Developments of Low-Voltage Fuse Standards

Referenced in BS 7671:2008

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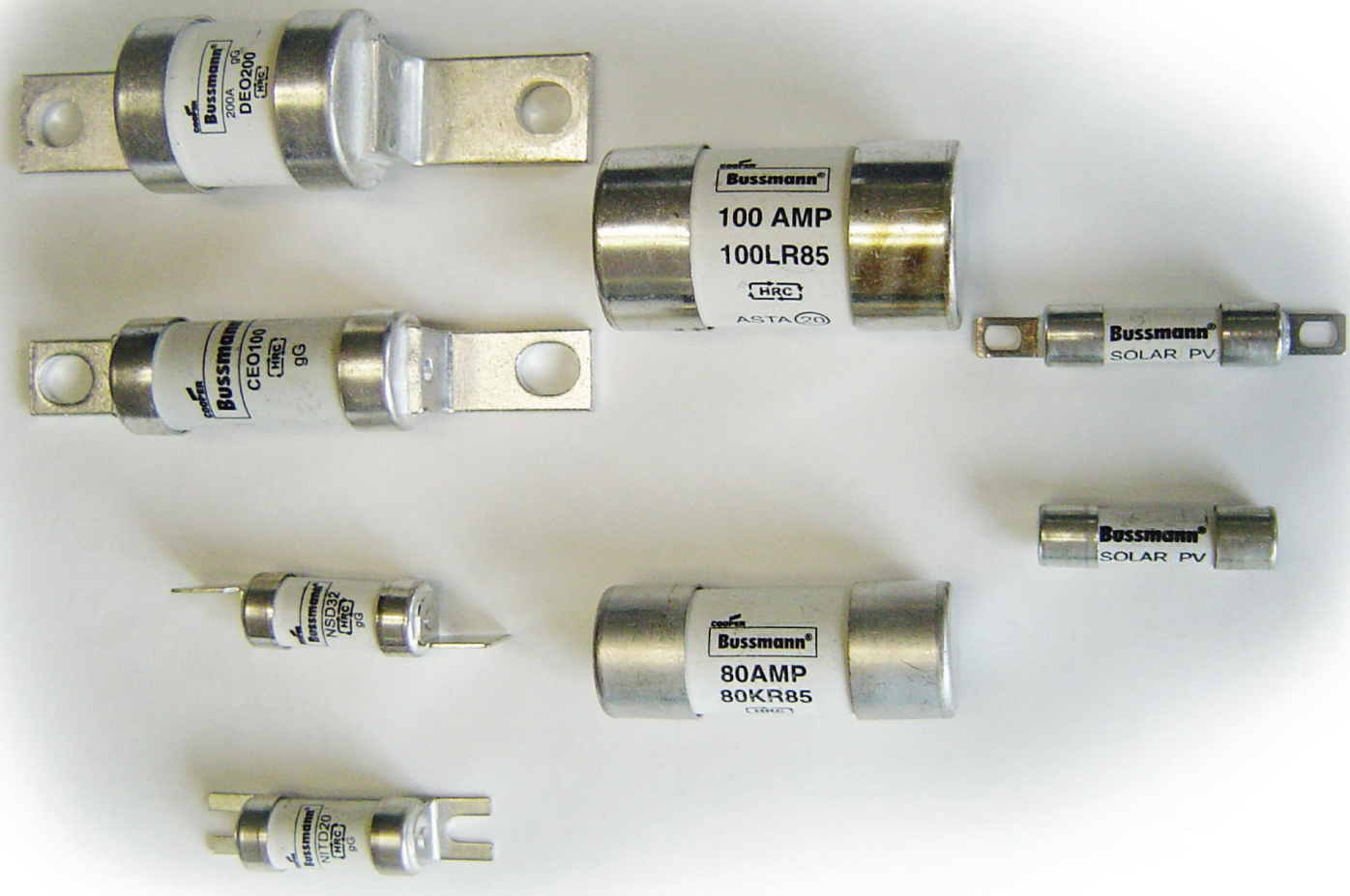
The UK national committee for the development of BS 7671 (JPEL/64) currently has a programme to develop amendment 1 of BS 7671:2008. As part of this programme it has been highlighted that there has been some developments in the low-voltage fuse standards that are included in the requirements of BS 7671:2008. This article will briefly describe the relevant developments in low voltage fuse standards, how these affect what is published in BS 7671:2008 and finally an insight into future developments of fuse standards.



