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Autorisé et notifié conformément à l'article 10 de la directive 89/106/EEC du Conseil, du 21 décembre 1988, relative au rapprochement des dispositions législatives, réglementaires et administratives des Etats membres concernant les produits de construction.

economie
SPF Economie, P.M.E., Classes moyennes et Energie

UBAtc
Member of EOTA

European Technical Approval **ETA-07/0244**

Trade name:	**KALWALL translucent self supporting system**
Holder of the approval:	**Kalwall Corporation** **1111 Candia Rd.** **P.O. Box 237,Manchester, NH 03105** **USA**
Website:	**http://www.kalwall.com**
Generic type and use of construction product(s):	**Self supporting composite panels for wall cladding**
Validity from:	**2008-09-01**
to:	**2013-08-31**
Manufacturing plant(s):	**Kalwall Corporation** **1111 Candia Rd.** **P.O. Box 237,Manchester, NH 03105** **USA**
This European Technical Approval contains:	**12 pages, including 3 annexes that form an integral part of the document**

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by UBAtc in accordance with:
   - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by Council Directive 93/68/EEC[2] and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council[3];
   - Belgian law of 25 March 1996 concerning the adaptation of legislative and administrative provisions of Member States to the Construction Products Directive (89/106/EEC) for construction products[4] and Belgian Royal Decree of 18 August 1998 concerning construction products[5]
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC[6];
   - Guideline for European Technical Approval of "Self-supporting composite lightweight panels" ETAG 016, edition 2003, Parts 1 and 3.

2. The UBAtc is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those laid down in the context of this European Technical Approval.

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6. The European Technical Approval is issued by the approval body in its official languages. These versions correspond fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

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[1] Official Journal of the European Communities N° L 40, 11.2.1989, p. 12
[2] Official Journal of the European Communities N° L 220, 30.8.1993, p. 1
[3] Official Journal of the European Union N° L 284, 31.10.2003, p. 1
[4] Belgian Law Gazette, 21.05.1996
[5] Belgian Law Gazette, 11.09.1998
[6] Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of the product and intended use

1.1 Definition of the product

Kalwall composite panels are translucent self-supporting composite panels formed by permanently bonding fibre glass sheets to a grid core constructed of interlocked thermally-broken or non-thermally broken aluminium I-beams.

The panels are factory made to the exact size and configuration for each project.

The composite panels covered by this ETA have a nominal thickness of 70 mm. Table 1 presents the types covered by this ETA.

Table 1: Denomination of Kalwall panels

Type	Description		
	Thermally broken grid	Fiberglass insulation (mm)	Dense fiberglass insulation (mm)
Kalwall 1,56	No	70	-
Kalwall 1,25	Yes		
Kalwall 1,2	No	38	32
Kalwall 0,78	Yes		
Kalwall 0,99	No	3	67
Kalwall 0,56	Yes		

The panel consists of fiberglass and dense fiberglass insulation. The difference between both is their density. Dense fiberglass has a density of (7,5 ± 0.1) kg/m², whereas the other fiberglass has a density of (4,5 ± 0.1) kg/m²; the thin insulation fleece has a specific mass of (120 ± 10) g/m².

The face sheets are composed of:

Outside sheet:
(from exterior face to inside face)
- A smooth weather resistant surface
- An erosion prevention barrier
- A polymer/fibreglass base with properties regarding UV, thermal resistance and /or reaction to fire

Inside sheet
(from interior face of the building to the inside face of the panel)
- A smooth exterior surface
- A polymer/fibreglass base with properties regarding impact resistance and reaction to fire

The panels are flat and formed by permanently bonded fibreglass reinforced translucent faces to a grid core constructed of interlocked, extruded structural aluminium or “thermally broken” composite I beams. Figure 1 gives an elevation and the cross sections for the panels when installed in the wall.

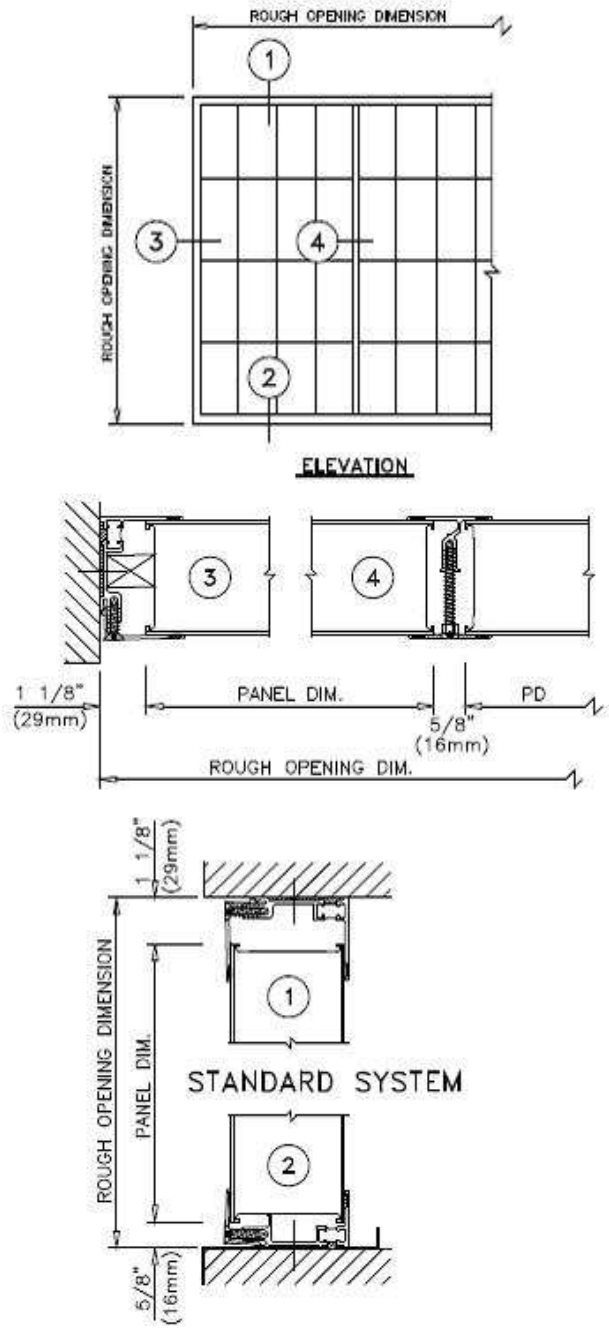

Figure 1: Elevation and cross section

1.2 Structural spacers of the panels

The composite panel 70 mm overall thickness is constructed by the external sheets separated by structural I-beams either non thermally broken or thermally broken. The structural I beams create a grid by the interlocking of horizontal or vertical profiles with the continuous I beams.

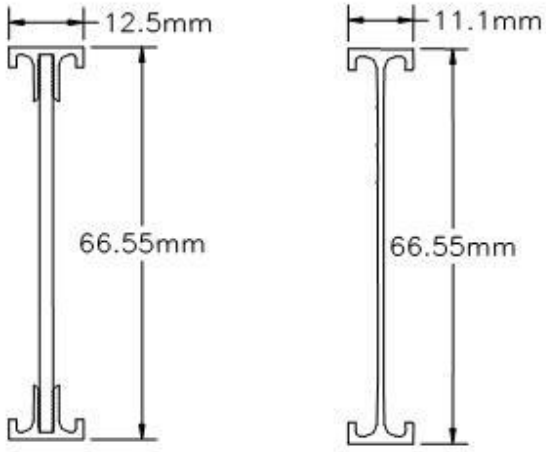

Figure 2: Thermally and non thermally broken profile (TB and AL-I)

1.2.1 Non thermally broken structural profile AL-I/AL-I/H

The non thermally broken profile has an I shape beam of an 6005 T5 alloy (ISO denomination AlMgSi) with a 0,2% yield strength of 160 N/mm² and a modulus of 70 kN/mm².

Two types of I-beams are available with the following characteristics in Table 2.

Table 2: Characteristics I-beams

Denomi-nation	Surface (mm²)	Inertia (cm^4)	Resistance moment (cm^3)	Height (mm)
AL-I	108,65	6,614	1,987	66,55
AL-I/H	129,26	7,717	2,317	66,55

1.2.2 Thermally broken structural profile (TB)

The thermally broken structural profiles feature a composite beam with aluminium flanges and a flat polyester (PE) fibre reinforced core. The core is cut out of a sheet of PE fibre reinforced facing type SW that can also be used as the exterior facing.
The assembly is done in a production process with inserting and gluing of the fibre reinforced core in the aluminium flanges and an additional mechanical clamping of the aluminium profiles to the PE fibre reinforced core.

The total height of the profiles is 66,5 mm with tolerances +0,5 mm and –0,0 mm
The total height of the panel with the exterior and interior facings is (70 ± 1) mm.

1.2.2.1 Standard version (TB-I)

This profile has an aluminium flange of 12.5mm

On the basis of the design value the stiffness of the composite beam can be determined.
The I-value, determined by testing of the I beam according to EN 14024:2005 method 1, of the thermally broken profiles is presented in figure 3 and Table 3 as a function of the span length.

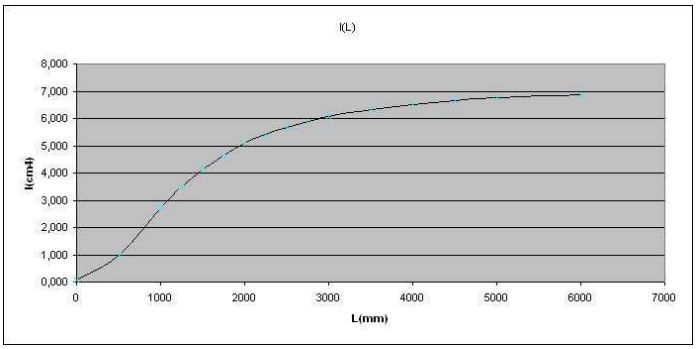

Figure 3: I-value of the thermally broken profiles

Table 3: Numerical data TBI

L(mm)	0	500	1000	1250	1500
I (cm^4)	0,083	0,996	2,730	3,505	4,151

L(mm)	1750	2000	2250	2500	2750
I (cm^4)	4,673	5,089	5,422	5,687	5,902

L(mm)	3000	3500	4000	4500	5000	6000
I (cm^4)	6,076	6,338	6,520	6,651	6,748	6,879

1.2.2. 2 Reinforced version (TB-I/H)

This version has an aluminium flange of 12,5 mm.
The I value as a function of the span length is given in figure 4 and Table 4.
The variation of this I value is determined on the basis of tests according to EN 14024.

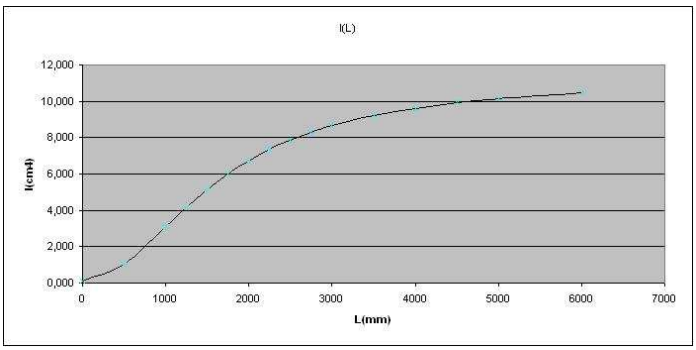

Figure 4: I-value of the thermally broken profiles

Table 4: Numerical data TBIH

L(mm)	0	500	1000	1250	1500
I (cm^4)	0,083	1,017	3,083	4,157	5,139

L(mm)	1750	2000	2250	2500	2750
I (cm^4)	5,997	6,729	7,346	7,861	8,293

L(mm)	3000	3500	4000	4500	5000	6000
I (cm^4)	8,654	9,215	9,620	9,919	10,145	10,455

1.3 Intended use

This ETA covers Kalwall composite panels for vertical wall systems.

The provisions, test and assessment methods in this ETA, have been written, based upon the assumed intended working life of the self-supporting composite lightweight panels for the intended use of 25 years provided that the self-supporting composite lightweight panel is subject to appropriate use and maintenance. These provisions are based upon the current state of art and the available knowledge and experience.

Note
The indications given as to the working life of a self-supporting composite lightweight panel cannot be interpreted as a guarantee given by the producer or the approval body. They should only be regarded as a means for the specifier to choose the appropriate criteria for self-supporting composite lightweight panels in relation to the expected, economically reasonable working life of the works.

2 Characteristics of the product and method of verification

2.1 Characteristics of the products

2.1.1 Product characteristics of the panels

2.1.1.1 Sheets of the panels

Translucent faces from glass fibre reinforced thermo set resin.

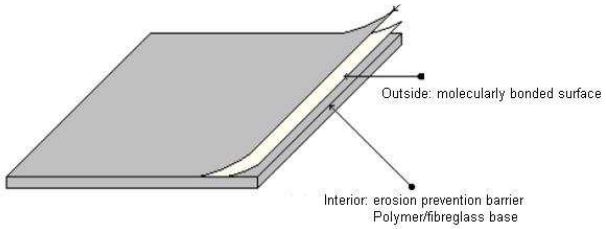

Figure 5: Detailed view of the sheets

2.1.1.2 Denomination of the Kalwall panels and maximum dimensions

The dimensions of the panels can continuously vary in width and be made up to 8096mm long and with tolerances on the length of ± 4mm and on the width of ± 2mm.
Panel thickness: (70 ± 1) mm. On the sheets ± 10% of the nominal thickness.

Table 5: standard dimensions

Panel width (mm) and tolerances +3mm, -0 mm	Grid cell dimensions (mm*mm - nominal)
1220	305*610
1524	305*610
1200	300*600
1500	300*600

The possible infills and their denomination combined with the structural profile are presented in Table 1.
The dimensional variations are not assessed as the panels fit into a structure allowing free movement in all directions.

2.1.2 Complementary products

The ancillary products, necessary for the installation of the panels in a translucent wall are presented in annex 1. The ancillary products are not covered by this ETA. Information about them and their use is given as complementary information for the end user. The execution drawings are presented in annex 2.

2.2 Method of verification

ER2 SAFETY IN CASE OF FIRE

Table 6: Classification according to EN 13501-1

TYPE of Panel	Classification
Kalwall 1,56	B, s2, d0
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

ER3 HYGIENE, HEALTH AND ENVIRONMENT

Water vapour permeability

Table 7: Classification for water vapour permeability

TYPE of Panel	Classification
Kalwall 1,56	No Performance Determined
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

Note
The permeability, determined through calculation, of the panels based on the unsaturated Polyester resin is 4.10^{-8} gram/ms.

Release of dangerous substances

The Kalwall panels comply with the provisions of Guidance Paper H ("A harmonized Approach relating to Dangerous Substances under the Construction Products Directive", edition 2002) about dangerous substances.
A written declaration of conformity in this respect was made by the manufacturer. In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

ER4 SAFETY IN USE

Mechanical resistance

The mechanical resistance of the Kalwall panel is determined by a cycle of testing on full scale panels in a 4 point bending test.

The ultimate failure load has been determined.

Table 8: Mechanical resistance

TYPE of Panel	Value
Kalwall 1,56	2248N/m²
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

Impact resistance

Soft body impact

Under soft impact load with a mass of 50 kg, the panel withstands 900 Joules on 3 different locations (panel center, in the node of the supporting grid and on the grid) at each panel side

Note.
Under soft impact load with a mass of 50 kg according to EN 1401 the panel withstands an impact height of 1600 mm from each panel side.

Hard body impact

Under hard body impact load with a mass of 1kg, the panel withstands 10 Joules applied on 3 different locations (panel center, in the node of the supporting grid and on the grid) at each panel side.

Table 9: Impact resistance

TYPE of Panel	Value
Kalwall 1,56	Soft body impact 900 Joules Hard body impact 10 Joules
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

Durability

The mechanical resistance of the Kalwall panel has been determined by a cycle of testing on full scale panels in a 4 point bending test, according to §6.7 of ETAG 16 part 3 after 15 climatic cycles of ageing and compared with the initial value for the ultimate failure load.

