles.
- I. Secretarial Workstation: Plastic laminate unit (could have wood edges) designed specifically for the function of secretarial/administrative duties. Unit needs to be ADA accessible, and should include space for computers, file storage, small personal supply storage, manual and form storage and worksurfaces for writing and telephone. 42 inches high, 10 to 12 inches deep transaction surfaces are often used. Size, shape, and specifics of this unit should be based on shape of room, size of school, and functions of staff. Include grommets and grommet holes for cord access to computer parts and electrical receptacles.

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****1.5 MUSIC CASEWORK**

- A. Cabinet Wall Panels: 3/4 inch thick industrial grade particleboard, minimum 45 pcf with thermoset polyester laminate complying with NEMA LD3-1991, GP 20 and ALA 1992 specifications standards.
- B. Cabinet Shelving
 - 1. Cabinets up to 27 inches wide: One piece high molecular blow molded polyethylene with 1-3/8 inch radius front edge or ABS surfacing thermo-formed with ribbed pattern and hair cell texture. Mount to cabinet walls with steel clip supports.
 - 2. Robe/Uniform Storage Cabinets over 27 inches wide: Two piece high molecular blow molded polyethylene with 1-3/8 inch radius front edge or ABS surfacing thermo-formed with ribbed pattern and hair cell texture. Mount to cabinet walls with steel clip supports.
 - 3. Instrument Storage Cabinets over 27 inches wide: Industrial (cabinet) grade particleboard, minimum 45 pcf, 3/4 inch thick with 1-1/2 inch thick front edge drop with 1-3/8 inch radius and postforming grade high pressure plastic laminate. Mount to cabinet walls with steel clip supports. Provide tubular steel support at front edge.
- C. Edges: Laminate doors and leading edge of music instrument storage cabinet vertical and upper horizontal members shall have a high impact rigid PVC extrusion, 3mm in thickness. The 3mm thick edging shall be applied with hot melt adhesive, and shaped to provide radiused front edges.
- D. Grille doors shall be constructed of electronically welded, .314-inch diameter heavy gauge steel perimeter and crossbrace wire, and .194-inch diameter vertical stringer wire. Five knuckle hinge and lock hasp shall be formed and welded to door frame and cross members. Lock hasp provides space for name/number plate.
- E. Finish Hardware
 - 1. Hinges, compartment doors: Two case hardened spring steel barrel hinges with .094-inch thick leaves and .25-inch diameter nonremovable pins. Through bolt to cabinet wall.
 - 2. Hinges, full-height cabinet doors: Continuous steel hinges.
 - 3. Locking slide bolt designed for padlocks, with strike plate; 14 gauge steel; provide clear plastic label holder for identification card insert.
 - 4. Cabinet levelers: Four leveling glides within minimum 3/8-inch diameter threaded rod in steel corner brackets.

LEED SUGGESTIONS

- 2.1** *The U.S. Green Building Council's - Green Building Rating System require that a minimum of 50% of wood-based materials be certified as having been obtained from forests that comply with FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship, for a building to qualify for Credit MR 7. Because the percentage of certified wood-based materials is determined from the costs of the various wood-based materials, casework can have a significant effect on meeting the 50% requirement. The Certified Forest Products Council lists on its website a number of cabinet manufacturers who produce cabinets made from certified wood.*

- 2.2** *LEED Credit EQ 4.4 (low-emitting materials) that require composite wood products be made without using urea-formaldehyde binders or adhesives. Urea-formaldehyde binders are commonly used in particleboard and MDF, and urea-formaldehyde adhesive is used in hardwood plywood. Softwood plywood and hardboard do not use urea formaldehyde. Particleboard made with a phenol-formaldehyde binder, which emits far less formaldehyde than urea formaldehyde and which qualifies as an “exterior glue,” is available. MDF made without urea formaldehyde is also available.*

END OF SECTION

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****SECTION 123553****LABORATORY CASEWORK****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for plastic-laminate laboratory casework, including countertops, sinks, and service fittings.

1.2 QUALITY ASSURANCE

- A. Construction shall equal or exceed that of "Educational Casework".
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Flammable Liquid Storage Cabinets: NFPA 30.

1.3 MATERIALS

- A. Materials:
 - 1. Particleboard: ANSI A 208.1, Grade M-2, made with binder containing no urea formaldehyde or straw-based particleboard complying with ANSI A 208.1, Grade M2, except for density, made with binder containing no urea formaldehyde.
 - 2. Plastic Laminate: High pressure decorative laminate complying with NEMA LD3.
 - a. Thermostet panels may be used for semi-exposed surfaces, only.
 - 3. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3mm thick at doors and drawer fronts, 1mm thick elsewhere.
 - 4. Acid Storage Lining: 1/4 inch thick polypropylene, epoxy, or phenolic composite lining material.
- B. Countertops
 - 1. Materials: Epoxy resin **or phenolic composite**, 1 inch thick minimum.
- C. Sinks
 - 1. Material: Cast epoxy resin.
- D. Service Fixtures
 - 1. Piped Service: Air, gas, vacuum, steam, hot water, cold water, and distilled water.
 - a. Comply with SEFA 7, "Laboratory and Hospital Fixtures – Recommended Practices."
 - 1) Comply with "Vandal-Resistant Faucets and Fixtures" recommendations in SEFA 7.
 - 2. Power Receptacles: Comply with NEMA WD 1, NEMA WD6, and UL498. Duplex type, configuration 5 20R.
 - a. Receptacle Grade: Hospital.

1.4 HARDWARE

- A. Locks: Cam type, complying with BHMA A156.H, Type E07281.
- B. Hinges: Stainless-steel or epoxy-coated steel 5 knuckle, complying with BHMA 156.9, Grade 1, with antifriction bearings and rounded tips.
 - 1. Frameless concealed hinges, Type BD1602, are not acceptable.
- C. Pulls: Bent metal wire of stainless steel.
- D. Drawer Slides: Steel, self-closing; complying with BHMA A156.9, Type B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Full over travel extension, ball-bearing type.
- E. Adjustable Shelving Supports: Powder-coated steel shelf rests complying with BHMA A156.9, Type B04013.
- F. Catches: Roller type or magnetic type.

1.5 ACCESSORIES (optional)

- A. Reagent Shelves.
- B. Burette Rods.
- C. Upright Rod Assembly and Metal Crossbar.
- D. Lattice Assembly.
- E. Pegboards.

END OF SECTION

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****SECTION 124813****ENTRANCE FLOOR MATS AND FRAMES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for special floor surfaces at entrances including roll-up linked tread type floor mat can be either recessed or surface mounted, or entrance tiles. Are not intended to be mounted over a drainage pit.
- B. There shall be a five-step or fifteen foot walk off mat at all entry points into the building. If the area cannot accommodate a fifteen foot mat, the mat should be as long as the area will accommodate.

1.2 ROLL-UP MATS

- A. Recessed Mat Frames
 - 1. Extruded Aluminum: ASTM B 221, alloy 6063-T5.
- B. Roll-Up Vinyl or Aluminum Linked Tread Floor Mat.
 - 1. Tread Surface: Level-cut, nylon pile carpet.

1.3 ENTRANCE TILES

- A. Carpet-Type Tiles.

LEED SUGGESTIONS

- 2.1 Dust and dirt can be carried into buildings on people's footwear, contributing to Indoor Air Quality (IAQ) problems and reducing the durability of interior floor finishes. Comprehensive walk-off systems specifically engineered for this purpose can offer a cost effective solution.

