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DEVELOPMENT OF FACTORY PRODUCTION CONTROL GUIDANCE FOR EUROPEAN MASONRY PRODUCT STANDARDS

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Abstract

This paper describes the process and progress to develop the factory production control guidance and the factory inspection schemes for masonry products meeting new European Standards published by CEN. The first generation product standards were thought to be lacking in the area of factory production control information and there was a clear requirement to develop the guidance necessary for national regulators, manufacturers and the certification bodies (the so-called 'Notified Bodies'). The guidance therefore had to cover the needs of all types of organisations and a strong liaison was imperative between the relevant Sector Groups of the Notified Bodies and the European manufacturers' trade bodies.
A commentary is given on the reasons behind the outcomes of the documents and how these can be improved upon in the future.

Key Words

European Standards, factory production control.

1 Introduction

The writing of European Standards (ENs) for masonry products started in earnest in the late 1980s under the auspices of the European Standards Body (CEN), Technical Committee TC 125. The mandate for the project was to write product standards for all types of masonry units, mortars and ancillary components. After years of development, public commenting, translation, comment assessment etc, the majority of ENs was given a Formal Vote of approval as "harmonised" standards (hENs) in 2003, although after amendment some versions will not be published until late 2004. Previously, a number of the ENs had been approved and published as 'non-harmonised' versions, the difference being whether or not it is possible to "CE mark" against the EN.

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However, even with the hENs a number of National Standards bodies and regulators had commented about the lack of factory production control information and how third parties were to go about their certification process. CEN TC 125 decided that for the so-called 'first generation' ENs the necessary information could be given as 'guidance' in separate documentation. To do otherwise would inevitably cause significant delay to the hENs, which the manufacturing industry in general did not want. As a result, CEN TC 125 set up a Task Group, under the convenorship of the author, to develop the necessary documentation, which would suffice until such time as the requirements could be included in the 'second generation' ENs. Some background information now follows to expand on some of the operating procedures required to achieve CE marking.

2 'CE' Marking

The background to the whole system of requirements lies with the Construction Products Directive (CPD) published by the European Commission. The aim of the CPD was to break down technical barriers to trade in construction products between Member States in the European Economic Area (EEA). To achieve this, four main elements were provided by the CPD.

- A system of harmonised technical specifications e.g. hENs.
- An agreed system of attestation of conformity for each product family.
- A framework of Notified Bodies.
- The CE marking of products.

It should be noted that the CPD did not aim to harmonise regulations, since Member States and public and private sector procurers were free to set their own requirements on the performance of works and therefore products. However, the CPD did set out to harmonise test methods, the method of declaration of product performance values, and the method of conformity assessment. Choices of required values for the chosen intended use is left to the regulators in each Member State.

European product standards for masonry units address characteristics that are not regulated in some Member States, but have been included for commercial reasons. As a result, all harmonised product standards under the CPD include an Informative Annex (Annex ZA), the first part of which (ZA.1) lists the regulated requirements and the clauses in the EN in which they are addressed. Some of these clauses may refer to separate supporting standards such as test methods.

As such, Annex ZA.1 in the hEN becomes a checklist for CE marking from which the manufacturer can see all the possible requirements of his product and how they can be met.

The CE marking of a product acts as a "passport" enabling it to be legally placed on the market in any Member State. This does not necessarily imply that it is suitable for all end uses in all Member States. Affixing the CE marking is the responsibility of the manufacturer or his agent.

One of the key aspects of CE marking is that it includes technical information in the form of declared values. Where there are minimum or maximum values set in the hENs, these are not repeated in the CE marking. Effectively, the CE marking is a harmonised data sheet and together with the standard, it gives all the information

needed by specifiers and regulators to assess whether the product is suitable for an intended use. In some cases, the manufacturer may declare 'no performance determined'. This is where regulations do not exist in the chosen market sector, either country or use, for a particular characteristic.

It must be noted that CE marking is not a quality mark, but simply shows that the product addresses the regulatory requirements.

3 Attestation of Conformity for Masonry Products

The attestation system is, by definition, the term applied to the degree of involvement of third parties in assessing the conformity of the product to the relevant hEN. For masonry products, in common with all other family groups, the attestation system was decided collectively by the Member States and the Commission on the basis of the implications for health and safety of the product, and on the particular nature and production process for the product itself. In total there are six systems of attestation and each has a different number of tasks for the manufacturer and the Notified Body. These are shown in table 1 below.

Table 1: CPD attestation tasks.

Conformity Attestation	1+	1	2+	2	3	4
Tasks for the manufacturer						
Factory Production Control (FPC)	X	X	X	X	X	X
Testing of samples to a prescribed plan	X	X	X			
Initial type testing	X	X	X	X		X
Tasks for the Notified Body	X	X				
Initial type testing	X	X			X	
Certification of FPC	X	X	X	X		
Surveillance of FPC	X		X			
Audit testing of samples						
X= Task required						

"Notified Bodies" are the product conformity certification bodies, FPC certification bodies, inspection bodies (in some countries) and test laboratories who are competent to carry out the attestation tasks shown in Table 1. These bodies were first approved by their respective Member States and have come together as a 'Group of Notified Bodies' (GNB) to discuss practical implication matters so that there is a consistent approach to the tasks. In latter times, the GNB have produced various documents and position papers to assist in the attestation process. Various Sector Groups (SGs) of the Notified Bodies have been formed, the relevant SGs for masonry being SG 10, for masonry units, and SG 02, which covers some types of masonry mortar.

Whilst there are six systems of attestation under the CPD, for the range of products for masonry, only three were deemed necessary.

