Technical Specification 11

Determination of characteristics and associated tests for insulation supporting loose-laid roof waterproofing covering under heavy protection or inverted insultation for terrace roof

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Table of content

TABLE OF CONTENT 1

1 PREAMBLE 2

2 CERTIFIED CHARACTERISTICS OF THESE INSULATING MATERIALS 3

2.1 FEATURES FOR MINERAL WOOL (MW) PRODUCTS 3

2.2 FEATURES FOR EXPANDED POLYSTYRENE (EPS) PRODUCTS 5

2.3 FEATURES FOR EXTRUDED POLYSTYRENE FOAM (XPS) PRODUCTS 8

2.4 FEATURES FOR RIGID POLYURETHANE (PU) FOAM PRODUCTS 10

2.5 FEATURES FOR CELLULAR GLASS (CG) PRODUCTS 14

2.6 CHARACTERISTICS FOR EXPANDED PERLITE (EPB) PRODUCTS 16

2.7 NUMBER OF TESTS IN AN ADMISSION 17

3 METHODS FOR DETERMINING CHARACTERISTICS 19

3.1 IDENTIFICATION OF TEST SPECIMENS 19

3.2 BEHAVIOUR UNDER DISTRIBUTED STATIC LOADS AND INCREASED TEMPERATURES – DETERMINATION OF THE COMPRESSIBILITY CLASS OF THE INSULATION 19

3.3 TEST OF RESIDUAL DIMENSIONAL VARIATIONS AFTER TEMPERATURE STABILIZATION 24

3.4 BOWING UNDER THE EFFECT OF A THERMAL GRADIENT 26

3.5 BEHAVIOUR TESTS UNDER LOAD MAINTAINED AT TEMPERATURE OF AN INSULATING MATERIAL, SO-CALLED "SLABS ON PEDESTALS" 28

3.6 TEST UNDER STATIC LOADS CONCENTRATED ON CANTILEVERED PARTS 29

3.7 CHARACTERISTIC OF RCS/DS 33

4 FACTORY PRODUCTION CONTROL AND MONITORING 34

4.1 MINERAL WOOL (MW) 35

4.2 EXPANDED POLYSTYRENE (EPS) 36

4.3 EXTRUDED POLYSTYRENE (XPS) 37

4.4 RIGID POLYURETHANE (PU) FOAM 38

4.5 CELLULAR GLASS (CG) 39

4.6 FIBERED EXPANDED PERLITE (EPB) 40

1 Preamble

This technical specification describes the fitness-for-use caracteristics of independant insulating materials supporting heavy protection on sealing in compliance with the Règles professionnelles *Isolants support d'étanchéité en indépendance sous protection lourde*, or for insulation used in inverted roof terrace in compliance with the Règles professionnelles *Isolation inversée de toiture-terrasse*.

These insulating materials for sealing support benefit from an ACERMI certificate for the caracteristics falling under the european standard for thermal insulation materials for construction, and are subject to tests regarding their fitness-for-use caracteristics as described in the present specification.

The thermal insulation products covered are :

- Mineral Wool (MW) panels, covered by NF EN 13162 and Product Guideline n°1 ;

- Expanded Polystyrène (EPS) panels, covered by NF EN 13163 and Product Guideline n°2 ;

- Extruded Polystyrene (XPS) panels, covered by NF EN 13164 and Product Guideline n°3 ;

- Rigid foam Polyurethane (PU) panels with facing, covered by NF EN 13165 and Product Guideline n°4 ;

- Cellular Glass (CG) panels, covered by NF EN 13167 and Product Guideline n°6 ;

- Expanded perlite (EPB) panels, covered by NF EN 13169 and Product Guideline n°8 ;

This Technical Specification lists the whole fitness-for-use caracteristics required for the use « non load bearing independant insulating materials supporting heavy protection on sealing » or « inverted roof terrace insulation » and defines the follonwing test methods :

- Behavior under static distributed load and high temperatures
- Behavior under maintained load and temperature
- Test under static load concentrated on the overhang parts
- Dimensional stability at deformation free state
- Test of curvature under a thermal gradient

2 Certified characteristics of these insulating materials

The following characteristics for products falling under NF EN 13162, NF EN 13163, NF EN 13164, NF EN 13165, NF EN 13167 and NF EN 13169 are required for the use « non load bearing independant insulating materials supporting heavy protection on sealing » or « inverted roof terrace insulation ». According the the Professional Rules some caracteristics are optional as they depend on the application, the load-bearing element, or the climate. The details are also indicated for information in the Matrix od Uses.

2.1 Features for Mineral Wool (MW) Products

The mineral wool insulating products covered by NF EN 13162 used for the application « non load bearing independant insulating materials supporting heavy protection on sealing » are Mineral Wool (rock or glass wool) panels, without facing or with a bitumen or glass veil on one side, or with glass veil on both sides.

2.1.1 Caracteristics certified according to NF EN 13162

Caracteristics	**Unit**	**Threshold level or class**		**Reference standard**
Reaction to Fire (non-bitumen surfaced products)	-	Class		NF EN 13501-1
Compressive stress at 10% deformation Mono Density	kPa	Compressibility class B	Compressibility class C	NF EN 826
		CS(10\Y) ≥ 40	CS(10\Y) ≥ 60	
Compressive stress at 10% deformation Dual Density	kPa	Case 1 : Compressive stress at 10% deformation CS(10\Y) ≥ 40	CS(10\Y) ≥ 60	NF EN 826
	kPa	Case 2 : Compressive stress at 10% deformation CS(10\Y) ≥ 30	CS(10\Y) ≥ 60	NF EN 826
	N	And Point Load (if CS(10\Y) ≤ 40) PL(5) ≥450		NF EN 12430
Tensile strength perpendicular to faces	kPa	TR ≥ 7,5		NF EN 1607
Short Term Water absorption	kg/m²	WS 1		NF EN 1609
Dimensionnal Stability	%	DS(70,90)		NF EN 1604

2.1.2 Dimensional caracteristics with specific thresholds for the heavy protection on sealing application

The maximum dimensions of the panels are : length 2400mm, width 1200mm and the thickness range is between 30mm to 260mm.

The following tolerances apply :

Characteristics	Unit	Threshold level	Reference standard
Thickness tolerance class	mm	T5	NF EN 823
Width tolerance	mm	± 2	NF EN 822
Length tolerance	mm	± 5	NF EN 822
Squareness tolerance	mm/m	≤ 3	NF EN 824 on a 1m length
Flatness tolerance	mm	≤ 2	NF EN 825

2.1.3 Mandatory suitability-for-use characteristics for the application of waterproofing support insulation

Characteristics	Unit	Threshold level or class	Reference standard
Compressibility class at 80°C	-	Class B or C	§ 3.2 of this Tech. Spec.

2.1.4 Optional characteristics of suitability-for-use according to the destination for the application waterproofing support insulation

Characteristics		Unit	Threshold level	Reference standard
Permissible Stress according to destination Q/2		kPa	For a specified thickness: Min. test stress Q of 40 kPa to achieve ≤ 2 mm deformation	§ 3.5 of this Tech. Spec.Erreur ! Source du renvoi introuvable. (Maintained Load Test)
Cantilever depending on the destination	Steel deck conforms to DTU 43.3 cantilever ≤ 70 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation and Ultimate load> 1000 N	§ 3.6 of this Technical Specification
	(for steel deck complying with CPT 3537_V2) cantilever> 70 mm and cantilever ≤ 200 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual Deformation and Ultimate load> 1200 N	

2.2 Features for Expanded Polystyrene (EPS) products

Expanded polystyrene insulation falling within the standard NF EN 13163 used for the use of insulation supporting loose-laid roof waterproofing covering under heavy protection are white expanded polystyrene panels of compression stress at 10% deformation CS(10) greater than or equal to 100 kPa and greater than or equal to 150 kPa.