END OF SECTION

SECTION 124816

ENTRANCE FLOOR GRILLES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for recessed foot grilles and frames.

1.2 COMPONENTS

- A. Aluminum Foot Grilles
 - 1. Top Surface: Serrated aluminum or carpet insert.
- B. Frame: Same material and finish as foot grille.

END OF SECTION

FURNISHINGS**CHAPTER 9: SPECIFICATIONS****SECTION 126600****TELESCOPING STANDS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for telescoping bleachers.

1.2 DESIGN REQUIREMENTS

- A. Comply with ADA Rules and Regulations, and ICC/ANSI 300-2002 Bleachers, Folding and Telescopic Seating, and Grandstands.

1.3 COMPONENTS

- A. Bench seats; wood or contour plastic seating
 - 1. Wood Bench Bleachers
 - a. Depth: 10 inches
 - 2. Molded Plastic Bleachers
 - a. Profile: Contoured seat surface
 - b. Depth: 10 inches (12 inches, option with 24 minimum row spacing)
- B. Operation, provide one of the following:
 - 1. Manual (limit 12 rows).
 - 2. Automatic friction or nonfriction type integral power unit.
- C. Wheelchair-Accessible Seating: Seating cutouts or retractable truncated benches.
Refer to ADAAG 4.33.3.
- D. Deck: Plywood.
- E. Safety Rails.
- F. Accessories: Steps, stairs, ramps, closure panels, signage, and scorer's table.

END OF SECTION

SECTION 129100

SITE FURNISHINGS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for site furniture and fixtures.

1.2 PRODUCTS

- A. Trash Receptacles: Precast concrete or metal to act as a holder for can or bag.
- B. Seating: Precast concrete or metal.
- C. Bicycle Racks: Steel pipe or tubing.

END OF SECTION

FURNISHINGS

CHAPTER 9: SPECIFICATIONS

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DIVISION 13: SPECIAL CONSTRUCTION

134814	Sound Barriers
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SECTION 134814

SOUND BARRIERS

GENERAL GUIDELINES**1.1 SECTION INCLUDES**

- A. Qualitative requirements for sound barriers.

1.2 SYSTEM DESCRIPTION

- A. Acoustical Performance: Sound absorbing panels shall have a mineral rock wool sound-absorbing batt between the perforated face and solid back panel. The rock wool is to be a minimum of 1/2 inch from the surface of the perforated panel and shall fill the panel cavity and be 2 inches thick. It shall have a density of 6-lbs. per cu.ft. and conform with ASTM standard E-136. The mineral rock wool sound-absorbing material shall absorb less than 1% water, be noncorrosive, melt about 2,000 Deg.F., have a flame spread of 15 or less and a smoke development of 0 when tested in accordance with ASTM standard E-84, be rated noncombustible by ASTM standard E-136, be non-hygroscopic, and have a NRC of 1.05.

1.3 MATERIALS

- A. Panels shall be fabricated from 22 to 16 gauge sheet steel conforming to the structural quality of ASTM A-446 and galvanized in accordance with ASTM A-525, Class G-90. Each panel shall have a width of 12 inches and a thickness of 2 3/4 inches or 3 3/4 inches.
- B. The individual panels shall be "nested" horizontally into structural members. The panels may be installed vertically or horizontally in heights up to 12 feet before intermediate girts may be required. Interior perforated side of panel is to be galvanized. Exterior panels are to be galvanized and finished with the following coil coating. The panel system can be galvanized or a combination of galvanized and pre-coated elements depending upon customer requirements; i.e., galvanized face panel and pre-coated back tray or pre-coated face panel and galvanized back tray.

END OF SECTION

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DIVISION 14: CONVEYING EQUIPMENT

142100	Electric Traction Elevators
142400	Hydraulic Elevators

SECTION 142100

ELECTRIC TRACTION ELEVATORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for electric traction passenger elevators.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. ASME A17.1 "Safety Code for Elevators and Escalators."

1.3 COMPONENTS

- A. Passenger Elevator Machines: Either variable-voltage, variable-frequency ac or variable-voltage dc type; with solid-state power converters.
- B. Elevator Description:
 - 1. Auxiliary Operations: Battery-powered lowering or standby powered lowering.
 - 2. Security Features: Card-reader or keyswitch operation.
 - 3. Car Enclosures:
 - a. Front Walls (Return Panels): Stainless Steel
 - b. Side and Rear Wall Panels: Plastic Laminate
 - c. Doors: Enameled Steel
- C. Signal Equipment
 - 1. Emergency communication system complying with ASME A 17.1 and the U.S. Architectural and Transportation Barriers Compliance Board's "American with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."

LEED SUGGESTIONS

- 2.1 *Energy consumption is the primary environmental concern with elevators. Careful selection of elevator type, controllers, and machines can have a significant impact on elevator energy consumption. Electric traction elevators use far less energy than hydraulic elevators. Solid-state power conversion uses less energy than the motor generators of the past, VVVF ac systems use less energy than dc systems, and regenerative systems will reduce power consumption more than non-regenerative systems. Sophisticated microprocessor operation systems can reduce energy requirements through more efficient elevator system operation and may also reduce embodied energy by requiring fewer elevators. When life-cycle costs, rather than just initial costs, for elevator systems are considered, many of these energy-saving features will prove to be cost-effective.***

END OF SECTION

CONVEYING EQUIPMENT**CHAPTER 9: SPECIFICATIONS****SECTION 142400****HYDRAULIC ELEVATORS****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for hydraulic passenger elevators.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. ASME A17.1 "Safety Code for Elevators and Escalators."

1.3 COMPONENTS

- A. ***Pump Units: Mounted on oil tank in steel enclosure or submersible pump, suspended inside tank.***
 - 1. ***Motor: Solid-state starting.***
- B. ***Cylinder Protection: PVC or HDPE pipe casing.***
- C. ***Signal Equipment***
 - 1. ***Car Control Stations: Semi-recessed or recessed type, one per car.***
 - 2. ***Emergency Communication System must comply with ASME A 17.1 and ADAAG.***
- D. ***Elevator Description***
 - 1. ***Auxiliary Operations***
 - a. ***Battery-Powered Lowering.***
 - 2. ***Security Features: Card-reader operation or keyswitch operation.***
 - a. ***Front Walls (Return Panels): Stainless steel.***
 - b. ***Side and Rear Wall Panels: Enameled steel or plastic laminate.***
 - c. ***Doors: Enameled steel.***
 - d. ***Ceiling: Luminous ceiling.***
 - e. ***Handrails: Stainless steel.***

END OF SECTION

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FIRE SUPPRESSION

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DIVISION 21: FIRE SUPPRESSION

210501	Common Work Results for Fire Suppression
211000	Water-Based Fire-Suppression Systems

SECTION 210501

COMMON WORK RESULTS FOR FIRE SUPPRESSION

GENERAL GUIDELINES

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

- A. Pipe and pipe fittings.
- B. Dielectric fittings.
- C. Mechanical sleeve seals.
- D. Piping specialties.
- E. Installation requirements common to piping systems and specification sections.
- F. Installation requirements common to equipment specification sections.
- G. Testing and repair.
- H. Final completion.
- I. Record drawings.
- J. Maintenance and operating manuals.
- K. Lubrication and packing.
- L. Piping systems and equipment per NFPA, state, and local codes.
- M. Requirements for a fire pump, jockey, controllers and equipment if required.

1.2 SUBMITTALS

- A. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.
- B. Refer to specific sections of this specification for additional submittal requirements.

