Technical Construction File

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Date of issue.....:	August 12, 2026
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Applicant.....:	Shandong Zhongyu Integrated Housing Co., Ltd.
Address.....:	20m north-east of the intersection of Industrial Second Street and Kaituo Road, Weicheng District, Weifang Economic Development Zone, Weifang, Shandong Province, China
Manufacturer.....:	Shandong Zhongyu Integrated Housing Co., Ltd.
Address.....:	20m north-east of the intersection of Industrial Second Street and Kaituo Road, Weicheng District, Weifang Economic Development Zone, Weifang, Shandong Province, China
Factory.....:	The same as Manufacturer
Address.....:	The same as Manufacturer
Standard.....:	☒ EN 12467:2012+A2:2018, ☒ EN 13986:2004+A1:2015, ☒ EN 14509:2013, ☒ EN 14041:2018, ☒ EN ISO 1452-1:2009, ☒ EN ISO 1452-2:2009, ☒ EN ISO 1452-3:2010, ☒ EN ISO 15875-1:2003+A1:2007, ☒ EN ISO 15875-2:2003+A1:2007+A2:2020, ☒ EN ISO 15875-3:2003+A2:2021, ☒ EN 1090-1:2009+A1:2011
TRF originator.....:	GTS
Master TRF.....:	Date 2020-09-15
Review procedure .....:	GTS
Type of Review object.....:	Expandable house
Trademark.....:	-
Model/type reference.....:	20ft/30ft/40ft and custom sizes available
Rating.....:	

Possible review case verdicts: - review case does not apply to the test object..... : N(.A.) - review object does meet the requirement..... : P(ass) - review object does not meet the requirement.....: F(ail)
General remarks:
"(see remark #)" refers to a remark appended to the report. "(see appended table)" refers to a table appended to the report. Throughout this report a comma is used as the decimal separator. The review results presented in this report relate only to the object reviewed. This report shall not be reproduced except in full without the written approval of the third party.

Testing:	
Date of receipt of review item:	August 01, 2026
Date(s) of performance of review:	August 01, 2026 to August 12, 2026

General product information: Plastic-steel Doors and Windows
Summary of reviewing: This review report includes: **Annex I: 5 page(s) of photo documentation.**
Copy of marking plate

Expandable house Model 20ft/30ft/40ft and custom sizes available Shandong Zhongyu Integrated Housing Co., Ltd.	Marking CE

EN 12467			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
1	Scope		
2	Normative references		
3	Terms and definitions		
4	Symbols and abbreviations		
5	Requirements		
5.1	General		
5.1.1	Composition		
	Sheets shall consist essentially of cement or a calcium silicate formed by a chemical reaction of a siliceous and a calcareous material, reinforced by fibres. The cement shall comply with EN 197-1 or with technical specifications relevant in the country of use. This European Standard covers fibre-reinforced cement flat sheets of type NT. The reinforcing fibres shall be one or more of the following forms:discrete elements randomly dispersed;	Compliance with the requirement.	P
	continuous strands or tapes;	Compliance with the requirement.	P
	nets or webs.	Compliance with the requirement.	P
	Process aids, fillers, aggregates and pigments may be added.	Compliance with the requirement.	P
5.1.2	Appearance and finish		
	The exposed face of the sheets can be with or without texture. The sheets can be coloured or left in their natural colour. The sheets can also receive adherent coloured or uncoloured coatings on their surface.	Compliance with the requirement.	P
	Variations of the surface appearance which do not impair the fitness for purpose of the sheets are permitted.	Compliance with the requirement.	P
	The sheets may be supplied with holes for fixing and/or cut to size.		P

