Electrical Passive Fire Protection for Hydro-Electric Power Plants

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

Section A | Electrical Zone-Wise Fire Risk Map

A1. Substations, MCC Rooms & Cable Galleries

Generator hall electrical cabinets, transformer yard, cable tunnels to surface switchyard, GIS hall, and the main / unit control rooms.

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Generator cubicle / AVR cabinets	Stator fire exposure, cable fire	Panel FP, cable coatings	**Critical**
Generator transformer (outdoor)	Transformer oil fire	Fire walls with firestopped penetrations, cable wraps	**3 hr / Critical**
Station / auxiliary transformer	Transformer oil fire	Fire walls, cable wraps	**Critical**
GIS hall / switchyard control	SF_6 leak, cable fire	Cable coatings, firestops, panel FP	**Critical**
Cable tunnels (generator hall to surface)	Propagating cable fire	Cable coatings + transverse firestops every 30 m	**3 hr / Critical**
11 kV / 6.6 kV auxiliary switchgear	Cable + arc fault fire	Cable coatings, firestops, panel FP	**Critical**
LT switchgear & MCC	Cable + panel fire	Panel FP, cable coatings, firestops	**Critical**
Main control room / SCADA	Panel + cable fire	Panel FP, firestops, FR doors	**2 hr / Critical**
Battery room (220 V DC)	H_2 accumulation	Firestops, FR doors, panel FP	**Critical**
UPS room	Thermal runaway	Firestops, FR doors, panel FP	**High**

A2. Safety-Critical Electrical Systems

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Fire water pump house	Must survive the fire it fights	Fireproofed structure, FR cables	**Critical**
Governor / turbine over-speed trip	Trip circuits must survive fire	Fire-survival cable, panel FP	**Non-negotiable**
Penstock / MIV emergency closure	Actuation solenoid + limit switch	Fire-survival cable	**Non-negotiable**
Black-start DG start circuit	Battery to engine panel	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 hydro-electric power plants locations and circuits where they must be specified. Use these tables to build the bill of quantities (BOQ) for any hydro-electric 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
Cable tunnels — generator hall to surface	Full-length coating + transverse firestops every 30 m	**Critical**
Generator hall overhead cable trays	All cable trays above generator floor	**Critical**
11 kV / 6.6 kV switchgear cable gallery	Incoming and outgoing	**Critical**
Switchyard outdoor cable trenches	Inter-bay cable routes	**Critical**
Main control room under-floor cables	All incoming cables	**High**
Turbine pit / spiral casing cable routes	Instrumentation + power	**High**

Zone	Specific Application	Priority
Gate operator control cable routes	Penstock intake and draft tube	**High**
Auxiliary transformer cable entry	Primary and secondary	**High**
DG room cable routes	Start, alternator, control	**High**
Fire water pump house cable	Incomer + motor	**Critical**

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
Generator emergency trip / protection	Differential, earth fault, over-voltage relaying	**Non-negotiable**
Turbine over-speed / governor trip	Over-speed sensor to governor oil dump valve	**Non-negotiable**
Fire water pump power (electric + diesel)	Switchgear to motor; battery to diesel	**Non-negotiable**
Black-start DG start circuit	Battery to engine panel	**Non-negotiable**
Penstock emergency closure (MIV, butterfly valve)	Actuation solenoid + limit switch	**Non-negotiable**
F&G detection (H_2 in battery room, generator)	Detector to panel	**Critical**
Emergency lighting + PA / GA	Plant-wide egress including tunnels	**Critical**
UPS feeders to SCADA and protection	UPS to relay panels	**Critical**
Dam spillway gate emergency control	Spillway gate actuation	**Non-negotiable**
Flood warning / siren circuits	Downstream warning system	**Critical**

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
Cable tunnel transverse barriers	Every 30–50 m + at tunnel ends	**Critical**
Generator hall to tunnel entry	Wall and cable entry penetrations	**Critical**
Switchgear room cable entries	Trench + floor penetrations	**Critical**
Control room external wall cable entries	All marshalling bundles	**Critical**
Battery / UPS room boundary	Cable and ventilation duct penetrations	**Critical**
Transformer bay fire wall penetrations	HT/LT + control cable openings	**Critical**
Fire water pump house entries	Power and control cable penetrations	**Non-negotiable**
DG room boundary	Fuel line and cable penetrations	**Critical**

Location	Specific Application	Priority
Spillway / gate gallery cable entries	Cable and instrumentation penetrations	**High**
HVAC duct penetrations in CCR / battery	Fire dampers + collar seals	**High**

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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