Our Ref: 94/S021

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

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13 January 2003

Portakabin Limited
New Lane
Huntingdon
York YO32 9PT

Dear Sirs

Re: Pullman Buildings

Whilst Pullman Buildings are no longer in production and therefore Certificate number 94/S021 is no longer valid, the BBA remain of the opinion that, if the product is unchanged, the performance of Pullman Buildings should have been and will be, consistent with the statements in the Certificate.

Yours sincerely

P. C. Hewlett

Dr P Hewlett
Chief Executive

UKAS PRODUCT CERTIFICATION 1131 UKAS TESTING 0947 UKAS CALIBRATION 0127

Designated by Government to issue European Technical Approvals
UK Representative in EOTA (European Organisation for Technical Approvals)
UK Representative in the UEAtc (European Union of Agrément)
British Board of Agrément, a company limited by guarantee registered in England No 178293. Registered Office as above

CI/SfB

3

Building System Agrément Certificate No 94/S21

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

Designated by Government to Issue European Technical Approvals

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PULLMAN BUILDINGS

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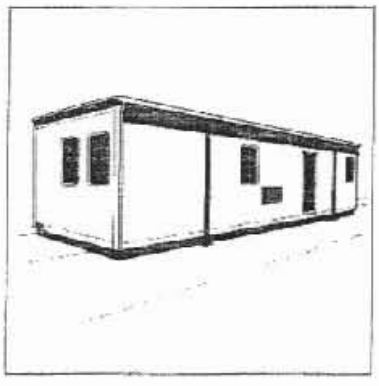
Product

- *THIS CERTIFICATE REPLACES CERTIFICATE No 88/S16 AND RELATES TO PULLMAN BUILDINGS.*
- *Pullman Buildings are self-contained, relocatable, factory finished units.*
- *The buildings are for use as single-storey institutional, educational, office and similar non-residential accommodation, or two-storey office and similar non-residential accommodation. In both cases the buildings can be in single or multiple units.*
- *The buildings have a design life of at least 20 years.*
- *Pullman Buildings can be used to construct buildings with a variety of plan forms.*
- *This assessment does not cover staircases, windows and doorsets or the adequacy of the plumbing, drainage or electrical services supplied with the buildings, or the ventilation of bathrooms and rooms containing sanitary conveniences, which will vary according to use.*
- *Users, or Portakabin Ltd, when specifying plan form, internal subdivision, siting of the building, access for the disabled, access for fire services and means of escape in case of fire, shall ensure compliance with the relevant Building Regulations' requirements.*



Building Regulations

1 The Building Regulations 1991 (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of building systems with the Building Regulations. In the opinion of the BBA, buildings constructed using Pullman Buildings, if used in accordance with the provisions of this Certificate, will meet the relevant requirements.

Requirement		Comments
A1	Loading	The buildings will have adequate strength and stability. See sections 7.1 to 7.6 of this Certificate.
B1	Means of escape	The buildings will meet the relevant requirements within the limitations set out in this Certificate. See sections 8.1, 8.3 to 8.5 and 8.7 of this Certificate.
B2	Internal fire spread (linings)	
B3	Internal fire spread (structure)	
B4	External fire spread	
B5	Access and facilities for the fire service	
C4	Resistance to weather and ground moisture	The buildings are acceptable.
L1	Conservation of fuel and power	The buildings are acceptable. See section 9.2 of this Certificate.
Regulation 7	Materials and workmanship	The buildings are acceptable. See section 15.1 of this Certificate.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

In the opinion of the BBA, the buildings described in this Certificate are capable of satisfying the Building Standards (Scotland) Regulations 1990 (as amended) with regard to the following matters, subject to the qualification contained in this Certificate.

Regulation/Standard		Comments
10	Fitness of materials	The buildings are acceptable.
B2	Selection and use of materials, fittings, components and other manufactured products	
11	Structure	The buildings will have adequate strength and stability. See sections 7.1 to 7.6 of this Certificate.
C2.1	Construction	

continued

2 The Building Standards (Scotland) Regulations (continued)

Regulation/Standard		Comments
12	**Structural fire precautions**	The buildings will meet the relevant Standards within the limitations set out in this Certificate. See sections 8.2 to 8.4 and 8.6 of this Certificate.
D2	Structural fire precautions	
13	**Means of escape from fire, facilities for fire-fighting and means of warning of fire in dwellings**	See section 8.7 of this Certificate.
E2	Means of escape from fire	
16 and 17	**Preparation of sites and resistance to moisture**	The buildings are acceptable.
G2	Preparation of a site and resistance to moisture from the ground	
G3.1	Resistance to precipitation	
22	**Conservation of fuel and power**	The buildings are acceptable. See section 9.2 of this Certificate.
J2.2	Performance standards	

3 The Building Regulations (Northern Ireland) 1994

In the opinion of the BBA, the buildings described in this Certificate are capable of satisfying the Building Regulations (Northern Ireland) 1994 with regard to the following matters, subject to the qualifications contained in this Certificate.



