

# *BITS*

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# **Raised Access Floors**

## **Technical Guidance**

❖ **B.I.T.S.** ❖ **TG 01: 2010**

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## **FOREWORD**

This technical guide gives a general commentary on the various aspects of the Raised Access Floors in the light of the introduction of BS EN 12825: 2001. In TG01.00 to TG14.00, there is a 'Check List' to enable a specifier to select a suitable floor followed by guidance on Installation and Site Control.

Finally two suggested Particular Project Specifications are given the first for use with PSA MOB PF2 PS/SPU specification and the second for the use with BS EN 12825: 2001

**Compliance with any British, European or PSA standard or ❖B.I.T.S.❖ technical guidance does not of itself confer immunity from legal obligations.**

<b>Contents</b>	<b>Page</b>
<b>SECTION TG</b>	
Technical Guidance	8
<b>SECTION PPS</b>	
Particular Project Specifications	55
<b>APPENDIX A</b>	
Rolling load test method	87
<b>APPENDIX B</b>	
On site air leakage test method	91
<b>BIBLIOGRAPHY</b>	96
<b>OTHER PUBLICATIONS REFERRED TO</b>	96

<b>Section TG</b>	<b>Contents</b>	<b>Page</b>
<b>TECHNICAL GUIDANCE</b>		
TG0.00	INTRODUCTION	9
TG0.01	Reason for this guidance	9
TG0.02	Using the guide	10
TG0.03	Definitions	11
TG1.00	SCOPE	11
TG2.00	HISTORY OF RAISED ACCESS FLOOR SPECIFICATIONS	12
TG2.01	PSA specification MOB PF2 PS/SPU	12
TG2.02	European Standard BS EN 12825; 2001	12
TG2.03	National Building Standard K41	13
TG3.00	DEVELOPING A PARTICULAR PROJECT SPECIFICATION	13
TG3.01	General	13
TG3.02	Using Standard specifications (MOB, BS EN, NBS)	13
	STRUCTURAL REQUIREMENTS	14
TG4.01	Selecting a suitable structural grade	14
TG4.02	Equivalent structural performance grade	15
TG4.03	Cut panels	17
TG4.04	Air terminal devices (Grilles and swirls)	17
TG4.05	Pedestrian dynamic requirements	17
TG4.06	Rolling loads	17
TG4.07	Creep	18
TG4.08	Pedestals	18
TG4.09	Stringers	19
TG4.10	Supplementary support structures, perimeters and ramps	20
TG4.11	Loading in corridors	20

<b>Section TG Contents (Continued)</b>	<b>Page</b>
TG4.12 Weight of the system	20
TG4.13 Environmental conditions	20
TG5.00 DIMENSIONAL REQUIREMENTS	21
TG5.01 Panel dimensions	21
TG5.02 Panel interchange ability	21
TG5.03 Panel location	21
TG5.04 Gaps between panels	21
TG5.05 Air leakage rate	22
TG5.06 Height	22
TG5.07 Pedestal bases	22
TG6.00 FIRE AND SAFETY REQUIREMENTS	22
TG6.01 General	22
TG6.02 Relevant current British Standards	23
TG6.03 Spread of flame	24
TG6.04 Panel cladding	24
TG6.05 Structural materials	25
TG6.06 Cavity barriers	25
TG7.00 ELECTRICAL REQUIREMENTS	25
TG7.01 Earthing and bonding	25
TG7.02 Electrostatic control	26
TG8.00 MANUFACTURE AND QUALITY CONTROL	26
TG8.01 General	26
TG8.02 Quality assurance	26

<b>Section TG Contents (Continued)</b>	<b>Page</b>
TG9.00 SUPPLY DELIVERY AND STORAGE	27
TG9.01 Transportation	27
TG9.02 Off loading	27
TG9.03 Storage on site	27
TG10.00 INSTALLATION	28
TG10.01 Dimensional co-ordination	28
TG10.02 Installation programme	28
TG10.03 Structural sub floor	28
TG10.04 Cleaning and sealing the sub floor	29
TG10.05 Fire stopping	29
TG10.06 Sample area	29
TG10.07 Validation tests	29
TG10.08 Pedestals fixing tests	30
TG10.09 Pedestal fixing method	31
TG10.10 Setting out	31
TG10.11 Overall levels	32
TG10.12 Panel levels	32
TG10.13 Pedestal adjustment	32
TG10.14 System fit	33
TG10.15 Panel fit and location	33
TG10.16 Squeaking	33
TG10.17 Panel rocking, rattles and other noises	33
TG10.18 Perimeter details	34
TG10.19 Threshold detail	34
TG10.20 Ramps and stairways	34
TG10.21 Use by following trades	34
TG10.22 Cleaning	35
TG10.23 Inspection of complete installation	35

<b>Section TG Contents (Continued)</b>	<b>Page</b>
TG11.00 FLOOR FINISHES	36
TG11.01 Factory bonded finishes	36
TG11.02 Loose lay finishes	36
TG11.03 Other methods of carpet fixing	37
TG12.00 DURABILITY	37
TG12.01 Protective finishes	37
TG12.02 Protective finishes in computer rooms	37
TG12.03 Life of components	38
TG12.04 Performance in use	38
TG13.00 TESTING	39
TG13.01 Type testing	39
TG13.02 Type testing to BS EN requirements	39
TG13.03 Type testing to PSA requirements	40
TG13.04 Validation testing	40
TG14.00 TECHNICAL ADVICE	44
TG15.00 CHECKLIST	41
TG15.01 Subject identification	41
TG15.02 Check lists	42

## **SECTION TG**

# **TECHNICAL GUIDANCE**



## **TG0.00 INTRODUCTION**

This document has been developed by Building Investigation and Testing Services (Surrey) Ltd (❖B.I.T.S.❖) with the assistance of Mr John Jeavons, Mr Derek Berry, Mr Kuldeep Grewal and Mr Richard Fryer.

Building Investigation and Testing Services, previously Yarsley Technical Centre is an independent test laboratory and has been specializing in raised access floor systems for over 25 years. They have UKAS accreditation for testing Raised Access Floors and are recognized worldwide.

Mr John Jeavons, with technical assistance from Yarsley Technical Centre was responsible for the development and production of the Property Services Agency Performance Specification for Platform Floors, MOB 01 801 in 1981, later to become MOB PF2 PS/SPU March 1992 and the companion PSA publication Platform Floors Technical Guidance MOB 01707 March 1982.

### **TG0.01 Reason for this Guidance**

A European Standard for raised access floor BS EN 12825:2001 published by BSI was given the status of a National Standard on February 2001 by the European Commission.

Although the Standard provides classification and performance requirements under test of access floors, which is critical to floor performance in service, it does not include any reference to applications or installation practice. Furthermore it provides for 72 classifications of access floors without any guidance as to their end use.

The National foreword contained in the document refers to the need for a Code of Practice for the UK but this has not yet been published. The foreword also refers to the Property Services Agency document MOB PF2 PS/SPU March 1992 (Copyright Access Floor Association) and the National Building

## Specification K41.

The Standard only covers classification and performance requirements for **Full Access Floors** and make **no** reference to **Partial Access Floors**.

Furthermore, experience has shown that components within the floor system are often changed by the manufacturer, for example, the type, quality and manufacture of chipboard, steel and adhesives. It is not unknown for some such changes to be made without the floor manufacturer realizing it or he may deliberately change a component for commercial reasons.

When this occurs, with a change of component(s) the structural characteristics of the floor system often change, sometimes reducing the structural performance leading to problems with installed floors. In the worst case, the floor may have a significantly reduced service life. With many floor - manufacturing companies changing hands or ceasing to trade by the time it is realized, it is often too late to seek redress from the original manufacturer.

In some cases, floors are installed by specialist fixing contractors who purchase floor systems from manufacturers of unproven reliability or they may mix unsuitable components, such as panels and pedestals from different manufacturers, which could lead to a sub standard installation.

End users must be protected against problems and it is essential that floor systems offered are correctly specified, evaluated before an order is placed and checked during and after the installation is completed. In order to assist architects, designers and end users to specify, evaluate, check and use floor systems, ❖B.I.T.S.❖ have produced this user-friendly Technical Guidance.

## **TG0.02 Using the Guide**

In the contents, the guide has Main headings and Sub headings have been used to allow easy reference.

This guide should be used in conjunction with:

The Property Services Agency Specification for Platform Floors (Raised Access Floors): PSA MOB PF2 PS/SPU March 1992.

The European Standard for Raised Access Floors BS EN 12825:2001

The National Building Specification K41: April 1993

## **TG0.03 Definitions**

For the purpose of this guide, the following definitions apply:

1. Collapse            State reached when deflection or deformation of the floor system will continue without an increase in the applied test load.
2. Deflection        The vertical distance any part of the floor system will move (up or down) when subjected to a load.
3. Floor system     The complete access floor system comprising of the panels, pedestals and where necessary, stringers, supplementary supports, pedestal fixings and adhesives etc.
4. Working load    The load the floor system will sustain over its lifetime without producing a deflection greater than the specified limits.
5. Ultimate load    The load, which will cause the floor system to collapse.
6. Safety factor    The ratio between the working load and the ultimate load.
7. Strength grade   PSA structural grade: LIGHT GRADE, MEDIUM GRADE, HEAVY GRADE & EXTRA HEAVY GRADE.

Other definitions are included in PSA MOB PF2 PS/SPU and BS EN 12825:2001

## SCOPE

This document is intended to provide independent advice and guidance to architects, designers and users for the design, selection and use of raised access floors and highlights the differences between the PSA MOB PF2 PS/SPU and the European standard BS EN 12825:2001.

It includes a checklist cross referenced to PSA MOB PF2 PS/SPU, BS EN 12825:2001 and items within this document. Also included are model particular specifications for use with the PSA MOB PF2 PS/SPU and the BS EN specifications and test methods for rolling loads and air leakage rates.

## HISTORY OF RAISED ACCESS FLOOR SPECIFICATIONS

### PSA Specification MOB PF2 PS/SPU March 1992

#### Platform Floors: Performance Specification

As a result of problems with raised access floor and the number of manufacturers offering vastly different specifications and quality in the late 1970's the Property Services Agency developed a raised access floor performance specification for use by public sector designers which was released for use by the private sector in 1982. It has been used as a national and international standard since then, during which time minor modifications were made by the PSA, the final version being identified as MOB PF2 PS/SPU March 1992.

It covers performance requirements and test methods for all aspects of design and installation including **four** structural grades with specific application and has a proven successful history over the last 20 years. Since the PSA was privatized, the UK Access Floor Association has acquired the Crown copyright. **Designer and users should be aware that the owners of the copyright have the authority to change the requirements.**

## **TG2.02 European Standard BS EN 12825:2001**

### **Raised Access Floors**

The European standard was given the status of a British Standard in February 2002 by the European Commission.

Although the Scope states that it specifies the characteristics and performance requirements, it generally only covers the structural and dimensional aspects of a floor system and as yet is untried. It does **not** cover installation practice or performance in use neither does it include for items such as dynamic loads, creep, effect of environmental conditions etc.

The National foreword included in the document refers to a proposed Code of Practice for UK applications and in the absence of this draws attention to the PSA document and the National Building Specification K41 April 1993.

At the time of publication of this ❖B.I.T.S.❖ Design Guidance, a Code of Practice has not yet been presented to the relevant British Standard Committee B550.

## **TG2.03 National Building Specification K41**

NBS K41 is generally based on the PSA performance specification and offers designers advice on specific design solutions. UK designers have used it as a basis for developing particular specifications for many years.

## **DEVELOPING A PARTICULAR SPECIFICATION**

### **General**

This section is written to provide assistance in the development of particular project specifications. It has been divided into separate requirement sections:

**TG4.00:** Structural, **TG5.00:** Dimensional, **TG6.00:** Fire and safety, **TG7.00:** Electrical, **TG8.00:** Manufacture and quality control, **TG9.00:** Supply, delivery and storage, **TG10.00:** Installation and site control, **TG11.00:** Floor finishes, **TG 12.00:** Durability, **TG13.00:**

Testing, **TG14.00**: Technical advice together with a Checklist **TG15.00**.

### **Use of Standard Specifications (MOB, BS EN or NBS)**

The use of any British or European standard specification is not mandatory in the private sector but designers should be aware that the development of specific requirements without background knowledge and experience could result in possible failures and litigation. It may be mandatory to quote European standards for public sector contracts.

Performance standards in the UK based on MOB PF2 are well known and accepted by the industry as the safe design solution. They are generally more onerous than in other European countries. Whereas most reputable UK manufacturers will continue to produce systems that will comply with the more stringent PSA requirements, it is more than likely that European manufacturers will offer systems that will comply with BS EN 12825:2001. Furthermore, UK manufacturers may start to offer systems that comply with BS EN 12825:2001 at an apparently advantageous price but which may be entirely unsuitable or unsafe for particular applications. Any system that will comply with BS EN 12825:2001 could carry the CE marking.

## **TG4.00 STRUCTURAL REQUIREMENTS**

### **TG4.01 Selecting a Suitable Structural Grade**

Selecting a suitable structural grade for a particular application is probably the most important aspect of the design process and using the **FOUR** grades detailed in the PSA specification is a relatively simple task. These grades are:

**Light Grade** for general office accommodation without heavy equipment.

**Medium Grade** for general office accommodation with heavier equipment and partitioned corridors to comply with the UK Building regulations.

**Heavy Grade** for computer room, public areas and control rooms etc.,

**Extra Heavy Grade** for computer and plant rooms with heavy equipment and other special applications.

Selecting a suitable structural classification from BS EN 12825:2001 presents

some difficulty because this standard details **six** classes of elements (a panel supported on four pedestals) of ultimate loading, (4kN to 12 kN), **two** classes of safety factors, (2.0 and 3.0), **three** classes of deflection (2.5mm, 3.0mm and 4.0mm) thus providing 36 structural performance classes which combined with the two classes of deviations on panel dimensions gives a choice from 72 classes. Furthermore, the loading tests detailed in BS EN 12825:2001 are virtually instantaneous and do not take account of long-term structural or physical properties such as the effect of temperature or humidity.

Since there has been no experience of proving these tests results in real applications, there can be little confidence in their performance at the present time. Whereas the working load and a maximum deflection are the main criteria for the PSA grades, the ultimate load is the main criterion for BS EN 12825:2001 classification. The ultimate load is divided by a safety factor to indicate a working load.

Safety factors of 2.0 and 3.0 are specified in BS EN 12825:2001. Historically the safety factor for access floors in the UK has always been three times the working load. This took into consideration both the fact that in the UK floor systems are installed at an early stage in the construction programme with a possibility of abuse by following trades during the later stages of construction and also the properties of the materials used in the construction of the panels. Chipboard based panels could be particularly vulnerable.

In mainland Europe it is often common practice to install the access floor as part of the fit-out process thus reducing the potential abuse and the need for a high safety factor.

It would be imprudent of designers to select or accept a safety factor of less than 3.0 for UK applications.

Classes of instantaneous deflections under the test load of 2.5mm, 3.0mm and

4.0mm are specified in BS EN 12825:2001. After considerable experimental work during development of the PSA specification, it was found that a maximum deflection of  $1/250^{\text{th}}$  of the shortest span or 2.5mm whichever was the least when the system was subjected to the working load for 24 hours was the safest deflection allowable. Any deflection greater than this tended to produce unacceptable creep and possible failure over longer periods particularly with wood particle based products. It would be imprudent for designers to select or accept a stable deflection greater than 2.5mm.

