203: Electrical installations technology  
**Handout 18: Trunking systems**

**Learning outcome**

The learner will:

1. know wiring systems of electrical installations.

**Assessment criteria**

The learner can:

3.2 identify **wiring systems** for different **environments**

3.6 calculate spacing factor of **wiring enclosures**.

**Range**

**Wiring systems**: Cable tray, cable trunking, cable conduit, ladder racking, thermoplastic multi-core, flat profile, SWA, MICC, FP200, thermoplastic single-core, support methods and requirements, component parts.

**Environments**: Domestic, commercial, hazardous, industrial installation, agricultural.

**Wiring enclosures**: Conduit, trunking.

**Trunking systems**

Trunking is used as a large-scale containment system for electrical cables in industrial and commercial installations. There are three main types:

* metal (steel)
* PVC
* mini trunking.

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| **Metal (steel) trunking**  Cable trunking offers a highly versatile and adaptable system of cable installation. It provides good mechanical protection to cables so it is entirely suitable for installations in workshops or industrial premises.  The standard trunking, with its removable lid, means that circuits can be added or removed with relative ease and – provided the regulations on segregation of different types of circuit are complied with – the cables need only be of the single PVC insulated type. | 01 steel trunking.png |

**Advantages of steel trunking:**

* affords conductors good mechanical protection
* can accommodate many cables of different sizes
* permits easy rewiring
* minimises fire risks
* can be utilised as the circuit protective conductor.

**Disadvantages of steel trunking:**

* expensive compared with some other systems
* requires skill to fabricate and install
* difficult to make it gas- and water-proof
* liable to corrosion when subject to acid, alkali and other fumes.

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| **Types of steel conduit finish:**   * galvanised for outdoors or situations where steam or dampness is present. * painted enamel for general work in dry situations.   **Typical sizes** are 50mm by 50mm section to 300mm by 300mm section and are generally supplied in 2.5m or 3m lengths.  **Steel trunking accessories**  A range of accessories are available and some are shown in the picture on the right.  The working of steel trunking, ie cutting, forming, etc, will be covered in Unit 204. | 02 steel trunking accessories.png |
| **Lighting trunking**  Without doubt, the biggest increase in recent times in the use of cable trunking is the widespread use in industrial and commercial premises of lighting trunking.  Easy to install with the use of specially designed hangers, it can span large distances between roof supports of the modern prefabricated premises.  Not only does it give mechanical protection for the cables, but it also provides a means of mounting the luminaires in neat straight rows and reduces the number of fixings required to the fabric of the building. | 03 lighting trunking.png |
| **Skirting trunking**  As its name implies, skirting trunking is fixed in place of the normal skirting board.  Its main use is confined to the outer perimeter of rooms, where there is a call for a large number of outlets for small power, telephone and computer outlets. | 04 skirting trunking.png |
| **Dado trunking**  Where there is a need for multiple electrical service outlet points at desk height, then this form of trunking can be considered.  It is ideal for use in offices where outlets for various voltages, telephones and computer networks are required.  It comes in multi-compartment types to provide segregation of the different services and can be obtained in a number of attractive finishes and styles. | 05 dado trunking.png |

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| **Underfloor trunking**  In some large buildings under construction, it is sometimes found practical and economical to provide a network of cable ducts or trunking in the concrete floor or under a suspended floor.  One advantage of this is that in large commercial buildings there are often changes of tenancy of individual office suites that may entail alterations of the layout of the areas.  These can be carried out more easily if there is a system of ducts or trunking, particularly in the large open plan offices favoured today. | 06 underfloor trunking.png | |
| **Busbar trunking**  The metal-clad overhead busbar system is often used for three phase distribution in factories to feed a number of machines.  The usual arrangement consists of zinc-coated sheet steel trunking finished in grey stove enamel, containing copper busbars mounted on insulators.  At intervals – for instance, every metre – tapping off points are provided, to which a fused unit can be fitted. The fused units consist of some means of making contact with the busbars – usually some type of socket or clamping arrangement.  Connection from the fused unit to the equipment is made by flexible connections, cable in conduit, mineral insulated cables, etc.  The initial cost of the overhead busbar trunking is high. However, once installed, it provides a highly flexible system to which additions and alterations can be carried out quickly and easily. | | 07 busbar trunking.png |
| **Rising main trunking**  For electrical installations in large multi-floor buildings, busbar trunking is sometimes used for vertical rising mains.  It consists of a zinc-coated sheet steel case finished in grey stove enamel. The sections are joined by the use of connectors, complete with plated steel screws, copper earthing links and shake-proof washers in much the same way as standard cable trunking.  The trunking contains copper busbars, often extruded in PVC insulation and colour coded to help identification of the phases.  These are mounted on insulators made of laminated insulating material.  The sections of busbar are connected by solid copper links but, in extremely long runs, joints consisting of flexible braided tape are included at certain points to take up any variations in length due to temperature change. | | 08 rising main.png |