Regulation		Comments
B2	Fitness of materials and workmanship	The buildings are acceptable. See section 15.1 of this Certificate.
C2	Preparation of site and resistance to dangerous and harmful substances.	The buildings are acceptable.
C4	Subsoil drainage	
C5	Resistance to ground moisture and weather	
D1	Loading	The buildings will have adequate strength and stability. See sections 7.1 to 7.6 of this Certificate.
D2	Stability	
E2	Means of escape	The buildings will meet the relevant regulations within the limitations set out in this Certificate. See sections 8.1, 8.3 to 8.5 and 8.7 of this Certificate.
E4	Internal fire spread — Linings	
E6	Internal fire spread — Structure	
E8	External fire spread	
E10	Facilities and access for the Fire Brigade	
F2	Conservation of fuel and power	The buildings are acceptable. See section 9.2 of this Certificate.

4 Description

General

4.1 Pullman Buildings are based on a structural steel framework and composite wall panels (see Figures 1 and 2).

Figure 1 Typical Pullman building

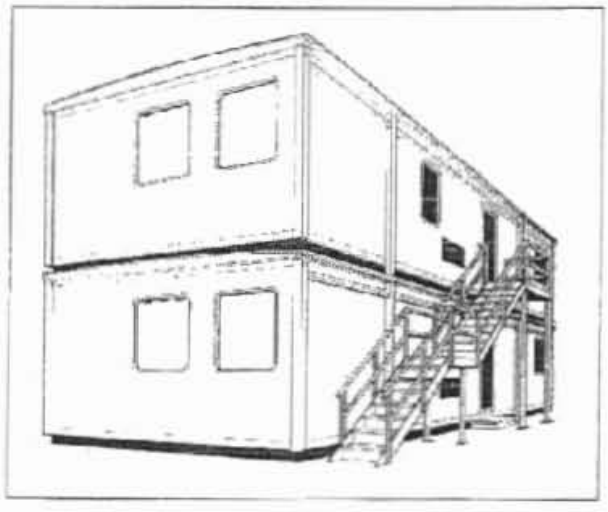
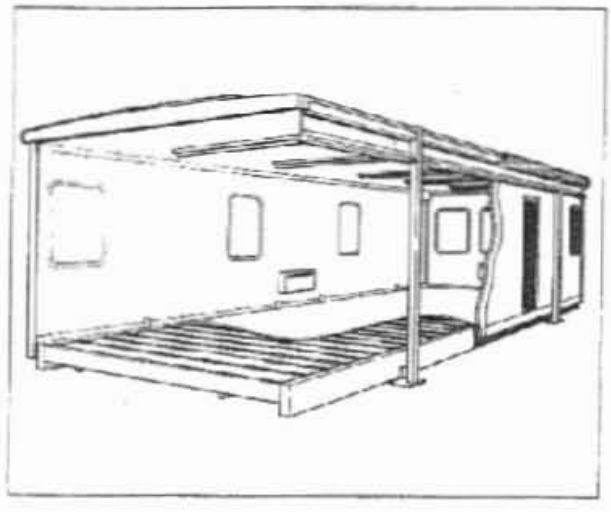