5.2	Classification		
5.2.1	General		
	Sheets covered by this document are divided into: four categories in accordance with their weather resistance (see 5.2.2 to 5.2.5);	Compliance with the requirement.	P
	five classes in accordance with their bending strength (see 5.4.3);		P
	two groups of sizes in accordance with their method of installation (see 5.2.6);		P
	two levels in accordance with their dimensional tolerances (see 5.3.4).	Compliance with the requirement.	P
	Type tests for each category are specified in Table 7.		P
5.3	Dimensions and tolerances		P
5.3.1	General		
	There are two levels of tolerances for length, width, straightness and squareness of edges. Sheets shall comply with the requirements of the same level for the four sets of tolerances.		P
5.3.2	Nominal length and width		P
	The manufacturer shall specify the nominal length and width of the sheets.		P
5.3.3	Thickness		
	The manufacturer shall specify the nominal thickness of the sheets. For non-textured sheets, the nominal thickness refers to the average thickness. For textured sheets, the nominal thickness refers to the maximum thickness.	Compliance with the requirement.	P
5.4	Physical requirements and characteristics		
5.4.1	General		
	Mechanical and material properties are normally determined on sheets as delivered. The results shall be identified as applying to coated or uncoated material.	Compliance with the requirement.	P
5.4.2	Apparent density		

	The manufacturer shall specify in his literature the minimum apparent density for each category and each class of sheet. When tested in accordance with the method specified in 7.3.1, the density shall be not less than this value.	Compliance with the requirement.	P
5.4.3	Moisture movement		
	The manufacturer's literature shall state the percentage value of linear sheet moisture movement measured when the sheet is exposed to a relative humidity change from 30 % to 90 %. The stated value shall be determined in accordance with 7.3.7 using the test method given in Annex C.	Compliance with the requirement.	P
5.4.4	Mechanical characteristics		P
	When tested as specified in 7.3.2, the minimum modulus of rupture of the sheets, expressed in megapascals, shall be as specified in Table 6. The *MOR* shall be the average of the values obtained from testing the samples in both directions.	Compliance with the requirement.	P
5.4.5	Water impermeability for Categories A, B and D		
	When tested in accordance with 7.3.3, traces of moisture may appear on the under face of the sheet, but in no instance shall there be any formation of drops of water.		P
5.4.6	Water vapour permeability for Category D		
	For flat sheets used as rigid underlays, the water vapour resistance value shall be determined according to 7.3.4 and shall be specified in the manufacturer's literature.		P
	The value obtained from the test shall not be higher than the value specified by the manufacturer.		P
5.5	Durability requirements		
5.5.1	General		
	Mechanical and material properties are normally determined for sheets as delivered. The results shall be identified as applying to coated or uncoated material. The performance of the coating in the following tests shall not be considered in the assessment of the product.	Compliance with the requirement.	P
5.6	Fire and safety		
5.6.1	Reaction to fire		
	When subject to regulatory requirements, the reaction to fire of the sheets shall be declared in accordance with 7.5.	Compliance with the requirement.	P

5.6.2	Release of dangerous substances		
	Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.		P
5.7	Product information		
	The manufacturer shall include the following in his literature:		
	a) designation of the sheet: 1) type of product: NT (see 5.1.1); 2) name of the sheet; 3) category; 4) class; 5) level of tolerances.	Compliance with the requirement.	P
	b) nominal values for: 1) thickness; 2) length and width.	Compliance with the requirement.	P
	c) minimum apparent density;		P
	d) instructions relevant to the handling and installation.		P
6	Evaluation of conformity		
6.1	General		
	The conformity of products with the requirements of this document shall be demonstrated by: initial type testing; and	initial type testing	P
	factory production control by the manufacturer.		N/A
6.2	Initial type testing		
	Type tests shall be carried out on sheets as delivered. If several formats, sizes and nominal thicknesses are being produced from the same composition and by the same production method, type tests only need to be carried out on the maximum and minimum thickness. If the ratio of the maximum to minimum thickness is greater than three then an additional intermediate thickness shall be tested.	Compliance with the requirement.	P
	All characteristics listed in Table 8 shall be subject to initial type testing, except reaction to fire Class A1 without testing and external fire performance “deemed to satisfy” products. The type tests relevant for each category are listed in Table 7.	Compliance with the requirement.	P
6.3	Factory production control (FPC)		

