

DIVISION 10

PLUMBING

SECTION 1001 INDEX OF SECTIONS

Section Number and Title	Page	Section Number and Title	Page
<del>1002 General Requirements</del>	<del>10-1</del>	<del>1006 Interior Plumbing</del>	<del>10-2</del>
<del>1003 Water Supply and Sewage Disposal</del>	<del>10-1</del>	<del>1007 Energy Efficiency</del>	<del>10-5</del>
<del>1004 Water Service Design</del>	<del>10-2</del>	<del>1008 Fixtures</del>	<del>10-5</del>
<del>1005 Exterior Building Sewer Design</del>	<del>10-2</del>	<del>1009 Record Drawings</del>	<del>10-7</del>
<del>1002 General Requirements</del>	<del>10-1</del>	<del>1005 Gas Piping</del>	<del>10-2</del>
<del>1003 Sewage Disposal</del>	<del>10-1</del>	<del>1006 Fixtures</del>	<del>10-5</del>
<del>1004 Interior Plumbing</del>	<del>10-2</del>		

SECTION 1002 GENERAL REQUIREMENTS

~~1002.1~~ Other regulatory authorities may require permits or have requirements in addition to the ICC Codes and the Guide. Please refer to Section 110 for additional information and guidance. ~~The plumbing system shall be designed by a professional engineer, experienced in plumbing design, and registered in South Carolina; the engineer's seal shall appear on each drawing for that portion of work for which he bears the responsibility for design.~~

~~1002.2~~ The plumbing design shall cover all potable water supply, wastewater, sewage disposal, storm drainage, (e.g. roof run-off), gas supply, compressed air, and other related systems.

~~1002.3~~ The design shall conform with the current codes as referenced in Division 1 of this Guide and as modified herein.

SECTION 1003 WATER SUPPLY AND SEWAGE DISPOSAL

~~1003.1~~ The engineer shall ascertain, before commencing his design, as to the type of water supply and sewage disposal systems that DHEC will approve for the particular project, and with the school district, shall secure the appropriate DHEC permits.

~~1003.2~~ Portable Water Supply

~~1003.2.1~~ Water supply shall be from a public system, if it is accessible and technically and economically feasible.

~~1003.2.2~~ Water supply shall be from an on-site well, only after public water supply is found to be not feasible.

~~1003.2.2.1~~ Well water shall meet all bacteriological, physical, and chemical requirements as set forth in the DHEC publication, *State Primary Drinking Water Standards*, and plans and specifications shall thoroughly cover the proposed installation in accordance with these regulations.

~~1003.2.2.2~~ A well system shall provide water in minimum amounts as follows: school building without cafeteria or gym, 10 Gallons Per Day/person; with cafeteria and gym, 20 GPD/person.

~~1003.3~~ Sewage Disposal

~~1003.3.1~~ All school sewage effluent shall discharge into a municipal or other public sewage system, or to an alternate system approved by DHEC. If a municipal or public system is not available, the engineer shall obtain approval from DHEC for any alternate system.

~~1003.13.2~~ All waste from kitchen areas except food grinder/garbage pulpers shall discharge through a grease trap as approved by the local wastewater authority. ~~except where food grinders are installed, in which case waste from these shall not pass through the grease trap but will discharge directly to a building sewer or be handled by other means.~~

~~1003.23.3~~ Food grinders/garbage pulpers shall not be installed in facilities served by a septic system in accordance with SCDHEC regulations.

#### ~~SECTION 1004~~ WATER SERVICE DESIGN

~~1004.1~~ The water system shall be designed on the minimum street pressure or minimum pressure at the pneumatic well system pressure tank.

#### ~~SECTION 1005~~ EXTERIOR BUILDING SEWER DESIGN

~~1005.1~~ All exterior building sewer design shall be designed in accordance with the International Plumbing Code and DHEC standards.

#### ~~SECTION 10046~~ INTERIOR PLUMBING

~~1004.1~~ Hot water may be omitted from student group toilets. Hot water is required at all other lavatories and other fixtures in accordance with the plumbing code.

~~1006.1~~ All interior plumbing (within 10 feet of building line) shall be designed in accordance with the International Plumbing Code. Piping shall be hung and braced in compliance with the seismic requirements of the International Building Code.

#### ~~1006.2~~ Water Piping

##### ~~1006.2.1~~ Water Piping Materials

~~1006.2.2~~ Water piping below floor slab on grade or below ground shall be Type "K" hard drawn copper tubing with wrought copper fittings with "lead free" solder. Joints below slab shall be silver soldered and their use kept to a minimum.

~~1006.2.3~~ Water piping within the building (above slab on grade or above ground) shall be Type "L" hard drawn copper tubing with wrought copper fittings, solder shall be "lead free," for 4" size and smaller. For 5" and larger, Schedule 40 galvanized steel pipe with galvanized malleable iron fittings may be used in lieu of copper. Ductile iron is acceptable for piping 3" and larger. Note that ductile iron pipe shall be cement lined as per IPC.

~~1006.2.4~~ A main cut-off control shall be located under each science instructor's table for master control of water to the sinks used by students in that room. Remote valve, electrically held open, with switch at the instructor's desk, is acceptable in lieu of valve itself at instructor's desk. Provide access to remote valve.

~~1006.2.5~~ Exterior hose bibbs shall be the anti-freeze type with backflow preventer, and provided at strategic locations, and at approximately 100 feet intervals around the perimeter of the building.

~~1006.2.6~~ **Water Pipe Pressure Test:** All water piping shall be proven tight under 150 psi hydrostatic pressure for two hours without loss of pressure before being covered. Blank off

Comment [t1]: Move information to best practice

Comment [t2]: Create O&M best practice with similar info?

equipment not designed for this test. All joints shall be proven tight.

~~1006.2.7—Laboratory Water Test: The entire water system, including hot water lines, shall be filled with a solution containing 50 ppm of available chlorine and allowed to stand 24 hours before flushing. At the end of the 24-hour retention period, the treated water shall contain no less than 24 mg/l chlorine throughout the system. After the chlorine has been completely flushed from the system, a DHEC approved testing agency shall take two samples of water on consecutive days and make analysis to determine efficiency of the disinfection process. Test results shall be sent to the engineer, architect, and plumbing contractor. Should any reports be unfavorable, the entire treatment and sampling process shall be repeated.~~

~~1006.2.8—All piping which penetrates a fire-rated wall shall be protected to the rating of the wall by a UL approved (or other required testing agency) assembly noted and detailed on the construction documents.~~

~~1006.2.9—All hydrants, and fire service lines including the piping serving hydrants shall be in accordance with NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.~~

~~1006.2.10—The contractor shall submit at job completion, the "Contractors Material and Test Certificate" found in figure A-9 2.1 of NFPA 24.~~

### ~~1006.3—Hot Water Systems~~

~~1006.3.1—Hot water supply shall only be required at the following:~~

~~1006.3.1.1—All kitchen facilities, as required by DHEC Regulation 61-25 Food Service Establishments, including hand-washing lavatories, hose bibb, trash can wash facility, etc.~~

~~1006.3.1.2—Lavatories, sinks, and showers in health rooms~~

~~1006.3.1.3—Sink serving the "snack" area of kindergartens (not the student-used sink, however)~~

~~1006.3.1.4—Hand-washing facilities in industrial arts, prevocational and vocational shops, and sink in library workrooms~~