2.2.1 Characteristics certified according to NF EN 13163

2.2.1.1 Case of EPS panels with a CS(10)≥100kPa

Characteristics	Unit	Threshold level or class	Reference standard
Reaction to fire	-	Euroclass E	NF EN 13501-1
Compressive stress at 10% deformation	kPa	CS(10) ≥100	NF EN 826

2.2.1.2 Case of EPS panels with a CS(10)≥150kPa

Characteristics	Unit	Threshold level or class	Reference standard
Reaction to fire	-	Euroclass E	NF EN 13501-1
Compressive stress at 10% deformation	kPa	CS(10) ≥150	NF EN 826

2.2.2 Dimensional characteristics with specific thresholds for the application waterproofing support insulation

The maximum dimensions of the panels are: length 1200 mm, width 1200 mm. The range of thicknesses is between 20mm and 400mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference standard
Thickness tolerance class	mm	T(2)	NF EN 823
Width tolerance	mm	± 2	NF EN 822
Length tolerance	mm	± 2	NF EN 822
Squareness tolerance	mm/m	≤ 3	NF EN 824
Flatness tolerance	mm	± 3	NF EN 825

2.2.3 Mandatory suitability-for-use characteristics for the application of waterproofing support insulation

2.2.3.1 Case of EPS Panels with a CS(10)≥100kPa

Characteristics	Unit	Threshold level or class	Reference document
Compressibility class	-	Class B at 80°C or Class C at 60°C	§ 3.23.2 of this Technical Specification
Residual dimensional variation at 23°C after stabilization at 60°C	% mm	≤ 0.3% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 80/23 °C	mm	≤ 3 mm on full panels	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.

2.2.3.2 Case of EPS Panels with a CS(10)≥150kPa

Characteristics	Unit	Threshold level or class	Reference document
Compressibility class	-	Class C at 60°C	§ 3.2 of this Technical Specification
Residual dimensional variation at 23°C after stabilization at 60°C	% mm	≤ 0.3% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 80/23 °C	mm	≤ 3 mm on full panels	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.

2.2.4 Optional characteristics of suitability-for-use according to the destination for the application waterproofing support insulation

2.2.4.1 Case of EPS Panels with a CS(10)≥100kPa

Characteristics		Unit	Threshold level	Reference document
Permissible Stress according to destination Q/2		kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Cantilever depending on the destination	Steel deck conforms to DTU 43.3 cantilever ≤ 70 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	§ 3.6 of this Technical SpecificationErreur ! Source du renvoi introuvable.
	(for steel deck complying with CPT 3537_V2) cantilever > 70 mm and cantilever ≤ 200 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	

2.2.4.2 Case of EPS Panels with a CS(10)≥150kPa

Characteristics	Unit	Threshold level	Reference document
Permissible Stress according to destination Q/2	kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)

2.3 Features for Extruded Polystyrene foam (XPS) products

Extruded polystyrene insulation within the scope of standard NF EN 13164 used for insulating use installed in inverted flat roof insulation is extruded polystyrene foam flat panels.

2.3.1 Characteristics declared according to NF EN 13164

Characteristics	Unit	Threshold level or class	Reference standard
Reaction to fire	-	Euroclass E, or E (non-exposed edges)	NF EN 13501-1
Compressive stress at 10% deformation	kPa	CS(10\Y) ≥ 300	NF EN 826
Tensile strength perpendicular to the faces (for multilayer products)	kPa	TR ≥ 200	NF EN 1607
Long-term water absorption by total immersion	% by volume	WL(T) ≤0.7	NF EN 12087
Long-term water absorption by diffusion	% by volume	WD(V) ≤3	NF EN 12088
Additional water absorption due to freeze-thaw	% by volume	FTCD 1	NF EN 12088 NF EN 12091

2.3.2 Dimensional characteristics with specific thresholds for the inverted insulation application

The maximum dimensions of the panels are: length 1250 mm, width 600 mm. The range of thicknesses is between 30mm and 160mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference standard
Tolerance class Thickness	mm	T1	NF EN 823
Width tolerance	mm	± 6	NF EN 822
Length tolerance	mm	± 6	NF EN 822
Squareness tolerance	mm/m	≤ 5	NF EN 824
Flatness tolerance	mm	≤ 6	NF EN 825

2.3.3 Mandatory suitability-for-use characteristics for the inverted insulation application

Characteristics	Unit	Threshold level or class	Reference standard
Compressibility class at 60°C	-	Class C	§ 3.2 of this Technical Specification3.2
bowing under a temperature gradient of 60/23 °C	mm	≤ 10 mm on full panels	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.
Dimensional variations in the state of free deformation (60°C)	% mm	≤ 0.5% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3

2.3.4 Optional suitability-for-use characteristics depending on the destination for the inverted insulation application

Characteristics	Unit	Threshold level	Reference standard
Permissible Stress according to destination Q/2	kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Service compression strength Rcs – Service deformation min and max ds min ds max	kPa %	Declared	§ 3.7 of this Technical Specification3.7
Compression creep under a load and extrapolated to 50 years	% and kPa	Declared	NF EN 1606
Fixed increment $_{\Delta\lambda H}$	W/(m.K)	Declared	Appendix D Professional Rule

2.4 Features for rigid polyurethane (PU) foam products

Rigid polyurethane foam insulation within the scope of the NF EN 13165 standard used for insulation supporting loose-laid roof waterproofing covering under heavy protection are PU insulation with multilayered facings and PU insulation with aluminium facings of 35 µm, or aluminium 50 µm.

2.4.1 Characteristics certified according to NF EN 13165

2.4.1.1 Case of PU Panels with multilayered facings

Characteristics	Unit	Threshold level or class	Reference standard
Reaction to fire	-	Class	NF EN 13501-1
Compressive stress at 10% deformation	kPa	CS(10\Y) ≥ 150	NF EN 826

2.4.1.2 Case of PU panels with minimum aluminium facing 50 µm

Characteristics	Unit	Threshold level or class	Reference standard
Compressive stress at 10% deformation	kPa	CS(10\Y) ≥ 150	NF EN 826
Reaction to fire	-	Euroclass D-s2,d0	NF EN 13501-1

2.4.1.3 Case of PU panels with minimum aluminium facing 35 µm

Characteristics	Unit	Threshold level or class	Reference standard
Compressive stress at 10% deformation	kPa	CS(10\Y) ≥ 120	NF EN 826
Reaction to fire	-	Euroclass E	NF EN 13501-1

2.4.2 Dimensional characteristics with specific thresholds for the application waterproofing support insulation

2.4.2.1 Case of PU Panels with multilayered facing, or aluminium of 37 µm

The panels have a maximum dimensions of 1200 mm x 600 mm. The range of thicknesses is between 30mm and 200mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference standard
Thickness tolerance	mm	± 2	NF EN 823
Width tolerance	mm	± 3	NF EN 822
Length tolerance	mm	± 5	NF EN 822
Squareness tolerance	mm/m	≤ 3	NF EN 824
Flatness tolerance	mm	≤ 3	NF EN 825

2.4.2.2 Case of PU panels with aluminium facing minimum 50 µm

The maximum dimensions of the panels are: length 2500 mm, width 1200 mm. The range of thicknesses is between 30mm and 200mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference standard
Thickness tolerance	mm	± 2	NF EN 823
Width tolerance	mm	± 3	NF EN 822
Length tolerance	mm	± 5	NF EN 822
Squareness tolerance	mm/m	≤ 3	NF EN 824
Flatness tolerance	mm	≤ 5	NF EN 825

2.4.3 Mandatory suitability-for-use characteristics for the application of waterproofing support insulation

2.4.3.1 Case of PU Panels with multilayered facings

Characteristics	Unit	Threshold level or class	Reference standard
Compressibility class	-	Class C at 60°C [a]	§ 3.2 of this Technical Specification3.2
Residual dimensional variation at 23°C after stabilization at 60°C	% mm	≤ 0.3% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 60/23°C	mm	≤ 3 on full panels	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.
Note [a]: if the test is carried out at 80°C it validates class C at 60°C.			

2.4.3.2 Case of PU panels with aluminium facing minimum 50 µm

Characteristics	Unit	Threshold level or class	Reference standard
Compressibility class at 80°C	-	Class C	§ 3.2 of this Technical Specification3.2
Residual dimensional variation at 23°C after stabilisation at 80°C	% mm	≤ 0.5% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 80/23 °C	mm	≤ 3 mm on samples 1200 mm x 600 mm minimum	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.

2.4.3.3 Case of PU panels with aluminium facing 37 µm

Characteristics	Unit	Threshold level or class	Reference standard
Compressibility class at 60°C or 80°C	-	Class C	§ 3.2 of this Technical Specification3.2
Residual dimensional variation at 23°C after stabilisation at 60°C	% mm	≤ 0.5% ≤ 5 mm on full panels	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 60/23 °C	mm	≤ 3 mm on samples 1200 mm x 600 mm minimum	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.

2.4.4 Optional characteristics of suitability-for-use according to the destination for the application waterproofing support insulation

2.4.4.1 Cases of PU Panels with multilayered facings

Characteristics	Unit	Threshold level	Reference document
Permissible Stress according to destination Q/2	kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Service compression strength Rcs – Service deformation min and max ds min ds max	kPa %	Certified	§ 3.7 of this Technical Specification3.7

2.4.4.2 Case of PU panels with aluminium facing 50 µm

Characteristics		Unit	Threshold level	Reference document
Cantilever depending on the destination	steel deck conforms to DTU 43.3 Cantilever ≤ 70 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	§ 3.6 of this Technical Specification
	(for steel deck complying with CPT 3537_V2) Cantilever > 70 mm and Cantilever ≤ 200 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	
Permissible Stress according to destination Q/2		kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)

2.4.4.3 Cases of PU Panels with aluminium facing 37 µm

Characteristics	Unit	Threshold level	Reference document
Permissible Stress according to destination Q/2	kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Service compression strength Rcs – Service deformation min and max ds min ds max	kPa %	Certified	§ 3.7 of this Technical Specification3.7

2.5 Features for cellular glass (CG) products

Cellular glass insulation within the scope of the standard NF EN 13167 used for the use of insulation supporting loose-laid roof waterproofing covering under heavy protectionare uncoated panels, or coated on one side with bitumen.

2.5.1 Characteristics certified according to NF EN 13167

Characteristics	Unit	Threshold level or class	Reference document
Reaction to fire	-	Euroclass A1 (uncoated panel) Euroclass E (coated panel)	NF EN 13501-1
Fracture stress in compression without crushing	kPa	CS(Y) ≥ 500	NF EN 826

2.5.2 Dimensional characteristics with specific thresholds for the application waterproofing support insulation

The maximum dimensions of the panels are: length 600 mm, width 450 mm. The range of thicknesses is between 40 mm and 360 mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference document
Thickness tolerance	mm	± 2	NF EN 823
Width tolerance	mm	± 2	NF EN 822
Length tolerance	mm	± 2	NF EN 822
Squareness tolerance	mm/m	≤ 2	NF EN 824
Flatness tolerance	mm	≤ 2	NF EN 825

2.5.3 Mandatory suitability-for-use characteristics for the application of waterproofing support insulation

Characteristics	Unit	Threshold level or class	Reference document
Compressibility class at 80°C	-	Class D	§ 3.2 of this Technical Specification3.2
Residual dimensional variation at 23°C after stabilisation at 80°C and -15°C	-	Null	§ 3.3 of this Technical Specification3.3
Bowing under a temperature gradient of 80/23 °C	-	Null	§ 3.4 of this Technical SpecificationErreur ! Source du renvoi introuvable.

2.5.4 Optional characteristics of suitability-for-use according to the destination for the application waterproofing support insulation

Characteristics		Unit	Threshold level	Reference document
Service compression strength Rcs – Service deformation min and max ds min ds max		kPa %	Declared	§ 3.7 of this Technical Specification3.7
Permissible Stress according to destination Q/2		kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Cantilever depending on the destination	steel deck conforms to DTU 43.3 Cantilever ≤ 70 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	§ 3.6 of this Technical Specification
	(for steel deck complying with CPT 3537_V2) Cantilever > 70 mm and Cantilever ≤ 200 mm	mm	Minimum declared thickness to obtain ≤ 1mm residual deformation	

2.6 Characteristics for expanded perlite (EPB) products

Expanded perlite insulation falling within the standard NF EN 13169 used for insulation supporting loose-laid roof waterproofing covering under heavy protection are rigid panels in expanded perlite. The panels can be uncoated or coated on one side with bitumen.

2.6.1 Characteristics certified according to NF EN 13169

Characteristics	Unit	Threshold level or class	Reference document
Reaction to fire	-	Coated panels tested on the perlite side: Euroclass C-s1,d0 Uncoated panels : Euroclass B-s1,d0	NF EN 13501-1
Compressive stress at 10% deformation	kPa	CS(10\Y)≥ 200	NF EN 826

2.6.2 Dimensional characteristics with specific thresholds for the application waterproofing support insulation

The maximum dimensions of the panels are: 1200 mm x 600 mm for installation on load-bearing elements in reinforced concrete and reinforced aerated concrete, and 1200 mm x 1000 mm for installation on load-bearing elements in ribbed steel deck, wood and wood-based panels. The range of thicknesses is from 20 mm to 120 mm.

The following tolerances apply:

Characteristics	Unit	Threshold level	Reference document
Thickness tolerance	mm	± 1 mm (monolithic panel)	NF EN 823
Width tolerance	mm	± 2 mm	NF EN 822
Length tolerance	mm	± 2 mm	NF EN 822
Squareness tolerance	mm/m	≤ 3 mm/m	NF EN 824
Flatness tolerance	mm	≤ 3 mm	NF EN 825

2.6.3 Mandatory suitability-for-use characteristics for the application of waterproofing support insulation

Characteristics	Unit	Threshold level or class	Reference document
Compressibility class at 80°C	-	Class D	§ 3.2 of this Technical Specification3.2

2.6.4 Optional characteristics of suitability-for-use according to the destination for the application waterproofing support insulation

Characteristics		Unit	Threshold level	Reference document
Permissible Stress according to destination Q/2		kPa mm	For a specified thickness: Maximum test stress Q to achieve a deformation ≤ 2 mm	§ 3.5 of this Technical SpecificationErreur ! Source du renvoi introuvable. (Maintained Load Test)
Service compression strength Rcs – Service deformation min and max ds min ds max		kPa %	Declared	§ 3.7 of this Technical Specification3.7
Cantilever depending on the destination	steel deck conforms to DTU 43.3 Cantilever ≤ 70 mm	mm	Minimum declared thickness to obtain a Residual deformation≤ 1 mm	§ 3.6 of this Technical SpecificationErreur ! Source du renvoi introuvable.
	(for steel deck complying with CPT 3537_V2) Cantilever > 70 mm and Cantilever ≤ 200 mm	mm	Minimum declared thickness to obtain a Residual deformation≤ 1 mm	

2.7 Number of tests in an admission

2.7.1 Compressibility class

Product family: Grouping by CS level and according to technical specification C on product grouping rules.

Initial: by product family, full tests on one line (mini - max - 2 layers) - The other tests distributed on the other lines according to the samples (minimum or maximum thickness).

For class C at 60 ° C, a test report of DLT(2)5 according to standard NF EN1605 carried out on the product considered by one of the two pilot members can be used.