Figure 2 General arrangement of components

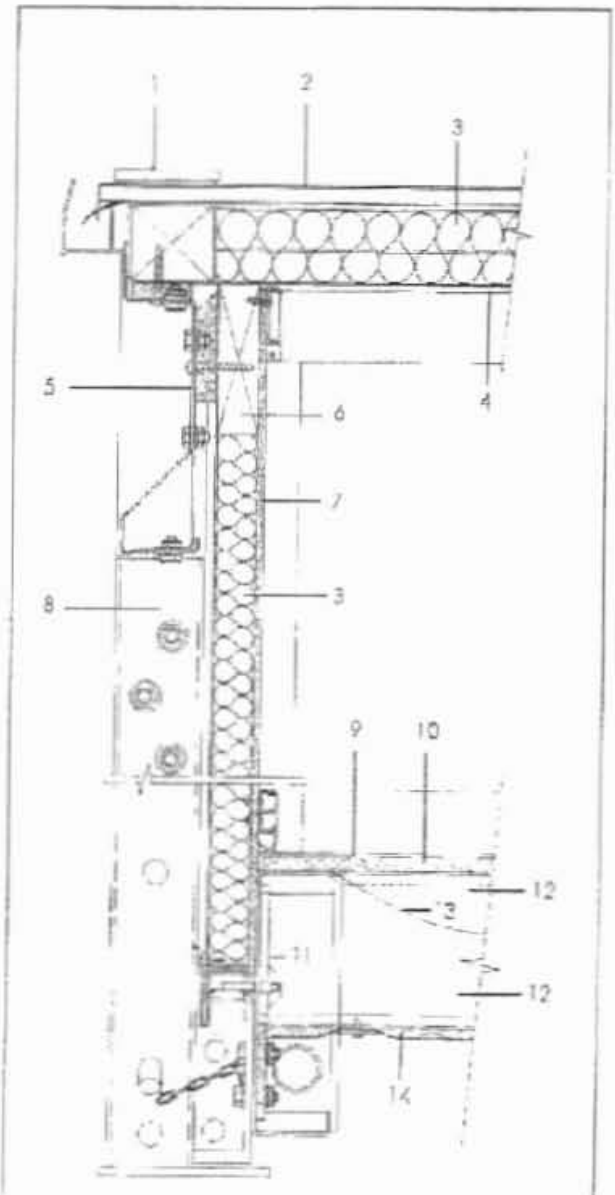


4.2 The buildings are available in the range of sizes given in Table 1. The internal height is 2.53 m and the overall external width is 4.25 m.

Table 1 Size range

Type	Internal length (m)	Internal width (m)	Floor area (m²)
PM 324	9.6	3.79	36.38
PM 404	12.0	3.79	45.48
PM 484	14.4	3.79	54.58
PM 604	18.0	3.79	68.22

Figure 3 Section through building



1 moulded PVC snap-on cover
2 plastisol coated galvanized steel
3 rigid, CFC-free, polyurethane insulation
4 polyester coated steel
5 cold-formed galvanized steel side beam
6 timber frame
7 vinyl-faced gypsum wallboard
8 hot-rolled steel hollow section column
9 vinyl floor covering
10 moisture resistant wood chipboard floor deck
11 cold-formed galvanized steel side beam
12 unventilated cavity
13 low emissivity thermal sheet
14 Alreflex ZL-2 insulation

4.3 The full specification and drawings for the materials and components covered by this Certificate have been examined and are retained by the BBA. This section gives only general details of the system. Typical details are shown in Figure 3.

Structural frame

4.4 The steel frame for each building comprises four hot-rolled steel hollow section columns bolted to cold-formed galvanized steel side beams at floor and roof level. Cold-formed galvanized steel floor joists and a profiled composite steel-faced panel span each building from side to side. Longitudinal timber floor runners are screwed to the steel floor joists to assist in the transportation of the building.

Floors

4.5 Floors comprise an 18 mm thick moisture-resistant wood chipboard [exceeding the requirements of BS 5669 : Part 2 : 1989 (type C4)] fixed to the steel joists by self-drilling/self-tapping, zinc coated screws.

4.6 Thermal insulation is provided by an aluminium foil-faced polythene bubble sheet (Alreflex 2L-2) fixed beneath the floor joists and a low emissivity reinforced aluminised polyester sheet draped between the joists. All joints between the bubble sheet and between the bubble sheet and steel floor joists/beams are sealed with continuous strips of aluminium jointing tape.

External walls

4.7 External walls are of composite construction having an external skin of plastisol-coated galvanized steel sheet (subject of a BBA Certificate), timber studs and peripheral frame, a galvanized steel bottom rail and an internal lining of 9.5 mm thick gypsum wallboard. The void between the external skin and internal lining is filled with injected, rigid, CFC-free polyurethane insulation.

4.8 Walls are fixed to the steel frame at floor level using countersunk head bolts screwed into blind rivet nuts set in the floor frame, and at the wall-to-wall corner joint and roof level using wood screws.

Roof and ceiling

4.9 The roof is of composite construction having an external profiled (trapezoidal) skin of plastisol-coated galvanized steel sheet, rigid polyurethane/plywood composite inserts, softwood peripheral frame and a ceiling of polyester-coated steel. The void between the external skin and ceiling is filled with injected, rigid, CFC-free polyurethane insulation.

