II - DEVELOPMENT OF THE QUALITY CERTIFICATION SYSTEM IN FRANCE

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- 1969 - 1989 Head of the caramic service to the building industry of the Societé Française de Céramique.
- Spokesman for the French delegation in the development of the European standards for ceramic tiles and at various international meeting such as the CEC.
- Participation in the work of ISO standards for ceramic tiles and European standards for sanity ware.
- In charge of the NF/UPEC quality certification for ceramic tiles and sanitary ware for the Societé Française de Céramique.
- Participation in the elaboration of codes of practice for the manufacture of ceramic products.
- Publication, in 1985, of "Les carreaux de France", which deals with the qualities of ceramic tiles.

European standardization of ceramic tiles undoubtedly presents numerous advantages, for it permits producers and consumers to speak a common language and thus avoid all arguments, litigation and waste of time. The characteristics, dimensions and quality provide users with guarantees of regularity, safety and greater possibility of comparing quotations received.

Although drawing up of this European norm was a difficult process, an agreement proceeding from successive commitments has been obtained with maintenance of a high level of quality. Publication of this European norm thus constitutes notable progress in the domain of regulations, and users are its main beneficiaries.

Use of ceramic tiles is indispensable to ensure durability of work, and the only means of proving quality is certification. As Mr. CARRE, Chairman of the French Trade Union Chamber of Ceramic Tiles, indicated in a recent communiqué, "if standardization is a contract of principles, certification is its guarantee."

The procedure for Quality Certification was laid down in France by Law no. 78-23 of 10 January 1978, the SCRIVENER law on protection and information of consumers of products and services.

Article 22 of that law specifies: "A quality certificate, whatever denomination is given to it, is constituted by an inscription, distinctive sign, any document or title tending to attest for commercial purposes "that an industrial product presents certain specific characteristics, having been submitted to control by an organism other than the manufacturer, the importer or the seller." "Any quality certificate can only be issued by a certifying body accepted by the government authority and issued in accordance with technical regulations approved by that authority."

Certification of ceramic tiles is authenticated in France by issue of a quality certificate called NF/UPEC, which according to the SCRIVENER law ensures:

- that the tiles comply with the homologated French norms derived from European norms;

- that they present use characteristics defined by the UPEC classification;

- that they proceed from a manufacturing process whose quality is controlled according to the regulations fixed.

The originality of the French system lies in the fact that it informs the user about suitability of a type of tile to a given use. The marked evolution of ceramic products from a technical point of view has profoundly modified their characteristics through major changes undergone by manufacturing procedures. It is for these reasons that evaluation of the products can no longer be considered simply in an empirical and analogical manner, but rather through their behaviour in the face of the demands made upon them.

In order to arrive at this point, the Scientific and Technical Construction Centre (CSTB), creator of the UPEC classification, has firstly established a classification of the main premises of the various types of buildings which may be found.

* buildings of dwellings

* civil or administrative buildings

* commercial buildings

* buildings of the catering industry

* education buildings

* hospital buildings and similar

The classification of premises is based upon four criteria symbolized by the letters U, P, E and C, which designate:

U: abrasion resistance

P: mechanical resistance

E: behaviour in face of water

C: resistance to chemical products and stains

Premises are thus defined by association of the four assigned letters of an ascending index, according to severity of use.

Some examples:

* kitchen of a private house:	U3	P2	E2	C2
* bathrooom of private house:	U2	P2	E1	C0
* supermarket:	U4	P4	E3	C2

Good evaluation of ceramic cladding of reasonable duration is obtained by classification thereof at least for the purposes of the premises to which it is destined.

In order to establish the UPEC classification for ceramic tiles, recourse was had to both standardized tests and the requirements of the quality mark.

- U: resistance to abrasion

Unglazed tiles: Resistance to wear is defined according to the modalities of norm NF P 61-505/ EN 102.

Glazed tiles: Resistance to wear is defined according to the modalities of norm NF P 61-511/ EN 154.

In short, behaviour in the face of abrasion leads to the following classification:

Severity of use		Class U	Unglazed Tiles	Glazed Tiles		Class U
			Length of relief (mm)	Class number of cycles (n)	Group PEI	
Private	Light	U1	- -	$n \leqslant 150$	I	U1
	Normal	U2	$45 < I \leqslant 65$	$150 < n \leqslant 600$	II	U2
	Heavy	U2S	$45 < I \leqslant 55$	$600 < n \leqslant 1500$	III	U2S
Group	Light	U2S	$45 < I \leqslant 55$	$600 < n \leqslant 1500$	III	U2S
	Normal	U3	$35 < I \leqslant 45$	$n < 1500$	IV	U3
	Heavy	U4	$I \leqslant 35$	- -	-	U4

- P: mechanical resistance Classified as minimum of P2 are all tiles whose flexion breaking pressure is in accordance with that required by the corresponding product norm.