2.7.2 Dimensional variation

Product family: Grouping by product according to technical specification C on product grouping rules.

Initial: by product family, tests by line.

2.7.3 Bowing under the effect of a thermal gradient

Product family: Grouping by product according to technical specification C on product grouping rules.

Initial: by product family, tests by line.

2.7.4 Slabs on pedestals - Behaviour under load maintained at temperature

Product family: Grouping by non-coating product according to Technical Specification C on the rules for grouping products.

Initial: by product family, full tests on one line (max 1 layer - 2 layers) - The other tests distributed over the other lines in maximum thickness. But special case of multilayer products will be tested the maximum thickness of the assembled product and not individual layers.

2.7.5 Test under static loads concentrated on cantilevered parts

Product family: Grouping by product according to technical specification C on product grouping rules.

Initial: by family, tests by line (mini longitudinal or transverse direction) + distribution of thicknesses with the different criteria requested.

3 Methods for determining characteristics

The test methods applied for each of the characteristics are specified in the preceding tables, supplemented by the following provisions.

3.1 Identification of test specimens

Before carrying out the tests, it is necessary to identify 3 m² of product as part of the follow-up and 5m² as part of an admission.

The acceptance criteria of the batch for the acceptance or extension tests are as follows:

- Panels of the same thickness come from the same production batch;
- The length, width and thickness measured according to NF EN 822 and NF EN 823 standards of the panels comply with the specifications defined in the tables above;
- The density measured according to NF EN 1602 complies with the manufacturer's specifications;
- The squareness and flatness measured according to standards NF EN 824 and NF EN 825 comply with the specifications defined in the tables above;
- The 10% compression measured according to the NF EN 826 standard on products conditioned at least 6 hours under laboratory conditions (excluding the stabilization/aging period required in the product standards) complies with the value declared by the manufacturer for his product and in accordance with the records of factory production controls.

In the case of follow-up testing by the pilot laboratory, only the dimensional characteristics and density are measured as above.

During the instruction, the tests described above are to be carried out according to the purpose of the insulation (cf. § 2 Mandatory and optional characteristics).

3.2 Behaviour under distributed static loads and increased temperatures – Determination of the compressibility class of the insulation

3.2.1 Principle

This test makes it possible to determine the behaviour of the insulation under distributed static load and increased temperature.

The specimens are taken randomly from current production, and have the surface condition of the delivery. As part of the instruction, in one bed, at least two thicknesses shall be tested, the smallest and biggest proposed; in two beds, the maximum thickness.

3.2.2 Equipment

- Instruments, capable of measuring linear dimensions with an accuracy of 0.5% for length and width and 0.1 mm for thickness.
- Oven, with thermostat and forced air circulation, which can maintain the required temperature to ± 1 °C.
- Load application device consisting of two flat plates, one of which is movable, in order to compress the test specimen in the vertical direction.

The movable plate must be guided so as to align automatically. It is equipped with a centered ball joint to ensure that only axial force is applied to the specimen. The plates shall allow for progressive loading without deformation so that, during the test, the static stress does not vary by more than ± 5 % (see Figure 1).
Both plates should be finely ground/polished. The distance between the top plate and the reading device should be as short as possible. The zero of the strain measuring device shall be set using a calibrated gauge block of approximately the same thickness as the product to be tested.

It consists of keeping the specimens at the operating limit temperatures (60 °C or 80 °C) and measuring the deformation in a temperature-regulated chamber, the load being held in place.

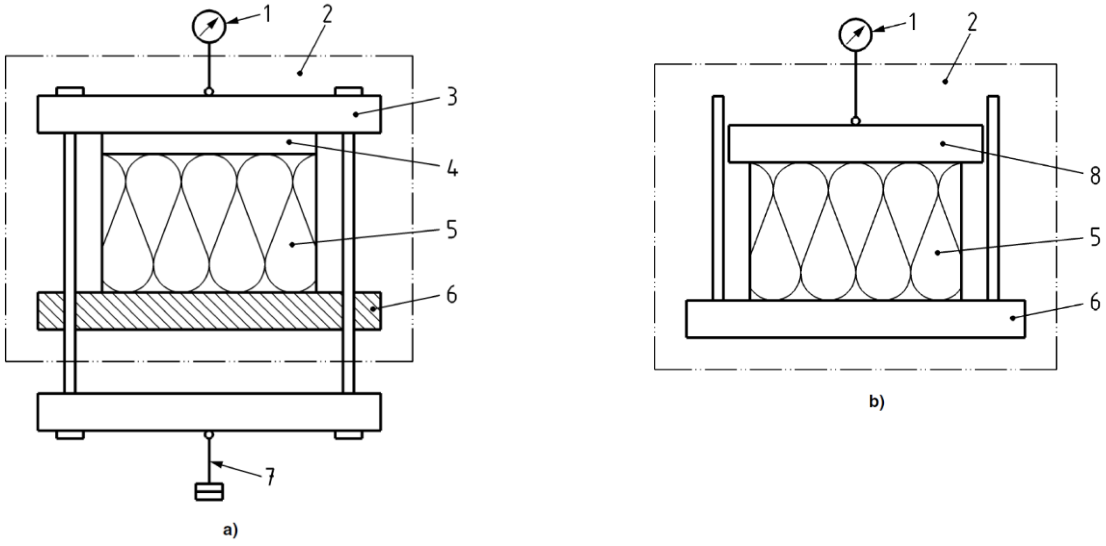

Figure 1 Test apparatus1

Legend:
1 dial indicator
2 oven
3 load application device
4 load distribution plate (mobile, with self-alignment)
5 test specimen
6 traverses
7 loading per weight
8 load

3.2.3 Test specimen according to product families

3.2.3.1 Preparation

The test specimens must be cut in such a way that the direction of application of the load on the product corresponds to the direction of application of the compressive forces on the product in the intended use.

Natural skins and any facing and/or coating that is an integral part of the product must be preserved.

3.2.3.2 Number and dimensions

Three test specimens are cut. They must have the initial thickness of the product. Their width should not be less than their thickness. Linear dimensions shall be determined in accordance with EN 12085.

They are cut into panels of the following minimum dimensions:

- samples of EPS, PU, XPS, EPB and CG:
    - if the total thickness is ≤ 150 mm: 150 mm x 150 mm;
    - if the total thickness is > 150 mm, but ≤ 200 mm: 200 mm x 200 mm;
    - if the total thickness is > 200 mm, but ≤ 300 mm: 300 mm x 300 mm;
    - if the total thickness is > 300mm, but ≤ 400 mm: 400 mm x 400 mm;

(derogation possible for thicknesses greater than 300mm, within the limit of 400mm: dimension 300x300mm)

For CG samples, in addition to the above dimensions, the surfaces of these are covered with bitumen or EPDM membrane.

- MW samples: 300 mm x 300 mm.

3.2.3.3 Conditioning

The test specimens shall be conditioned for at least 16 h at (23 ± 5) °C. In case of dispute, they must be packed at (23 ± 2) °C and (50 ± 5) % relative humidity for the period specified in the appropriate product standard.

3.2.4 Procedure

The table below summarizes the stress, duration and temperature conditions for the test according to the insulation classification :

Class	Stress (kPa)	Duration of stress hold (pre-stress + test stress)	Temperature (°C)
B	20±2	24 hours ±1 hour at 23°C Then 48 hours ±1 hour at Temperature	80 or 60 ± 5
C	40±2	24 hours ±1 hour at 23°C Then 168 hours ±1 hour at Temperature	
D	80±2		

In case of dispute, the test shall be repeated with conditioning at 23 °C ± 2 °C and a test temperature at 60 °C ± 2 °C or 80 °C ± 2 °C.

It is determined successively:

- The initial thickness of the specimen at 23 ° C ± 5 ° C under a pre-stress of 1 kPa ± 0.1 kPa ;
- The thickness of the specimen after application of the test load at 23 °C ± 5 °C for 24 hours ±1h ;
- The thickness of the test specimen under high temperature test stress + 60 °C ± 5 °C or + 80 °C ± 5 °C; ensure a gradual rise in temperature ≤ 3 hours.
- For Class B materials, the thickness of the test specimen after a stay of two full days, at least once during the first day;
- For materials of classes C and D, after a stay of 7 full days, determine the thickness of the test specimen at least once during 0, 24, 48, 72, 96, 120, 144 and 168 hours ±1h for measurements.

Thickness (or deformation) measurements are made at 1/10 mm per dial indicator.

Figure 2 summarizes the conduct of the test.

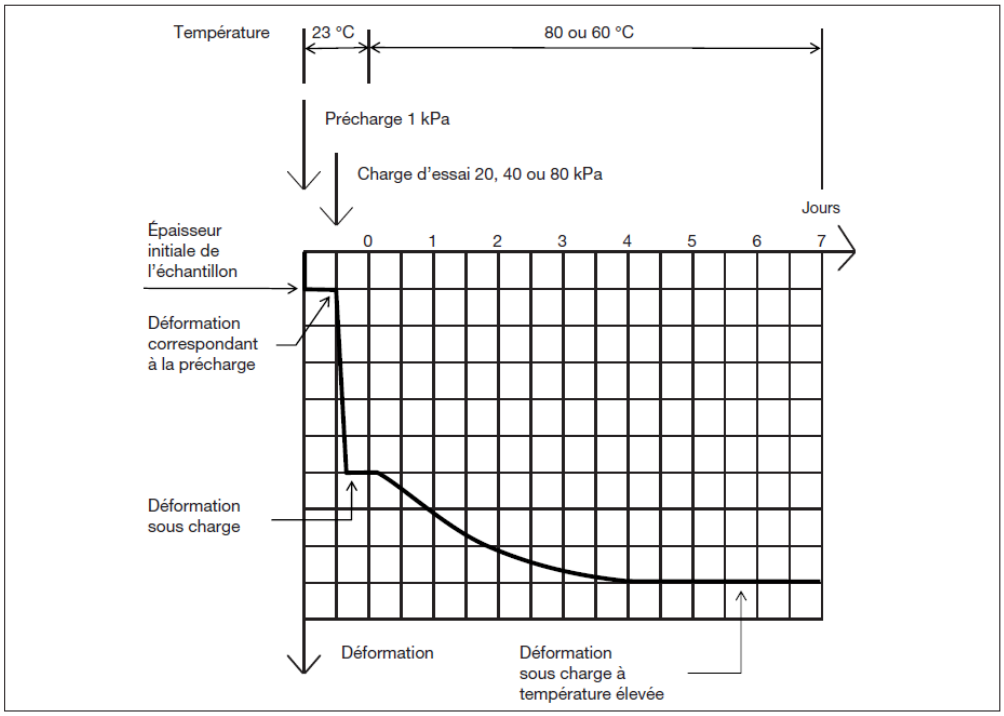

FIGURE 2: DEFORMATION OVER TIME OF THE UNCOATED INSULATION

3.2.5 Calculation and expression of results

Compliance is define as the average of the specimens being less than or equal to 5.0%.

The rounding rule for the expression of the result expressed in %: rounded to the nearest 10th

Example:

5.04% => 5.0% compliant 5.05% => 5.1% non-compliant

The deformations are calculated from the difference in the initial thickness measured at 23 ° C under a prestress of 1kPa and the thickness measured under pressure in temperature at the end of the test related to the initial thickness measured at 23 ° C under a prestress of 1kPa.

The test report shall indicate the results of all thickness measurements and the calculation of the deformation

Depending on the class sought, the deformation at the end of the test must respect the limits defined in the table below. The result is expressed in class.

Class	Test condition	Deformation(%)
B	Temperature 80(60) °C	≤ 5.0%
	Load 20 kPa	
	Duration 3 days	
C	Temperature 80(60) °C	≤ 5.0%
	Load 40 kPa	
	Duration 8 days	
D	Temperature 80(60) °C	≤ 5.0%
	Load 80 kPa	
	Duration 8 days	

3.3 Test of residual dimensional variations after temperature stabilization

3.3.1 Principle

The purpose of this test is to determine the residual dimensional variations of specimens after stabilization following conditioning/cooling cycles in temperature.

3.3.2 Equipment

- Measuring column or caliper or optical displacement sensor at 1/100 mm;
- Oven, able to maintain the required temperature to ± 2 °C.

3.3.3 Specimen

3.3.3.1 Preparation

The test specimens must be cut in such a way as to be representative of the product in real dimensions. Any skin, facing and/or coating shall be preserved. The directions of length and width shall be marked on the test specimens.

3.3.3.2 Number and dimension

Three test specimens with minimum dimensions of 250 mm x 250 mm are cutted from panels.

3.3.3.3 Conditioning

The specimens are conditioned at a temperature of 23 °C ± 2 °C and a relative humidity of 50% ± 5% for 6 hours before measurement.

3.3.4 Procedure

During the measurement cycles, the specimens shall be placed horizontally or vertically in the enclosure (test chamber), leaving sufficient space for air circulation, on a rigid metal grid or perforated metal plate in order to facilitate free air circulation around the specimens.

The test specimens shall not be exposed to direct radiation from the heating elements.

The specimen shall be measured in length and width (direction of the panel) at 23 °C ± 2 °C. Measurements shall be made at 1/100 mm per dial indicator, on the surface or on the upper edge of the specimen and at its mid-thickness.

The temperature of the test specimen shall be increased from 23 °C to 80 °C (or 60 °C) within one hour, maintained at ± 2 °C for 6 hours.

After exposure to the test atmosphere, remove the test specimens and expose them to a temperature of 23 ± 2°C and a relative humidity of 50 ± 5 %.

Once the specimen has cooled to 23 ± 2 °C by natural cooling (or in the absence of measurement of the core temperature wait 3±1 hour), the length and width dimensions are measured again.

The cycle of temperature rise and cooling to 23°C is repeated several times until stabilization.

Tightening is indicated by the minus sign (-), dilation by the plus sign (+). The test determines the following characteristic:

- residual dimensional variation at 23 °C in % between the beginning of the first cycle and the end of the last cycle (ΔLs).

The test stopped when at least one of the following two conditions is met:

- the dimensional variation of each of the measured lengths between the last two cycles is less than 5 % of the dimensional variation between the last cycle and the initial measurement.

    - After 5 conditioning/cooling cycles

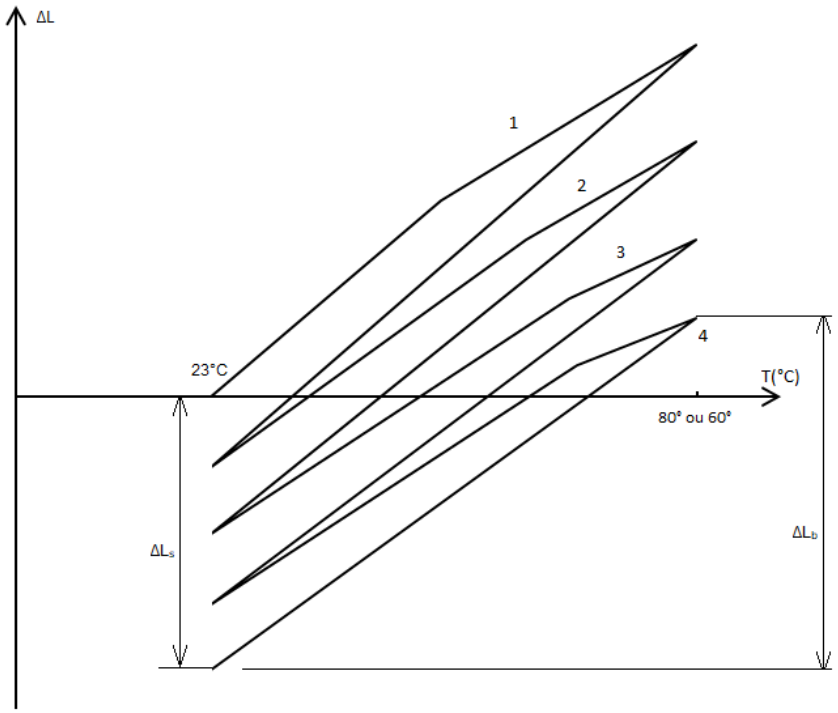

FIGURE 3.GRAPHICAL ILLUSTRATION OF MOVEMENTS DUE TO TEMPERATURE VARIATIONS

3.3.5 Calculation and expression of results

Measurement of dimensional variations in surface and at mid-thickness: the average value of the 6 specimen widths and the average value of the 6 specimen lengths are used for the expression of the result.

