

OPEN REFERENCE GUIDE

# Fibre Cable Jacket Compliance

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A vendor-neutral guide to the fire-safety jacket standards for optical-fibre cable. It compares NEC (OFNP / OFNR), EU CPR Euroclasses, and IEC LSZH across three regions.

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**FOR**

Specifiers, designers, integrators

**BASIS**

NEC / NFPA / UL · EU CPR · IEC

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## 1 Why the cable jacket matters

The jacket is the outer layer of an optical-fibre cable. In this guide, "jacket" always names this outer layer. Fire-safety rules apply to the whole cable, not to the jacket alone. But the jacket is a critical part of how the cable meets these rules. It strongly controls how the cable behaves in a fire.

Three regions set three independent fire-safety regimes for the jacket:

- North America: NEC, NFPA and UL.
- Europe: the EU Construction Products Regulation (CPR).
- Asia-Pacific and the wider world: IEC LSZH tests.

The three regimes test the jacket in different ways. Their tests do not translate one-to-one. So one cable specification must map against three separate regimes. This guide compares the three regimes in neutral terms.

Two fire concepts matter, and the guide keeps them apart:

- Reaction to fire: how much a cable adds to a fire.
- Fire resistance: whether a circuit keeps working during a fire.

A reaction-to-fire class measures the contribution of a cable to a fire.<sup>1</sup> It does not measure fire resistance. Fire resistance is circuit integrity. A separate standards family covers it. This guide does not cover fire-resistance standards such as EN 50200 or IEC 60331. This guide covers reaction-to-fire jacket standards only.

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1. EN 13501-6 — reaction-to-fire classification of cables.

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## 2 North America: NEC, NFPA and UL

In North America, the cable carries a listing tied to its install location. The listing is a pass or fail result. It is not a graded result. The Authority Having Jurisdiction (AHJ) enforces the listing on site. NEC (NFPA 70) Article 770 governs optical-fibre cable listings.<sup>2</sup>

The install location sets the required cable type. The type name also shows if the cable has a metallic member.

Each type name follows a pattern. "OF" means optical fibre. The next letter is "N" for nonconductive or "C" for conductive. A nonconductive cable is all-dielectric. It has no metallic member. A conductive cable has a metallic member, such as a metal strength element. The last letter is the fire rating: "P" for plenum, "R" for riser, or "G" for general.

So each install location has a nonconductive type and a conductive type:

- Plenum: OFNP (nonconductive) or OFCP (conductive).
- Riser: OFNR (nonconductive) or OFCR (conductive).
- General: OFNG or OFN (nonconductive), or OFCG or OFC (conductive).

The plenum test is NFPA 262 (formerly UL 910), a horizontal Steiner tunnel.<sup>3</sup> Its limits are:

- flame travel  $\leq 5$  ft (1.5 m)
- peak optical smoke density  $\leq 0.50$
- average optical smoke density  $\leq 0.15$

The NFPA 262 setup is:

- tunnel length about 25 ft
- burner 87.9 kW (300,000 BTU/hr)
- burn time 20 min
- forced airflow 240 ft/min (73 m/min)

The riser test is UL 1666, a two-storey vertical shaft.<sup>4</sup> Its setup and limits are:

- cable bundle about 17 ft
- burn time 30 min
- flame propagation height  $\leq 12$  ft (3.66 m) above the burner
- temperature at 12 ft  $\leq 850$  °F (454 °C)

The general test is UL 1685, a vertical-tray test.<sup>5</sup> It checks limited flame propagation only. It sets no smoke limit and no temperature limit.

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2. NFPA 70 (National Electrical Code), Article 770 — optical-fibre cables.

3. NFPA 262 (formerly UL 910) — plenum flame-travel and smoke test.

4. UL 1666 — riser (vertical-shaft) flame-propagation test.

5. UL 1685 — vertical-tray flame-propagation test.

Substitution runs upward only, under NEC Table 770.154(b).<sup>6</sup> A plenum cable may replace a riser cable or a general cable. A riser cable may replace a general cable. A lower type may never replace a higher type.

