THE DESIGN AND INSTALLATION OF CERAMIC TILING

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This presentation is designed to provide an overview of the activities that have so far developed within CEN/TC67/WG4. WG4 is the Working Group that has been elected to produce a European Code of Practice for the Design and Installation of Tiled Surfaces. WG4 was officially inaugurated at the November 1991 Plenary Meeting of CEN/TC67; the approval of the programme of work featured as Draft Resolution BTS1 1/1992, and more recently within the list of Provisional Mandates for suggested harmonisation. The scope defines that this standard gives recommendations for the installation of ceramic wall and floor tiling and mosaics in situations where there are specific functional or environmental requirements and/or conditions that are potentially detrimental to the installation or the background or both. Recommendations are made for the choice of materials, application practices and, where appropriate, for the design of backgrounds and structural bases. Interfaces with the Interpretative Documents of the Construction Products Directive will receive appropriate attention.

It is most convenient for specifiers, users and manufacturers of ceramic tile products for the complete package of 'tiles and tiling' to remain within the framework of CEN/TC67 which also has a very amicable association with ISO/TC189 at International level. In this context, therefore, WG4 enjoys the advantages of being quite conversant with global tile fixing documents such as the newly published Australian Standard AS 3958, new draft standards in Malaysia, existing American National Standards Specifications in addition to all the National documentation published throughout Europe.

Participating member countries that are contributing to the work of WG4 include Germany, France, Luxembourg, Italy, Belgium, Netherlands, Switzerland, Sweden and the United Kingdom. A notable absentee since the first active meeting is Spain.

Communication has been exchanged with ASCER who state that the organisation at present is not in a position of having delegate representation in WG4. Meantime, the request by Spain for draft minutes of meetings has received positive attention. It is interesting to note however at this junction that certain references have recently been published in Ceram. Inf. (Spain) 19 No. 184 dealing with the traditional fixing of floor tiles in Europe and also concerning the fixing of ceramic floor tile with cement-based adhesives.

There is a belief that a tile is not a tile until it is in position on the floor or on the wall. Characteristics of tiles in terms of quality aspects and test methods have already been completed within the work activities of CEN/TC67/WG1 and WG2. Positioning the product on the wall or floor is now being addressed within the format of a European Standard Code of Practice.

The European standard will not be a 'fast track' document, but efforts are being directed at achieving draft stage in a much shorter time compared with the lengthy procedures associated with European standardisation work in general. National Standards bodies however should not accept CEN drafts that are inferior and are of poor quality and that do not address essential needs. This is certainly an attitude being adopted within the United Kingdom on the grounds of legal duty of care. The document will contain essential elements of good practice applicable to the satisfactory installation of internal and external wall and floor tiles reflecting their intelligent use both decoratively and functionally. Certain controlled traditional practices exercised over many years provide a positive track record of tiling successes with cement mortar based systems as described , for example, in the 1937 publication of Wall and Floor Tiling by Carter and Hidden, and given further consideration within the tile-fixing seminars throughout the United Kingdom during the early 1960's. Aspects of these 'perfected' traditional techniques, together with proven adhesive systems that have continually developed since the 1950's will be encompassed within the European Code.

Since the first active meeting of WG4 in January 1992 at Bologna considerable progress has been made in the 'decision making' for document structure and content. As already intimated both mortar and adhesive fixing systems will be included as these are in common use throughout Europe, as noted during preliminary exchanges of information:

	TRADITIONAL		ADHESIVES	
	WALL	FLOOR	WALL	FLOOR
SPAIN	80	60	20	40
SWEDEN	< 5	15-20	> 95	>85
U.K.	10	50	90	50
NETHERLANDS	20	30	80	70
ITALY	< 5	50	> 95	50
GERMANY	< 5	10	> 95	90
FRANCE	10	40	90	60
BELGIUM	20	60	80	40

Lists of wall backgrounds and floor substrates for inclusion have been agreed upon (again general commonalities exist throughout Europe and other International arenas).