1.3 QUALITY ASSURANCE

- A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.
- B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.
- C. All materials used shall be first grade of their kind and shall be new and in first-class condition when installed.

FIRE SUPPRESSION**CHAPTER 9: SPECIFICATIONS**

- D. Work done by the Contractor shall include the services of an experienced superintendent.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Piping and tubing shall include factory-applied end caps.
- B. All piping and tubing shall be elevated from grade for onsite storage.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Protect fire pump, jockey pump and controllers from moisture and dirt.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.
- C. Coordinate installation sleeves and supporting devices with concrete and structural components.
- D. Coordinate connection of piping systems with underground and overhead utilities and services.
- E. Coordinate requirements for access panels and doors.
- F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

- A. Piping support shall only be permitted at steel joist panel points.
- B. Any supplemental steel required for support between building structural members shall be the responsibility of the Div. 21 Contractor.

1.7 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21 piping sections for pipe, tube, and fitting materials and joining methods.

1.8 JOINING MATERIALS

- A. Refer to individual Division 21 piping sections for special joining materials not listed below.

1.9 DIELECTRIC FITTINGS

- A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

CHAPTER 9: SPECIFICATIONS

FIRE SUPPRESSION

1.10 MECHANICAL SLEEVE SEALS

- A. Seals shall be designed with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve and shall include connecting bolts and pressure plates.

1.11 PIPING SPECIALTIES

- A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.
- B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

1.12 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Division 21 piping section specifies unique installation requirements.
- B. Install components with pressure rating equal to or greater than system operating pressure.
- C. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.
- D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.
- E. Install all piping specialties to meet manufacturer's requirements.
- F. Install pipe sleeves at all wall penetrations. Provide Schedule 40 steel pipe.
 - 1. PVC pipe sleeves are not permitted.
 - 2. Do not install sleeves through structural members.
- G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.

1.13 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to facilitate service, maintenance, and repair or replacement of components.
- B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

1.14 EQUIPMENT START-UP

- A. Start-up of all fire pump equipment shall be video-taped by the Div 21 contractor. Two DVD copies shall be turned over to the Owner's maintenance staff.

FIRE SUPPRESSION**CHAPTER 9: SPECIFICATIONS****1.15 TESTING AND REPAIR**

- A. All piping systems shall be thoroughly cleaned and flushed prior to final testing.
- B. Pressure testing shall be completed for the piping systems:
- C. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.
- D. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.16 FINAL COMPLETION

- A. All work shall be cleaned prior to issuance of Substantial Completion.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.
- C. Deliver extra sprinkler heads as required by this Specification, to Owner and obtained signed receipts of delivery.
- D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.
- E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.
- F. Contractor shall submit written certificates warranting each item of equipment.

1.17 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.
- B. The final Project Record Drawings shall be submitted to the Engineer for approval at the completion of the project.
- C. Record Drawings shall include the location of concealed piping and ductwork.

1.18 MAINTENANCE AND OPERATING MANUALS

- A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.
- B. Bind the written operating instructions, approved shop drawings, equipment catalog cuts, equipment warranties, and manufacturer's instructions into a binder.

END OF SECTION

CHAPTER 9: SPECIFICATIONS

FIRE SUPPRESSION

SECTION 211000

WATER-BASED FIRE SUPPRESSION SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for piping systems, sprinkler equipment, fire pumps, controls, tank and accessories, standpipes/hose cabinets, and double detector check valves.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and materials. Submit hydraulic calculations and drawings showing the sprinkler piping layout with the sprinkler designer's registration seal.

1.3 QUALITY ASSURANCE

- A. Piping shall be installed per NFPA 13, state and local fire codes.
- B. Testing of the piping shall be per NFPA 13.
- C. Sprinkler heads shall be UL and FM labeled and shall be located on spacing requirements as noted in NFPA 13 according to the hazard designation. Extended coverage sprinkler heads are acceptable.
- D. Fire pumps shall be UL and FM labeled.
- E. Stand pipes and hose cabinets shall be provided per NFPA 14, state and local codes.
- F. Backflow preventers shall meet the current requirements of ASSE 1015, ASSE 1047 and/or ASSE 1048.

1.4 PIPING SYSTEMS

- A. Piping to include schedule 40 black steel and/or schedule 10 thin wall steel.
- B. Grooved piping with ductile iron couplings and EPDM gasket may be used in lieu of threaded pipe.
- C. An option to the final connection to the sprinkler head shall be flexible braided stainless steel hose assembly per UL, FM, and NFPA 13 requirements.

1.5 SPRINKLER EQUIPMENT

- A. The types of heads shall be used in the following locations;
 - 1. Unfinished exposed spaces and mechanical spaces - brass heads.
 - 2. Finished spaces with ceilings – concealed or semi recessed heads.
 - 3. Finished spaces in storage rooms and janitor closets - white pendent heads.
 - 4. Corridors, locker/shower rooms, restrooms - concealed white head assemblies.
 - 5. Heads in the gym shall have wire guards.
 - 6. If heads are exposed in the locker/shower rooms, use a wire guard on each head.

FIRE SUPPRESSION**CHAPTER 9: SPECIFICATIONS**

- B. Provide vane type water flow indicator with tamper switch and electronic retard.
- C. Provide valve position supervisory switch for monitoring all valves.
- D. Provide test station with valve and drain assembly for testing sprinkler system.
- E. Provide a fire department siamese connection on the exterior of the building or a free standing siamese post for connection to the building sprinkler system.
- F. Provide a wall indicator wall or post indicator valve for shutoff of the sprinkler system supply. The valve shall be supervised with a tamper switch.

1.6 FIRE PUMPS, CONTROLS, AND ACCESSORIES

- A. Provide a UL labeled fire pump, controls and accessories.
- B. The fire pump shall be [vertical turbine] [horizontal split case] [vertical in line] fire pump.
- C. Power to the pump shall be [limited service electric motor] [shaft coupled diesel engine].
- D. Controls shall be for a limited service motor.
- E. A transfer switch shall be provided if there is more than one power supply feeding the fire pump.
- F. The jockey pump shall be provided to pressurize the piping system for detection of a head activating by a fire or by a trouble condition.
- G. In the case of a condition where a local water supply must be provided, a tank or tanks shall be installed to provide an adequate amount of water to fight a fire based on NFPA 13 requirements for the flow rate and duration based on the hazard designation. Types of tanks shall include concrete or fiberglass. Level controls shall be installed in the tank to maintain the water level and indicate an alarm for an inadequate water supply.

1.7 STANDPIPES/HOSE CABINETS

- A. Cabinets on the stage shall be surface mounted.

1.8 DOUBLE DETECTOR CHECK VALVES

- A. The double detector check valve assembly shall consist of two spring loaded double check valves, with a cast iron body with epoxy lining or stainless steel body UL and FM approved. Provide a detector water meter if required by the local fire authority. Provide inlet and outlet resilient seated O.S. & Y. gate valves. Provide bypass piping with test cocks. Provide inlet and outlet pressure gauges.

1.9 INSTALLATION

- A. Piping shall be installed from approved hangers located at steel joist panel points.
- B. When required by inadequate water pressure and flow conditions, furnish and install the fire pump, jockey pump, controls, transfer switch and required piping.

- C. Piping in gymnasiums shall be above the bottom chords of the roof structure.
- D. Heads in the corridors shall be centered between the corridor walls. All others heads in the finished spaces with ceilings shall be located within 6 inches of the ceiling grid.
- E. Install double detector check assembly with water meter on the incoming water supply to the sprinkler system.
- F. Clean pipe to prevent MIC (microbially influenced corrosion).