Protection of steelwork against corrosion

4.10 The side beams and floor joists are produced from galvanized steel sheet to EN 10147 : 1992 having a G 600 coating. After fabrication, all welds are cleaned off and coated with zinc-rich paint.

4.11 The roof beams are produced from galvanized steel sheet to EN 10147 : 1992 having a G 275 coating. After fabrication, all welds are cleaned off and coated with zinc-rich paint. In addition, the beams are protected by a powder coating paint system.

4.12 The floor beams are, in addition, protected by the application of a bitumen-based paint.

4.13 The hot-rolled steel columns are shot-blasted, coated with anti-corrosive primer and finished with a blue-grey gloss paint.

4.14 The external skin of the building is protected by a 200 micron coating of PVC plastisol applied over a G 275 zinc coating to EN 10147 : 1992.

Finishes

4.15 The external faces of wall panels have a plastisol coating, silk grey in colour, with a leathergrain finish.

4.16 The external face of the roof panel has a plastisol coating, white in colour, with a leathergrain finish.

4.17 Internal walls have a textured dolomite white vinyl finish.

4.18 The ceiling has a silk white polyester finish.

4.19 The roof beams and columns have a blue-grey finish. The end skirt and perimeter floor beams are black.

4.20 The floor covering is black vinyl with white fleck. All joints are welded. In applications where water will be present, ie kitchens or toilets, sealed 100 mm vertical upstands must be provided at all floor/wall interfaces. The vinyl floor covering is classified G4 or better as defined in MOAT No 36 : 1987.

5 Manufacture

5.1 Building components are bought in to agreed specifications or in accordance with British Standards or Agrément Certificates.

5.2 Steel framed components of the building are constructed using conventional metalworking techniques.

5.3 Quality checks are made on the sub-assemblies, such as wall and roof panels and the steel frame, and on the final assembly of the buildings. Quality control carried out during manufacture includes checks on dimensions, squareness and welding.

6 Delivery and site handling

6.1 The buildings are transported to site on a flat-bed lorry or trailer long enough to fully support the building.

6.2 The building can be unloaded using either the telescopic legs or by crane. Handling must be in accordance with the manufacturer's handbook.

6.3 The buildings are normally positioned on the day of delivery, thus site storage is not required.

7 Strength and stability

7.1 With certain exceptions described in this section, the design of Pullman Buildings is in accordance with the following:

BS 5268 : Part 2 : 1991

BS 5950 : Part 1 : 1990

BS 5950 : Part 5 : 1987

BS 6399 : Part 1 : 1984

BS 6399 : Part 3 : 1988

BS CP 3 : Chapter V : Part 2 : 1972

7.2 Where required, structural testing has been used to verify the relevant aspects of the design outside the scope of the codes, including resistance of panels to racking, fastening characteristics, interaction of components and effects of thermal cycling.

7.3 One- or two-storey buildings will have adequate resistance to wind loads in areas within the 50 ms^{-1} basic wind contour excluding sites located on exposed hills above the general level of the surrounding terrain and open country without obstructions as defined in CP 3 : Chapter V : Part 2 : 1972.

7.4 The roof is designed to support a uniformly distributed imposed load of 0.75 kNm^{-2} or a concentrated load of 0.9 kN, in accordance with BS 6399 : Part 3 : 1988, and is therefore acceptable where no access is provided, other than that necessary for cleaning or repair.

7.5 The floor is designed to support a uniformly distributed imposed load of 3 kNm^{-2} or a concentrated load of 2.7 kN, in accordance with BS 6399 : Part 1 : 1984, and is therefore acceptable, for example, in classrooms and offices for general use.

7.6 Foundations must be designed in accordance with BS 8004 : 1986.

8 Behaviour in relation to fire

8.1 Buildings subject to the Building Regulations 1991 (England and Wales), or the Building Regulations (Northern Ireland) 1994 must not be erected within one metre of a boundary. Due regard must be taken of all 'unprotected areas'.

8.2 Buildings subject to the Building Standards (Scotland) Regulations 1990 (as amended) must be sited in accordance with the provisions of Technical Standard D2.6 for compliance with these Regulations. Due regard must be taken of all 'unprotected areas'.

8.3 It can be shown by tests and assessment that the buildings will meet building regulations' requirements for fire rating as follows:

external wall	half hour	(from inside)
roof ceiling (ground floor)	one hour	(from underside)

8.4 The various exposed surfaces of the buildings assessed as having a Class 0* rating are:

Plastisol-coated steel external wall, roof and trim surfaces

Gypsum Wallboard internal wall surfaces

polyester-coated steel ceiling surface.