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| **PVC trunking**  Many of the trunking types mentioned above can be obtained in high impact PVC.  These are suitable for many different applications in domestic, commercial or industrial situations and have the added advantage of being light in weight, easy to cut and prefabricated.  The IET Regulation 521.6 requires that all trunking complies with BS EN 50085. Additionally, PVC trunking is acid- and corrosion-resistant, and can be obtained in more attractive colours than the metallic types. | 09 pvc trunking.png |
| **PVC mini trunking**  Mini trunking comes in various sizes, including 16 x 16mm and 16 x 25mm.  Using mini trunking and surface mounted switch and socket boxes, circuits can easily be extended and even complete rewires are carried out without disturbing the underlying decoration.  Consequently, it was favoured by councils and housing associations as a quick and easy method of carrying out domestic rewires without the need for expensive post‑rewire decorating. It is for this reason that they became colloquially known in the trade as *‘*council rewires’. | 10 mini trunking.png |

**Sizing trunking**

The size of trunking required is worked out by using **Tables E5** and **E6** of the IET On‑Site Guide; these are reproduced on the following pages of this Handout. For each of the cables that are going to be installed, a term for that particular size of cable is given in **Table E5**. The terms for all the cables are added together and compared to the factors for trunking given in **Table E6**. The size of trunking that is most suitable for use with these cables is the one whose factor is equal to or greater than the sum of the cable factors.

**Table E5 – Cable factors for trunking**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of conductor** | **Conductor cross‑sectional area (mm2)** | **PVC BS 6004 Cable factor** | **Thermosetting BS 7211 Cable factor** |
| **Solid** | **1.5** | **8.0** | **8.6** |
|  | **2.5** | **11.9** | **11.9** |
| **Stranded** | **1.5** | **8.6** | **9.6** |
|  | **2.5** | **12.6** | **13.9** |
|  | **4** | **16.6** | **18.1** |
|  | **6** | **21.2** | **22.9** |
|  | **10** | **35.3** | **36.3** |
|  | **16** | **47.8** | **50.3** |
|  | **25** | **73.9** | **75.4** |

**Notes:**

1. These factors are for metal trunking and may be optimistic for plastic trunking, where the cross‑sectional area available may be significantly reduced from the nominal by the thickness of the wall material.
2. The provision of spare space is advisable; however, any circuits added at a later date must take into account grouping, Regulation 523.5.

**Table E6 – Factors for trunking**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Dimensions of trunking (mm x mm)** | **Factor** |  | **Dimensions of trunking (mm x mm)** | **Factor** |
| **50 x 38** | **767** |  | **200 x 100** | **8572** |
| **50 x 50** | **1037** |  | **200 x 150** | **13001** |
| **75 x 25** | **738** |  | **200 x 200** | **17429** |
| **75 x 38** | **1146** |  | **225 x 38** | **3474** |
| **75 x 50** | **1555** |  | **225 x 50** | **4671** |
| **75 x 75** | **2371** |  | **225 x 75** | **7167** |
| **100 x 25** | **993** |  | **225 x 100** | **9662** |
| **100 x 38** | **1542** |  | **225 x 150** | **14652** |
| **100 x 50** | **2091** |  | **225 x 200** | **19643** |
| **100 x 75** | **3189** |  | **225 x 225** | **22138** |
| **100 x 100** | **4252** |  | **300 x 38** | **4648** |
| **150 x 38** | **2999** |  | **300 x 50** | **6251** |
| **150 x 50** | **3091** |  | **300 x 75** | **9590** |
| **150 x 75** | **4743** |  | **300 x 100** | **12929** |
| **150 x 100** | **6394** |  | **300 x 150** | **19607** |
| **150 x 150** | **9697** |  | **300 x 200** | **26285** |
| **200 x 38** | **3082** |  | **300 x 225** | **29624** |
| **200 x 50** | **4145** |  | **300 x 300** | **39428** |
| **200 x 75** | **6359** |  |  |  |

**Notes:**

Space factor is 45% with trunking thickness taken into account.

**Example**

The following PVC insulated cables are to be installed in steel cable trunking:

* 10 off 4mm2 cables
* 10 off 6mm2 cables
* 10 off 10mm2 cables.

Calculate the size of cable trunking that would be suitable for this application.

|  |  |  |
| --- | --- | --- |
| Factor for 10 off solid core 4mm2 from On-Site Guide Table E5 |  |  |
|  |  |  |
| Factor for 10 off solid core 6mm2 from On-Site Guide Table E5 |  |  |
|  |  |  |
| Factor for 10 off solid core 10mm2 from On-Site Guide Table E5 |  |  |
|  |  |  |
|  |  |  |

From **IET On-Site Guide,** **Table E6** a **75 x 25mm trunking** with a term of 738 would be suitable in this case.

However, in practice the electrician will use a larger size to allow for future extensions to the installation and it is more likely that a 50 x 50mm trunking would be installed in this case.

For sizes of cables and trunking not given in the tables, the number of cables installed should be such that the resulting spacing factor does not exceed 45%. The space factor in this case is the ratio of the sum of the overall cross-sectional area (CSA) of the cables (including cable and sheath) to the internal CSA of the trunking. This is calculated as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |