Don’t install fire rated cables in galvanized steel conduit

April 2018

Installing cables inside galvanized steel conduit is a very common way to provide mechanical protection for circuits or parts of circuits, but what is not commonly known is that Fire Rated cables should not be run inside galvanized steel conduits.

The problem was first identified by UL (Underwriters Laboratories) in 2012 and subsequently UL removed all approvals for flexible fire rated cables installed in galvanized steel conduit in the USA and ULC did likewise in Canada. The reason UL removed the listings can be explained as follows:

http://www.ecmweb.com/safety/safety-and-compliance-fire-resistive-cable-products

UL received information that the zinc in the galvanised conduit can affect the cables fire rating. The concern regarding performance of these products is that the presence of zinc (galvanization) can compromise the cable circuit integrity at high temperatures because of the reaction of the zinc with the copper conductor which at the high temperatures in fires will form brass. This effect was validated by Underwriters Laboratories and as a result of this validation, UL and ULC revised the guide information and individual certifications to exclude the use of zinc (galvanised) components with Fire Resistant cables.

During further research on a wide array of products, including conduits without zinc interior coating, it was found that Fire Resistant cables were also not able to consistently achieve the required 2-hour fire-resistive rating.

In the UK installing Fire Rated cables in steel conduit is not yet excluded by regulation but manufacturers of Fire Rated cables sold in UK are required to test and certify them to respective British Standards. Currently in the UK, none of the BSI test standards actually require the fire rated cables to be tested in the mounting configurations they are normally installed.

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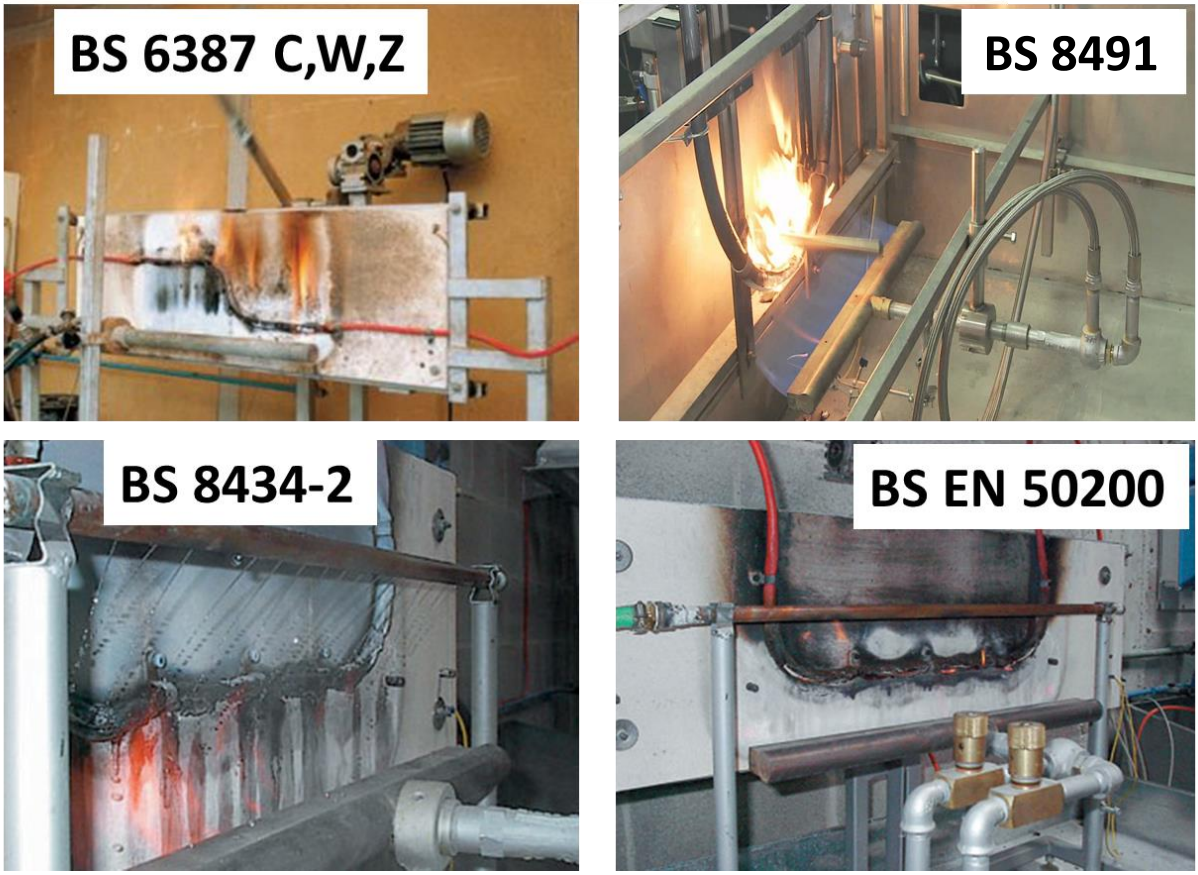
British Standards: Fire Resistant cable flame tests



