

ELECTRICAL DISTRIBUTION PILLAR SPECIFICATION TO BSEN 60439-1

BACKGROUND

In the electrical industry the basic specification for the manufacture and installation of all electrical products is covered by a series of international manufacturing and product installation standards. All products whether just a component or a group of components must be manufactured safely, correctly specified and installed, and be fit and used for the purpose for which they are designed.

The purpose of all electrical product standards is to ensure that everyone in the supply chain; from manufacturer, through to Specifier, through to end user, are producing equipment, prescribing equipment and using equipment that is fundamentally safe.

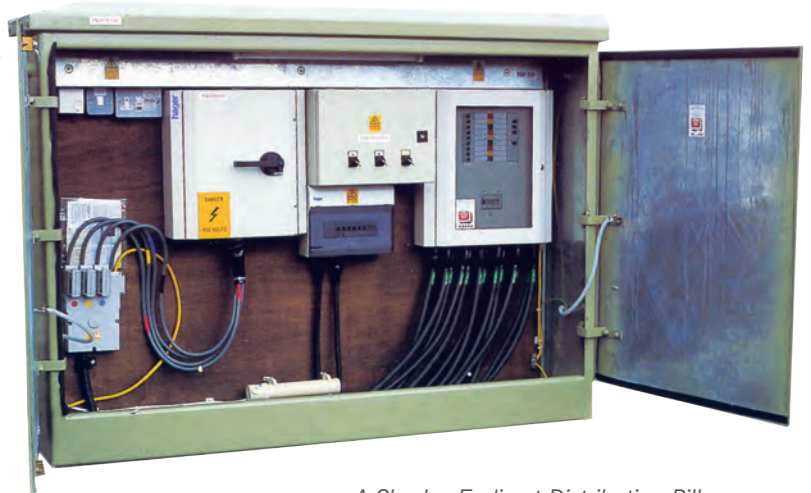
In the UK all electrical installations must comply with BS 7671, Requirements for Electrical Installations, and to help the Specifier and end user to have confidence that they are complying with the correct product standards. BS 7671 (Appendix 1) provides a list of other standards that are referenced within it; typical examples being a circuit breaker that must comply with BSEN 60898 and a switch fuse with BSEN 60947-3.

From this we can conclude that all products supplied, specified and installed should comply with one of the standards referenced in Appendix 1.

In the Street Lighting Industry we often, quite rightly, see a number of references to BS 7671 with respect to installations but in other areas product standards are not so widely referenced. There are some obvious ones which re-occur, BS 7654 and IEC 60269 (BS 88) but one area where no standard is obvious, or used, is in the specification of Street Lighting Distribution Pillars.

To help further understand the relationship between BS 7671 and national manufacturing standards, BS 7671 states in Part 1, Chapter 11, Scope, (113.1), 'the Regulations apply to items of electrical equipment only so far as selection and application of equipment in the installation are concerned. The Regulations do not deal with requirements for the construction of assemblies of electrical equipment, which are required to comply with appropriate standards'. This means that whilst we must ensure that the final installation complies with BS 7671, an Assembly of products cannot, and therefore should not be specified to it.

It further states in Part 1, Chapter 13, Fundamental Principles, (133.1.1) 'every item of equipment shall



A Charles Endirect Distribution Pillar

comply with the appropriate EN (European Norm) or HD (Harmonisation Document) or National Standard implementing the HD. In the absence of an EN or HD the equipment shall comply with the appropriate National Standard. In all other cases reference shall be made to the appropriate IEC Standard or to the appropriate standard of another country'. This tells us that the product that is specified must comply with a recognised standard. In conclusion, installations must be specified to and comply with BS 7671 but the products that are used in the installation must be specified to and comply with the relevant national or international standard.

It is therefore clear that everyone manufacturing, specifying and installing electrical equipment has a clear responsibility to ensure they comply with the correct product or installation standard. So, as a Specifier or Street Lighting Engineer how can you be sure the product is safe and fit for purpose? How can you show you are acting professionally and responsibly in using the standards laid down by BS 7671? And how can you protect yourself in the event of a failure or accident if the product you are prescribing has no standard?

At Charles Endirect Ltd. we have always prided ourselves on the manufacture of quality, safe products which are fit for purpose. As part of this continuing commitment we have looked closely at Distribution Pillars to ensure we manufacture to a recognised standard and we have identified both an international standard and a test procedure which we can apply to ensure we are able to maintain our high quality ethos.

WHICH STANDARD?

All products must be manufactured to a recognised standard. In a typical Distribution Pillar there will be a mixture of various products and product standards, and the difficulty is in linking all these products into a standard once they are assembled into a complete unit.

The current British Standard which applies to electrical Assemblies is BSEN 60439:1999, Low Voltage Switchgear and Controlgear Assemblies and part one of this standard specifically relates to type tested Assemblies and partially type tested Assemblies. The scope can be found in clause 1.1: which states 'this international standard applies to low-voltage switchgear and controlgear assemblies ((type tested assemblies (TTA) and partially type tested assemblies (PTTA) the rated voltage of which does not exceed 1,000 V a.c. at frequencies not exceeding 1,000Hz, or 1,500 V d.c. We then have to decide whether the Distribution Pillar is a type tested Assembly or partially type tested Assembly and this can be answered by looking at Clause 2) Definitions 2.1.1.2.: which clearly defines a partially type tested Assembly as: A low voltage switchgear and controlgear Assembly, containing both type tested and non type tested arrangements provided the latter are derived (e.g. by calculation) from type tested arrangements which have complied with the relevant tests (see table seven).

It can therefore be seen that Distribution Pillars can be covered by this scope and definition. The next stage is to ensure that the product we design, manufacture and sell complies with the requirements of this standard.



Design Area

DESIGN AND CONSTRUCTION

To successfully ensure a product complies with a standard, the starting point is with the design. Only products that are designed considering the requirements of the standard e.g. Scope; Definitions; Classifications; Electrical Characteristics; Product Information; Service Conditions; Design and Construction etc. will successfully test to the criteria laid down in that standard. The successful passing of these tests is, of course, the evidence that the product complies with the standard and only then can certification be issued to support it.

At Charles Endirect Ltd we have invested in a specialist team to design, construct and test Distribution Pillars.

The responsibility of this team is to work very closely both with our own Sales Managers and the end customer, to ensure that the final product will meet both the customer's requirement and will be able to be successfully tested, and certified, to BSEN 60439-1.

Once an order is received the local Sales Manager or a Technical Support Engineer will liaise directly with the customer. A circuit diagram and layout will be produced and the instruction to start manufacture will be issued to the production team. An engineer who is solely responsible for the construction of Distribution Pillars will ensure that it is built in such a way that compliance is ensured.

Testing:

BSEN 60439-1 states the series of tests that should be undertaken on a PTTA. There are two types of tests, Routine Tests and Type Tests and to claim compliance manufacturers must be satisfied both sets of tests are completed as instructed by the standard.

Routine Tests:

These must be performed on every unit. They are designed to ensure the product is safe and will function correctly and are as important as the Type Tests. The Type Tests often refer to previous tests that have been carried out or can be supported by external supplier's tests, whereas the Routine Tests are the ongoing daily proof of the manufacturer's capability to produce safe products. For example it is common to use a commercial distribution board fitted with Din rail in a Distribution Pillar. Once control or protection devices (mcb's fuses etc.) have been fitted on to the Din rail, and electrically connected together, this unit then becomes, in itself, an Assembly. Assemblies must be insulation tested to ensure their integrity as the insulation could be adversely affected by their construction. Once this Assembly is installed into a Distribution Pillar and connected to other distribution and control equipment, it then becomes part of a secondary main Assembly, in this case a PTTA which must also be insulation tested.

