

# **POWERSPEC, AN ELECTRONIC SPECIFICATION SYSTEM FOR CERAMIC TILING**

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## **SUMMARY**

An important new computerised specification system for the design and installation of ceramic and natural stone tiling and mosaic is described. Using a series of on-screen menus, a tiling installation can be defined easily and the appropriate specification, including the correct selection of tiling products and application methods automatically generated.

## **1.INTRODUCTION**

It is now generally recognised that comprehensive, accurate and up to date specifications are essential to provide protection against building failures, claims for extra costs and allegations of negligence. However developing and maintaining a successful specification system and the supporting information resources required to back up such a system is a time consuming and expensive task.

The main costs of specification writing to any design office are associated with the time required to carry out the necessary technical investigation, research reference documents and manufacturers product data, draft the specification text and type and check

the final specification. The natural response to this in many offices is to simply refer back to specifications previously written against similar requirements, no matter how long ago they had been written! The danger with this action is that mistakes can easily be perpetuated, new more efficient and effective materials are not taken advantage of as quickly as they should be and new regulatory requirements may not be accounted for; this latter point is becoming increasingly more important in a construction market governed by ever more health and safety directives.

Ceramic tiling is an important sector of the construction market where the correct specification plays a vital role in achieving the required durability and performance of the resulting finish. As a surface ceramic tiling is highly visible, any defects often being immediately apparent. It is hard wearing, durable and will satisfy many technical requirements providing that the correct materials and installation methodology are used.

In the UK, the market leader in constructional specifications systems is the National Building Specification Services (NBS), a company owned by the Royal Institute of British Architects. They offer to their subscribers a complete library of clauses from which a specification is compiled. These specification clauses are categorised into work sections covering contract preliminaries, general conditions and construction elements from demolition, groundwork, concrete bases and formwork, and masonry to waterproofing, surface finishes and mechanical and electrical services.

The Work Section specifically relating to the design and installation of ceramic tiling is M40 STONE/CONCRETE/QUARRY/CERAMIC TILING/MOSAIC. Associated sections are M10 covering cement:sand screeds, M20 covering gypsum and cement:sand renderings and Z22 covering the application of sealants.

The work sections are further divided into three versions. The Standard Version provides the full range of clauses for where a full specification is required. The Intermediate Version covers specifications for medium size contracts where the work is reasonably simple and the Minor Works Version for where the work is small in scale and brevity is of particular importance.

A specification is compiled by selecting and editing the relevant clauses from those available in the appropriate work sections. This process is aided by the provision of high quality guidance notes which describe the background to the technical points covered in each clause and giving direct references to National and International standards. Both clauses and guidance notes are updated regularly. The extensive guidance has come to be highly regarded by building designers and information users, as a design aid as well as for specification.

The result is that NBS is now well established as the industry standard specification system and is the basis of many specifiers ISO 9000 quality assurance accreditation.

When Building Adhesives (BAL) decided to publish a specification tool specifically for the ceramic tiling industry in 1991 it was therefore natural that they should turn to NBS for collaboration in designing a specialist system which would be in a format familiar to architects, contractors, clients and their quality representatives. BAL were the first commercial company to be allowed to work with NBS in this way and the result was the highly successful BAL-NBS M40 TILING SPECIFICATION SYSTEM, published in May 1992. This system provided a library of ceramic tiling clauses and guidance notes in hard copy and on word processing software. The process of selecting the correct adhesive, grout

and bedding method was simplified through the use of Specification Selector Tables- an innovation in specification systems at that time.

The system, however, still relied for its accuracy on the correct selection and editing of clauses from those available, which by necessity covered as wide a range of installations and service conditions as practically possible. This meant that the drafting of specifications and particularly the proof reading required remained a relatively time consuming process. Far better if the system itself could automatically select only those clauses and products appropriate to the installation concerned and yet be sufficiently flexible to allow full editing to be made. Such a system would be ideally suited to the modern fast computer running specially designed database software.

After an extensive period of development, a series of powerful computerised specification systems for the design and installation of ceramic and natural stone tiling and mosaic have been developed by BAL in collaboration with NBS. The software packages are available under the name BAL POWERSPEC.

There are five versions of POWERSPEC available at the time of writing:-

<b>VERSION 1</b>	a full specification version, in English, for Architects and specifiers.
<b>VERSION 2</b>	for ceramic tiling contractors
<b>VERSION 3</b>	for minor works (e.g. tiling domestic installations)
<b>VERSION 4</b>	a full specification version for the Middle East.
<b>VERSION 6</b>	a full featured Spanish version.

## 2.THE PRINCIPLES BEHIND THE SOFTWARE DESIGN

The accurate specification for a tiling finish is derived from a full description of the following details:

- a) The surface being tiled i.e. whether it is a wall, floor or worktop.
- b) The background/base material being tiled.
- c) The condition of the background/base.
- d) The service conditions to which the tiling finish will be exposed.
- e) The requirement for any special intermediate layers such as waterproof membranes.
- f) The type and size of tile being installed.

POWERSPEC operates by presenting as a series of menus, the most frequently occurring options for each detail. A number of options will generate sub menus offering a wider choice or a more specific set of options. The selections made are analysed by the software to provide the correct design and installation tiling specification clauses and the most appropriate adhesive, grout and related products. POWERSPEC provides the facility for including, in the specification, full descriptions for proprietary products such as tiles, movement joint sealants and tiling accessories.

### 3.FEATURES OF POWERSPEC.

The important features of the software which make it easy and rapid to use are:

- The details defining the installation are presented as series of menus for easy selection
- The optimum tiling specification is automatically generated, even for multi site complex installations.
- Tiling products and their application methods are automatically selected.
- Full specification editing facilities are available.
- Full on screen guidance is available at all stages of specifying and editing.
- Comprehensive file management functions and print support are provided as standard.
- Specification files can be imported into word processing systems for further processing or merging with other specification files

The best way of demonstrating the operation of POWERSPEC is by following an example:-

Let us assume that we require to compile a specification for installing fully vitrified floor tiles to a screeded suspended concrete base in a food processing production area. After giving the specification a filename for future reference or amendment and identifying the precise location involved, we begin to define the installation by the simple means of selecting the appropriate options from menus presented on the specification editing screen.

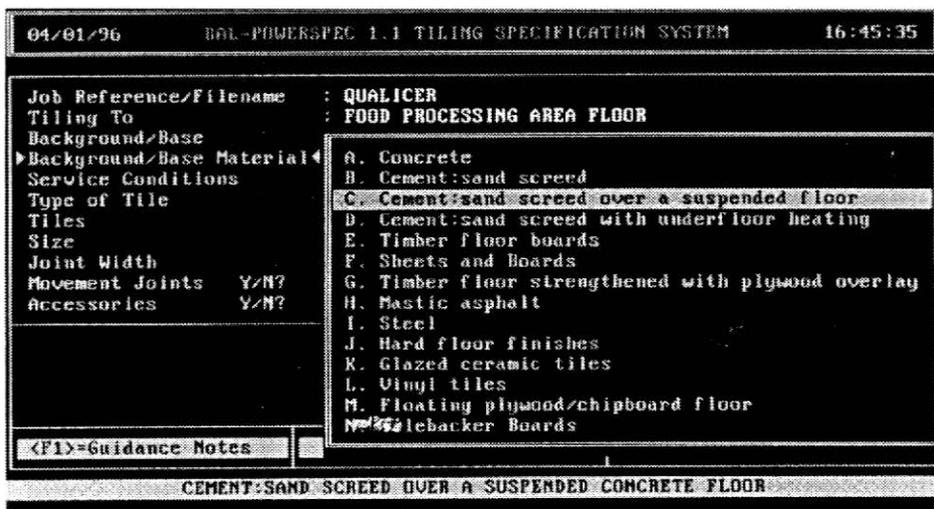


FIG. 1 SPECIFICATION EDITING SCREEN

After selecting FLOORS from the initial option of WALL/FLOORIWORKTOP a comprehensive menu of generic BASES are presented from which option C is chosen

The HYGIENIC/STERILE option (covering for example rooms governed by the requirements of the EC Directive on the Hygiene of Foodstuffs -EC Directive No. 93/43/EEC) is then selected from the list of SERVICE CONDITIONS.

