Prefabricated wiring systems are an established alternative to conventional fixed wiring methods. They are often referred to in generic terms as ‘modular wiring’ or ‘plug-and-play’.

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This article identifies key aspects of BS 8488 for the specification of prefabricated wiring systems and associated requirements in BS 7671 and highlights the responsibility on the designer to make the necessary electrical calculations.

When referring to this standard it is important to realise that its latest amendment is BS 8488:2009+A1:2010 Incorporating Corrigendum No 1. This latest amendment introduces requirements associated with electrical design calculations and BS 7671. BS 8488 identifies that separate luminaires are a typical group of electrical equipment, which can easily be linked to a comprehensive lighting system by using a prefabricated wiring system (see fig 2).

**BS 8488 System safety standard**

BS 8488 specifies safety requirements, together with associated tests, for prefabricated wiring systems that are within its scope. It includes systems that:

- incorporate installation couplers to BS EN 61535
- have a rated voltage up to and including 500 V a.c.
- are a permanent connection in fixed installations

**Application of the system**

The standard provides a guide to use and applications, including those within suspended floors and ceilings. Fig 1 illustrates a typical prefabricated wiring system.

**Safety requirements and tests**

Safety requirements and tests in BS 8488 include:

- provision for earthing
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Fig 2 – Diagram of a typical prefabricated wiring system

- protection against electric shock
- resistance to solid objects, dust and moisture
- insulation resistance and electric strength
- clearances, and creepage distances
- resistance to heat, fire and tracking
- electrical connections
- routine tests during/after production

Rated current and wiring section conductor size
BS 8488 prescribes that the rated current shall be assigned according to a reference method defined by the manufacturer from BS 7671:2008, Table 4A2.

The rated current and cross-sectional area of the wiring section conductors, are determined on the following basis:

- the number of loaded cores defined by the manufacturer
- not being grouped with other wiring systems or cables
- not being in contact with thermal insulation
- the ambient temperature not exceeding 30°C
- the frequency of operating being not greater than 61Hz

Marking of wiring section rated current
BS 8488 requires that the rated current (A) and corresponding reference method from BS 7671:2008, Table 4A2 is distinctly and durably marked on each individual section (see fig 3, below).

System design to BS 7671
Additional documentation
BS 8488 requires the following details to be provided with each prefabricated wiring section, if they are necessary to ensure safe use and maintenance:

- instructions for safe use
- system design information, validating conformity with BS 7671*
- information required to facilitate inspection and testing for conformity with BS 7671*

*This information can be for the complete system and not provided with each wiring section.

It can be assumed that safe use includes protection against electric shock and adequate conductor current-carrying capacity. Therefore, it is likely that every BS 8488 system includes:

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will have been designed using basic calculations/circuit arrangements or dedicated calculation software and be provided with this design information.

BS 8488 states that the required current-carrying capacity of a system section should be determined by the system designer by applying rating factors for the specific installation conditions.

This current carrying capacity may be different from the rated current.

Design elements of the system
Design elements of the system, to be verified for compliance with BS 7671 may include:

- Cross-sectional area of live conductors
- Voltage drop
- Earth fault loop impedance for protection against electric shock (fault protection)
- Protective conductor cross-sectional area for protection against earth fault current
- Cross-sectional area of live conductors for protection against short circuit current

Connection to LV switchgear and controlgear assembly
A key requirement of BS 8488 specifies that a wiring system comprising a number of circuits connected to separate overcurrent protection shall originate from an LV switchgear and controlgear assembly complying with the relevant part of BS EN 60439, BS EN 61439 or BS EN 61534.

An appropriate standard for the system distribution board can be BS EN 60439-3, which is known as an MCB distribution board.

Where the LV switchgear and controlgear assembly contains the wiring system overcurrent protection, the connector to the assembly must conform to BS EN 61984 and the installation coupler shall conform to BS EN 61535 (see fig 4).

Through-connection arrangements
BS 8488 stipulates the applicable standards for the assembly containing couplers for the through-connection of circuits that emanate from separate overcurrent protection e.g. circuit-breakers.

One example of this arrangement is a multiple circuit distribution cable (known as a home run) originating from a distribution board and terminating at an assembly of couplers, known as an Area Distribution Box or ADB (see fig 5, below).

Depending upon the configuration of the assembly of couplers for through connection, BS 8488 requires conformity with BS 5733 or the relevant part of BS EN 60439, BS EN 61439 or BS EN 61534.

Circuit branching arrangements
Where a wiring system comprising a single circuit terminates at an assembly containing couplers intended for branching of the circuit, BS 8488 requires the assembly containing the couplers must comply as follows:

a. if it is not designated for the connection of luminaires, it must conform to BS EN 61535 and be classified as a distribution block

Fig 4 System distribution board to BS EN 60439-3 with distribution connectors to BS EN 61984

Fig 5 An assembly of couplers (known as an ADB) complying with BS EN 61439-2 connected to a multiple circuit distribution cable (known as a home run)
b. if it is specifically designated for the connection of luminaires, it must conform to BS 5733 and be classified as a lighting distribution unit (LDU) as defined in BS 5733:2010 (see fig 6) manufacturers might not be compatible nor safely interconnectable. Fig 7 illustrates one manufacturer’s type of installation coupler used in a prefabricated wiring system.

c. if it is not covered by (a) or (b), it must conform to BS 5733 or the relevant part of BS EN 60439, BS EN 61439 or BS EN 61534

Compatibility between different manufacturers

BS 8488 requires that prefabricated wiring systems use installation couplers that conform to BS EN 61535. Installation couplers are not required to be dimensionally compatible between different manufacturers. Therefore, the standard requires that a notice be marked on each section or in the manufacturer’s instructions and/or literature, warning that prefabricated wiring systems manufactured to BS 8488 by different manufacturers might not be compatible nor safely interconnectable. Fig 7 illustrates one manufacturer’s type of installation coupler used in a prefabricated wiring system.

Summary

BS 8488:2009+A1:2010 specifies the safety requirements, together with associated tests for prefabricated wiring systems. Three key requirements associated with BS 7671 are:

- Wiring sections must be marked with the rated current and corresponding reference method from BS 7671:2008, Table 4A
- System design information, validating conformity with BS 7671 shall be provided*
- Information required to facilitate inspection and testing for conformity with BS 7671 shall be provided*  
  *If they are necessary to ensure safe use and maintenance

If necessary, to ensure safe use and maintenance, BS 8488 requires information to be provided relating to system design and inspection and testing for conformity with BS 7671.

It can be assumed that safe use includes protection against electric shock and adequate conductor current-carrying capacity. Therefore, it is likely that every BS 8488 system will have been designed using basic calculations/circuit arrangements or dedicated calculation software and be provided with this design information.

Specifiers and installers have been keen to exploit the benefits of prefabricated wiring systems for a number of years. The development of BS 8488A1: 2010 now sets down the requirements for the design of prefabricated wiring systems to conform with specific parts of BS 7671.

References and further reading

Standards referenced in this article can be purchased from the British Standards Institution (BSI) www.bsigroup.com.

Fig 7 One manufacturer’s type of installation coupler used in a prefabricated wiring system