GuaraPly

CE

1034-CPD-12981/1/07

# Declaration of Conformity

Indústria de Compensados Guararapes Ltda.
Rua Alcina Santos Araújo, 411
Palmas, PR 85555-000
Brazil

declarares that the Pine Plywoods manufactured at its

Palmas Plywood Mill

bearing the marking

CE 1034-CPD-12981/1/07 GUARAPLY PALMAS 07 EN 13986 EN 636-2 E1

intended to be used in buildings and constructions

conform with EN 13986 and its Annex ZA

for internal use as structural components in humid conditions
and for internal use as structural floor and roof on joists

as per technical file GRP-CE-01/07.

The Factory Production Control was certified by

HFB Engineering GMBH
Zschortauer Strasse 42
04129 Leipzig
Germany

with certificate No. 1034-CPD-12983/1/07.

Palmas, 30th June, 2007.

Bartolomeu da Silva Neto
Technical Manager

**HFB ENGINEERING GMBH**
TEST LABORATORY FOR BUILDING MATERIALS AND STRUCTURAL ELEMENTS

HFB Engineering GmbH • Zschortauer Straße 42 • 04129 Leipzig

- Test, monitoring and certification laboratory officially approved for building permits according to the current directory of Deutsches Institut für Bautechnik (*German Institute for Structural Engineering*) (Reference No. SAC 05)
- Notified test, monitoring and certification laboratory according to the Bauproduktengesetz (*Building Materials Law*) – function and product areas, in compliance with a certificate of recognition (Reference No. 1034)
- Certified according to DIN EN ISO 9001

# CERTIFICATION REPORT

Original Issuance

## No.: CR 31100 12981 / 1 / 2007

| | |
|---|---|
| **Production site:** | **Industria de Compensados Guararapes Ltda.<br>Rua Alcina Santos Araujo, 411<br>85555-000 Palmas, PR<br>Brazil** |
| **Content of order:** | **Certification of the Factory and the Factory Production Control (FPC)** |
| **Attestation of Conformity System:** | **$2^+$** |
| **Building product:** | **Wood-based panels for use in construction – Characteristics, evaluation of conformity and marking EN 13986 : 2004** |
| **Group of building products:** | **Plywood** |

This report consists of 3 pages of text and
- appendices with a total of - pages

Leipzig, June 29th, 2007

**Dipl.- Ing. L. Röwer**
Managing Director/ Head of the Certification Laboratory

Prüf-, Überwachungs- und Zertifizierungsstelle HFB

Any publication of this Certification Report – even in extracts – requires the advance approval of HFB Engineering GmbH.

## 1. Fundamentals of this Certification Report

This certification report is based on the statements found in Inspection Report No. IR 31100 12981 / 1 / 07 issued by the monitoring laboratory HFB Engineering GmbH Leipzig on June 29th, 2007.

## 2. Assessment of the Results of Third-party Monitoring

The following assessments are based on Inspection Report No. 31100 12981 / 1 / 07 of June 29th, 2007 (Regular Inspection of the Factory and the Factory Production Control /FPC):

- The production site Industria de Compensados Guararapes Ltda., Palmas, PR (Brazil) sufficiently fulfills the technical and personnel preconditions necessary to produce, in accordance with the requirements, wood-based panels, especially plywood, as according to EN 13986 : 2004.
- The plywood panels produced at the production site Industria de Compensados Guararapes Ltda., Palmas, PR (Brazil) and of the following types

| Panel Types | | Nominal thickness/ Composition | Intended Use as pursuant to EN 13986, Section 4.1 to 4.7 |
|---|---|---|---|
| No. | Plant designation | | |
| 1 | GUARAPLY | 12.5 mm | 4.1 / 4.2 / 4.7 |
| 2 | GUARAPLY | 15.0 mm | 4.1 / 4.2 |
| 3 | GUARAPLY | 18.0 mm | 4.1 / 4.2 / 4.7 |
| 4 | GUARAPLY | 18.0 mm T&G | 4.1 / 4.2 / 4.7 |
| 5 | GUARAPLY | 20.0 mm | 4.1 / 4.2 |

| Panel Types | | | Wood Species | | Veneer Thickness | | |
|---|---|---|---|---|---|---|---|
| No. | Thickness | Plies | Outer Layers | Inner Plies | Face, Back | Crossbands | Centers |
| 1 | 12.5 mm | 5ply | pinus elliottii > 650 kg/m³ | pinus elliottii, pinus taeda > 420 kg/m³ | 2.7 mm | 2.7 mm | 2.7 mm |
| 2 | 15.0 mm | 5ply | | | 2.7 mm | 3.8 mm | 2.7 mm |
| 3 | 18.0 mm | 7ply | | | 2.7 mm | 2.7 mm | 2.7 mm |
| 4 | 18.0 mm T&G | 7ply | | | 2.7 mm | 2.7 mm | 2.7 mm |
| 5 | 20.0 mm | 7ply | | | 2.7 mm | 3.3 mm | 2.7 mm |

are subject to factory production control (FPC) as in accordance with the standards of EN 13986 : 2004.

- The required performance characteristics for the products mentioned above were demonstrated by the results if initial type testing (ITT).
- The notices found in inspection report No. 3110012981/1/07 of June 29th, 2007 must be complied with.

## 3. Statements Concerning the Certificate of Factory Production Control and Concerning CE Labeling

Based on the results of the Regular Inspection of the Factory and the Factory Production Control, carried out by the notified inspection body, the Certificate of Factory Production Control No. CE 1034 – CPD – 12981/1/07 dated June 29th, 2007, is issued.

In consequence, the production site is still entitled to label plywood products "Guaraply", mentioned in section 2 of this certification report, with the symbol CE and all other necessary information as long as all further requirements that the production site is responsible for have been meet, effective immediately.

The Certificates of Factory Production Control issued on June 29th, 2007, shall retain the validity only under the pre-condition, that the manufacturer will comply with the notices (observations) contained in the inspection report.

The Certificates of Factory Production Control No. CE 1034 – CPD – 12981/1/05, No. CE 1034 – CPD – 12981/2/05, No. CE 1034 – CPD – 12981/3/05, No. CE 1034 – CPD – 12981/4/05 and No. CE 1034 – CPD – 12981/5/05 issued on February 24th, 2005, lost their validity and have to be returned to the notified inspection body.