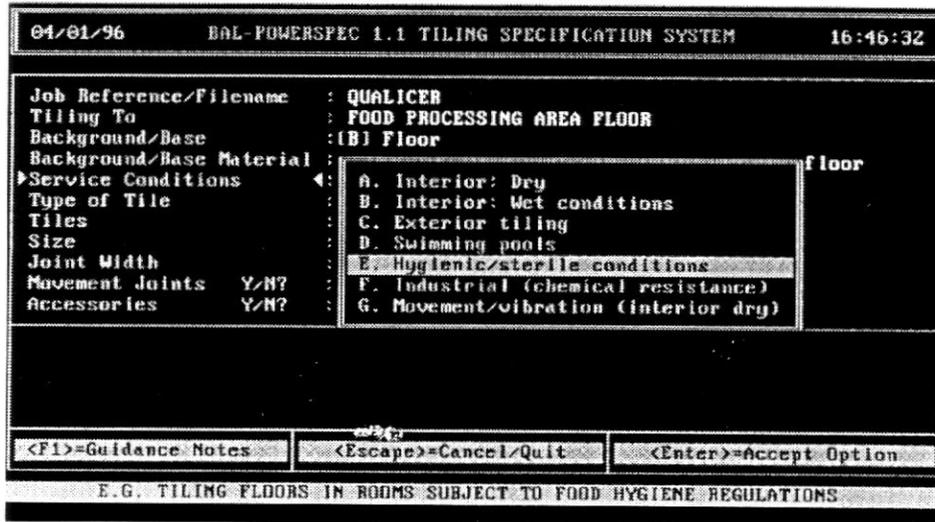


FIG 2 SERVICE CONDITIONS FOR FLOORS

The FULLY VITRIFIED TILES (i.e. tiles to EN 176 with a water absorption of 0.5% or less) option from the TYPE OF TILE/MOSAIC menu is then selected.

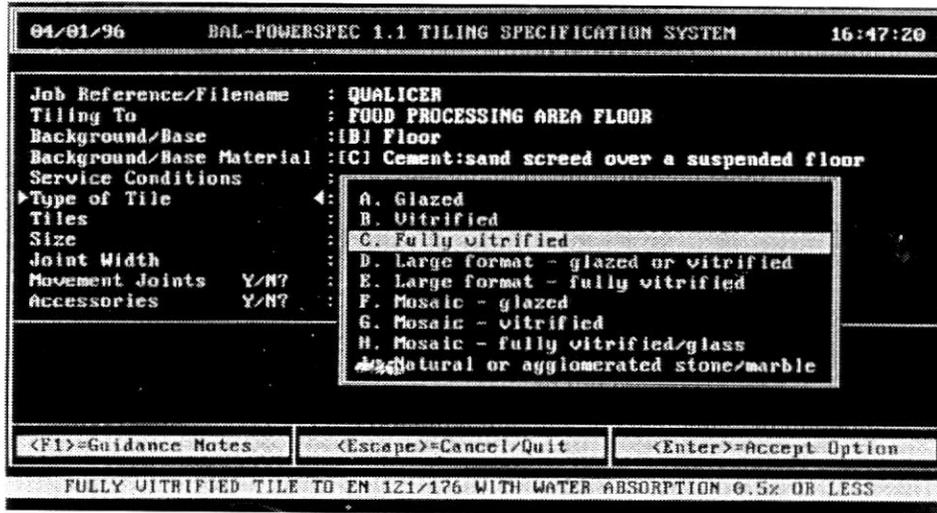


FIG 3 TYPE OF TILE/MOSAIC MENU

At any point in the program full on screen guidance is available to help select the correct detail and to help in any subsequent specification editing that may be required.

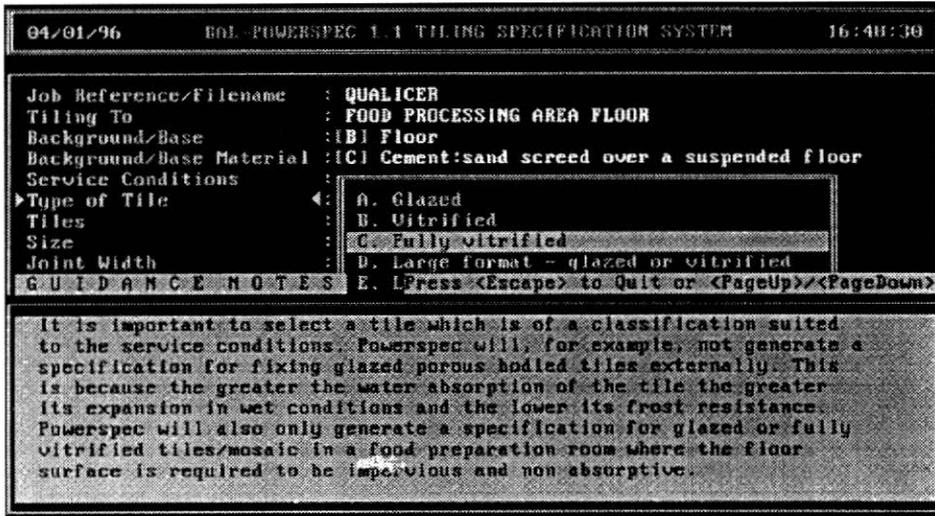


FIG 4. ON SCREEN GUIDANCE

A precise proprietary description for the tiles and their size is entered before the required tile joint width is then specified.

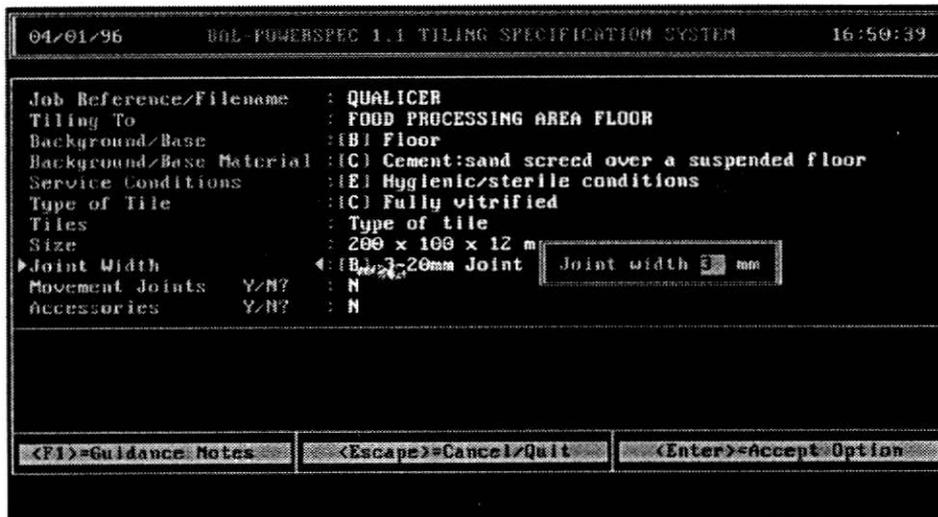


FIG 5 TILE JOINT WIDTH

One of the important features of POWERSPEC is that the system will not accept invalid entries, e.g. the UK version, POWERSPEC 1, will not allow glazed porous bodied tiles to be specified for exterior walls which are subjected to freeze/thaw conditions. In this way the validity of the final specification can be assured.

After the installation has been defined in this manner the software recommends the best choice of ceramic tile adhesive and grout for the installation and offers valid alternatives.

The colours available for the grout selected are also presented for a selection to be made.

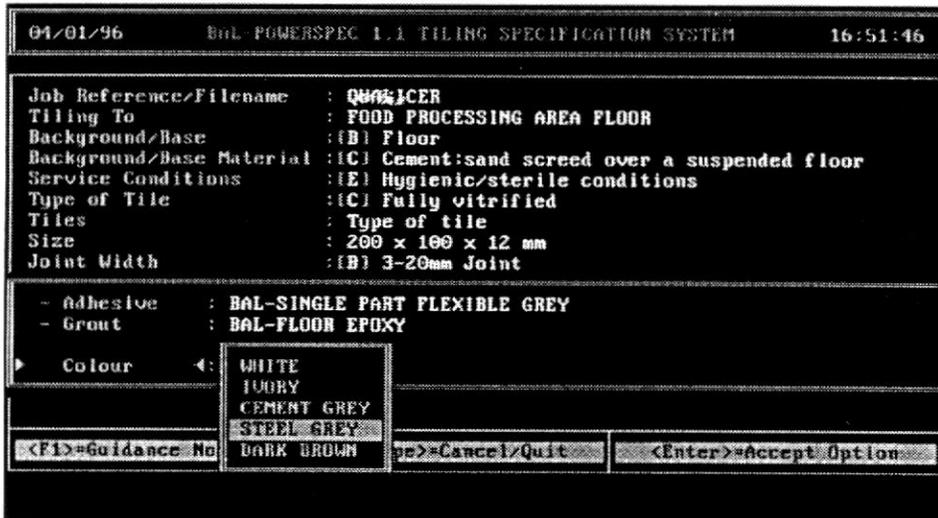


FIG 6 ADHESIVE AND GROUT SELECTION

The system also provides menus for the correct design and installation of movement joints and tile accessories.

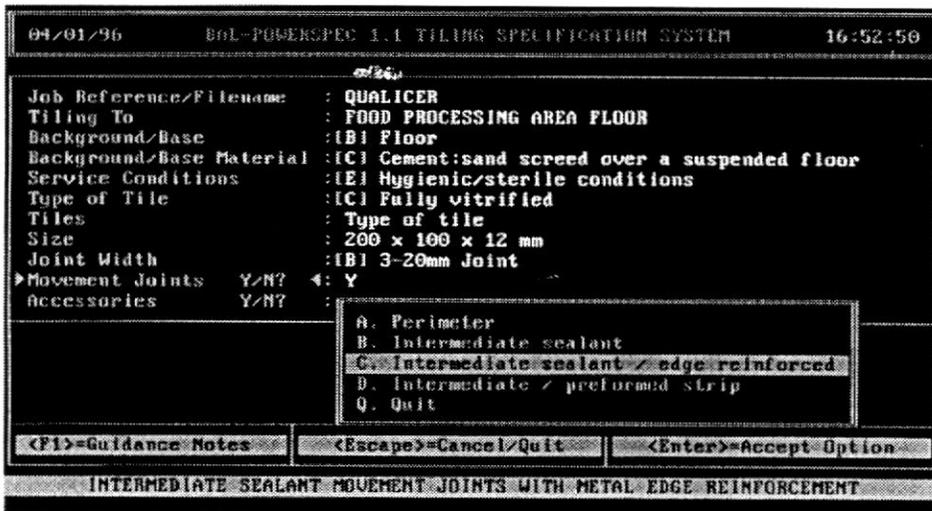


FIG 7 FLOOR MOVEMENT JOINT MENU

The tiling specification for the installation is then generated by the software and presented on the screen. Points in the specification where data entry or deletion is required by the specifier are identified (e.g. the precise width of joint required over a structural movement joint).

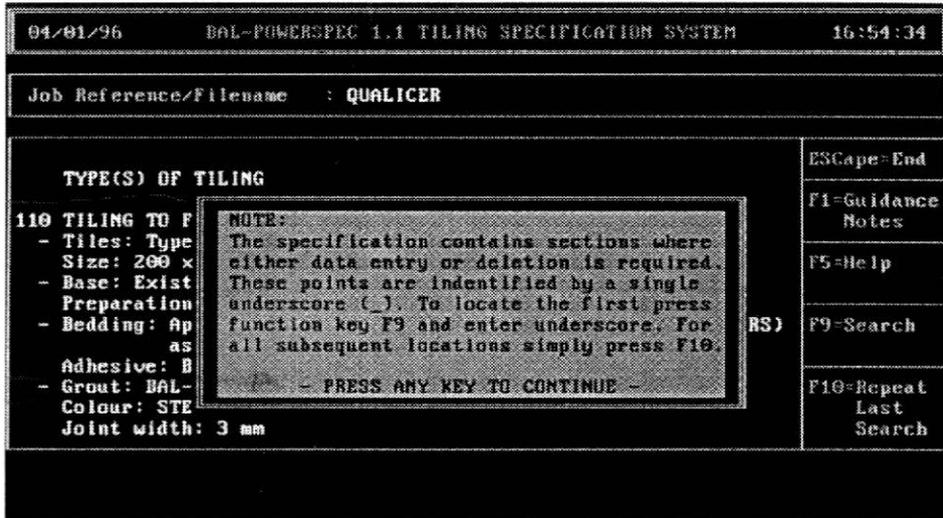


FIG 8 SPECIFICATION EDITING

With the aid of guidance notes the specification can be revised and edited directly on

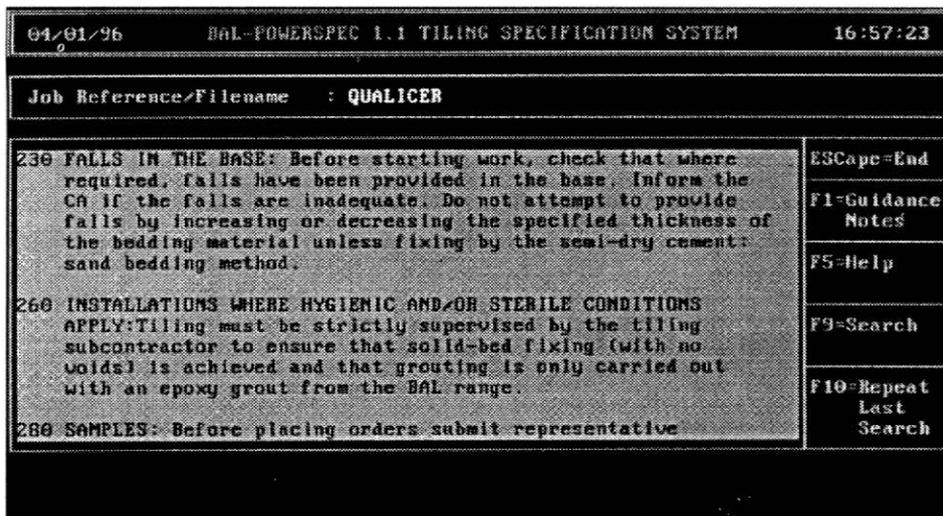


FIG 9 SPECIFICATION CLAUSES

The specification generated for the example used is shown in Appendix 1. This can be saved to memory and printed if required. Full file identification and management is achieved through the FILE MANAGEMENT SCREEN.

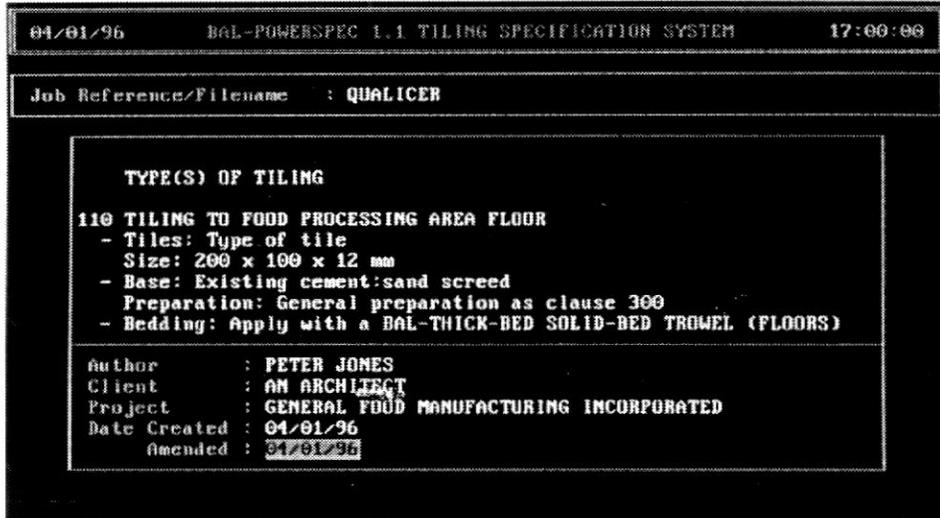


FIG 10 FILE MANAGEMENT SCREEN

POWERSPEC provides many more features and options than can be presented in a paper of this size. For instance a complex specification, involving multi-site tiling, e.g. wall and floor tiling to different surfaces, can be easily compiled with all the necessary cross referencing of clauses.

The software and its associated manuals are provided completely free of charge to bona fide architects and specifiers. Registration will also ensure that the software is regularly updated to take account of industrial and regulatory changes as well as advances in computer software itself. Nevertheless its value as a specification tool has been demonstrated by the enthusiasm with which specifiers in the UK have received the system, and the use to which it is being put.

**APPENDIX 1**

**EXAMPLE OF A POWERSPEC SPECIFICATION**

TILING TO FOOD PROCESSING AREA FLOORS  
 BAL-NBS M40 TILING SPECIFICATION  
 To be read with preliminaries/general conditions

TYPE(S) OF TILING

110 TILING TO FOOD PROCESSING AREA FLOOR

- Tiles: Type of tile  
 Size: 200 x 100 x 12 mm
- Base: Existing cement:sand screed  
 Preparation: General preparation as clause 300
- Bedding: Apply with a BAL-THICK-BED SOLID-BED TROWEL (FLOORS)  
 as clause 810  
 Adhesive: BAL-SINGLE PART FLEXIBLE GREY
- Grout: BAL-FLOOR EPOXY  
 Colour: STEEL GREY  
 Joint width: 3 mm
- Movement Joints (Floors):
- Perimeter movement joints as clause 624  
 Sealant: BAL-UNIVERSAL SILICONE SEALANT  
 Size: 15 x 12 mm
- Intermediate edge reinforced movement joints as clause 626  
 Sealant: BAL-UNIVERSAL SILICONE SEALANT  
 Colour: GREY  
 Metal Edge Reinforcement: STAINLESS STEEL  
 Size: 15x 12mm

**GENERAL REQUIREMENTS**

210 INSTALLATION to be carried out by trained operatives using safe working methods and where necessary, suitable protective clothing and equipment.

