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Appraisals

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TECHNICAL ASSESSMENT 310

October 2003

Unitex[®] Thermal Wall System (Uni-TWS[®])

PURPOSE

Insulation and surface protection of external walls of buildings.

APPLICANT

Unitex Granular Marble Pty Ltd (ABN 42 087 324 477), 22 Park Drive, Dandenong, Victoria 3175
(Manufacturer/Distributor).



TECHNICAL OPINION

In the opinion of CSIRO Appraisals, Unitex[®] Thermal Wall System, Uni-TWS[®], is suitable for the insulation and weatherproof protection of external walls for buildings up to three storeys, under the following conditions:

1. The system is installed in strict compliance with the *Uni-TWS[®] Manual* (October 2003).
2. The system is not installed in an area subjected to tropical cyclones as defined in AS 4055 - 1992 'Wind loads for housing' (Amdt 1 December 1994).
3. Fixing of the Uni-IB Boards (EPS sheets) is set on 450mm maximum stud spacings. Fixer spacings are 450mm maximum except where closer spacings are determined by the wind loads. Therefore fixer spacings for Wind Classification, as defined in AS4055, *Wind loads for housing*, is as follows:
 - (a) Wind Classification N1: Within 1200mm of a building edge at 450mm centres, elsewhere 450mm centres.
 - (b) Wind Classification N2: Within 1200mm of a building edge at 450mm centres, elsewhere 450mm centres.
 - (c) Wind Classification N3: Within 1200mm of a building edge at 350mm centres, elsewhere 450mm centres.
 - (d) Wind Classification N4: Within 1200mm of a building edge at 200mm centres, elsewhere 400mm centres.
 - (e) Wind Classification N5: Within 1200mm of a building edge at 150mm centres, elsewhere 250mm centres.
 - (f) Wind Classification N6: Not suitable
4. The finish is applied in temperatures above 10°C and below 35°C.
5. The surface over which the insulation sheet is fixed is flat within 6 mm over a 1200 mm radius. When using a timber frame, the frame must be constructed in accordance with the Australian Standard AS1684.
6. The surface over which the Uni-IB Board (foam insulation sheet) is fixed, is dry and free from dirt, dust, efflorescence, grease, oil, paint and lichen.
7. The foam insulation sheet is fire retardant 'SL' grade, with minimum bead fusion of 50%, to AS 1366 'Rigid cellular plastics sheets for thermal

insulation' Part 3-1992 'Rigid cellular polystyrene - Moulded (RC/PS-M)' (Amdt 1 February 1993).

8. All sealants used in conjunction with the Uni-TWS[®] system are to be of a durable, elastic nature and compatible with the Uni-IB Board.
9. The system is not cleaned, painted or otherwise treated with materials containing hydrocarbon solvents. This requirement applies both during construction and occupancy.
10. Where the building is required to be protected from subterranean termite attack, the building is protected by a barrier system that complies with the requirements of AS 3660.1-2000 'Termite management -New building work' and is compatible with the use of the expanded polystyrene sheet (Uni-IB Board) usage in the system.

Note: the framing is outside the scope of this assessment.

BUILDING CODE of AUSTRALIA 1996

In the opinion of CSIRO Appraisals, Uni-TWS[®] - the Unitex[®] Thermal Wall System described in this Technical Assessment and installed under the conditions listed in this Technical Assessment will satisfy the performance requirements of Clauses BP1.1, CP2, FP1.4 Volume 1 (Class 2- 9 buildings) and P2.1, P2.2.2, P2.6.1 Volume 2 (Class 1 and 10) of the Building Code of Australia 1996 (including all amendments up to and including Amdt No. 12).

Notes:

- (i) The inclusion of this clause with reference to the BCA is aimed at assisting those involved in the design, specifying and building approval/permit process relate the Appraisal to the relevant Performance Requirements of the BCA.
- (ii) Any changes made to the BCA will be reviewed during the term of validity of this Technical Assessment and, where necessary, any amendment required will be published on the CSIRO Appraisals web pages on <http://www.cmit.csiro.au>.

