

## Electrical Passive Fire Protection for Oil Refineries

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

### Section A | Electrical Zone-Wise Fire Risk Map

#### A1. Substations, MCC Rooms & Cable Galleries

The core electrical infrastructure of a refinery — central and satellite substations, MCC and switchgear rooms, cable spreading rooms, cable tunnels, transformer yards, control rooms and battery rooms. External hydrocarbon exposure (pool fire, jet fire, blast overpressure) and internal electrical events (arc flash, transformer fire, cable propagation) must both be designed for.

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Main / central substation	Transformer and cable fire	Cable coatings, firestop seals, fire-rated doors, intumescent pillows	<b>2-3 hr / Critical</b>
PIB / satellite substation (in-unit)	External HC jet fire plus internal cable fire	Blast + jet-fire rated wall coatings, H-rated cable transits, FR glands	<b>H120 + 2 hr / Critical</b>
MCC / switchgear rooms	Arc flash, short-circuit cable fire	FR cable trays, intumescent panel gaskets, firestop mortar at trenches	<b>2 hr / Critical</b>
Cable spreading rooms and basements	Propagating cable fire (Browns Ferry scenario)	Intumescent cable coating, transverse fire barriers every 30 m, slab firestops	<b>3 hr / Critical</b>
Cable trenches and tunnels	HC ingress plus cable fire	Coating, sand-seal, firestop pillows at exits, sealed covers	<b>2 hr / Critical</b>
Overhead cable racks in process area	Pool fire from below, radiant heat	Intumescent cable coating, ablative wrap, FR tray system	<b>H60 / H120</b>
Transformer yards	Oil fire leading to cable propagation	Fire walls with firestopped penetrations, cable wraps	<b>3 hr / Critical</b>

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Control room (CCR / RIE / SIS)	External explosion plus internal cable fire	Blast and fire-rated panels, firestops at cable entries, FR SIS cable	<b>H120 + 2 hr / Critical</b>
Battery / UPS rooms (incl. Li-ion)	H <sub>2</sub> accumulation, thermal runaway	FR doors, firestops, intumescent gaskets	<b>2 hr / High</b>

## A2. Safety-Critical Electrical Systems

These systems must remain operational throughout the fire event in order to control or extinguish it. Fire-survival cable integrity is mandatory under IEC 60331-21 and BS 6387 CWZ; failure to specify is an OISD non-compliance.

Area	Fire Scenario	Stanvac PFP Product Application	Rating / Priority
Fire water pump house	Must survive the fire it fights	Fireproofed structure, FR cables to motors, firestops	<b>2-3 hr / Critical</b>
ESD / F&G cable routing	Circuit integrity during fire	Fire-survival cable coating, ablative wrap, FR trays	<b>IEC 60331 / BS 6387 CWZ / Non-negotiable</b>

## Section B | Product-to-Application Matrix

This section maps each of the four priority Stanvac product lines to the specific oil refineries locations and circuits where they must be specified. Use these tables to build the bill of quantities (BOQ) for any oil refineries 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 spreading room / basement	All cable trays, risers, bunches (Browns Ferry scenario)	<b>Critical</b>
Main substation cable gallery	Incoming and outgoing HT and LT cable trays	<b>Critical</b>

Zone	Specific Application	Priority
MCC / switchgear cable trenches	Bottom-entry cable bunches	High
Overhead cable racks in process area	Trays running above pump rows, under pipe racks	Critical
Cable tunnels (substation to plant)	Full-length coating plus transverse breaks every 30–50 m	Critical
Control room under-floor void	All incoming multi-core and fibre-optic cables	High
Tank farm cable routing	Trays to MOVs, level transmitters, rim-seal detectors	High
Fire water pump house	Incomer and motor cables	Critical
Loading gantry cable runs	Earthing, interlock, MOV cables	High
Flare area cable routing	KO drum, ignition, monitoring cables	Medium

## 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
ESD (Emergency Shutdown) loops	Field SDVs to logic solver to CCR	Non-negotiable
Fire and Gas (F&G) detection	Detector to F&G panel to CCR	Non-negotiable
Fire water pump power	Switchgear to motor (electric and jockey pump)	Non-negotiable
Deluge / foam system controls	Solenoid and MOV actuation circuits	Non-negotiable
SIS / Safety Instrumented System	Sensor to marshalling to logic solver	Critical
Emergency lighting and PA / GA	Throughout plant and CCR egress routes	Critical
Blowdown valve actuation	BDV solenoids and feedback	Critical
UPS feeders to critical loads	UPS to DCS / SIS / F&G	Critical

Circuit Type	Where Applied	Priority
Relief valve position indication	PSV feedback to DCS	High
Diesel FW pump starter cables	Start battery to engine panel	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
Substation cable trench to building entry	Sand-seal + firestop pillows + mortar	Critical
Wall between MCC and switchgear room	Cable & cable-tray penetrations	Critical
Floor slab penetrations in multi-floor substation	Cable, tray, conduit, busduct openings	Critical

Location	Specific Application	Priority
Control room external wall cable entries	Marshalling cable bundles	Critical
Transverse barriers in cable tunnels	Every 30–50 m + at each end	Critical
CCR under-floor cable void boundary	Slab penetrations + void sealing	Critical
Battery / UPS room boundary	Cable + ventilation duct penetrations	High
Transformer bay fire wall penetrations	HT/LT + control cable openings	Critical
FW pump house entries	Power + control cable penetrations	Critical
Cable spreading room entries	Perimeter seal + penetration firestop	Critical
HVAC duct penetrations in substation	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.**

*Stanvac Chemicals India Ltd · Passive Fire Protection Division*