If a commercial Consumer Unit or Three Phase Distribution Board, which has been tested by the original manufacturer, is used as part of the distribution equipment within the Distribution Pillar it is important that a full insulation test is performed on the final PTTA, i.e. the Distribution Pillar. There are a number of different ways to undertake the insulation tests for which the methods and relevant voltages are explained within the standard. At Charles Endirect Ltd. we opt to test using a high voltage insulation test method, (sometimes called a flash test) which allows us to declare an insulation voltage value (Ui) of 690V. By choosing this method we are confident the product will withstand the most arduous operating and installation conditions and we perform this test on every Assembly and Distribution Pillar prior to dispatch.

Type Tests:

The standard also lists a series of Type Tests that must be performed to ensure compliance. These tests can be performed in various ways depending on the design, construction and application of the Distribution Pillar,

BSEN 60439-1 : 1999 Table 7 - List of verifications and tests to be performed on PTTA

	Characteristic to be checked.	Clause	For PTTA
1	Temperature-rise limits.	8.2.1	Verification of temperature-rise limits by test or extrapolation.
2	Dielectric properties.	8.2.2	Verification of dielectric properties by test according to 8.2.2 or 8.3.2, or verification of insulation resistance according to 8.3.4. (see Nos.9 & 11).
3	Short-circuit withstand strength.	8.2.3	Verification of the short-circuit withstand strength by test or by extrapolation from similar type-tested equipment.
4	Effectiveness of protective circuit.	8.2.4	Verification of the effective connection between the exposed conductive parts of the Assembly and the protective circuits by inspection or by resistance measurement.
	Effective connection between the exposed conductive parts of the Assembly and the protective circuit.	8.2.4.1	
	Short-circuit withstand strength of the circuit.	8.2.4.2	Verification of the short-circuit withstand strength of the protective circuit by test or appropriate design and arrangement of the protective conductor. (See 7.4.3.1.1, last paragraph).
5	Clearances and creepage distances.	8.2.5	Verification of clearances and creepage distances.
6	Mechanical operation.	8.2.6.	Verification of mechanical operation
7	Degree of protection	8.2.7	Verification of the degree of protection
8	Wiring, electrical operation.	8.3.1	Inspection of the Assembly including inspection of wiring and, if necessary, electrical operational test.
9	Insulation test	8.3.2	Dielectric test or verification of insulation resistance according to 8.3.4. (see Nos. 2 & 11)
10	Protective measures	8.3.3	Checking of protective measures.
11	Insulation resistance	8.3.4	Verification of insulation resistance unless test according to 8.2.2. or 8.3.2. has been made (see Nos. 2 & 9)

all connections prior to the despatch of Distribution Pillars, so not only do we comply with, but exceed the requirements of the standard in this area.

All the tests are performed in house by a trained Engineer. To do this we have invested in unique test equipment, which has been specifically designed by a specialist manufacturer, to ensure the tests comply with the Type Test requirements of BSEN 60439-1.

As the tests are performed, they are individually logged into a purpose designed database which requires an input for each completed part of the test. Should the database not receive an input then it will not sequence to the next test or allow the final certificate to be produced. In this way we can be sure that all tests are carried out and all results recorded.

Once the tests have been performed and logged, the database automatically records all the results and stores them into a file. This file produces the final test report, nameplate and test certificate, and is backed up every day onto the company server to ensure full traceability, should it be necessary to refer back to them in the future.

The test area has been specially designed with safety in mind. Only experienced personnel are permitted to carry out the testing, observing strict safety precautions for which they have been specifically trained. All the equipment used in the test area has been calibrated by the original manufacturers, who annually calibrate their equipment and issue certificates to show the equipment is in good condition and operating correctly.

INFORMATION TO BE SUPPLIED BY THE MANUFACTURER:

The standard is also clear about the information that should be provided by the

but before the certificate can be issued we must be sure that we have complied with every part of the testing requirement. The list of Type Tests can be found in table 7) of BSEN 60439-1, which is reproduced above.