The Hard and Soft body impact tests detailed in BS EN 12825:2001 are similar to the PSA requirements but need only to be carried out **where required**. As the soft body impact test simulates a man jumping down from desk on to the floor, we consider this test to be essential.

No indication for end use applications for the various structural classes is provided in BS EN 12825:2001.

## **TG4.02 Equivalent Structural Performance**

We have attempted to provide a BS EN structural performance to match the PSA grades but as the main performance criteria are so vastly different we have erred on the safer side. ❖B.I.T.S.❖ are carrying out ongoing experimental programmes using BS EN test methods to ascertain if these selections are acceptable. The indications are that the transient instantaneous deflection permitted for Class B and C in Table 2: Classes of deflection would result in continuous creep over the life of the floor system.

The provisional equivalents structural performances are as follows:

### **PSA Light**

BS EN: Class 2/3 (6/8kN) from Table 1 - Class of elements

Safety Factor of 3.0

Class A (2.5mm) from Table 2 – Class of deflection

Class 2 From Table 3 – Deviations on panel dimensions



### **PSA Medium**

BS EN: Class 5/6 (10/12kN) from Table 1 – Class of elements

Safety factor of 3.0

Class A (2.5mm) from Table 2 – Class of deflection

Class 2 from Table 3 – Deviations on panel dimension.

### **PSA Heavy**

BS EN: Class: No suitable class from Table 1 – Class of elements

The highest BS EN classification does not meet the PSA Heavy grade requirements.

Safety factor of 3.0

Class A (2.5mm) from Table 2 – Class of deflection

Class 2 from Table 3 – Deviations on panel elements

### **PSA Extra Heavy**

BS EN: As for PSA Heavy but with an additional requirement to sustain an additional working load of 11kN applied equally on four points, each 25mm sq. on a 200mm x 200mm square configuration at any point on the system which simulates the load from heavy data equipment, with a safety factor of 2.0. The BS EN standard includes **optional** dynamic requirements for the absorption of hard and soft body impacts it does **not** include requirements or tests for cut panels, pedestrian or rolling loads, creep or hydrothermal effects.

### **TG4.03 Cut Panels**

It is essential that panels with cut edges and cutout holes be installed to the same structural standard as for complete panels. This might be achieved by the use of supplementary supports or pedestals or by fixing the cut panels to the pedestals. Whatever method is proposed it should be subjected to the relevant structural tests.

### **TG4.04 Air Terminal Devices (Grilles Swirls Etc.)**

European Standard BS EN 13264: 2002: 'Ventilation for buildings - Floor mounted air terminal devices – Tests for structural classification' was given the status of a National Standard in September 2001. The requirements and grades are similar but more onerous to those detailed in the PSA specification MOB PF2 PS/SPU: Appendix A, except that an additional structural grade of **Extra light** has been included. The performance requirements and tests include static, dynamic and rolling loads applied to all types of air terminal devices that can be used in raised access floor systems.

Any of these devices that have been successfully tested for type approval can be accepted for use within an equivalent structural grade access floor system, however the use of an Extra light grade (domestic) is not recommended for commercial applications. Care should be taken to ensure that the dimensional, location and supporting characteristics are compatible with the main requirements for the raised access floor system. It should be noted that this European standard is **not** cross referenced with BS EN 12825:2001

### **TG4.05 Pedestrian Dynamic Loading**

Dynamic loading created by pedestrian activity and light wheeled traffic should be considered. Such activity should not cause the floor system to deteriorate, bounce excessively or move. A suitable test T14.00 is included in the PSA specification.

## **TG4.06 Rolling Loads**

Rolling loads may occur when a vehicle follows a dedicated track i.e. an automated post trolley, or a vehicle that manoeuvres randomly, e.g. a pallet-truck. There are no standard specific rolling load requirements or test methods for access floor systems but ❖B.I.T.S.❖ have a test rig with which comparative tests can be carried out.

A rolling load test for floor grilles associated with raised access floor is detailed in a European standard BS EN 13264:2001 – Ventilation for buildings – Floor mounted air terminal devices – Tests for structural classification. The requirements and test method is similar to that detailed in the PSA specification MOB PF2 PS/SPU. (See also Clause TG4.04). Suitable comparative rolling load tests for access floor systems are included in the Appendix 'A' of this document.

## **TG4.07 Creep**

Creep or an increase in deflection of a panel can occur when a constant load such as desks, filing cabinets or other heavy equipment is applied to the floor system over a long period. The increase in deflection could continue until failure occurs. Creep is one of the essential requirements of the PSA specification and if a system to BS EN 12825:2001 is to be accepted it is essential that a creep test is included in the particular project specification. A creep test should be incorporated into the structural validation test as detailed in the model Particular Project Specification.

## TG4.08 Pedestals

BS EN 12825: 2001 only provides for a simple requirement of 4 times the working load applied vertically to the centre of the pedestal via a 50mm square indenter. The height of the pedestal is not indicated.

The PSA requirements are more onerous and provide for vertical test loads on the centre and quadrant positions of the pedestal head, a horizontal load applied to the top of the pedestal as well as a requirement for the restriction of free play in the structure. The PSA require the tests to be carried out on pedestals designed to provide the maximum height of the type of floor system submitted. It has always been assumed that shorter pedestals would be stronger, but at some recent installations, shorter pedestals failed to meet the test requirements. We recommend that validation tests should be carried out on pedestals designed for the floor height of the particular project.

It is also essential that pedestals and panels are designed and tested as a complete floor assembly and the details recorded in the test report. Any modification to the pedestal design and/or manufacturing process is not acceptable until they have been tested with the relevant panels.

It is essential that any vertical adjusting device within the pedestal structure has a positive locking arrangement and must not become loose during the life of the system in use due to vibration or other causes.

### Fixing Pedestals to the Sub-Floor

An important contribution to the horizontal stability of the Raised Access Floors is the fixing of the pedestal bases to the sub-floor. The PSA Performance Specification says that as first preference adhesive bonding plus mechanical fixings should be used. Only if it can be shown that adhesive fixing is satisfactory on it's own may mechanical fixings be omitted.

It should be realized that the surface condition of the sub-floor is an important factor in the bonding of the pedestal base in addition to the type used and the condition of the underside of the pedestal base. It is therefore, recommended that trials be performed in various parts of the building by bonding down pedestals and after 48 hours performing the 'T42.00 'Pedestal Structure and Fixing Test (Swing Bag Test) of PSA MOB PF2 PS/SPU. A 95% pass rate is recommended for general offices and a 99% pass rate in Critical Areas, e.g. Computer rooms, machine rooms and pedestal heights greater than 300mm.

#### **TG4.09 Stringers**

In order to achieve certain heavier structural requirements, stringers (beams connecting pedestal heads) may be required. These must be removable and may be clip-in or mechanically fixed to the pedestal heads. Stringers may also be used to control air leakage rates, improve the lateral stability and fire resistance performance.

#### **TG4.10 Supplementary Support Structures, Perimeters and Ramps**

Any supplementary support structures such as bridging and ramps must comply with the relevant structural requirements for the floor system. BS EN 12825:2001 does not include these requirements.

#### **TG4.11 Loading in Corridors**

The UK Building Regulations refer to BS 6399: Part 1:1996 Loading for building: Code of practice for dead and imposed loads.

This standard includes a requirement for a concentrated load of 4.5kN in corridors (Table 1). This aspect is covered in the structural requirements for the PSA **Medium** grade. BS EN 12825:2001 may not specifically cover the requirement.

## **TG4.12 Weight of the System**

When designing the main structural slab or when an access floor is to be installed in an existing building, the total weight of the floor system may need to be considered.

## **TG4.13 Environmental Conditions**

All component parts and materials related to an access floor system will be subjected to a wide range of environmental conditions during transportation, building construction and its lifetime in-use that may affect the structural and dimensional performance. The supplier must state any limitation of use in or after exposure to extreme conditions.

BS EN 12825:2001 does not make provision for testing or acceptance criteria related to the effect of temperature and humidity variation. Deemed-to-satisfy tests covering the effects of temperature and humidity are detailed in the PSA specification. Where the panel materials are likely to be affected by the ingress of moisture it is essential that any exposed edges such as found on cut panels or panels with holes are effectively sealed to prevent such ingress.

## **TG5.00 DIMENSIONAL REQUIREMENTS**

### **TG5.01 Panel Dimensions**

The first preferential size for the floor panels is 600mm x 600mm. Other panels sizes which have been offered by manufacturers are 500mm x 500mm and 750mm x 750mm. The thickness of panels will vary according to the structural characteristics, typically 27mm to 38mm for a PSA Medium grade.

BS EN12825:2001 specifies two classes of deviation (tolerance) on panel dimensions in Table 3. Class 2 is similar to those detailed in the PSA specification. Class 1 would be difficult and expensive to achieve with wood core or cement based products commercially used in the UK.

### **TG5.02 Panel Interchangeability**

All panels (with the exception of panels with cut edges) are required to be totally interchangeable and replaceable in any of four directions at 90-degree increments. Panels are required to be removed and replaced without undue force using lifting devices and it is preferable that panels can be lifted from one side without damaging the edges or pedestal heads.

### **TG5.03 Panel Location**

Lateral location of the system often depends on the skill of the fixer. Close fitted panels could cause squeaking when the floor is subjected to pedestrian activity and excessive tightness due to thermal expansion. A pedestal support design that incorporates a positive panel location system should provide a controlled gap of say 0.50mm to avoid these problems.

### **TG5.04 Gaps Between Panels**

The maximum gap between panels should not exceed 1.00mm.

### **TG5.05 Air Leakage Rate**

When the under floor space is to be used as a distribution air plenum, the floor system may have to comply with a specific air leakage rate between the joints and at the perimeter. In this case special arrangements may be required to seal the joints and perimeters, stringers and gaskets may be proposed. Laboratory or on site air leakage tests are required to confirm the leakage rate and ensure energy efficiency. A method of on-site testing is included in the Appendix 'B' to this Technical Guidance.

## **TG5.06 Height**

The height of the finished access floor together with details of tolerances in the levels of the sub floor must be stated in the particular project specification.

The supplier of the access floor should be required to detail any limitation that may apply and if any additional bracing, stringers or additional pedestal fixings are required. The access floor system must be fully adjustable to cater for any tolerances in the level of the sub floor.

## **TG5.07 Pedestal Bases**

Pedestal bases must be designed to evenly transmit loads to the sub floor, and have an area of not less than 10,000mm<sup>2</sup>, i.e. 100mm x 100mm square or 113mm diameter.

## **TG6.00 FIRE AND SAFETY REQUIREMENTS**

### **TG6.01 General**

An European Standard prEN 1366-6: Fire resistance tests for service installation – Part 6: Raised access floors and hollow floors, is still only in **draft** form and has been submitted to CEN members for enquiry and comments. No final date has been set for its approval. In the meantime, the fire and safety requirements and tests set out in MOB PF2 PS/SPU March 1992 should be used for UK installations.

### **TG6.02 Relevant Current British Standards**

The UK Building Regulation 2000 require access floor systems to comply with the fire and safety requirements of the following British standards:

BS 5588: Part 11: 1997 (amended to January 1999): Fire precaution in the design, construction and use of buildings. Part 11. Code of practice for shops, offices, industrial, storage and other similar buildings.



BS 6266: 1992: British Standard Code of Practice for Fire Protection for Electronic Data Processing Installation if applicable.

**BS 5588: Part 11: 1997 Section 6 Clause 27, (page 59) Commentary:**

contains specific references to platform floors (raised access floors) as follows:

*“Platform floors may be provided in some buildings for the installation of services to equipment and workstations. A fire may develop in the void formed between the underside*

*of the platform floor and the upper surface of the structural floor beneath. The platform floor needs to retain its load bearing function and contain the fire for a period of time sufficient for the occupants to escape. The usual conditions of test for determining the fire resistance of elements (currently BS476: Parts 20 to 23) are not appropriate for determining the fire behaviour of a platform floor. A small-scale fire could occur; however, and hence the tests for such conditions published by the Property Services Agency should be used (see 27.2b). In this context, a reference to the ‘structural floor’ included the oversite or sealing floor slab of the lowest floor in the building.*

27.2 Recommendations

b) Any platform floor where the depth between the top of the structural floor beneath and the underside of the platform floor is more than 200mm, or where total area of the floor is more than 64m<sup>2</sup> should satisfy the requirements given in *Method of Building MOB PF2 and MOB PF2 PS/SPU: Performance specification: Platform floors (1990)*, published by Department of the Environment, Property Services Agency, for a period of not less than 30 minutes. The test should be performed in accordance with the test procedure for partial access floors (T40.00) or for full access floors (T19.00) as appropriate.” (BS 5588: Part 11: 1997).

**BS 6266: 1992 Section 3.4** refers to raised floors within an Electronic Data Processing (EDP) area as follows:

**“3.4.1 General**

*Materials used to support raised floors built above structural floors should be of adequate strength, be non combustible and should not incorporate materials having a melting point lower than 600°C. The design of a raised floor should be such that it retains its integrity and provides adequate thermal insulation in the event of a fire developing in the void beneath. (Where combustible materials are used for the raised floor, it should be faced on the underside with non-combustible materials). Where modular raised floors are installed, appropriate lifters should be provided which are obvious and readily accessible.*

NOTE. Additional guidance is available in PSA publication MOB 08 801 June 1981. *Performance specification – Platform floors*”. (BS 7266:1992).

### **PG6.03 Spread of Flame**

Within the cavity, the system is required to achieve;

Class 1 Surface classification when tested in accordance with BS 476 Part 7

And an Index of Performance(s) not exceeding 12 and a Sub Index (i) not exceeding 6 when tested in accordance with BS 476: Part 6.

### **PG6.04 Panel Cladding**

Panels with combustible core material must be securely clad to the underside in non-combustible material having a melting point of not less than 600°C. It must be securely fixed to the panel and remain in place to ensure that the flame or radiant heat does not come in contact with the combustible material when the sample is subjected to the spread of flame, index of performance and the fire resistance tests.

It is preferable that panels constructed with a chipboard core are completely clad in steel. The cladding will also protect the core against ingress of moisture and provide a dimensionally stable panel.

## **PG6.05 Structural Materials**

Any materials forming the panel supporting structure must have a melting point of not less than 550°C.

## **PG6.06 Cavity Barriers**

If cavity barriers are required, they must be designed and installed in accordance with the applicable current building regulations. See Building Regulations: Approved Document B – Fire safety: 2000 Edition amended 2000.

## **TG7.00 ELECTRICAL REQUIREMENTS**

### **TG7.01 Earthing and Bonding**

When required by the electrical regulations currently applicable, (BS 7671: 1992 Regulations for Electrical Installations) all metallic components forming an access floor should be electrically bonded to earth by a means that will satisfy the regulations. In practice, these requirements may be satisfied by using the conductive components of the floor system without additional conductors providing those components and the joints between them make substantial metal-to-metal contact of negligible impedance and are capable of carrying an earth fault current from electrical installations associated with or contained within the access floor system. **All metal-to-metal contacts must be designed so that the electrical efficiency cannot be impaired by incorrect installation.**

The floor system and any conductive parts of electrical equipment mounted on or associated with the floor must be bonded to the building earth by means of suitable conductors. After installation, the access floor system must be electrically tested and the results recorded. A suitable test method is described in the PSA specification, Test T44.00. When the resistance, measured in accordance with this test method, is added to the resistance of other parts of the path forming earth fault loop, the total should not exceed that required to operate the particular earth fault protection device within the disconnection time

required by the Electrical Regulations.

In practice a resistance of less than 1.00 ohm with the access floor path is usually acceptable. However, the Project Electrical Engineer should be consulted.

## **TG7.02 Electrostatic Control**

Electrostatic build up can occur on personnel within the building accommodation and may cause malfunction of data processing equipment and discomfort. It is created in many ways eg clothing materials, floor covering materials, environmental conditions etc., and must be safely discharged to earth.

In order to achieve the protection and provide a safe working platform, the resistance between the surface of the floor covering and the main building earth continuity conductor must be between  $5 \times 10^5$  and  $2 \times 10^{10}$  ohms. A suitable test method is described in the PSA specification Test T43.00. The requirements and tests can only be achieved and measured with the floor covering in place including any adhesive or tackifier. Generally the floor covering will need to be an anti static type to achieve the forgoing requirements.

## **TG8.00 MANUFACTURE AND QUALITY CONTROL**

### **TG8.01 General**

Since the mid 1970's the access floor industry has developed from small 'cottage type' to multi million pound sophisticated production. Manufacturers have research and development departments including test facilities and sometimes use independent test laboratories during the development of new products. Improved production methods allow floor components to be produced to fine limits but commercial pressures to provide minor changes to materials such as chipboard, steel, adhesives etc., may alter the structural characteristics to below the minimum requirements.

## **TG8.02 Quality Assurance**

Preference should be given to manufacturers who operate an accredited third party assessed quality management system in accordance with BS EN ISO 9000 series of standards. It should include a Factory Production Control system (FPC) incorporating type testing, production testing, input material testing and any other procedure to ensure that the product maintains the stated performance requirements.

The FPC must conform to the relevant parts of BS EN 9000-3:1997 and BS EN ISO 9001:1994 and make specific reference to the requirements of the PSA and the BS EN 12825:2001 specifications.

It is considered essential that any FPC system should be capable of relating all input materials to specific batches of components. It would be preferable if panels were marked with an identification number and date together with an indication of the structural grade or characteristic.

## **TG9.00 SUPPLY DELIVERY AND STORAGE**

### **TG9.01 Transportation**

The supplier will generally take responsibility for the transportation of the access floor components to the site. The delivery method and schedule should be agreed with the Main Contractor or the Project Manager at an early stage. Components in transit must not be subjected to any adverse conditions that are likely to affect the performance of the floor system in use.

### **TG9.02 Off Loading**

The Main Contractor is generally responsible for off loading the components at the site. Where there is no Main Contractor, the supplier will be responsible for this operation. Although panels are generally transported on pallets and protected by shrink-wrapping, care must be taken when off loading components from a protective vehicle that they are not subjected to any adverse weather conditions.

### **TG9.03 Storage on Site**

When stored on site before installation, components and panels in particular, must not be subjected to conditions likely to affect their performance in use. Storage conditions must be agreed before delivery. Stored materials must not be stacked to cause any overloading of the building sub floors or any completed access floor.

## **TG10.00 INSTALLATION**

### **TG10.01 Dimensional Co-ordination**

It is preferable that the dimensional frame building is based on BS 6750:1982 Modular co-ordination in building and that the access floor system is capable of being located and fixed within this framework. However, the floor system offered must also be capable of modification to meet the requirements of a non-modular building such as in the case of the refurbishments of existing buildings.

See also Clause TG5.01.

### **TG10.02 Installation Programme**

The access floor-installing contractor must liaise with the project co-ordinator to ensure that the delivery, site storage and installation are carried out at the agreed sequence. The installer must notify the appropriate authority (Main Contractor), of the period of time required to have a clear area and to erect the complete system and the period of time that will be required before access is allowed due to the setting time of any adhesives used to fix pedestals etc.

Consideration might be given to the installation of the main under floor services such as main cable runs, cable trays, pipe work and ductwork etc., **before** the installation of the access floor, thus reducing the possibility of damage or abuse by the following trades. If this method is proposed, the sub floor will have to be marked with the pedestal positions or grid lines.

### **TG10.03 Structural Sub Floor**

The flooring contractor must be made aware of the type and finish of the structural sub floor including details of any reinforcement and be required to confirm that it is suitable for the installation of the access floor system and notify any restrictive requirements for the condition of the surface such as moisture content, which may affect the efficiency of pedestal fixing adhesives.

### **TG10.04 Cleaning and Sealing the Sub Floor**

Before commencing the installation of the access floor, the sub floor must be dry and free of dirt and debris. It is preferable that a sealant is applied to the concrete surface or any brickwork within the void to prevent dusting throughout the life of the floor system. This is particularly important if the void is to be used as a plenum for the distributions of conditioning air and when the accommodation is to house dust sensitive electronic equipment.

It is preferable that the sealant is coloured and essential that it is compatible with any adhesives used to pack or fix pedestals.

### **TG10.05 Fire Stopping**

It may be preferable that all openings into the void are fire stopped to the satisfaction of the fire authority before the access floor system is erected.

### **TG10.06 Sample Area**

It is a wise precaution to request that a sample area of floor is installed before the main areas are commenced. This will enable the installation standard to be evaluated and established. The sample area should be at least 5 m square and if possible include threshold and perimeter details. The evaluation should include preliminary pedestal fixing and electrical tests.

The sample would become part of the main installation after evaluation and would be an example of the quality expected.

### **TG10.07 Validation Tests**

Validation tests carried out by an accredited independent test laboratory, such as:

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on samples of panels and pedestals selected **on site** will provide a positive indication that the system will comply with the performance requirements detailed in the Particular project specification and those detailed in contractor's offer.

The tests should include validation of the structural characteristics and if the PSA requirements are specified, the following programme is suggested:

1. For **office accommodation, select 0.5%** of the total number of panels and pedestals included in the contract in batches when they are delivered to site. (Minimum 15 panels with 60 pedestals)
2. For **computer suite accommodation, select 1.0%** of the total number of panels included in the contract in batches when they are delivered to site. (Minimum 15 panels with 60 pedestals)
3. Commission an independent test laboratory to carry out the following PSA tests on the selected full and cut panels in accordance with the relevant structural grade:
  - a. Test T8.00 – 10 tests of 5 minutes duration on positions selected by the test authority. 5 samples showing the worst results, tested for 24 hours on positions selected by the test authority followed by the safety factor test T11.00.
  - b. Test T8a.00 – 2 tests on a cut panel edge of 5 minutes duration followed by a 24-hour test and safety factor test T11.00 if considered necessary by the test authority.
  - c. T16.00 – 3 pedestal vertical load tests.
4. If one panel fails to meet the T8.00 requirements, five more new sample panels should be tested. That particular batch will only be accepted if all



five pass. The installation should not be allowed to proceed until the tests have been successfully completed.

5. Similar validation tests could be carried out on floor systems supplied to the requirements of BS EN 12825:2001 using the declared working load as the 25mm<sup>2</sup> test load over a 24 hours period. This would examine the creep properties and ensure that the deflection and/or deviation were less than the allowed 2.5mm after the 24-hour test period.

### **TG10.08 Pedestal Fixing Tests**

In order to ensure that the pedestals will be adequately secured to the sub floor, the installer should be required to carry out a fixing test on sample pedestals fixed by the method proposed at random positions throughout the building. As the installation proceeds, fixing tests should be carried out to randomly selected pedestals at the rate of 0.5% on each area/level. The pass rate must be at least 95% but in high-risk areas such as computer machine rooms, the pass rate should be 99%. Suitable tests are detailed in the PSA specification Tests T42.00 and T15.00 and should be carried out by the installer and witnessed by the Client's representative.

### **TG10.09 Pedestal Fixing Method**

Pedestals are generally bedded and fixed to the sub floor by means of a suitable adhesive with additional mechanical fixing when necessary. Experience has shown, that generally, high pedestals cannot be adequately fixed to a concrete sub floor by adhesives alone due to the fact that the concrete surface will fail if even a small horizontal force is applied to pedestal head. When additional mechanical fixing is considered to be necessary, at least three equally spaced fixings should be applied through preformed holes in the pedestal base. Pedestals must be installed vertically to provide the correct horizontal plane for the panel support. Access should not be allowed to the floor system until the adhesives used to fix or bed-in the pedestal have had time to set/cure, generally 48 hours.

### **TG10.10 Setting Out**

When setting out the floor system grid in relation to the building, consideration should be given to the following:

- a. The floor grid should be set to avoid if possible, cut perimeter panels of less than 300mm wide. Manufacturers can sometimes supply oversize panels to avoid cut panels of less than 300mm wide.
- b. The grid location should also take into account the position of any columns and the need to avoid cut panels if possible.
- c. The lateral stability of the floor system should not be reliant on the perimeter walls or constructions. Although a close fit is required to all such interfaces, a gap is required to allow for possible building movement and any hygrothermal movement.

If the building shape dictates a change in the angle of the grid, special design consideration must be given to the mitre joint at the change. Weak areas can occur at such interfaces, which may necessitate very small cut panel infill pieces.

### **TG10.11 Overall Levels**

The PSA specification provides an acceptable standard for the overall access floor levels:

- a. +/- 1.50mm over any 5 m sq. and
- b. +/- 6.00mm over any basic space

The system must be adjustable to meet these requirements when it is installed on a structural floor slab to normal tolerances in accordance with good building practice.

### **TG10.12 Panel Levels**

The difference in height (stepping) between adjacent panels without a carpet type floor finish should not be greater than 0.75mm before the application of any load and not greater than 3.25mm when one panel is subjected to the specified working load and any adjacent panel unloaded. This requirement would also apply to panels with a factory bonded hard surface.

Excessive stepping could be a tripping hazard and may cause premature wear to loose laid carpet tiles.

### **TG10.13 Pedestal Adjustment**

Pedestals are required to have a height adjustment system to provide for the variations in the sub floor levels.

The manufacturer is required to state the safe adjustment height parameters and longer or shorter basic pedestals should be used to avoid adjustment beyond these limits. The adjustment device must be positively locked and must not become loose due to vibration or other causes during the life of the system. The locking is generally mechanical (locknut) but some installers use adhesive. It must be possible to release the locking method should readjustment become necessary during the life of the system.

The locking should be checked as the installation proceeds.

### **TG10.14 System Fit**

The system must not rely on the perimeter walls or columns etc., for lateral stability and a suitable gap of not more than 15mm is required at such interfaces to allow for environmental, thermal and possible building movement. Panels adjacent to these areas must be located to prevent any lateral movement of the system. Gaps at the building interfaces may be covered by a skirting trim or sealed by means of a flexible foam strip attached to the panels.

### **TG10.15 Panel Fit and Location**

All full panels must be easily removable, replaceable and fully interchangeable in any of four directions at 90-degree increments. Panels should be located on the supporting pedestals by means of a positive location method.

It is preferable that the location system provides a controlled gap between panels of at least 0.5mm but not more than 1.00mm. This should ensure that the floor system would not become excessively tight in service due to environmental, thermal and building movement. The location method should prevent any lateral movement of panels adjacent to panels that have been removed for access to the void.

### **TG10.16 Squeaking**

Experience has shown that when panel edges are in contact and deflected by pedestrian movement or rolling loads, squeaking noises can occur. This can also be exacerbated by dust or dirt contamination in the joints. The design solution to this very common problem is to provide a positive gap between panels by means of a positive panel/pedestal location system.

### **TG10.17 Panel Rocking, Rattles and Other Noises**

The floor system should be sturdy, rigid and firm and should be designed to prevent excessive panel movement such as rocking, rattles and other annoying noises. If pedestals are not vertical, the heads will not be horizontal and can be the cause of rocking panels. Distorted panels can also be a significant cause.

It is sometimes very difficult to remedy this problem after the adhesives used to bed and fix pedestals have set and it is therefore essential that any rocking is corrected as the installation proceeds. Supplementary packers between panels and pedestal heads should generally not be accepted.

### **TG10.18 Perimeter Detail**

Specific consideration must be given to the design detail at perimeters, which usually involve cut panels. It is essential that the structural performance characteristics be maintained in these vulnerable areas. Curtain walling at perimeters can cause panel support problems and may involve the use of additional pedestals or cantilever support structures. To prevent lateral panel movement and tipping, installers may propose additional mechanical fixing of panels to supports. This is generally acceptable if well designed but if there is any doubt, the design should be subjected to relevant validation tests.

### **TG10.19 Threshold Detail**

Doorway and lift thresholds are subjected to the most concentrated pedestrian and sometimes rolling loads. It is therefore important that specific consideration is given to the design details at these areas. It is usual for some form of additional supports to be installed at these vulnerable areas to prevent unacceptable lateral movement, rocking, tipping and deflection of full and cut panels. It is a wise precaution to screw panels to pedestals and to have additional mechanical pedestal fixings. It is essential for the installer to supply design details before the installation is commenced, that the design should reflect the structural characteristic requirement for the main floor system and be subjected to validation test if necessary.

### **TG10.20 Ramps and Stairways**

Any ramps or stairways incorporated in the design must be to the same structural characteristics of the floor system and/or comply with any relevant Building Regulation.

### **TG10.21 Use by Following Trades**

Past experience has shown that considerable damage can occur when the completed access floor system is used as a construction platform by following trades. Although a 3x safety factor is recommended, structural damage has

occurred due to overloading by storage of heavy materials, pallet or forklift trucks, work towers and large cable drums etc. It is essential that following trades are aware of the structural limitations. If heavy equipment is to be transported across the floor, spreader plates should be used to distribute loads. If access is required to install services within the void, contractors should be aware of the number of panels that can be removed at any one time and that panels should not be removed to leave unprotected free standing pedestals. The floor supplier will be able to advise on this aspect. In particular cabling should not be installed using the pedestals as pivot points around which the cables are pulled. Panels should only be lifted using the proper lifting equipment. It is a wise precaution to arrange for the floor supplier to provide attendance during any under-floor installation programme. Damage to the panel protective surface can also occur and personnel should be aware that excessive damage might result in rusting or other corrosion over a period of time. Some additional temporary protection may be required.

### **TG10.22 Cleaning**

After installation, the void below the floor should be left and kept clean and dust free, this is particularly important if the void is to be used as an air distribution plenum. Before handover or prior to laying a floor finish, the top surface of the panels must be left in a clean condition. Dry cleaning methods are recommended, excessive use of water can damage the panel surface and the substrate. It may be preferable to clean the floor surface before cleaning the void because dirt or dust will be swept and fall between the panel joints into the void below.

### **TG10.23 Inspection of Completed Installation**

A thorough inspection of the floor system should be carried out on completion of the installation. It should include inspections of the perimeters, thresholds, checks for panel movement, rocking, squeaking and other noises, ease of removal and replacement of panels, pedestal locking, panel levels and gapping, panel damage etc. and ensure that the whole system has been installed to an

acceptable standard and if necessary refer to the standard of the sample area which was accepted and agreed. A record of the inspection should be included in the contract documents.

## **TG11.00 FLOOR FINISHES**

### **TG11.01 Factory Bonded Finishes**

Various types of floor finishes can be bonded to individual access floor panels and this operation is normally carried out as part of the manufacturing process in the factory. Finishes include carpet, vinyl, high-pressure laminate, wood, stone marble etc. Purchasers should be aware that factory bonded finishes are difficult to remove and replace without damage to the panels. Any replacement of bonded finishes usually involves the replacement of complete panels. Manufacturers will be able to advise on possible floor finish replacement problems.

It is essential that the bonded finish will not become detached when panels are lifted by means of a recommended lifting device and BS EN 12825:2001 includes a floor covering peel resistance test to provide an indication that coverings will not easily become detached. However the test requirements **do not** specify the **type** of covering - it would only be suitable for flexible type coverings.

Factory bonded finishes will need to be protected after installation on site during the construction period before handover.

### **TG11.02 Loose Laid Carpet Finishes**

Various loose laid carpet systems are available but generally consist of 500mm x 500mm square carpet tiles. These are usually laid on a tackifier solution. Tackifier is intended to prevent lateral movement of the tiles and should **not be used** to adhere the carpet to the panel surface. It should be remembered that the tiles have to be easily removed and replaced to enable panels to be

removed to obtain access to the void. 500mm square tiles do not co-ordinate with the 600mm square access floor grid and therefore, at least four tiles may need to be removed to obtain access to one floor panel. Tackifiers are applied to the panel surface and **must** be allowed to dry before carpet tiles are laid to avoid a possible corrosive effect on the panel protective galvanized surface. It is unnecessary to apply tackifier over the entire surface and generally an application in a tartan grid pattern will be sufficient. Tackifier must not be applied over or allowed to penetrate into the joints between panels otherwise difficulty will be experienced in lifting panels. Likewise, tackifier must not be applied over panel joints to reduce air leakage rates if the under floor space is used as an air distribution plenum.

Double sided adhesive tapes are sometimes used to locate loose lay carpet tiles but if regular access is required to the void, the tapes will become contaminated with dirt or dust and will become less effective.

### **TG11.03 Other Methods of Carpet Fixing**

Other methods of carpet fixing are available but do have certain drawbacks. 600mm square carpet tiles can be fixed/located to each individual panel by means of press-studs at each corner or by magnetic strips fixed to the carpet. Such systems are generally more expensive than the normal loose lay method, carpets have to be specially cut to closer tolerances and the carpet subsequently tends to stretch and creep over joints making it difficult to remove and replace individual floor panels.

## **TG12.00 DURABILITY**

### **TG12.01 Protective Finishes**

All parts of the floor system must have finishes that will adequately protected against rust, corrosion or any other form of deterioration likely to affect the performance in use in the environment specified. The supplier must state the type and standard of the protection provided.



## **TG12.02 Protective Finishes in Computer Equipment Rooms**

Recent experience has brought to light a phenomenon that has occurred in some computer or data processing rooms. Investigators found that certain intermittent malfunctions within the data processing equipment were being caused by zinc particles at molecular level being deposited on the electronic components within the equipment. The zinc particles (whiskers) originated on the protective zinc plating on the steel surface on the undersides of the raised access floor panels. The particles were carried on the conditioned air from the under floor plenum to equipment interiors. The investigators found that the particles only develop on electroplated zinc surfaces and do not occur on hot dip galvanized surfaces. It therefore follows that only hot dip galvanized or painted protective surfaces are acceptable for this type of accommodation.

## **TG12.03 Life of Components**

The supplier should be required to state and guarantee the minimum design life that all components of the floor system will be expected to meet:

- a. The specified performance requirements,
- b. The recommended maintenance period and
- c. The methods required to achieve the minimum design life.

It is desirable for the supporting components to have a minimum life of 50 years and for the panels to have a minimum life of 25 years. Users should be aware that a factory bonded floor finish might restrict the life of the system to the life of the finish.

## **TG12.04 Performance in Use**

It is important that the floor system provides a satisfactory performance over the stated design life. It is difficult for the manufacturer to provide an estimate for the minimum design life particularly with regard to the structural requirements. It will be even more difficult to provide guarantees for systems that are designed and manufactured to BS EN 12825:2001 which does not include a requirement for creep.

In order to provide some confidence in the guarantee, structural validation tests should be carried out over a 24 hours period including stability in deflection or deviation to examine the creep properties.

Specifiers should be aware that a failure of a floor system, which may require replacement or major repair, could result in high consequential costs far exceeding the cost of the floor system particularly if mainframe computer equipment, dealing rooms or relocation of personnel is involved.

### **TG13.00 TESTING**

In order to provide an indication that the access floor system will comply with the stated performance requirements, an accredited specialist independent test laboratory should carry out a 'Type Approved' testing programme. In addition, production quality control tests should be carried out by the manufacturer and validation tests should be carried out on components selected on site by an accredited independent test laboratory, such as:-

#### **BUILDING INVESTIGATION AND TESTING SERVICES**

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### **TG13.01 Type Testing**

Manufacturers should have each type of system tested by an accredited independent test laboratory in accordance with specified requirements and the subsequent reports must confirm that the system will comply with the performance requirements specified. The report must also include all dimensional and material details together with a full product specification and related drawings. Any change in materials, production methods and assembly may necessitate a retesting programme. Test reports that are more than three years old should be treated with extreme caution and should be examined carefully to check that there have been no changes in the components.

### **TG13.02 Type Testing to BS EN Requirements**

The testing regime detailed in BS EN 12825:2001 is not comprehensive and additional PSA tests may be required. These include: 300mm<sup>2</sup> loading, creep over 24 hours, effect of humidity, effect of temperature, pedestrian dynamic, rolling load dynamic, pedestal quadrant and fire (to meet UK requirements).

### **TG13.03 Type Testing to PSA Requirements**

The testing regime detailed in MOB PF2 PS/SPU (March 1992) is fully comprehensive and has been successfully applied since 1981. All systems said to comply with the PSA requirements should be tested in accordance with the test methods detailed. If a floor system is specified and offered to PSA requirements, a **full test report** must be included with the contract documents and the supplier must confirm that it is exactly the same as that subjected to the test regime.

### **TG13.04 Validation Testing**

It is a wise precaution to require validation tests on panels and pedestals selected at random after they are delivered to the site or from stocks that are dedicated to the project. Suitable validation test requirements are details in Clause TG10.07 and should be carried out by an accredited specialist independent test laboratory, such as:-

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The floor installation should not be allowed to commence until the validation tests have been successfully carried out.

## **TG14.00 TECHNICAL ADVICE**

Independent technical advice on any aspect of raised access floors may be obtained from:-

### **BUILDING INVESTIGATION AND TESTING SERVICES**

**Telephone 00 44 (0) 1737 765432 Fax 00 44 (0)1737 765431**

Email bitstlab@btconnect.com Website [www.bits-testlab.co.uk](http://www.bits-testlab.co.uk)

## **TG15.00 CHECKLIST**

### **TG15.01 Subject Identification**

The following subjects should be taken into account in the design, selection, installation and maintenance of a raised access floor system.

The checklist must be used in conjunction with information contained in this Technical Guidance document, (TG01:2003.) PSA Performance Specification; Platform Floors MOB PF2 PS/SPU March 1992, European Standard BS EN 12825:2001 (Spec Ref.) and other listed references (Other Refs.)

**TG15.02 CHECK LISTS**

1 BASIC PROJECT DATA				
SUBJECT	SELECTION/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
1a Type of Floor	Select: (i) Full access (ii) Partial access	TG2.02	PSA P2.01	K41: 2
1b Structural Grade	Select grade to suit anticipated loading (i) PSA: Light, Medium, Heavy & Extra Heavy.	TG4.01	PSA P4.01	BS 6399 Part 1: 1996
	(ii) BS EN: Table 1, Table 2 & Safety factor. Inform Structural Engineer of the load, grid and pedestal base area.	TG4.02	BS EN 4.1 4.2.1 & 4.2.2	K41:3.1
1c Loading	Ensure that the structural slab is designed to the access floor grade selected.	TG4.00	PSA P4.01	K41:3.2
1d Weight of the System	Manufacturer to supply the total weight of the system offered, Inform Structural Engineer.	TG4.12	PSA P4.11	K41:2.1
1e. Dimensional requirements	Select access floor grid/panel size Preferred size is 600mm x 600mm.	TG5.01	PSA P3.05	
1f. Finished Floor Height	Select height to cater for under floor service requirements. Take thickness of floor panels into account.	TG5.06	PSA P3.05	
1g. Levels	Check that the selected height of the floor system can be installed on the structural sub floor laid with the maximum level tolerances.	TG5.06	PSA P3.07	
1h. Test Reports	Check that the system offered has been tested and complies with the PSA or BS EN specifications. Check that the descriptions of the components on a <b>recent</b> test report, drawings and product specifications apply to the system offered and to be installed.	TG4.08 TG10	PSA P14.00  BS EN 5.1	Manufacturers Product Spec

<b>2 MAIN PERFORMANCE REQUIREMENTS</b>				
SUBJECT	SELECTION/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
2a. Structural Requirements to PSA Specification.	Refer to the test reports to ensure that the system offered fully complies with the PSA performance requirements for the grade and that the constituent materials are as stated.	TG4.01 TG13.00 TG13.01	PSA P14.00 and Test Section T	BS EN 13264: 2001
2b. Structural Requirements to BS EN Specification	Refer to the Initial type testing reports to ensure that the system offered complies with BS EN performance requirements for the Class of element, the Class of deflection (Max 2.50mm) and Safety factor (Min 3x) and that the constituent materials are as stated.	TG4.01 TG13.02	BS EN Section 5	
	Test results for any additional structural requirements such as creep, pedestrian dynamic load, rolling loads, hygrothermal, cut panels, pedestal strength, must be included in the report.	TG4.03 TG4.05 TG4.06 TG4.07 TG4.08 TG4.13	PSA tests T8.00 T8.00a T14.00 T15.00 T16.00 T17.00 T18.00	
2c. Structural Requirements for Air Grilles	Air grilles designed and tested to PSA or BS EN 13264:2001 requirements can be accepted.	TG4.04	PSA Appendix 'A'	
2d. Structural Requirements for Perimeter, Thresholds and around Columns	Check that perimeter, threshold, and column details provide a good indication that the system has been designed to the same standard as the main floor area and will sustain the specified working load at these locations.	TG10.18 TG10.19	PSA P4.00	
2e. Environmental Conditions	Notify manufacturer of the working environmental conditions expected during the life of the floor system. Ascertain the environmental limits for the installation of the floor.	TG4.13		

<b>2 MAIN PERFORMANCE REQUIREMENTS (continued)</b>				
SUBJECT	SELECTION/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
2f. Air Leakage Rate	If the floor void is to be used as an air distribution plenum, obtain the leakage rate pressure from the H&V Engineer. Ensure that the system offered will satisfy the requirements. Request proof testing.	PG5.05	PSA P3.14	
2g. Transmission of Sound	If there is a requirement for vertical or flanking airborne sound reduction, obtain & compare laboratory sound test reports from various manufacturers.		PSA P7.00	EN ISO 140-12
	Laboratory sound tests are indicative only; on site performance would not necessarily be as good.	TG6.00	BS EN 4.11	K41: 4.1 & 4.2
2h. Fire Requirements	The fire requirements set out in BS EN 12825: 2001 may not be applicable for UK installations. UK Building Regulation requires access floor systems to be in accordance with the fire and safety requirements of BS5588: Part 11 & BS6266. requirements.	TG6.06	BS EN 4.7 and 4.8	UK Building Regs
	These British Standards refer to the PSA MOB PF2 PS/SPU fire requirements. Check if the Local Authority has any specific requirements.		PSA 6.00	BS 5588 Part 11 BS 6266 K41:4.3
2l. Cavity Barriers	Locate cavity barriers in accordance with the UK Building regulation, standards, Byelaws and/ Building Acts. Inform manufacturer of positions & obtain details of the proposed construction. Check with the Local Authority if this is acceptable.	TG6.06		K41:4.4

<b>3 TECHNICAL SOLUTION: PANELS</b>				
SUBJECT	SELECTION/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
2J. Electrical  Requirements: Earthing and Bonding	All metallic components forming an access floor should be electrically connected to the building earth bar as required by applicable Regulations for Electrical Installations (IEE Wiring Regulations) BS7671:1992. Use PSA requirements & tests.	TG7.01	PSA P9.03  BS EN 4.10	BS 7671: 1992 K41:9. 2
2i. Electrical Requirements: Electrostatic Control	If electrostatic control is required for operational or comfort purposes, use the PSA requirements and tests. Tests cannot be carried out until the floor covering is in-situ.	TG7.2	PSA P9.01	K41:9.1
3a. Panels	Review performance and select preferred panel material or combination of materials offered by the manufacturer. These can include:- All steel. Fully steel encased chipboard. Chipboard with steel sheet or tray to underside. All steel with cementitious infill. Reinforced cementitious material. Aluminum die cast., etc. Ensure that all materials are fully described in the test reports.  Note. The BS EN or PSA do not specify particular materials. Manufacturers may offer any materials provided they meet the performance requirements. There may however, be other considerations on the project.			
3b. Panel Fixing	Are panels mechanically fixed to the pedestals? If so, captive screws are preferred. Are screw fixed panels acceptable to the Client's service engineers?			



<b>3 TECHNICAL SOLUTION: PANELS (continued)</b>				
SUBJECT	SELECT/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
3c. Panel Location Method	Are the panels positively located on the pedestal heads? A location method providing a positive gap between panels is preferred to avoid squeaking noises.	PG5.03		
3d. Perimeter and Threshold Panels	Obtain details of perimeter and threshold panels from manufacturer. Can oversize panel be supplied? Are cut panels less than 300mm wide? Are panels to be cut? What is the sealing method on the cut edge? Is a foam strip to be fitted? Are panels removable? Are panels to be screw fixed? Are panels positively located? Are extra pedestals or stringers needed?	PG4.03 PG10.18 PG10.19		
3e. Expansion joints	Check that any proposed oversize or cut panels have been structuralism <b>tested and comply</b> with the specified PSA fire and safety requirements.  Is the floor system to be installed over building expansion joints? Inform manufacturer of expected movement. Check if the manufacturer considers an expansion joint in the floor system to be necessary. If so obtain details			

<b>4 TECHNICAL SOLUTIONS: SUPPORTING STRUCTURE</b>				
<b>SUBJECT</b>	<b>SELECT/ACTION/CHECKS</b>	<b>Tech Guide Ref</b>	<b>Spec Ref</b>	<b>Other Refs</b>
4a. Pedestal fixing	Ascertain if the manufacturer intends to use mechanical fixings in addition to adhesives. If so check that any reinforcing in the structural slab will be clear of the proposed fixings.	TG10.08 TG10.09	PSAP4.06	
4b. Stringers	Are stringers offered as part of the system? If so, are they acceptable to the Client's service engineers? Are stringers required to control air leakage rate? Are stringers clipped-in or bolted? Clipped-in are preferred.	TG4.09		
4e. Threshold Supports	The manufacturer must supply details of panels supporting arrangement at all thresholds. Ensure that any support structure will comply with structural performance of the floor. Check that the panels are positively located and cannot rock or move.	PG10.19		
4c. Bridging Structures	Bridging structures may be required to support the floor clear of services. Services should be designed to clear pedestal grid. This may not always be possible particularly if air ducting is installed within the void. The manufacturer will require details of any services coinciding with the pedestal grid. The manufacturer must supply details of any bridging structures and proof that they comply with structural performance of the floor system.	PG4.10	PSA P4.09	
4d. Perimeter Supports	The manufacturer must supply details of panel supporting arrangements at perimeters. Ensure that any support structures, including special perimeter pedestals comply with the structural performance of the floor. Check that the edge panels are positively located and that they cannot rock or move	PG10.18	PSA P4.08	

<b>5 TECHNICAL SOLUTION: FINISHES</b>				
<b>SUBJECT</b>	<b>SELECT/ACTION/CHECKS</b>	<b>Tech Guide Ref</b>	<b>Spec Ref</b>	<b>Other Refs</b>
5a. Floor Covering	Select type of finish: Finishes include; Needle punch carpet – Factory bonded Needle punch carpet – Loose lay tiles Tufted loop pile carpet –Factory bonded Tufted loop pile carpet- Loose lay tiles Tufted cut pile carpet – Factory bonded Tufted cut pile carpet – Loose lay tiles Vinyl – Factory bonded High pressure laminate– Factory bonded Linoleum – Factory bonded Wood – Factory bonded Stone or marble – Factory bonded	PG11.01 PG11.02	PSA P8.00	
5b. Fixing Methods	For carpet finish, select factory bonded or loose lay. Loose lay systems are generally based on 500mm x 500mm tiles located by a tackifier solution applied to the surface of the access floor panels.  All factory bonded finishes are difficult to remove and replace without damage to the panels. The life of certain finishes may dictate the life of panels or complete floor systems.  Some manufacturers can offer alternative carpet fixing systems i.e. Press-studs or magnetic.  Double sided tape can be used to locate carpet tiles but this can be easily contaminated by dust and dirt and become ineffective.	PG11.01	PSA P8.05	
5c. Tackifier	If the carpet fixer proposes a tackifier solution, ensure that it will not corrode the panel protective galvanized or zinc finish. The tackifier should be completely dry before carpet tiles are laid. Tackifier must not be allowed to penetrate the panel joints, making panels difficult to remove.	PG11.03		

<b>6 ACCESSORIES</b>				
<b>SUBJECT</b>	<b>SELECTION/ACTION/CHECKS</b>	<b>Tech Guide Ref</b>	<b>Spec Ref</b>	<b>Other Refs</b>
6a. Accessories	<p>Are accessories required?            These can include:            Ramps            Stairs            Railings            Balustrades            Vertical edge panels            Skirting trims            Air grilles; Bar type or perforated panels            Electrical socket outlet boxes            Telecom and data outlet boxes            Cable outlet trim and seals            Cable grommets            Etc.</p> <p>Will the floor manufacturer supply and fix the accessories?            Will they compromise the structural requirements of the floor when fitted?            All accessories must be to a similar standard and quality to the main floor system and meet national standards.</p>	<p>TG10.20</p> <p>TG4.04</p>	<p>PSA P2.05</p> <p>PSA P4.02</p>	

<b>7 INSTALLATION AND SITE CONTROL</b>				
<b>SUBJECT</b>	<b>SELECTION/ACTION CHECKS</b>	<b>Tech Guide Ref</b>	<b>Spec Ref</b>	<b>Other Ref</b>
7a. Supply and Installation	Check if the contract is to be Supply and Fix or Supply only and fixed by others. Some manufacturers will supply the access floor product to a fixing contractor. If so check that the fixing contractor is approved by the manufacturer. Supply and Fix by the floor manufacturer is preferred to avoid split responsibility for the finished product. Check who is responsible for the warrantee.		PSA P13.01	
7b. Installation Programme	Ensure that the flooring contractor has liaised with the main contractor with regard to delivery, site storage, installation and installation conditions. Particular attention must be paid to the time required to install the system and the time required before any access is allowed on the completed floor due to the setting time of any fixing adhesives.	TG9.00 TG10.02	PSA P13.02	
7c. Cleaning the Sub-Floor	Ensure that the sub floor is clean and dry before the floor installation is commenced.	TG10.04		
7d. Sealing the Sub-Floor	If sealant is specified, ensure that it is applied to a clean and dry sub floor surface before the floor installation is commenced. Ensure that any sealant is compatible with the pedestal fixing adhesives.	TG10.04	PSA 13.03	
7e. Fire Stopping	It is preferable that all fire stopping required within the void is completed before the floor installation is commenced.	TG10.05	PSA P13.04	
7f. Sample Area	If a sample area is specified, carry out a thorough examination of the installation including indicative pedestal fixing tests and electrical tests. Record the details of the sample area components and its location for future reference.	TG10.06 TG4.08		

<b>7 INSTALLATION AND SITE CONTROL (continued)</b>				
<b>SUBJECT</b>	<b>SELECTION/ACTION CHECKS</b>	<b>Tech Guide Ref</b>	<b>Spec Ref</b>	<b>Other Ref</b>
7f. Sample Area Continued	Ensure that there is no excessive panel movement, rocking, squeaking or other noises and that the perimeter and threshold details are satisfactory. Do not allow the main installation to commence until the sample area is considered to be satisfactory. Use the sample area to establish the quality of the main installation.	TG10.06 TG4.08		
7g. Validation Tests	If validation tests are specified, randomly select the requisite number of panels and pedestals including a quantity of adhesive from delivery batches as they arrive on site and arrange for the samples to be delivered to the selected accredited independent test laboratory for the relative tests to be carried out. Do not allow the installation to proceed until all test results are satisfactory. Ensure that the test reports are distributed to the Clients representative.	TG4.08 TG10.07		
7h. Pedestal Fixing	Obtain details of the method proposed for fixing pedestals. Are additional mechanical fixings proposed or have they been shown to be unnecessary?	TG10.09	PSA P4.06	
7i. Pedestal Fixing Tests	Request indicative fixing tests are carried out on pedestals fixed in randomly selected areas throughout the building by the method proposed by the manufacturer. If any failure occurs, request proposed remedy. Ensure that pedestal fixing tests are carried out at the rate of 0.5% on each area/level as the installation proceeds. Do not accept a failure rate of more than 5%.			

<b>7 INSTALLATION AND SITE CONTROL (continued)</b>				
SUBJECT	SELECTION/ACTION CHECKS	Tech Guide Ref	Spec Ref	Other Ref
7j. Setting Out	<p>If possible, ensure that initial setting out will avoid the use of cut panels less than 300mm wide. Alternatively oversize panels could be proposed.</p> <p>If under floor services are to be installed before the floor is laid, ensure that the services will clear the pedestal bases.</p>	TG10.10	PSA P3.07	
7k. Overall Levels	Check that overall levels are within the specified limits.	TG10.11	PSA P3.08	
7l. Panel Levels	Check that the difference in level between adjacent unloaded panels is less than 0.75mm.	TG10.12	PSA P4.07	
7m. Pedestal Adjustment and Locking	Ensure that all pedestal adjustment-locking devices are tight.	TG10.13	PSA P3.06	
7n. System Fit	<p>Ensure that the gap at perimeter locations will cater for environmental, thermal expansion and building movement.</p> <p>Check that the panels do not have any lateral movement.</p>	TG10.14	PSA P3.13	
7o. Panel Fit and Location	Check that panels can be easily removed, replaced, located in any other position and can be replaced in any four of 90-degree increments. Relocated panels should not rock or have any other excessive movement.	TG10.15	PSA P2.04	
7q. Panel Rocking, Rattles and Other Noises	<p>Ensure that panels do not rock, rattle and/or produce unacceptable noises when subjected to pedestrian or rolling load activity.</p> <p>These can develop if the pedestals are not truly vertical or the pedestal adjustment is not correct or locked. Supplementary additional packing should not be accepted.</p>	TG10.17	PSA P2.04	

<b>7 INSTALLATION AND SITE CONTROL (continued)</b>				
SUBJECT	SELECTION/ACTION CHECKS	Tech Guide Ref	Spec Ref	Other Ref
7r. Perimeters and Thresholds	<p>Check that perimeter &amp; threshold are installed to an acceptable standard &amp; that any additional supporting structures are in place and securely fixed.</p> <p>Check that all panels are stable &amp; do not rock, rattle, produce unacceptable noises when subjected to pedestrian or rolling load activity.</p>	TG10.18 TG10.19	PSA P2.04	
7s. Ramps and Stairways	Ensure that any ramps or stairways are installed to same standard and structural characteristics as the main floor installation.	TG10.20	PSA P2.04	
7t. Use by Following Trades	Ensure that the completed floor is not damaged or overloaded by subsequent building operations by following trades. If necessary, some form of protection should be provided particularly if the panels have a factory bonded finish.	TG10.21	PSA 13.06	
7u. Cleaning the Void	Ensure that the void is cleaned and kept clean after the floor installation is completed.	TG10.20	PSA 13.05	
7v. Cleaning the Panel Surface	If the panel surface requires cleaning, ensure that wet methods are not used. Certain panels can be damaged by excessive moisture.	TG10.22		
7w. Quality Control Tests	Instruct the floor contractor to carry out all quality control tests as necessary. These are as follows: Pedestal fixing tests PSA T42.00 Electrical continuity test PSA T44.00 Electrical resistance test for electrostatic control PSA T.43.00.	TG10.08 TG7.01  TG7.02	PSA T42.00 T44.00	
	<p>This test can only be carried out when the floor finish is in position.</p> <p>All test results should be recorded in the contract documents.</p>		T43.00	



<b>8 USER INFORMATION (To be supplied at handover)</b>				
SUBJECT	SELECTION/ACTION/CHECKS	Tech Guide Ref	Spec Ref	Other Refs
8a. Durability and Maintenance	Obtain expected life of the system from the manufacturers. Obtain maintenance methods from the manufacturer. Ensure that the client is aware of the methods and periods of maintenance	PG12.03	PSA 11.01	
8b. Cleaning the Factory Bonded Floor Finish	Obtain the recommended cleaning method for the factory-bonded finish. It is usual for dry cleaning methods to be recommended. Wet cleaning methods could damage panel materials.		PSA P8.06	
8c. Installation of Heavy Equipment	Ensure that all panels are in position and that spreader plates are used when heavy loads are moved across the floor system. Ensure that the client is aware of this requirement		PSA P4.13	
8d. Floor Loading	Ensure that the client is aware of the maximum floor loading. PSA grade can be checked by means of a colour code, which should be painted on each panel. Information on loadings for BS EN systems can be ascertained from the commercial documents.		PSA P4.12	
8e. Safety of the System When Panels are Removed	Ensure that the client is aware of the number of panels that may be temporarily removed at any time without endangering the stability of the floor system.  Obtain the information from the floor manufacturer.		BS EN 7.1	

# **PARTICULAR PROJECT SPECIFICATIONS**

# Contents

<b>PARTICULAR PROJECT SPECIFICATIONS</b>	<b>Page</b>
PPS0.00 INTRODUCTION	57
PPS0.01 Developing a Particular Project specification	57
PPS0.02 Model specifications	57
PPS1.01 MODEL SPECIFICATION FOR USE WITH	58
PPS1.02 MODEL SPECIFICATION FOR USE WITH <b>European Standard BS EN 12825: 2001</b>	70

## Section PPS

### PPS0.00 INTRODUCTION

The Model Specifications in this section have been developed to assist designers in specifying an access floor system for a particular project using the PSA Performance Specification MOB PF2 PS/SPU March 1992 and /or the European Specification BS EN 12825:2001 **and are for guidance only.**

Special requirements that are not covered by the PSA or BS EN specifications should be referred to the manufacturer of Raised Access Floors or a specialist consultant.

### PPS0.01 DEVELOPING A PARTICULAR PROJECT SPECIFICATION FOR ACCESS FLOORS

The PSA Performance Specification contains the majority of performance requirements but needs to be supplemented by specific project information and additional clauses to cover certain problems that have arisen since the document was published.

A considerable number of performance requirements are not included in the European Specification BS EN 12825:2001 and therefore need to be supplemented by additional clauses to ensure a satisfactory installation.

## PPS0.02 THE MODEL SPECIFICATIONS

The following Model specifications contain clauses requiring particular project details to be added or selected (**shown #**) and clauses or details which may be deleted (**shown\***) as appropriate. When developing the Particular specification, reference should be made to the relevant information detailed in the Technical Guidance section of this document.

It should be noted that the Models are provide for guidance only and that additional requirements including preliminary contract clauses may need to be added to suit particular contracts.

**Compliance with any British, European or PSA standard or ❖B.I.T.S.❖ Technical Guidance does not of itself confer immunity from legal obligations.**

## PPS1.01 MODEL SPECIFICATION FOR A FULL ACCESS FLOOR SYSTEM USING THE PSA STANDARD MOB PF2 PS/SPU: MARCH 1992

A Particular Project Specification should be issued for the raised access floor contract and may be based on this model specification.

### 1.0 GENERAL

This Particular Project Specification relates to the supply and fix of a complete RAISED ACCESS FLOOR system, which is to be installed in ..... #

The RAISED ACCESS FLOOR, hereafter termed the FLOOR SYSTEM shall be designed, manufactured and installed in accordance with the requirement of the Property Services Agency Performance Specification: Platform Floors (Raised access floors) MOB PF2 PS/SPU: March 1992, hereafter referred to as the PSA specification, in all respects and as modified and detailed in this Particular Project Specification.

Any statutory regulations or requirements, which are more restrictive, shall have precedence. The term AUTHORITY in the PSA Specification shall, in this instance, be taken to mean Architect/ Main Contractor/Project Manager/Client /or other. #

The installation shall comprise all materials to complete the system including pedestals, panels and where appropriate, bonded floor covering or finishes, stringers, bridging or additional support structures cavity barrier, ramps, steps, skirting trims, edge sealing, railings, balustrades, air terminal devices, electrical and data outlet boxes, cable entries, sub floor sealing, electrical bonding, protective covering etc.

**2.0 DESCRIPTION**

2.01 Type

The system shall be FULL access as defined in the PSA Specification.

2.02 Structural grade

The structural grade of the system shall be LIGHT/MEDIUM/HEAVY/EXTRA HEAVY# as defined in the PSA Specification.

2.03 Accessories

The following accessories are required. ....#

Located where shown on Drawing Nos. ....#

### **3.00 DIMENSIONAL REQUIREMENTS**

#### **3.01 Area**

The system shall be located within the areas shown on Drawing Nos.....#

#### **3.02 Height**

The nominal floor height above the structural sub-floor shall be. ....mm #

The Main Contractor will provide the actual finished floor height before the installation commences.

The Tenderer must be satisfied that this requirement is feasible and that the system offered is capable of being installed and adjusted within the tolerances of the sub-floor and the finished floor level of the raised access floor.

The tolerance on the finished surface of the sub-floor has been specified as +/- .....mm #

The Tenderer shall state the minimum clear height within the cavity.

#### **3.03 Grid**

The dimensional grid of the supporting structure (pedestals) shall be ....mm x ....mm. # (Normally 600mm x 600mm) and shall be set out to avoid, if possible, cut perimeter panels which are less than 300mm wide. Alternatively, oversize perimeter panels may be offered.

The Tenderer shall state if fixing points are required to perimeter walls and columns for the attachment of any supporting structures.

Details of the proposed position of the pedestals are required. \*

The positions of the pedestals shall be marked on the sub-floor before the installation commences to enable services to be installed prior to the installation of the access floor. \*

### 3.04 Fit and Perimeter Sealing

The allowable gap of up to 15mm around perimeters and columns shall be covered by a skirting trim and/or sealed # to minimise conditioned air leakage. Details of the proposed skirting trim and/or sealing method are required.

### 3.05 Panel Location

Each panel shall be positively located on its respective pedestals so that they do not rely on neighbouring panels for lateral restraint. The method shall provide a controlled gap to prevent edges from rubbing and squeaking when the system is subjected to pedestrian and transient rolling loads. The gap between panels shall not exceed 1.00mm.