RELATED INFORMATION

VALIDITY OF THE ASSESSMENT

Condition:

This Technical Assessment applies only to the use of Uni-TWS[®] described herein.

Withdrawal:

This Technical Assessment will be withdrawn or amended if CSIRO Appraisals considers that a change in design or manufacturing quality renders the basis of appraisal invalid, or if reported field experience convinces CSIRO Appraisals of unsatisfactory quality or performance.

Term of Validity:

This Technical Assessment will lapse three years after the date of issue unless revalidation has been requested and granted.

RELEVANT DOCUMENTS

Standards Australia, AS 4055 - 1992 'Wind loads for housing' (Amdt 1 December 1994),
 AS 1366 'Rigid cellular plastics sheets for thermal insulation' Part 3-1992 'Rigid cellular polystyrene - Moulded (RC/PS-M)' (Amdt 1 February 1993).
 Standards Australia, AS/NZS 1530.3 – 1999 'Simultaneous determination of ignitability, flame propagation, heat release and smoke release'.
 Standards Australia, AS 3660.1 – 2000 'Termite management – New building work'.
 ASTM C518-98 'Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Apparatus'.
 ASTM E514-90 'Standard Test Method for Water Penetration and Leakage Through Masonry'

APPROVED ASSESSMENT EXTRACT

The Unitex[®] Thermal Wall System, Uni-TWS[®], is manufactured and distributed by Unitex Granular Marble Pty Ltd (ABN 42 087 324 477), Dandenong, Victoria, is suitable for the insulation and surface protection of external walls of buildings when the conditions listed in CSIRO Appraisals Technical Assessment 310 are fulfilled.

APPRAISAL

DESCRIPTION

The following description is based on information provided by the applicant.

General:

The Unitex[®] Thermal Wall System, Uni-TWS[®], is a method of applying insulation to the external walls of buildings and providing a weatherproof protection over the insulation. The system comprises several parts with the main ones being expanded polystyrene insulation sheets, Uni-IB Board, that can be fixed with a proprietary mechanical fixing system, fibreglass reinforcement mesh, Uni-Mesh IM 250, and bonding compound, Unitex[®] Polymer Render, a high fibre render base coat, Unitex[®] HiFibre Render, and a mineral based acrylic finish, from the Unitex[®] Décor range or Unitex[®] dry powder finish. The use of Unitex[®] patented edge, window and corner reveals ensures the correct base coat (and subsequent finish coat) render thickness, whilst also protecting all corner edges.

The system can be installed over the following – timber or metal frame walls, cellulose fibre cement board on timber framing, clean unpainted or painted concrete and concrete block/brick walls. The system is designed for vertical surfaces.

Also available are accessories including various faced lightweight cement-based profiles including parapet mouldings, window mouldings, quoins and scotia.

Specifications:

The following is a brief outline of the major parts of the system;

Unitex[®] Thermal Wall System insulation Board, Uni-IB Board. This is a panel of fire retardant expanded polystyrene or EPS, manufactured to AS 1366 'Rigid cellular plastics sheets for thermal insulation' Part 3-1992 'Rigid cellular polystyrene - Moulded (RC/PS-M)' (Amdt 1 February 1993). The standard grade used is 'SL' grade (approximate density 13.5 +/-0.5 kg/m³). The sheet comes in sizes 1200 mm by 2400 mm in thicknesses of 50 mm, 75 mm and 100 mm. The Uni-IB Board sheets are fixed in a horizontal orientation, offset pattern.

Unitex® Thermal Wall System Mechanical Fixing System. This is used for timber or metal frame construction and consists of fixing anchors and washers in relevant sizes for fixing the three different thicknesses of sheet. The anchors are Bugle C/R Needle Point, Class 3 hardened steel screws complying with AS3566-2002. and washers are extruded polypropylene.

Uni-Mesh IM250. The mesh is a specially woven reinforcing fabric which is treated for compatibility with Uni-TWS® mineral based and acrylic modified materials. It comes in a width of 250mm rolls 50 m in length. It is a 5 mm square woven mesh weighing approximately 160 gm/m.

Uni-Glu® Adhesive is a polymer material mixed with Portland Cements used in conjunction with the mechanical fasteners when fixing the insulation board to solid masonry surfaces, only when using the 100 mm (or greater thickness) EPS foam.

Unitex® Polymer Render is also a polymer material mixed with Portland Cements used to embed the reinforcing mesh to the face of the insulation board at sheet joins.

Unitex® Thermal Wall System HiFibre Render is a lightweight fibre-reinforced, high impact resistant render. It must be built up to a minimum 10 mm thickness. Unitex® Thermal Wall System HiFibre Render is a reinforced polymer compound available in multi-walled paper sacks and Bulka bags and is applied by spray or trowel.

Unitex® Thermal Wall System Applied Finish is available in a range of mineral based or acrylic based compounds that can be trowelled, sprayed or painted. There are a variety of colours and textures.

Installation:

Construction and installation instructions are contained in The Uni- TWS Manual (October 2003).

Timber framing should comply with AS 1684-1999, 'National Timber Framing Code' and metal framing should comply with AS 3623 – 1993 'Domestic metal framing'. Other instruction details are applicable and are summarized below but the above instructions should be referred to in practice.

New timber/metal frame construction. A fire-retarded reflective-foil must be fixed under expanded polystyrene sheets if the internal walls are unlined, (i.e. for garages). An alternative is to spray Unitex® HiFibre Render to a minimum thickness of 5 mm on the unlined internal surfaces,

The Unitex® Thermal Wall System Uni-TWS® sheets are fixed to a bracing sheet or attached directly to the frame. Where a bracing sheet is used, the sheets are fixed with Uni-Glu® Adhesive and Uni-TWS® Mechanical fixings. Where there is no bracing, the sheets are mechanically fixed to the studs. The frame must be braced by an approved bracing method prior to attaching the TWS panels.

Stud spacing is normally 450 mm and at external corners an extra stud is used between frames.

Concrete, brick or concrete block buildings.

The surface over which the expanded polystyrene sheet is installed must be approved by Unitex® or an approved distributor and be dry and free of dirt, dust, efflorescence, paint, grease, oil, and lichen. The expanded polystyrene sheets, the Uni-B Board, are fixed to the substrate by Uni-Glu® Adhesive and Uni-TWS® Mechanical fixings. This adhesive is applied to the back of each sheet in a 50 mm wide by 5 mm thick band around the edge of each sheet, then in vertical strips 400 mm apart and 50 mm wide and 5 mm thick.

Application of the base render coat

The base render coat, Unitex® HiFibre Render, is spray or trowel applied to the wall to a minimum specified thickness of 10 mm. Thickness is controlled by the screeding of the render between the patented edge, window and corner reveals around the openings and at the top and bottom of the wall.

Applied Finish Coat

The finish coat is selected from the Unitex® Applied Finishes range. Refer to the appropriate brochures for application details.

Expansion and construction joints. Expansion and construction joints are determined by engineering requirements. In any case they should be no more than 6 metres apart on any surface. At these joints, the edge of the expanded polystyrene sheets are finished with a preformed moulding in accordance with the Unitex® installation instructions.

DESIGN INFORMATION

General:

Based on information from the applicant, Unitex® Thermal Wall System is a method of applying insulation to the external walls of buildings and providing a weatherproof protection over the insulation.

Design considerations:

According to the applicant, Unitex[®] Thermal Wall System consists of an expanded polystyrene insulation sheet mechanically fixed to a framed wall. Sheet joins are reinforced by treated fibreglass mesh bonded with a polymeric render. A minimum 10 mm thick spray or trowel-applied fibre-reinforced render is applied over the expanded polystyrene sheets. The use of the Unitex[®] patented edge, corner and sill reveals ensures that the minimum 10mm base render is achieved. The complete system is then finished with a coloured textured coat.

Durability:

In the opinion of CSIRO Appraisals, the Unitex[®] Thermal Wall System will have durability equivalent to conventional claddings currently in use in Australia.

BASIS OF APPRAISAL

CSIRO Appraisals has assessed the following aspects in undertaking this appraisal:

- (a) installation procedures,
- (b) the ability of the system to prevent entry of wind driven rain,
- (c) the bonding of the system on to the substrate,
- (d) the durability of the system,
- (e) the ability of the system to resist impact loadings and
- (f) the fire performance of the system.