The threshold for acceptance of the result is defined according to the product family in the different tables in paragraphs 2.X.2. above for length and width.

The rounding rule for the expression of the result expressed in %: rounded to the nearest 10th

Example for a limit of 0.3%:

0.34% => 0.3% compliant 0.35% => 0.4% non-compliant

3.4 Bowing under the effect of a thermal gradient

3.4.1 Principle

This test simulates the possible deformation by bending a panel under the effect of a thermal gradient between the 2 faces of the insulation panel. This test consists of measuring the residual deformation by bending the panel under the effect of thermal radiation.

3.4.2 Equipment

Test frame equipped with infrared lamps, temperature regulated, regularly distributed over the entire test surface.

The frame has a horizontal support plane placed in a regulated laboratory at (23 ± 5) ° C.

The surface temperatures of the insulation material are monitored by at least two surface temperature sensor.

3.4.3 Specimen

3.4.3.1 Preparation

An identification of the specimen is necessary by achieving a flatness according to the associated product standard.

3.4.3.2 Number and dimension

The test shall be carried out on 3 panels of nominal dimensions or dimensions of at least 1200 mm x 600 mm for products in large dimensions.

3.4.3.3 Conditioning

The test specimens shall be conditioned for at least 16 h at (23 ± 5) °C. In case of dispute, they must be packed at (23 ± 2) °C and (50 ± 5) % relative humidity for the period specified in the appropriate product standard.

3.4.3.4 Test conditions

The test shall be carried out at 60°C or 80°C.

3.4.3.5 Test procedure

A panel of nominal dimensions is used which is laid horizontally, (on a support, so that it is kept in free deformation).

The exposed face of the panel is brought from ambient temperature in 30 minutes ± 5 minutes to a uniform temperature of 60 °C or 80 °C ± 5 °C which is maintained for 2 hours ± 5 minutes.

The deformation of the panel relative to the horizontal reference plane is recorded to the nearest 0.5 mm at frequent intervals, and at least:

- initially at ambient temperature 23 °C ± 5 °C;
- when the maximum temperature is reached;
- after two hours of maximum temperature;
- after returning to ambient temperature 23 °C ± 5 °C.

3.4.4 Calculation and expression of results

The maximum deformation is determined by the difference between the initial deformation measurement at 23°C (flatness of the panel before temperature setting) and the maximum deformation (obtained throughout the test).

The residual deformation is determined by the difference between the initial deformation measurement at 23°C (flatness of the panel before heating) and the deformation after returning to ambient temperature 23°C.

The result is the average of the residual deformation of the 3 test specimens.

3.5 Behaviour tests under load maintained at temperature of an insulating material, So-called "slabs on pedestals"

3.5.1 Principle

This test simulates the deformation caused by a permanent load applied by slabs on pedestals or other processes with pedestals.

3.5.2 Equipment

Device for the application of a single axial load on a circular plate with a diameter of 50 mm, consisting of a metal plate with a flat underside and whose stops have a radius of curvature of 1 mm. The load shall be kept constant throughout the test. The concentrated load is applied perpendicular to the upper surface of the specimen.

The test specimen or the entire test bench shall be kept at a temperature regulated at ±2°C.

3.5.3 Test specimens

3.5.3.1 Preparation

The support surfaces of the test specimens must be representative of the product designed at the factory. No surface treatment of the specimens is therefore required.

3.5.3.2 Number and dimensions

The test shall be carried out on 3 specimens cutted from insulation panels of dimensions 150 x 150 mm or 300 mm x 300 mm.

3.5.3.3 Conditioning

The test specimens and the measuring and testing devices are conditioned in advance in the enclosure at 50 ± 2 °C for at least 16 hours.

3.5.4 Procedure

3.5.4.1 Test procedure

The specimen is placed on a flat, non-deformable surface.

It is charged, without shock, via the circular plate, centered on the specimen.

The stress value (in kPa) is named Q, such that Q is equal to 2 times the operating load indicated by the applicant.

The stress Q (+/- 1 kPa) applied to the specimen is maintained for a time t. The time t is such that the deformation curve as a function of the neperian logarithm of time tends to a straight line. The deformation of the insulation is measured in the direction of its thickness by the displacement of the circular plate.

Deformation measurements are made with a dial indicator at a resolution of ± 0.01 mm.

It is reported on a graph the displacement (ordinate, natural scale) as a function of time (abscissa, ln scale), by showing 5 to 6 regularly spaced points (after application of the load, and at 2.5 h, 3 h, 6 h, 24 h, 48 h, 72 h, 96 h for example).

The test has a minimum duration of 96 hours. From 96h the test can be stopped if the displacement function f (ln t) is linear or tends towards a limit. It is extended if not, or if there is uncertainty.

An average displacement curve is plotted from the three curves of the deformation measurements. As soon as this curve tends to a straight line (Coefficient R^2>0.9) on the last four points recorded, the final rectilinear part of this average curve is projected linearly at 100,000 hours, and this allows the assessment of the behaviour of the insulation material.

3.5.5 Calculation and expression of results

The report presents:

- A table with the recording of all deformations measured during the test at 0.01 mm;
- The results for each specimen;
- The displacement chart;
- The average projected displacement value of 100,000 hours (11.4 years), in mm, determined as follows:
    - The value of the deformations of each specimen shall be measured from the first point of deformation measurement to the last,
    - An average displacement curve is plotted from the three curves of the deformation measurements. As soon as this curve tends to a straight line over at least four points (Coefficient R^2 > 0.9), the final straight part of this average curve is projected linearly at 100,000 hours,
- The value of the test is the mean deformation projected at 100,000 hours; it is rounded by default to a tenth of a millimetre.

3.6 Test under static loads concentrated on cantilevered parts

3.6.1 Principle

This test simulates the movement of a person on the cantilevered parts of the insulation when implemented on ribbed steel deck (TAN means ribbed steel deck).

Tests are carried out on the minimum thickness claimed, per top rib opening (Ohn means top rib opening) of the TAN.

3.6.2 Equipment

Measurement at ± 2mm for opening measurements for the overhang of the insulation board from the end of the support. Measurement of the deformation at the end of the panel (vertical) at 1/100th of a mm.

Continuous measurement of the force at any given time shall allow a reading of ± 2 %.

The test shall be carried out on the insulation panel at its most critical position, when one of its ends is projected above the top rib opening of a steel deck. But it is necessary to take into account any recommendations of the manufacturer as to the direction of installation, the maximum free range, etc.