The more specific attestation of conformity systems for masonry units are given in the EN 771 series of standards as 2+ for 'Category I' masonry units and 4 for "Category II". The manufacturer is required to declare which category of product is been placed on the market. "Category I" units are defined as units with a declared compressive

strength with a probability of failure to reach it not exceeding 5%. "Category II" masonry units are units not intended to comply with the level of confidence of Category I units. In some National design codes and in Eurocode 6, Category I units attach a more favourable safety factor, allowing greater economy in design.

For masonry mortars manufactured in accordance with EN 998-2, attestation levels are set as 2+ for factory made designed masonry mortars and 4 for factory made prescribed masonry mortar. Other plasters and mortars for other uses have also generally been assigned a level of 4.

Ancillary components, such as wall ties, straps etc, have been assigned an attestation level of 3.

A summary of the requirements is shown in table 2 below.

Table 2: Summary of attestation levels for masonry products.

Masonry Product	Attestation level
Masonry Units- Category I	2+
Masonry Units- Category II	4
Factory made designed mortar	2+
Factory made prescribed mortars and other mortars/plasters	4
Ancillary Components	3

4 Development of the Operating Procedures and FPC

From the very first meeting of the newly formed Task Group, there was an excellent liaison between the SG 10 of the Notified Bodies and the masonry unit manufacturers. The Group decided to develop the guidance initially on masonry units and then to transfer the documentation and knowledge gained to masonry mortars.

SG 10 had already prepared the basis of the inspection schemes and general requirements for FPC. This had been in anticipation of the needs of the certification bodies, as well as to provide a starting point for manufacturers. It was soon recognised that the task of agreeing inspection frequencies for end product testing and equipment was going to be a delicate balance. On one hand, manufacturers were looking to control costs of additional testing, both in terms of financial and human resources. On the other hand, testing frequencies had to be relevant to the importance of the product and protect the needs of the end-users and designers. In addition, it had to be recognised that masonry units are manufactured from a wide range of plant sizes, from a small plant making a few units a day, to a fully automated mass unit manufacture producing, say, 400,000 m^3 of material a year. As a result, the guidance produced could not be too prescriptive, but act as a starting point for negotiations between the manufacturer and Notified Body.

An agreement was reached on the working mechanism for the work in hand. The SG 10 (and SG02 for mortars) agreed to develop and draft the basic operation procedures, giving the manufacturer guidance for granting and maintaining a certificate of FPC for Category I masonry units on the basis of the requirements of Annex ZA of the EN 771 series. The basic guidance consisted of the following main issues:-

* Responsibility for the performance of the FPC
* What to do in the case of non-conformities
* How to carry out an initial inspection of the factory and the FPC
* Information concerning the issue of a “certificate of FPC”.
* The period of validity of a certificate
* Requirements for the continuous surveillance of FPC
* Marking and traceability of products

To aid the manufacturer, a model for an application form to the Notified Body was given as an annex. To aid the Notified Body, a separate annex was included giving a certificate of FPC.

The CEN TC 125 Task Group took on the job of producing and agreeing the guidance covering FPC and the inspection schemes that later had to be ratified with the Advisory Group of Notified Bodies. The document produced was added to the basic operating procedures as an annex and the whole document was published as a ‘Position Paper’.

Whilst the guidance was drafted for Category I products, a note was added to the effect that it could be used as a basis for establishing suitable FPC procedures for manufacturers of Category II products. The main areas covered by the CEN TC 125 guidance were seen to be a general expansion of the basic FPC clause in the product standards. In summary, the new annex gave information on:

* General guidance on the establishment of a FPC system
* Testing and measuring equipment
* Production equipment
* Raw materials
* Production process
* Finished product testing
* Marking and stock control of products
* Non-conforming products

The bulk of the work revolved around the final section of the guidance, which were the schedules of inspection schemes. Whilst there were common areas for all products, for example, inspection of testing and measuring equipment, specific products in each EN 771 part needed specific details. At this point in the proceedings, the TG turned to the assistance of the various European product trade associations, who helped considerably in the understanding of needs and processes. After some cross checking between product groups, the schedules were finally agreed without too much bloodshed.

The checklists within the schedules were to be used as guidance to Notified Bodies and manufacturers. The frequency of inspections were noted to depend upon the variation in raw materials, the process and the regularity of inspection in the process compared with the one of testing of finished product. The information given in the tables within was understood to be as a starting position for discussions betweens the manufacturer and the Notified Body. The frequency of surveillance by the Notified Body was left to take into account the product type and composition, the manufacturing process and its complexity and the sensitivity of product features to variations in manufacturing parameters. It was agreed that the inspections should normally be carried out at least once per year and that the inspections should be

announced in advance. For each of the product types, the following tables of frequencies of inspection by the manufacture were given:

* Testing and measuring equipment
* Production and controlling equipment
* Raw materials and production process
* Finished products
* Marking and stock control

Much of the inspection frequencies relied heavily on the manufacturers documentation of FPC, because of the wide range in manufacturing techniques. However, wherever possible frequencies have been suggested in terms of 'x' number of units per volume produced or not less than a certain period of time.

For mortars, a very similar approach was taken, although at the time of writing (April 2004), the documentation had not been fully approved for publication. Both CEN and the Advisory Group of Notified Bodies had approved the basic documentation in principle. However, there was a request to separate the frequencies o inspection from the main clauses dealing with factory production control and publish these as different documents. This is more to do with the legal status of the document, rather than the actual content.

5 The Future Generation Standards

It is envisaged that the documentation produced by the Task Group, will be amended and codified so that it can be included in the next generation of masonry product standards. Until CE marking is in full operation, it is difficult to judge how successful the position paper has been, but the consensus is that it will be a useful stopgap. At some stage, FPC clauses are expected to be included in all ENs, including those standards not requiring the services of a Notified Body.