A quick glance at the fixings of these samples during common British Standards tests for fire rated cables shows clearly the massive disparity between how cables are tested and approved and how fire rated cables are actually installed.

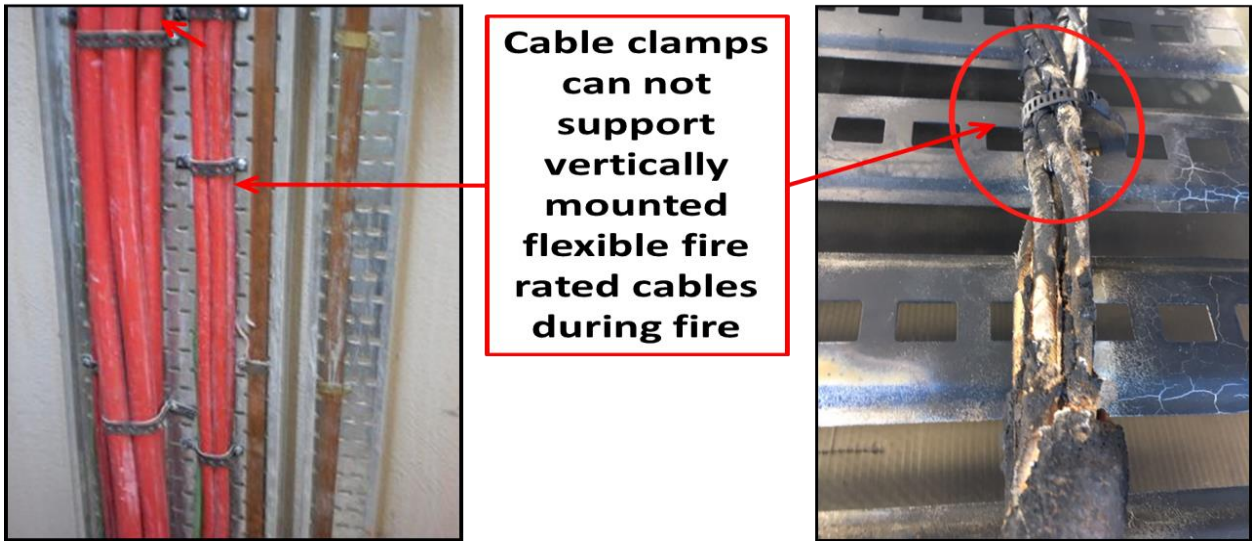
In practice cables are not fixed every few millimeters, they are not hung in free air very often nor are they mounted on non-conductive test boards. In reality cables are mounted on steel cable trays, cable ladders and the fixings to these normally conductive supports are made in accordance with manufacturers' recommendations; which are most often far from what was actually tested.