END OF SECTION

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PLUMBING

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221119	Plumbing Piping Specialties
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223100	Domestic Water Softener Equipment
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226313	Gas Piping Systems

SECTION 220501

COMMON WORK RESULTS FOR PLUMBING

GENERAL GUIDELINES

1.1 SECTION INCLUDES QUALITATIVE REQUIREMENTS FOR:

- A. Pipe and pipe fittings.
- B. Dielectric fittings.
- C. Mechanical sleeve seals.
- D. Piping specialties.
- E. Installation requirements common to piping systems and specification sections.
- F. Installation requirements common to equipment specification sections.
- G. Testing and repair.
- H. Final completion.
- I. Record drawings.
- J. Maintenance and operating manuals.
- K. Lubrication and packing.

1.2 SUBMITTALS

- A. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.
- B. Refer to specific sections of this specification for additional submittal requirements.

1.3 QUALITY ASSURANCE

- A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.
- B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.
- C. All materials used shall be first grade of their kind and shall be new and in first-class condition when installed.
- D. Work done by the Contractor shall include the services of an experienced superintendent.

PLUMBING**CHAPTER 9: SPECIFICATIONS****1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Piping and tubing shall include factory-applied end caps.
- B. All piping, tubing, and equipment shall be elevated from grade for on-site storage.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.
- C. Coordinate installation sleeves and supporting devices with concrete and structural components.
- D. Coordinate connection of plumbing systems with underground and overhead utilities and services.
- E. Coordinate requirements for access panels and doors.
- F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

- A. Piping support shall only be permitted at steel joist panel points unless noted otherwise.
- B. Any supplemental steel required for support between building structural members shall be the responsibility of the Plumbing Contractor.

1.7 PIPE AND PIPE FITTINGS

- A. Pipe threads shall meet ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- B. Pipe-flange gasket materials shall meet ASME B16.21, nonmetallic, flat, asbestos-free.
- C. Pipe Flanges
 - 1. Full face shall be Class 125, cast iron and cast-bronze material.
 - 2. Narrow face shall be Class 250, cast-iron and cast steel material.
- D. Flange bolts and nuts shall meet ASME B18.2.1.
- E. Solder filler materials shall meet ASTM B 32.
 - 1. Alloy Sn95 and Sn94 shall be used.
- F. Brazing filler materials shall meet AWS A5.8.

CHAPTER 9: SPECIFICATIONS

PLUMBING

- G. Welding filler metals shall comply with AWS D10.12.
- H. Solvent materials shall meet standard solvent cement requirements.
 - 1. PVC piping shall meet ASTM D 2564. Include primer according to ASTM F 656.
 - 2. Plastic pipe seals shall meet ASTM F 477
 - 3. Flanged, ductile-iron gasket, bolts, and nuts shall meet AWWA C 110.

1.8 DIELECTRIC FITTINGS

- A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

1.9 MECHANICAL SLEEVE SEALS

- A. Seals shall be designed with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve and shall include connecting bolts and pressure plates.

1.10 PIPING SPECIALTIES

- A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.
- B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

1.11 PLUMBING PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Division 22 piping sections specify unique installation requirements.
- B. Install components with pressure rating equal to or greater than system operating pressure.
- C. Install all piping at right angles or parallel to the building walls. Diagonal runs are prohibited.
- D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.
- E. Install all piping specialties to meet manufacturer's requirements.
- F. Install pipe sleeves at all wall penetrations. Provide Schedule 40 steel pipe.
 - 1. PVC pipe sleeves are not permitted.
 - 2. Do not install sleeves through structural members.
- G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.
- H. Install unions in piping 2 inch and smaller adjacent to each valve and at final connection to each piece of equipment.

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- I. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.

1.12 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to facilitate service, maintenance, and repair or replacement of components.
- B. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

1.13 EQUIPMENT START-UP

- A. Start-up of all plumbing equipment shall be video-recorded by the plumbing contractor. Two DVD copies shall be turned over to the Owner's maintenance staff.

1.14 TESTING AND REPAIR

- A. All piping and ductwork systems shall be thoroughly cleaned and flushed prior to final testing.
- B. Pressure testing shall be completed for the following piping systems:
 - 1. Domestic water, sanitary and vent, storm and gas piping systems, and other systems as noted on the plans.
- D. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.
- E. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

1.15 FINAL COMPLETION

- A. All work shall be cleaned prior to issuance of Substantial Completion.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.
- C. Deliver any equipment as required by this Specification to Owner and obtained signed receipts of delivery.
- D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.
- E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.
- F. Contractor shall submit written certificates warranting each item of equipment.

1.16 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.
- B. The final Project Record Drawings shall be submitted to the Engineer for approval at the completion of the project.
- C. Record Drawings shall include the location of all piping systems.

1.17 MAINTENANCE AND OPERATING MANUALS

- A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.
- B. Bind the written operating instructions, approved shop drawings, equipment catalog cuts, equipment warranties, and manufacturer's instructions into a binder.

END OF SECTION

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SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for thermometers and fittings, as well as pressure gauges and fittings.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 COMPONENTS

- A. Thermometers: 1-percent accuracy.
 - 1. Liquid-in-Glass Type: Organic filled 9 inch long industrial type.
 - 2. Direct-Mounting Filled-System Dial Type: Vapor actuated, thermal bulb, precision brass gear.
 - 3. Remote-Reading, Filled-System Dial Type: Vapor actuated, thermal bulb; precision brass gear.
 - 4. Bimetal Dial Type: Direct mounting, bimetal coil.
 - 5. Insertion Dial Type: Bimetal coil.
- B. Pressure Gauges: Phosphor-bronze Bourdon-tube gages, 1-percent accuracy.
 - 1. Vacuum Range: 30 inches Hg of vacuum to 15 psig of pressure .
 - 2. Pressure Range: Two-times operating pressure.

1.4 INSTALLATION

- A. Provide thermometers at the following locations:
 - 1. Inlet and outlet domestic water heaters.
 - 2. Outlet of the hot water storage tank.
 - 3. Inlet and outlet hot water at the main thermostatic mixing valve.
 - 4. Domestic circulation pump outlet.
- B. Provide pressure gauges at the following locations:
 - 1. Outlet piping of each water heater with 200 MBH input or greater.
 - 2. Inlet and outlet of the main reduced pressure backflow preventer.

END OF SECTION

PLUMBING**CHAPTER 9: SPECIFICATIONS****SECTION 220533****ELECTRIC SELF-REGULATING HOT WATER TEMPERATURE MAINTENANCE CABLE****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for hot water maintenance cable.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.
- B. Cable shall be UL listed, CSA certified and FM approved.
- C. Cable system shall conform to ANSI/IEEE Standard 515.1.
- D. Cables designed for freeze protection of water lines will not be allowed.

1.4 WARRANTY

- A. Cable – Minimum 10 year warranty.
- B. Follow manufacturer's installation and testing requirements.

1.5 MAINTENANCE CABLE

- A. The self-regulating cable shall consist of (2) nickel-coated copper bus wires embedded in a radiation cross-linked conductive polymer core. The cable shall be capable of varying its heat output along its entire length to maintain the water in the selected temperature range.
- B. Provide electronic controller for temperature control and energy savings.

1.6 INSTALLATION

- A. Refer to the manufacturer's hot water temperature maintenance design guide for design details, insulation requirements, maximum circuit lengths, and accessory information.
- B. The cable shall not be installed in a concealed space.