~~1006.3.1.5—Photography darkrooms~~

~~1006.3.1.6—Custodial areas and janitors' closets~~

~~1006.3.1.7—Home economics facilities~~

~~1006.3.1.8—Health and cosmetology teaching facilities~~

~~1006.3.1.9—Gym dressing room showers and lavatories~~

~~1006.3.1.10—Art room lavatories~~

~~1006.3.1.11—Media center work room lavatories~~

~~1006.3.1.12—Science rooms in grades 7-12 at acid-resistant sink at instructor's demo table.~~

### ~~1006.3.2—Cafeteria/Kitchen Hot Water System~~

~~1006.3.2.1—A separate and independent hot water generating and distribution system for domestic use shall be provided for new school kitchens and also existing kitchens when~~

~~present domestic hot water heating systems are replaced. These systems are to provide hot water for kitchen areas only, in accordance with DHEC requirements.~~

~~1006.3.2.2 — An exception to the requirement for an independent hot water system may be made, provided a thermal storage system is designed and engineered as a source of heat of sufficient capacity to provide all hot water demands simultaneously for the entire building. The use of such a system shall require prior approval from DHEC.~~

~~1006.3.2.3 — A mixing faucet for hot and cold water shall be installed in the trash can wash area of kitchens.~~

~~1006.3.2.4 At least one hose bibb with hot and cold water mixing valve and with vacuum breaker shall be installed in each kitchen area, or a threaded faucet with a vacuum breaker on the mixing valve on a service sink or floor receptor fitting will be acceptable, if conveniently located.~~

#### **1006.4 — Soil, Waste, Vent and Roof Drain Systems**

~~1006.4.1 — Under floor soil, waste, and vent piping shall be PVC or service weight cast iron bell and spigot pipe with caulked or compression gasket joints.~~

~~1006.4.2. — Soil, waste, vent and roof drainage piping within the building above ground shall be cast iron bell and spigot with caulked joints or cast iron “no hub” pipe and fittings, except that, soil, waste, vent and roof drainage lines may be galvanized steel in lieu of cast iron. If a ceiling plenum is used as a return air plenum, piping materials shall meet flame, and smoke spread rating required by the IMC.~~

~~1006.4.3 — Corrosion resistant waste and vent piping serving science areas in grades 6-12 shall be extra heavy silicon iron, fire resistive polypropylene, Type 316 stainless steel, or borosilicate glass pipe and fittings, and shall extend to a point where line is washed by heavy flow of water. Mechanical joint piping shall not be used below floor slab on grade or below ground.~~

~~1006.4.4 — **Drainage Pipe Testing:** Piping of soil, waste, vent, and roof drainage and venting systems shall be tested with not less than a 10-foot head of water before being covered. Each opening shall be filled with water. Water shall be kept in system for at least 15 minutes before inspection starts and system shall then be proven tight at all points. Perform smoke test if required by engineer or local authority.~~

~~1004.26.4.5 Rain water, and/or grey water systems shall not be acceptable for use within buildings. requires prior approval by the OSF with demonstration of adequate protection to ensure the health of the building occupants to include, but not limited to pipe identification.~~

#### **1006.5 — Floor Drains**

~~1006.5.1 — Floor drains shall be installed in conjunction with each internal hose bibb in all group toilets, gym dressing rooms, and kitchens; also in other areas normally washed down or subject to receiving overflow water from equipment, such as condensation water, pressure relief water or steam, dishwashers and other indirect waste, drainage from backflow preventers, equipment rooms, etc.~~

~~1006.5.2 — Floor drains in kitchen areas shall be provided adjacent to and outside the walk in cooler door, at the vegetable peeler, and at other pertinent locations, with floor graded to drains.~~

~~1006.5.3 — Floor drains in kitchen can wash areas shall be installed in conjunction with the mixing faucet and shall be located in the area immediately below the faucet. Drain line from~~

Formatted: Font: Bold, Font color: Black

Comment [t3]: O&M best practice?

the floor drain in the can wash area shall be 4" minimum size. Floor slope to drain shall be 1/4" per foot minimum and 5/8" per foot maximum. Discharge from this area shall drain into an approved grease trap.

#### **1006.6—Gas Piping**

~~1006.6.1—Gas piping shall be installed in accordance with the International Gas Code. Piping shall be installed as indicated below or as otherwise permitted by the International Gas Code, the IFC, NFPA 54, and NFPA 58.~~

~~1006.6.2—Gas piping within the building above ground or above slab on grade may be installed exposed, or in furred space or pipe chase, or in area between floors or in attic area (see exceptions below).~~

~~1006.6.3—A main cut off control shall be located under each science instructor's table (where gas is used) for master control of gas to all the outlets used by students in that room. The valve shall be a gas rated 1/4 turn ball valve with a permanent handle. An optional, remote, electrically held open valve, with switch at instructor's desk and also controlled by the fire alarm system, can be used in addition to the main valve. The electric valve shall be a normally closed manual reset type.~~

**Comment [t4]:** Information included in classroom best practice

#### **SECTION 1005 GAS PIPING**

1005.1 Science laboratories containing piped natural gas systems are required to have shut off valves and isolation provisions in accordance with NFPA 45.

1005.1.1 A manual shutoff valve at the point of use shall be located away from the potential hazard and within 6 feet of the point of use.

1005.1.2 An emergency shutoff device in an accessible location at the exit shall be provided in addition to the manual point-of-use valve.

~~1006.6.4—A manual cut off valve shall be installed on the supply side of an automatic cut-off valve for kitchen fire suppression system. The valve shall have a permanent handle.~~

~~1006.6.5—Gas Pipe Testing:—Pipe and conduit testing shall be done before piping or conduit is concealed in furred or otherwise inaccessible spaces. Testing shall be done in accordance with the International Fuel Gas Code.~~

~~1006.6.6—Gas Piping Conduits:—All gas piping located below ground floor slab shall be encased in vented gas conduit pipe installed in accordance with the International Fuel Gas Code.~~

#### **SECTION 1007 ENERGY EFFICIENCY**

~~1007.1—Submit work sheets to demonstrate compliance with ASHRAE 90.1.~~

~~1007.2—Domestic hot water shall be stored at not less than 140 degrees and equipped with a mixing valve. Higher temperatures may be used in the following cases:~~

~~1007.2.1—Where required by DHEC, in which case the higher temperature systems shall be separate from other hot water systems.~~

~~1007.2.2—Where high temperature thermal storage systems are designed for off-peak electrical heating or where solar heating has sufficient energy storage capabilities to be energy efficient and is sufficiently insulated.~~

## **SECTION 1008—FIXTURES**

### **1008.1—General**

**1008.1.1**—The engineer's attention is called to Sections 3 of this regulation where various fixtures and overall fixture requirements are mentioned.

**1008.1.2**—Heights of fixtures and accessories shall be in accordance with IBC, the latest edition of ANSI A117.1 and the ADA as applicable, under which heights can be adjusted for children.

**1008.1.3**—Resistance to vandalism and abuse should be uppermost in the engineer's mind when specifying fixtures and their methods of installation.

### **1008.2—Fixtures**

**1008.2.1**—The following fixture list is intended to encompass the fixtures in common use throughout the school, but does not include special fixtures in such areas as science labs and kitchens, for example.