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**Technical File GRP-CE-01/07**
**30th June, 2007.**

**Guaraply Pine Plywood**


**Physical characteristics:**

| Type | **Thickness tolerances** (EN 315, EN 12871) | | | | Layup | **Veneers thickness** (mm) | | |
|---|---|---|---|---|---|---|---|---|
| | **Sanded** (mm) | | **Unsanded** (mm) | | | Faces and backs | Centers | Cores |
| | A-C, B-C, Cp-C | | Flooring, Sheathing | | | | | |
| | Min. | Max. | Min. | Max. | | | | |
| 12,5mm 5ply | 12,1 | 12,9 | 11,7 | 13,1 | –\|–\|– | 2,7 | 2,7 | 2,7 |
| 15mm 5ply | 14,6 | 15,4 | 14,2 | 15,8 | –\|–\|– | 2,7 | 2,7 | 3,8 |
| 18mm 7ply | 17,6 | 18,4 | 17,2 | 18,8 | –\|–\|–\|– | 2,7 | 2,7 | 2,7 |
| 20mm 7ply | 19,6 | 20,4 | 19,2 | 20,8 | –\|–\|–\|– | 2,7 | 2,7 | 3,3 |

| **Tolerances** (EN 315, EN 12871) | **Size** | **Squareness** | **Straigthness** |
|---|---|---|---|
| | + 0 / - 3.0mm | +/- 1.0 mm/m | +/- 1.0 mm/m |

| **Mean density** (EN 323) | 580 Kg/m³ at 9% moisture contend |
|---|---|

**Performance characteristics for non structural uses:**

| **Bending** (EN 310) | **Strength** (N/mm2) | | | | **Stiffness** (N/mm2) | | | |
|---|---|---|---|---|---|---|---|---|
| | // | | -/- | | // | | -/- | |
| Panel type | Mean | L5% | Mean | L5% | **Mean** | L5% | **Mean** | L5% |
| 12,5mm 5ply | 55,4 | **39,5** | 27,9 | **12,1** | **6.870** | 4.120 | **2.230** | 1.120 |
| 15mm 5ply | 44,8 | **26,4** | 29,9 | **20,3** | **7.320** | 5.310 | **2.790** | 2.000 |
| 18mm 7ply | 58,0 | **39,4** | 27,8 | **14,9** | **8.200** | 5.990 | **2.530** | 1.450 |
| 20mm 7ply | 42,3 | **25,2** | 28,9 | **17,0** | **6.600** | 5.330 | **3.260** | 2.220 |

| **Bonding quality** (EN 314-1/2) | **Bonding class 3** (typical mean performance listed below) |
|---|---|

| | | |
|---|---|---|
| Release of formaldehyde | **E1** | |
| | Taken from EN 13986 Annex B, NOTE 2 for phenolic glue. | |
| Reaction to fire | **Flooring - $D_{FL}$-s1** | **Other uses - D-s2, d0** |
| | Taken from EN 13986 Table 8 for min. 400 kg/m³: | |
| Water vapour permeability | **Wet cup - 70 μ** | **Dry cup - 200 μ** |
| | Taken from EN 13986 Table 9 for 500 kg/m³: | |
| Airborne sound insulation | **R = 13 x lg ($m_A$) + 14** | |
| | Calculated in acc. to EN 13986 part 5.10 using the formula. | |
| Sound absorption coefficient | **250-500 Hz - 0,10** | **1.000-2.000 Hz - 0,30** |
| | Taken from EN 13986 Table 10: | |
| Thermal conductivity | **0,13 W/(m.K)** | |
| | Taken from EN 13986 Table 11 for 500 kg/m³: | |
| Biological durability (EN 335-1/3) | **Hazard class 2** | |
| | Taken from ENV 1099 and EN 350-2 item 2.10b | |
| Content of pentachlorophenol (PCP) | **< 5 ppm** | |
| | Taken from EN 13986 part 5.18. | |

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**Technical File GRP-CE-01/08**
**30th June, 2007.**

**Guaraply Pine Plywood**


**Performance characteristics for structural use as components:**

| Bending | Strength (N/mm2) | | | | Stiffness (N/mm2) | | | |
|---|---|---|---|---|---|---|---|---|
| | // | | -/- | | // | | -/- | |
| Panel type | Mean | L5% | Mean | L5% | Mean | L5% | Mean | L5% |
| 12,5mm 5ply | 43,1 | **25,3** | 17,5 | **9,4** | 9.520 | 5.420 | 2.660 | 1.610 |
| 15mm 5ply | x | **15,0** | x | **10,0** | x | 4.000 | x | 1.500 |
| 18mm 7ply | 39,3 | **16,9** | 20,7 | **11,4** | 8.940 | 4.500 | 3.250 | 1.850 |
| 20mm 7ply | x | **15,0** | x | **10,0** | x | 4.000 | x | 2.000 |

**Performance characteristics for structural use as Roof Decking:**

| Thickness | Support spacing (span) | Impact resis-tance | Strength under point load | | | | Stiffness under point load | |
|---|---|---|---|---|---|---|---|---|
| | | | Related to service | | Ultimate Load | | | |
| | | | $F_{ser, k, 05}$ 5% fractile | | $F_{max, k, 05}$ 5% fractile | | $R_{mean}$ Average | |
| | | | Mid span | Joint | Mid span | Joint | Mid span | Joint |
| | mm | | N | N | N | N | N/mm | N/mm |
| 12,5mm | 400 | Fulfilled | 2.087 | x | 3.536 | x | 546 | x |
| | 450 | Fulfilled | 2.203 | | 3.548 | | 482 | |
| | 600 | Fulfilled | 1.711 | | 3.800 | | 274 | |