6.3.1	General		
	The manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform to the stated performance characteristics.		N/A
	The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.		N/A
	A manufacturer who has established a Quality management system according to EN ISO 9001 and made specific to the requirements of this standard, is considered to satisfy the above requirements. The results of inspections, tests or assessments requiring action shall be recorded, as shall the action(s) being taken.		N/A
6.3.2	Acceptance tests		
	The specifications of acceptance tests apply to the product as delivered, but may be carried out at an earlier stage of maturity.		N/A
6.3.3	Equipment		N/A
6.3.4	Raw materials and components		N/A
6.3.5	Product testing and evaluation		N/A
6.3.6	Non-conforming products		N/A
6.4	Inspection of a consignment of finished products		N/A
7	Test methods		
7.1	General		
	This part of the document details both acceptance and initial type testing.	initial type testing	P
7.2	Dimensional and geometrical tests		
7.2.1	Preparation of specimen		
7.2.2	Apparatus		
7.2.3	Procedure		
7.2.4	Expression and interpretation of results		
	Length and width: Each value shall comply with the tolerances specified in 5.3.4.		P

	Thickness: The average of the measurements shall be not less than the minimum specified by the manufacturer and shall comply with the tolerances specified in 5.3.4.2.	Compliance with the requirement.	P
	Straightness of edges: Each result shall be not more than the tolerances given in 5.3.5.1, appropriate for the intended level.		P
	Squareness of edges: Each result shall be not more that the tolerances given in 5.3.5.2, appropriate for the intended level.		P
7.3	Tests for physical performance and characteristics		P
7.3.1	Apparent density		P
7.3.2	Mechanical characteristics - Bending strength – Modulus of elasticity (Bending modulus)		P
7.3.3	Water impermeability		
7.3.4	Water vapour permeability		P
7.3.5	Warm water		P
7.3.6	Soak-dry		P
7.3.7	Moisture movement test		P
7.4	Tests for climatic performance		
7.4.1	Freeze-thaw		P
7.4.2	Heat-rain	In accordance with the manufacturer’s declaration.	P
7.5	Test for reaction to fire performance		
7.5.1	Sheets satisfying the requirements for the fire reaction Class A1 without the need for testing		P
7.5.2	Other sheets		P
8	Marking, labelling and packaging		
	The packaging of sheets shall be marked with at least the following: a) manufacturers identification;	It is provided.	P
	b) number of this European Standard (EN 12467);	It is provided.	P
	c) size and/or name;	It is provided.	P
	d) category;	It is provided.	P

	e) class;	It is provided.	P
	f) level of tolerances;	It is provided.	P
	g) date of manufacture;	It is provided.	P
	h) “NT” (see 5.1.1);	It is provided.	P
	i) trade name.	It is provided.	P

Test Conducted:
Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking (EN 13986:2004+A1:2015)

Terms and definitions

Clause	Requirement	Result - Remark	Verdict
3.1	wood-based panel		N/A
3.2	solid wood panel (SWP)		N/A
3.3	laminated veneer lumber (LVL)		N/A
3.4	plywood		Pass
3.4.1	plywood for internal use as a structural component in dry conditions		N/A
3.4.2	plywood for internal use as a structural component in humid conditions		N/A
3.4.3	plywood for external use as a structural component		N/A
3.4.4	plywood for internal use as a non-structural component in dry conditions		N/A
3.4.5	plywood for internal use as a non-structural component in humid conditions		N/A
3.4.6	plywood for external use as a non-structural component		-
	plywood incorporating the performance characteristics from 4.6 that are relevant to plywood in EN 636, type EN 636-3		Pass
3.5	oriented strand board (OSB)		N/A
3.6	particleboard		N/A
3.7	fibreboard		N/A

Test result:

Test Property	Test Method	Test Principle / Requirements	The Result
5. Determination of the performance characteristics			
Bending strength	EN 13986 Clause 5.1	The bending strength shall be determined according to EN 310, except for solid wood panels which shall be tested according to prEN 789 and for extruded particleboards which shall be tested according to prEN 14755. The results shall be expressed as a 5 percentile value according to EN 326-1.	Pass
Bending stiffness (Modulus of elasticity)	EN 13986 Clause 5.2	The modulus of elasticity in bending shall be determined according to EN 310 except for solid wood panels which shall be tested according to prEN 789. The results shall be expressed as a 5 percentile value according to EN 326-1.	Pass
Bonding quality	EN 13986 Clause 5.3	The bonding quality of solid wood panels shall be determined and the results expressed according to CEN/TS 13354. The bonding quality of plywood shall be determined according to EN 314-1 and the results expressed according to EN 314-2. The bonding quality of LVL shall be determined according to prEN 14279.	Pass
Internal bond (Tensile strength)	EN 13986 Clause 5.4	For OSB, particleboard, cement-bonded particleboard, and fibreboard, the tensile strength perpendicular to the plane of the board shall be determined according to EN 319, except for extruded particleboards which shall be tested according to prEN 14755. The result shall be expressed as a 5 percentile value according to EN 326-1.	Pass
Durability (Swelling in thickness)	EN 13986 Clause 5.5	The swelling in thickness shall be determined according to EN 317 and expressed as a 95 percentile value, according to EN 326-1.	Pass
5.6 Durability (Moisture resistance)			-
5.6.1 OSB			N/A
5.6.2 Particleboard			N/A
5.6.3 Cement-bonded particleboard			N/A
5.6.4 Fibreboard			N/A

Test Property	Test Method	Test Principle / Requirements	The Result
Plywood and solid wood panels	EN 13986 Clause 5.6.5	The durability against moisture is assessed as bonding quality (see 5.3). The appropriate preconditioning for the expected use (dry, humid, exterior conditions) shall be used.	Pass
Release of formaldehyde	EN 13986 Clause 5.7	The formaldehyde release of wood-based panels shall be determined according to Annex B.	Pass < 0.1 mg/m^3 E1
Reaction to fire	EN 13986 Clause 5.8	The reaction to fire performance shall either be classified according to EN 13501-1 or the classes shall be taken from Table 8. When testing, and where required by the test method, the product shall be mounted and fixed in a manner representative of its intended end use.	Pass
Water vapour permeability	EN 13986 Clause 5.9	The water vapour permeability shall either be determined as the water vapour resistance factor according EN ISO 12572:2001 or taken from Table 9.	Pass
Airborne sound insulation	EN 13986 Clause 5.10	The airborne sound insulation shall be determined only for uses subject to acoustic sound requirements. The sound transmission loss R of a single wood-based panel, measured in dB, is related the mean surface mass mA in kg/m2 according to the following equation	N/A
Sound absorption	EN 13986 Clause 5.11	The sound absorption coefficient shall only be determined when the panel is intended to be used as an acoustical absorbant. It shall either be determined according to EN ISO 354 or taken from Table 10.	Pass
Thermal conductivity	EN 13986 Clause 5.12	The thermal conductivity shall be determined only for uses subject to thermal insulation requirements. It shall either be determined according to EN 12664 or taken from Table 11.	Pass
Strength and stiffness for structural use	EN 13986 Clause 5.13	The bending strength and stiffness shall be determined according to prEN 789 and expressed as a characteristic value according to EN 1058. The characteristic values for use in structural design may also be taken from the relevant part of EN 12369, if included.	Pass

Test Property	Test Method	Test Principle / Requirements	The Result
5.14 Impact resistance for structural use			N/A
5.15 Strength and stiffness under point load for structural use			N/A
Mechanical durability	EN 13986 Clause 5.16	The mechanical durability shall either be determined according to ENV 1156 or the appropriate modification factors kmod and kdef. may be taken from prEN 1995-1-1	Pass
Biological durability	EN 13986 Clause 5.17	The hazard class(es) in which a product may be used shall be taken from the relevant parts of EN 335.	Pass
Content of pentachlorophenol	EN 13986 Clause 5.18	Wood-based panels normally contain less than 5 ppm of pentachlorophenol (PCP). If the product contains raw materials that include PCP, then the product shall be tested according to methods valid in the country of use. In case the value of 5 ppm is exceeded, the indication “PCP > 5 ppm” shall be added to the marking.	Pass
6. Evaluation of conformity			
General	EN 13986 Clause 6.1	The compliance of a wood-based panel with the requirements of this document and with the stated values (including classes) shall be demonstrated by: -factory production control by the manufacturer, - initial type testing, - where required, initial factory inspection and continuous surveillance.	Pass
Factory production control (FPC)	EN 13986 Clause 6.2	The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market conform with the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments; the results shall be used to control raw and other incoming materials or components, equipment, the production process and the product, and shall be sufficiently detailed to ensure that the conformity of the product is apparent. If the manufacturer operates an FPC system conforming with the requirements of EN ISO 9001, and made specific to the requirements of this document, the above requirements are considered to be satisfied.	Pass

