

Electrical Passive Fire Protection for Nuclear Power Plants

Substations · Cable Galleries · Control Rooms · Safety-Critical Circuits

Section A | Electrical Zone-Wise Fire Risk Map

A1. Substations, MCC Rooms & Cable Galleries

Cable spreading rooms (main + redundant), main / emergency / supplementary control rooms, Class 1E switchgear, and containment electrical penetrations.

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Main cable spreading room (CSR)	Browns Ferry propagation scenario	Nuclear-qualified cable coatings + transverse firestops	Non-negotiable
Redundant / Div II cable spreading room	Independent-division fire integrity	Nuclear-qualified cable coatings + 3-hr firestops	Non-negotiable
Main control room (MCR)	Panel fire + external propagation	Panel FP, firestops, 3-hr FR doors	Non-negotiable
Emergency control room (ECR)	Must function if MCR is lost	Panel FP, firestops, 3-hr FR doors	Non-negotiable
Supplementary control room (SCR)	Redundant control	Panel FP, firestops, FR doors	Critical
Class 1E switchgear rooms	Safety-class cable + switchgear fire	Cable coatings, firestops, panel FP	Non-negotiable
Class 1E battery rooms	H ₂ + thermal runaway	Firestops, FR doors, panel FP	Critical
Containment electrical penetration assemblies (EPAs)	Cable fire at RPV / containment boundary	Qualified firestop assemblies + fire-survival cable coatings	Non-negotiable
Generator transformer yard	Transformer oil fire	Fire walls with firestopped penetrations, cable wraps	Critical

A2. Safety-Critical Electrical Systems

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Essential service water pump house	Must survive design-basis fire	Fireproofed structure, FR cables	Non-negotiable
Class 1E emergency DG (EDG)	Fuel + lube oil fire, must start on demand	Panel FP, firestops, fire-survival cable	Non-negotiable
Emergency core cooling system (ECCS) cables	Cable fire to ECCS pumps	240-min fire-survival cable coatings	Non-negotiable
Reactor protection system (RPS)	Trip circuit integrity during fire	Nuclear-qualified fire-survival cable	Non-negotiable

Section B | Product-to-Application Matrix

This section maps each of the four priority Stanvac product lines to the specific nuclear power plants locations and circuits where they must be specified. Use these tables to build the bill of quantities (BOQ) for any nuclear power plants opportunity.

B1. Cable Coatings — Fire Propagation Prevention

Minimum 240 minutes protection, thickness ≤ 1.6 mm DFT.

Purpose: prevent the spread of fire along cable trays, risers and bunches. The "Browns Ferry" scenario — one cable igniting an entire cable gallery — is the design basis.

Applicable standards: IEC 60332-3 (FM 3971 has limited use — it provides only short-duration protection against arcs and sparks)

Zone	Specific Application	Priority
Main and redundant cable spreading rooms	All cable trays with nuclear-qualified coating	Non-negotiable
Class 1E cable galleries (Div I & Div II)	Separated galleries, coating each	Non-negotiable
Containment internal cable trays	All trays inside containment	Non-negotiable
Fuel handling building cable routes	All cable trays	Critical
Turbine hall overhead cable trays	Above lube oil system	Critical

Zone	Specific Application	Priority
Switchyard / GIS cable gallery	Incoming and outgoing HV cables	Critical
EDG building cable trays	Emergency DG power and control	Non-negotiable
Essential service water pump house cables	Power and control cables	Non-negotiable
Control building under-floor cables	All incoming marshalling	Critical
Safety-class instrumentation cable trays	All Class 1E I&C cables	Non-negotiable

B2. Cable Coatings — Fire Survivability

240-minute circuit integrity, thickness ≤ 1.6 mm DFT.

Purpose: keep the cable electrically functional while burning, so the safety circuit continues to operate through the fire event. Fire-survival coatings are specified where loss of the circuit would defeat the fire-fighting or shutdown system itself.

Applicable standards: IEC 60331-21 and IS 17505-1

Circuit Type	Where Applied	Priority
Reactor protection system (RPS) cables	Sensor to logic to actuator	Non-negotiable
Engineered safety features (ESF) actuation	ECCS, AFW, HPCI actuation	Non-negotiable
Class 1E EDG start & load sequencing	Battery to engine panel	Non-negotiable
Fire water pump power (electric + diesel)	Switchgear to motor	Non-negotiable
Post-accident monitoring (PAM) instruments	Containment sensors to MCR	Non-negotiable
Remote shutdown system cables	MCR abandonment scenario	Non-negotiable
Containment isolation valve controls	Isolation valve actuation	Non-negotiable
Emergency lighting + PA / GA	Plant-wide egress	Critical
Class 1E DC distribution feeders	Battery to critical loads	Non-negotiable
Off-site power & station service transfer	Transfer logic + actuation	Non-negotiable

B3. Electrical Panel Fireproofing

Purpose: protect field control panels, junction boxes, MCC panels and logic cabinets from external fire and internal electrical fire. Stanvac offers three complementary solutions under this product line.

Option	Stanvac Solution	Description & Typical Use
A	Two-hour rated firestop sealant	For sealing cable gland openings, panel cut-outs, conduit entries and small penetrations at the panel boundary. Silicone / acrylic intumescent sealant certified to UL 1479 / IS 12458 at 2-hour rating.
B	Non-combustible intumescent paint	For external coating of panel enclosures, cable glands and junction boxes exposed to radiant heat or hydrocarbon fire. Non-combustible base with intumescent top-coat.
C	Two-hour rated intumescent translucent coating for small-dia. cables (aerosol spray)	Aerosol-delivered translucent intumescent coating for small-diameter instrumentation, control and signal cables entering panels. Clean application in congested panel interiors; 2-hour rated.

B4. Two-Hour Rated Firestop Barriers

Hybrid combination of mineral wool and firestop mortar.

Purpose: seal every penetration through a fire-rated wall, floor or cable tunnel so compartmentation is maintained. Stanvac's hybrid system combines high-density mineral wool (for bulk void filling and thermal insulation) with firestop mortar (for load-bearing, smoke-tight surface seal). This dual-material approach delivers superior 2-hour rating performance across a wider range of penetration sizes than single-material systems.

Applicable standards: UL 1479 · ASTM E814 · IS 12458

Location	Specific Application	Priority
Containment electrical penetration assemblies (EPAs)	Qualified firestop assembly at every cable penetration	Non-negotiable
Cable spreading room boundary penetrations	All penetrations at 3-hr rating	Non-negotiable
MCR and ECR external wall cable entries	All marshalling bundles, 3-hr	Non-negotiable
Class 1E switchgear room boundaries	Cable + tray penetrations	Non-negotiable
Cable tunnel transverse barriers	Every 20–30 m, 3-hr	Non-negotiable
Fire area boundaries between safety divisions	Independent-division separation	Non-negotiable
Battery / UPS room boundary	Cable and ventilation duct penetrations, 3-hr	Critical

Location	Specific Application	Priority
EDG building boundary	Fuel line and cable penetrations, 3-hr	Non-negotiable
Fuel handling building boundary	Cable and HVAC penetrations	Critical
Turbine building to control building	All cable entries at boundary	Critical
HVAC duct penetrations across fire areas	Fire dampers + collar seals, 3-hr	Critical

Detailed product data sheets, certifications, specimen specifications and project BOQ support are available on request.

For more information, please connect with us.

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