**Performance characteristics for structural use as Floor Decking:**

| Thickness | Support spacing (span) | Impact resis-tance | Strength under point load | | | | Stiffness under point load | |
|---|---|---|---|---|---|---|---|---|
| | | | Related to service | | Ultimate Load | | | |
| | | | $F_{ser, k, 05}$ 5% fractile | | $F_{max, k, 05}$ 5% fractile | | $R_{mean}$ Average | |
| | | | Mid span | Joint | Mid span | Joint | Mid span | Joint |
| | mm | | N | N | N | N | N/mm | N/mm |
| 18mm | 400 | Fulfilled | 3.634 | x | 6.003 | x | 1.025 | x |
| | 480 | Fulfilled | 4.112 | | 5.779 | | 858 | |
| | 600 | Fulfilled | 3.485 | | 4.915 | | 605 | |
| 18mm T&G | 400 | Fulfilled | 3.077 | 2.795 | 4.993 | 3.551 | 952 | 774 |
| | 480 | Fulfilled | 3.802 | 2.696 | 5.297 | 3.721 | 804 | 649 |
| | 600 | Fulfilled | 3.405 | 2.464 | 5.270 | 4.059 | 586 | 466 |

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# Installation Guide

**30th June, 2007.**

## Guaraply Pine Plywood
## Structural Floor Decking on joists
## Load Category A

**Application**

1. Appropriately CE marked panels may be used as Structural Floor Decking on joists in Hazard Classes 1 or 2 in Load Category A (areas for domestic and residential activities).
2. Panels shall be transported, delivered, handled, stacked and stored as protected from the elements as soon as possible and in accordance to the recommendations of clauses 6, 7, 8 and 9 of ENV 12872.
3. Before installation panels shall be allowed to reach an equilibrium moisture contend in accordance to the intended intended Service Class in accordance to clause 10 of ENV 12872.

**Installation**

1. During and after installation, the panels need to be permanently protected from rain as quickly as possible.
2. Panels shall be laid with their long grain across the joists.
3. For square edged panels, the edges between the joists need to be supported on a minimum bearing of 18mm and the short edges supported for their full length on the joists.
4. A 3mm expansion gap shall be left between the edges of square edge panels to prevent buckling.
5. T&G panels shall be laid across the joists with both short edges supported on a joist.
6. All panels joints need to be staggered.
7. A 10mm expansion gap shall be left at the perimeter of the floor and each panel shall be firmly fixed down to prevent buckling.
8. Panels shall be cut, drilled, laid down and fixed in accordance to clauses 11, 12 and 13 of ENV 12872 and in accordance to the following table:

| Panel type | Maximum span centre to centre | Minimum fastener dimension (Ringshank) | Minimum fastener distance from panel edge | Maximum fastener spacings | |
|---|---|---|---|---|---|
| | | | | Centres at the perimeter of the panels | Centres of the intermediate supporting joists and noggings or stud of panels |
| **18mm 18mm T&G** | 400mm, 480mm, 600mm | Diameter - 2.9mm Length - 50mm | 8mm | 150mm | 300mm |

**Performance**

1. Panels meet the requirements of EN 12871 and Eurocode I for impact load resitance and also for strength under point load for serviceability and ultimate loads.
2. Stiffness under point load is given in the table below:

| Panel type | Maximum span centre to centre | Rmean average (N/mm) | |
|---|---|---|---|
| | | Mid span | Joint |
| **18mm** | 400mm | 1.025 | x |
| | 480mm | 858 | |
| | 600mm | 605 | |
| **18mm T&G** | 400mm | 952 | 774 |
| | 480mm | 804 | 649 |
| | 600mm | 586 | 466 |

# CE MARKING
## UK APPLICATION GUIDE

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

**No 06/G001**

*Second issue**

This Guide forms a link between the CE Marking and UK Building Regulations and construction practice.

# GUARAPLY PINE PLYWOOD


Holder

**Indústria de Compensados Guararapes Ltda**
Rua Alcina Santos Araújo 411
Bairro São Francisco
P O Box 264
Palmas
PR 85.555-000
Brazil
Tel: 00 55 46 3263 8300
Fax: 00 55 46 3263 8310
e-mail: januario@guararapes.com.br
website: www.guararapes.com.br

Technical representative

**Ashford Associates**
18 Pear Tree Close
Alderholt
Fordingbridge
Hampshire SP6 3ER
Tel/Fax: 01425 656252
e-mail: duncanking@ashfordassociatesuk.com


## Generic type of construction product and use

Wood-based panel for use in construction.

This Guide relates to Guaraply Pine Plywood, a plywood for internal use as a structural component in humid conditions as defined in EN 13986 : 2004. Additional information is provided to aid use in accordance with BS 5268-2 : 2002.

## Basis of this Guide

This Guide gives information supporting the CE Marking to enable the product to be incorporated satisfactorily into the construction works according to UK requirements. This Guide must be read in conjunction with the CE Marking and its accompanying information.

It covers regulatory compliance and voluntary aspects where appropriate. The presentation by the manufacturer of the information underwriting CE Marking has been taken as valid and requiring no further corroboration in accordance with the Construction Products Directive.

A Declaration of Conformity against the relevant technical specification has been provided by the manufacturer and as a condition of the issue of this document the BBA requires the manufacturer to confirm the Declaration of Conformity at six-monthly intervals.

Users must satisfy themselves that the product's performance fulfils their requirements and that the product is being used correctly. Readers are advised to check the current validity of the CE Marking with the Application Guide holder and the validity of this document with the BBA website: www.bbacerts.co.uk


British Board of Agrément
Bucknalls Lane
Garston, Watford
Hertfordshire WD25 9BA


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Tel: 01923 665300
Fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

# Part 1 Product Summary

1.1 Guaraply Pine Plywood is an untreated coniferous plywood made from timber of the species *pinus elliotti* and *pinus taeda*.

1.2 The product is available in thicknesses of 12.5 mm (five-ply) and 18 mm (seven-ply). The panels are square edged and either sanded or unsanded, the 18 mm panel is also available with tongue-and-groove. Details of the product range are given in Table 1.

*Table 1 Product range*

| Thickness (mm) | Surface finish | Edge detail | Grade |
|---|---|---|---|
| 12.5 | sanded | square edge | E/III, I/III, II/III, III/III, III/IV |
| 12.5 | unsanded | square edge | III/III, III/IV |
| 18.0 | sanded | square edge | E/III, I/III, II/III, III/III, III/IV |
| 18.0 | unsanded | square edge | III/III, III/IV |
| 18.0 | sanded | tongue-and-groove | II/III, III/III, III/IV |

1.3 The CE Marking covers the panels for internal use as structural components in humid conditions. Additionally, the 12.5 mm thick plywood is for use as internal structural roof decking and internal structural wall sheathing and the18 mm thick plywood is for use as internal floor decking. However, designers should be aware that when dealing with built-up felt roofs or flat roofs with continuously supported coverings, it is recommended in BS 8217 : 2005 that plywood roof decks should be designed in accordance with BS 6229 : 2003 and BS 8103-3 : 1996, with a minimum thickness of 15 mm for joist spacing up to 450 mm and 18 mm for spacings up to 600 mm.