220 SUITABILITY OF BACKGROUNDS/BASES: Before starting work ensure that backgrounds/ bases are:

- Sufficiently flat to permit specified flatness of finished tiling, bearing in mind the permissible minimum and maximum thickness of the bedding material.
- Suitable for tiling in the service conditions to which it will be exposed.
- Sufficiently strong and rigid to support the tile finish.

225 NEW CEMENT:SAND SCREEDS: Before commencing tiling ensure that screeds have been allowed to dry out by exposure to air for at least 3 weeks.

230 FALLS IN THE BASE: Before starting work, check that where required, falls have been provided in the base. Inform the CA if the falls are inadequate. Do not attempt to

provide falls by increasing or decreasing the specified thickness of the bedding material unless fixing by the semi-dry cement:sand bedding method.

**260 INSTALLATIONS WHERE HYGIENIC AND/OR STERILE CONDITIONS APPLY:** Tiling must be strictly supervised by the tiling subcontractor to ensure that solid-bed fixing (with no voids) is achieved and that grouting is only carried out with an epoxy grout from the BAL range.

**280 SAMPLES:** Before placing orders submit representative sample(s) of\_. Ensure that delivered materials match sample(s).

**290 CONTROL SAMPLE(S):** Complete sample area(s), being part of the finished work in approved location(s) as follows, and obtain approval of appearance before proceeding.\_.

## **PREPARATION**

### **300 EXISTING BACKGROUNDS/BASES GENERALLY:**

- Remove efflorescence, laitance, dirt and other loose material by thoroughly dry brushing.
- Remove deposits of oil, grease and other materials incompatible with the bedding using a suitable emulsion cleaner then washing with clean water.
- Clean down all tile, paint and other non porous surfaces by washing with water containing detergent then with clean water.
- Allow background/base to dry before fixing tiles.

### **320 EXISTING CONCRETE/SCREED BASES:**

- Cut out all loose or hollow portions and make good with 1:3 cement:sand mortar applied over a slurry bonding coat as clause 510.
- Carefully remove any soft or unsound adhesive residues without damaging base. Ensure remaining adhesive residue is sound and firmly bonded to the base.

### **510 SLURRY BONDING COAT:**

- For mortar using Portland cement: Mix by weight 2 parts Portland cement to BS 12, class 42.5 to 1 part BAL-BOND SBR.
- Brush on to background/base immediately before applying mortar.

## **FIXING**

### **600 FIXING GENERALLY:**

- Check that there are no unintended colour/shade variations within the tiles for use in each area/room. Thoroughly mix variegated tiles.
- Cut tiles neatly and accurately.
- Work in small areas to ensure tiles are fixed within the open-time of the adhesive.
- Before bedding material sets make adjustments necessary to give true, regular appearance to tiles and joints when viewed under final lighting

conditions.

- Clean surplus bedding material from joints and face of tiles without disturbing tiles.

#### 610 ADVERSE WEATHER:

- Do not fix tiles if the temperature is below 5 deg C or in damp conditions.
- Do not use frozen materials or apply adhesives to frozen or frost covered surfaces.
- Do not fix tiles if the temperature of the background/base is in excess of 65 deg C.
- Take adequate precautions to protect work from inclement weather, frost and premature drying out.

#### 620 SETTING OUT GENERALLY:

- Joints to be true to line, continuous and without steps.
- Joints on walls to be truly horizontal, vertical and in alignment round corners.
- Joints in floors to be parallel to the main axis of the space or specified features.
- Cut tiles/slabs to be kept to the minimum, as large as possible and in unobtrusive locations.
- Joints in walls and floors to be in alignment.
- Where positions of movement joints are not specified they are to be agreed with the CA.
- For setting out of \_ see drawing(s) \_.
- Before laying tiles obtain approval of setting out \_.

#### 624 SETTING OUT PERIMETER MOVEMENT JOINTS (FLOORS):

- Provide movement joints in tiling at floor perimeters including abutments with walls, columns, upstands/bases, etc.
- Joints to be at least 6mm wide and extend through tiles and bedding to substrate.

#### 626 SETTING OUT INTERMEDIATE MOVEMENT JOINTS (FLOORS):

- Provide movement joints in tiling:
  - Over existing and/or structural movement joints.
  - Over junctions between different base materials.
  - Over supporting walls and beams.
- Joints to be at least 6 mm wide and extend through tiles and bedding to the base.
- Joints located over existing structural movement joints should extend through any intermediate substrate and be \_ mm wide.