END OF SECTION

SECTION 221116

DOMESTIC WATER PIPING SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for domestic water piping.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.
- B. Welding procedures per ANSI/ASME Section 9, AWS D10.9 and D1.1 and the National Certified Pipe Welding Bureau.
- C. Brazing procedures per ANSI B31.5 and the ASME Boiler and Pressure Vessel Code SFA-5.8, Section II.
- D. Soldering procedures per ANSI B16.18.
- E. Comply with ANSI B31 pressure code for pressure piping.

1.4 PLUMBING PIPING

- A. Domestic water piping (hot water, cold water, hot water return) shall be type L copper conforming to ASTM B88. Fittings shall be wrought copper conforming to ANSI B16.22.
 - 1. Grooved copper piping with ductile iron or bronze couplings and EPDM gasket may be used as an option.
 - 2. Copper press fittings may be used as an option per ASTM B16.18 or ASTM B16.22. O-Rings shall be EPDM.
- B. An option to A. for domestic hot and cold water shall be as follows:
 - 1. Cross linked polyethylene (PEX) plastic tubing per ASTM F876, F877. Installed in a conduit or sleeve, **if under slab**.
 - 2. Polypropylene Schedule SDR 7.4 and **SDR** 11 meeting NSF14, 61 and 51. Piping shall also meet ASTM F2389 and Plumbing Code Chapter 605. Piping installed in air plenums shall have a Foil Wrap to meet the 25/50 smoke and fire ratings for plenum spaces. Follow manufacturer's instructions for installation and hanger requirements. Verify expansion requirements.

1.5 INSTALLATION

- A. Provide pipe and tube of type, joint type, size and weight (wall thickness or class) indicated for cold water, hot water, and hot water return.

END OF SECTION

PLUMBING**CHAPTER 9: SPECIFICATIONS****SECTION 221119****DOMESTIC WATER PIPING SPECIALITIES****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for vacuum breakers, backflow preventers, plumbing thermostatic mixing valves, strainers, outlet boxes, hose bibbs, wall hydrants, water hammer arresters, trap-seal primer systems, domestic hot water return balancing device (manual), and clothes washer connection.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Vacuum breaker wall hydrants and freeze resistant wall hydrants shall meet ASSE Standard 1019.
- B. Provide backflow prevention devices wherever possible sources of undesirable materials are connected to the potable water system.
- C. The backflow prevention devices shall meet the standards set by the American Society of Sanitary Engineers and the latest edition of the Plumbing Code and air gap standards under American National Standards Institute A112.1.2-1943(1979).
- D. The backflow prevention devices shall be approved for use by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.
- E. Atmospheric vacuum breaker per ANSI/ASTM 1020.
- F. Hose connection vacuum breaker per ASSE 1011 and CSA B64.2.
- G. Reduced pressure vacuum breaker per ASSE 1013, AWWA C511, CSA B64.5.
- H. Pressure type backflow preventer per ANSI/ASSE 1035.
- I. Dual check valve per ANSI/ASSE 1024, CSA B64.6.
- J. Thermostatic mixing valves shall meet the Ohio Plumbing Code and the requirements of ASSE 1017.
- K. Strainers shall meet NSF 61 and ASTM B 62.
- L. Hose bibbs and wall hydrants shall meet ASSE 1019.
- M. Water hammer arresters shall meet ANSI/ASME A112.26.1M and ASSE 1010.

- N. Trap seal primers shall meet ASSE 1018.
- O. Clothes washer connection shall meet ANSI/ASSE 1035.
- P. Emergency mixing valves shall meet ANSI 2.358.1-1998.

1.4 COMPONENTS

- A. Atmospheric vacuum breaker shall have brass body, stainless steel working parts, integral strainer, rubber discs, maximum pressure, maximum 175 psi operation, unions.
- B. Hose connection vacuum breaker shall have ¾ inch female hose inlet connection, ¾ inch male outlet connection, non-removal feature, plain brass finish.
- C. Reduced pressure backflow preventer shall have fused epoxy coated cast iron check valve body and relief valve, replaceable bronze seats, bronze ball check valve test cocks, maximum 175 psi operation, stainless steel internal parts, air gap connection for relief piping to drain.
- D. Pressure type backflow preventer shall have atmospheric vent, all brass construction, in-line continuous operation, maximum 125 psi operation.
- E. Dual check valve shall have straight line poppet type check modules, replaceable seats, brass construction.
- F. Water Hammer Arresters: Shall be the stainless steel bellow type.
- G. Balancing devices shall be bronze with adjustable control.
- H. Domestic hot water anti-scald thermostatic mixing control valve unit shall include swivel action check stops, removable cartridge with strainer, stainless steel piston and liquid fill thermal motor with bellows element mounted out of water. The mixing valve shall control the domestic hot water temperature distributed throughout the building. The mixing valve shall have a thermostatic sensing unit. The mixing valve shall fail to the cold water side. Flow rate shall determine whether a single valve shall be required or a high/low valve with pressure reducing valves is required to provide the correct temperature at the minimum and maximum hot water flow in the building.
- I. Strainers: Shall be bronze threaded, flanged, or soldered.
- J. Outboxes: Shall be recessed with pressure backflow preventer.
- K. Hose bibbs and Wall Hydrants: Shall be recessed or surface with vacuum breakers.
- L. Exterior Wall Hydrants: Shall be non-freeze, self-draining with copper/bronze construction with recessed wall box with loose key.
- M. Clothes Washer Connection Box and Refrigerator Supply: Metal recessed box complete with hot and/or cold water shut-off valves and drain connection.
- N. Emergency thermostatic mixing valve: shall be liquid or bi-metal thermostats, cold water bypass, high limit stop, locked temperature regulator.

PLUMBING**CHAPTER 9: SPECIFICATIONS****1.5 INSTALLATION**

- A. Provide vacuum breakers on all threaded hose bibb connections.
- B. Install reduced pressure principle backflow preventer in irrigation and incoming domestic water service.
- C. Install pressure type vacuum breakers in lines under continuous pressure and at least 12 inches above the highest outlet downstream of the unit.
- D. Provide drain line from reduced pressure backflow preventer discharge outlet; extend to nearest drain.
- E. Units shall be installed in strict accordance with manufacturer's written instructions.
- F. Test each backflow device and submit test data.
- G. Provide thermostatic mixing valves to regulate the hot water temperature to a fixture.
- H. Provide a recessed washer box **at** each domestic clothes washer.
- I. Provide a recessed box to supply water to each refrigerator.
- J. Wall hydrants with hose connections shall be provided in the mechanical room and boiler room.
- K. Provide a water hammer arrestor at each solenoid valves or piece of equipment that has a quick closing type valve. Water hammer arrestor for down-feed risers to be at top of riser. Size shock absorber according to fixture unit count. Provide shock absorbers at each group of water closets and urinals. Shock absorber shall be easily accessible for repair or replacement.
- L. Provide trap seal primers on all floor drains to prevent trap seals from drying up.
- M. Provide emergency thermostatic mixing valve with inlet and outlet thermometers to regulate tempered water to the emergency eye wash and/or showers.

END OF SECTION

SECTION 221123

PLUMBING PUMPS AND ACCESSORIES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for recirculation pumps and water pressure booster pump system.

1.2 SUBMITTALS

- A. Submittals are required and shall include capacities, warranties, product data noting materials, sizes, and dimensions.
- B. Pressure booster system panel shall be UL listed and labeled.

1.3 QUALITY ASSURANCE

- A. Each pump shall be capable of providing the scheduled flow in gpm and head required.
- B. Pump motors shall be high efficiency type.
- C. All three-phase motors shall be protected with phase loss protection. Protection shall be provided by the electrical system, by built-in protection, or by protection built into a variable frequency drive.

