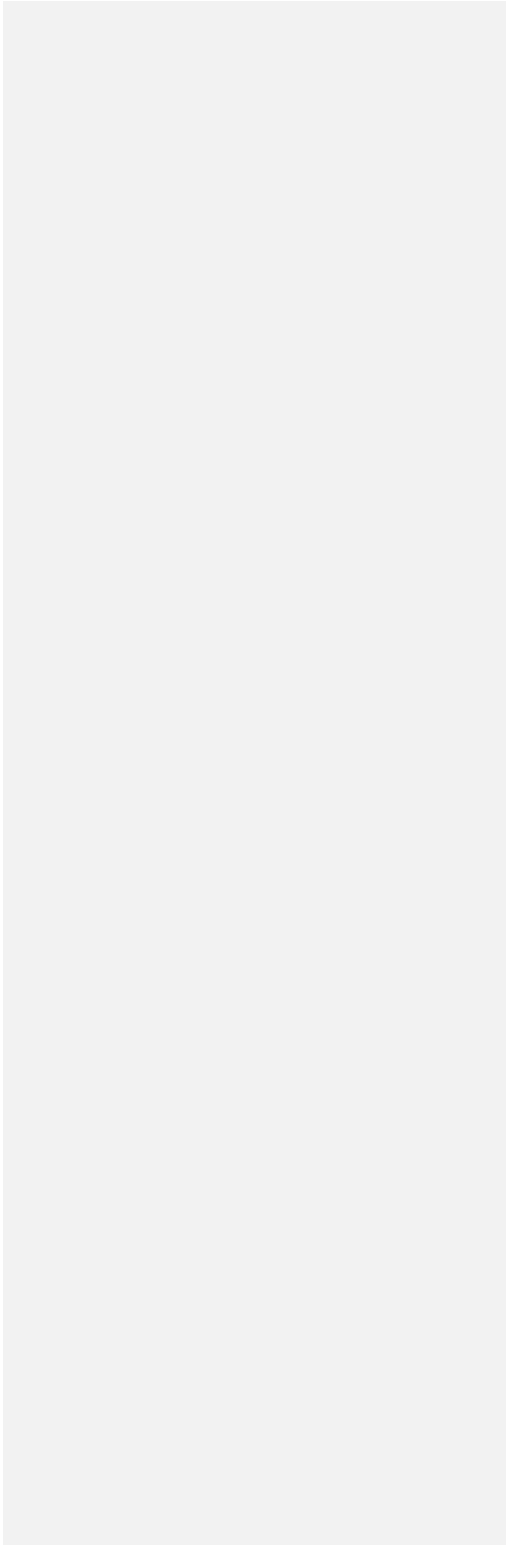
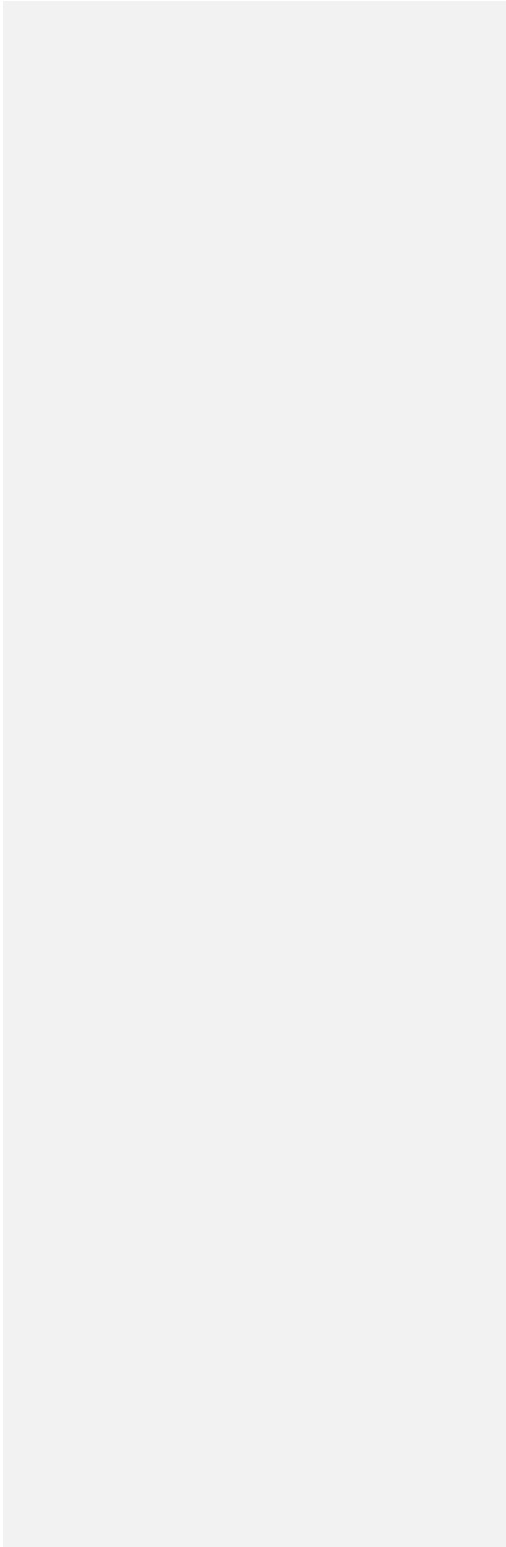


**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

e



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

- c For items to be demolished remove wiring devices and conduit complete, do not abandon in place**
- d Provide temporary wiring and connections to maintain electrical continuity of existing systems during construction. All temporary installations shall be code compliant.**
- e Remove and restore wiring which serves usable existing outlets clear of construction or demolition.**
- f Existing junction boxes will be made inaccessible or if abandoned outlets serve as feedthrough feedthrough**

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

Provide PFS badge access for maintenance employees to bypass payment.
Include in submittal requirements for monthly service costs to be provided

G Electric Hard Dyes

Electric hard dyes are recommended in new and full modernization projects in grouped student restrooms with Electric shop review and approval. The unit must be commercial, recessed, have no heating element and be vandal resistant.

Acoustic separation from teaching spaces is required; dyes must not be installed on wall adjacent to offices, classrooms, or other spaces with acoustic needs. The sound energy produced by the dryer is required to be mitigated through acoustic absorption in the space. Provide room acoustic performance data for PFS review prior to finalizing selection and installation details.

Wood backing is required

At least (1) electric hard dryer per restroom to be on optional standby power.

H Deviations from Standards

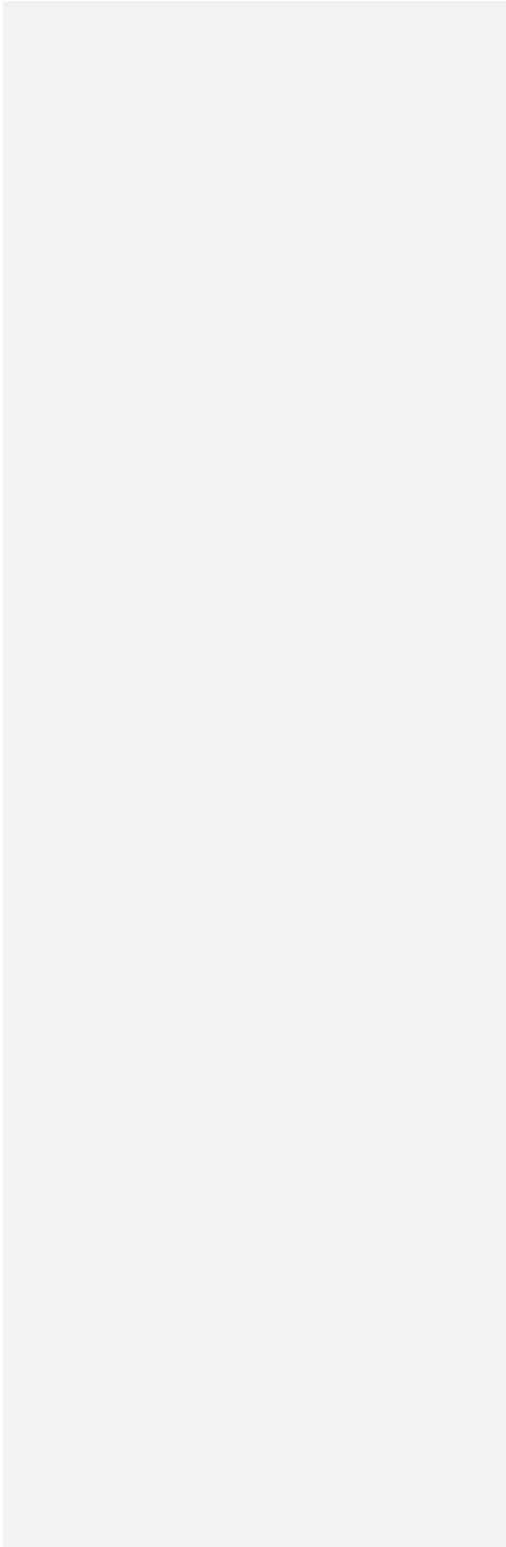
~~Multiple~~ ^{Multiple} deviations from standards organized by specification division. List each deviation separately and include all technical references and document links for stakeholder review.

Update the log of deviations no later than at each phase review milestone (e.g. Schematic Design, Design Development, Construction Documents, and Bid Documents) as established in the project schedule approved by the District.

Provide the log of deviations for stakeholder review at the established milestones, allowing a minimum of two full workweeks for review by the District.

At the conclusion of each District milestone review, record results of the review for each item in the log and provide to the District for incorporation into the project record and the Program Administrator's tracking. Incorporate approved deviations into the project documents.

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

B Acceptance

- a Systems are not considered for acceptance until work is complete and demonstrated to meet contract documents
- b Acceptance by the Authority Having Jurisdiction (AHJ), or City/State/County Inspectors does not demonstrate work meets contract documents

C Training to be provided for the following which includes servicing the systems. Include training requirements for the following in coordination with each project scope

Lighting controls including daylight harvesting and access into system

Theater lighting and lighting controls

Kitchen appliances and equipment (coordinate with Kitchen Consultant or Architect).

Hood fire suppression systems

Kitchen control systems and other power controls and cabinets such as for shut trip

