

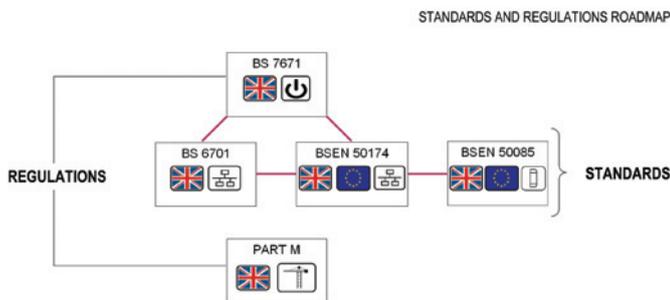
# White Paper

## The New Critical Factor – Containment



One area where there continues to be a certain level of naivety is that of containment and trunking, and in the last 12-18 months this lack of awareness has really come to the fore.

There are, in fact, five separate elements that affect the installation of containment:



These elements include a combination of regulations and standards. The former are legal requirements as they involve Electricity, which, obviously, can be fatal. For this reason containment and trunking are normally involved as part of the electrical package, but how many structured cabling installers know the following element, or even want to?

### BS 7671 Wiring Regulations

- Safty
  - Protection against
    - > Electric shock
    - > Thermal effects
    - > Overcurrent
  - Inspection & testing
  - Requirements on special locations



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The most important standard to cabling installers is BS/EN 50174, which is in three main sections:

- Part 1. Installation specification of IT cabling
- Part 2. Planning and practices INSIDE buildings
- Part 3. Planning and practices OUTSIDE buildings

Part1 also covers all aspects relating to the quality of the containment and its installation, ensuring the pathway systems SHALL have smooth surfaces and be free from burrs, sharp edges and other projections that can damage cables. Furthermore, pathway systems SHOULD provide all components with physical protection, and IT pathways SHOULD not be supported in the other supply systems i.e. Heating and HVAC trunking etc.

NB. In Standards parlance SHALL = Mandatory and SHOULD = Recommended

There has been much written in the last 12-18 months about the move from Cat6 to Cat6A, with every article focusing on performance and the relative merits and advantages. The one major factor that is rarely discussed is the impact on containment. Currently, more time than ever before is being spent inspecting and assessing containment for suitability. With careful planning this could be minimised and the project could avoid some time-consuming and costly mistakes.

However, before that stage is reached a great deal of education is required, at all levels, from Installers to Building Services Consultants and M&E engineers, right the way through to some of the manufacturers of containment. The fundamentals have changed with Cat6A and are further complicated by capacity claims made by certain Containment Manufacturers.

On top of all this, the waters are muddied even further by the more increasingly critical factor of the separation of power and data; the higher the bandwidth the more susceptible it is to interference, hence the more common use of a screened cabling systems in current times.

Whether they are screened or unscreened Cat6A solutions, they both bring their separate, but not vastly different problems, both born by their physical construction. The common factor is the physical dimensions. The outside diameter (OD) has increased by a huge percentage, in fact a staggering 25-30% from approximately 6mm for Cat6 up to about 8mm for Cat6A. For example, where it used to be common to run 4 Cat6A cables in a length of 25mm Kopex to a GOP box it would now be difficult to get 3 Cat6A cables in.

And it doesn't end here; the impact is all the way down the line. Dado Trunking is one of the most sensitive areas. Many of these products' designs were based upon the electrical requirements and that of Cat6A, but without due care this can cause problems around not only the capacity but, more importantly, the bend radii. Already one manufacturer's capacity claim has reduced from 14 to just 3 Cat6A cables due the design of their bends, which were compromised by the corner pieces having to be screwed into place and the screw positions being on the inside of the outer compartments.

The next major factor is the depth of the trunking. Not only does this contribute to the overall capacity when trunking it with Cat6A, but great care needs to be taken with the bend radii. This increase in the OD of the cable has a natural knock-on effect. What was a bend radii of 24mm for Cat6 suddenly becomes a minimum bend radius (MBR) of 40mm with Cat6A. This is usually well-catered for in the bends of the trunking, but is severely hampered when it comes to the back box depth. Add on outlet and an angled shuttered module, which in themselves can add a further 20mm, and the problem becomes apparent. If the trunking has a depth of 60mm or more, with the exception of MK Prestige 3D whose depth is only 57mm, its overall dimension has been designed to satisfy the data market, and it can accommodate even the thickest Cat6A cables, as long as good installation practices are maintained.