1.4 RECIRCULATION PUMPS

- A. The pump shall be all bronze, horizontal in line, oil lubricated, and 125 psi working pressure.
- B. Aquastat with voltage thermostat shall start/stop pump or start/stop by the temperature control system.

1.5 WATER PRESSURE BOOSTER PUMP SYSTEM

- A. The pump system shall consist of two pumps providing a constant water pressure to the piping system. The control system shall provide alternation of the pumps, on/off operation and an alarm system.
- B. Provide expansion pressure tank with a bladder insert for storage capacity required, sized accordingly to meet flow requirements.

1.6 INSTALLATION

- A. Provide the correct gpm, head and voltage required.
 - 1. Inlet piping shall consist of a line size valve and strainer. Outlet piping shall consist of a line size check valve and valve.
 - 2. The pump shall be supported by the inlet and outlet piping.
- B. Pressure Booster System
 - 1. Install the pressure booster pump system according to the manufacturer's recommendations. Provide inlet and outlet piping and valves. Install the expansion tank with size as required.

END OF SECTION

PLUMBING**CHAPTER 9: SPECIFICATIONS****SECTION 221316****SANITARY PIPING SYSTEM****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for sanitary piping and vent, as well as acid waste piping and vent.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.
- B. Obtain list of Owner's chemicals to review against pipe material chemical resistance chart for acid waste piping.

1.4 SANITARY AND VENT PIPING

- A. Sanitary and vent piping materials below slab
 - 1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
 - 2. Cast iron hub and spigot per ASTM A74 and C 564.
- B. Sanitary and vent piping above finish floor.
 - 1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
 - 2. Cast iron no hub and fittings per ASTM.
- C. Sanitary and vent piping above ceiling in plenum space
 - 1. Cast iron no hub and fittings per ASTM.
 - 2. PVC piping is not permitted in a return air plenum or in a chase exposed to the plenum.
- D. Acid waste piping below slab and above slab.
 - 1. Schedule 40 polypropylene per ASTM D4101 and ASTM 3311.
 - 2. Schedule 40 CPVC with solvent joints per ASTM D1784, F493, F441, D3311, and NSF Standard 14.
- E. Acid waste piping in plenum space and chases open to plenums
 - 1. Schedule 40 polyvinylidene fluoride per ASTM D3222 or glass per ASTM C1053-90.
- F. Underground waste and vent piping in kitchen space.
 - 1. Cast iron hub and spigot.

1.5 INSTALLATION

- A. Terminate vent piping through roof, a minimum of 12 inches above the roof.
- B. Location of vent on the roof shall be a minimum of 20 feet from any rooftop or wall louver outside air intake or rooftop HVAC equipment outside air intake.

END OF SECTION

SECTION 221323

GREASE/OIL/ACID INTERCEPTORS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for grease interceptors, solids interceptors, clay traps, and acid waste neutralizing sumps.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Grease interceptors, solid interceptors, and clay traps shall meet the latest edition of PDI Seal of Approval and Ohio Plumbing Code.
- B. Acid sump shall meet Ohio Plumbing Code.

1.4 GREASE INTERCEPTORS

- A. The interceptor shall be a minimum of 500 gallons, constructed of concrete, cast iron, or fiberglass. Verify size with local health authority.
- B. Provide cleanouts at each end of the tank with access up to grade.
- C. Provide access to grade, using a 2'-0" diameter concrete collar with a cast iron frame and lid, 4 inches above finish grade.

1.5 SOLIDS INTERCEPTORS

- A. Interceptors shall be acid resistant coated fabricated steel, heavy duty cover. Provide extension to finish floor as required.

1.6 CLAY TRAPS

- A. Clay trap shall be acid resistant coated fabricated steel, stainless steel mesh screen basket, gasketed cover.

1.7 ACID NEUTRALIZING SUMP

- A. Tank shall be polypropylene or HDPE with bolt down gasketed lid, inlet and outlet piping, vent, flanged connections.
- B. Provide access to grade, using a 5'-0" diameter concrete or corrugated metal collar with a cast iron frame and lid in a 6 inch thick reinforced concrete cover, 4 inches above finish grade.
- C. A single 5 gallon sump can be specified for a single sink requiring acid neutralization.

PLUMBING**CHAPTER 9: SPECIFICATIONS****1.8 GREASE INTERCEPTORS**

- A. Provide a minimum of 2'-0" cover over the tank.
- B. Set tank on a 6 inch bed of compacted granular material. Backfill around the tank to within 12 inches of grade with compacted granular material.
- C. The interceptor shall be located on the exterior of the building, 10'-0" minimum distance from the building.
- D. Do not locate the interceptor in a drive area without providing adequate support over the tank.
- E. Vent the interceptor into the building, up through the roof.

1.9 SOLIDS INTERCEPTORS

- A. Piping invert under the floor to the tank will determine if an extension of the interceptor will be required to meet finish floor elevation.
- B. Provide adequate clearance above the lid for cleaning and basket removal.
- C. The interceptor can be located on or in the floor slab.
- D. Provide access to the lid for cleaning.

1.10 CLAY TRAPS

- A. Provide adequate clearance above the lid for cleaning and basket removal.
- B. If the trap is installed within the casework, set on floor inside the base cabinet. Adjust the outlet piping extending to the wall to meet the invert.
- C. Cleaning of the trap shall not constitute removal of the trap.
- D. Piping connections shall have unions.

1.11 ACID NEUTRALIZING SUMP

- A. Set basin on a 6 inch concrete slab, with the diameter the same as the outside diameter of the collar.
- B. Provide stone around the basin, to just below the lid.
- C. The access lid shall allow the removal of the basin lid. Size accordingly.
- D. The lid and frame shall be set in a 6 inch concrete lid, 12 inches in diameter larger than the collar.
- E. Fill the sump with water and the required amount of limestone chip, with size as recommended by the manufacturer.

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- F. Piping connections to the tank shall be flanged.
- G. The sump shall be located on the exterior of the building, 10'-0" minimum distance from the building.
- H. Do not locate the interceptor in a drive area without providing adequate support over the tank.
- I. Vent the acid sump into the building, up through the roof.

1.12 SINGLE AND NEUTRALIZING SUMP (1 sink)

- A. Provide adequate clearance above the lid for cleaning and basket removal.
- B. If the trap is installed within the casework, set on floor inside the base cabinet. Adjust the outlet piping extending to the wall to meet the invert.
- C. Cleaning of the sump shall not constitute removal of the trap.
- D. Fill sump with water and limestone chips.
- E. Piping connections shall have unions.

END OF SECTION

PLUMBING**CHAPTER 9: SPECIFICATIONS****SECTION 221413****STORM PIPING SYSTEM****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for storm piping.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.

1.4 STORM PIPING

- A. Storm piping materials below slab
 - 1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
 - 2. Cast iron hub and spigot per ASTM A74 and C 564.
- B. Storm piping above finish floor.
 - 1. Schedule 40 PVC with solvent joints per ASTM D2665, D2564, D2665.
 - 2. Cast iron no hub and fittings per ASTM.
- C. Storm piping above ceiling in plenum space
 - 1. Cast iron no hub and fittings per ASTM.
 - 2. PVC piping is not permitted in a return air plenum or in a chase exposed to the plenum.

1.5 INSTALLATION

- A. Connect to roof drains and/or secondary roof drains as required.