Test Property	Test Method	Test Principle / Requirements	The Result
		The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria have not been met shall be recorded. The manufacturer shall control the required performance characteristics of the panels according to EN 326-2. The performance characteristics relevant to the intended application (see Tables 1 to 7) shall be controlled using frequencies of testing equal to or greater than the frequencies given in the Table 12. Sampling shall be carried out at random.	
Marking	EN 13986 Clause 7	The marking shall consist of the relevant properties for the intended application (see Tables 1 to 7) using the elements in Table 13 or in Table 14.	N/A

Remark:
N/A = Not applicable.

Table 8

Table 8 — Reaction to fire classes (Euroclasses as defined in EN 13501-1)

Wood-based panel products[a]	EN product grade reference	Minimum density kg/m^3	Minimum thickness mm	Class[b] Excluding floorings	Class[c] Floorings
OSB	EN 300	600	9	D-s2, d0	D_{FL}-s1
Particleboards	EN 312	600	9	D-s2, d0	D_{FL}-s1
Fibreboards, Hard	EN 622-2	900	6	D-s2, d0	D_{FL}-s1
Fibreboards, Medium	EN 622-3	600	9	D-s2, d0	D_{FL}-s1
		400	9	E, pass	E_{FL}
Fibreboards, Soft	EN 622-4	250	9	E, pass	E_{FL}
Fibreboards, MDF	prEN 622-5	600	9	D-s2, d0	D_{FL}-s1
Cement-bonded particleboard[d]	EN 634-2	1 000	10	B-s1, d0	B_{FL}-s1
Plywood	EN 636	400	9	D-s2, d0	D_{FL}-s1
Solid wood panels	EN 13353	400	12	D-s2, d0	D_{FL}-s1

The classes given in the table are for unjointed panels, T&G jointed panels installed according to ENV 12872 and fully supported joints installed according to ENV 12872.

[a] Wood-based panels mounted without an air gap directly against class A1 or A2-s1, d0 products with minimum density 10 kg/m^3 or at least class D-s2, d0 products with minimum density 400 kg/m^3

[b] Classes as provided for in Commission Decision 2000/147/EC Annex Table 1

[c] Classes as provided for in Commission Decision 2000/147/EC Annex Table 2

[d] Cement content at least 75 % by mass

Table 9

Table 9 — Water vapour resistance factors of wood-based panels as given in EN 12524

Wood-based panel	Mean density kg/m^3	Vapour resistance factor	
		Wet cup μ	Dry cup μ
Solid wood panel, plywood and LVL	300 500 700 1 000	50 70 90 110	150 200 220 250
OSB	650	30	50
Particleboard	300 600 900	10 15 20	50 50 50
Cement-bonded particleboard	1 200	30	50
Fibreboard	250 400 600 800	2 5 12 20	5 10 20 30
NOTE For densities not given in Table 9, values can be found by interpolation.			

Table 10

Table 10 — Sound absorption coefficients

Wood-based panel	Sound absorption coefficient	
	Frequency range 250 Hz to 500 Hz	Frequency range 1 000 Hz to 2000 Hz
Solid wood panel, plywood and LVL	0,10	0,30
OSB, Particleboard	0,10	0,25
Cement-bonded particleboard	0,10	0,30
Fibreboard mean density < 400 kg/m^3 mean density ≥ 400 kg/m^3	 0,10 0,10	 0,30 0,20

Table 11

Table 11 — Thermal conductivity of wood-based panels in relation to density

Wood-based panel	Mean density ρ kg/m^3	Thermal conductivity λ W/(m · K)
Solid wood panel plywood and LVL	300 500 700 1 000	0,09 0,13 0,17 0,24
OSB	650	0,13
Particleboard	300 600 900	0,07 0,12 0,18
Cement-bonded particleboard	1 200	0,23
Fibreboard	250 400 600 800	0,05 0,07 0,10 0,14
NOTE For densities not given in Table 11, λ can be found by interpolation		