Energy Control Centers

Sub metering system

Electric vehicle charging equipment

Solar photovoltaic systems

Battery energy storage systems

Generators, bonding stations, and transfer switches

Lighting battery inverters

UPS systems

Sports field lighting systems

260509 Equipment Wiring

A Motors

1/2HP and under: 120V, 1 phase

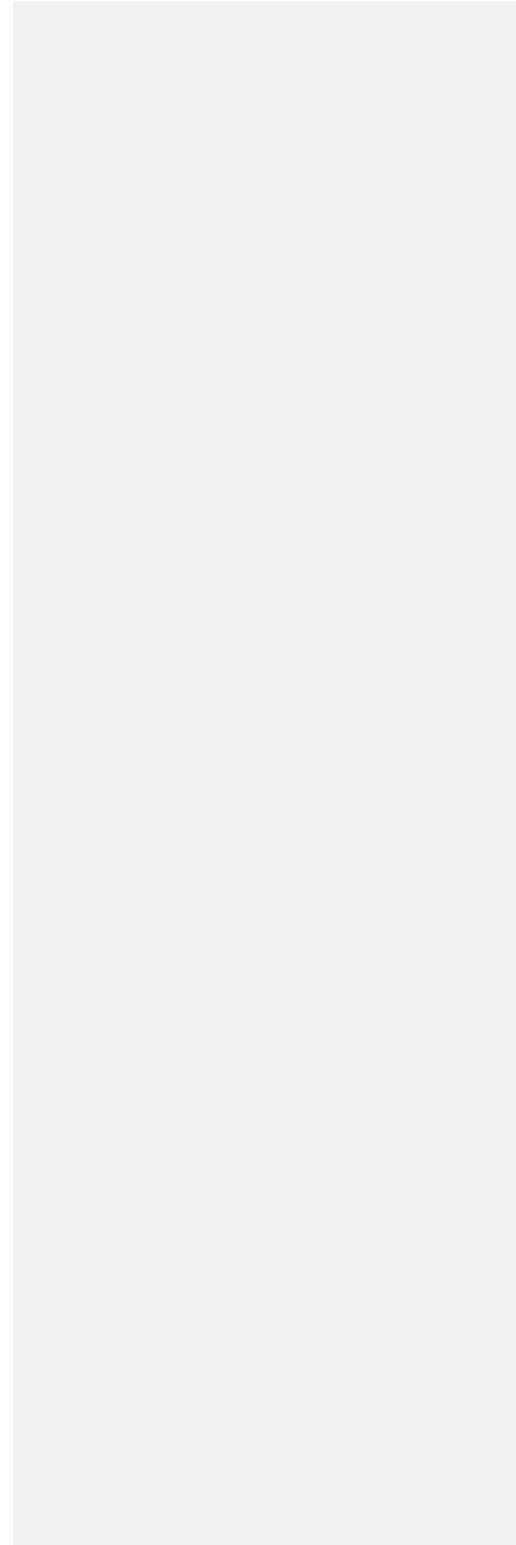
3/4HP and over: 208V, 3 phase or 480V, 3 phase

B Verify connection requirements with equipment nameplate and submit as prior to installation

C Install disconnects and motor starters in readily accessible locations

D Provide appropriate cable and conduit for final connection unless equipment is provided with the same. Provide receptacle to match conduit cap

**FORLANDPUBLICSCHOOLS
TECHNICALDESIGNANDCONSTRUCIONSTANDARDS**



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

Ceiling tiles shall not be used as the only means of support for boxes and raceways

The ceiling grid shall not be used as the only means of support for boxes and raceways

B Lead type pipe and cross shall not be used to anchor electrical equipment, enclosures, and conduit

C Feeder conductors shall be installed in rigid conduits with threaded connections

D Pull strings are required in all raceways, pathways and conduits. Label pull lines as to conduit starting or termination point.

E Conduit Materials

Approved conduit types shall be Galvanized steel or EMI where specifically approved

Underground 90 degree bends shall be GRC rigid conduit or Fiber Glass. Treat GRC threads with a copper coat to avoid moisture and corrosion

Underground conduit shall be Galvanized Rigid Conduit (GRC) or PVC GRC required for heavier weight bearing areas and where accessible to vehicular traffic

Exterior above ground conduit to be Galvanized Rigid Conduit (GRC) if accessible to the public. No substitutions. No PVC conduit above grade unless authorized by PSE Electric Shop

EMI allowed on rooftops and areas not accessible by public only if there is no other viable location

Aluminum conduits prohibited

F Junction Boxes

Exterior junction boxes located below 8 feet from grade to be equipped with security screws

Underground junction boxes / vaults to be concrete or stainless steel with security screws. Plastic is prohibited

Interior junction boxes. No studded / ganged boxes allowed beyond one extension ring

G Cast EMI fittings are prohibited

H EMI box connectors shall be steel with nylon throats

I Standard long radius elbows are required or District approved equal

J Size branch circuits to allow 4 circuits per classroom

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

Wiring for 120/208V or 120/240V systems shall be continuously color coded in accordance with the following schedule:

- a Phase A Black**
- b Phase B (Orange - Wildleg in 240V Delta) Red**
- c Phase C Blue**
- d Neutral White**
- e Ground Green**

Wiring for 277/480V and 120V systems shall be continuously color coded in accordance with the following schedule:

- a Phase A Brown**
- b Phase B Orange**
- c Phase C Yellow**
- d Neutral Gray**
- e Ground Green**
- f Device labeling**
 - i All junction boxes and device plates will have an extra strength laminated astern: P n**

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

260600 Schedules for Electrical

A Electrical Record Drawings

Exact routing of feeders and service conduits

Conduit dimensions

Exact location of junction boxes

Exact location of conduits installed for future construction. Provide dimensions and depth of burial.

All Drawings of Record shall include a one-line diagram including Sub panels, and note Switch gear/Panel locations by room number.

All Switch gear and Panel Schedules shall be listed on Drawings of Record

260620 Schedules for Low Voltage Electrical Distribution

A Electrical Labeling

Name plates and labels: Engaged stock melamine or lam acid plastic laminate in size and thickness indicated below provide 1/8 inch thick material

a

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

Label motor controller and disconnects with engaged labels

260630 Photovoltaic System

- A Refer to PPS Solar Standard documentation for requirements and additional information <https://www.pps.net/Page/15497/mde/Division26-Electrical261-SolarStandards>**
- B Provide electrical panel and pathway dedicated for future PV system**
- C Refer to 260000 above**

260800 Commissioning of Electrical Systems

- A General Requirements**
 - Provide Fundamental Commissioning for IBD projects**
 - Provide Enhanced Commissioning where requested by PPS**
 - For small or remodel projects confirm with PPS if commissioning is desired and what system needs to be commissioned**

260913 Power Monitoring and Control

- A Power monitoring and control system of the same manufacturer as the electrical distribution equipment.**
- B Provide power monitor at main breaker and branch panels to obtain individual loads (lighting receptacle, mechanical equipment, kitchen, etc. per IBD requirement).**
- C Monitoring system to be its own dedicated system, separate from BAS system**