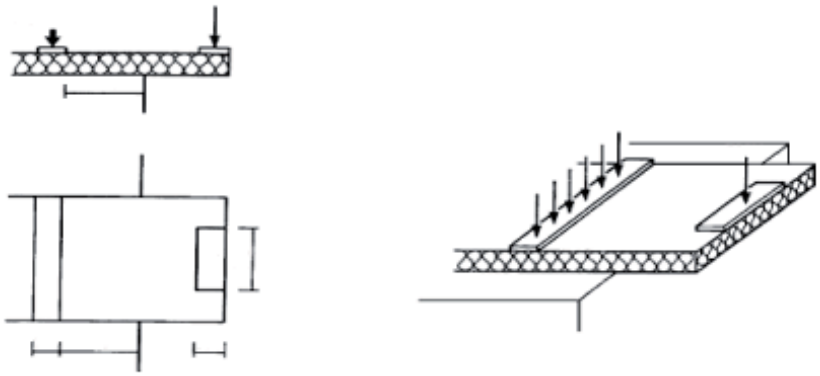

FIGURE 4.PROCEDURE FOR OVERHANG MEASUREMENT

3.6.3 Specimen

3.6.3.1 Preparation

When there is a preferred direction of installation of the panels, for example:

- The flat face to be placed on the upper side of the test apparatus;
- For a longitudinal or transverse direction of the projection of the panels,

The applicant shall inform the pilot in advance of the principle of installation of the test specimens.

Where there is no preferred direction of installation, the test shall be carried out on two series: one in the longitudinal direction and the other in the transverse direction.

Convention: The longitudinal and transverse directions of a test specimen are defined in relation to the orientation of the rigid plate:

- Longitudinal direction (L), when the plate is perpendicular to the length of the panel;

Transverse direction (T), when the plate is perpendicular to the width of the panel as shown in the following figure.

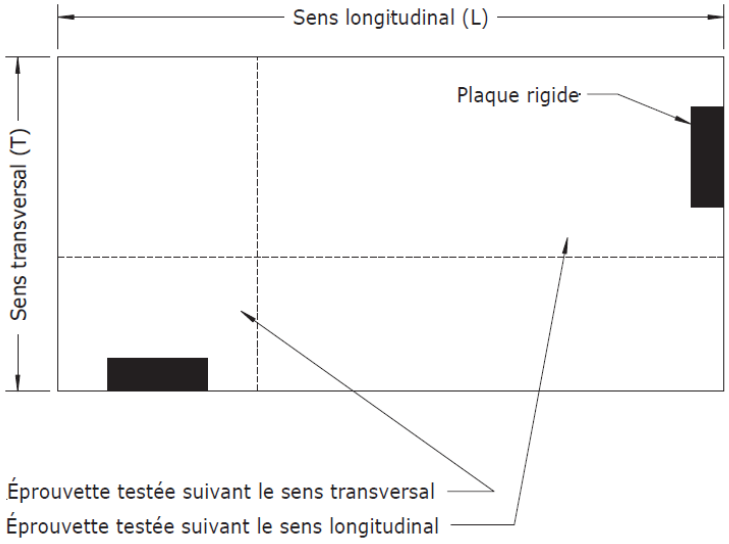

FIGURE 5.DEFINITION OF THE LONGITUDINAL AND TRANSVERSE DIRECTIONS OF A SPECIMEN

3.6.3.2 Number and dimensions

The test shall be carried out on a series of three test specimens taken from three panels taken from a batch of previously identified panels.

These specimens shall be 600 mm wide or the width of the panel, whichever is less than 600 mm. The length of the test specimen shall be chosen according to the maximum top rib opening, but not less than 450 mm. The linear dimensions of the specimens (NF EN 12085), length - width and thickness are measured.

3.6.3.3 Conditioning

They should be stored for at least 24 hours at (23 ± 5) °C before testing.

3.6.3.4 Procedure for insulation on ribbed steel deck with a top rib opening of less than or equal to 70 mm

3.6.3.4.1 Test conditions

The test shall be carried out at a temperature of 23 °C ± 5 °C.

3.6.3.4.2 Test procedure

The specimen shall be positioned as shown in Figure 6 so that it is firmly pressed against the load-bearing element with a force of at least 1000 N by the action of a rigid plate 100 mm wide and 600 mm long. The displacement measurement must be made at the end of the panel by the crossbar of the press.

A load of 700 N ± 20 N is applied via a rigid plate of 70 x 300 mm. This rigid plate must be equipped with a pivot. The stress is applied to the center, at the end of the panel (Figure 5) at a speed of 20 ± 5 mm/min.

- The test specimen shall be arranged on the test frame in such a way as to have a overhang of the test specimen of 70 ± 2 mm;
- The specimen is clamped via the plate of the 100x600mm under at least 1000N;

- Reset load and displacement measurements;
- Application of the load from 700 N to 20 ± 5 mm/min and stabilization of the load for 15s;
- Measurement of deformation under load without rupture of the panel;
- Removal of the 700 N load for at least 2 min;
- Measurement of residual deformation.
- Whenever the ultimate load is required, application of a new load at 20 ± 5 mm/min is performed until the panel failure, the ultimate load is considered to be the maximum load recorded.

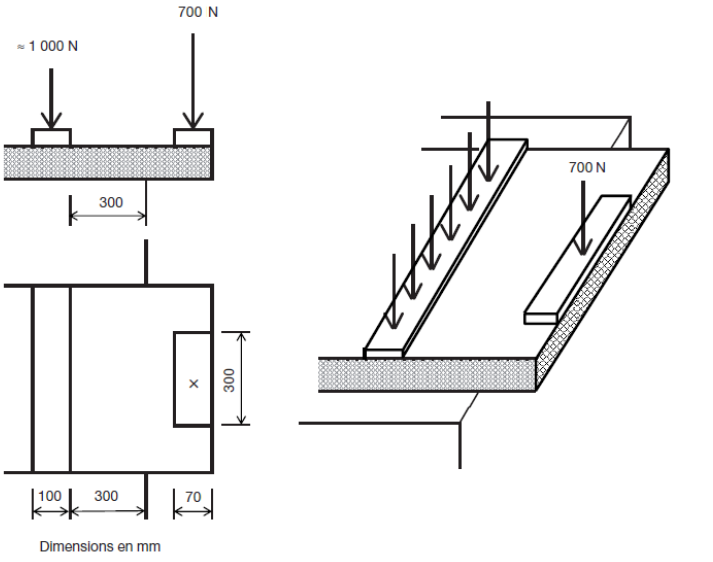

FIGURE 6.PROCEDURE FOR OVERHANG MEASUREMENT

3.6.3.5 Procedure for insulation on ribbed steel sheet with a top rib opening greater than 70 mm

3.6.3.5.1 Test conditions

The test shall be carried out at a temperature of 23 °C ± 5 °C.

3.6.3.5.2 Test procedure

The specimen shall be positioned as shown in Figure 7 so that it is firmly pressed against the load-bearing element with a force of at least 1000 N by the action of a rigid plate 100 mm wide and 600 mm long. The displacement measurement must be made at the end of the panel by the crossbar of the press.

A load of 1000 N ± 20 N is applied via a rigid plate of 100 x 300 mm. This rigid plate must be equipped with a pivot. The load is applied to the center, at the end of the panel (Figure 5) at a speed of 20 ± 5 mm/min.

- The test specimen shall be arranged on the test frame in such a way as to have the claimed overhang ±2 mm;

- The test specimen shall be clamped via the plate of 100 x600 mm under at least 1000 N;
- Reset load and displacement measurements;
- Application of the load from 1000 N to 20 ± 5 mm/min and stabilization of the load for 15s;
- Measurement of deformation under load without rupture of the panel;
- Removal of the 1000 N load for at least 2 min;
- Measurement of residual deformation ;
- Whenever the ultimate load is required, application of a new load at 20 ± 5 mm/min is performed until the panel failure, the ultimate load is considered to be the maximum load recorded.

3.6.3.6 Calculation and expression of results

The panel is examined to determine if it breaks. The residual deformation of the insulation is measured at the "loading point".

The test is repeated with more specimens, increasing the projection until the breaking occurs.

