

## BASEC Product Certification Requirements - Summary

This document has been prepared for specifiers, installers and users of cable, for manufacturers and suppliers of cable, and for other interested parties such as regulators. It provides a general summary of the main features of BASEC's certification and approval schemes (documented as the **BASEC Product Certification Requirements**), and the specific requirements BASEC places on manufacturers and suppliers in order for them to achieve and maintain approval. Also discussed is the rationale behind these requirements and how they address stakeholder needs.

### Background

BASEC was established in 1971 by end users and cable manufacturers as an independent approval body for cable and related products, with objectives to sustain and improve standards of safety and quality. BASEC does this by providing a professional certification service using inspection of production facilities and cable testing, and through the issue of the BASEC mark.

Specifiers, installers and users of cable are recommended to use BASEC approved cable in order to provide confidence that products have been independently and regularly tested as fully compliant with standards and that ongoing cable production is maintained at the required levels of compliance, safety and quality.

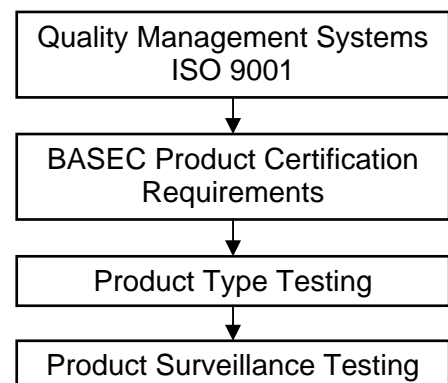
### Independent, Impartial and Accredited

BASEC assesses all manufacturers and their products on the same basis, irrespective of size or location. BASEC's certification schemes are established, approved and monitored by the BASEC Board of Management and by the Certification Committee, which consists of external experts from key stakeholders. The role of the Certification Committee is to ensure the impartiality and independence of BASEC's services. BASEC's certification operations are externally assessed by our UK Government-appointed accreditation body, UKAS, and peer-assessed by other electrotechnical approvals bodies within Europe. BASEC is appointed as a Notified Body under the European *Low Voltage Directive*. In addition to the main cable approval schemes BASEC offers other specialist services for cable manufacturers and other parties.

### Requirements

BASEC product approval is based on a mutually-supportive series of requirements placed on manufacturers:

- Certification of management systems - cable-specific
- Testing of products – initial type testing
- Ongoing surveillance testing



### Management Systems and Quality Control

Producing electric cables to a consistently high standard of quality requires manufacturers to have tight control over production and other business operations. To achieve this, manufacturers establish and maintain appropriate quality management systems, which can be certificated and audited on a regular basis. BASEC offers stand-alone certification to quality management system standards such as ISO 9001. This certification gives end users an indication that the company has the basics of production control in place, but in BASEC's view ISO 9001 does not in itself provide sufficient scope or level of detail to ensure ongoing quality in cable production.

Manufacturers wishing to move on to gain BASEC product approval are required to undergo and maintain certification to BASEC's main product certification scheme requirements (these were formerly known as BA 2250). These are tailored for cable production and go well beyond the more general approach of ISO 9001. The requirements include: sales process, cable design, procurement, production process control, process equipment, inspection and testing procedures, test and measurement



equipment, calibration, rework and repair procedures, non-conforming product, packaging and marking, health and safety, general product safety, environmental impacts, BASEC's sampling and product pick-up requirements, and action on notification of defects (including product recalls). Holding this certification does not in itself entitle the manufacturer to claim BASEC approval of products or to mark cable with the BASEC mark.

The practicalities of quality system assessment and auditing are that BASEC's expert assessors visit the manufacturing site and other critical locations (such as sales offices) between once and four times each year. Manufacturers holding product approvals are visited either two, three or four times each year. For a small manufacturer this could be one or two days per visit, while for larger ones this might be up to five days per visit. BASEC auditors check all aspects of management and production – the operation of each machine is checked. Discrepancies from the requirements of the standards found at assessment must be rectified before initial certification is granted, or within a period specified by BASEC for ongoing assessments. Every three years BASEC undertakes a complete re-assessment of the manufacturer.

## BASEC Product Approval

BASEC offers approval to all British (BS), European (CENELEC), International (IEC etc.) and other national cable standards (such as Irish Standards), and to special standards such as defence, railways, oil and gas, etc. Each type of standard is assigned to a particular BASEC Scheme. Where a standard does not yet exist or is in development, BASEC has the capability to work with manufacturers to create a bespoke approval through a Certificate of Assessed Design.

Manufacturers wishing to obtain and maintain BASEC approval for a product or range of products, to enable them to claim product approval and mark cable with the BASEC mark, must be subject to the procedures set out below. These requirements apply to each type of cable to be approved, and hence each manufacturer will have an approved scope of production (list of approved cables). Most manufacturers also produce other cables that are either (i) not BASEC approved, (ii) approved by another body, (iii) have alternative forms of testing or assessment, or (iv) are not tested or approved at all.