END OF SECTION

SECTION 221500

COMPRESSED AIR SYSTEM

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for compressed air piping, compressor, regulator, and air dryer.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Follow manufacturer's requirements for installation.
- B. Comply with ANSI B31 pressure code for pressure piping.

1.4 COMPRESSED AIR PIPING

- A. Compressed air piping shall be galvanized steel, schedule 40, per ASTM A53. Fittings shall be threaded, class 150 per ASME A733 and B1.20.1.

1.5 AIR COMPRESSOR

- A. Provide single or two stage air compressor as required by air pressure requirements.
- B. Provide vibration isolation.
- C. Consider noise factor as to where compressor is placed.
- D. Provide ASME constructed air tank.
- E. Provide air cooled after cooler.
- F. Provide inlet and outlet valves, unions, and flexible connections.

1.6 AIR REGULATOR

- A. Provide quick disconnect hoses.
- B. Provide valve to each drop.

1.7 AIR DRYER

- A. Provide air dryer to match air compressor CFM.
- B. Provide refrigerated unit with high temperature inlet capabilities.
- C. Provide inlet and outlet valves, unions, and flexible connections.

1.8 INSTALLATION

- A. Branch air connection shall connect to the top of the air main.
- B. Provide proper CFM air regulator to match system use.

END OF SECTION

PLUMBING**CHAPTER 9: SPECIFICATIONS****SECTION 223100****DOMESTIC WATER SOFTENER EQUIPMENT****GENERAL GUIDELINES****1.1 SECTION INCLUDES**

- A. Qualitative requirements for the water softener system.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data, noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. The water softener shall meet with the approval of the OEPA when installed in association with a water well.
- B. The softener shall be sized to meet the requirements concerning the amount of water to be softened between regenerations based on the grains hardness.

1.4 WATER SOFTENER SYSTEM

- A. The tank shall be fiberglass, rated for 100 psi working pressure.
- B. The backwash distributor shall be of the radial hub design.
- C. The control valve shall initiate regeneration, backwash, rinse, brine draw and brine tank refill. Initiation of the regeneration sequence shall be by a volumetric water meter coupled to a timer control, preset at a specific gallons used. The timer will not let the regeneration begin until a preset time.
- D. The mineral tank will be provided with a correct amount of resin, having a minimum exchange rate of 30,000 grains when regenerated with 15 lbs of salt per cubic foot.
- E. A hardness test kit shall be included with the softener.

1.5 INSTALLATION

- A. Provide and install the softener complete with inlet and outlet valves and unions, and bypass piping around the inlet and outlet connections.
- B. Install sampling tees/valves in inlet and outlet piping to the mineral tank for testing the water.

END OF SECTION

SECTION 223200

DOMESTIC WATER FILTRATION EQUIPMENT

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Quantitative requirements for the iron filter system.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. The iron filter system shall meet with the approval of the OEPA when used in conjunction with a water well.
- B. The iron filter shall be sized to meet the requirements concerning the amount of water to be filtered between regenerations based on the iron content.
- C. The iron filter system shall remove all ferrous, ferric or bacterial iron from the incoming water supply without the use of chemicals.

1.4 IRON FILTER SYSTEM

- A. The main service valve shall be diaphragm operated. No raw water bypass is allowed. If controller maintenance is required, the system will remain in service.
- B. An automatic flow controller shall be provided to maintain backwash and rinse rates over variable operating pressures.
- C. A factory assembled cycle controller shall incorporate an adjustable time switch with multi-ported pilot valve to control all steps of automatic regeneration with provisions for manual regeneration.
- D. The multi-ported pilot control valve shall automatically pressure activate the main operating service/backwash valves through the steps of regeneration and return to service. In the event of a power failure, a complete regeneration can be performed by manual operation of the pilot valve.
- E. The electrical time clock shall be adjustable to initiate regeneration at any time of the day and any number of days in a minimum of a 12 day period.
- F. The mineral shall require no chemical regeneration. Periodic regeneration shall only be required.
- G. The air induction system to introduce oxygen into the water for the oxidation process shall be of the venturi type. Forced air injection is not acceptable.

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- H. Attrition loss of mineral shall not exceed 3 to 5 percent per year.
- I. The distribution shall be factory installed with a washed quartz gravel bed.

1.5 INSTALLATION

- A. Install all equipment and associated piping and valves.
- B. Install sampling tees/valves in the inlet and outlet piping to the mineral tank for testing the water.
- C. Provide bypass piping around the inlet and outlet connections.

END OF SECTION

SECTION 223400

DOMESTIC WATER *HEATING SYSTEMS*GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for instantaneous gas fired water heaters, hot water storage tanks, electric booster heater, tank type under fired heaters, and combination power vented heaters installed in a common tank.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, and dimensions.

1.3 QUALITY ASSURANCE

- A. Gas units shall meet CSA requirements.
- B. Units must meet ASHRAE 90.1, ADDM 90 1 b.
- C. The gas heater shall be ASME certified for 125 psi operation and National Board listed.
- D. Heater shall be rated at a minimum of 82 percent thermal efficiency.

1.4 WARRANTY

- A. Water heater heat exchanger - 5 year.
- B. Storage tank - 5 year limited.
- C. Booster heater - 3 year limited.
- D. Combination heat exchanger/storage tank – 5 year.
- E. Gas-fired units shall have sealed combustion.

1.5 INSTANTANEOUS GAS FIRED WATER HEATER

- A. Two pass copper fin tubes.
- B. Cast iron headers.
- C. Built-in draft diverter.
- D. Insulated jacket.
- E. ASME temperature and pressure relief valves.
- F. Electronic controls.

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- G. Integral bronze circulation pump.
- H. Flow switch.
- I. Electronic ignition.
- J. Cupro nickel heat exchanger.

1.6 HOT WATER STORAGE TANKS

- A. Vertical storage tank.
- B. Glass lining.
- C. ASME constructed.
- D. Insulated.
- E. 150 psi work pressure.
- D. Inlet and outlet piping.

1.7 COMBINATION 2 HEATERS AND STORAGE TANK

- A. Vertical storage tank.
- B. Polymer-lined tank.
- C. ASME constructed.
- D. Insulated.
- E. 150 psi working pressure.
- F. Inlet and outlet piping.
- G. Submerged combustion heat exchangers.
- H. Electronic flame safeguard.

1.8 ELECTRIC BOOSTER HEATERS

- A. The tank construction shall have a 150 psi working pressure. The interior of the tank shall be glass lined. The jacket surrounding the tank shall be stainless steel front with baked enamel sides and back with 6 inch adjustable legs
- B. The control circuit shall consist of a pilot switch with indicator light, built in thermostat and hi-limit, and magnetic contactors.
- C. Heater elements shall be copper-sheathed, furnished with 4 bolt flange for disassembly without removing the booster head.

- D. Provide ASME temperature and pressure relief valve, temperature and pressure gauge.

1.9 TANK TYPE UNDER FIRED HEATER

- A. Multi-flue design.
- B. Working pressure - 150 psi.
- C. Glass lined.
- D. ASME constructed.
- E. Insulated with minimum 2 inch foam insulation.
- F. Heavy jacket.
- G. Vent damper control.
- H. Spark ignition.