EN 14509

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Annex: Test results of each performance

1 Preliminary remark

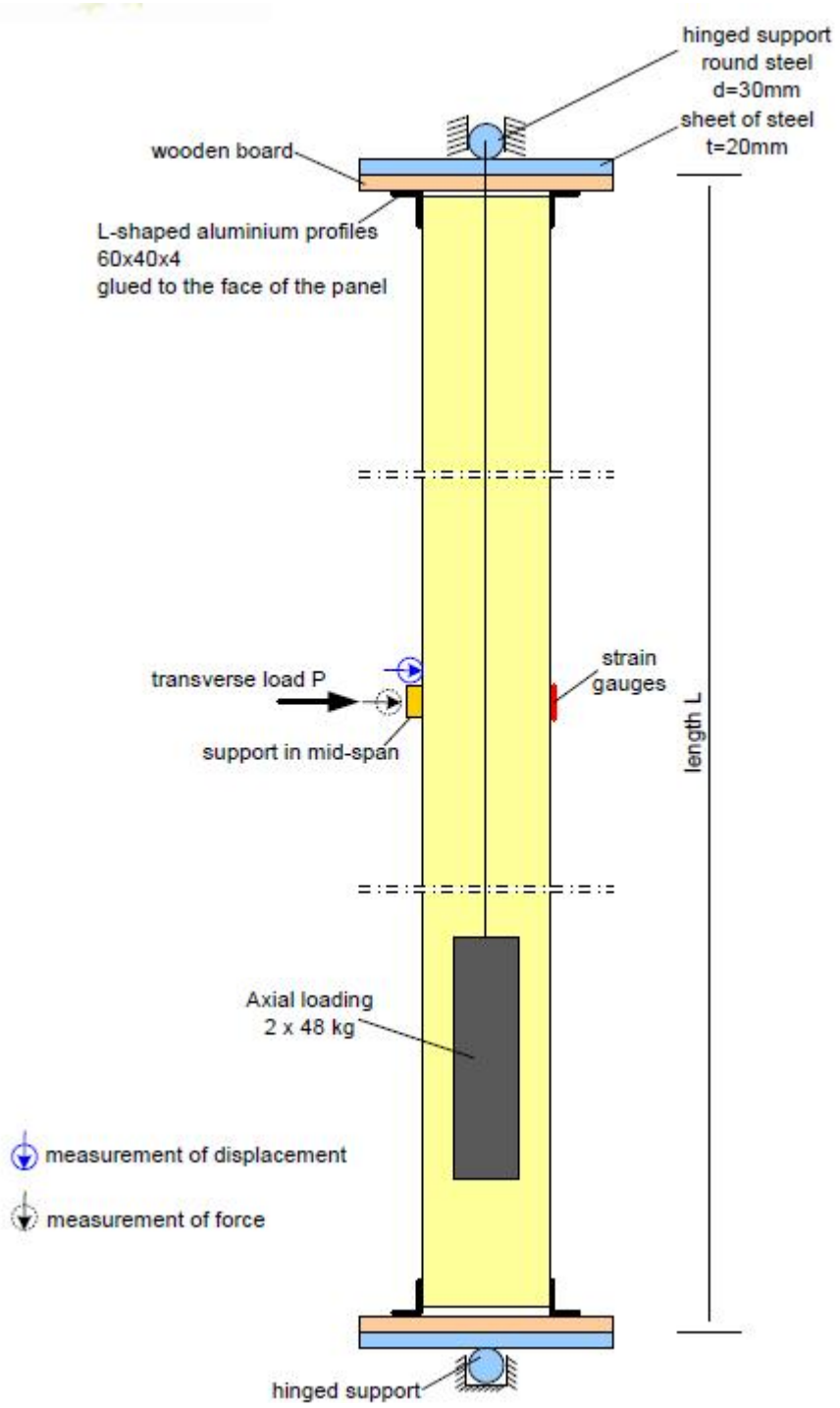
Clean board, which generally consist of two thin faces (e.g. thin sheet metal) and a rigid core material (PUR, PIR, EPS, mineral wool, etc.), are used as roof covering and wall finishes in a wide field of applications. For determination of internal forces and design it is necessary to determine among other factors the material properties and strength of the core material. These values need to be determined through testing.
Traditionally Clean board are used as covering elements of buildings. In this application the panels only transfer transverse loads (wind, snow) to the substructure by bending. In the panels only the stress resultants of bending moment and transverse force are effective. A recent tendency, especially in the area of smaller buildings – such as cooling chambers, climatic chambers and clean rooms – is to apply the panels without substructure. In addition to the stress resultants arising from transverse loads, the wall panels also have to transfer normal forces. This results in the question for the load-bearing capacity of the panels subjected to axial loads or a combination of axial and transverse loads.

