

### Power and data segregation

It is important when installing power and data cables in the same installation that the installation complies with the relevant standard. If any conflicts in separation distances arise then the greater separation distance must always apply. To comply with the correct separation distance between power and data cables please refer to BS EN 50174-2:2009+A2:2014 section 6.

There are a number of factors that will affect the separation distance of power and data cables these are listed below:

- Total number of power circuits
- The total load on the power circuit
- The type of data cable being installed
- The installation method of the power and data cables

Every installation is different so it is important to refer to the installation standard for each installation to ensure compliance.

### Types of data cable – different categories of cable

Data cables are classified in a number of different categories such as Cat 5e and Cat 6 etc. Generally speaking the higher the category number the higher the performance specification. Data cable is backwards compatible so a Cat 6 installation will always perform to a higher specification than a Cat 5 installation. The basic principle of data cable is very similar across all the different categories and is based on 4 pair twisted cable which is shielded to protect from external EMI and alien or cross talk interference from adjacent cables.

### Understanding segregation methods

<b>Incorrect installation</b>		All cables installed in same compartment with no separation.
<b>Correct installation</b>		Cables separated by means of physical barrier in accordance with BS EN 50174-2:2009+A2:2014 section 6
		Cables separated by minimum distance in accordance with BS EN 50174-2:2009+A2:2014 section 6
<b>Key</b>		

### Data cable comparison table

Data Cable type	*Cable diameter	Frequency	Speed	Notes
Cat 5e	6mm	Up to 100MHz	Up to 1000MBps	Cat 5e has its limitations and will not be able to support emerging 10GBase-T Ethernet
Cat 6	7.2mm	Up to 250MHz	Up to 10GBps	Cat 6 will run at a much higher performance than Cat 5e supporting more than double the speed and frequency, running to a much tighter specification.
Cat 6a	7.4mm	Up to 500MHz	Up to 10GBps	Cat 6a is designed to support 10GBase-T over a maximum distance of 100 metres.
Cat 7	7.9mm	Up to 600MHz	Up to 10GBps	Cat 7 and Cat 7a data cables are shielded including both the individual cables and the overall cables being screened.
Cat 7a	8.2mm	Up to 1000MHz	Up to 10GBps	

\*Please note that cable diameters have been calculated on an average figure from a range of data cable manufacturers.

### 45% Cable capacity

It is important to follow the Wiring Regulations when installing cables in trunking. By following the Wiring Regulations you minimise the potential of heat rise and cable damage and maintain data throughput when installing new circuits. For further information on trunking cable capacity and grouping factors please refer to the latest BS 7671:2008 Wiring Regulations.

Conductor type	Size	Cable factor
Stranded PVC power	1.5mm <sup>2</sup>	8.0
Stranded PVC power	2.5mm <sup>2</sup>	11.9
Stranded PVC power	4.0mm <sup>2</sup>	16.6
*Data cable	Ø5.5mm	23.8
*Data cable	Ø6.0mm	28.3
*Data cable	Ø6.5mm	33.2
*Data cable	Ø7.0mm	38.5
*Data cable	Ø8.4mm	55.4

Please note that made to order fabricated fittings can be manufactured to meet your Cat 7a data cable minimum bend radius. Please contact our technical department on +44 (0)1424 856688 for further information.

### Marshall-Tufflex cable management systems are suitable for a variety of data category cables.

The information in the table below is based on average data cable diameters taken from a number of data cable manufacturers.

In all cases it is highly recommended to contact the data cable manufacturer to confirm the specification and minimum bend radius of the data cable prior to installation.

#### Guidance to determine minimum bend radius

Data Cable	Un-Shielded	Shielded
Cat 5	Up to 10 x cable diameter	-
Cat 5e	Up to 10 x cable diameter	Up to 7 x cable diameter
Cat 6	Up to 8 x cable diameter	Up to 7 x cable diameter
Cat 6a	Up to 8 x cable diameter	Up to 6 x cable diameter
Cat 7	-	Up to 6 x cable diameter
Cat 7a	-	Up to 6 x cable diameter

#### Installation guidance laying vs pulling

It is important to consider the installation method prior to installing data cables. Incorrect method or poor installation techniques can alter the cable characteristics and degrade the overall specification of the data cable. When pulling cables into trunking systems it is important to note the manufacturer's maximum pulling force as this can reduce the minimum bend radii of the data cable. Laying data cables into a trunking system ensures that minimum bend radius can be achieved and that the data cables installed complies with the required specifications for the installation.

#### Types of screening available materials of screening

The shielding of data cables is important as this stops the signal generated within the data cable radiating and interfering with signals in nearby cables and circuitry. The shielding also protects the signal from surrounding cables and other external influences. The two main types of shielding material are metallic foil and metallic braid. A number of factors should be considered before selecting the type of shielding for an installation.

- The flexibility of the data cable
- The mechanical strength
- The required shield effectiveness
- Ease of stripping and terminating

Once the correct type of shielding has been selected it is important that the shielding is bonded correctly for it to be effective in protecting against signal interference.

#### Data cable types advantages/disadvantages

##### Advantages

- Screened cables offer better protection against electromagnetic interference compared to un-screened data cables.
- Screened and unshielded cables work fine at 1Gigabit Ethernet data rates but screened data cables will outperform at data rates such as 10Gigabit due to their ability to support higher frequency transmissions

##### Disadvantages

- Unshielded data cables require a physical barrier and or separation distance between power cables must be increased.

#### Data aperture sizes – LJ6C and Euro modules

LJ6C data modules are suitable for use in trunking systems, floor boxes or any systems that has an industry standard LJ6C aperture. The aperture size for the LJ6C module is 22mm x 37mm but may differ slightly between manufacturers. The Euro data modules have a slightly larger aperture at 25mm x 50mm. Coordinating accessory plates can accommodate one or multiple Euro data modules.

#### PVC-U vs aluminium trunking advantages/disadvantages

PVC-U trunking systems are low cost, light weight and can be easily fabricated whilst on site, however PVC-U is a non-conductive material so offers no protection against EMI. When using a PVC-U trunking for data installation it is important to segregate and screen the data cables from power and control cables.

This can be easily overcome by either using our range of conductive copper sprayed multi compartment trunking systems or by using the steel screening divider. Steel screening dividing strips can be easily retro fitted to an existing PVC-U trunking installation.

Aluminium trunking systems are lightweight and easy to handle and have high impact and mechanical strength compared to a PVC-U trunking installation. Aluminium trunking systems offer great protection against EMI especially at higher frequencies. Both material options aid and support compliant installations.