Backgrounds agreed for Walls:-

1. Clay Brickwork and Blockwork
2. Prefabricated Concrete
3. In-Situ Cast Concrete
4. Natural Stone
5. Tiling
6. Concrete Brickwork/Blockwork
7. Calcium Silicate Brickwork
8. Autoclaved Aerated Blockwork/Concrete
9. No Fines Concrete
10. Plasterboard
11. Fibre Cement Board
12. Gypsum Plaster
13. Paintwork
14. Metal
15. Plywood/Chipboard
16. Water-Proofing Layer
17. Gypsum Blocks
18. Cement : Sand Rendering
19. Insulating Boards

Backgrounds agreed for Floors:-

1. Prefabricated Concrete
2. In-Situ Cast Concrete
3. Timber
4. Cement : Sand Screed
5. Tiling
6. Asphalt
7. Anhydrite Screed
8. Metal
9. Magnesium Oxychloride
10. Dry Screeds (Plasterboard)
11. Paintwork
12. Water Proofing Layer
13. Insulating Boards
14. Levelling Layers

The suggested framework will include sections dealing with:-

- Introduction
- Materials
- Design
- Fixing

It is still somewhat premature to pre-judge the exact layout of the final document, but the actual fixing detail (installation operations) for both wall and floor, traditional and adhesive, will constitute discrete sections.

Working papers have been formulated by Luxembourg for adhesive fixing and by the United Kingdom for mortar systems. Consideration may be given for these to be published as individual documents suitably referenced to a 'base' document consisting of the three essential elements, namely, Introduction, Materials and Design. Due to the significance of 'Design Characteristics' the Committee has majored at length upon 'Background Design'.

The prepared table identified as Doc N26 focuses upon mechanical, regularity, chemical/physical characteristics that need to be considered when deciding upon the choice of fixing method - an essential ingredient for quality and durability of the installation. Care is being exercised so that levels of responsibility of the parties concerned within a project are appropriately detailed. For example it is not expected that engineering requirements would be a part of the installer's portfolio. Guidance papers have been produced containing statistical data about specific requirements for issues of commonality, for example curing times and flatness. Variances do exist and in some instances the differentials are extreme.

In attempting to progress sections of the subject-matter in parallel, the possibility has been considered for separate 'task forces', for example 'installers' having the responsibility for documenting installation detail. When producing working papers for meetings this approach has proved to be a sensible route, but, because of practicalities and an obvious reluctance to split into groups within the timetable of meetings, the Committee as a whole elected to study the contents of working papers.

The working paper for adhesive fixing originally prepared by Luxembourg as Document N29 and modified by France to incorporate terminology agreed within CEN/TC67/WG3 has occupied much of the last meeting in Amsterdam. In principle the paper contained essential elements but certain fundamental issues generated somewhat opposing viewpoints. For example specific details such as 'type of trowel', 'angle of application', 'depth of adhesive spread', 'minimum area of contact' etc., constitute issues that should be left to experience - so state the installers. The latter maintain that the code has a duty to state the expectations of a job in terms of flatness, tolerances etc., but not how to do the job. On the other hand there is the school of thought that recognises the fact that the published standard will be a reference for specifiers and designers and other parties, therefore it should not lack essential detail.

In addition to the decision already agreed about terminology, the methods agreed for application will include Floating, Buttering and the combined Floating/Buttering technique. A definitive English worded version incorporating all the amendments so far agreed is being prepared by the United Kingdom. The section therein about grouting will be expanded to address the differing systems (cementitious, reaction resin etc.) and together with an overview on movement joints, these two common elements are designed to be documented following the application procedures. Prior to the next meeting planned for March 1994, each delegation has been charged to submit views pertaining to the document infrastructure interlinked to the main section headings, Introduction, Materials and Design.

Another salient issue that has been brought to the attention of this Working Group concerns the weight of tile packages. It is generally known that this subject-matter has already been voiced within the European Manufacturers framework (CET) and strong feelings have now been expressed by 'installer interests' within WG4. Indeed the motion put forward by Luxembourg and documented as Resolution No. 1 Amsterdam was subjected to voting, the result being 7 in favour with 2 against.

RESOLUTION NO. 1 - AMSTERDAM - NOVEMBER 1993

The weight of the packages of ceramic tiles, presents a serious problem during handling on site.

We are determined to deal with this matter in the European Code of Practice for tile fixing, therefore, TC67/WG4 recommends to the European Manufacturers that they take this matter into consideration now by limiting the packaging to 18 kg maximum and thereby ease the Health and Safety Problems of handling on site.