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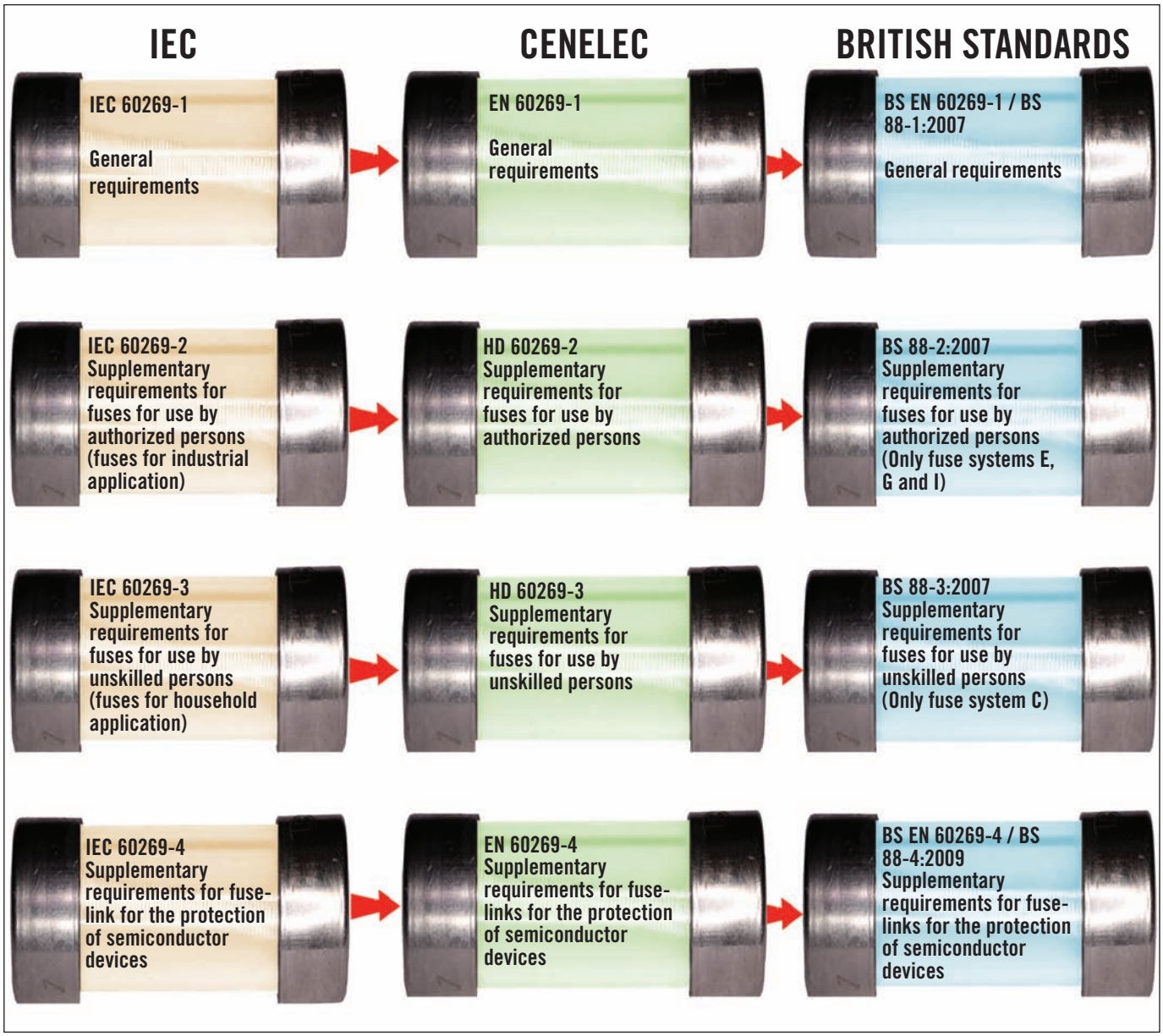