Classified as P3: Unglazed tiles which also simultaneously meet the following three requirements:

1 = flexion breaking pressure conforming to that required.

2 = Minimum classification of at less U3

3 = Flexion breaking point of $\geqslant$ 600 N

4 = pass a ramming test which consists in moving over a sealed tiled surface a trolley fitted with three wheels covered in hard plastic and loaded with 450 kg (150 kg per wheel). Duration of 1 hour.

Classified as P4: Unglazed tiles which only meet the following four requirements:

1 = Flexion breaking pressure conforming to that required.

2 = Be classified as U4.

3 = Breaking point of: $\geqslant$1 500 N for square tiles of surface area S$\geqslant$100 cm2.

$\geqslant$1 200 N for rectangular tiles of surface area S$\geqslant$200 cm2.
$\geqslant$1 000 N for rectangular tiles of surface area S$\leqslant$200 cm2.

4 = Pass a ramming test. For this test, the plastic wheels are replaced by a single roller bearing a weight of 30 kg. In addition to the ramming effect, two steel sheets placed along the run of the roller

produce shocks. Duration of 4 hours, with distance travelled being 14 km.

- E: behaviour in the face of water

All ceramic tiles of whatever type respond perfectly to contact with water and are classified as E3. The complementary notion of reaction to ice is required for all those which might be fitted in such conditions - such as tiles for terraces or balconies. Classified as resistant to freezing are tiles which undergo no noticeable deterioration after 50 cycles of freezing/thawing, as laid down in norm NF P 61-513/EN 202.

- C: behaviour in the face of stains and chemical products

Premises in which the risk of staining and cleaning needs are important are examples where ceramic tiles are most advisable.

In order to ensure good response of the tiles to be used, they are subjected to the following tests:

- products which produce stains, such as oil and wax.

- acid solutions: (*) hydrochloric acid for unglazed tiles (*) acetic acid for glazed tiles

- potassium solutions.

Depending upon the results obtained, the tiles are classified as C1 (slight alteration) or C2 (no alteration).

How are the rights of use of the NF / UPEC quality mark attributed?

It should be pointed out, firstly, that AFNOR, owner of the NF mark, has entrusted sectorial management of applications of the "Ceramic Tiles" quality certificate to the CSTB.

Any manufacturer wishing to take advantage of the right to use the NF/UPEC mark must apply to the CSTB.

The manufacturer then acquires a commitment on the regularity of the quality of the products manufactured and sent to clients: that commitment involves compliance of the products with French norms and constant adherence to the characteristics declared.

The manufacturer must therefore be able to provide proof of the existence and efficacy of a quality assurance system.

We may mention the essential points:

* Check on the control material:

The manufacturer must ensure good cross-comparison of his measuring and trial equipment.

* Control of raw materials:

The manufacturer commits himself to carry out control of raw materials which are used in manufacturing of the tiles. This control can be simplified if the suppliers provide analysis cards with each batch. The frequency and nature of raw material controls are left at the discretion of the manufacturer.

* Control of manufacturing process

The manufacturer organizes as he sees fit controls of the different phases of manufacturing.

* Control of the finished products

The manufacturer must check the characteristics of the finished products before delivery thereof.

These characteristics are of two types:

- Principal characteristics of the NF/UPEC mark, such as:

* appearance

* dimensions

* water absorption

* resistance to flexion, abrasion, ramming pressure (by P3 and P4 classification), freezing, stains, acids and bases.

* humidity expansion measurement (if the weight of water absorbed is greater than 6%).

* secondary characteristics such as: surface hardness, chemical resistance, resistance to vibration and to thermal shock, thermal expansion.

Constant production quality shall be ensured by the following procedures:

- Daily control of:

* dimensions (length, thickness)

* appearance

* water absorption or flexion.

- Monthly control of:

* abrasion resistance of glazed tiles

* resistance to stains, acids and bases

* resistance to flexion (for unglazed tiles)

* measurement of humidity-related expansion (for vitreous tiles with weight of absorbed water greater than 6% or for fired clay tiles with weight of absorbed water greater than 3%).