What this means is these tests do not and cannot guarantee that the fire rated cables will provide the electrical continuity survival time in real fires as indicated by the test method. In turn means the life safety and firefighting equipment might not operate for as long as the design engineer expects putting occupants, emergency response workers and property at risk.

Other factors to consider in the installation of Fire Rated cables:

Most installations of Fire Rated cables include horizontal, vertical and inclined mounting. Commonly steel cable clamps or stainless steel ties are used to secure the cables to the

metallic cable tray or supports. In practice, horizontal, inclined and vertical installations of fire rated cables are installed the same way but during fire the steel clamps or steel cable ties holding inclined and vertical cable runs in place can no longer support the cables because the polymer sheath and insulation on these cables will burn away the clamps and ties can then no longer grip the cables.

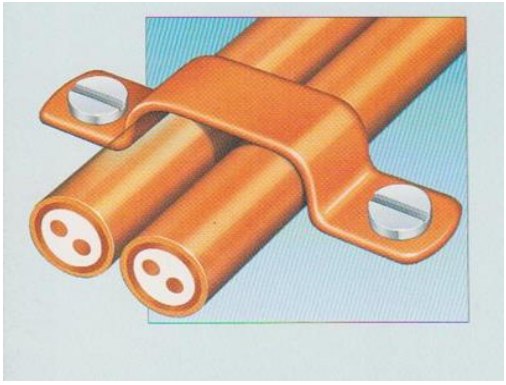


Cable manufacturers selling fire rated cable in UK are not required fire test cables in full scale vertical installations, so given installing contractors can be held to account for 'Fit for Purpose' installation, it is highly recommended that the manufacturers and suppliers of polymer (plastic) Fire Rated wiring systems be consulted on these installation methods to ensure the wiring systems they sell are fully warrantied when installed and that the manufacturer or supplier will underwrite the performance of their cables for such mounting configurations.

An alternative to running Fire Rated cables in steel conduit or running these cables inclined, or vertically or where not fully supported by horizontal cable trays could be to re-route these cables away from areas where mechanical damage or excessive (fire) heat is possible. Such alternatives might be to install cables buried in concrete, sand or providing thermal protection for the wiring system.

Another option which will often prove much cheaper is simply to run MICC (Mineral Insulated Copper Clad) cables. These copper sheathed cables provide excellent mechanical and fire resistance and in any mounting configuration. All MICC cables sold in UK are fully certified for use in fire rated circuits but they are also certified by countries where testing cables is done as part of a wiring system which includes actual fixings and supports and in full scale horizontal and vertical installations. Certainly MICC cables don't need to be installed inside conduit or be provided with additional mechanical or heat protection, unless extreme mechanical damage is likely or run in areas of special risk as defined in BS8519:2010 and BS EN12485.

As MICC cables don't need a polymer jacket, the steel or copper cable clamps or stainless steel cable ties will continue to fully support the cable during fire when installed vertically, inclined or in any other mounting configuration.



In many large public buildings like rail infrastructure, airports, shopping centers etc. conventional risk from fire alone is no longer the only concern. Often these buildings have long evacuation times and with the potential for terrorist actions, life safety and firefighting systems need to rely on robust 'fit for purpose' essential wiring systems to ensure their operational reliability

Running fire rated communication, control and power cables in galvanized steel conduit is no longer a safe option so MICC cables can provide a good technical and economic solution.

British Standards and The British Building Regulations are only minimum requirements, so whilst it may be mandatory to meet these minimum codes it does not preclude buildings and systems with higher performances. Professional engineers who design the buildings and the systems in them are accountable for the use of 'reasonable skill and care' (which can often mean just adopting minimum code) but they frequently avoid the obligation of 'Fit for Purpose' design. In turn this means 'Fitness for Purpose' is often the responsibility of the project/asset owner and installing contractor.

With the lessons learnt from Grenfell and other major fire events around the world, building/asset owners and installing contractors need to be aware they can be held to account for the systems they install, unless they have specifically opted out of this obligation.

More information is available from the MICC company:

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