Manufacturers sometimes only require a cable product to be type tested to a standard. This is generally on the request of a particular end user or client. In these cases BASEC can help manufacturers obtain relevant type test reports. However, products tested in this manner cannot be described as BASEC approved or marked "BASEC". Type tests of this nature only demonstrate that a particular sample passed the tests on a particular day, and give no assurance of ongoing conformance or production quality. These tests are sometimes used for special consignments of bespoke cable.

BASEC only approves cable to a full cable manufacturing standard (such as BS 6004, or BS 7629-1) rather than to a particular single test (such as a fire test like BS 8434-1). Only where the manufacturer has achieved approval to the full cable standard will BASEC issue additional certificates covering an end use application (such as BS 5839-1) – these are often needed for marketing purposes. This approach ensures that BASEC scrutinizes and monitors all of the electrical, mechanical and material properties of the cable, in addition to specific properties of interest (such as fire performance).

To initially gain BASEC product approval, the manufacturing facility must be successfully assessed against the BASEC Product Certification Requirements. The manufacturer must then submit samples of the cables in question to BASEC for full type testing. BASEC specifies the particular samples needed, across the manufacturing range of conductor size, the number of cores and other construction aspects, to reflect the requested range of approval. These samples are submitted to the full range of tests

### BASEC Schemes

**Scheme A:**  
(Harmonised power)  
BS 6004  
BS 6500  
BS 7211  
BS EN 60702-1  
BS 7919

**Scheme B:**  
(Non-harmonised power)  
BS 5467  
BS 6231  
BS 6346  
BS 6724  
BS 7629-1  
BS 7846  
BS 5839-1

**Scheme C:**  
Data cables (all types)

**Scheme D:**  
Instrumentation  
BS 5308 etc.

**Scheme E:**  
IEC standards  
Irish Standards  
Defence, Railway, etc.

**Scheme F:**  
Medium voltage  
BS 6622 etc.



specified in the cable standards and in any standards referenced within (such as insulation materials). BASEC requires all tests to be passed before approval is given. Following this process the manufacturer is awarded a certificate with an approved range of production, and they can then begin to mark the cable with the BASEC mark. The certificate is listed on the BASEC web site and entered into BASEC's list of approved products.

## Surveillance Testing

One of the key benefits for end users of a BASEC approval is our scheme of regular surveillance testing. This provides ongoing evidence that products continue to comply with standards and that this applies to each drum or reel of cable used. Cable making is a form of continuous process rather than product assembly, and the quality of cable is hence prone to variation in materials and equipment setup. We consider that cable approval schemes without surveillance testing are of limited value.

BASEC visits each manufacturer several times each year to select samples for surveillance testing, and at the same time we audit their production process and management systems. The frequency of visits is dependant on the cables in question and on the approval scheme (some schemes specify more visits). For manufacturers producing European harmonised cables this is four times per year. For a company manufacturing only specialist products such as fire performance cables this might be two or three visits per year. The number of visits may be increased if the manufacturer fails to operate satisfactorily with low numbers of surveillance test failures or system non-conformities. Any non-conformity found at regular audit must be rectified within a period specified by BASEC.

During their visits BASEC auditors make a selection of samples from put-by / reserve stock or directly from production, removing any perception that the manufacturer might apply undue influence on the samples tested. The number of samples taken per annum depends on the volume of production – the more cable produced the more samples that are taken. For a manufacturer of harmonised cables this would be between 50 and 150 samples per year across the manufacturer's approved range of cables in that scheme. For national types (such as specialist fire performance cable) this would be between 16 and 50 per year across the manufacturer's approved range of cables in that scheme. The sample selections are shared across the audit visits. BASEC makes sure over a three-year testing cycle that sufficient samples of every construction variant are selected and tested to the full range of tests specified in the standards. Once selected, samples are security labeled by the BASEC auditor and shipped to our designated laboratories for testing.

## Testing of Cables, Test Failures and Product Recalls

BASEC's sample testing regime is set out in the detailed scheme documentation, for each cable type. All samples are subjected to a range of basic electrical, mechanical and functional tests. A proportion of samples are selected for additional tests on materials, performance and functional properties, including fire performance where specified. Test reports are reviewed by BASEC on completion.

Where a sample fails a particular test, even in a minor way, this is reported by the laboratory to BASEC immediately by email. Each type of test failure is assigned a number of demerit points, as set out in the BASEC Product Certification Requirements document. Manufacturers are permitted only a certain number of demerit points, and if this exceeds a certain running total their approval for that cable, or all their approvals may be suspended or withdrawn. For all test failures the manufacturer is required to implement corrective and preventive actions which are verified by the BASEC auditor at the next visit. This ensures that any problems in cable compliance to standards are rectified quickly.

Some test failures are deemed serious and the manufacturer may be subjected to a product recall notice. BASEC issues product recall notices to manufacturers immediately and requires them to quarantine batches, notify customers and where possible recover the affected cable. Common causes of product recalls are changes in polymer compound formulation and equipment failure. In recent times BASEC has issued around 20 product recall notices each year.

BASEC, January 2007