

Conduit Sealing & Boundary Verification:

Hazardous-Location Gas Migration Control

A field checklist for sealing fittings at classified-area boundaries

Pressurizing a substation to keep explosive gas out is useless if a hollow conduit runs straight from the process yard into the switchgear trench. This checklist captures the verification steps that prevent the failure mode behind a documented propane explosion — heavy vapor that migrated through unsealed conduits, bypassed the building's pressurized walls, and was ignited by a contactor.

Use it during commissioning, turnaround inspections, and boundary audits wherever conduits cross from a classified area into a building. Sign each line. Remember: an empty sealing fitting is not a seal.

COMPANION RCA

The Unsealed Conduit: Propane Gas Ignition

AUDIENCE

E&I crews, hazardous-location inspectors, commissioning engineers

STANDARDS

NEC 501.15(B)(2), CEC Section 18, NFPA 496, API RP 500

Use this checklist wherever conduit crosses from a classified area into a building or unclassified space. Each item must be verified by the qualified person on site. If you cannot confirm a seal is filled and hardened, treat the boundary as breached.

1. SEALING FITTING INSPECTION

☐ **Sealing fittings installed at every classified-area boundary.**

EYS / EZS fittings present on each conduit run exiting a Class I location into an unclassified space (NEC 501.15(B)(2)).

☐ **Sealing compound verified poured and hardened.**

Confirm the fitting is filled with compound (for example, Chico A) and set — not just the outer fitting in place.

☐ **Dams installed correctly before the pour.**

Fiber filler packed so compound surrounds each conductor and does not leak out during the pour.

PASS CRITERIA – SEAL INTEGRITY

Each boundary seal is **filled and hardened**, dammed, with compound fully surrounding every conductor. Where fill cannot be confirmed, open and re-pour. A fitting with no compound provides zero gas barrier.

2. CONDUIT AND CABLE INTEGRITY

☐ **Conductors separated inside the fitting.**

Cables spread so the compound surrounds each conductor rather than bridging them in a bundle.

☐ **Empty and spare conduits plugged.**

Any unused or spare conduit entering the building is fitted with a listed, gas-tight mechanical plug.

☐ **Conduit threads fully engaged and tight.**

Full thread engagement maintains the explosion-proof and gas-tight integrity of the run.

3. BUILDING BOUNDARY VERIFICATION

☐ **Wall and floor penetrations sealed gas-tight.**

All cable and conduit penetrations sealed with listed fire-stop and gas-tight materials.

☐ **Building pressurization verified functional.**

Pressurization confirmed in service and holding positive pressure — but never credited as a substitute for conduit seals.

PASS CRITERIA – PRESSURIZATION

Pressurization maintains positive pressure of at least **0.1 in. w.c.** relative to the surrounding area (NFPA 496) AND every boundary conduit is sealed. Pressure without seals does not stop vapor traveling inside the conduit bore.

4. GAS DETECTION & IGNITION CONTROL

☐ **LEL detectors in trenches and basements connected to process areas.**

Combustible-gas detectors installed in cable trenches and crawlspaces, calibrated, and tied to the emergency shutdown.

☐ **Ignition sources reviewed against migration risk.**

Area classification re-examined where conduits or trenches could carry vapor into spaces with standard switching equipment.

REFERENCE STANDARDS

- **NEC 501.15(B)(2) / 501.15(A)(4)** — Class I boundary conduit seals (Division 2 and Division 1)
- **CEC Section 18** — Hazardous location classification, sealing, and equipment
- **NFPA 496** — Purged and pressurized enclosures for electrical equipment
- **API RP 500** — Classification of locations for electrical installations
- **OSHA 29 CFR 1910.307** — Electrical installations in hazardous (classified) locations

DISCLAIMER & LIMITATION OF LIABILITY

This checklist is provided for educational and informational purposes only. It is a general industry reference, not a site-specific procedure, engineering specification, or legal compliance document. It does not replace the judgement of a qualified person, professional engineer, or authority having jurisdiction (AHJ).

Codes, standards, and regulations are revised periodically and vary by jurisdiction. **Verify the current edition of all referenced codes (CEC, NEC, CSA, NFPA, API, OSHA) and any provincial, state, or local amendments that apply to your work site before relying on the items listed here.** Where any conflict exists between this checklist and the applicable code, regulation, or your employer's safe work procedure, the code, regulation, or procedure governs.

ELI Intelligence and the authors of this material disclaim all liability for any loss, injury, or damage arising from the use of, or reliance on, this checklist. Use at your own risk and only under the supervision of competent persons trained for the work being performed.

GET THE FULL RCA AND THE NEXT CHECKLIST

This checklist accompanies the full incident analysis at safetyblog.eli-intelligence.com. New incident RCAs and field checklists publish every Friday. Subscribe at the site footer to get them in your inbox the morning they go live.