**1008.2.1.1—Water Closets:** Shall be standard flush valve, elongated type with open front seats, except that round front models shall be used in kindergarten toilet areas and in individual classroom toilets of grades 1 and 2. Tank type water closets shall be allowed only where water pressure is insufficient for flush valves.

**1008.2.1.2—Urinals:** Shall be standard types, wall hung, and elongated where placed to serve people with physical disabilities. Note from Section 3 that trough urinals shall not be permitted except at football stadiums.

**1008.2.1.3—Lavatories:** Shall be standard acid-resisting enameled cast iron, vitreous china, or 18-gauge (minimum) stainless steel. Lavatories should project no more than 18" from wall. Precast or stainless steel wash fountains shall be acceptable in lieu of lavatories. Drilling shall match faucet provided. Cock hole covers are not acceptable.

**1008.2.1.4—Sinks:** Shall be standard acid-resisting enameled cast iron or 18-gauge (minimum) stainless steel. All counter sinks in the classrooms of elementary schools shall be "classroom" type with gooseneck fitting and drinking bubbler on other (except that in kindergartens, a single kitchen type sink with swing faucet should be used if a second sink for the food preparation area is provided; see Division 3). A lever arm wrist control fitting should be specified for the counter top sink in health rooms. Drilling shall match faucet provided. Cock hole covers are not acceptable.

**1008.3**—Special attention shall be given to the method of mounting all fixtures with regard to resistance to vandalism or abuse.

**1008.4—Water Closets:** All wall hung water closets shall be mounted on heavy duty concealed carriers.

**1008.4.1—Lavatories:** All wall mounted lavatories or sinks shall be either mounted on heavy duty concealed carriers, heavy duty wall mounting brackets with through wall bolts and back plates, or heavy duty brackets mounted directly to concrete filled block work with structural fasteners such as "red head" type fastened into the concrete fill. Standard lightweight pressed steel mountings with screws and ordinary shields into the surface of the block shall not be permitted. Where a countertop lavatory design is contemplated in student toilet areas, the counter should be strong enough to resist one or more students sitting on it.

~~1008.4.2—Urinals: Heavy duty mounting comparable with that designated for lavatories shall be provided.~~

~~1008.4.3—Water Coolers: Mounting shall be similar to that designated for lavatories. Coolers should be located and walls prepared for mounting during construction operations. Plastic bubblers shall not be acceptable. See Section 304.13.8 for additional water-cooler fixture requirements.~~

Draft July 11

**SECTION 1006 FIXTURES**

**1006.18.5 Recommended Working Heights for Fixtures:** Mounting heights and configurations for fixtures shall comply with the applicable codes including ANSI 117.1. The requirements for Water Closets and Toilet Compartments for Children’s Use shall apply to fixtures intended to serve children in first grade and younger. Urinals, if used in these rooms, shall be mounted with the top of the front rim at the same height as required for the water closet. Please refer to the section discussing toilet facilities in the “Best Practices for Instructional Space” for additional recommendations and guidance.

~~Mounting heights and configurations for fixtures shall comply with the applicable codes including ANSI 117.1. The requirements for Water Closets and Toilet Compartments for Children’s Use shall apply to fixtures intended to serve children in first grade and younger. Urinals, if used in these rooms, shall be mounted with the top of the front rim at the same height as required for the water closet. Please refer to the section discussing toilet facilities in the “Best Practices for Instructional Space” for additional recommendations and guidance.~~

**Grade Structure**

Item	Pre-K and Kindergarten	1-3	4-6	7-12 & others
Elongated Water Closet	N/A 14" 15"	( 1 ) 1 5 "	1 5 "	15"
Urinal	N/A	( 1 ) "	1 5 "	24" others
Lavatory or Sink and Work Counter	25"	2 7 "	3 0 "	36"
Drinking Fountain / Water Cooler	(4)	2 7 "	3 0 "	33"

**Notes:**

1. If grade 3 will be served by a group toilet, the fixture height should be the same as the grade 4-6 category.

2. If the grade structures for 4-6 and 7-12 should overlap each other in the same school, consult the OSF.

3. In elementary schools, the height of a drinking fountain/water cooler should be selected based on its location in the building and the age group served. In all cases, fountains/coolers shall be set at 36" in the main public area of the building to serve adults and people with physical disabilities.

4. In elementary schools, the dimensions of the “bubblers” on counter sinks will be determined by the required counter height.

~~5. See Division 4 for any accessibility issues.~~

#### ~~SECTION 1009—RECORD DRAWINGS~~

~~1009.1—The applicable engineer shall specify that during construction operations the plumbing contractor shall faithfully make a record of all approved changes from the contract drawings, including accurate dimensions where applicable, and shall also record accurate dimensions locating all below-grade outside plumbing utilities (whether changed or not) with reference to permanent above-grade objects.~~

~~1009.2—The engineer shall also specify that at completion of the work all such changes shall be recorded neatly with red ink by the plumbing contractor on an unused set of the plumbing contract drawings supplied by the architect. The red-line changes shall be reviewed by the engineer and the completed record prints returned to the architect.~~

~~1009.3—The applicable engineer shall contact DHEC for requirements of submission of record drawings where changes have been made from the original design.~~

DIVISION 11

MECHANICAL

SECTION 1101 INDEX OF SECTIONS

Section Number and Title	Page	Section Number and Title	Page
1102 General Requirements	11-1	1108 Fire Sprinkler Systems, Standpipes and Fire Hydrants	11-3
1103 Systems	11-1	1109 Kitchens	11-4
1104 Equipment	11-1	1110 Energy Efficiency	11-5
1105 Ventilation	11-2	1111 Record Drawings	11-5
1106 Materials and Installation	11-2		
1107 Fire and Smoke Systems	11-2		

SECTION 1102 GENERAL REQUIREMENTS

~~1102.1 Access for fire dampers and other equipment requiring inspection and maintenance shall accepted if installed in accordance with manufacturer's instructions and applicable codes and standards and it is physically possible to touch, manipulate or replace the required item. The mechanical systems shall be designed by a professional engineer, experienced in mechanical design and registered in South Carolina. The engineer's seal shall appear on each drawing for that portion of work for which he bears the responsibility for design.~~

~~1102.2 The mechanical design shall include all heating, air conditioning, ventilation, sprinkler systems, kitchen exhaust and make-up air system with associated extinguishing system and hoods, and other related systems.~~

~~1102.2.1 Sprinkler systems shall be either part of mechanical design or separated into a fire protection design section.~~

~~1102.3 In the design of a new building where future additions are definitely contemplated, the capacities of any equipment allowing for such additions shall be clearly noted on the drawings, along with any other pertinent information, such as points of future connections, etc.~~

~~1102.4 The design shall conform with the current codes as referenced in Division 1 of this Guide and as modified herein.~~

SECTION 1103 SYSTEMS

~~1103.1 Separate heating/cooling systems shall be provided for the administrative area of the school so as to provide economical operation during times when only this part of the building is in use.~~

~~1103.2 Provisions shall be made to prevent sound transmission through any common duct system serving more than one area, such as adjoining toilet rooms.~~

Comment [dcc5]: Best Practice discussion about admin and IT areas

Comment [dcc6]: Best Practices – add information about noise

SECTION 1104 EQUIPMENT

~~1104.1 Rooftop HVAC equipment shall have special attention given to:~~

~~1104.1.1 The prevention of water leaks either through the manufacturer's equipment, the duct installed by the contractor, the equipment supports, or due to routine equipment maintenance~~