630 LEVEL OF FLOOR TILING: Permissible deviation in level from datum for \_ to be +/- \_ mm.

**640 FLATNESS OF TILING:** Sudden irregularities not permitted.  
When checked with a 2 m straightedge with 3 mm thick feet at each end, placed anywhere on the surface, the straightedge should not be obstructed by the tiles and no gap should be greater than 6 mm.

**650 LEVEL OF TILING ACROSS JOINTS:**

Maximum deviation between tile surfaces either side of a joint, including movement joints to be:

- 1 mm for joints less than 6 mm wide.
- 2 mm for joints 6 mm or greater in width.

**700 ALTERNATIVE ADHESIVES:** The following adhesives may be substituted by any other from the same group:

- BAL-CEM GOLD STAR, BAL-CTF3; BAL-RAPID SET.
- BAL-SINGLE PART FLEXIBLE; BAL-SINGLE PART FLEXIBLE (WHITE); BAL-RAPIDSET FLEXIBLE
- BAL-WALL BLUE STAR; BAL-WALL (except for domestic showers for which only BALWALL BLUE STAR is recommended)

**810 ADHESIVE BEDDING: THICK-BED/SOLID-BED (FLOORS):**

- Use a BAL-THICK-BED SOLID-BE-TROWEL.
- Apply adhesive to dry base in areas up to 1 sq m.  
For porous bases, apply a skim coat of adhesive first and comb the remaining adhesive while the skim coat is still wet.
- Fill any depressions (ribbed, keyed profiles, etc.) to backs of tiles with adhesive.
- Press tiles firmly into position with a twisting/sliding action ensuring that as far as possible no voids are left beneath the tiles.

**880 CHECKING CONTACT AREA:** As work proceeds and before bedding has set, carefully remove random tiles to verify that contact area is as specified. Remove the initial bedding material, butter the removed tiles with fresh material and refix.

**GROUTING/COMPLETION**

**900 GROUTING:**

- Allow bedding material to harden sufficiently before grouting.
- Ensure that joints are 6 mm deep (or the depth of the tile if less), and are free from dust and debris.
- Fill joints completely using a rubber grouting squeegee, tool to an approved profile, clean off surface and leave free from blemishes.

**910 COLOURED GROUT:** Check the potential risk of staining by applying the grout to a few tiles in a small trial area. If discolouration occurs apply BAL-PROTECTIVE SEALER and repeat the trial.

920 SUITABILITY OF MOVEMENT JOINTS: Before commencing, check that:

- Joint dimensions are within limits specified for the sealant.
- Surfaces are smooth and undamaged.
- Preparatory work which must be done before assembly of the joint has been carried out.

Inform CA if joints are not suitable to receive sealant and submit proposals for rectification.

930 PREPARING MOVEMENT JOINTS:

- Clean surfaces to which sealant must adhere using methods and materials recommended by sealant manufacturer.
- Remove all temporary coatings, tapes, loosely adhering material, dust, oil, grease and other contaminants which may affect bond.
- Keep joints clean and protect from damage until sealant is applied.
- Backing strip, bond breaker, primer: Types recommended for the purpose by sealant manufacturer.
  
- Insert backing strips and/or bond breaker tape into clean joint leaving no gaps. If the adhesive used to fix the tiles is BAL-FLEX or BAL-FASTFLEX, ensure that backing strip and/or tape prevent contact between silicone sealants and the adhesive.
- Cover adjacent surfaces with masking tape to prevent staining and protect surfaces which would be difficult to clean if smeared with primer or sealant.

950 APPLYING SEALANTS:

- Ensure that operatives observe the manufacturer's and statutory requirements for storage and safe usage of sealants.
- Use equipment and methods recommended by sealant manufacturer and apply within the recommended application life of primer and sealant, and the recommended air and substrate temperature ranges.
- Do not apply to damp surfaces (unless recommended otherwise), to surfaces affected by ice or snow or during inclement weather. Do not heat joints to dry them or raise the temperature.
- Fill joints completely, leaving no gaps, excluding all air and ensuring firm adhesion of sealant to required joint surfaces. Tool the sealant to a neat, slightly concave profile unless specified otherwise.
- Protect until cured.

960 PROTECTION (GENERAL): Adequately protect and keep clean all completed areas. Clean off any droppings immediately.