It may seem strange, but when dressing cables into back boxes, sometimes more is less. By creating a loop within the box (i.e. entering at the bottom), looping up to the top to terminate on a jack that is angled down usually makes it easier to then put the faceplate back on. Trying to bend a short length of a thick cable cannot only be difficult, but it could result in the cable being crushed back into place with a compromised bend radii. Part 1 of BS/EN 50174 states the design of the termination points SHALL:

- Allow safe access
- Ensure link performance (Keep MBR)
- Have adequate clearance to install components in accordance with cable manufacturer's instructions.

The following image gives an example of how to do it WRONG!



**Wrong practice**

A manufacturer of dado trunking that has thought about these issues in detail is Reha. They have widely consulted with cable manufacturers, and even member of the standards bodies, before finalising their design. This has resulted in their Profilla Data product being one of the best in the market, with an overall depth of 65mm and a variable depth back box which

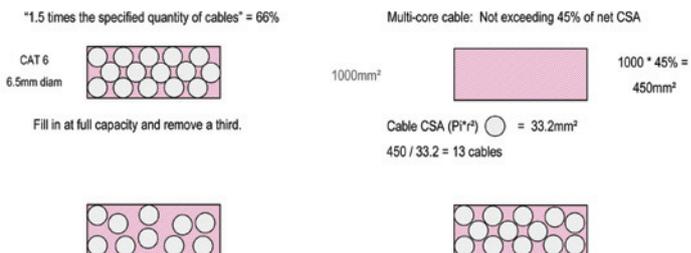
has punch out slots at various angles to ensure that even the bulkiest cables can be fitted without too many problems.

Whilst dado trunking poses the largest area of concern, there are still issues with the perforated tray and basket tray, which is not just down to the greater OD, it is also a factor of the weight. With both screened and unscreened cables, the thickness of the conductors has increased to 23AWG from 24AWG, which doesn't seem a large amount, but soon builds up. In the American Wire Gauge Standard, the lower the number, the thicker the cable, and this also relates to how many times the cable has gone through the drawing process.

Whilst the latter factor is more about the how the basket is fixed or mounted rather than the possibility of the bulk of the cable bundles crushing those on the lower levels, it is something to be aware of.

The major impact of the larger OD is that of capacity. A 300mm section of Basket Tray may comfortably hold 320 Cat6 cables with 20% spare capacity left. Given the same criteria it would be difficult to get 200 Cat6A cables in. This is a major consideration when planning main horizontal runs as approximately 35% more basket tray is required for the same amount of cable.

Both BS/EN50174 and BS7671 Wiring Regulations give different calculations to determine capacity. For consistency cabling installers should stick with BS/EN 50174.



## BSEN 50174

## BS 7671 Wiring Regs.

Finally, there are two elements to consider; they are Part M of the BS7671 and BS/EN 50085 the European Trunking Standards; the latter being referenced in BS/EN 50174-2 as follows: Clause 4.5

- Trunking should comply with EN50085-2-1



The above is the Standard for safety and performance of trunking and covers:

- Fire Hazard
- Access to Live Parts
- Mechanical Strength
- Resistance to Heat

Part M is probably the most under used building regulation and covers, amongst other things, visibility requirements (BS 8300 – 2009). It effectively states that power sockets be identified by way of visual contrast. This visual contrast is achieved by 30 points difference in Light reflectance values (LRV). LRV is the proportion of light reflected by a colour. In essence, Pure White = 100 and Jet Black = 0

## Conclusions

Containment used to be something that was 'installed by others'. That may remain the same, however the cabling installer needs to have an input, and early on, to ensure what is being put in is up to the job.

*This Technical Note has been produced by Paul Cave, Technical Manager, on behalf of Excel.*

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