260923 Lighting Controls

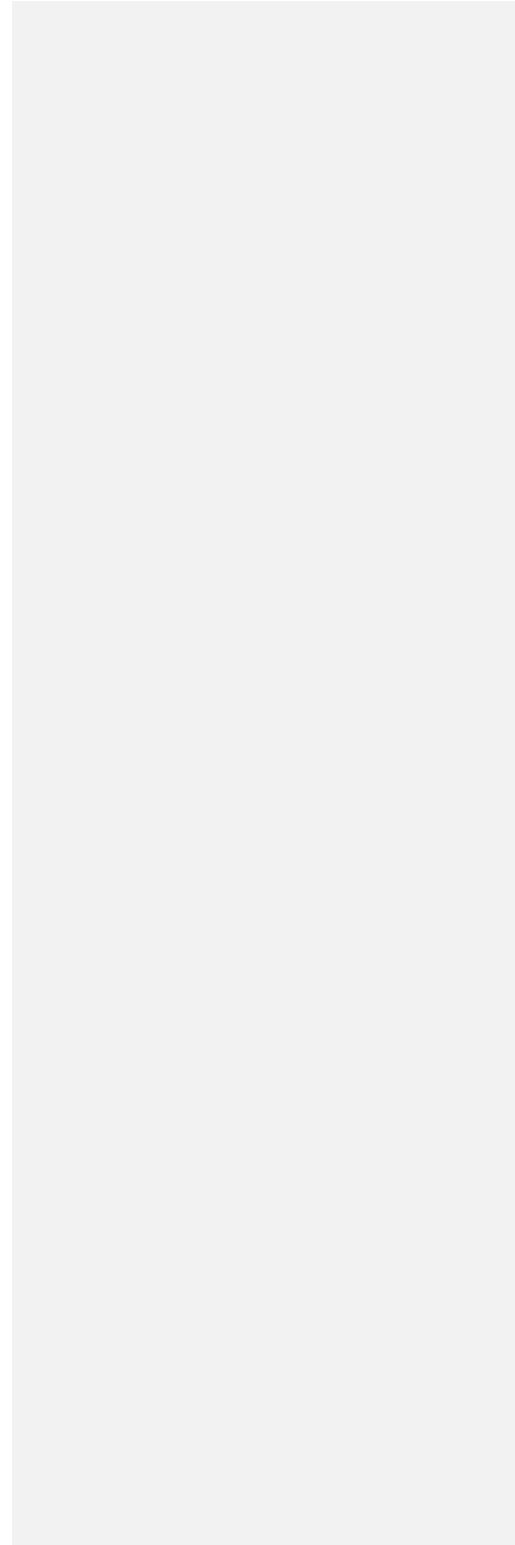
- A All controls to meet or exceed current version of ASHRAE 90.1**
- B Line voltage relays with occupancy sensors is the standard for existing facilities**
Digital lighting controls will be considered for new projects or additions conditional to District approval. Control systems to not require reprogramming settings if a luminaire or driver is switched out.
- C Wireless devices to be evaluated case by case. No battery operated devices allowed**
- D Classrooms (including shops, CIE, Maker Spaces, labs, **Special Education**)**
 - Use Dual technology sensors with override off switches located at entry doors**
 - Provide capability to lockout classroom sensors during school hours**

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

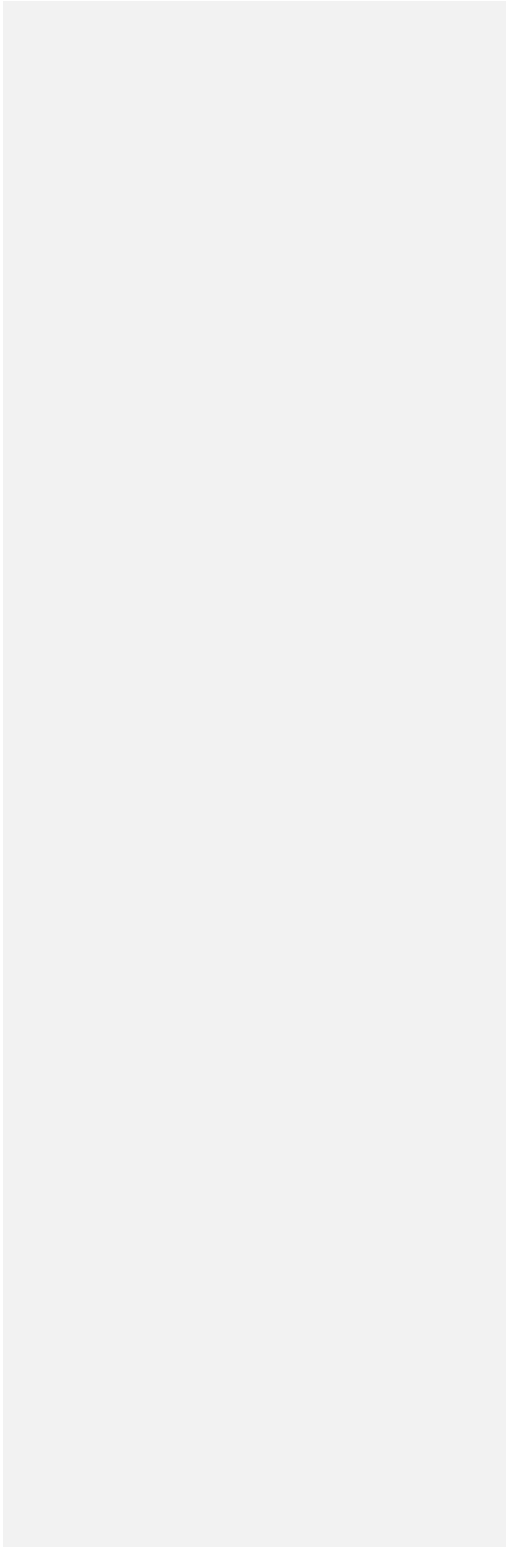
260961 Dimming and Controls for Theater Lighting