1.10 **HEAT MAINTENANCE CABLE**

- A. *Wrap piping with self-regulating cable to maintain temperature in piping.***
- B. *Provide controller for adjusting temperature and night and weekend set back.***
- C. *Provide cable temperature to match intended service.***
- D. *The cable shall meet a 10-year limited warranty period.***
- E. *Install with correct thickness of insulation.***
- F. *Follow manufacturer's installation instructions.***

1.11 **INSTANTANEOUS ELECTRIC WATER HEATER**

- A. *Use heater for one or multiple sinks and lavatories.***
- B. *Install heater(s) above ceiling or away from student access.***
- C. *Size per GPM requirements.***
- D. *Verify water quality concerning excessive buildup of minerals on interior heating surfaces.***
- E. *Provide thermostatic mixing valve if required.***

1.12 **INSTALLATION**

- A. The heater shall be designed to produce the required gallons per hour at the temperature required based on the Btu input.

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- B. Where two or more heaters are shown, pipe for equal flow through the heaters. Provide unions and shutoff valves at each heater connection.
- C. Follow manufacturer's recommendations for installation, space requirements, and piping sizing.
- D. Provide temperature and pressure gauge in the upper 1/3 portion of the tank.
- E. The booster heater shall boost the 140 degree water to 180 degrees for the dishwasher final rinse.
- E. Time of day control shall be provided to disable domestic water heater system when building is unoccupied.

END OF SECTION

SECTION 224000

PLUMBING FIXTURES

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for plumbing fixtures and plumbing specialties.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes and dimensions.

1.3 QUALITY ASSURANCE

- A. Meet requirements of the current Plumbing Code.
- B. Water closets shall meet ANSI A112.19.1M. Trim shall meet ANSI A112.19.5.
- C. Urinal shall meet ANSI 2124.4, ASME A112.19.2M, and ASME A112.19.6. Trim shall meet ANSI A112.19.5. The optional waterless urinal shall meet ASTM A112.19.2M and A-117.1 and 1APMO 1 GC 161-2000 and ANSI Z124.9-94.
- D. Lavatories shall meet ANSI A112.19.1M and Z 124.3.
- E. Drinking water coolers shall meet ANSI A112.19.2M.
- F. Sink shall meet ANSI A112.19.1M and A112.19.2M.
- G. Sinks shall meet ANSI A112.19.1M and A112.19.2M.
- H. All fixtures shall meet the governmental regulations for low-flow operation.
- I. Drinking fountains shall meet ASME A112.19.1, A112.19.2, or A112.19.9, and ANSI 117.1.
- J. Drinking water coolers shall meet ARI 1010 and ANSI 117.1.

1.4 PLUMBING FIXTURES AND SPECIALTIES

- A. Water closets shall be wall mounted, white vitreous china with white seat and flush valve. Water closets for kindergarten students can be floor mounted. Automatic/battery or direct wired flush valve is optional.
- B. Urinals shall be white vitreous china with flush valve. Automatic/battery or direct wired flush valve is optional. An option to the urinal with flush valve shall be the waterless type vitreous china urinal with a removable ABS plastic trap.

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- C. Lavatories shall be wall hung, white vitreous china with hot and cold blade handle faucet on 4 inch centers. An option to the lever handles shall include commercial grade single lever faucets with a ceramic disc. An option to the lever handle faucet shall be a battery or hardwired infrared faucet.
- D. Showers shall be pressure balancing, single lever with vandal resistant shower head.
- E. Drinking water coolers and fountains shall be wall mounted and shall meet ADA requirements.
- F. Sinks shall be 302 or 304 stainless steel, single, double, or triple compartment with faucet with hot and cold blade handles and swing spout. An option to the lever handles shall include commercial grade single lever faucets with a ceramic disc.
- G. Science lab sinks shall be acid resistant for high school applications. Provide acid resistant strainer and tailpiece. Science casework contractor shall provide sink and trim.
- H. Service sinks shall be floor mounted molded stone, 10 A high, 24" x 24", 3" outlet and a wall faucet with pail hook and vacuum breaker.
- I. Washfountains shall be terrazzo or stainless steel or modified acrylic (complying with ANSI 2124.3 and ANSI 2124.6) with infrared sensing for water activation, ADA accessible, and floor or wall mounted.
- J. Emergency eye wash shall be wall mounted, ADA accessible and set at ADA height. Also provide supply from thermostatic mixing valve per ANSI Z358.1, latest edition.
- K. Emergency shower shall have a 10 inch diameter shower head, vertical or horizontal supply and have a ADA accessible handle. Also provide supply from thermostatic mixing valve per ANSI Z358.1, latest edition.

1.5 PLUMBING FIXTURES AND SPECIALTIES (cont.)

- O. Provide a stainless steel, wall mounted drinking fountain for exterior installations. Unit shall be freezeproof, have push button activation and be ADA accessible. Mount to the exterior building wall.

1.6 INSTALLATION

- A. Lavatories, water closets, and urinals shall have carriers attached to the floor.
- B. All fixtures and trim so noted for handicap installation shall meet ADA requirements.
- C. Clay trap installation for an ADA sink shall not interfere with the space requirements under the sink. Locate next to the sink casework.
- D. The power transformer for the washfountain shall be a plug-in type located within the housing of the washfountain, and plugged into a duplex receptacle.

END OF SECTION

SECTION 226313

GAS PIPING SYSTEMS

GENERAL GUIDELINES

1.1 SECTION INCLUDES

- A. Qualitative requirements for natural gas piping, gas valves, and gas regulators.

1.2 SUBMITTALS

- A. Submittals are required and shall include product data noting materials, sizes, performance ratings, and installation instructions.

1.3 QUALITY ASSURANCE

- A. Conformance to National Fuel Gas Code.
- B. Material and installation requirements shall follow NFPA 54, state and local gas company codes.
- C. Conformance to ANSI B31.
- D. Gas regulators shall be AGA rated.

1.4 GAS PIPING

- A. Gas piping shall be schedule 40 black steel piping.
- B. Gas piping installed external to the building from the service main to the gas meter shall be as per the gas company requirements.
- C. Final connection from the building gas piping system to the gas turret in the science room can be corrugated stainless steel tubing per NFPA 54, state and local gas company requirements.

1.5 GAS VALVES

- A. Gas valves 2 inches and smaller shall be full port all brass screwed gas service stops with lever handles and check.
 - 1. (option) Gas valves 2" and smaller may be ¼ turn ball valves.
- B. Gas valves 2-1/2 inches and larger shall be semi-steel, straightway flanged, 125 pounds swp, square head wrench operated, lubricated plug valve.
- C. Kitchen Hood – Spring loaded (N.C.) gas valve or manual reset electric solenoid valve.
- D. In the science and art rooms, provide the following:
 - 1. A manual reset, solenoid operated shut-off valve with 120v operation with remote push button operation and fire alarm system activation.

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1.6 GAS REGULATORS

- A. Gas regulators shall be die cast aluminum alloy diaphragm, external vent connection, interchangeable brass orifices, cast iron body, Buna-N with nylon fabric insert diaphragm.

1.7 INSTALLATION

- A. Unions and valves are not permitted in the gas piping in a return air plenum.
- B. Piping 1-1/2 inches and smaller shall have threaded joints.
- C. Piping 2 inches and larger shall have welded joints.
- D. All regulators shall be separately vented full size to the exterior, with a turndown elbow and insect screen. Vent outlet shall not terminate next to a combustion or fresh air intake.
- E. Provide a valve, union, and dirt leg at connection to each appliance. Lubricate all valves before putting the valves into service.
- F. Provide 1/2 inch elastomeric insulation around all piping in walls and through floors.
- G. Test all gas piping per NFPA 54.
- H. Gas piping shall be accessible.
- I. Science room auto shut-off valves can be located in teacher's demo unit, under sink, or exposed in storage room.

END OF SECTION