1.4 Additional preservative treatment can be applied which will enable other use outside the scope of this Guide.

# Part 2 CE Marking — Overview

2.1 CE Marking includes technical information in the form of declared values. It enables a product to be legally placed on the market in any EC Member State. However, this does not necessarily mean the product will be suitable for all end uses in all Member States. A judgement must be made on whether the product is suitable for a particular intended use according to the relevant regulations.

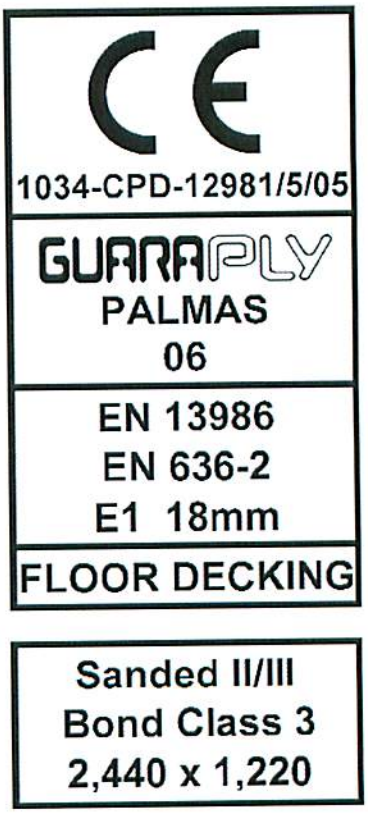
2.2 Technical information given by the CE Marking and the related harmonised standard is indicated in this Guide by the prefix CE

2.3 BBA opinions on the suitability of the product in relation to UK regulations and construction practice relates to the information as given in the CE Marking and the manufacturer's declaration and are indicated by the prefix

2.4 The CE Marking (see Figure 1) is indelibly marked on the product. The complete technical information is contained in the manufacturer's declaration of conformity and data sheet.

2.5 The CE Marking accompanying this product indicates that it was affixed by the Guide holder at its Palmas Factory and is under supervision of HFB Engineering GmbH (notified body number 1034). The marking includes the last two digits of the year in which the marking was affixed.

*Figure 1 Typical CE Marking*




CE 2.6 EN 13986 : 2004 is the harmonised technical specification and specifies the relevant characteristics and appropriate test methods.

CE 2.7 EN 636-2 is the technical class. It signifies that the boards are for internal use in humid conditions in structural applications. Furthermore, the 12.5 mm thick panels are marked to show that the product is intended for use as roof decking and wall sheathing and the 18 mm thick panels for floor decking.

CE 2.8 The boards are classified as E1 with regard to release of formaldehyde.

CE 2.9 The product meets the requirements for the Euroclass D-s2, d0 and $D_{fl}$-s1 for reaction to fire and has a PCP-content of less than 5 ppm. Consequently, in accordance with EN 13986 : 2004, the Euroclass and the PCP-content are not specified on the CE Marking.

CE 2.10 Additional declared values appear on the accompanying manufacturer's data sheets, relating to:

- physical characteristics
- bending properties
- bonding quality
- reaction-to-fire class
- water vapour permeability
- airborne sound insulation
- thermal conductivity
- performance characteristics for structural use.

## Part 3 CE Marking — Detailed interpretation

**Of the six Essential Requirements under the Construction Products Directive (CPD), only the following are relevant to the UK in relation to plywood in the considered applications.**

### Essential Requirement 1 — Mechanical resistance and stability

CE 3.1 The 12.5 mm thick panels are classified as type EN 636-2; wall sheathing and roofing.

CE 3.2 The 18 mm thick panels are classified as type EN 636-2; flooring.

3.3 Both thicknesses of panel are marked with the legend EN 636-2, this technical class indicates that the panels are for internal use as structural components in humid conditions. For these structural applications design and detailing of the panel members should be carried out in accordance with BS EN 1995-1-1 : 2004 (Eurocode 5) together with its UK National Annex using the information given in Tables 2 and 3 relating to mechanical properties derived from EN 789 : 2004.

*Table 2 Performance characteristics for structural use (for grades III/IV and higher)*

| Property[1] ($Nmm^{-2}$) | 12.5 mm panels | | | | 18 mm panel | | | |
|---|---|---|---|---|---|---|---|---|
| | Parallel | | Perpendicular | | Parallel | | Perpendicular | |
| | Mean | L5% | Mean | L5% | Mean | L5% | Mean | L5% |
| Strength | 43.1 | 25.3 | 17.5 | 9.4 | 39.3 | 16.9 | 20.7 | 11.4 |
| Stiffness | 9520 | 5420 | 2660 | 1610 | 8940 | 4500 | 3250 | 1850 |
| Compression strength | 27.9 | 21.0 | 19.7 | 14.4 | 28.8 | 20.4 | 22.1 | 16.6 |
| Compression stiffness | 6340 | 3500 | 4160 | 2520 | 6190 | 5110 | 4160 | 2440 |
| Tension strength | 26.3 | 17.0 | 17.7 | 8.4 | 24.1 | 14.1 | 17.7 | 8.4 |
| Tension stiffness | 6200 | 3640 | 3860 | 1880 | 6040 | 3660 | 3980 | 2060 |
| Planar shear | 2.52 | 1.68 | 2.5 | 1.88 | 2.7 | 2.1 | 2.3 | 1.8 |
| Planar modulus of rigidity | 89 | 69 | 82 | 60 | 98 | 74 | 89 | 69 |
| Panel shear | 7.04 | 5.46 | 7.52 | 5.84 | 8.03 | 6.84 | 7.7 | 6.36 |
| Panel modulus | 636 | 493 | 649 | 489 | 659 | 545 | 655 | 494 |

(1) Characteristics in accordance with EN 789 : 2004 and EN 1058 : 1995.

*Table 3 Performance characteristics for structural use — Point load resistance[1] (EN 12871, EN 1195)*

| Property | 12.5 mm panels square edge at mid-span | | | 18 mm panel square edge at mid-span | | | 18 mm panel tongue-and-groove at mid-span | | | 18 mm panel tongue-and-groove at joint | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | L5% values at listed spans | | | L5% values at listed spans | | | L5% values at listed spans | | | L5% values at listed spans | | |
| | 400 (mm) | 450 (mm) | 600 (mm) | 400 (mm) | 480 (mm) | 600 (mm) | 400 (mm) | 480 (mm) | 600 (mm) | 400 (mm) | 480 (mm) | 600 (mm) |
| Serviceability strength $F_{use}$ (N) | 2087 | 2203 | 1711 | 3634 | 4112 | 3485 | 3077 | 3802 | 3405 | 2795 | 2696 | 2464 |
| Ultimate strength $F_{max}$ (N) | 3536 | 3548 | 3800 | 6003 | 5779 | 4915 | 4993 | 5297 | 5207 | 3551 | 3721 | 4099 |
| Stiffness $R$ (Nmm) | 403 | 366 | 237 | 815 | 695 | 503 | 745 | 638 | 441 | 601 | 532 | 410 |

(1) 50 mm diameter for 12.5 mm thick panels and 25 mm diameter for 18 mm thick panels.

3.4 Additionally, the marking on the panels indicates that:

- 12.5 mm thick panels are for use as internal structural roof decking and that additional tests against the requirements of BS EN 12871 : 2001 for concentrated load and soft body impact have been met. However, designers should be aware that when dealing with built-up felt roofs or flat roofs with continuously supported coverings, it is recommended in BS 8217 : 2005 that plywood roof decks should be designed in accordance with BS 6229 : 2003 and BS 8103-3 : 1996, with a minimum thickness of 15 mm for joist spacing up to 450 mm and 18 mm for spacings up to 600 mm.
- 12.5 mm thick panels are for use as internal structural wall sheathing and that additional tests against the requirements of BS EN 12871 : 2001 for soft body impact have been met.
- 18 mm thick panels are for use as internal floor decking and that additional tests against the requirements of BS EN 12871 : 2001 for concentrated load and soft body impact have been met.

3.5 The CE Marking indicates that the plywood meets the requirements of technical class EN 636-2 in relation to bonding quality and biological durability for internal use. As such, it meets the recommendations given in BS 5268-2 : 2002, Clause 4.6. The characteristic values derived from EN 789 : 2004 accompanying the CE Marking can be converted to grade strength and moduli values for permissible stress basis of design using the information given in BS 5268-2 : 2002, Clause 4.6; the information required and examples are given in Tables 4 and 5.

*Table 4 Characteristic long-term(1) grade strength and moduli values(2)*

| | | 12.5 mm thick panels | | | | 18 mm thick panel | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Parallel | | Perpendicular | | Parallel | | Perpendicular | |
| | | Service class | | Service class | | Service class | | Service class | |
| | | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Strength | – L5% | 9.4 | 9.4 | 3.5 | 3.5 | 6.3 | 6.3 | 4.2 | 4.2 |
| Stiffness | – L5% | 3011 | 2710 | 894 | 805 | 2500 | 2250 | 1028 | 925 |
| | – mean | 5289 | 4760 | 1478 | 1330 | 4967 | 4470 | 1806 | 1625 |
| Compression strength | – L5% | 7.8 | 7.8 | 5.3 | 5.3 | 7.6 | 7.6 | 6.1 | 6.1 |
| Compression stiffness | – L5% | 1944 | 1750 | 1400 | 1260 | 2839 | 2555 | 1356 | 1220 |
| | – mean | 3522 | 3170 | 2311 | 2080 | 3439 | 3095 | 2311 | 2080 |
| Tension strength | – L5% | 6.3 | 6.3 | 3.1 | 3.1 | 5.2 | 5.2 | 3.1 | 3.1 |
| Tension stiffness | – L5% | 2022 | 1820 | 1044 | 940 | 2033 | 1830 | 1144 | 1030 |
| | – mean | 3444 | 3100 | 2144 | 1930 | 3356 | 3020 | 2211 | 1990 |
| Planar shear | – L5% | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.7 | 0.7 |
| Planar modulus of rigidity | – L5% | 38 | 35 | 33 | 30 | 41 | 37 | 38 | 35 |
| | – mean | 49 | 45 | 46 | 41 | 54 | 49 | 49 | 45 |
| Panel shear | – L5% | 2.0 | 2.0 | 2.2 | 2.2 | 2.5 | 2.5 | 2.4 | 2.4 |
| Panel modulus of rigidity | – L5% | 247 | 247 | 272 | 245 | 303 | 273 | 274 | 247 |
| | – mean | 353 | 318 | 361 | 325 | 366 | 330 | 364 | 328 |

(1) The design should be checked to ensure that the permissible stresses are not exceeded for any other condition of loading that might be relevant.

(2) Characteristic values should be converted into values for permissible stress basis of design using data from BS 5268-2 : 2002:

$X_d = k_{mod} X_k / (1.35 \gamma_m)$

where:

$X_d$ is the grade strength value

$X_k$ is the characteristic strength value (5-percentile value)

$k_{mod}$ is the modification factor for duration of loading and service class given in Table 5 (BS 5268-2 : 2002, Table 37)

$\gamma_m$ is the material partial safety factor (eg 1.2 for plywood).

$E_d = E_k / (1+k_{def})$

where:

$E_d$ is the grade modulus, 5-percentile or mean value

$E_k$ is the characteristic modulus value (value as required)

$k_{def}$ is the modification factor for creep deformation and service class given in Table 5 (BS 5268-2 : 2002, Table 38).

*Table 5 Modification factors*

| Duration of loading | Modification factor $k_{mod}$ | | Modification factor $k_{def}$ | |
|---|---|---|---|---|
| | Service class | | Service class | |
| | 1 | 2 | 1 | 2 |
| Long-term | 0.60 | 0.60 | 0.80 | 1.00 |
| Medium-term | 0.86 | 0.86 | 0.11 | 0.14 |
| Test duration | 1.02 | 1.02 | 0.00 | 0.00 |
| Short-term | 1.06 | 1.06 | 0.00 | 0.00 |
| Very short-term | 1.08 | 1.08 | 0.00 | 0.00 |
| Safety factor ($\gamma_m$) | 1.2 | 1.2 | – | – |

3.6 It should be noted that EN 13986 : 2004 includes reference to load categories, the method to derive these is not currently available.

3.7 The deflection or deformation of a structural member subject to a combination of loads of different duration should be determined by considering the load in each category as acting separately and calculating the deflections or deformations induced by each, using the appropriate moduli values.

### Essential Requirement 2 — Safety in case of fire

*Reaction to fire*

CE 3.8 No marking in relation to reaction to fire.

3.9 The Euroclass is not specified on the CE Marking, therefore, in accordance with EN 13986 : 2004, it can be assumed that the product meets the reaction to fire requirements for Euroclass D-s2, d0, excluding floorings and class $D_{fl}$-s1 for floorings.

3.10 The classification relates to a 9 mm thick (minimum) panel, mounted without an air gap directly against class A1 or A2-s1, d0 products with a minimum density of 10 $kgm^{-3}$ or at least class D-s2, d0 products with a minimum density of 400 $kgm^{-3}$. The classification is for unjointed panels, tongue-and-groove jointed panels and fully supported joints installed in accordance with ENV 12872 : 2000.

3.11 This classification may limit the allowable exposed surface and when exposed within a cavity, the use of cavity barriers may be required to meet regulatory requirements

*Resistance to fire*

3.12 The resistance to fire of the plywood cannot be given in isolation. An appropriate assessment or test of the assembly in which the plywood is incorporated must be carried out by a UKAS (United Kingdom Accreditation Service) approved fire testing laboratory.

### Essential Requirement 3 — Hygiene, health and environment

CE 3.13 The formaldehyde (HCHO) classification is E1.

CE 3.14 No marking in relation to PCP-content.

3.15 Formaldehyde and pentachlorophenol are not subject to control under UK Building Regulations for this product and use. Boards of class E1 can be used without causing an indoor air concentration greater than 0.1 ppm HCHO in conditions according to EN 717-1 : 2004. Therefore, the quantity of gas emitted from the board alone, in the context of use given in this Guide, should not increase the level of gas within the building to an extent which will affect habitability.

3.16 The pentachlorophenol (PCP) content is not specified on the CE Marking, therefore, in accordance with EN 13986 : 2004, it can be assumed that the product contains less than 5 ppm PCP.

CE 3.17 The water vapour resistance factors (μ) are: wet cup 70, dry cup 200.

3.18 Assessment of the risk of interstitial condensation should be carried out in accordance with BS 5250 : 2002. The dry cup μ value can be used for the panels in buildings in humidity classes 1 to 4. In humidity class 5 (for example in buildings such as laundries, breweries, swimming pools), specialist advice should be sought and the least favourable factors used in any calculations, depending on the panels' location. For example wet cup μ for panels on the warm side of the construction and dry cup μ for panels on the cold side of the construction.

### Essential Requirement 5 — Protection against noise

CE 3.19 In relation to resisting sound transmission, the mean surface mass of the panels can be taken as 7.2 $kgm^{-2}$ for 12.5 mm thick panels and 10.4 $kgm^{-2}$ for 18 mm thick panels.

3.20 These values can be used to contribute to meeting minimum weight per unit area requirements for parts of specified constructions.

CE 3.21 When considering the sound absorbing properties of the panels, the coefficients shown in Table 6 should be taken into account.

*Table 6 Sound absorption coefficients*

| Frequency range (Hz) | Coefficient |
|---|---|
| 250 to 500 | 0.10 |
| 1000 to 2000 | 0.30 |

3.22 In general, where panels form cavities in a construction required to be sound resisting, an absorbent layer, such as mineral wool, should be included in the cavity.

CE 3.23 The sound transmission loss ($R$) for the panels themselves can be estimated in accordance with section 5.10 of EN 13986 : 2004, where $R = 13 \times log_{10} (m_A) + 14$. This gives $R$ values of 25 dB for the 12.5 mm thick panels and 27 dB for the 18 mm thick panels.

### Essential Requirement 6 — Energy economy and heat retention

CE 3.24 The thermal conductivity ($\lambda$) is 0.13 $Wm^{-1}K^{-1}$.

3.25 This value may be used in the calculation of U values in accordance with BS EN ISO 6946 : 1997.

### Aspects of durability, serviceability and identification

3.26 The panels are classified as type EN 636-2.

3.27 Technical class EN 636-2 relates to internal humid climatic conditions equivalent to service class 2 in accordance with BS EN 1995-1-1 : 2004 (Eurocode 5) and BS 5268-2 : 2002. These conditions are characterised by moisture content in the material corresponding to a temperature of 20°C and a relative humidity of the surrounding air only exceeding 85% for a few weeks per year.

3.28 Plywoods of this type are for use in biological hazard classes 1 and 2 as given in EN 335-3 : 1995. This type of plywood is appropriate for protected external applications (eg behind cladding or under roof coverings), but is also capable of resisting weather exposure for short periods (eg when exposed during the construction). It is also suitable for interior situations where the service moisture condition is raised above humidity of dry conditions.

### Attestation of conformity

3.29 The CE Marking has been affixed on the basis of compliance with the relevant requirements of EN 13986 : 2004. The attestation of conformity level associated with the CE Marking is system 2+. Attestation of Conformity is intended to ensure that the product is made and tested on a consistent basis. It involves tasks for the manufacturer and certification body:

3.30 Tasks for the manufacturer are:

- factory production control
- further testing of samples taken at factory
- initial type-testing or assessment.

3.31 Tasks for the certification body are:

- initial inspection of factory and the factory production control
- continuous surveillance
- assessment and approval of the factory production control.

These tasks have been carried out by HFB Engineering GmbH, notified body number 1034. It has issued Certificate of Conformity 1034-CPD-12981/4/05 for the 12.5 mm thick plywood and Certificate of Conformity 1034-CPD-12981/5/05 for the 18 mm thick plywood.

## Part 4 Factors relating to UK Regulations

### UK implementation of the CPD

4.1 Statutory Instrument 1991, No 1620. The Building and Building Construction Products Regulations 1991 as amended by the Construction Products (Amendment) Regulations 1994 (Statutory Instruments 1994, No 3051).

4.2 These Regulations implement Council Directive 89/106/EEC of 21 December 1988[1], modified by the Council Directive 93/68/EEC of 22 July 1993 and lay down the criteria for CE Marking of construction products. Where the stated performance values accompanying the CE Marking pass the minimum legal requirements for the intended use, if used appropriately and in satisfactory conditions, a product bearing CE Marking shall be presumed by the building control body to satisfy the relevant requirements unless there are reasonable grounds for suspecting otherwise.

(1) Known as the Construction Products Directive (CPD).

## The Building Regulations 2000 (as amended) (England and Wales)

**4.3 In the opinion of the BBA, the CE Marking indicates that Guaraply Pine Plywood, if used in accordance with the provisions of this Guide and the conditions associated with CE Marking, will satisfy or contribute to satisfying the various Building Regulations as listed below.**

| | | |
|---|---|---|
| Requirement: | A1(1) | Loading |
| Comment: | | When contributing to the structural strength and stability of a timber structure, the product is satisfactory, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| Requirement: | B2 | Internal fire spread (linings) |
| Requirement: | B3(4) | Internal fire spread (structure) |
| Comment: | | The panels have a reaction to fire class of Ds2, d0 excluding floors and class $D_{fl}$-s1 for flooring. See sections 3.8 to 3.12 of this Guide. |
| Requirement: | C2(c) | Resistance to moisture |
| Comment: | | The water vapour resistance factors should be used in calculations of the risk of interstitial condensation. See sections 3.17 and 3.18 of this Guide. |
| Requirement: | E1 | Protection against sound from other parts of the building and adjoining buildings |
| Requirement: | E2 | Protection against sound within a dwelling-house etc |
| Comment: | | The panels' mass will contribute to construction meeting these Requirements. See sections 3.19 to 3.23 of this Guide. |
| Requirement: | L1(a)(i) | Conservation of fuel and power |
| Comment: | | The thermal conductivity value should be used in U value calculations. See sections 3.24 and 3.25 of this Guide. |
| Requirement: | Regulation 7 | Materials and workmanship |
| Comment: | | The CE Marking shows that the product is acceptable. See sections 3.29 to 3.31 to 4.1 and 4.2 of this Guide. |

## The Building (Scotland) Regulations 2004 (as amended)

**4.4 In the opinion of the BBA, the CE Marking indicates that Guaraply Pine Plywood, if used in accordance with the provisions of this Guide and the conditions associated with CE Marking, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.**

| | | |
|---|---|---|
| **Regulation:** | **8** | **Fitness and durability of materials and workmanship** |
| Regulation: | 8(1) | Fitness and durability of materials and workmanship |
| Comment: | | The CE Marking shows that the product can contribute to a construction satisfying this Regulation. See sections 3.29 to 3.31 and 4.1 to 4.2 of this Guide. |
| **Regulation:** | **9** | **Building standards — construction** |
| Standard: | 1.1(a)(b) | Structure |
| Comment: | | The product is deemed to have sufficient strength and stability to sustain and transmit the design loads and therefore can contribute to satisfying this Standard, with reference to clause 1.1.1[(1)(2)]. See sections 3.1 and 3.7 of this Guide. |
| Standard: | 2.1 | Compartmentation |
| Standard: | 2.2 | Separation |
| Standard: | 2.3 | Structural protection |
| Standard: | 2.4 | Cavities |
| Standard: | 2.5 | Internal linings |
| Standard: | 2.6 | Spread to neighbouring buildings |
| Comment: | | The panels have a reaction to fire class D-s2, d0 excluding floorings and class $D_{fl}$-s1 for floorings and, therefore, is deemed to be combustible, classified as 'high risk' in relation to reaction to fire and able to contribute to satisfying these Standards, with reference to clauses 2.1.12[(2)], 2.2.4[(2)], 2.2.7[(1)], 2.3.2[(1)(2)], 2.5.1[(1)(2)], 2.6.5[(1)] and 2.6.6[(2)]. See sections 3.8 to 3.12 of this Guide. |
| Standard: | 3.15 | Condensation |
| Comment: | | The water vapour resistance factors should be used in calculations of the risk of interstitial condensation, with reference to clauses 3.15.1[(1)] to 3.15.7[(1)]. See sections 3.17 and 3.18 of this Guide. |
| Standard: | 6.2 | Building insulation envelope |
| Comment: | | The thermal conductivity value should be used in U value calculations, with reference to clause 6.2.0[(1)(2)]. See sections 3.24 and 3.25 of this Guide. |

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

### The Building Regulations (Northern Ireland) 2000 (as amended)

4.5 In the opinion of the BBA, the CE Marking indicates that Guaraply Pine Plywood, if used in accordance with the provisions of this Guide and the conditions associated with CE Marking, will satisfy or contribute to satisfying the various Building Regulations as listed below.

| | | |
|---|---|---|
| Regulation: | B2 | Fitness of materials and workmanship |
| Comment: | | The CE Marking shows that the product is acceptable. See sections 3.29 to 3.31 and 4.1 and 4.2 of this Guide. |
| Regulation: | C5 | Condensation |
| Comment: | | The water vapour resistance factors should be used in calculations of the risk of interstitial condensation. See sections 3.17 and 3.18 of this Guide. |
| Regulation: | D1 | Stability |
| Comment: | | When contributing to the structural strength and stability of a timber structure, the product is deemed to be satisfactory provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| Regulation: | E3 | Internal fire spread – Linings |
| Regulation: | E4(4) | Internal fire spread – Structure |
| Comment: | | The panels have reaction to fire class of D-s2, d0 excluding floorings and class $D_{fl}$-s1 for floorings. See sections 3.8 to 3.12 of this Guide. |
| Regulation: | F2(a)(i) | Conservation measures |
| Comment: | | The thermal conductivity value should be used in U value calculations. See sections 3.24 to 3.25 of this Guide. |