- A Include system components and fabrication requirements for dimmers, relays, control stations, control consoles, Stage Manager's Panel, Emergency Lighting Transfer Devices, digital data network and other stage lighting control devices**
- B Provide dimmers, relays, control receptacles, control stations and processors for a complete lighting control system for general lighting, work lighting and stage lighting in the auditorium and stage, and in the Drama Classroom/ Back Box**
- C Systems shall be configurable via software, firmware and hardware, utilizing Ethernet and other non-proprietary means**
- D Include requirements for full system commissioning by factory, along with user training in operation and maintenance**

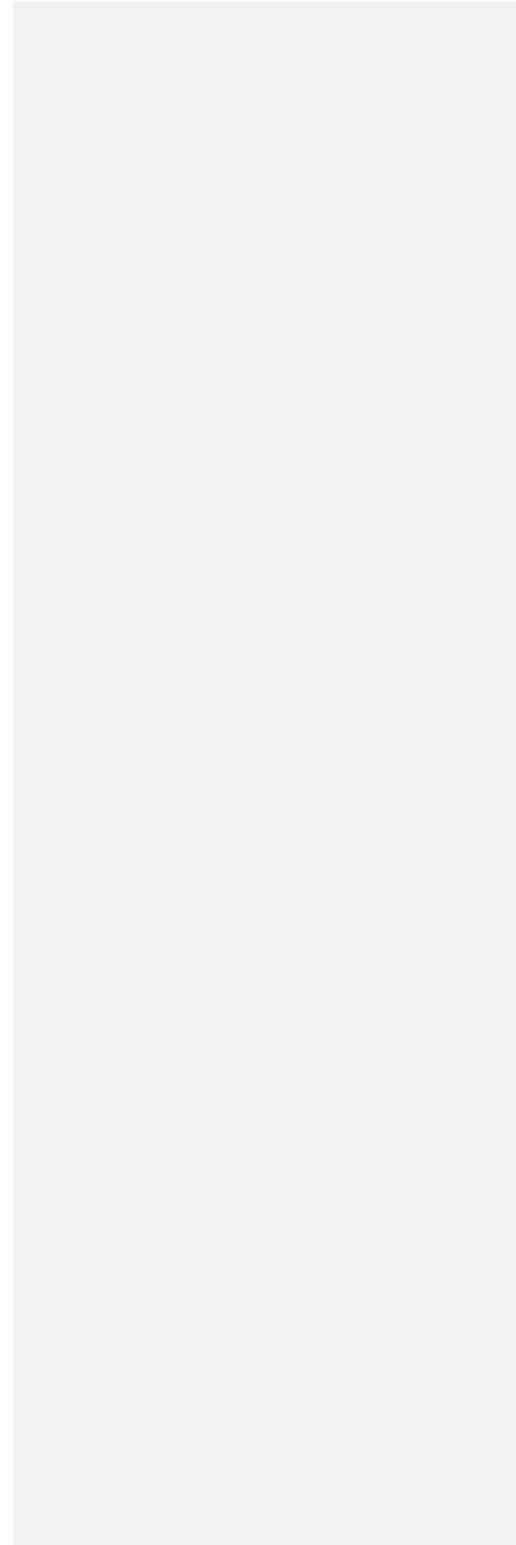
FORLANDPUBLICSCHOOLS



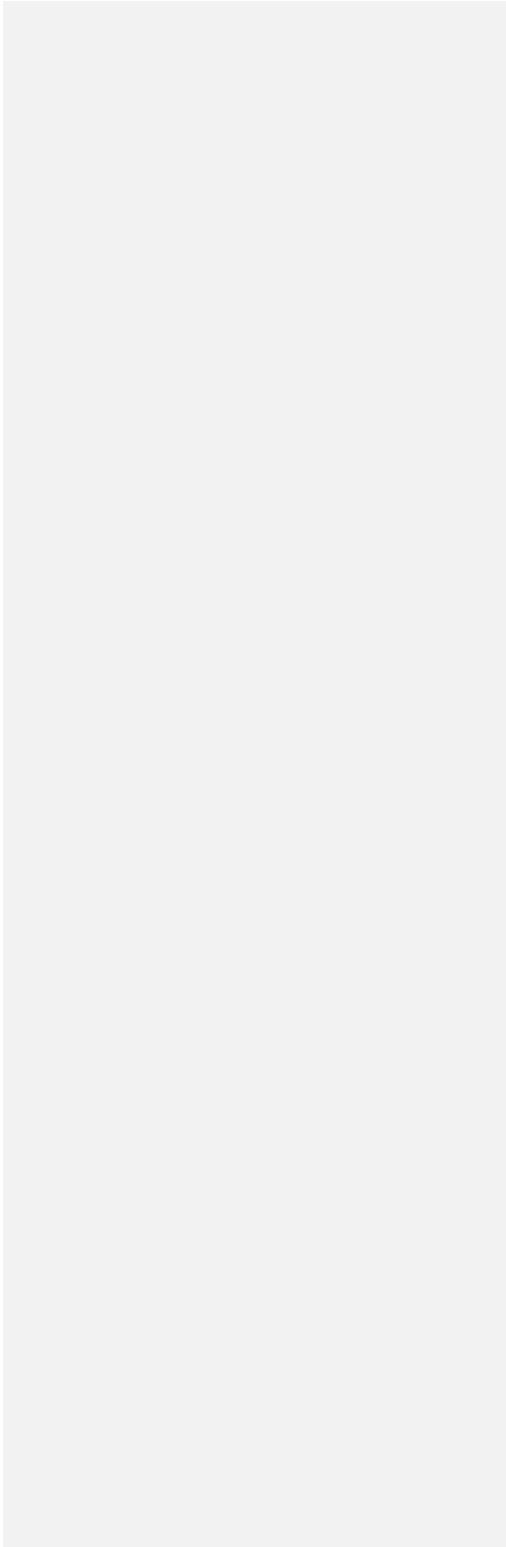
**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