**Table A — NEC substitution hierarchy.**

| Location | Cable types         | Test standard | Key limits                                                                     | May substitute for |
|----------|---------------------|---------------|--------------------------------------------------------------------------------|--------------------|
| Plenum   | OFNP / OFCP         | NFPA 262      | flame travel ≤ 5 ft (1.5 m); peak optical smoke density ≤ 0.50; average ≤ 0.15 | Riser, General     |
| Riser    | OFNR / OFCR         | UL 1666       | flame height ≤ 12 ft (3.66 m); temperature at 12 ft ≤ 850 °F (454 °C)          | General            |
| General  | OFNG-OFN / OFCG-OFC | UL 1685       | limited flame propagation; no smoke or temperature limit                       | —                  |

<sup>6</sup>. NEC Table 770.154(b) — permitted optical-fibre cable substitutions.

### 3 Europe: the EU Construction Products Regulation

In Europe, the CPR is law. Regulation (EU) No 305/2011 sets this framework.<sup>7</sup> A cable needs a CE mark to enter the EU market. It also needs a Declaration of Performance (DoP). The DoP states the cable's Euroclass. EN 50575 is the harmonised product standard for cables.<sup>8</sup> EN 13501-6 is the classification standard for the Euroclass.<sup>9</sup>

Unlike a US listing, a Euroclass does not depend on the install location. The Euroclass is a graded result. Each EU member state decides where each class may be used.

The main reaction-to-fire test is EN 50399.<sup>10</sup> It uses a bunched-cable vertical flame and measures heat release and smoke. Table B lists the class limits. Class Aca is the non-combustible class. A calorific-value test (EN ISO 1716) defines it.<sup>11</sup>

The Euroclass hierarchy runs from best to worst: Aca > B1ca > B2ca > Cca > Dca > Eca > Fca.

B2ca is typically the highest class available in optical-fibre cables. B1ca and Aca are stricter and rare. They sit above B2ca on the scale. Aca is effectively non-combustible.

The B1ca and B2ca limits look counter-intuitive:

- B1ca allows a flame spread of 1.75 m.
- B2ca allows a flame spread of 1.5 m.
- B1ca is still the better class.

B1ca is better because its test uses a stronger 30 kW flame source. The B2ca test uses a 20.5 kW flame source. A class that resists a stronger flame ranks higher.

A CPR Euroclass measures reaction to fire. It does not measure fire resistance or circuit integrity.

**Great Britain and UKCA note.** Great Britain still recognises CE-marked DoPs alongside the UKCA mark. The 2024–2026 construction-products reform extended this recognition. No hard cut-off is in force. Northern Ireland follows EU CPR. This framework is under active reform. Verify the rules at the time of use.

**Table B — Euroclass matrix (EN 13501-6).**

| Class | EN 50399 flame source            | FS       | THR1200s | Peak HRR | FIGRA     |
|-------|----------------------------------|----------|----------|----------|-----------|
| Aca   | — (EN ISO 1716: PCS ≤ 2.0 MJ/kg) | —        | —        | —        | —         |
| B1ca  | 30 kW                            | ≤ 1.75 m | ≤ 10 MJ  | ≤ 20 kW  | ≤ 120 W/s |
| B2ca  | 20.5 kW                          | ≤ 1.5 m  | ≤ 15 MJ  | ≤ 30 kW  | ≤ 150 W/s |
| Cca   | 20.5 kW                          | ≤ 2.0 m  | ≤ 30 MJ  | ≤ 60 kW  | ≤ 300 W/s |

<sup>7</sup>. Regulation (EU) No 305/2011 — Construction Products Regulation (CPR).

<sup>8</sup>. EN 50575 — reaction-to-fire requirements for cables (CPR product standard).

<sup>9</sup>. EN 13501-6 — reaction-to-fire classification of cables.

<sup>10</sup>. EN 50399 — bunched-cable heat-release and smoke test.