### 3.06 Panel Removal

It is preferable that the system is designed to allow any panel to be lifted and replaced from any one edge without causing damage to the lifted panel or any adjacent panels, locating devices, pedestals or pedestal fixing. The system shall be designed so that panels may be lifted and replaced safely with the appropriate lifting device. The weight of each panel shall not exceed 20kg.

### 3.07 Air Leakage Rate \*

The under floor space will be used as an plenum for the SUPPLY/RETURN # of conditioned air.

The maximum design pressure shall be .....Pa . #

The maximum void leakage rate at this pressure shall be...l/s.m<sup>2</sup>. #

The maximum floor leakage rate at this pressure shall be ....l/s.m<sup>2</sup>. #

The Tenderer shall confirm that the system offered would comply with this requirement and provide details of the sealing methods proposed.

The Floor Contractor shall arrange for an accredited specialist test authority to carry out an on site air leakage test. \*



**Note! A suitable test method is detailed in Appendix B of ❖B.I.T.S.❖ Technical Guidance.**

3.08 Air Control Cavity Barriers. \*

Air control cavity barriers shall be installed where shown on Drawing No... and shall be effectively sealed to the sub floor and to the underside of the access floor system. Design details of the barriers are required.

## 4.00 **STRUCTURAL REQUIREMENTS**

4.01 Pedestal Fixing

Specific attention is drawn to Clause P4.06 of the PSA Specification and the pedestal fixing tests to prove the proposed fixing of the pedestals to the particular sub floor **before** the general installation of the floor system is commenced. The proving tests shall be carried out by the Floor Contractor on sample pedestals fixed on randomly selected areas of the sub floor throughout the building.

4.02 Structural Sub Floor

Specific attention is drawn to the design and composition of the structural sub floor. Details of which are as follows:.....# The Tenderer shall confirm that the proposed structure and finish of the sub floor is suitable for the installation of the floor system offered including the proposed method of fixing the pedestals. The Tenderer shall carry out an inspection of the sub floor to confirm that it is suitable before the installation of the floor system commences.

4.03 Mechanical Pedestal Fixings

If, after testing it is found that mechanical fixings are required in addition to adhesives, there shall be at least three fixings equally spaced around the pedestal base through preformed holes. Details of the proposed pedestal fixing method are required. Cost for additional mechanical fixing shall be separately identified.

#### 4.04 Quality Control Fixing Tests

Specific attention is drawn to the requirement in PSA Specification Clause P4.06 that the Site Quality Control Pedestal Fixing Tests T42.00 shall be carried out on randomly selected pedestals at the rate of 0.5% of the total number of pedestals installed on each area as the installation proceeds. A success rate of at least 95%/100% # is required.

The tests are to be witnessed by a representative of the Client and a suitable test report issued.\*

#### 4.05 Stringers

If stringers are proposed for additional structural support or air leakage control they shall be CLIP IN/SCREWED CONNECTION # to the pedestal heads.

#### 4.06 Panel or Stringer Screw Fixings

Where screw fixings are proposed for panels or stringers, the screws shall be machine captive type.

#### 4.07 Ramps\*

Ramps are to be provided where shown on the drawings and the structural characteristics shall be at least equal to that for the main floor system. The slope of the ramps shall not exceed 5 degrees.

#### 4.08 Steps or Stairs\*

Steps/stairs # are to be provided where shown on the drawings and the structural characteristics shall be at least equal to that of the main floor system. Steps and stairs shall be designed and installed in accordance with the current Building Regulations.

#### 4.09 Balustrades \*

Balustrades shall be provided where shown on the drawings and shall be designed and installed in accordance with structural and safety requirements of BS 6180.

4.10 Perforated Panels for Air Distribution\*

Perforated panels are to be provided where shown on Drawing No... and shall be to the same structural grade as that of the main floor system.

The panels shall be designed to handle. ....litres /second # with a .....Pascal pressure difference #.

Control dampers ARE/ARE NOT # required.

4.11 Other Air Terminal Devices \*

Air terminal devices are shown and detailed on Drawing No..... and shall comply with the structural requirements detailed in BS EN13264:2001. The structural grade shall be as for the main floor system.

The terminal devices shall be designed to handle... ..litres/second # with a ..... Pascal pressure difference. #

Control dampers ARE/ARE NOT # required.

**5.00 HYGROTHERMAL REQUIREMENTS**

5.01 Environmental Conditions

The expected working environmental conditions will be:

Temperature .....°C ±      Humidity .....%RH ±

This information does not relieve the Tenderer of the responsibility to supply a floor system that will comply with the requirements of the PSA Specification Clauses P5.01 and the following 'deemed to satisfy' Clause 5.02.

## **6.0 FIRE AND SAFETY**

### **6.01 Panel Cladding**

If panels offered are constructed with a combustible core material, they shall be completely clad in steel. A non-combustible material to BS 476 Part 8: Class 1 Spread of flame shall protect cut edges of such panels. The Tenderer shall provide details of the cut edge protection, e.g. Aluminium foil.

### **6.02 Cavity Barriers and Fire Stops**

Cavity barriers and fire stops shall be designed and installed to meet the requirements of the current Building Regulation and/or where shown on the Drawings. If fibrous materials are proposed all surfaces are to be sealed so that no loose fibres will contaminate the floor void.

### **6.03 Thermal Insulation**

Information of thermal properties ARE/ARE NOT # required.

## **7.00 TRANSMISSION OF SOUND**

Details of tests indicating the transmission of airborne sound performance detailed in PSA Specification Clause P7.00 ARE/ARE NOT # required.

## **8.00 FLOOR COVERING**

### **8.01 Loose Lay Carpets\***

The floor covering will consist of loose lay carpet tiles (.....description) and will be laid by others on the finished access floor system. The Contractor responsible for the floor covering will be required to liaise with the Tenderer to ensure that any proposed method of carpet location i.e. tackifier, double sided tape etc, will not adversely affect the protective surface of the floor panels or restrict the removal and replacement of the floor panels.

## 8.02 Factory Bonded Floor Covering\*

The floor finish shall be: (FINISH TO BE FULLY DESCRIBED) # shall be factory bonded to each panel with a suitable adhesive and shall not peel, separate, raise or crack when subjected to pedestrian activity, light wheeled vehicles, rolling transient movement of equipment or when panels are lifted by means of the lifting device supplied by the Tenderer. The bond shall remain effective throughout the design life of covering material. The covering shall not fray, chip, crack or deteriorate at the edges of panels, cut panels, cable openings, electrical floor boxes etc., when subjected to normal in service conditions.

Any protective edge strips shall comply with PSA Specification Clause P3.12.

The tolerance on the thickness of the covering shall be such that there is no noticeable difference in level or cause a tripping hazard when the panels are in position.

**Delete** PSA Specification Clauses P8.01, P8.02, P8.03 and P8.07.

## 9.00 **ELECTRICAL REQUIREMENTS**

### 9.01 Electrostatic Properties\*

The electrostatic properties of the floor system shall be as described in the PSA Specification Clause P9.01 and tested (PSA Test T.43.00) with the bonded or loose laid floor covering in position.

### 9.02 Earth Continuity

Earth continuity tests, in accordance with the method described in the PSA Specification Test T44.00, shall be carried out on at least four positions on each floor level or area at a maximum distance from the main building earth point. The resistance shall be measured from all metallic components at each position i.e. Panel top, panel bottom, pedestals (all component parts), stringers, bridging structures etc.

**9.03**      Supplementary bonding

The Electrical Contractor will carry out supplementary bonding to electrical equipment and the connections from the floor system to the main building earth. The Floor Contractor shall provide suitable earth connection points on the floor system. Details of the connections shall be provided.

**10.00**      **INSTALLATION****10.01**      Work Programme

The installation of the floor system shall not commence until the building is fully weather proof and the structural sub floor slab is dry. The condition of the sub floor slab shall be as defined and measured in accordance with BS 8203: 1996: Code of Practice: Installation of Resilient Floor Coverings: Clause 3.14. The Floor Contractor should be aware that the building programme might require the floor system to be installed in an unheated building during the winter months and shall inform the Main Contractor of any unacceptable environmental conditions.

**10.02**      Sample Area

In order to establish the standard of installation, the Floor Contractor shall erect a sample area that will become part of the final installation. The area shall consist of at least 36 panels with one edge along a perimeter and if possible include a threshold detail with cut panels as necessary.

Four pedestal fixing tests to PSA T42.00 and relative indicative electric tests shall be carried out on the sample area by the Floor Contractor and witnessed by the Client's representative. Further installation shall not proceed until the Client is satisfied with the standard of workmanship.

**10.03**      Protection of Works

The Flooring Contractor shall provide temporary barriers to protect the floor system as the installation proceeds and until the pedestal-fixing adhesive has had time to cure (approx 48 hours) to prevent access and damage by others.

10.04 Protection of Completed Works \*

The Floor Contractor shall supply and lay suitable protective coverings to the completed floor system to prevent damage by following trades using the floor as a working platform for subsequent building operations.

10.05 Panel Lifters

The Floor Contractor shall supply.....No. suitable panel lifting devices to the Client on completion of the work.

10.06 Spares

The Floor Contractor shall supply the following spare components to the Client at the completion of the works: ...No. panels, ...No. pedestals, ...No. stringers, ...litres of adhesive.

**11.00 TESTING**

11.01 Test Evidence

The Tenderer shall submit a copy of **recent full test reports** as required in the PSA Specification Clause P14.00. A specialist independent test laboratory (Nationally Accredited in accordance with ISO/IEC 17025), such as:-

**BUILDING INVESTIGATION AND TESTING SERVICES**

**Telephone 00 44 (0) 1737 765432 Fax 00 44 (0)1737 765431**

Email bitstlab@btconnect.com Website www.bits-testlab.co.uk

shall carry out the tests to provide an indication that the system offered would comply with the relevant requirements of the PSA Specification and this particular specification.

The test reports shall contain full details of the manufacture and specifications of the materials used in the manufacture of the floor system. Systems that have been modified in any respect will not be accepted until further tests have been carried out.

## 11.02 Validation Tests

The Tenderer shall include for validation tests to be carried out by a specialist independent test laboratory (Nationally Accredited in accordance with ISO/IEC 17025) on randomly selected panels and pedestals selected in batches when they are delivered to site.

The total number of sample panels shall be 0.5% /1.0% # of the total number of panels to be installed with a minimum of fifteen together with four pedestals per panel and sufficient fixing adhesive selected by the test authority/Client's representative. #

The validation tests will verify that the system will comply with the specified structural performance requirements and shall consist of:

- a. PSA Test T8.00: .....\* tests of 5 minutes duration on positions selected by the test authority and 30% of those showing the greatest deflection shall be subjected to the full 24 hour test on the positions selected by the test authority followed by the safety factor test T11.00.
- b. PSA Test T8a.00:.....\* tests of five minutes duration followed by the full 24 hour test and safety factor test T11.00 if considered necessary by the test authority. The cut panel shall be mounted on pedestals and/or supports proposed by the Tenderer.
- c. PSA Test T16.00 on three sets of pedestals.

If any of the foregoing tests fail to produce satisfactory results, then five further samples shall be selected from that particular batch and shall be subjected to the relevant tests. The batch will only be accepted if all five samples pass.

The Test Authority shall report directly to the Client's representative and the floor installation will not be allowed to commence or continue until satisfactory results are produced.



**11.03**      Certificates of Testing

Certificates detailing the results of all validation and site pedestal fixing and electrical tests shall be submitted to the Client's representative and become part of the handover documents.

**12.00**      **QUALITY ASSURANCE**

Manufacturers, suppliers and installers shall operate a Quality Assurance scheme in accordance with BS EN ISO 9000 with production and installation requirements certified by an independent third party assessor. The Tenderer shall submit a Quality Assurance Plan that shall clearly define the quality control related to the manufacturing process together with a site inspection programme.

**13.00**      **INFORMATION REQUIRED WITH THE TENDER****13.01**      PSA Schedule of Performance Offer

The Tenderer shall complete Schedule of Performance Offer in accordance with the format and content defined in the PSA Specification.

**13.02**      Summary of Other Information Required where Relevant

1. All relevant test reports in accordance with the PSA Specification
2. Quality assurance plans – PPS Clause 12.00
3. Details of sub floor sealant – PSA Clause 13.03
4. Details of panel screw fixing \*– PPS Clause 4.06
5. Details of stringer fixing \* - PPS Clause 4.06
6. Details of ALL accessories – PPS Clause 2.02
7. Clear height above sub floor - PPS Clause 3.03
8. Proposed pedestal positions and grid layout – PPS Clause 3.03
9. Requirements for fixings at perimeter walls, columns and thresholds etc. - PPS Clause 3.03
10. Details of sealing at perimeters, columns and thresholds – PPS Clause 3.04
11. Confirmation that the composition and finish of the sub floor is acceptable

and any adverse environmental conditions – PPS Clause 4.02

12. Details of ramps \* - PPS Clause 4.07
13. Details of steps or stairs \* – PPS Clause 4.08
14. Details balustrades \* – PPS Clause 4.09
15. Details of perforated panels including test reports \*- PPS Clause 4.09
16. Details of air terminal devices including test reports \*– PPS Clause 4.10
17. Details of cut panel support arrangement – PPS Clause 3.03
18. Details of panel cut edge, fire and moisture protection – PPS Clause 6.01
19. Details of transmission of airborne sound \*– PPS Clause 7.00
20. Details of fire cavity barriers – PPS Clause 6.02
21. Details of air control cavity barriers \* - PPS Clause 3.08
22. Details of electrical earth connections – PPS Clause 9.03
23. Details of factory bonded floor finishes \*- PPS Clause 8.02

#### **14.00 SAMPLES**

Samples of panels, pedestals, stringers and bonded floor coverings are required with the tender and shall be delivered to.....#

### **PPS1.02 MODEL SPECIFICATION FOR FULL ACCESS FLOORS USING THE EUROPEAN STANDARD BS EN 12825: 2001**

A Particular Project Specification should be issued for the raised access floor contract and may be based on this model. A considerable number of performance requirements are **not** included in BS EN 12825:2001 and Clauses in the PSA Specification MOB PF2 PS/SPU: March 1992 have been used to supplement those requirements. Specifiers should also refer to the relevant sections of ❖B.I.T.S.❖ Technical Guidance.

## 1.00 GENERAL

This Particular Specification relates to the supply and fix of a complete RAISED ACCESS FLOOR system, which is to be installed in .....#

The Raised Access Floor, hereafter termed as the Floor System shall be designed, manufactured and installed in accordance with the European Standard Specification BS EN 12825:2001, hereafter referred to as the BS EN Specification, supplemented by certain requirements contained in the Property Services Agency Performance Specification: Platform Floors (Raised Access Floors) MOB PF2 PS/SPU: March 1992, hereafter referred to as the PSA Specification and as modified and detailed in this Particular Project Specification. Any statutory regulations or requirements, which are more restrictive, shall have precedence. The term Authority contained in the PSA Specification shall, in this instance, be taken to mean Architect/Main Contractor/ Management Contractor/ Client/ or other. #

The installation shall comprise all materials to complete the floor system including pedestals, panels and where appropriate, bonded floor covering finishes, stringers, bridging or additional support structures, cavity barriers, ramps, steps, skirting trims, edge sealing, railings, balustrades, air terminal devices, electrical and data outlet boxes, cable entries, sub floor sealing, electrical bonding, protective covering etc.