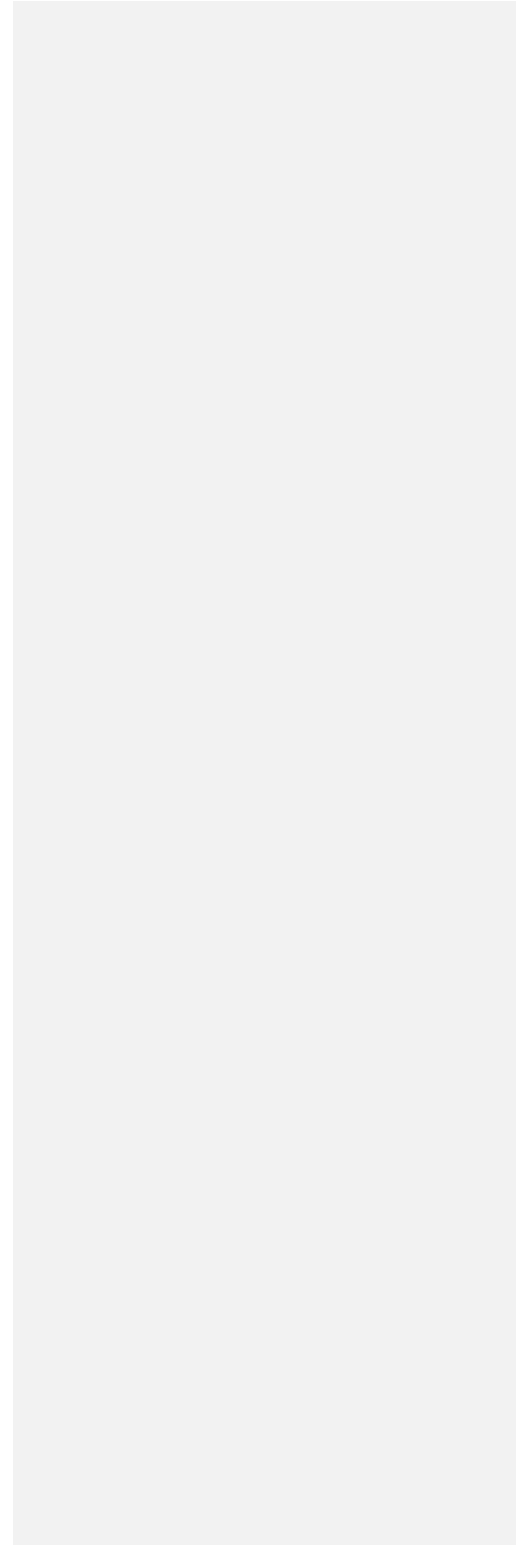
FORLANDPUBLICSCHOOLS



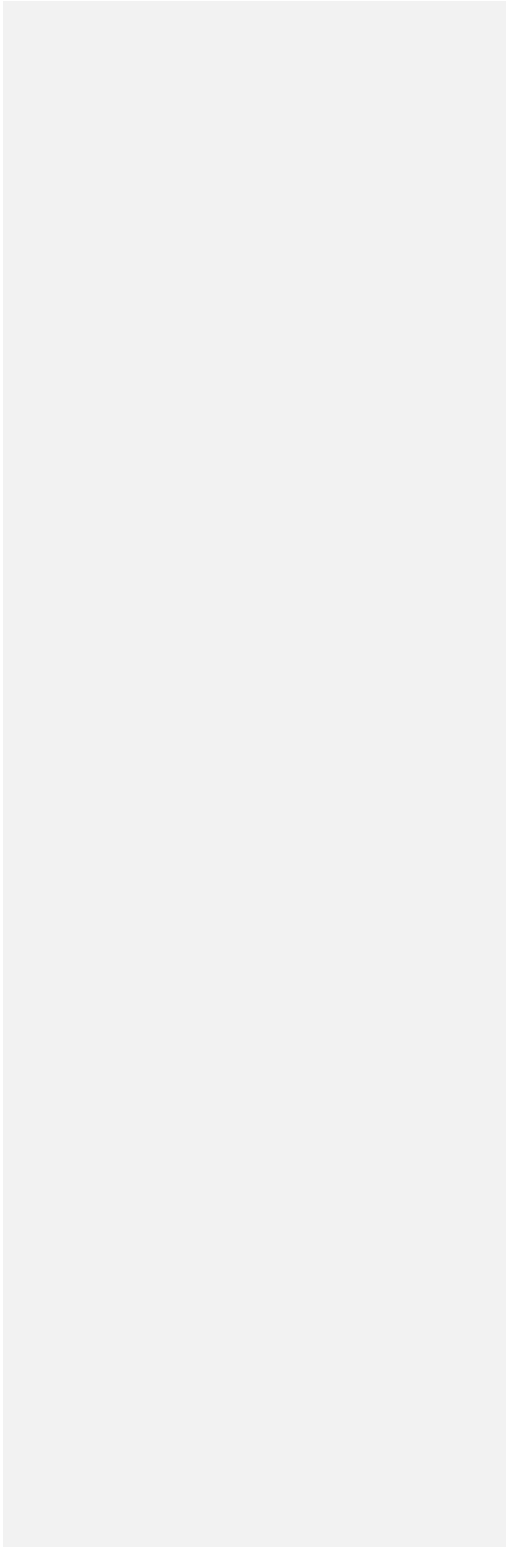
**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