<sup>11</sup>. EN ISO 1716 — gross heat of combustion (calorific value).

| Class | EN 50399 flame source          | FS          | THR1200s | Peak HRR | FIGRA      |
|-------|--------------------------------|-------------|----------|----------|------------|
| Dca   | 20.5 kW                        | no FS limit | ≤ 70 MJ  | ≤ 400 kW | ≤ 1300 W/s |
| Eca   | — (EN/IEC 60332-1-2 gate only) | —           | —        | —        | —          |
| Fca   | fails Eca / not determined     | —           | —        | —        | —          |

Key: FS = flame spread; THR1200s = total heat release in the first 1200 s; peak HRR = peak heat release rate; FIGRA = fire growth rate index. The section on FIGRA and heat release explains FIGRA, THR and peak HRR.

A full Euroclass also carries suffixes for smoke, droplets and acidity. Commission Delegated Regulation (EU) 2016/364 sets these suffix criteria.<sup>12</sup> The three suffixes are:

- s = smoke.
- d = flaming droplets.
- a = acidity (corrosivity).

The s-suffix grades smoke from the EN 50399 test. The s1, s2 and s3 classes use total smoke production and smoke production rate. The smoke light transmittance from EN 61034-2 splits s1 into s1a and s1b only.<sup>13</sup>

**Table C — smoke (s), droplet (d) and acidity (a) suffixes.**

| Suffix | Criterion                                                                                                          |
|--------|--------------------------------------------------------------------------------------------------------------------|
| s1     | total smoke production (TSP1200) ≤ 50 m <sup>2</sup> AND peak smoke production rate (SPR) ≤ 0.25 m <sup>2</sup> /s |
| s1a    | s1 AND smoke light transmittance ≥ 80 % (EN 61034-2)                                                               |
| s1b    | s1 AND smoke light transmittance 60 % to under 80 % (EN 61034-2)                                                   |
| s2     | TSP1200 ≤ 400 m <sup>2</sup> AND peak SPR ≤ 1.5 m <sup>2</sup> /s                                                  |
| s3     | worse than s2 (no requirement)                                                                                     |
| d0     | no flaming droplets within 1200 s                                                                                  |
| d1     | no flaming droplets that persist more than 10 s within 1200 s                                                      |
| d2     | no requirement                                                                                                     |
| a1     | conductivity ≤ 2.5 μS/mm AND pH ≥ 4.3 (EN 60754-2) <sup>14</sup>                                                   |
| a2     | conductivity ≤ 10 μS/mm AND pH ≥ 4.3 (EN 60754-2)                                                                  |
| a3     | worse than a2 (no requirement)                                                                                     |

<sup>12</sup>. Commission Delegated Regulation (EU) 2016/364 — reaction-to-fire classification method.

<sup>13</sup>. EN 61034-2 / IEC 61034-2 — smoke density (light transmittance, 3 m cube).

<sup>14</sup>. EN 60754-2 / IEC 60754-2 — acidity (pH) and conductivity of combustion gases.

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## 4 FIGRA and heat release explained

The CPR grades three heat-release metrics that no US listing uses. Each metric has its own name and unit:

- FIGRA: fire growth rate index, in W/s.
- THR: total heat release, in MJ.
- Peak HRR: peak heat release rate, in kW.

FIGRA measures how fast a fire grows. THR measures the total heat that a cable releases. Peak HRR measures the highest heat-release rate that a cable reaches.

The FIGRA ladder runs by class:

- $B1ca \leq 120 \text{ W/s}$ <sup>15</sup>
- $B2ca \leq 150 \text{ W/s}$
- $Cca \leq 300 \text{ W/s}$
- $Dca \leq 1300 \text{ W/s}$

Aca, Eca and Fca have no FIGRA criterion. No US listing grades fire-growth rate. So FIGRA is a CPR-only benchmark.

The B2ca FIGRA limit is 150 W/s or less. B2ca is a high class, but not the top of the scale. The hierarchy again is  $Aca > B1ca > B2ca > Cca > Dca > Eca > Fca$ . The "20" in some press coverage is the B1ca peak heat-release-rate limit. This "20" differs from the B2ca FIGRA limit in three ways:

- a different metric — peak power, not fire-growth rate
  - a different unit — kW, not W/s
  - a different class — B1ca, not B2ca
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<sup>15</sup>. EN 13501-6 — reaction-to-fire classification of cables.