Prior to ageing:

Ultimate load (N/m²): 2248

After ageing:

Ultimate load (N/m2):2208

Table 10: Durability classification

TYPE of Panel	Classification
Kalwall 1,56	Lifetime of 25 years
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

Note on UV exposure
In situ tests showed that Kalwall panels withstand outdoor exposure in Florida with an average UV exposure 280MJ/m² for 8 years (total exposure per year of 6588MJ/m²) with a ΔE lower than 3.

ER5 SOUND INSULATION

The airborne sound insulation of the Kalwall panel was not assessed in the framework of this ETA.

Table 11: Airborne sound insulation

TYPE of Panel	Value
Kalwall 1,56	No Performance Determined
Kalwall 1,25	
Kalwall 1,2	
Kalwall 0,78	
Kalwall 0,99	
Kalwall 0,56	

Note on available test results

The following panel compositions (see Table 11) have been subjected prior to testing and classification of the sound insulation factor is determined according to EN ISO 717-1:1997.

Generalities
Overall size of the mock-up:1.52m*2.64m=8.53m²
The results are presented in Table 12.

Table 12: Airborne sound insulation

Kalwall panel type denomination	Description grid (mm*mm)	Result Rw (C,Ctr)
Kalwall 0.99	200*500	31(-3,-8)
Kalwall 0.56	200*500	32(-4,-9)
Kalwall 0.56	300*600	31(-2,-8)

ER6 ENERGY ECONOMY AND HEAT RETENTION:

Determination of thermal insulation and susceptibility to condensation.

Calculation method for the U value.

The U-value calculation was performed according to EN ISO 10077-2 on the basis of a model to determine the U-value at different locations: center value, at the edge (63 mm wide) and at the grid (127 mm wide) in the panel. The results are summarised in Table 13.

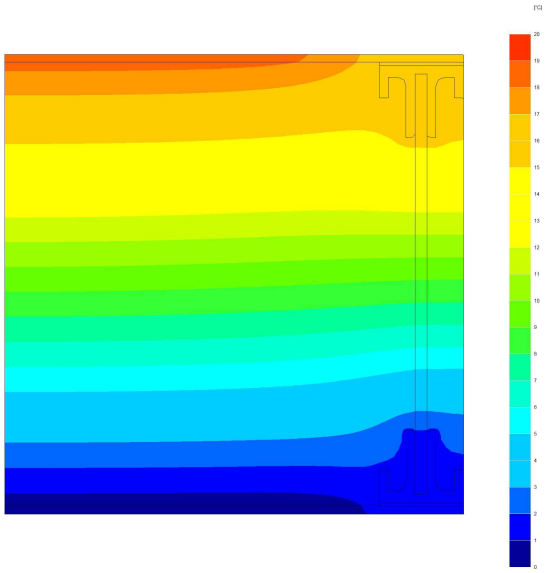

Figure 6: Isotherms in panel edge

Table 13: U-values

Kalwall panel type denomination	U-value center W/m²K	U-value edge W/m²K	U-Value grid factor W/m²K
Kalwall 1,56	1,35	2,00	4,12
Kalwall 1,25	1,35	1,39	1,73
Kalwall 1,2	0,79	1,55	4,01
Kalwall 0,78	0,79	0,86	1,15
Kalwall 0,99	0,58	1,27	4,24
Kalwall 0,56	0,58	0,63	0,96

ASPECTS OF DURABILITY

The durability of the translucent panel in time will be influenced by the behaviour in time of the edge sealing similar to the situation for insulating glass units.
To investigate the durability of the edges of the panel, assessment according to EN 1279-4 for ageing under a cycle of heat, UV and water has been executed. No adhesion loss of more than 40% was obtained.

3 Evaluation of conformity and CE marking

3.1 ATTESTATION OF CONFORMITY SYSTEM

In the framework of the mandate for lightweight panels, the systems of attestation of conformity specified by the European Commission detailed in Commission Decision 2000/447/EC* of 13 June 2000 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards self-supporting composite lightweight panels, amended by Commission Decision 2001/596/EC of 8 January 2001**

*OJ, L 180, 19.7.2000, p. 40
**OJ, L 209, 2.8.2001, p. 33

For Kalwall panels being put on the market with a declaration regarding fire performance, the system 1 applies.

System 1

(a) tasks for the manufacturer

— factory production control;
— testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.

(b) tasks for the approved body

— initial type testing of the product;
— initial inspection of the factory and of factory production control;
— continuous surveillance, assessment and approval of the factory production control.

3.2 RESPONSIBILITIES

3.2.1 Tasks for the manufacturer

3.2.1.1 Factory production control

Kalwall as the panel manufacturer exercises permanent internal control of production and has set up a FPC system in line with ETAG 016.

All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval (ETA).

3.2.1.2 Testing of samples taken at the factory

A prescribed test plan has been set up related to the FPC controls.

Table 14: FPC controls on incoming components

Type of Test	Method	Minimum number of specimens	Minimum frequency
I-beam profile			
Depth	3.3.1	10	each delivery
Hardness / alloy / temper	declaration	1	each delivery
TBI interface bond	SOP	1	3x per shift
Face material			
Thickness	declaration	1	all incoming reels
Hardness			
Width			
Type			
Tensile strength	5,7	4	2x / year
Insulation (glass wool)			
Density	SOP	1	every 35 rolls
Thickness			
Colour			
Adhesive			
Viscosity	3.2.5	1	each delivery
Draw down	3.2.1		
Peel strength	3.2.3		
Tensile strength	3.2.4		

Table 15: In process FPC controls

Type of Test	Method	Minimum number of specimens	Minimum frequency
Adhesive spread thickness	QC-010	10	1x per shift
Bond strength	3.2.3 & .4	1	1x per shift
Panel[7]			
Length	QC-016	1	20 x per shift
Width			
Diagonal (squareness)			
Grid spacing			
Appearance			
Pinholes (permeability air / water vapour)			

[7] Each panel is submitted to these controls as they are build to order

Table 16: Sample plan for surveillance

Description	Test method	Frequency
Thermally broken grid profiles	EN 14024 for control of the Shear and Tensile resistance of the thermally broken girders.	Every week
Glass fibre insulation	According to EN 13162 and the Lambda value and U value determined as described in annex D.	Every 3 months
Face material	According to EN ISO 11925-2:2002 Single flame source test	Every week

Note: The manufacturer may adopt alternative but similar test methods, using comparable testing equipment and under other testing conditions, verifying the same characteristic.

3.2.2 Tasks for the approved body :

3.2.2.1 Initial Type Testing

Approval tests have been conducted by the approval body (UBAtc - BUtgb) or under its responsibility (which may include a proportion conducted by an indicated laboratory or by the manufacturer witnessed by the approval body) in accordance with ETAG. The approval body (UBAtc - BUtgb) has assessed the results of these tests in accordance with this ETAG, as part of the ETA issuing procedure.

3.2.2.2 Assessment of the factory production control system-initial inspection and continuous surveillance

Assessment of the FPC is the responsibility of the approved body and an assessment has been carried out on the required manufacturing step of each manufacturing plant to demonstrate that the factory production control is in conformity with the ETA 016 and any subsidiary information. This assessment is based on an initial inspection of the factory.
Subsequently continuous surveillance of factory production control is necessary to ensure continuing conformity with the ETA 016. This continuous surveillance is performed as foreseen in ETAG 016.

On the basis of the initial assessment surveillance inspections shall be conducted twice a year, divided into an FPC audit and one technical inspection

3.2.2.3 Certification

A notified body shall issue an EC certificate of conformity once all conformity assessment tasks have been performed or are being performed (as relevant) by the ETA-holder.

3.3 CE MARKING

The CE marking shall be affixed on the packaging and in the accompanying documents. The symbol "CE" shall be accompanied by the following information:

- Registration number of the notified body
- Name of identifying mark of the producer and manufacturing plant;
- The last two digits of the year in which the CE marking was affixed;
- Number of European Technical Approval;
- Number of EC certificate of conformity;
- Reference to ETAG 016, parts 1 and 3

CE	"CE" symbol
XXXX	Number of the Notified Body
Kalwall Corporation, 1111 Candia Rd. P.O. Box 237 Manchester, NH 03105 USA 08	Name and address of the producer (legal entity responsible for placing onto the market) and manufacturing plant Two last digits of year of affixing CE marking
ETA-07/0244	ETA number
ETAG 016 Parts 1 and 3	ETA-Guideline reference
XXX-CPD-YYYY	Number of EC Certificate of conformity
KALWALL DIFFUSE TRANSLUCENT SANDWICH PANEL TYPE X,XX	Information distinguishing between different products or types specified in the ETA, permitting to establish the performances of the product to which the CE Marking belongs.

Figure 7: Example of CE marking and accompanying information

4 Assumption under which the fitness of the product for the intended use was favourably assessed

4.1 MANUFACTURING DIRECTIVES

The manufacturing directives are presented in the Kalwall manual and take into account the complete production process, testing indoor and outdoor.

Kalwall produces the interior and exterior sheets.
The aluminium girders or TB broken girders are assembled.
The grids are assembled on the basis of the overall measures and the grid structure is obtained by the interlocking connection between the profiles. The interior sheet is applied to the grid structure.
The corner sealings and assembly are made.
The panels are filled with the appropriate insulation depending on the panel type.
The outside sheet is then applied and in a temperature and pressure controlled calendaring the panels are assembled.
Both top and bottom of the panels are marked for ease of installation.
Together with the ancillary components the panels are protected and prepared for transport.

4.2 DESIGN RULES AND APPLICATION RULES

4.2.1 Design rules

The design rules are in the Kalwall manual and take into account the calculation of deflection and stresses in line with the specifications of the project

On the basis of the wind loads and horizontal loads, the calculation of the deflections and stresses are done in the girders and the imposed allowable deflections are verified.
The calculations are done in line with the Euro code 1, EN 1991-1-4 and the national annex of the country in which the panels are installed.

4.2.2 Application rules

The application rules are in the application documents that are used by the by Kalwall approved installers. Only installers that received a training course should apply the system.
For the first projects a detailed follow up of the installation is done by Kalwall.

4.2.3 Recommendation for façade maintenance and cleaning

The field maintenance procedure for Kalwall panels and systems contains the necessary instructions regarding maintenance schedule, surface preparation and application of the maintenance and cleaning products.

The Kalwall panels contain a self-cleaning surface . Under normal rainfall the panels will be free of dust and dirt.
The maintenance can then be done by washing with soapy water and periodic rinsing.
In case of the weathering surface would lose its sheen and become matte this can be restored.
The procedure is described in the maintenance manual and will depend of the exposure of the panels.
A field maintenance procedure for Kalwall Panels and systems is available
It contains information for:

- The resurfacing;
- The repairing of damaged Kalwall Panels;
- The repairing of holes in Kalwall Panels;
- The refinishing of Kalwall Aluminum Clamp-Tite Installation Systems;
- The application of light transmission reducing coating and sealer;
- The cleaning of the Kalwall Panels;
- The scratch repair.

Annexes to ETA on Kalwall

Nr	Description
1	References
2	Ancillary products
3	Execution drawings

Annex 1: references

The following standards have been referred to, in addition to those mentioned in ETAG 016, parts 1 and 3.

EN 14024:2004 Metal profiles with thermal barrier - Mechanical performance - Requirements, proof and tests for assessment

EN 1279-4: 2002 Glass in building - Insulating glass units - Methods of test for the physical attributes of edge seals

EN 13162:2001 Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification

NOTE: The editions of reference documents given above are those which have been adopted by the UBAtc for its specific use when establishing this ETA. When new editions become available, these supersede the editions mentioned only when confirmed by the UBAtc.

Annex 2: Ancillary products

The following table gives an overview of the ancillary products.

Nr	Description	Specific name/type
1	Interior multi-storey batten	Aluminium profile
2	Interior jamb	Aluminium profile
3	Exterior jamb	Aluminium profile
4	Exterior multi-storey batten	Aluminium profile
5	Sealing tape for interior sealing	Tape
6	Butt joints sealing	Kalseal kit
7	Jamb spacer	Accessory
8	Flashing tab	Accessory
9	Panel stop	Accessory
10	Fixing screw	Accessory
11	Sealing product	Kalcaulk
12	Aluminium clip Angle	Accessory

Annex 3: Execution drawings

The execution drawings are listed in the following table.