**FORLANDPUBLICSCHOOLS
TECHNICALDESIGNANDCONSTRUCIONSTANDARDS**

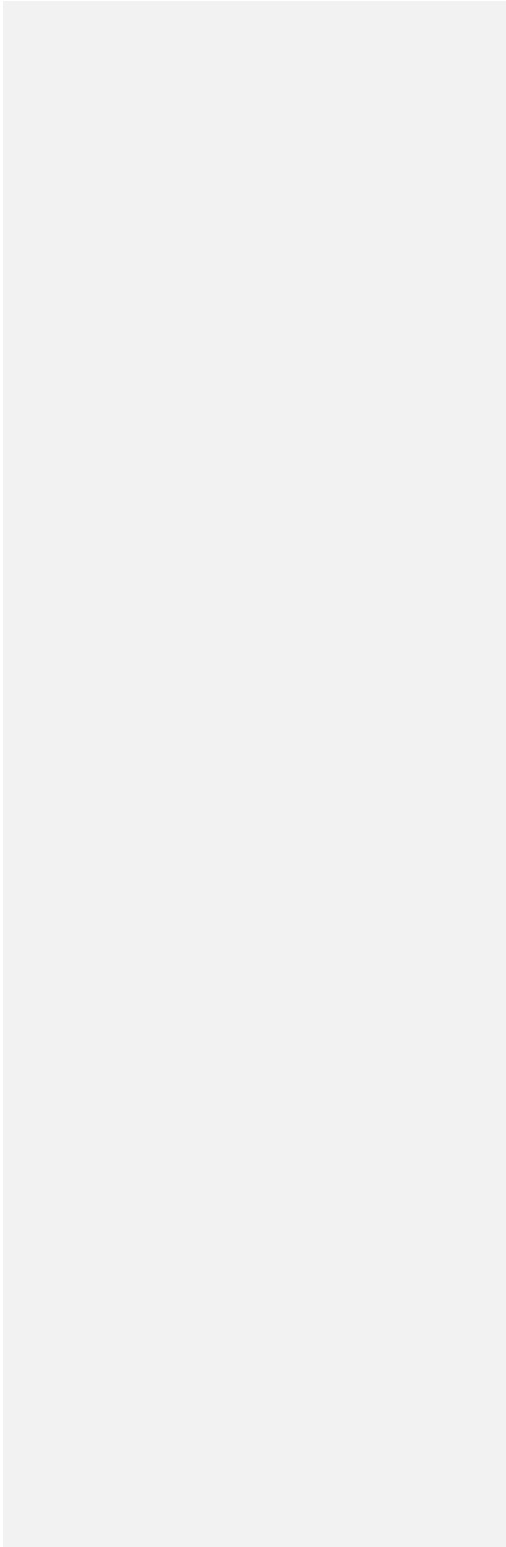


**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

d. Alternator output voltage diff. not more than plus or minus percent of rated



**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

- c Provide ability to remove the load bank off line from operation with a remote normally closed set of auxiliary contacts from a transfer switch or other device. In the event of the remote contact opening all load is removed**
- d Provide Radiator/Duct mounted load bank as a supplemental load to the generator set sized at**

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

26-4200 Cathodic Protection

A Corrosion Control

Systems piping shall be installed with corrosion control integrated into the approach

Underground systems protected by cathodic protection magnesium anodes or impressed direct current.

26-4313 Surge Protection Devices

A Same manufacturer being provided for switch boards and panel boards

B Compatible with the electrical system voltage, current, system configuration and intended applications and NRTL listed for such application

C Parallel design only with individual protection components

Line to Ground and line to line for Delta and High Resistance Grounded systems

Line to Ground, Line to Neutral and Neutral to Ground for Wye and Single Phase distribution systems

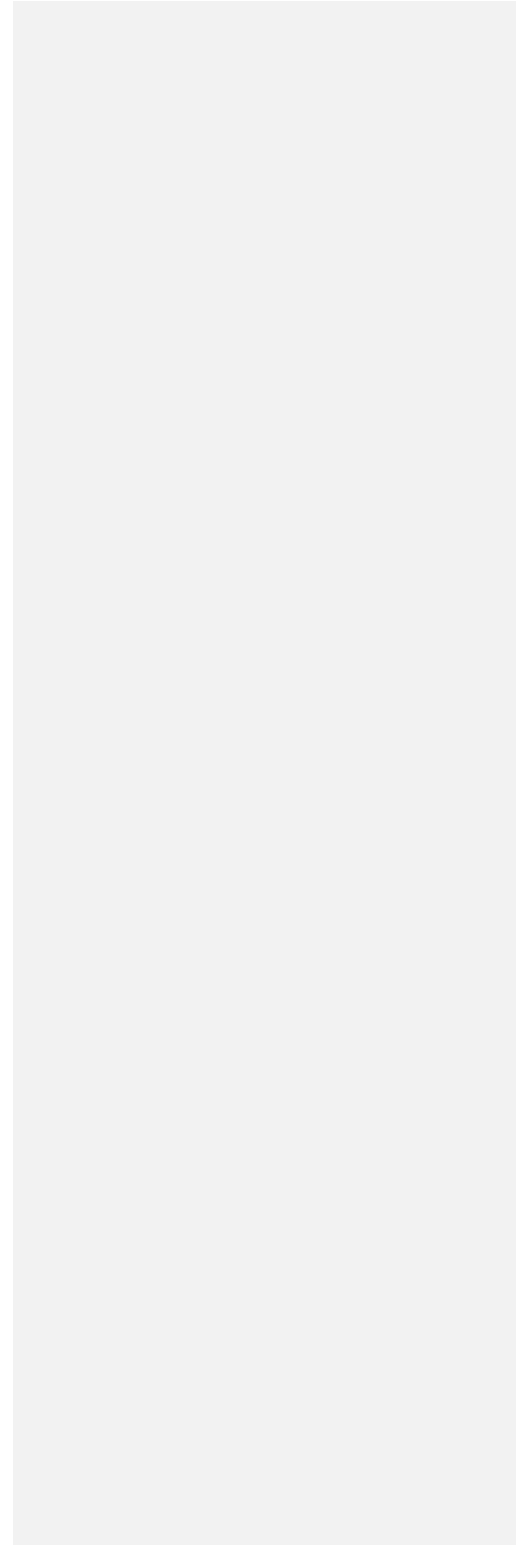
D Short Circuit Current Ratings (SCCR): Suitable for location SFDs to be installed