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## 5 How to read a CPR class string

A full CPR class string has four parts. The example Cca-s1b,d1,a1 shows all four parts. Read the parts in this order:

1. The reaction class letter.
2. The s value for smoke.
3. The d value for flaming droplets.
4. The a value for acidity (corrosivity).

The rule for "better" is simple. A higher letter class is better. A lower suffix number is better.

### Class-string decode panel — Cca-s1b,d1,a1.

| Part | Meaning               | Threshold                                                                |
|------|-----------------------|--------------------------------------------------------------------------|
| Cca  | reaction class        | FS ≤ 2.0 m; THR ≤ 30 MJ; peak HRR ≤ 60 kW; FIGRA ≤ 300 W/s <sup>16</sup> |
| s1b  | smoke                 | smoke light transmittance 60 % to under 80 % <sup>17</sup>               |
| d1   | flaming droplets      | no flaming droplets that persist more than 10 s <sup>18</sup>            |
| a1   | acidity / corrosivity | conductivity ≤ 2.5 μS/mm; pH ≥ 4.3 <sup>19</sup>                         |

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<sup>16</sup>. EN 13501-6 — reaction-to-fire classification of cables.

<sup>17</sup>. EN 61034-2 / IEC 61034-2 — smoke density (light transmittance, 3 m cube).

<sup>18</sup>. Commission Delegated Regulation (EU) 2016/364 — reaction-to-fire classification method.

<sup>19</sup>. EN 60754-2 / IEC 60754-2 — acidity (pH) and conductivity of combustion gases.

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## 6 Asia-Pacific and global: IEC LSZH

The guide now leaves Europe and turns to the global IEC material tests.

LSZH means Low Smoke Zero Halogen. The industry also writes it as LSOH, LSFH or LSHF. LSZH is a material and performance concept, not a national listing.

A cable is LSZH when its jacket compound passes two kinds of test:

- the IEC smoke test (IEC 61034-2)<sup>20</sup>
- the IEC halogen and corrosivity tests (IEC 60754-1 and IEC 60754-2)<sup>21 22</sup>

LSZH describes smoke output and halogen content only. LSZH is not a flame class. LSZH does not indicate flame performance. LSZH does not confer a plenum listing.

Zero halogen means the cable jacket releases 5 mg/g of halogen acid gas or less (IEC 60754-1). It does not mean the jacket has no halogen atoms.

The IEC halogen test is IEC 60754-1. It measures halogen acid gas content (HCl and HBr; it excludes HF). A jacket is halogen-free at  $\leq 5$  mg/g (0.5 %). The test uses a furnace at about 800 °C with a 1 g sample.

The IEC corrosivity test is IEC 60754-2. It measures corrosivity by pH and conductivity. A jacket is non-acidic at  $\text{pH} \geq 4.3$  and conductivity  $\leq 10$   $\mu\text{S}/\text{mm}$ . The test uses a furnace at about 935 °C for 30 min.

The IEC smoke test is IEC 61034-2. It measures smoke light transmittance. Cables commonly reach  $\geq 60$  % transmittance in a 3 m  $\times$  3 m  $\times$  3 m cube. Higher transmittance means less smoke.

Two IEC flame-spread tests apply to cables alongside LSZH. These tests stay independent of LSZH. The single-cable flame test is IEC 60332-1-2.<sup>23</sup> It limits the charred length to  $\leq 425$  mm with a 1 kW premixed flame. The bunched-cable flame test is IEC 60332-3.<sup>24</sup> It limits flame damage to  $\leq 2.5$  m. IEC 60332-3 sets categories by fuel load:

- A = 7 L/m
- B = 3.5 L/m
- C = 1.5 L/m
- D = 0.5 L/m

A flame-spread class is independent of LSZH. A cable of any jacket type may or may not pass these flame tests.

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<sup>20</sup>. EN 61034-2 / IEC 61034-2 — smoke density (light transmittance, 3 m cube).

<sup>21</sup>. IEC 60754-1 — halogen acid gas content.