### 1.01 The PSA Specification

Many performance requirements necessary for a successful installation are not included in the BS EN Specification, therefore, in addition, the Floor System shall comply with the following performance requirements detailed in the PSA Specification:

P0.00 INTRODUCTION

P0.01 Classification

P0.02 Definitions

P0.03 Evaluation of systems

P0.04 Quality Assurance

P1.00 IDENTIFICATION

P1.01 Type and Quality (Where applicable to the PSA Specification)

P1.02 Purpose and use

P1.03 Related documentation

P2.00 DESCRIPTION

P2.01 Types

P2.03 Constituent materials

P2.04 Fixings and fastenings

P2.05 Accessories

P2.06 Floor coverings

P2.07 Design and manufacture

P3.00 DIMENSIONAL REQUIREMENTS

P3.01 Size and dimensional framework

P3.04 Damage to services

P3.05 Shape: Grid: Dimension: Weight. Full access floor only

P3.07 Overall levels

P3.08 Panel levels

P3.12 Panel edge strip

P3.13 Panel interchangeability, installation and removal

P3.14 Air leakage rate

P4.00 STRUCTURAL REQUIREMENTS

P4.05 Pedestrian dynamic loading

P4.08 Perimeter details

P4.09 Bridging structures

P4.10 Safety of the system when panels are removed

P4.11 Weight of the system

P4.13 Installation of heavy equipment

P5.00 HYGROTHERMAL REQUIREMENTS

P5.01 Moisture and thermal movement

P6.00 FIRE AND SAFETY REQUIREMENTS

P6.01 General

P6.02 Spread of flame

P6.03 Panel cladding

P6.05 Structural materials

P6.06 Cavity barriers

P6.07 Perimeter and bridging structure details

P6.08 Thermal properties

P7.00 TRANSMISSION OF SOUND

P8.00 FLOOR COVERINGS

P8.05 Fitting and installation

P8.06 Cleaning

P9.00 ELECTRICAL REQUIREMENTS

P9.01 Electrostatic properties

P9.02 Equipotential bonding

P9.03 Earthing and bonding

P10.00 SIDE EFFECTS

P10.01 Fungi, moulds and insects

P10.02 Toxicity

P10.03 Odour

P10.04 Vermin

P10.05 Creation of dust and harmful contaminants

P11.00 DURABILITY

P11.01 Life of components

P11.02 Protective finishes

P12.00 TRANSPORTATION AND STORAGE ON SITE

**P13.00 SUPPLY AND INSTALLATION**

P13.01 General

P13.02 Working time

P13.03 Sealing

P13.04 Fire stopping

P13.05 Cleaning the void

P13.06 Protection of completed work

**2.00 DESCRIPTION****2.01 Type**

The system shall be a FULL access as defined in the PSA specification and as described in the BS EN Specification: 1. Scope.

**2.02 Structural Classification**

The structural classification of the system shall be as defined in the BS EN specification as follows:

Table 1 – Class of elements: Class 2/ Class 3/ Class 4/ Class 5/ Class 6 #  
Class of safety factor – 3.0

Table 2 – Class of deflection: Class A (2.50mm)

The system shall be designed and tested in accordance with the methods detailed in the BS EN specification including: 5.2 Static load, 5.3.1 Pedestal vertical load, 5.4 Permanent deformation on element, 5.5.1 Hard body impact, 5.5.2 Soft body impact.

**2.03 Dimensional Deviation Classification**

The dimensional deviation of the panels defined in the BS EN specification Table 3 shall not exceed those shown for Class 2.

The sample panels shall be selected and tested in accordance with methods detailed in the BS EN Specification.

2.04 Type of accommodation and suitability of use

The floor system will be installed in accommodation that will be used as General offices/offices with corridors/public areas/data preparation areas/education accommodation/ dealer rooms/control rooms/data processing machine rooms/computer rooms/or as specified. #

The Tenderer is required to confirm that the floor system offered would be suitable and fit for purpose in this type of accommodation throughout its declared design life.

2.05 Accessories

The following accessories are required. ....#

Located where shown on Drawing Nos. ....#

**3.00 DIMENSIONAL REQUIREMENTS**

3.01 Area

The system shall be located within the areas shown on Drawing No.....#

3.02 Height

The nominal floor height above the structural sub-floor shall be.....mm #

The Main Contractor will provide the actual finished floor height before the installation commences. The Tenderer must be satisfied that this requirement is feasible and that the system offered is capable of being installed and adjusted within the tolerances of the sub-floor and the finished floor level of the raised access floor. The tolerance on the finished surface of the sub-floor has been specified as +/- .....mm. The Tenderer shall state the minimum clear height within the cavity.

3.03 Grid

The dimensional grid of the supporting structure (pedestals) shall be ....mm x. ....mm. # (Normally 600mm x600mm) and shall be set out to avoid, if possible, cut perimeter panels which are less that 300mm wide. Alternatively, oversize perimeter panels may be offered. The Tenderer shall state if fixing points are

required to perimeter walls and columns for the attachment of any supporting structures. Details of the proposed position of the pedestals are required. \*

The positions of the pedestals shall be marked on the sub-floor before the installation commences to enable services to be installed prior to the installation of the access floor.\*

### 3.04 Fit and Perimeter Sealing

The allowable gap of up to 15mm around perimeters and columns shall be covered by a skirting trim and/or sealed # to minimise conditioned air leakage. Details of the proposed skirting trim and/or sealing method are required.

### 3.05 Panel Location

Each panel shall be positively located on its respective pedestals so that they do not rely on neighbouring panels for lateral restraint. The method shall provide a controlled gap to prevent edges from rubbing and squeaking when the system is subjected to pedestrian and transient loads. The gap between panels shall not exceed 1.00mm.

### 3.06 Panel Removal

It is preferable that the system is designed to allow any panel to be lifted and replaced from any one edge without causing damage to the lifted panel, adjacent panels, locating devices, pedestals or pedestal fixing. The system shall be designed so that panels may be lifted and replaced safely with the appropriate lifting device. The weight of each panel shall not exceed 20kg.

### 3.07 Air Leakage Rate \*

The under floor space will be used as a plenum for the SUPPLY/RETURN # of conditioned air.

The maximum design pressure shall be .....Pa .#

The maximum void leakage rate at this pressure shall be...l/s.m<sup>2</sup>. #

The maximum floor leakage rate at this pressure shall be ...l/s.m<sup>2</sup>. #



The Tenderer shall confirm that the system offered would comply with this requirement and provide details of the sealing methods proposed. The Floor Contactor shall arrange for an accredited specialist test authority to carry out an on site air leakage test. \* **Note: A suitable test method is detailed in Appendix B of ❖B.I.T.S.❖ Technical guidance.**

3.08 Air Control Cavity Barriers. \*

Air control cavity barriers shall be installed where shown on Drawing No... and shall be effectively sealed to the sub floor and to the underside of the access floor system. Design details of the barriers are required.

## 4.00 **STRUCTURAL REQUIREMENTS**

### 4.01 Load Class

The load class of the system shall be in accordance with BS EN 12825:2001, Tables 1 and 2, with a safety factor of 3 as detailed in Clause 2.02 of this particular specification. The system shall be tested in accordance with the test methods detailed in the BS EN Specification. **The system shall also comply with the following additional structural requirements:**

### 4.02 Creep

Any deflection or deviation shall be less than 2.50mm and shall be stable after the static working load over 25mm sq. (as defined in the BS EN Specification) has been applied for 24 hours on the weakest test point. Stability is deemed to be a maximum of 0.02mm difference in deflection or deviation between 23 and 24 hours after the application of the load. This requirement shall also apply to perimeter cut panel edges. The test methods T8.00 and T8a.00 detailed in the PSA Specification shall be used to determine compliance with this requirement.

### 4.03 Pedestrian Dynamic Loading \*

The system shall comply with the pedestrian dynamic loading detailed in the PSA Specification Clause P4.05 except that any reference to partial access floors shall be omitted and the subsequent point load test shall be as detailed in

Clause 4.02 above.

#### 4.04 Pedestal Structure

Pedestals shall be structurally sound and have a base area of not less than 10,000mm<sup>2</sup> designed to transmit the particular static loads over the full area to the sub floor when fixed as proposed by the Tenderer and shall not be permanently deformed by more than 1mm per 100mm in height or 1mm if the pedestal is less than 100mm high when subjected to steady horizontal moment of 90Nm within the range of applied loads from 9kg for pedestal heights of 1.00m and above to 50kg maximum for pedestal heights below 185mm. The load shall be applied to the uppermost part of the pedestal for 5 minutes. The pedestal fixing shall not fail whilst being subjected to the load. The test shall be carried out in accordance with the method described in PSA Test P15.00.

In addition to the BS EN specified vertical load requirement of 4 times the working load applied to the centre of the pedestal head, the pedestal shall sustain 3 times the working load applied through a panel over one quadrant of the head when tested in accordance with the method described in PSA Test T16.00.

#### 4.04 Pedestal Fixing

Pedestals shall be plumb and may be fixed to the sub floor by adhesives and shall not become detached or damaged when subjected to the PSA Site Quality Control Test T42.00. Proving tests shall be carried out by the Floor Contractor on sample pedestals fixed in randomly selected areas throughout the site with a success rate of 95/100%. If the adhesive fixing fails, additional mechanical fixings shall be used and samples shall be subjected to retests. At least three equally spaced mechanical fixings through preformed holes in the base are required. The installation of the system will not be allowed to commence until the pedestal fixings have been proved to be satisfactory.

In addition to the forgoing tests, the Floor Contractor shall arrange to have the PSA site quality control pedestal fixing tests T42.00 as the installation

proceeds. Pedestals shall be selected at random, at the rate of 0.5% of the number of pedestals in each area and/or floor level and when subjected to the tests neither the pedestal structure or the fixing shall fail. A success rate of at least 95%/100% # is required.

The tests shall be witnessed by a representative of the Client and a test report issued. \*

4.06 Structural Sub Floor

Specific attention is drawn to the design and composition of the structural sub floor. Details of which are as follows:.....#

The Tenderer shall confirm that the proposed structure, reinforcements, and finish of the sub floor is suitable for the installation of the floor system offered including the proposed method of fixing the pedestals. The Tenderer shall carry out an inspection of the sub floor to confirm that it is suitable before the installation of the floor system commences.

4.07 Stringers

If stringers are proposed for additional structural support or air leakage control they shall be CLIP IN/SCREWED CONNECTION # to the pedestal heads.

4.08 Panel or Stringer Screw Fixings

Where screw fixings are proposed for panels or stringers, the screws shall be machine captive type.

4.09 Ramps\*

Ramps are to be provided where shown on the drawings and the structural characteristics shall be at least equal to that for the main floor system. The slope of the ramps shall not exceed 5 degrees.

4.10 Steps or Stairs\*

Steps/stairs # are to be provided where shown on the drawings and the

structural characteristics shall be at least equal to that of the main floor system. Steps and stairs shall be designed in accordance with the current Building Regulations.

#### 4.11 Balustrades \*

Balustrades shall be provided where shown on the drawings and shall be designed and installed in accordance structural and safety requirements of BS 6180.

#### 4.12 Perforated Panels for Air Distribution \*

Perforated panels are to be provided where shown on the drawing with the same structural grade as that of the main floor system.

The panels shall be designed to handle. ....litres /second # with a .....Pascal pressure difference. #

Control dampers ARE/ARE NOT # required.

#### 4.13 Air Terminal Devices \*

Air terminal devices shall comply with the structural requirements detailed in BS EN 13264: 2001. The structural grade shall be as for the main floor system.

The terminal devices shall be designed to handle.....litres/second # with a ..... Pascal pressure difference. # Control dampers ARE/ARE NOT # required

## 5.00 **HYGROTHERMAL REQUIREMENTS**

### 5.01 Environmental Conditions

The expected working environmental conditions will be:

Temperature .....°C +/- Humidity .....%RH+/-

This information does not relieve the Tenderer of the responsibility to supply a floor system that will comply with the requirements of the PSA Specification Clauses P5.01 and the following 'deemed to satisfy' Clause 5.02.

**5.02**      Deemed to Satisfy

The system shall be deemed to satisfy in respect of the hygrothermal requirements if sample panels:-

- a. Do not exceed the dimensional deviations identified in Table 3 of BS EN Specification.
- b. The materials or components to not delaminate or deteriorate.
- c. Comply with the requirements of Clause 4.02 of this particular specification, after such samples have been subjected to the temperature and humidity conditions stated in PSA Test method T17.03 and T18.03.

**6.00**      **FIRE AND SAFETY****6.01**      Panel Cladding

If panels offered are constructed with a combustible core material, they shall be completely clad in steel. A non-combustible material to BS 476 Part 8 Class 1 Spread of flame shall protect cut edges of such panels. The Tenderer shall provide details of the cut edge protection.

**6.02**      Cavity Barriers and Fire Stops

Cavity barriers and fire stops are to be designed and installed to meet the requirements of the current Building Regulation and/or where shown on the Drawings. If fibrous materials are proposed all surfaces are to be sealed so that no loose fibres will contaminate the floor void.

**6.03**      Thermal Insulation

Information of thermal properties ARE/ARE NOT # required.

**7.00**      **TRANSMISSION OF SOUND**

Details of tests indicating the transmission of airborne sound performance detailed in PSA Specification Clause P7.00 or BS EN Specification clause 4.11 ARE/ARE NOT # required.

## **8.00 FLOOR COVERING**

### **8.01 Loose Lay Carpets\***

The floor covering will consist of loose lay carpet tiles (...description) and will be laid by others on the finished access floor system. The Contractor responsible for the floor covering will be required to liaise with the Tenderer to ensure that any proposed method of carpet location i.e. tackifier, double sided tape etc, will not adversely affect the protective surface of the floor panels or restrict the removal and replacement of the floor panels.

### **8.02 Factory Bonded Floor Covering\***

The floor finish shall be: (FINISH TO BE FULLY DESCRIBED) # shall be factory bonded to each panel with a suitable adhesive and shall not peel, separate, raise or crack when subjected to pedestrian activity, light wheeled vehicles, rolling transient movement of equipment or when panels are lifted by means of the lifting device supplied by the Tenderer. The bond shall remain effective throughout the design life of covering material.

The covering shall not fray, chip, crack or deteriorate at the edges of panels, cut panels, cable openings, electrical floor boxes etc., when subjected to normal in service conditions. Any protective edge strips shall comply with PSA Specification Clause P3.12.

The tolerance on the thickness of the covering shall be such that there is no noticeable difference in level or cause a tripping hazard when the panels are in position. **Delete** PSA Specification Clauses P8.01, P8.02, P8.03 and P8.07

## **9.00 ELECTRICAL REQUIREMENTS**

### **9.01 Electrostatic Properties\***

The electrostatic properties of the floor system shall be as described in the PSA Specification Clause P9.01 and tested (PSA Test T.43.00) with the bonded or loose laid floor covering in position.

**9.02**      Earth Continuity

Earth continuity tests in accordance with the method described in the PSA Specification Test T44.00 shall be carried out on at least four positions on each floor level or area at a maximum distance from the main building earth point. The resistance shall be measured from all metallic components at each position ie: Panel top, panel bottom, pedestals (all component parts), stringers, bridging structures etc.