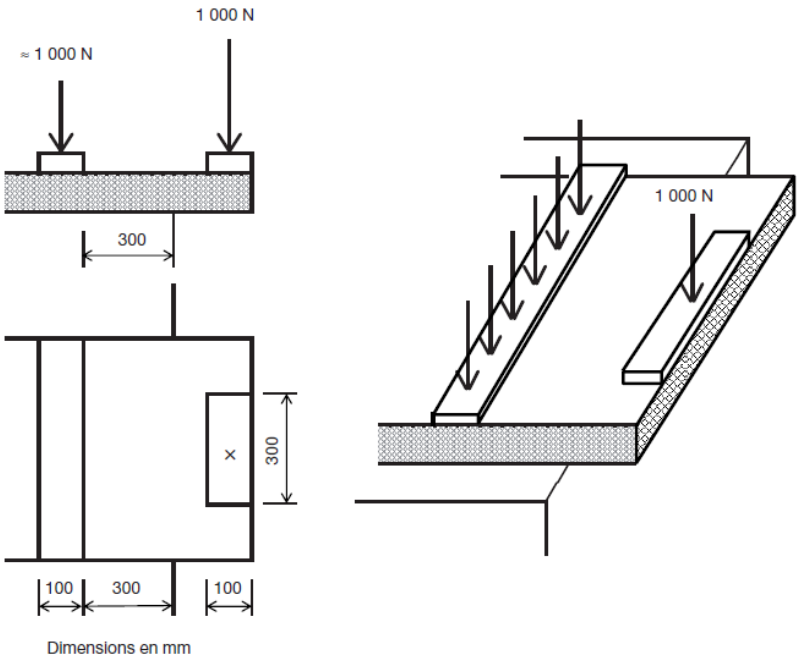

FIGURE 7.ARRANGEMENT OF THE TEST ON CANTILEVERED PARTS, INDICATING THE POSITIONING OF THE SPECIMEN

3.7 Characteristic of RCs/ds

The provisions of Technical Specification n°5 apply.

4 Factory production control and monitoring

For the characteristics derived from the associated product standards, the factory production control meets the requirements of Annex B of the associated standard. Surveillance at the pilot laboratory is carried out according to the conditions defined in the associated product standard.

For other certified characteristics the tables below apply.

The test methods applied for the surveillance tests carried out by the pilot laboratory shall be those defined in paragraphs 3, with the exception of the following points:

- The compressibility class test will be performed with the following specifications:
    - Only one specimen will be tested per production line. The result of the worst specimen or the specimens with a result greater than or equal to 4% shall be supplemented by two additional specimens.
- Dimensional variation, bowing, slabs on pedestals, cantilever and class tests shall be carried out with the following specifications:

Only one specimen will be tested per production line. The result of the worst test specimen shall be supplemented by two additional specimens. All specimens with a result not conforming to the specifications shall be systematically supplemented by two additional specimens.

4.1 Mineral wool (MW)

Certified characteristics	Minimum test frequency Factory production control			Surveillance by the pilot laboratory	
	Direct test	Indirect test		Fréquence	Direct test
		Test method	Frequency		
Compressibility class (§3.2)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	5 years	for classes B: one test per level of CS declared in max thickness on critical line. for classes C: a test on all maximum thicknesses (all families and all lines). Random sampling from stock.
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test under loads concentrated on cantilevered parts (§3.6)	1 test every 6 months per thickness produced per product	/	/	5 years	By product on average thickness or the most manufactured. Random sampling from stock.

4.2 Expanded polystyrene (EPS)

Certified characteristics	**Minimum test frequency** **Factory production control**			**Surveillance by the pilot laboratory**	
	Direct test	**Indirect test**		**Fréquence**	**Direct test**
		Test method	**Frequency**		
Compressibility class (§3.2) Class B: Class C:	1 direct test in thickness not more than 100 mm 1 time every two years Or indirect 1 direct test in thickness not more than 100 mm 1 time every two years Or indirect	Compression stress according to NF EN 826	Appendix B of the associated product standard	5 years	for classes B: one test per level of CS declared on critical line. for classes C: a test on all families and lines. Random sampling from stock.
Test of residual dimensional variations after temperature stabilization (§3.3)	1 direct test every two years or 1 indirect test once a month with correlation to be established by the manufacturer	48h mini 60°C according to EN1604	1/month	5 years	One test per product per line. Random sampling from stock.
Bowing under the effect of a thermal gradient (§3.4)	1 direct test 1/year Or indirect test	Flatness measurement 1/8h		/	/
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test under loads concentrated on cantilevered parts (§3.6)	/	Tensile perpendicular to the faces	Appendix B of the associated product standard	/	/

4.3 Extruded Polystyrene (XPS)

Certified characteristics	**Minimum test frequency**			**Surveillance by the pilot laboratory**	
	Direct test	**Indirect test**		**Fréquence**	**Direct test**
		Test method	**Frequency**		
Compressibility class (§3.2)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test of residual dimensional variations after temperature stabilization (§3.3)	/	/	/	5 years	One test per product per line. Random sampling from stock.
Bowing under the effect of a thermal gradient (§3.4)	1 every 6 months with variable thickness between minimum and 100mm thickness, higher thickness possible if multilayer panel	/	/	5 years	One test per product per line. Random sampling from stock.
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Characteristic of RCs/ds (§3.7)	According to TS 5	According to TS 5	/	/	/

4.4 Rigid polyurethane (PU) foam

Certified characteristics	**Minimum test frequency**			**Surveillance by the pilot laboratory**	
	Direct test	**Indirect test**		**Fréquence**	**Direct test**
		Test method	**Frequency**		
Compressibility class (§3.2)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	5 years	for classes B: one test per level of CS declared in max thickness on critical line. for classes C: a test on all families and lines. Random sampling from stock.
Test of residual dimensional variations after temperature stabilization (§3.3)	1 every 3 months with variable thickness Or indirect tests with correlation to be established by the manufacture r	72h at 80°C + 24h at 23°C. Criterion ≤0.3%.	1 time per month on 3 specimens minimum 150x150 mm with variable thickness (less specimens possible if larger size).	5 years	One test per product per line. Random sampling from stock.
Bowing under the effect of a thermal gradient (§3.4)	1 every 3 months with variable thickness	/	/	/	/
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test under loads concentrated on cantilevered parts (§3.6)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Characteristic of RCs/ds (§3.7)	According to TS 5	According to TS 5	/	/	/

4.5 Cellular Glass (CG)

Certified characteristics	Minimum test frequency			Surveillance	
	Direct test	Indirect test		Fréquence	Direct test
		Test method	Frequency		
Compressibility class (§3.2)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test of residual dimensional variations after temperature stabilization (§3.3)	/	/	/	/	/
Bowing under the effect of a thermal gradient (§3.4)	/	/	/	/	/
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test under loads concentrated on cantilevered parts (§3.6)	1 time per year on variable thickness.	/	/	5 years	One test per product per line on the most critical thickness (minimum thickness or minimum breaking load). Random sampling from stock.
Characteristic of RCs/ds (§3.7)	According to TS 5	According to TS 5	/	/	/

4.6 Fibered Expanded Perlite (EPB)

Certified characteristics	Minimum test frequency			Surveillance	
	Direct test	Indirect test		Fréquence	Direct test
		Test method	Frequency		
Compressibility class (§3.2)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Behaviour tests under load maintained at temperature (§3.5)	/	Compression stress according to NF EN 826	Appendix B of the associated product standard	/	/
Test under loads concentrated on cantilevered parts (§3.6)	1 time per year on 2 thicknesses	/	/	5 years	One test per product per line on the most critical thickness (minimum thickness or minimum breaking load). Random sampling from stock.
Characteristic of RCs/ds (§3.7)	According to TS 5	According to TS 5	/	/	/