E Visual indication of protection status on each phase, visible from the front of the equipment

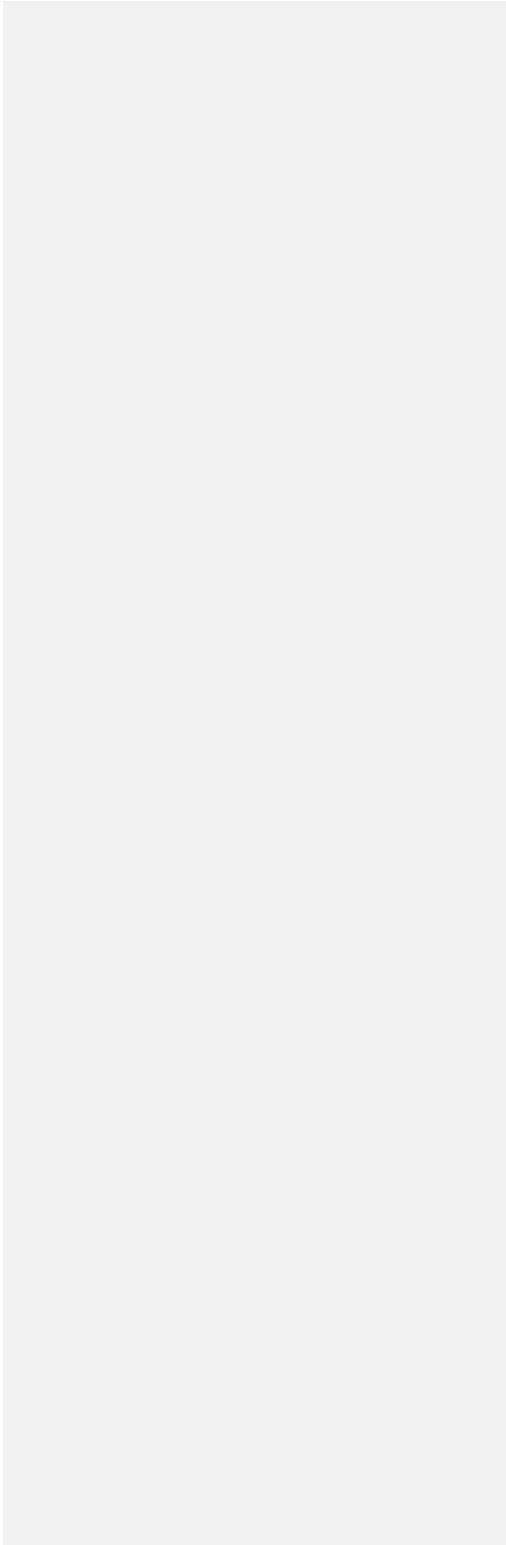
F Protection Status

Normally open and normally closed contacts for remote monitoring

**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**

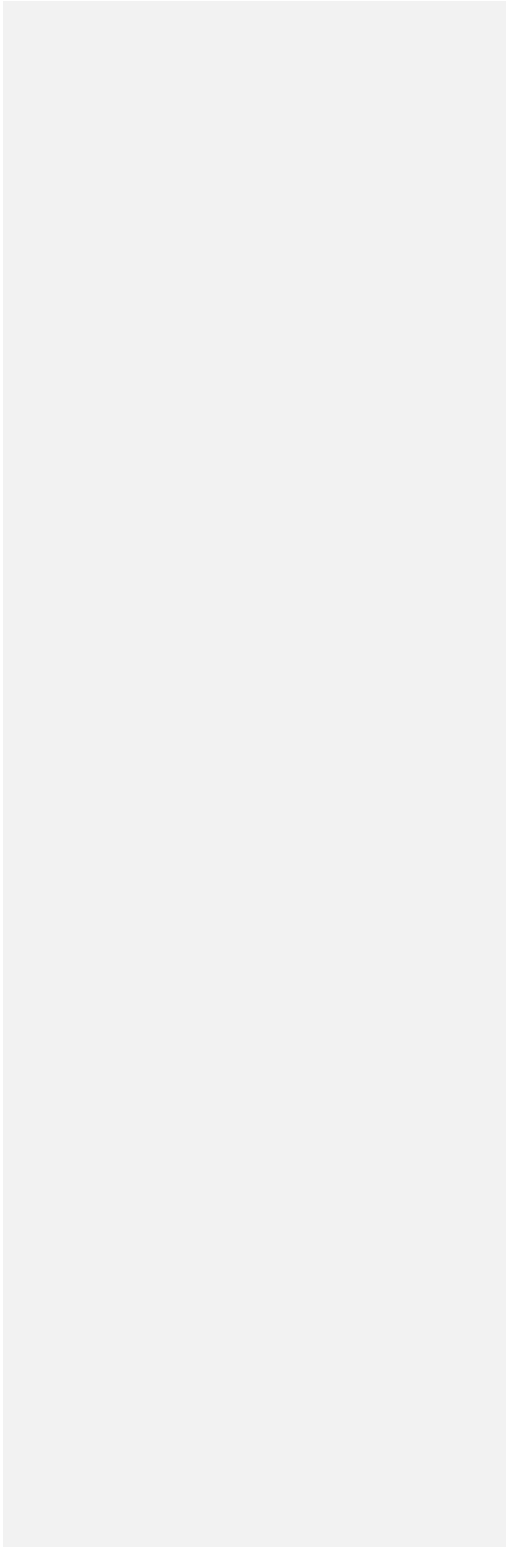


**PORTLAND PUBLIC SCHOOLS
TECHNICAL DESIGN AND CONSTRUCTION STANDARDS**



Revision August/January 3122, 2023

**FORLANDPUBLICSCHOOLS
TECHNICALDESIGNANDCONSTRUCIONSTANDARDS**



Revision August :