Nr	Description	Revision
1	Wall installation instructions	6/6/1998
2	Multi-storey wall installation instructions	02/2002

They contain the fully detailed information for the on site handling, installation and weatherthightning of the wall in which the panels are installed.
They are available in digital form , the underneath Figure 8 contains an overview of the main components.

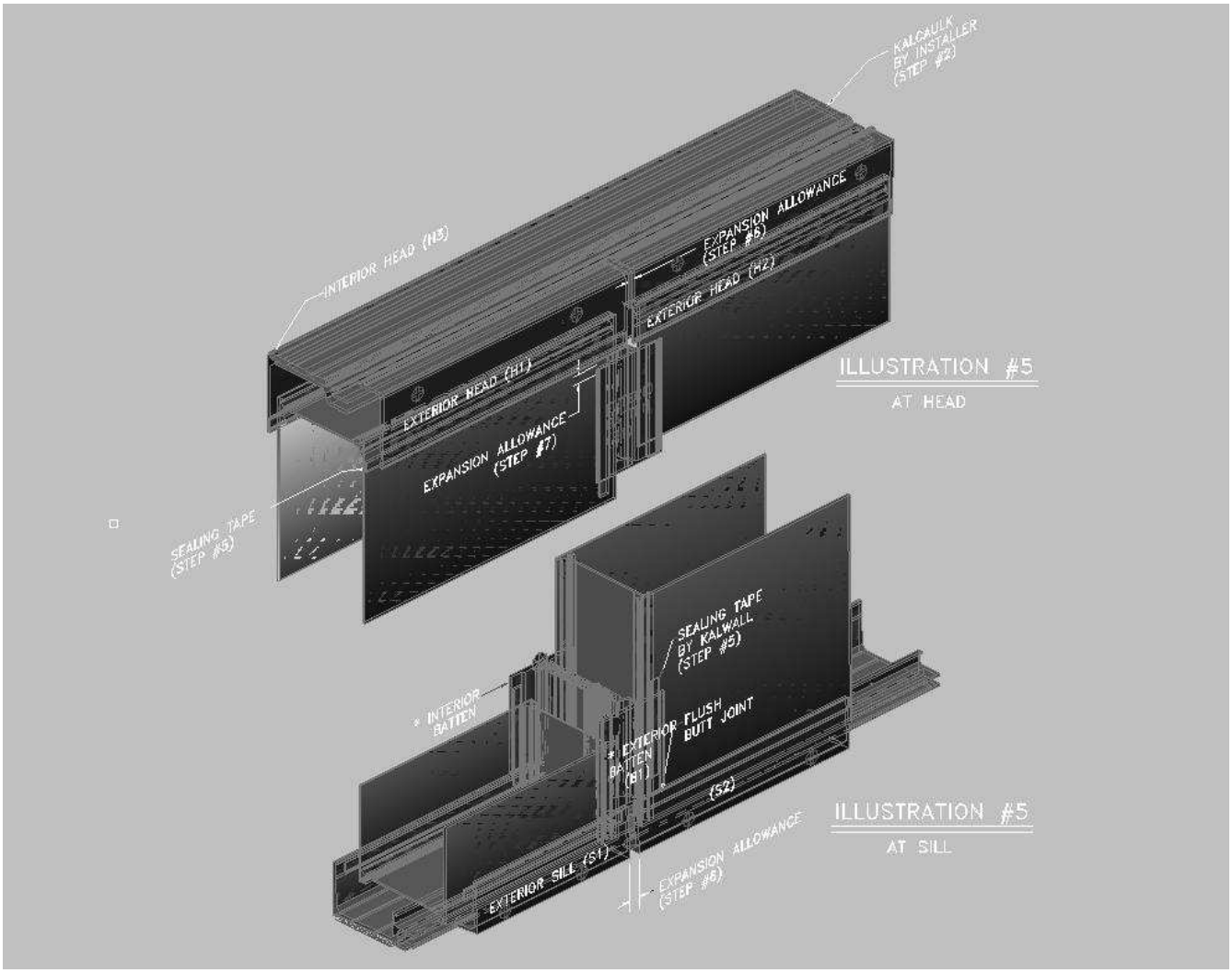

Figure 8: Main components in the Kalwall system