- Annual control of:

* abrasion resistance of unglazed tiles

* resistance to flexion of glazed tiles

* resistance to freezing

* resistance to light ramming (class P3)

* reistance to heavy ramming (class P4)

* dimension control (control of all standardized characteristics).

Observations: at the time of application for admission the manufacturer must supply proof that all main and secondary characteristics have been checked. Once admission has been granted, frequency of control of secondary characteristics is not imposed. If the manufacturer is not equipped to carry out all the tests, he may have recourse to an laboratory outside the production factory, which may be a central laboratory belonging to the producer or an independent laboratory.

- Recording of controls:

The results of controls carried out by the manufacturer are recorded following execution thereof in files which will subsequently be signed by the manufacturer.

These records are of two types:

* record no. 1: concerning the controls carried out on raw materials and products at the production phase. Their form and presentation are left to the discretion of the manufacturer.

* record no. 2: concerning the results of the trials carried out on the finished product.

Role of the checker:

The in-factory checkers are assured by the CSTB and the French Ceramics Society (SFC), at the delegation of the accredited body.

The mission of the checker, who is bound to professional secrecy and has the right to inspect all applicants, may be summed up as:

At the admission stage:

* gathering information of a general nature on the manufacturing process (nature and volume of production, references of the products to be certified, percentage of first choice, laboratory equipment, conditios of installation of the quality plan).

* establishing a balance of manufacturing controls.

* analysis of register no. 2.

* taking stock samples for control of all principal and secondary characteristics by an independent laboratory, which shall be the CSTB, the SFC, the Tile and Brick Technical Centre (CTTB).

Role of the Private Committee:

The Private Committee is a consultative body whose members are appointed by the AFNOR. Its mandate, which is in force for one year, may be renewed from year to year by tacit extension. It complies with the norm of professional secrecy and the exercise of its function is strictly personal.

The private committee is made up of representatives of the manufacturers, users (businessmen, architects, etc.), experts (laboratories, technical controllers, etc.), Government (Ministry of Equipment and Industry).

Each check control report, accompanied by the results of the trials carried out by one of the independent laboratories, is the object of a verbal report presented to the Private Committee.

The latter inspects the regularity of control operations and proposes to the body the decisions to be taken.

Publication of the certified products:

The list of products admitted under the NF/UPEC mark is published annually by the mandatory body.

Extension of the follow-up visit certification:

The follow-up is destined to ensure the ongoing nature of manufacturing and quality thereof.

Following admission to certification, the factory which has received the certificate is visited by the checking body at least once a year in order to proceed to annual renewal of the certificate.

The mission of the checker consists in:

- observing any eventual modification of the manufacturing process and/or the characteristics of the product under certification;

- drawing up a balance of the production under certification:

* cancellation of certain references;

* new coloration or creation of new products;

- checking the control system implemented by the manufacturer and its compliance with requirements imposed;

- carrying out certain checks on the spot;

- taking samples to be submitted for checks by an independent laboratory.

It is in fact a question of ensuring the veracity of the controls carried out by the manufacturer by making further tests on samples of the same production already controlled by the manufacturer. These controls include dimensions and appearance, resistance to abrasion, flexion, freezing, stains, acids and bases, expansion with humidity (for tiles with aborbed water content above 6%). - check on marking of product and/or packaging.

As for admission, the report of the checker, accompanied by the results of the tests, shall be presented to the Private Committee, which shall pronounce upon extension or cancellation of the certification or a supplementary visit.

In relation to the norm, the NF/UPEC certification provides an unquestionable advantage. It is in fact not possible to ensure perfect suitability of a tile for a specific use, even though its characteristics may not be in accordance with those established by the regulations. In short, a NF/ UPEC certified product makes its domain of utilization more specific.

Users in France have understood this well. The presence of NF/UPEC signs on packaging is for them a guarantee of quality, and assures them that they are selecting tiles which are best suited to the premises to which they are destined.

As we have already stated, the list of tiles admitted under the NF/UPEC mark is published officially on an annual basis. In parallel to this, manufacturers indicate clearly in their documentation the UPEC classification of their products. On this level, the user can make a choice without worry, centring attention solely on problems of an aesthetic and price order. As can be seen, French manufacturers who, we might remind ourselves, have opted spontaneously for the NF/UPEC mark, have adopted this procedure in order to simplify to the utmost the operation of choosing tiles, so far