~~1104.1.2— Structural and seismic coordination for units of different manufacturers~~

~~1104.1.3— Electrical wiring requirements of units of different manufacturers~~

~~1104.2— Locate and design all mechanical components and systems to allow for proper access for maintenance.~~

## SECTION 1105 VENTILATION

~~1105.1— Minimum ventilation shall be in accordance with the ASHRAE Standards as published at time of submission of architect's design development drawings.~~

~~1105.2— A separate exhaust fan shall be provided for each chemistry or physical science laboratory and be of such capacity to be able to quickly remove objectionable odors. A fan is also desirable in a biology lab, but not needed as critically as in the former two areas.~~

~~1105.3— Separate mechanical ventilation systems shall be provided for all gymnasium-dressing rooms to minimize objectionable odors. Such systems shall be separate from any system installed primarily for comfort.~~

~~1105.4— Mechanical ventilation shall be provided for all toilet rooms, janitor's closets, chemical storage rooms, and for storage rooms where odors could become a problem.~~

~~1105.5— Mechanical ventilation in addition to heating and cooling shall be provided in all bookrooms that are used for summer storage of textbooks, and kitchen dry storage rooms.~~

~~1105.6— Food storage rooms shall be provided with mechanical ventilation in addition to normal heating and cooling.~~

## SECTION 1106 MATERIALS AND INSTALLATION

~~1106.1— Ductwork should not be installed exposed to the weather, except in special limited applications, as approved by the OSF.~~

~~1106.2— Ductwork shall be galvanized steel constructed to the requirements of SMACNA, as a minimum. Lined duct usage shall be kept to a minimum. Where used, the interior surface shall be smooth and cleanable and treated with an EPA approved biocide to resist fungal/bacterial growth. Duct board is prohibited. Flexible duct meeting SMACNA requirements may be used for supply ductwork, provided it is not more than six feet long and terminates at a diffuser.~~

~~1106.3— Ductwork insulation joints, tears, punctures and other penetrations shall be sealed with mastic. Duct tape by itself is not permissible.~~

~~1106.4— Condensate shall be piped to drain or drywell and not dumped outside or on roof (where practical).~~

Comment [dcc7]: O&M best practice

~~1106.5— Plastic pipe shall not be used within the building except for sleeves in exterior walls and incidental transitional couplings and fittings.~~

## SECTION 1107 FIRE AND SMOKE SYSTEMS

~~1107.1— Where ductwork penetrates firewalls it shall be installed per UL tested assembly as shown on construction drawings and caulked to prevent passage of smoke. Access doors shall be provided of sufficient size to allow for maintenance.~~

**SECTION 1108 FIRE SPRINKLER SYSTEMS, STANDPIPES AND FIRE HYDRANTS**

Comment [dcc8]: Move to separate division?

~~1108.1 The Engineer of Record shall prepare the “Fire Sprinkler System Specification Sheet” outlining the design criteria for the sprinkler system in accordance with South Carolina State Law and requirements of LLR, Division of Fire and Life Safety, Office of the State Fire Marshal. This is required for both above ground and underground fire lines.~~

~~1108.2 The Engineer of Record shall review the shop drawings and calculations as submitted by the sprinkler contractor and prepare the “Fire Sprinkler System Specification Sheet” and “Certificate of Compliance” and submit to LLR, Division of Fire and Life Safety, Office of State Fire Marshal.~~

Formatted: Font: 11 pt, Bold, Font color: Black

~~1108.3 Fire Sprinkler and Standpipe Systems shall be designed and installed in accordance with applicable codes and standards.~~

Formatted: Font: 11 pt, Bold, Font color: Black

~~1108.4 LLR, Division of Fire and Life Safety, Office of State Fire Marshal, by law, has 30 days to review the submittal. Sufficient time for review and approval must be allowed for in the construction period. Also IBC 106.1.1.1 requires approval before start of system installation.~~

**1108.5 Underground Fire Service to Buildings**

**1108.5.1** Each fire line serving a riser assembly shall contain either a free standing post indicator valve, or a wall indicator valve visible from the outside of the building. These above-grade valves shall be provided with tamper switches connected to the building fire alarm.

~~1108.5.2 The use of locks and chains for tamper prevention in lieu of tamper switches is acceptable below grade provided the valve pit has secured (locked) access, and weather-proof signage is displayed which reads, “If valve(s) are closed for any reason, contact the local fire department (by name) immediately (ph# xxx xxx xxxx),” where x denotes the local, non-alarm number.~~

**1108.6 Design Requirements**

**1108.6.1** The following spaces shall be protected at a minimum hazard classification of Ordinary Group I: Secondary school laboratories and preparation rooms, computer labs (rooms containing 30 or more computers), office/administrative areas, vocational labs, kitchens, storage areas, mechanical equipment areas, electrical rooms, coolers, and freezers. Note that sprinklers may be omitted from electrical rooms, when the room meets all the necessary exception requirements from NFPA 13, including being enclosed by a 2-hour rated construction.

**1108.6.2** Stage sprinklers shall be designed to operate before stage smoke and heat vents.

~~1108.6.3 Class One standpipes are acceptable in lieu of Class Three for protection of stages when standpipes are required elsewhere by code.~~

**1108.7 Materials and Installation**

**1108.7.1**— Fire sprinkler systems that are installed utilizing an electric fire pump shall be connected to an emergency generator to provide a reliable source of power or the engineer of record shall provide documentation from the utility company demonstrating reliability of the system over the last 24-month period.

**1108.7.2**— Fire pump controllers shall be provided with a factory installed integral automatic power transfer switch for connection to the building emergency generator. Limited service fire pump controllers are not acceptable.

**1108.7.3**— Each system riser shall contain a fully trimmed alarm check valve and retard chamber. “Shotgun” risers or risers that utilize the backflow prevention device as the system check are not acceptable.

**1108.7.4**— Above-ground piping shall be metallic in accordance with NFPA 13.

**1108.7.5** Quick response type sprinkler heads shall not be used in coolers and freezers.

**1108.7.6**— Oversized, metallic escutcheons for sprinkler heads shall be provided in seismic suspended ceilings as required by the IBC. A flexible connection to the sprinkler head is an acceptable alternative.

**1108.7.7**— The fire sprinkler system seismic restraint system shall be designed with a minimum importance factor of 1.5 as designated by the structural design chapter of the IBC. See also the requirements of NFPA 13.

## **SECTION 1109 KITCHENS**

**1109.1**— Kitchen ventilation shall be designed and installed in accordance with the DHEC requirements, *Rules and Regulations Governing Food Service Establishments and Installation Methods for Food Service Equipment* and NFPA 96. Proper make up air for range hoods is essential to proper operation of the entire school ventilation system. Each hood shall provide sufficient make up air without using air from the educational areas of the school. Calculations indicating the exhaust capacity of hoods and the capacity of make up air sources shall be provided at final construction document submission.

Comment [dcc9]: Required by SCDHEC

**1109.2**— Automatic fire extinguishing systems shall be installed in all cooking hoods per NFPA 96; NFPA 17 and 17A; and the DHEC publication, *Installation Methods for Food Service Equipment*.