*As defined in the Building Regulations 1991 (England and Wales), Approved Document B, Appendix A, the Building Regulations (Northern Ireland) 1994 Technical Booklet E, and the Appendix to Part D of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended).

8.5 The roof is designated AA in accordance with the Building Regulations 1991 (England and Wales), Approved Document B, Appendix A, and the Building Regulations (Northern Ireland) 1994, Technical Booklet E.

8.6 The designation of the roof in Scotland must be determined in accordance with Standard D2.5 and the Appendix to Part D of the Building Standards (Scotland) Regulations 1990 (as amended).

8.7 Adequate provision must be made for escape in case of fire.

8.8 Where it is necessary for fittings, services or ducts to penetrate part of the fire-resisting construction the detailing must ensure that the relevant fire resistance is not impaired.

9 Thermal insulation

9.1 The U value (thermal transmittance measured in $Wm^{-2}K^{-1}$) of the building elements (excluding discrete bridges) can be taken as:

floor	0.28
external wall	0.44
roof	0.21
glazing	5.7

9.2 It can be shown by calculation that the rate of heat loss through the envelope of a building (with or without discrete bridges) does not exceed that of a notional building of the same size and shape which is designed to comply with the Elemental Approach given in Approved Document L1 to the Building Regulations 1991 (England and Wales), Standard J2.2 of the Technical Standards for compliance with the Building Standards (Scotland) Regulations 1990 (as amended), and Technical Booklet F to the Building Regulations (Northern Ireland) 1994.

10 Condensation

10.1 The buildings are not suitable for use where the internal relative humidity is expected to exceed 70% for any significant length of time as condensation may occur. Assuming normal internal conditions of temperature and humidity, and appropriate ventilation (see section 11), it is considered that the amount and duration of condensation will be insufficient to significantly affect the structural or thermal properties of the building.

10.2 If the floor is penetrated by services, eg soil pipes, the joints between the services and the floor deck and floor insulation must be adequately sealed to prevent the ingress of water and water vapour.

10.3 Equipment producing large quantities of water vapour, for example flueless heaters, must not be used.

11 Ventilation

The design of the windows should allow adequate ventilation and is an important factor in reducing the incidence of surface condensation. The windows should be designed so that the amount of openable window ventilation is a minimum of 5% of the floor area or provision of mechanical ventilation considered. Portakabin Ltd should be consulted with regard to the requirements for background ventilation.

12 Weathertightness and damp-proofing

12.1 The steel supporting columns raise the building clear of the ground giving it an inherent resistance to rising damp in the walls.

12.2 The ground beneath the building should, as a minimum, be effectively cleared of turf and other vegetable matter and be treated with a chemical weedkiller.

12.3 The roof and external wall surfaces will provide adequate weather resistance.

12.4 The buildings are provided with suitable rainwater gutters and downpipes.

12.5 The performance of windows and doors is not covered by this Certificate, However, the perimeter joints between windows and doors and the wall panels have been assessed and are adequate to ensure that water penetration will not occur at these positions.

13 Services

Electrical and plumbing services are outside the scope of this Certificate. However, in designing and installing these services precautions must be taken to avoid the possible risk of long-term damage to the structure or the services by, for example, the ingress of water, water vapour or condensate from cold water service pipes.

14 Maintenance

14.1 External cladding requires an occasional washing down with water containing a mild detergent. In some areas, after approximately 10 years of service, it may be necessary to restore the visual appearance of the building by painting, using a paint recommended by Portakabin Ltd (see section 15.3).

14.2 In the event of impact or other damage to an external wall, a replacement plastisol-coated steel panel can be fitted over the original panel by Portakabin Ltd. If necessary, damage to the foam core of the wall can be made good before fitting the replacement panel. This will restore the appearance and ensure that the weathertightness and insulation are unaffected.

15 Durability

15.1 Available evidence relating to the durability of the materials used in the construction indicates that Pullman Buildings, when correctly maintained, will have a life of at least 20 years.



15.2 Foot traffic over the roof should be restricted to the purpose of maintenance and suitable precautions taken to obviate the risk of damaging the plastisol coating.

15.3 The plastisol coating and galvanizing will be effective for the buildings' envisaged life. Where a high aesthetic standard is required, maintenance painting may be required after a minimum of 10 years in coastal environments or after longer periods in less aggressive situations.