Figure 1 – Alignment of 60269 series low voltage fuse standards

The International Electrotechnical Commission (IEC) has restructured the IEC 60269 series of low-voltage fuse standards so that there are now only four parts to the series instead of seven. The European technical committee CENELEC has aligned to the IEC 60269 standards. Finally, the UK has adopted the CENELEC standards, but only includes the specific fuse systems used in the UK. This alignment is summarised in figure 1. As a consequence of this alignment the UK has now withdrawn a number of low-voltage fuse standards on 1 March this year (2010) that is summarised in table 1. A main point to highlight from figure 1 and table 1 is that UK standard BS 88-2:2007 includes supplementary requirements for fuses for use by authorised persons, typically industrial applications, specific to fuse types E (bolted type), G (clip in) and I (wedge tightening). These fuse systems were covered by the existing standards BS

BS EN 60269-1: 1999	General Requirements
BS EN 60269-2:1995	Common industrial fuse requirements
BS EN 60269-3:1995	Fuses for domestic applications
BS EN 60269-4:1996	Semiconductor protection fuses
BS EN 60269-4-1:2002	Examples of types of semiconductor protection fuses
BS 88-2.2:1988	Industrial fuse systems
BS 88-6:1988	Fuses for domestic applications
BS 88-5: 1988	Fuse-links for use in a.c. electricity supply networks
BS 1361:1971	Cartridge fuses for a.c. circuits in domestic premises
Note 1: BS 88-2.2, BS 88-5 and BS 88-6 have been incorporated into BS 88-2:2007 as fuse systems G (clip in), I (wedge tightening) and E (bolted) respectively Note 2: BS 1361 has been incorporated into BS 88-3:2007	

Table 1 – BS and BS EN fuse standards withdrawn on 1st March 2010

Figure 2 – BS 88-2 (bolted) fuse system E

88-2.2:1988, BS 88-6:1988 and BS 88-5:1988 respectively. However, the requirements of these fuses have been incorporated into BS 88-2:2007 and are now withdrawn.

As three standards have been incorporated into a single standard, reference will have now have to be made to either BS 88-2 fuse system E (bolted), BS 88-2 fuse system G (clip in) or BS 88-2 fuse system I (wedge tightening). A second point to highlight is that UK standard BS 88-3:2007 includes supplementary requirements for fuses for use by unskilled persons, typically household applications, to fuse system C (BS cylindrical fuse system). This fuse system was covered by the existing standard BS 1361:1971 – however, the requirements have been incorporated into BS 88-3:2007 and is now withdrawn. A BS 1361 fuse should now be referenced as BS 88-3 fuse system C. Examples of the various fuse systems are shown in figures 2, 3 and 4.

Finally, Table 2 shows that the UK standalone low-voltage fuse standards BS 646, BS 1362 and BS 3036 remain current.

Impact on BS 7671:2008

There are a number of areas in BS 7671:2008 that reference various low-voltage fuse standards. The developments already discussed will have an impact in what is published in BS 7671:2008; therefore, it is worth highlighting these areas that will require updating. In Chapter 41, the tables 41.2 and 41.4 both have reference to BS 88-2.2, BS 88-6 and BS 1361. Therefore, the tables will need to reflect the appropriate change. For example, Tables 41.2(a)/41.4(a) could become 'General purpose (gG) fuses to BS 88-2 – Fuse systems E (bolted) and G (clip in)' and

BS 646:1958	Cartridge fuse-links (rated up to 5 A) for a.c. and d.c service
BS 1362: 1973	General purpose fuse-links for domestic purposes
BS 3036: 1958	Semi-enclosed electric fuses (ratings up to 100 A 240 volts to earth)

Table 2 – Standalone BS fuse standards referenced in BS 7671:2008 that remain current

Tables 41.2(b)/41.4(b) could become 'Fuses to BS 88-3 – Fuse system C'. Regulation group 411.8 deals with reduced low-voltage systems and gives maximum earth fault loop impedance values in Table 41.6, which includes values for typical BS 88-2.2 and BS 88-6 fuses.