**1109.3** Rangehood roof Hood exhaust fans shall be designed to prevent air from being discharged down toward the roof.

**1109.4**— Exterior entrances to kitchens shall be equipped with a fly fan with automatic switch geared to opening and closing of door, unless otherwise waived by the OSF. Location of fan on interior with air directed down and towards door is preferred.

**1109.5**— All “short circuit” type hoods are prohibited, unless tested and listed in accordance with UL 710.

**1109.6**— All kitchen hood systems may be subject to a capture and containment test during the final or occupancy inspection as allowed for in IMC 507.16.1.

## **SECTION 1110 ENERGY EFFICIENCY**

### **1110.1—General Requirements:**

~~1110.1.1— Compliance with ASHRAE 90.1 shall be required in the design of all new and renovated facilities. Submit appropriate work sheets to demonstrate compliance. Energy management systems may be specified to be consistent with existing systems where applicable and shall comply with all other requirements of this regulation.~~

~~**SECTION 1111—RECORD DRAWINGS**~~

~~1111.1— The mechanical engineer shall specify that during construction operations the mechanical contractor shall faithfully make a record of all approved changes from the contract drawings, including accurate dimensions where applicable, and shall also record accurate dimensions locating all below grade outside mechanical utilities (whether changed or not) with reference to permanent above grade objects.~~

~~1111.2— The engineer shall also specify that at completion of the work, all such changes shall be recorded neatly with red ink by the mechanical contractor on an unused set of the mechanical contract drawings supplied by the architect. The red line changes shall be reviewed by the engineer and the completed record prints returned to the architect.~~

~~1111.3— The mechanical engineer, in conjunction with the architect, shall sign a Declaration of Completion in accordance with the requirements of Division 9 of this regulation.~~

Draft July 2011

**DIVISION 12**

**ELECTRICAL**

**SECTION 1201 INDEX OF SECTIONS**

Section Number and Title	Page	Section Number and Title	Page
1202 General Requirements	12-1	1210 Exhaust Hood	12-11
1203 Power Service/Distribution	12-1	1211 Communication Systems	12-12
1204 Lighting	12-4	1212 Provisions for Educational Television	12-12
1205 Emergency Power	12-6	1213 Provisions for Teaching Equipment	12-12
1206 Exit Signs	12-7	1214 Lightning Protection	12-13
1207 Emergency Lighting	12-7	1215 Energy Efficiency	12-13
1208 Fire Alarm System	12-8	1216 Record Drawings	12-13
1209 Fire Alarm Operation	12-11		

**SECTION 1202 GENERAL REQUIREMENTS**

~~1202.1~~ The electrical systems shall be designed by a qualified professional engineer, registered in South Carolina, the engineer's seal shall appear on each drawing for that portion of work for which he bears the responsibility for design.

~~1202.2~~ The electrical design shall cover all lighting, power, emergency, communications, and related systems. It is recommended that the design of all systems under this head normally be the responsibility of a single engineer unless special conditions warrant otherwise.

~~1202.3~~ Where future additions are definitely contemplated, electrical service and related equipment should be sized and stub-outs provided to serve these planned additions with all such information shown on drawings.

Comment [dcc10]: Best Practices

~~1202.4~~ Conduits, cables or raceways shall not be attached directly to decking.

~~1202.5~~ The design shall conform with the current codes as referenced in Division 1 of this Guide and as modified herein.

~~1202.6~~ When new replacement systems of any type (power or signal) are provided, the old existing system shall be removed from all areas, including above ceiling spaces.

**SECTION 1203 POWER SERVICE AND DISTRIBUTION OF ALL SYSTEMS**

~~1203.1~~ The engineer shall coordinate with power supplier and indicate and/or specify all requirements for:

~~1203.1.1~~ Point of service

~~1203.1.2~~ Division of work (contractor and power company)

~~1203.1.3~~ **Fault current:** Over current device(s) shall have interrupting capacity in excess of available fault current throughout system.

~~1203.2~~ **Wiring Methods:** Wiring methods shall be insulated conductors in properly supported raceways for all systems, including, but not limited to power, remote control, ETV, signal, computer and communications. Installation shall be as outlined below.

~~1203.2.1—All power wiring shall be in metallic conduit, busways or cablebus unless otherwise allowed by this *Guide*. Non-metallic conduit may be used below grade.~~

~~1203.2.2—Signal cable other than fire alarm shall be in supporting/organizing raceways. Signal cables include those for intercom, ETV, public address, computer networks and telephone. Acceptable raceways are conduit, wireways, and cable trays.~~

~~1203.2.3 Fire alarm cable shall be installed in metallic conduit.~~

~~1203.2.4 Where wiring of any type or system occurs above an inaccessible ceiling or portion of a building structure, it shall be installed in conduit. No other raceway will be acceptable where systems are inaccessible.~~

~~1203.2.5—When using cable trays in new buildings, the cables shall be installed in conduit from cable tray to outlet. In existing facilities, cable may be installed in conduits or supported as outlined for existing buildings below. Conduit must terminate within 6 inches of cable tray.~~

~~1203.2.6—All penetrations of fire-rated walls shall be protected by a UL tested through-penetration fire stop system as outlined in the International Building Code.~~

~~1203.2.7—Metal clad cable shall be permitted for light fixture whips provided they do not exceed 6 feet in length and are provided by the light fixture manufacturer.~~

~~1203.2.8—Modular wiring systems made from metal clad cable shall be acceptable for light fixtures above accessible ceilings.~~

### ~~1203.3—Signal Systems in Existing Buildings~~

~~1203.3.1—An existing building is defined as one constructed prior to adoption of the IBC 2000.~~

~~1203.3.2—Signal systems other than fire alarm: Signal cables for systems other than fire alarm include intercom, ETV, public address, computer networks, telephone and similar systems which have no direct effect on Life Safety. These systems are recommended to be installed in raceways. However, raceways are not mandatory. In the event that the district permits installation of these systems without raceways, the following shall apply.~~

~~1203.3.2.1—Cables shall be bundled neatly and identified as to system and individual cable function at intervals not to exceed ten (10) feet wherever cables are accessible, as when installed above lay-in acoustical ceilings.~~

~~1203.3.2.2—Cables shall be supported from the building structure. Cables shall not be laid directly on top of acoustical tile ceilings, shall not be secured to the tie-wires which support acoustical ceiling grids or be supported otherwise from any part of the ceiling system, whether lay-in type or other. It also shall not be supported from other Trade work.~~

~~1203.3.2.3—Where cables are routed through inaccessible elements of the building they shall be installed in conduit.~~

~~1203.3.2.4—Where cables are not installed in raceways but are bundled, identified and secured to the structure, methods of securing cables or cable bundles to the structure shall comply with the following:~~

~~1203.3.2.5—Support devices shall have sufficient load rating to support the installed cables and accessories.~~

**1203.3.2.6** Cable support devices shall be spaced no further than 36 inches apart and shall be configured so that cables are not deformed, crimped, bent or otherwise damaged by supporting devices.

**1203.3.2.7** Cables shall be identified as to function, circuit number and the like at 10-foot intervals along each cable and at points of entry and exit from inaccessible cavities and spaces within the building.

**1203.3.2.8** Prior to starting work, each installer of cable system as covered under this regulation shall obtain written approval of installation means and methods proposed from the district or district's appointed agent.