### Construction (Design and Management) Regulations 2007

### Construction (Design and Management) Regulations (Northern Ireland) 2007

4.6 Information in this Guide is intended to assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

| | |
|---|---|
| See section: | *Health and safety* (6.4 and 6.5). |

# Part 5 Factors relating to UK home warranty providers

## NHBC Standards 2007

5.1 In the opinion of the BBA, the CE Marking indicates that Guaraply Pine Plywood, if used in accordance with the provisions of this Guide and the conditions associated with CE Marking, will satisfy or contribute to satisfying the various NHBC Standards in the following situations:

| | | | |
|---|---|---|---|
| Chapter: | 6.2 | External timber framed walls | M4 |
| Comment: | | The product, when used as a sheathing material in timber frame construction, can contribute to the structural strength and stability of the building provided the design is in accordance with sections 3.1 to 3.7 of this Guide. | |
| Chapter: | 6.4 | Timber and concrete upper floors | M7 |
| Comment: | | The product, when used as a floor decking, can contribute to the structural strength and stability of a domestic floor, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. | |
| Chapter: | 6.6 | Staircases | M3 |
| Comment: | | The product is suitable for use in forming the risers in domestic timber staircases. | |
| Chapter: | 6.10 | Light steel framed walls and floors | M5 |
| Comment: | | The product, when used as a sheathing material in light steel frame construction, can contribute to the structural strength and stability of the building, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. | |
| Chapter: | 7.2 | Pitched roofs | M5 (e) rigid sarking |
| Comment: | | The product, when used as rigid sarking material, can contribute to the structural strength and stability of a domestic roof, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. | |

**5.2 In the opinion of the BBA, the CE Marking indicates that Guaraply Pine Plywood, if used in accordance with the provisions of this Guide and the conditions associated with CE Marking, will satisfy or contribute to satisfying the various technical requirements as listed below.**

| | | |
|---|---|---|
| External walls – timber frame | Page 186 | The product, when used as a sheathing material in timber frame construction, can contribute to the structural strength and stability of the building provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| External walls – steel frame | Page 207 | The product, when used as a decking material, can contribute to the |
| Upper floors | Page 221 | structural strength and stability of the floor provided the design is in |
| accordance with Internal works – floors | Page 275 | sections 3.1 to 3.7 of this Guide. |
| Pitched roofs | Page 246 | The product, when used as a sarking material, can contribute to the structural strength and stability of a domestic roof, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| | Page 250 | The product, when used as a sheathing material in timber roof construction, can contribute to the structural strength and stability of the roof provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| | Page 252 | The product is suitable for use in forming a tank base in domestic timber roofs. |
| Flat roofs | Page 269 | The product, when used as a flat roof decking material, can contribute to the structural strength and stability of the roof, provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| Internal works – ceiling | Page 288 | The product, when used as a decking material, can contribute to the structural strength and stability of the floor provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |
| Internal works – timber roofs | Page 376 | The product, when used as a plate material in timber roof construction, can contribute to the structural strength and stability of the roof provided the design is in accordance with sections 3.1 to 3.7 of this Guide. |

# Part 6 Additional factors

## Installation

6.1 The board is cut and fixed using conventional woodworking techniques.

6.2 The hygroscopic properties of plywood differ from those of solid timber, and under the same exposure conditions its equilibrium moisture content can be 2% to 3% less than, and the time taken to reach its equilibrium moisture content greater than, that for solid timber.

6.3 Where a building construction is likely to be sensitive to the relative movement of the panels, it is recommended that the panels should:

- be checked for moisture content at the time of the installation; the determination of moisture content by a calibrated moisture meter will be sufficiently accurate for this purpose
- have a moisture content at the time of installation close to the moisture content they will attain in service.

## Health and safety

6.4 Normal precautions should be exercised to avoid inhalation of wood dust when cutting, drilling and sanding the boards.

6.5 Depending on size and thickness the panels can be handled by one or two operatives. Normal precautions should be observed when handling large panels. Handling difficulties may be experienced in high winds.

# Part 7 Bibliography


BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

BS 8103-3 : 1996 *Structural design of low-rise buildings — Code of practice for timber floors and roofs for housing*

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS EN 1995-1-1 : 2004 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*

BS EN 12871 : 2001 *Wood-based panels — Performance specifications and requirements for load bearing boards for use in floors, walls and roofs*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

EN 335-3 : 1995 *Durability of wood and wood-based products — Definition of hazard classes of biological attack — Application to wood-based panels*

EN 717-1 : 2004 *Wood-based panels — Determination of formaldehyde release — Formaldehyde emission by the chamber method*

EN 789 : 2004 *Timber structures — Test methods — Determination of mechanical properties of wood-based panels*

EN 1058 : 1995 *Wood-based panels — Determination of characteristic values of mechanical properties and density*

EN 1195 : 1997 *Timber structures — Test methods — Performance of structural floor decking*

EN 12871 : 2001 *Wood-based panels — Performance specifications and requirements for load bearing boards for use in floors, walls and roofs*

EN 13986 : 2004 *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking*

ENV 12872 : 2000 *Wood-based panels — Guidance on the use of load-bearing boards in floors, walls and roofs*

# Part 8 Terms and Conditions

## Conditions

8.1 This Guide:

- relates only to the product that is named, described, installed, used and maintained as set out in this Guide;
- is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Guide;
- is valid only within the UK;
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- is copyright of the BBA;
- is subject to English law.

8.2 References in this Guide to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Guide.

8.3 This Guide will remain valid for an unlimited period provided that:

- the product, the manufacture and/or fabrication remain unchanged;
- the CE Marking remains valid;
- it is reviewed by the BBA as and when it considers appropriate: and
- the manufacturer confirms the Declaration of Conformity at six-monthly intervals.

8.4 In granting this Guide, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- the right of the Guide holder to market, supply, install or maintain the product;
- the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works: and
- the accuracy and validity of the information relating to the CE Marking.

8.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Guide are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Guide or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Guide, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.

On behalf of the British Board of Agrément

Date of Second issue : 22nd November 2007

Chief Executive

**Original Guide issued on 19th May 2006. This amended version includes change of marketing company, additional information on joist spacing on flat roofs and revision of product grades (Table 1).*

**British Board of Agrément**
Bucknalls Lane
Garston, Watford
Hertfordshire WD25 9BA

©2007

Tel: 01923 665300
Fax: 01923 665301
e-mail: mail@bba.star.co.uk
**website: www.bbacerts.co.uk**