<sup>22</sup>. EN 60754-2 / IEC 60754-2 — acidity (pH) and conductivity of combustion gases.

<sup>23</sup>. EN/IEC 60332-1-2 — single-cable vertical flame test.

<sup>24</sup>. IEC 60332-3 — bunched-cable vertical flame-spread test.

The same IEC methods sit under the CPR suffixes. The CPR "a" suffix derives from EN 60754-2. The CPR "s" suffix derives from EN 50399 and EN 61034-2.<sup>25</sup> EU law wraps these IEC methods into a legal class.

**Table D — IEC tests for LSZH cables.**

Group (a): tests that define LSZH.

| Standard    | Measures                                        | Verified threshold                                                                                                    |
|-------------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| IEC 60754-1 | halogen acid gas content (HCl/HBr; excludes HF) | halogen-free if $\leq 5$ mg/g (0.5 %); furnace $\sim 800$ °C, 1 g sample                                              |
| IEC 60754-2 | corrosivity by pH and conductivity              | non-acidic if $\text{pH} \geq 4.3$ AND conductivity $\leq 10$ $\mu\text{S}/\text{mm}$ ; furnace $\sim 935$ °C, 30 min |
| IEC 61034-2 | smoke light transmittance                       | commonly $\geq 60$ % transmittance in a $3\text{ m} \times 3\text{ m} \times 3\text{ m}$ cube                         |

Group (b): flame-spread tests specified separately alongside LSZH cables.

| Standard      | Measures                    | Verified threshold                                                               |
|---------------|-----------------------------|----------------------------------------------------------------------------------|
| IEC 60332-1-2 | single vertical cable flame | charred length $\leq 425$ mm; 1 kW premixed flame                                |
| IEC 60332-3   | bunched vertical-tray flame | damage $\leq 2.5$ m; categories A = 7 L/m, B = 3.5 L/m, C = 1.5 L/m, D = 0.5 L/m |

A flame-spread class is independent of LSZH. A cable of any jacket type may or may not pass these tests.

<sup>25</sup>. EN 50399 — bunched-cable heat-release and smoke test.

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## 7 Head-to-head: NEC versus CPR

The NEC and CPR regimes are structurally incompatible. Any side-by-side view shows approximate stringency only. It is never a legal crosswalk.

A CPR Euroclass measures reaction to fire.<sup>26</sup> It does not measure fire resistance or circuit integrity.

A US listing such as OFNP does not give a CPR Euroclass. A CPR class such as B2ca does not give a US listing. Any side-by-side table is an approximate stringency comparison only. A cable for both markets must carry independent dual certification.

**Table E — NEC versus CPR head-to-head.**

| Dimension                                                       | NEC approach                                                                | CPR approach                                                                                                                         |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Fire scenario / rig (indicative only — not an equivalence)      | NFPA 262 horizontal tunnel with forced airflow; UL 1666 vertical shaft      | EN 50399 vertical bunch, no forced airflow                                                                                           |
| Result type (indicative only — not an equivalence)              | pass or fail, tied to install location                                      | graded class, independent of install location                                                                                        |
| Forced airflow (indicative only — not an equivalence)           | 240 ft/min plenum airflow, unique to NFPA 262                               | no CPR test uses forced airflow                                                                                                      |
| Fire-growth-rate grade (indicative only — not an equivalence)   | no US listing grades fire-growth rate                                       | FIGRA, THR and peak HRR graded                                                                                                       |
| Smoke metric (indicative only — not an equivalence)             | optical smoke density (peak $\leq$ 0.50 / average $\leq$ 0.15, plenum only) | total smoke production and smoke production rate ( $\text{m}^2$ , $\text{m}^2/\text{s}$ ); smoke light transmittance (%) as a suffix |
| Corrosivity and droplets (indicative only — not an equivalence) | not graded                                                                  | corrosivity (a) and flaming droplets (d) graded                                                                                      |

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**26.** EN 13501-6 — reaction-to-fire classification of cables.

## 8 Regional metric panel

This panel is a short summary of the whole guide. For each region, it shows the framework, what you specify, the main test, and the headline pass criterion. Use it as a quick reference. The regional sections above give the full detail and the sources.