**1203.3.2.9** All penetrations of cables through fire rated walls, or through walls that should be rated according to the current Building Code shall be properly protected by a UL tested through-penetration fire stop system and as outlined in the Building Code.

**1203.3.2.10** The OSF strongly recommends districts retain the services of a registered professional engineer to review vendor wiring proposals, inspect installations in progress and as completed.

**1203.3.2.11** Where cable trays exist, they shall be used for any additional wiring systems.

#### **1203.4 Aluminum Conductors**

**1203.4.1** At the option of the engineer, but only with the concurrence of the school district, aluminum conductors may be provided for conductors #2 AWG and larger. Conductors smaller than #2 AWG shall be copper only.

**1203.4.2** Where aluminum raceways are provided, they shall not be installed underground, or encased in concrete, or be used with brass or bronze fittings.

**1203.5 Grounding:** Grounding shall be provided in accordance with NFPA 70.

**1203.6 Ground Fault Protection:** Ground fault protection shall be provided in accordance with NFPA 70 and for all receptacles (convenience outlets) installed outdoors and within five (5) feet of a sink and/or lavatory or water source.

#### **1203.7 Receptacles (Convenience Outlets)**

**1203.7.1** Every full-size instructional classroom shall be provided with a minimum of nine (9) duplex receptacles. Two (2) located on each wall and one (1) for ETV. Where computers are to be located in classrooms, additional outlets shall be provided. Smaller instructional areas should be provided with receptacle quantities at the discretion of the engineer.

**1203.7.2** Science laboratories, home economics departments, business education departments, shops, and other instructional areas where a considerable amount of electrical equipment is to be used shall be provided with outlets of the proper type and number to meet the needs of each area. In such areas, consideration shall be given to providing a main disconnecting means to enable the disconnection of all instructional electrical loads from the power supply (lighting not included) and should be provided unless obviously not needed for safety or control, or if not desired by the school district.

**1203.7.3** Office areas and teachers' workrooms shall be supplied with at least four electrical outlets located to best serve anticipated needs.

**1203.7.4** Receptacles should be properly located throughout the building for cleaning equipment and other similar uses.

Comment [dcc11]: Best Practice

**1203.7.5** A minimum of one duplex receptacle shall be provided on the interior near the top of the ladder serving any scuttle to a roof area.

**1203.7.6** All receptacles shall be of the Specification Grade type.

**Comment [dcc12]:** Best Practices

**SECTION 1204 LIGHTING**

**1204.1 Illumination Levels**

**1204.1.1** The lighting levels shown in the table below are minimum initial design levels. In no case shall the initial lighting level be less than those listed without approval of the OSF.

Type of Interior Areas	Minimum Initial Design Level*	Remarks
All interior areas other than listed below	70 foot-candles	Multipurpose rooms and auditorium stages need 70 foot-candles at full bright dimmer setting.
Industrial art, prevocational or Trade and Industrial shops, laboratory and lecture room demonstration areas, and task lighting areas	100 foot-candles	
Administration and office area and gymnasiums	50 foot-candles	
Cafeterias and commons, stair ways, and auditorium seating areas	30 foot-candles	Auditorium seating areas need 30 foot-candles at full bright dimmer setting.
Corridors, toilet area, gym dressing rooms, storage rooms and boiler, mechanical or electrical equipment rooms	25 foot-candles	

— Lighting calculations by engineers during years past have mostly been based on maintained design levels, rather than initial design levels. Therefore, in using the above initial design levels, the architect and the engineer should caution a district that a strict maintenance program should be adhered to as to relamping and cleaning of fixtures and lenses.

**1204.1.2**— Lighting calculations shall be based on room surface reflectances for interior finishes selected by the architect, which in all cases shall not be less than the following for instructional areas:

**1204.1.2.1** Ceiling Cavity, 80 percent; Walls, 50 percent; Floor Cavity, 20 percent

**1204.1.3**— Fixture selection and placement should provide the minimum practical amount of brightness and glare.

**1204.1.4**— Due to constantly changing lighting technology, special designs will not be prohibited but shall have prior approval of the OSF. Consult Illuminating Engineering Society's *Lighting Handbook* for recommended levels for other uses and any other additional pertinent information.

Comment [dcc13]: Best Practices

## **1204.2 Lighting Control**

**1204.2.1**— Room switches should be placed in the most convenient location, preferably on the strike side of the entrance door to the area served.

**1204.2.2**— "Local" switching for group toilets shall not be permitted unless keyed switches are used.

**1204.2.3**— Switches must comply with the adopted version of ASHRAE 90.1 adopted code. Automatic lighting control shut-off shall not be required in areas that have two or fewer luminaries.

**1204.2.4**— The engineer shall provide multiple levels of switching for classrooms and larger areas.

**1204.2.5**— Automatic lighting control panels shall fail in the on position.

## **1204.3 Exterior Lighting**

**1204.3.1**— Exterior lighting shall be provided for building entrances, parking areas, outdoor storage areas, loading docks, bus ports, covered walkways, and other outdoor areas where, in the judgment of the engineer, lighting is required for night functions, security, or safety.

**1204.3.2**— The engineer shall specify the most energy efficient lamp source in each instance, consistent with color rendition and other application requirements and meet lighting allowance specification ASHRAE 90.1.

**1204.4 Lighting System Security:** All practical measures shall be taken to provide protection for lighting fixtures and equipment.

**1204.4.1**— Vandal-resistant materials or metal guards shall be considered for fixtures within reach of floor and for all outdoor locations.

**1204.4.2**— Mounting heights shall be specified to afford protection, consistent with ease of maintenance.

**1204.4.3**— Exit signs and directional signs related thereto shall be wall-mounted (either recessed or surface) where possible in lieu of ceiling-mounted, as ceiling-mounted signs are subject to a much greater degree of abuse. Signs must be visible from anywhere within the length of exit access corridor or directional signs shall be provided (See Division 7).

Comment [dcc14]: Best Practices

## **SECTION 1205 EMERGENCY POWER**

**1205.1—Mandated Emergency Power:** The following systems shall be provided with a primary and a secondary (emergency) power source.

**1205.1.1—** Exit signs

**1205.1.2—** Emergency lighting

**1205.1.3—** Fire alarm system

**1205.1.4—** Telephone

**1205.1.5—** Fume hoods in facilities with emergency generators

**1205.2—Sources of Emergency Power:** The primary source of power shall be the normal building distribution system. The secondary (emergency) power source shall be one of the following.

**1205.2.1—** Engine generator set

**1205.2.2—** Central or local rechargeable battery system (DC)

**1205.2.3—** Central or local battery inverter system (AC)

**1205.2.4—** Single battery packs

**1205.2.5—** Battery packs integral with the fixture

**1205.2.6—** Any other type of system permitted by the National Electric Code except connection ahead of main and separate service.

**1205.2.6.1—** The emergency power from a secondary system, such as a generator set or a central battery source shall be on separate circuitry and in separate conduit from normal power and lighting. The emergency power shall be compatible with the system served and as required by that system.

**1205.2.6.2—** See Division 5: Emergency Preparedness, for discussion of additional emergency generator/disconnect requirements.

## **SECTION 1206 EXIT SIGNS**

**1206.1—** Exit signs and directional signs related thereto shall be provided with power from two sources.

**1206.1.1—** The primary source may be connected at any point within the normal lighting system. The secondary source shall operate automatically upon interruption of the primary source and may be served from any emergency power source as listed under Section 1205.2. The secondary source shall operate when the associated circuit in an area that requires emergency lights goes out.