The following documents and inspections were used in carrying out the appraisal.

Manufacturer's and Installation Information:
(MANUAL AND SPECIFICATIONS)

1. Unitex Uni-TWS[®] Manual (October 2003).

Reports:

1. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Report NO FNE8054 (10 May 2002):** This report provides results of testing of the Unitex[®] Thermal Wall System for Fire hazard properties to AS 1530.3. It met the BCA general requirements for Classes 1 to 10 buildings.
2. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Report NO 02/182 (June 2002):** This report provides results of the Unitex[®]

Thermal Wall System for testing of Soft Body Impact resistance. The testing showed satisfactory performance.

3. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Report NO 02/183 (June 2002):** This report provides results of the Unitex[®] Thermal Wall System for testing of Hard Body Impact resistance. The testing showed satisfactory performance.
4. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Report NO 02/181 (June 2002):** This report provides results of the Unitex[®] Thermal Wall System for testing of Ladder Loading resistance. The testing showed satisfactory performance.
5. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Report NO 02/170 (June 2002):** This report provides results of testing of the Unitex[®] Thermal Wall System for water penetration to ASTM E514-90. No water penetration was observed to the back of the joins in the expanded polystyrene sheeting at the end of the four hour exposure to simulated wind driven rain.
6. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Fax (24th May 2002):** This document provides results of testing of the Unitex[®] Thermal Wall System for thermal insulation properties of the cladding system.
7. **CSIRO Building, Construction and Engineering, Graham Road, Highett, Victoria 3190, Reports NO 02/133 (May 2002) & 02/214 (November 2002):** These reports provide results of testing of the Unitex[®] Thermal Wall System for the structural strength of the mechanical fastening system used to fasten the expanded polystyrene boards to the framing system. They outline the fasteners spacings for studs spaced at 450 mm and 600 mm centres.
8. **Allunga Exposure Laboratory, Townsville Queensland 4810, Exposure Report Ref 276 180 (4th October 2002):** This report provides a 6 month report on the performance of the Uni-TWS[®]. It shows that there has been no noticeable change for some samples and for others the colour is a trace lighter.

Note: Exposure tests outdoors are the only reliable means of obtaining information about the durability of materials in terms of their continuing satisfactory performance. Such testing takes a long time. CSIRO Appraisals does not consider it warranted to await results from such tests before issuing an Appraisal based on laboratory assessments, inspections

and the history of completed installations. Interim results of the Allunga tests will be considered during the review of the Technical Assessment.

Inspection:

CSIRO has witnessed an installation in progress. There were no problems arising from this installation. Overseas experience has shown satisfactory performance of similar systems for the past 35 years.



Paul Bailey
CSIRO Appraisals



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- Technical Assessments – full fitness for purpose appraisals of innovative products, systems or materials that may or may not be covered by Australian Standards or building regulations.
- Interim Reports – appraisals of products that have not yet reached the fully developed or manufacturing phase. They aid with product development and may be used as a step towards a subsequent Technical Assessment.
- Certification Assessments – appraisals of products, systems or materials solely against the requirements of the BCA and used for gaining approval from Federal or State authorities.

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Technical Assessments are intended to help all those concerned with the approval, specification and use of new

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Each Technical Assessment has been prepared by CSIRO Appraisals and then reviewed, revised and finally endorsed by the Technical Advisory Committee (TAC), detailed below. CSIRO makes the appraisals on a national basis by obtaining input from regional committees in each State and Territory to take account of variations in local building regulations, practice and local climatic features.

CSIRO Appraisals bases its assessment on the product and information it receives and cannot accept responsibility for deviations in the manufactured quality and performance of the material, product or system. However, Technical Assessments will be withdrawn where adequate quality or performance has not been maintained.

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The Unitex[®] Thermal Wall System is manufactured and distributed by Unitex Granular Marble Pty Ltd (ABN 42 087 324 477), Dandenong, Victoria, is suitable for the insulation and surface protection of external walls of buildings when the conditions listed in CSIRO Appraisals Technical Assessment 310 are fulfilled.