March 2025

PVC CABLES: A RESPONSIBLE CHOICE FOR FIRE SAFETY AND ENVIRONMENTAL SUSTAINABILITY

Recent advancements across the European PVC cable value chain demonstrate that PVC remains a responsible and balanced choice, offering superior fire performance alongside significant environmental benefits. Misconceptions regarding PVC, particularly in relation to smoke production, smoke toxicity, acidity, and corrosivity, fail to consider key data on real-world fire behaviour and material performance.

PVC and Phthalates

PVC compounds used in cables do not contain harmful substances. The typical phthalates used in PVC have been extensively assessed and found to be safe. Nevertheless, PVC cables can also be formulated without phthalic plasticisers to meet specific environmental certification requirements such as the Nordic Ecolabelling[1] which applies to new residential, educational, and office buildings. Before excluding a high-performing polymer from fire-critical applications, it is crucial to evaluate whether any additive non-compliant with a specific label can be replaced to meet labelling requirements.

PVC Smoke, Acidity, and Corrosivity

Well-formulated PVC cable compounds incorporating flame retardants and smoke suppressants achieve the best classifications for smoke production, with modern PVC cables easily reaching the Class s_2 under EN 13501-6 standards.[2] [3]

It is important to recognize that acidity is a poor indicator of smoke corrosivity and an inadequate measure of smoke toxicity.[4] As noted by leading fire-safety experts, in real-world fire scenarios, hydrogen chloride (HCl) emitted during combustion rapidly breaks down and remains localised near the fire's origin. In contrast, carbon monoxide (CO) poses the primary toxic threat, reaching lethal concentrations well before any other combustion by-products.[5]

Fire safety studies consistently show that the leading cause of fatalities in fires is the inability to control, confine, and extinguish the fire before it escalates. The heat release rate (HRR) is the *"single most important variable in fire hazard"*[6] and, in this regard, PVC cables excel in performance.

Flame Retardant Low Smoke (FRLS) and New Low Smoke Acidity (LSA) PVC Cables

Flame Retardant Low Smoke (FRLS) PVC compounds, although uncommon in the EU, are used extensively in many other countries to manufacture FRLS cables. These cables meet the Class B2ca classification and are effective in reducing not only smoke production but also toxicity, for example, the release of CO, comparable to that of Halogen Free Flame Retardant cables (HFFR).[7]

Moreover, new Low Smoke Acidity (LSA) PVC compounds have been developed to further limit HCl release during combustion. LSA PVC cables release even lower CO emissions than their HFFR counterparts, achieving Class Bca and s1b classification for smoke production.[8]

Reevaluating Corrosion and Cost-Effective Fire Recovery

Costs associated with post-fire damage repair are high, but most of these costs relate to smoke removal, rather than to corrosion caused by HCl emissions. In actual fire scenarios, high temperatures and smoke are the predominant causes of damage, while the role of HCl remains minor.

FRLS PVC cables minimise smoke density, reducing post-fire clean-up expenses. Furthermore, fire safety assessments confirm that HCl-related corrosion remains a secondary concern in fires, as critical threats like intense heat and CO levels occur well before HCl reaches problematic concentrations. The key to protecting lives, property, and business continuity is ensuring that fires remain manageable. In this context, B2ca and Cca classified cables are more suitable than Dca.

Advancing Circularity

PVC's recyclability and durability align well with the EU's circular economy objectives. Unlike most alternatives, PVC cables can be mechanically recycled at the end of their lifecycle without losing their properties. This is a key advantage, as mechanical properties of most alternative material cables – whether cross-linked or not – are significantly decreased when recycled.

The European PVC industry is continuing to innovate in recycling technologies, including advanced sorting and dissolution methods that separate PVC from other materials and remove legacy additives. These technologies ensure that only REACH-compliant materials enter the recycling stream, enhancing the quality and sustainability of recycled PVC.

Informed, Science-Based Choices in Cable Safety

We encourage stakeholders to consider the advanced capabilities of modern PVC cables, which now provide industry-leading fire safety, durability, and environmental sustainability. Cutting-edge PVC technology ensures that these cables not only comply with but often exceed stringent fire safety regulations, reaffirming PVC as a trusted material for cable applications.

PVC4Cables remains committed to supporting the European PVC cable industry in delivering high-performance, sustainable innovations, and ensuring that both the industry and the public have access to the most effective safety and environmental solutions available.

REFERENCES

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