15.4 The vinyl covering to the internal surfaces of walls will require replacement within the life of the buildings. This can be carried out using conventional techniques and materials.

15.5 The ceiling surface will remain effective for this period. If cleaning is necessary this can be done with water and a mild detergent can be used.

15.6 The vinyl floor covering may require replacement during this period depending on the use. Should it be necessary to replace or repair the vinyl floor covering, all joints must be welded. Any replacement vinyl floor covering must be to the same specification as the original.

Installation

16 Preparation

Clients are normally responsible for provision of suitable foundations and services and therefore the following aspects should be subject to adequate supervision and should be checked before the buildings are delivered to site:

(a) setting out and level of foundations

(b) setting out of service connections.

17 Siting

17.1 Siting of the buildings on the prepared foundations is carried out by Portakabin Ltd. The arrangements for siting have been assessed and found to be satisfactory.

17.2 Where specified, the buildings must be bolted to the foundations.

17.3 Buildings having the same leg centres can be double stacked. The telescopic legs must be fully retracted with the leg pin fitted through the outer leg. The lower building must be fixed to suitable foundations through the two holes in each leg base plate. The buildings are to be bolted together at the four leg points.

Technical Investigations

The following is a summary of the technical investigations carried out on Pullman Buildings.

18 Investigations

18.1 Existing data were examined to assess:

structural strength and stability
behaviour in fire
impact resistance of floor and wall panels
physical characteristics of injected, rigid, CFC-free polyurethane insulation
weathertightness
durability
maintenance requirements.

18.2 Calculations were undertaken and examined in conjunction with test data to establish the structural strength and stability of the buildings.

18.3 Calculations were made and computer simulations carried out to determine the effectiveness of the insulation arrangements and the risk of condensation.

18.4 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Additional Information

The management systems of Portakabin Ltd have been assessed and registered as meeting the requirements of ISO 9001, EN 29001 and BS 5750 : Part 1 : 1982 by SGS Yarsley International Certification Services Ltd (Certificate No 91/444).

Bibliography

BS 5268 *Structural use of timber*
Part 2 : 1991 *Code of practice for permissible stress design, materials and workmanship*

BS 5669 *Particleboards*
Part 2 : 1989 *Specification for wood chipboard*

BS 5750 *Quality systems*
Part 1 : 1987 *Specification for design/development, production, installation and servicing*

BS 5950 *Structural use of steelwork in building*
Part 1 : 1990 *Code of practice for design in simple and continuous construction: hot rolled sections*
Part 5 : 1987 *Code of practice for design of cold formed sections*

BS 6399 *Loading for buildings*
Part 1 : 1984 *Code of practice for dead and imposed loads*
Part 3 : 1988 *Code of practice for imposed roof loads*

BS 8004 : 1986 *Code of practice for foundations*

BS EN 10147 : 1992 *Specification for continuously hot dip zinc coated structural steel sheet and strip. Technical delivery conditions*

CP 3 *Code of basic data for the design of buildings*
Chapter V *Loading*
Part 2 : 1972 *Wind loads*

MOAT No 36 : 1987 *UEAtc Directives for the Assessment of Manufactured Plastic Floorings*

19 Conditions

19.1 The system design, the quality of materials and components, the method of manufacture and the erection procedure have been examined and found satisfactory by the BBA and must be maintained to this standard during the period of validity of this Certificate. This Certificate will remain valid for an unlimited period provided that:

(a) the specification of the product is unchanged, and

(b) the system manufacturer continues to have the product checked by the BBA.

19.2 Where reference is made in this Certificate to any Act of Parliament, Regulation made thereunder, Statutory Instrument, Code of Practice, British Standard, manufacturer's instruction or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certificate.

19.3 In granting this Certificate, the BBA makes no representation as to the presence or absence of patent rights subsisting in the product and/or as to the legal right of Portakabin Ltd to market, install or maintain the product.

19.4 It should be noted that any recommendations relating to the safe use of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to re-state the requirements of the Health and Safety at Work etc Act 1974, or of any other statutory or Common Law duties of care, or of any duty of care which may in the future exist; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any other present or future statutory or Common Law duties of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage incurred in respect of personal injury arising as a direct or indirect result of the use of this product.

BBA BRITISH BOARD OF AGRÉMENT

In the opinion of the British Board of Agrément, Pullman Buildings are fit for their intended use if used and constructed as set out in this Certificate. Certificate No 94/S21 is accordingly awarded to Portakabin Ltd.

On behalf of the British Board of Agrément

Date of issue: 30th November 1994 — Director

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