WHITE PAPER

PLANNING CABLE INSTALLATIONS WITH SYSTEM CIRCUIT INTEGRITY: ALL TO NO AVAIL WITHOUT COORDINATION

There is probably hardly a sizeable new building in which the electrical design of the various systems is really well coordinated. The result is that system circuit integrity – one of the most important safety-related features in any public and commercial building – frequently falls by the wayside once construction is complete.

Nowadays every engineer and electrical designer knows what extended (or system) circuit integrity is, as in the event of fire the operation of safety-related plant and equipment could not be assured without cabling having E30-E90 circuit integrity.

This issue is relevant primarily to electrical engineering, since cable systems with extended circuit integrity are specified, for example, for safety lighting, emergency power and lift installations. But specialist heating, ventilation and air conditioning (HVAC) planners also need safety cables to connect their mechanical smoke extraction and sprinkler systems. In the area of low-voltage current there are comparable regulations for fire alarm and evacuation systems. Architects dealing with natural smoke extraction systems cannot avoid this issue either.

Overall approach essential

The sad truth is, however, that none of the planners responsible for the above areas look at the cabling as a whole. The different systems are separate, and with them the individual plans. Even high- and low-voltage current are worlds apart. Only extremely rarely does real coordination take place. On top of this there is even more separation (sub-contracting out) during the construction phase. Those who bear the brunt are the many on-site installation teams who then have to manage "one way or another".

In fact there is hardly any major building work today where the electrical design of the various systems is coordinated. This frequently results in faulty installations which no longer give any guarantee of system circuit integrity.

In many cases the dilemma begins when designing runs for the high-voltage and low-voltage current cables: this is generally planned in the form of a rough estimate – before the precise requirement has been established. So it is no wonder that some sections are regularly too generously sized for the actual number of cables, while space in other sections is much too tight.

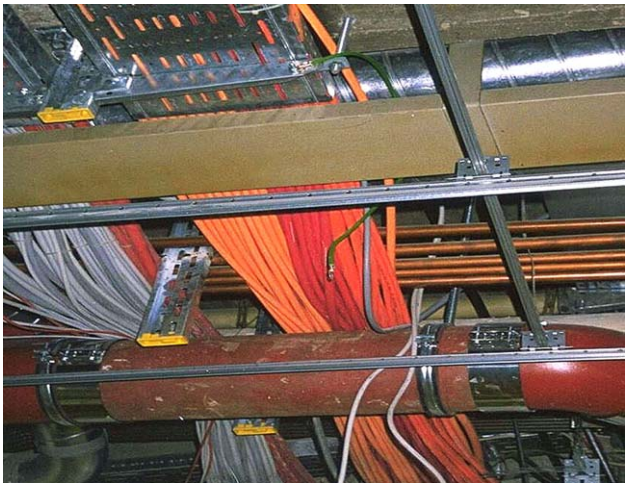

Image 1: Example of a faulty installation

When the individual installation companies have laid their cables the latter then quickly become hopelessly overcrowded (see Image 1).

In most instances the designer responsible did not consult enough – or early enough - with the other electrical designers and HVAC designers. This means that when the work is carried out there are often collisions between the cable runs installed and the pipes and lines of other systems. Or the HVAC designer did not understand his colleague's query correctly. He thinks primarily in terms of large plant and machinery, and only secondly of the pipes which supply and drain them. Only very infrequently does he think of the extended circuit integrity of the power supply to some of these systems.

Example of faulty installation

Image 1 is a good example of all that can go wrong when there is no coordination: the cable route is totally overloaded

at this point. In order to create space for pipes, part of the systems circuit integrity run has even been subsequently removed by other installers. Cold water and waste water pipes run above the cable routes, not below them. In the event of fire the incorrectly laid cables would fairly quickly cause a short circuit. In addition, the water pipes could drop down and pull the cables with them.

Of course it is impossible to plan and specify everything in advance down to the last screw. But a rethink is necessary when it comes to system circuit integrity: It must be more carefully planned – after all these are not just any cables, but the most important ones in the whole building.

Software support

The extended circuit integrity of cable installations must not be compromised by surrounding components (for an exemplary layout see Image 2). To meet this requirement close coordination is required between all the designers involved, as provided for in many international fee scales.

A suitable software solution, for example Datwyler's "Panorama", which can be employed as a planning platform by several users, can be extremely helpful here.

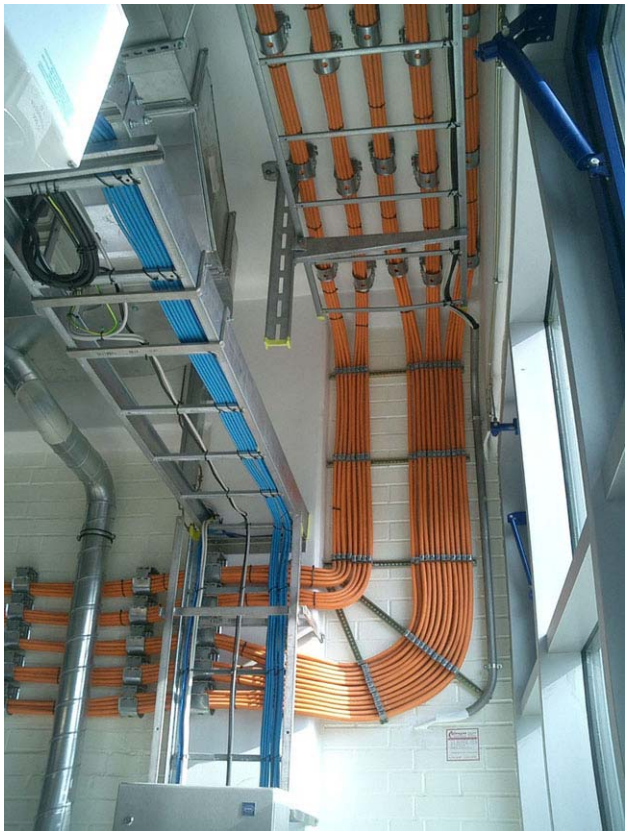

Image 2: An exemplary solution with bending radii adhered to and generous circumvention of other systems

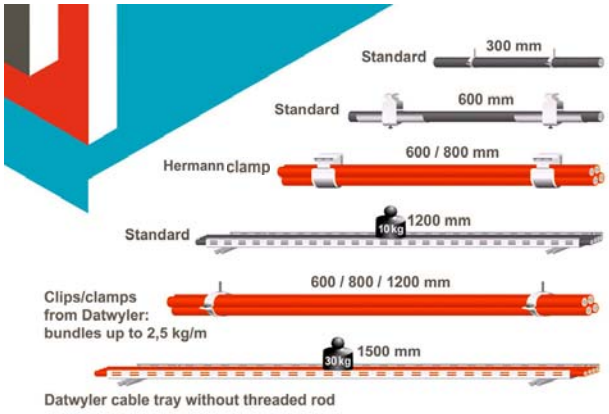

Image 3: Standard laying techniques (grey) and optional laying techniques with greater fixing distances and bundle installation instead of individual installation (red)

The choice of a tested and certified cabling system is definitely also a wise precaution: This allows lower fire loads, greater fill factors, a high loading capacity and innovative installation techniques, for example large fixing distances without compromising the system circuit integrity of the cable system (Image 3).

Please do not hesitate to contact us for any further information! We would be happy to answer your questions.

Image 4: The latest edition of the "System Circuit Integrity Handbook" – everything worth knowing about the subject at a glance.