In Favour	**Against**
Germany	Italy
Switzerland	France
Luxembourg	
Belgium	
Netherlands	
Sweden	
United Kingdom	

Maybe it will be considered that the weight factor is a Health and Safety/Building and Construction Regulations issue, but this Working Group Resolution will mean that some reference will be made within the Code. Certain National documents do contain inferences about product handling, but do not define specific weights. For example, phrases appear such as 'the delivery of materials should be so arranged as to minimise handling', 'unloading and hoisting facilities' and for Health and Safety, 'information on articles and substances for use during the work that are liable to be a health risk'.

An overview will need to be maintained so as to monitor manufacturers reactions that are being

channelled through bodies such as National Trade Organisations and CET.

Returning now to the question of harmonisation, this standard will complement European Product Norms for ceramic tiles and adhesives. The CPD Essential Requirements are:-

1. Mechanical resistance and stability.
2. Safety in case of fire.
3. Hygiene, health and the environment.
4. Safety in use.
5. Protection against noise.
6. Energy economy and heat retention.

For ceramic tiles/adhesives the connecting link proposed by CEN/TC67 in relation to the Interpretative Documents does concern WG4 activities.

Hygiene

WG4 has already initiated a working paper pertaining to tiling and hygiene requirements (reference Interpretative Document 3) in terms of current draft EC Directives on the Hygiene of Foodstuffs and the achievement of performance requirements such as easily cleaned, impervious, non-absorbent, that are detailed therein. At the time that this subject-matter was raised by the United Kingdom, brief discussion ensued but certain members expressed only a passive interest!

The response from delegations about the hygiene question adversely influencing tiling specifications was summarised:-

France	-	No problems
Germany	-	No problems
Luxembourg	-	No problems
Switzerland	-	No problems
Italy	-	No problems, but concern about Health Control Authority
Netherlands	-	Future problems
Belgium	-	No major problems some radioactivity concerns
Sweden	-	No major problems, but grouts sometimes in question.

Furthermore, the majority were not in favour of including any guidelines about cleaning and maintenance, sentiments being expressed that specialist cleaning companies were employed, and for specific disinfection techniques, WG4 was not an authority to provide advice.

Safety In Use

Directly related to Interpretative Document 4 is the ISO/TC189 Work Item on Coefficient of Friction and the requirements within ISO Draft Product Norms (13006) for Safety in use, WG4 will adequately detail 'Design and Workmanship' that addresses CPD issues concerning 'Performance of the works' and 'Essential characteristics of the products'. The risks include **falling after slipping** where the required performances of the work are a limit upon the slipperiness of the floor or the pavement and a limitation in sudden changes of the slipperiness. Slipperiness depends on the inherent surface characteristics of the floor as well as on circumstances like the presence of water or grease on the surface.

For Essential Characteristics of the Products there will be need to comment about:-

The slipperiness of the tile,

- for a floor or other relevant surfaces: barefoot, or shod in various manners;
- the conditions of the surface such as dry, wet, iced, greasy, polished.

and

Classes of slipperiness that exist for some specific applications.

Effects of ageing by use, weathering and maintenance may also be considered.

At this point it is opportune to 'flag-up' the fact that WG4 is conscious of CEN Resolution BT95/ 1993 and, the necessity for informative annexes, as required.

CEN

RESOLUTION BT 95/1993

Subject: Identification of the link between Essential Requirements and the «harmonized» part of
European Standards

BT. noting the need to identify the «harmonized» part of European standards, as well as their relation to the essential requirement(s) of the Directive(s) concerned, decides that

- the relation between identified clauses of «harmonized» standards or parts of standards and the essential requirements of specified Directives shall be given in an informative annex to the standard not only at drafting enquiry and voting stage but also in the final adopted EN as far as possible in line with the approach followed in the medical equipment field.

- if more than one Directive has to be addressed, a specific informative annex will be prepared for each of the Directives.

This Resolution enters into force as from September 1993 for all work items currently at a stage before launching enquiry

Consideration, therefore will need to be given for the inclusion of informative annexes. Such features are not unfamiliar within pending ISO tile standardisation.

When this paper was prepared, apart from the inaugural meeting in Brussels there have been six active Working Group Sessions hosted by Italy (2), United Kingdom, Belgium, Germany and Holland. By the time of the Qualicer Congress, this will more of less coincide with the next meeting planned in Paris. The expertise of the participating delegates from authoritative organisations representing member countries provides fundamental ingredients for the success of this work.