Chapter 43 has requirements in Regulation 432.4 for the time/current characteristics of an overcurrent protective device to comply with one of a number of fuse standards. This includes BS 88-2.2, BS 88-6 and BS 1361. Regulations 433.1.2 and 433.1.5 both include reference to these fuses for coordination between conductor and overload protective device when providing protection against overload current. In Chapter 53, Regulation 533.1 lists a number of standards that a

Figure 3 – BS 88-2 (clip in) fuse system G

Figure 4 – BS 88-3 fuse system C (BS cylindrical fuse system)

Figure 5 – Solar photovoltaic fuses

device for protection against overcurrent needs to comply with, which includes fuses to BS 88-2.2, BS 88-6 and BS 1361. Section 537 deals with Isolation and switching, where Table 53.2 includes guidance on how appropriate a device is for isolation, emergency switching and functional switching. This has reference to a 'BS 88' fuse. It is worth highlighting that this table does not currently include guidance on a BS 1361 fuse.

Appendix 1 provides a list of British Standards to which reference is made in the Regulations, therefore the appropriate BS/BS EN number will require amendment to reflect the appropriate status. Appendix 3 includes information on the time/current characteristics of overcurrent protective devices, including fuses to BS 88-2.2, BS 88-6 and BS 1361. Appendix 8 provides information on busbar trunking and powertrack systems where protection against overload current includes reference to a 'BS 88' fuse.

Therefore, the low-voltage fuse standards that are likely to be referenced in various Regulations and Appendices in a future amendment of BS 7671:2008 are;

- BS EN 60269-1:2007 / BS 88-1:2007
- BS 88-2:2007
- BS 88-3:2007
- BS 646:1958
- BS 1362:1973
- BS 3036:1958

Future developments of fuse standards

There are currently two developments related to fuses that are worth highlighting. The first is IEC TR 60269-5 Guidance for the application of low voltage fuses. This is an application guide that combines existing guidance on coordination between fuses and contactors / motor starters and guidance on low-voltage fuses. This is due for publication in 2011. A second development is IEC 60269-6 Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems. As the title suggests there will eventually be a specific standard for photovoltaic fuses. This is likely to be published as an International standard towards the end of 2010. This is planned to be published as European standard EN 60269-6 and will eventually adopted in the UK as a dual referenced standard BS EN 60269-6 / BS 88-6, probably in early 2011. Although it is not likely to affect what is published in BS 7671:2008 at the moment, this standard will eventually be relevant to the requirements for Section 712, therefore anyone working with photovoltaic systems should be aware of the standard for fuse-links for these types of systems. Examples of photovoltaic fuses are shown in figure 5.

Additional information

Low-voltage fuse standards are the responsibility of BSI technical committee PEL/32. Committees can be contacted via customer services bservices@bsigroup.com.

The status of British Standards can be checked via the BSI site http://shop.bsigroup.com/ and searching for the required standard.

The CENELEC committee responsible for low-voltage fuse standards is technical committee CLC/SR 32B.

The status of CENELEC standards can be searched via the following site www.cenelec.eu/Cenelec/Homepage.htm

The IEC committee responsible for low voltage fuse standards is technical committee IEC/TC 32B. The status of IEC standards can be searched via the site www.iec.ch/ using the standards and development page or TC dashboard page.

The British Electrotechnical & Allied Manufacturers Association (BEAMA) has fuse experts represented on technical committees. The BEAMA website address is www.beama.org.uk