**9.03**      Supplementary Bonding

The Electrical Contractor will carry out supplementary bonding to electrical equipment and the connections from the floor system to the main building earth. The Floor Contractor shall provide suitable earth connection points on the floor system. Details of the connections shall be provided.

**10.0**      **INSTALLATION****10.01**      Work Programme

The installation of the floor system shall not commence until the building is fully weather proof and the structural sub floor slab is dry. The condition of the sub floor slab shall be as defined and measured in accordance with BS 8203: Code of Practice: Installation of Resilient Floor Coverings: Clause 3.14.

The Floor Contractor should be aware that the building programme might require the floor system to be installed in an unheated building during the winter months and shall inform the Main Contractor of any unacceptable installation environmental conditions.

**10.02**      Sample Area

In order to establish the standard of installation, the Floor Contractor shall erect a sample area that will become part of the final installation. The area shall consist of at least 36 panels with one edge along a perimeter and if possible include a threshold detail with cut panels as necessary.

Four pedestal fixing tests to PSA T42.00 and relative indicative electric tests

shall be carried out on the sample area by the Floor Contractor and witnessed by the Client's representative.

Further installation shall not proceed until the Client is satisfied with the standard of workmanship.

#### 10.03 Protection of Works

The Flooring Contractor shall provide temporary barriers to protect the floor system as the installation proceeds and until the pedestal-fixing adhesive has had time to cure (approx 48 hours) to prevent access and damage by others.

#### 10.04 Protection of Completed Works \*

The Floor Contractor shall supply and lay suitable protective coverings to the completed floor system to prevent damage by following trades using the floor as a working platform for subsequent building operations.

#### 10.05 Panel Lifting Devices

The Floor Contractor shall supply ..... No. suitable panel lifting devices to the Client on completion of the work.

#### 10.06 Spares

The Floor Contractor shall supply the following spare components to the Client at the completion of the works: .....No. panels, .....No. pedestals, .....No. stringers, .....litres of adhesive.

### **11.00 TESTING**

#### 11.01 Test Evidence

The Tenderer shall submit a copy of a recent Initial Type Testing report in accordance with the BS EN Specification and recent test reports of the relevant PSA performance requirements detailed in this Particular Project Specification. Tests in accordance with the method described in the PSA Specification shall be carried out by a specialist independent test laboratory (Nationally Accredited in accordance with ISO/IEC 17025) and provide an indication that the system



offered would comply with the relevant requirements of the PSA Specification and this particular specification.

The BS EN and PSA test reports shall contain full details of the manufacture and specifications of the materials used in the manufacture of the floor system. Systems that have been modified in any respect will not be accepted until further tests have been carried out.

#### 11.02 Validation Tests

The Tenderer shall include for validation tests to be carried out by a specialist independent test laboratory (Nationally Accredited in accordance with ISO/IEC 17025) such as:-

#### **BUILDING INVESTIGATION AND TESTING SERVICES**

**Telephone 00 44 (0) 1737 765432 Fax 00 44 (0)1737 765431**

Email bitstlab@btconnect.com Website www.bits-testlab.co.uk

on randomly selected panels and pedestals selected in batches when they are delivered to site.

The number of sample panels shall be 0.5% /1.0% # of the total number of panels to be installed with a minimum of fifteen together with four pedestals per panel and sufficient fixing adhesive shall be selected by the Test Authority/Client's representative. #

The validation tests will verify that the system will comply with the specified structural creep performance requirements and offset loads or pedestals.

- a. PSA Test T8.00: .....\* tests of 5 minutes duration on positions selected by the test authority and 30% of those showing the greatest deflection shall be subjected to the full 24 hour test on the positions selected by the test authority followed by the safety factor test T11.00.
- b. PSA Test T8a.00:..... \* tests of five minutes duration followed by the full 24 hour test and safety factor test T11.00 if considered necessary by the test

authority. The cut panel shall be mounted on pedestals and/or supports proposed by the Tenderer and the load applied to the weakest point of the cut edge.

- c. BS EN Test 5.3.1 and PSA Test T16.00 on three sets of pedestals.

The 25mm<sup>2</sup> static working load applied to tests a. and b. shall be as defined in the BS EN Specification and declared by the manufacturer.

If any of the foregoing tests fail to produce satisfactory results, then five further samples shall be selected from that particular batch and shall be subjected to the relevant tests. The batch will only be accepted if all five samples pass.

The Test Authority shall report directly to the Client's representative and the floor installation will not be allowed to commence until satisfactory results are produced.

**NOTE! The tests a. and b. are required to examine the creep properties of the system.**

#### 11.03 Certificates of Testing

Certificates detailing the results of all validation and site pedestal fixing and electrical tests shall be submitted to the Client's representative and become part of the handover documents.

### 12.00 **QUALITY ASSURANCE**

Manufacturers, suppliers and installers shall operate a Quality Assurance scheme in accordance with BS EN ISO 9000 with production and installation requirements certified by an independent third party assessor.

The Tenderer shall submit a Quality Assurance Plan that shall clearly define the quality control related to the manufacturing process together with a site inspection programme.

**13.00 INFORMATION REQUIRED WITH THE TENDER****13.01 PSA Schedule of Performance Offer**

The Tenderer shall complete Schedule of Performance Offer in accordance with the format and content defined in the PSA Specification.

**13.02 Summary of Other Information Required where Relevant**

1. All relevant test reports in accordance with the PSA Specification
2. Quality assurance plans – PPS Clause 12.00
3. Details of sub floor sealant – PSA Clause 13.03
4. Details of panel screw fixing \*– PPS Clause 4.06
5. Details of stringer fixing\* -PPS Clause 4.06
6. Details of ALL accessories – PPS Clause 2.02
7. Clear height above sub floor -PPS Clause 3.03
8. Proposed pedestal positions and grid layout – PPS Clause 3.03
9. Requirements for fixings at perimeter walls, columns and thresholds etc.  
- PPS Clause 3.03
10. Detail of sealing at perimeters, columns and thresholds – PPS Clause 3.04
11. Confirmation that the composition and finish of the sub floor is acceptable –  
PPS Clause 4.02
12. Details of ramps - PPS Clause 4.09
13. Details of steps or stairs – PPS Clause 4.10
14. Details of balustrades – PPS Clause 4.11
15. Details of perforated panels including test reports - PPS Clause 4.12
16. Details of air terminal devices including test reports – PPS Clause 4.13
17. Details of cut panel support arrangement – PPS Clause 3.03
18. Details of panel cut edge fire and moisture protection – PPS Clause 6.01
19. Details of transmission of airborne sound – PPS Clause 7.00
20. Details of fire cavity barriers – PPS Clause 6.02
21. Details of air control cavity barriers -PPS Clause 3.09
22. Details of electrical earth connections – PPS Clause 9.03
23. Details of factory bonded floor finishes - PPS Clause 8.02

**14.00 SAMPLES**

Samples of panels, pedestals, stringers and bonded floor coverings are required with the tender and shall be delivered to.....#

## **APPENDIX A:**

# **ROLLING LOAD TEST**

## **APPENDIX A:**

### **ROLLING LOAD TEST**

#### **A1.00 General**

There are no specific rolling load performance requirements or acceptance criteria for raised access floor systems, therefore, the object of the following test regime is to enable purchasers to make comparisons between various system. It will also provide an **indication** of the durability and wearing characteristics of the system when it is subjected to specific dynamic rolling loads.

An accredited independent test laboratory specialising in raised access floors shall carry out the tests.

#### **A1.01 Test Specimen**

Eight full size panels and two half panels with cut edges with a sufficient number of pedestals and supplementary perimeter supports to mount the panels on the rolling load test rig. The height of the pedestals shall be to suit the test rig but shall be not less than 150mm.

#### **A1.02 Mounting for Test**

The eight full panels and two cut panels shall be mounted in line on pedestals in the test rig on either side of a solid surface that simulates a threshold. The cut edges of the half panels shall abut the solid threshold and shall be supported at this interface by the method proposed by the manufacturer. The pedestals shall be fixed to the bed of the test rig by a suitable adhesive. The line of panels may be restrained at each end by adjustable stops.

#### **A1.03 The Test Apparatus**

The rolling test load shall consist of a powered carriage arranged to travel forwards and backwards along the centre line of the panels or along the weakest position, with one or two 150mm diameter x 40mm wide nylon wheels mounted centrally to the underside at 800mm centres. The test load shall be applied to each wheel by means of means of a calibrated pneumatic ram. An air accumulator should be connected to each ram to minimise any effect on the

applied load, which may be due to any unevenness that develops in the floor system.

#### **A1.04 Method of Test**

A load, equivalent to the working load of the specimen shall be applied via each wheel and the carriage operated to traverse the floor panels in each direction at approximately 1.00 mile/hour. (0.45m/s)

After the completion of 0, 250, 500, 1000, 2000, 4000, 8,000, 15,000 and 20,000 passes, any 'bow' of each panel shall be measured by means of a bridge and dial gauge with the bridge resting on opposite edges of the panels in the method used in the PSA MOB PF2 PS/SPU Test T1.00.

Grooving along the wheel track shall be measured by the bridge and dial gauge method at five positions across the track and at three points parallel to the track on each panel and any other visual deterioration shall be reported.

The measured 'bow' will be a combination of panel bending, the depth of any grooving along the wheel track and any buckling or deformation of the top surface.

PSA Test T1.00 'Concavity and Convexity' shall be carried out on each panel before the Rolling load test has commenced and after 20,000 passes.

After completion of 20,000 passes the following structural tests in accordance with the PSA MOB PF2 PS/SPU: March 1992 shall be carried out on all eight full panels and the two cut panels:

T8.00 25mm square point-loading test on all full panels.

Working load applied at the centre of adjacent edges for five minutes only instead of 24 hours.

T8a.00 25mm square point-loading test on perimeter cut edge of the two half panels.

Working load applied at the centre of the cut edge for five minutes only instead of 24 hours.

T11.00 Safety factor load tests.

After the forgoing tests, three times the working load shall be applied via a 25mm indenter to: the centre of edge on the wheel path, the adjacent centre of edge and to a point along a diagonal 70mm beyond edge of the pedestal head. All tests shall be carried out on particular panels selected by the test authority.

## **A1.05 Test Report**

The subsequent test report shall include the following information:

- a. The structural grade of the system and a full description of the components including the weight of each panel.
- b. The average environmental condition over the period of the tests.
- c. The maximum bow after the various numbers of passes in tabular format.
- d. The permanent deformation of the top steel sheet or surface after the various numbers of passes in tabular format.
- e. The results of the point loading tests in tabular format.
- f. The results of the safety factor tests.
- g. The result of the PSA T1.00 Concavity and convexity measurements at 0 and 20,000 passes in tabular format.
- h. A report of any other deformation damage in the system.



## **APPENDIX B:**

# **THE ON-SITE AIR LEAKAGE TEST**

## **APPENDIX B:**

### **THE ON-SITE AIR LEAKAGE TEST**

#### **B1.00 General**

The object of an on-site air leakage test is to determine the leakage of air through the joints and perimeters of an installed raised access floor when the cavity below the floor is used as an air distribution plenum. The test regime will also provide an indication of air leakage from other parts of the cavity.

The Project Air Conditioning Engineer will provide the maximum acceptable air leakage rate per square metre of floor area and the design and test pressure. Typically, these will be 0.9 l/s.m<sup>2</sup> for the void and 0.9 l/s.m<sup>2</sup> for the floor at a test pressure of 50Pa. An accredited independent test authority specialising in raised access floors shall carry out the tests.

#### **B1.01 Test Area**

Each test area shall be at least 100 sq metres and shall include an outside perimeter and an internal perimeter. The cavity within the test area shall be sealed from other areas of the floor system by permanent or temporary cavity barriers. Areas to be tested shall be selected by the test authority.

It is preferable that the tests are carried out before any loose laid carpets are installed.

#### **B1.02 Test Apparatus**

The test apparatus shall consist of the following:

- a. A suitably sized axial fan (600mm diameter) with a variable speed controller and fitted with an airflow-measuring conical inlet to measure airflows between 0 to 2000 litres/second.
- b. A digital manometer to measure the air pressure in the floor void in Pa (N/m<sup>2</sup>) via a flexible tube.
- c. A digital manometer to measure the air pressure across the fan conical inlet.

- d. Calibration tables relating pressure difference to actual air flow through the conical inlet in litres per second.
- e. Instruments to measure environmental conditions.

The axial fan will generate an air pressure within the floor void, the design pressure being set and maintained by varying the fan speed. The measured airflow into the void (litres/second) to maintain the void pressure (Pa) will be the air leakage.

### **B1.03 Test Method**

The air leakage rate values are required for:

- a. The raised access floor (**floor leakage rate**)
- b. Other paths from the void. (**void leakage rate**)
- c. Total leakage rate.

#### **Procedure**

1. The joints between floor panels, between panels and penetrations, such as columns etc, air terminal devices within the test zone area shall be effectively sealed with adhesive tape to prevent air leakage. Any air conditioning supply duct outlets within the void shall also be sealed.
2. The axial fan outlet shall be sealed to the floor over an opening formed by removing a floor panel.
3. The manometer shall be connected to the floor void by means of a flexible tube at a convenient location.
4. Air shall be delivered to the void via the axial fan until the required void pressure is achieved.
5. The inlet pressure at the conical inlet is noted and the airflow in litres per second calculated from the calibration chart. This is the total leakage rate from the void.

6. The airflow from the void, divided by the test zone area, will provide the air leakage rate in l/s.m<sup>2</sup>.
7. If the air leakage rate is equal to, or less than, the maximum allowable, the value is recorded as the **void leakage rate** and the temporary sealing tape removed.
8. If the void leakage rate is greater than the maximum allowable, a glycerine based smoke shall be introduced into the void and a slight pressure created by the fan. Any points of smoke leakage from the void shall be noted and remedied /sealed and the tests repeated. The process shall be repeated until the leakage rate is equal to, or less than, the maximum requirement.
9. After the adhesive tape has been removed, the tests shall be repeated and the total air leakage rate recorded for the void and the floor system. The void rate is then deducted from the total rate to provide the **floor leakage rate**.

If the floor leakage rate is equal to, or less than, maximum allowable, the value shall be recorded as the **floor leakage rate** for the access floor in that zone. The testing of that zone is complete and subsequent zones shall be tested as above.

10. If the floor leakage rate is greater than the maximum allowable, smoke shall be introduced into the void and a slight pressure created by the fan. Any points of smoke leakage from the floor system shall be noted and remedied/sealed and the tests repeated. The process shall be repeated until the leakage is equal to or less than the maximum requirement.

**B1.04 Test Results**

The subsequent test report shall include the following information:

- a. The building site.
- b. The floor zone and location
- c. The area and dimensions of test zone
- d. A description of the test zone area
- e. The design void pressure Pa
- f. Report if smoke was used to locate leaks
- g. The **void leakage rate** (with floor joints sealed) l/s.m<sup>2</sup> (adjusted to standard conditions)
- h. The **void and floor leakage rate** (floor joints unsealed) l/s.m<sup>2</sup>
- i. The **floor leakage rate** l/s.m<sup>2</sup>
- j. The maximum void and floor leakage requirement
- k. Pass or fail
- l. The environmental condition at the time of the tests
- m. A report of any additional permanent sealing requirements
- n. Any other relevant information ie. If loose-lay carpet were in position, leakage through electrical outlet boxes or grommets etc.
- o. Full description and details of the installed floor system
- p. The time and date of test
- q. Name of the witnessing authority.

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