At Charles Endirect Ltd. we link the existing information resulting from the Routine Testing with the Type Testing to ensure that testing is quick, efficient and most importantly, effective. Because a standard is an all encompassing document in certain areas it can only be general and not specific to equipment. A typical example of this can be seen in the mechanical and electrical checking of cable terminations which can, according to the standard, be made by 'possibly random checking'. At Charles Endirect Ltd we mechanically and electrically check 100% of



Test Station

manufacturer. There are nineteen separate pieces of information which can be given in various ways but must be supplied. Clause 5) of BSEN 60439-1 clearly states which information should be given and the various options open to the manufacturer on how to provide it.

Name Plate:

The Distribution Pillar must be fitted with a nameplate showing the manufacturer's name or trade mark and the type designation or the identification number of the product. At Charles Endirect Ltd. every Distribution Pillar is given a unique reference and job number. These can be found on the nameplate fitted inside of the door. The information on the nameplate must be clear, durable, legible and visible, and to ensure compliance a purpose designed printer has been purchased to produce the nameplate in line with the requirement of the standard.

Markings:

The distribution circuits and the protective devices, inside the Distribution Pillar, must also be clearly labelled. Although this may appear a very obvious point, it is important to ensure the labelling is also as clear, durable and legible as the nameplate and able to stand the harsh environments into which the Distribution Pillar is installed.

Instructions for Installation, Operation and Maintenance.

The product must be supplied with instructions to aid and assist the end user, which should complete the list of product information requirements. For example the standard recommends that if the circuitry is not obvious from the physical arrangement of the Distribution Pillar then a circuit diagram must be supplied. The circuit diagram must then reflect the labelling applied to the distribution

circuits. At Charles Endirect Ltd. we supply circuit diagrams and an instruction leaflet with all Distribution Pillars. The instruction leaflet also serves to remind the Installation Engineers of their responsibilities by highlighting installation standards and, for example, reminding them that all cable connections should be re-checked prior to final completion. Although every terminal connection is checked prior to despatch, copper stranded cable can compress, and during transport vibration can cause terminals to loosen. It is therefore only good working practice to check all terminal connections prior to completion.

SUMMARY:

Charles Endirect Ltd. has invested to ensure the continuing improvement in the design, manufacture and testing of Distribution Pillars. We have done this because it is clearly the responsibility of all those in the supply chain to ensure a safe, fit for purpose product is delivered to the customer, and as a manufacturer we are a key part of that supply chain.

In the past the Specifier and Street Lighting Engineer has had only their judgement and experience to rely on in the prescription of Distribution Pillars. This, as we all know can be open to challenge and question and possibly litigation, should it be seen that BS7671 has not been complied with. Charles Endirect Ltd. is now leading the market by offering a clear product standard for the Specifier and Street Lighting Engineer to use, therefore providing peace of mind and confidence in the final product.

All Distribution Pillars, manufactured by Charles Endirect Ltd. are designed, constructed, tested and certified to BSEN 60439-1.

OTHER PRODUCTS

As well as Distribution Pillars, Charles Endirect Ltd also produce and manufacture:

- ◆ Cut-Outs
- ◆ Isolators
- ◆ Earthing - CETs
- ◆ Feeder Pillars
- ◆ Belisha Units
- ◆ Passive Disconnection Systems

We manufacture our own metalwork and assemble pre-wired cut-outs, isolators, feeder pillars etc. at our premises in Wincanton.

We therefore keep control of our customers' requirements from order to despatch.

For further information please contact either our Customer Services Team at Head Office or your Area Sales Manager. They will be able to provide any help you may require.



T +44 (0)1963 828400
F +44 (0)1963 828401
E info@charlesendirect.com
www.charlesendirect.com

Wessex Way
Wincanton Business Park
Wincanton
Somerset BA9 9RR