**1206.1.2—** Exit signs and directional signs related thereto shall be provided at all exit doors, doors in an egress route and doors leading to egress routes in large areas. See IBC for further requirements. Signs must be visible from anywhere within the length of the exit access corridor or directional signs shall be provided.

**1206.1.3—** Classrooms, laboratories, and workrooms which are required to have multiple exits shall only be required to have exit signs on exterior exits.

## **SECTION 1207 EMERGENCY LIGHTING**

**1207.1**—Emergency lighting shall be provided with power from two sources.

**1207.1.1**—The primary source may be connected at any point within the normal lighting system. The secondary source shall operate automatically upon interruption of the primary source and may be served from any emergency power source as listed under Section 1205.2. The secondary source shall operate when the associated circuit in an area that requires emergency lights goes out.

**1207.1.2**—The power from a secondary system such as a generator set or a central battery source shall be on separate circuitry and in separate conduit from normal power and lighting.

**1207.1.3**—In spaces required to have emergency lighting, not all lighting fixtures shall be on the emergency power circuit.

**1207.2**—The following areas shall have emergency illumination, whether having natural lighting or not:

**1207.2.1**— Exits and exit access corridors

**1207.2.2**— Small and large assembly areas

**1207.2.3**— Areas occupied by over 50 persons

**1207.2.4**— Gymnasium dressing rooms

**1207.2.5**— Band and choral rooms

**1207.2.6**— Industrial arts, vocational shops

**1207.2.7**— Administration or other building control centers

**1207.2.8**— Kitchens

**1207.2.9**— Group toilets

**1207.2.10**— Main electrical service disconnect location

**1207.2.11**— Emergency power equipment location

**1207.2.12**— Media Centers

**1207.2.13**— Laboratory preparation room

**1207.2.14**— Mechanical/boiler room area

**1207.2.15**— Exterior point of egress

**1207.2.16**— Classrooms in which an exterior door is an exit as defined by the building codes

**1207.2.17**— Sprinkler riser and fire pump rooms.

**1207.2.18**— Athletic stadiums.

**1207.3**—The following areas shall have emergency illumination when they either have no natural light or are anticipated to have night occupancy:

~~1207.3.1~~ Classrooms, conference rooms, and other instructional spaces over 200 square feet in size. Flexible or open-plan areas.

~~1207.3.2~~ Spaces over 500 square feet in size, which are expected to have regular human occupancy.

Comment [dcc15]: Best Practices

## SECTION 1208 FIRE ALARM SYSTEM

~~1208.1~~ Fire alarm systems shall be provided in any building over 500 square feet as follows.

Formatted: Font: 11 pt, Bold, Font color:

~~1208.1.1~~ All new fire alarm systems and substantially renovated alarm systems shall be remote supervising station systems, central station fire alarm systems, or proprietary supervising station systems.

Formatted: Font: 11 pt, Bold, Font color:

~~1208.1.2~~ The policies by Labor, Licensing & Regulation (LLR), Division of Fire and Life Safety, Office of State Fire Marshal may establish more stringent requirements than found in this *Guide*.

~~1208.1.3~~ When using a Remote Supervising Station Fire Alarm system, the School District shall be responsible for providing response by trained service personnel within one hour of an alarm and within four hours of a supervisory signal from that fire alarm system. Trained service personnel can be fire alarm companies, third-party contractors, or District employees who are trained in accordance with NFPA 72 Annex A. The School District shall be responsible to confirm in writing to OSF the method of response which will be used.

Formatted: Font: 11 pt, Bold

~~1208.2~~ In renovated buildings larger than 500 square feet, a new fire alarm system meeting the requirements of this section shall be installed or the existing system shall be brought into compliance with the requirements of this section when:

- ~~1.~~ There is no existing fire alarm system;
- ~~2.~~ Modifications or additions to the existing fire alarm that require 50 net devices;
- ~~3.~~ The existing system is a "110 Volt" system.

Comment [dcc16]: Cose requirements for existing systems to be placed in best practices

~~1208.3~~ All systems shall meet the requirements of NFPA 72 (National Fire Alarm Code) and of NFPA 70 (National Electrical Code) and ANSI.

~~1208.4~~ Fire alarm system control equipment, alarm initiating devices, power sources, municipal or remote station signaling apparatus, smoke door hold/release devices, and remote annunciation/control panels (graphic display panels excluded) shall be Underwriter's Laboratories listed for the installed application.

~~1208.5~~ Equipment shall be provided for the selected alarm system as follows, and shall function as described:

~~1208.5.1~~ A control panel shall be provided, incorporating all provisions for operations and capabilities described in this section.

~~1208.5.2~~ An annunciator panel, where required by the selected system, shall indicate the station or zone from which the alarm sequence is initiated. The annunciator panel shall be installed at an attended location in the school administration area (A graphic type annunciator is recommended).

~~1208.5.3~~ When a graphic display panel is used, the basic operation of the fire alarm system shall operate independently of the display panel and shall not rely upon any component or function of the graphic panel or its associated circuitry. In other words, with the graphic panel completely disconnected from the fire alarm control panel, the control panel shall still perform all operations required by this section.

**1208.5.4** An audible and visual trouble alarm shall be installed at an attended location in the school administration area to signal an off-normal condition of alarm initiation, or alarm and supervisory portions of the system. This trouble signal may be integral with the control-panel or annunciator at the discretion of the engineer.

**1208.5.5** A drill switch shall be provided to enable the administrative personnel to initiate fire drills without operating an initiating device or activating the fire department notification apparatus.

~~**1208.5.6** When the building is equipped throughout with an automatic sprinkler system, a single manual fire alarm pull station shall be required at one exit from a normally occupied location, if all code requirements are met. An additional manual pull station shall be installed at a single exit in each occupied portion of the building if the building is expected to have partial occupancy (for example, gymnasiums or auditoriums). When the building is not fully sprinklered, manual fire alarm pull stations shall be installed at all exits.~~

~~**1208.5.7** Audible alarm devices shall be provided and shall produce a sound level that is 15dBA above ambient noise levels or levels that are 5dBA above the maximum sound level for 60-second duration, with a maximum level of 120dBA. Voice alarm communication systems shall be provided in assembly spaces with occupancy over 1000.~~

~~**1208.5.8** Visual alarm devices shall be provided and installed in all locations as specified by ANSI A117.1 and IBC~~

**1208.5.9** Apparatus for transmitting alarm and trouble signals shall be provided as applicable to operate with local alarm-reporting equipment. The engineer shall coordinate with the local fire authority to determine the method to be used. Leased, dedicated telephone lines may be used with the permission of the school district. Where a municipal fire-reporting circuit is available near the job site, a municipal fire-reporting box and connection to the municipal system shall be provided. In areas where connection to a municipal system, or direct phone line connection to a remote receiving station is not possible, radio signal communication may be utilized. Automatic telephone dialers with pre-taped messages are not recommended to report the alarm condition, as they tend to tie up reporting lines excessively.