**Regional metric panel — the three regimes side by side.**

| Region and framework                          | What you specify                                                            | Main test                                        | Headline pass criterion                                                                        |
|-----------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------|
| North America — NEC (NFPA 70), Article 770    | a listing by install location: OFNP (plenum), OFNR (riser) or OFN (general) | NFPA 262 (plenum); UL 1666 (riser)               | plenum flame travel ≤ 5 ft (1.5 m); optical smoke density ≤ 0.50 peak and ≤ 0.15 average       |
| Europe — EU CPR (Regulation (EU) No 305/2011) | a Euroclass on the DoP, for example Cca-s1b,d1,a1                           | EN 50399, with the EN/IEC 60332-1-2 flame gate   | the FIGRA ladder (for example B2ca ≤ 150 W/s), plus the s, d and a suffixes                    |
| Asia-Pacific / global — IEC LSZH tests        | an LSZH jacket, plus a separate flame class                                 | IEC 60754-1, IEC 60754-2, IEC 61034-2, IEC 60332 | zero halogen ≤ 5 mg/g; non-corrosive pH ≥ 4.3 and ≤ 10 μS/mm; smoke light transmittance ≥ 60 % |

Each column describes one regime only. The three regimes measure different things. Do not compare the values across regions. A cable for more than one region needs separate certification for each.

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## 9 Jacket-family performance profiles

Each jacket family has honest trade-offs. No family is best for every use. Each family loses exactly where another family wins.

Fluoropolymer plenum FEP gives strong flame and smoke performance under forced airflow. It is halogenated, stiff and costly.

Riser PVC is cheap and flexible. It produces denser smoke and is halogenated. It is not plenum-legal.

LSZH gives low smoke output (IEC 61034-2).<sup>27</sup> It gives low halogen content (IEC 60754-1).<sup>28</sup> It gives low corrosivity and low acid-gas release (IEC 60754-2).<sup>29</sup> It is stiff and brittle because of a high mineral-hydroxide filler load. This filler is typically 50 % to 60 % of the compound by mass. LSZH is not automatically plenum-rated.

**Table F — jacket-family performance profiles.**

| Family                     | Strongest at                                     | Weakest at                                | Why (material reason)                                               |
|----------------------------|--------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------|
| Fluoropolymer / plenum FEP | flame and smoke performance under forced airflow | cost and stiffness                        | halogenated fluoropolymer; rigid and expensive                      |
| Riser PVC                  | cost and flexibility                             | smoke density; not plenum-legal           | halogenated compound; denser smoke                                  |
| LSZH                       | low smoke, low halogen, low corrosivity          | stiffness; not automatically plenum-rated | high mineral-hydroxide filler, 50 % to 60 % of the compound by mass |

Any of these three materials can carry a CPR class string. The class is a legal outcome, not a jacket material.

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<sup>27</sup>. EN 61034-2 / IEC 61034-2 — smoke density (light transmittance, 3 m cube).

<sup>28</sup>. IEC 60754-1 — halogen acid gas content.

<sup>29</sup>. EN 60754-2 / IEC 60754-2 — acidity (pH) and conductivity of combustion gases.

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## 10 Frequently asked questions

### 1. Can a plenum cable replace a riser cable?

Yes, substitution runs upward only. A plenum cable may replace a riser cable. A riser cable may not replace a plenum cable. NEC Table 770.154(b) sets this rule.<sup>30</sup>

### 2. What is the difference between IEC methods and CPR law?

IEC documents are test procedures. The CPR (Regulation (EU) No 305/2011) makes the declared Euroclass the legal route to the EU market.<sup>31</sup> The same IEC method can be quoted worldwide. Only the CPR turns that method into a legal class.

### 3. Why is LSZH stiffer?

An LSZH compound uses a high mineral-hydroxide filler to remove halogens. This filler is typically 50 % to 60 % of the compound by mass. The stiffness is the physical cost of that filler.

### 4. How are the s, d and a suffixes applied?

The manufacturer appends them after the class letter. The best values are s1a, d0 and a1. All suffixes appear on the DoP.

