



# INSTALLING RECESSED LUMINAIRES IN CEILINGS

by Bill Allan

**THE IEE** receives a number of enquiries from designers and installers and others regarding the application of Regulation 527-02-01 when installing recessed luminaires in ceilings in domestic premises. Regulation 527-02-01 is clear enough. It requires that where a wiring system passes through elements of building construction such as floors, walls, roofs, ceilings, partitions or cavity barriers, the openings remaining after passage of the wiring system shall be sealed according to the degree of fire resistance required of the element concerned (if any). The two words in brackets at the end of the Regulation, (if any), highlight the problem. Simply stated, the question is: if an electrician is installing one or more recessed downlighters in a location such as a domestic kitchen, for example, what degree of fire resistance is required? Is any degree of fire resistance required? This question has been highlighted by the introduction of Part P into the Building Regulations. This article will not deal with protection against thermal effects, for which reference should be made to Chapter 42 of BS 7671: 2001 and IEE Guidance Note 4, Protection Against Fire. Reference should always be made to Part B of the Building Regulations for fire safety requirements. For sound insulation requirements, reference should be made to Part E of the Building Regulations. It should be emphasised at the outset that this article is intended to provide guidance, which, it is hoped, will prove helpful; it is recommended that the local building control be consulted for advice.

## **Fire compartments**

Let's begin with a brief review of some theory about fire safety. The spread of fire within a building is restricted by sub-dividing the building into compartments separated from one another by walls and/or floors of fire-resisting construction. There are two reasons for this:

- To prevent the rapid spread of fire that could trap occupants of the building; and
- To reduce the chance of fires becoming large on the basis that large fires are more dangerous not only to occupants and fire service personnel but to people in the vicinity of the building.

## **Dwellings**

Walls that separate semi-detached houses or terraced houses are constructed as fire compartment walls and the houses are considered as separate buildings. Where a domestic garage is attached to a house, (or forms an integral part of it), the garage should be



separated from the rest of the house. In buildings containing flats or maisonettes, every floor is constructed as a fire compartment floor (unless it is within a maisonette, i.e. between one storey and another within one dwelling) and every wall that separates a flat or a maisonette from any other part of the building is constructed as a fire compartment wall. Otherwise, the walls and ceilings within detached, semi-detached and terraced houses are not constructed as fire compartment walls and ceilings.

**Installing downlighters in ceilings that are not fire compartments**

Downlighters are commonly installed in locations such as kitchen ceilings, which are not fire compartment ceilings. But because they are not fire compartment ceilings does not mean that they don't require some degree of fire resistance. The minimum fire resistance of a floor in a two-storey house, for example, is given in Appendix A of Approved Document B, 'Fire Safety', as 30 minutes (See

Table A1). The idea is that, in a fire situation, the floor will not collapse for at least 30 minutes, enabling building occupants to leave safely.

Downlighters are usually made of steel or aluminium and have a diameter of approximately 50mm (the holes themselves being about 60mm). Common sense suggests that cutting a number of holes in the plasterboard ceiling of a timber joisted floor may compromise its fire resistance capability. One measure to help the situation is to keep the number of downlighters in any one area to a minimum and to space them as far apart as possible. Solutions proposed to restore the integrity of the ceiling's fire resistance include building a plasterboard box around luminaires or installing commercially available 'fire hoods'. But is it necessary to restore the fire resistance capability of ceilings?

**The TTL tests**

In 1996, the DoE and TRADA commissioned TRADA Technology Limited (TTL), a member of the TTL Chiltern group of companies, to test the effect of recessed downlighters (with no boxing in or fire hoods) on the fire resistance of plasterboard ceilings with conventional rectangular joists. TTL has been involved in fire research and testing for many years and is the UK's leading authority on the fire protection of timber. During 1994/95, TTL carried out the tests. The results of the tests were published in the July 1996 edition of Building Control magazine. These results were, perhaps, surprising in that they confirmed that downlighters, even without being boxed in and with no fire hoods, in plasterboard ceilings have little significant effect on fire resistance ratings up to 30 minutes. It must be inferred from these tests therefore, that, at least with plasterboard ceilings with conventional rectangular joists, it is not necessary to 'box in' luminaires or to use fire hoods for the purpose of restoring the fire resistance capability of ceilings which are not of fire compartment construction.

**Downlighters in ceilings under roof spaces**

However, in situations where downlighters are installed in ceilings under roof spaces, where debris or thermal insulation may accumulate on top of the luminaire, a case could be made for building a plasterboard or metal box around the luminaire or installing a fire hood. When boxing in a luminaire, in the absence of any manufacturers' guidance, a gap of about 100mm around the luminaire and 75mm above is recommended to allow for heat dissipation.

### Downlighters in flats and maisonettes

As mentioned earlier, in buildings containing flats or maisonettes, floors are constructed as fire compartment floors. However, suspended ceilings, comprising metal grids and plasterboard with voids of approximately three inches, are frequently installed for sound insulation and to hide services. Where suspended ceilings have been installed in flats and maisonettes, they can conveniently be utilised to install downlighters without fireproofing. In Scotland, the Building Regulations don't allow downlighters to be installed in fire compartment ceilings if they are timber-based, unless a suspended ceiling has been provided. It is understood that this requirement is to reduce noise transmission between dwellings.

### Installing downlighters in fire compartment ceilings

For fire compartments to be effective, there must be continuity at the junctions of the fire-resisting elements that enclose them, and any openings from one compartment to another should not present a weakness. Section 9 of Approved Document B, 'Fire Safety' permits openings to be made in compartment walls and floors for certain purposes, including the passage of pipes, etc, that meet the provisions in Section 11. Clearly, the requirements of Approved Document B must be satisfied when installing downlighters in fire compartment ceilings. The advisability of keeping the number of downlighters in any one area to a minimum and to space them as far apart as possible was mentioned earlier but it is especially important when installing downlighters in fire compartment ceilings. As the period of fire resistance for fire compartment ceilings will be at least 60 minutes, it will be necessary to restore their fire resistance capability. The use of fire hoods or 'boxing in' of luminaries could be considered as a way of achieving this. Any openings remaining after the installation of downlighters must be sealed according to the degree of fire resistance required of the ceiling. The fire resistance of a fire compartment floor is typically 60 minutes but reference should be made Table A2 of the above document.

### Smoke alarms

It would seem remiss not to mention that The Building Regulations 2000 and the Building Standards (Scotland) Regulations 1990 require all

new and refurbished dwellings to be fitted with mains-operated smoke alarms, which may have a secondary power supply such as a battery (either rechargeable or replaceable) or a capacitor. These must be installed in accordance with BS 5839, Part 6: 2004. Such alarms, along with the fire resistance capability of building elements, are an important part of the strategy for protecting building occupants in case of fire. They would, after all, be reasonably expected to operate within minutes of a smoke situation developing.

### Conclusion

It should be pointed out that manufacturers' instructions must be followed when installing downlighters. It is hoped that this article will prove helpful in the application of Regulation 527-02-01 to the installation of downlighters.

For such installations, it is recommended that the local authority building control be consulted.



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