~~**1208.5.10 Emergency Power Supply:** Systems shall be provided with an emergency power supply to ensure system operation under conditions of normal power outage. The emergency power supply shall be capable of maintaining the system in a supervisory, standby condition for a period of at least 24 hours, with sufficient power capability after the 24-hour standby period for 5 minutes of alarm condition operation. (See NFPA 72)~~

~~**1208.5.11** Emergency power may be provided from a power supply integral with the fire alarm system, or from a separate emergency power source, that is compatible with the alarm system. The emergency power system shall be designed to automatically transfer power to the fire alarm system upon loss of normal power.~~

~~**1208.5.12** When standby batteries are used, a charger unit shall be provided capable of recharging the batteries within 24 hours.~~

**1208.5.13** All control switches and indicator lamps for remote operation of the system and trouble monitoring shall be provided and installed at an attended location in the administrative area. The fire alarm control panel should also be located in this area and protected as much as possible from fire hazards.

~~**1208.5.14** All smoke detectors shall comply with U.L. Standard 268 for smoke detectors; detectors not meeting this standard are not acceptable. Since the UL standard requires both ionization and photoelectric detectors to meet the same response tests, the engineer shall decide the type of detectors to use.~~

~~1208.5.15~~**1208.5.14** All K4 and younger classrooms shall have smoke detectors installed in accordance with NFPA 72. These detectors shall be tied directly into the school's fire alarm system.

~~1208.5.16~~ Delay of the transmission of the primary power failure signal in accordance with NFPA 72 is acceptable, however, loss of primary power must be indicated at the FACP and any remote annunciator panels immediately upon loss of primary power.

**1208.6** Contractors installing fire alarm system must be certified and acceptable to the Authority Having Jurisdiction.

### **SECTION 1209 FIRE ALARM SYSTEM OPERATION**

~~1209.1~~ **Sequence of Operation:** Operation of any manual or automatic station (other than fire door smoke detectors and air handling unit shutdown smoke detectors) shall activate the system, the general alarm shall sound and the fire alarm reporting agency shall be notified.

~~1209.2~~ **Fire Doors Operation:** Fire doors shall be self-closing (except as permitted by the OSF for 20-minute classroom doors).

~~1209.2.1~~ Where it is desired to have fire doors remain open due to continual use, such as doors in stairwells, horizontal exits, building area separations, and smoke doors in corridors, it is required that they be held open with wall-mounted magnetic releases in combination with ceiling-mounted smoke detectors; upon activation, smoke detector sensing particles of combustion shall release magnetic door holders and doors shall close. Manual release of doors from holding device shall allow self-closing with no effect upon holding device or fire alarm. When smoke-actuated door closers are used, a smoke detector shall be placed on both sides of the door.

~~1209.2.2~~ Door holders and associated smoke detectors shall be specified under the electrical division of the plans and specifications

~~1209.2.3~~ All stairway or exit passageway doors shall close when any door common to that enclosure closes by means of activation of any smoke detector tied to automatic door release devices.

~~1209.3~~ **Air Handling Unit Shut Down Smoke Detectors:** Operation of any automatic station required for air distribution systems shall activate a visible and audible supervisory signal at a constantly attended location, except when the building fire alarm indicating appliances are activated. A remote indicating device shall be provided near the automatic station to indicate device in alarm. Detectors are to be powered through the fire alarm system.

~~1209.4~~ All wiring shall be insulated conductors in metal conduits.

### **SECTION 1210 EXHAUST HOOD**

~~1210.1~~ All kitchen equipment producing grease-laden vapors shall comply with NFPA 96 and the International Mechanical Code.

~~1210.2~~ All power or gas sources under the outline of a Type I hood must automatically shut down upon activation of the hood extinguishing system.

~~1210.3~~ The system used to automatically disconnect power to the fuel or heat sources under the kitchen hood shall be fail-safe design such that a loss of control power to this system will cause the devices under the hood to be automatically shutdown. Approved methods include under voltage relays, controlled circuit powered from certificated/placarded fire alarm systems, normally open contactor, or other method acceptable to the OSF.

## **SECTION 1211 – COMMUNICATION SYSTEMS**

**1211.1 – Communication System:** The following communication systems shall be provided in all schools. See Section 1203 for conduit/cable tray requirements.

**1211.1.1 – Telephone conduit system**

**1211.1.2 – Classroom intercom system.** All call mode with callback feature should be provided.

**1211.1.3 – Educational television**

**1211.1.4 – Program bell system**

**1211.2 – Teacher Call Back:** Two-way communication to the office should be provided.

**1211.3 – Intrusion Detection System:** May be provided at the option of the school district.

**1211.4 – An Area of Refuge:** The communication will be located adjacent to the fire alarm enunciator panel.

## **SECTION 1212 – PROVISIONS FOR EDUCATIONAL TELEVISION**

**1212.1** All new buildings and new building additions shall be provided with a complete ETV system.

**1212.2** The electrical engineer should contact the Network Technical Services Director at the South Carolina ETV Center, at the design development stage to coordinate requirements and system concepts for the project.

**1212.3** The engineer shall submit the system design to SCETV for review and approval prior to advertising for bid. A copy of this approval shall be sent to the OSF.

**1212.4** The engineer shall refer to the specifications and details, as approved by the South Carolina Educational Television Network, for the layout and design of ETV systems. These can be found on the SCETV website.

## **SECTION 1213 – PROVISIONS FOR TEACHING EQUIPMENT**

**1213.1** Raceways, enclosures, power sources, and electrical equipment required for teaching aids or equipment in areas such as science, home economics, business classrooms, media centers, language laboratories, shops, etc., shall be provided.

**1213.2** Consideration shall be given to future load growth, both in systems capacity and in physical accessibility for expansion.

**Comment [dcc17]:** Move to best practices

~~SECTION 1214 – LIGHTNING PROTECTION~~

~~1214.1— Lightning protection systems may be provided at the discretion of the school district and the engineer. Where complete systems are provided, the U.L. Master Label requirements shall be used for design and construction and the Master Label inspection service shall be required. At job completion, the Master Label plate shall be affixed to the building.~~

~~1214.2— Any attachment to the roof (membrane and flashings) shall be approved by the roofing manufacturer or owner.~~

Comment [dcc18]: Move to best practice

~~SECTION 1215 – ENERGY EFFICIENCY~~

~~1215.1— The engineer shall make every effort to provide a system designed with the maximum utilization of energy efficiency measures consistent with the functional requirements of the building.~~

~~1215.2— There shall be close coordination between the electrical and mechanical engineers and the architect in the interest of energy efficiency.~~

~~1215.3— Plans and construction shall comply with the Model Energy Code and ASHRAE 90.1. Submit worksheets to demonstrate compliance.~~

Comment [dcc19]: Move to best practice

~~SECTION 1216 – RECORD DRAWINGS~~

~~1216.1— The electrical engineer shall specify that during construction operations the electrical contractor shall faithfully make a record of all approved changes from the contract drawings, including accurate dimensions where applicable, and shall also record accurate dimensions locating all below-grade outside electrical utilities (whether changed or not) with reference to permanent above-grade objects.~~

~~1216.2— The engineer shall also specify that at completion of the work all such changes shall be recorded neatly with red ink by the electrical contractor on an unused set of the electrical contract drawings supplied by the architect. The red line changes shall be reviewed and approved by the engineer and the completed record prints returned to the architect.~~

~~1216.3— The electrical engineer, in conjunction with the architect, shall sign a Declaration of Completion in accordance with the requirements of Division 9 of this regulation.~~