### 5. Is a US-rated cable legal in the EU, and the reverse?

No, each market needs its own certification. The two routes are:

- EU market: CE mark, DoP and a Euroclass to EN 13501-6.<sup>32</sup>
- US market: a UL or NFPA listing under NEC Article 770.<sup>33</sup>

A cable sold in both markets usually carries dual certification. One certificate never carries the other market.

### 6. What does "zero halogen" mean?

Zero halogen means the cable jacket releases 5 mg/g of halogen acid gas or less (IEC 60754-1).<sup>34</sup> It does not mean the jacket has no halogen atoms. The test excludes HF.

### 7. What are the trade-offs between halogenated and halogen-free jackets?

Halogenated jackets (PVC and FEP) give strong flame performance and low cost. They are also easy to handle. They release corrosive acid gas in a fire. Halogen-free jackets release less corrosive acid gas. Neither type is universally better. The CPR grades this corrosivity trade-off with its "a" suffix.<sup>35</sup>

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<sup>30</sup>. NEC Table 770.154(b) — permitted optical-fibre cable substitutions.

<sup>31</sup>. Regulation (EU) No 305/2011 — Construction Products Regulation (CPR).

<sup>32</sup>. EN 13501-6 — reaction-to-fire classification of cables.

<sup>33</sup>. NFPA 70 (National Electrical Code), Article 770 — optical-fibre cables.

<sup>34</sup>. IEC 60754-1 — halogen acid gas content.

The NEC does not grade corrosivity at all. So the same cable can look graded in Europe and ungraded in North America.

## 8. What is the plenum airflow context?

A plenum is an HVAC return space. The plenum test uses these parameters and limits:

- test: NFPA 262 Steiner tunnel<sup>35</sup>
- airflow: 240 ft/min (73 m/min)
- burner: 87.9 kW (300,000 BTU/hr)
- smoke limits: peak optical smoke density  $\leq 0.50$ ; average  $\leq 0.15$
- flame limit: flame travel  $\leq 5$  ft (1.5 m)

No CPR test uses forced airflow. So a plenum result has no CPR equivalent.

## 9. How do I handle retrofit or mixed-region builds?

Choose one of two routes:

- dual-certify the cable
- segment the bill of materials by region

Specify a minimum class or listing per region. Confirm the result on the DoP or UL listing, not the datasheet.

## 10. How do I read a full CPR class string?

Decode the four parts: class letter, s, d and a. The section on how to read a CPR class string works through the example Cca-s1b,d1,a1.

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<sup>35</sup>. Commission Delegated Regulation (EU) 2016/364 — reaction-to-fire classification method.

<sup>36</sup>. NFPA 262 (formerly UL 910) — plenum flame-travel and smoke test.

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## II Standards referenced

Every figure in this guide traces to a published standard. The footnotes name the standard on the page where the figure appears. The standards, by region, are:

**North America:** NFPA 70 (National Electrical Code), Article 770 · NFPA 262 (formerly UL 910) · UL 1666 · UL 1685 · NEC Table 770.154(b).

**Europe:** EN 13501-6 · Regulation (EU) No 305/2011 · EN 50575 · EN 50399 · EN/IEC 60332-1-2 · EN ISO 1716 · Commission Delegated Regulation (EU) 2016/364 · EN 61034-2 / IEC 61034-2 · EN 60754-2 / IEC 60754-2.

**Asia-Pacific / global:** IEC 60754-1 · IEC 60332-3. EN/IEC 60332-1-2, EN 61034-2 / IEC 61034-2 and EN 60754-2 / IEC 60754-2 also apply here.

**Great Britain and UKCA note.** Great Britain still recognises CE-marked DoPs alongside the UKCA mark. The 2024–2026 construction-products reform extended this recognition. No hard cut-off is in force. Northern Ireland follows EU CPR. This framework is under active reform. Verify the rules at the time of use.

Verify each figure against the current standard before you specify a cable.

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## 12 Contact us

ScaleFibre serves customers worldwide. For sales or technical questions, contact the office for your region.

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