2 Object of testing

For all tests specimens with the width 50mm have been uses

3 Test set-up

The test set-up for performing the creep tests on axially loaded Clean board is outlined in Fig.1 &2



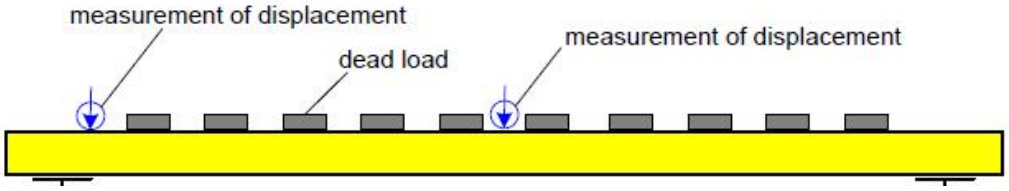
4 Test performance and results of the tests

At the beginning of the test an axial force of approximately 1kN was applied. Following the initial deflection w0 was applied to the panel at mid-span. At this position the support was fixed during the test.
The reaction force P in mid-span and the strain in the face subjected to tension were measured continuously during the test.

Annex 1 shows the results of the tests. For each test, a table listing all relevant parameters is given, followed by the graphs of the measured values. The first diagram shows the forces at mid-support for both thread rods. For determination of the forces a load-strain-curve was determined for each thread rod before starting the tests. The second diagram shows the measured strains in the face subjected to tension.
During the test increasing of deflection in mid-span did not appear at any specimen.

5 Creep tests according to EN 14509

For the purpose of comparison additionally to the creep tests on axially loaded panels creep tests with transverse loading according to EN 14509 were performed for each type of panel.



6 Determination of the material properties

6.1 Mechanical properties of the core layer
The mechanical properties were determined according to EN 14509. The determination of the compression strength f_{Cc}, the tensile strength f_{Ct}, the shear strength f_{Cv}, as well as the appropriate shear, compression and tensile module values G_C, E_{Cc} and E_{Ct} was realized on at least three specimens. The analysis of the modulus of elasticity E_C was realised as mean value from the compression and tensile module of a specimen pair.

6.2 Fire performances
The reaction to fire classification of the product shall be determined according to EN 13501-1.

7 Ambient temperature

During the test the ambient temperature was measured continuously. The measured temperatures are shown in the following diagram.

8 Summary

The metal cover deals with Clean board used for buildings without substructure. In this application the wall panels have to transfer normal forces in addition to transverse loads. project deals with Clean board used for buildings without substructure. In this application the wall panels have to transfer normal forces in addition to transverse loads

No.	Test items	Standard requirement	Test results		Conclusion
1	Bending strength	≥100MPa	face upward lengthways	139MPa	PASS
			face upward crosswise	138MPa	PASS
			back up lengthways	142MPa	PASS
			back up crosswise	141MPa	PASS
2	Flexural modulus of elasticity	≥2.0*10^{4}MPa	Front lengthways	3.2*10^{4}MPa	PASS
			Front crosswise	3.3*10^{4}MPa	PASS
			Back lengthways	3.4*10^{4}MPa	PASS
			Back crosswise	3.6*10^{4}MPa	PASS
3	Roller peel strength	mean value ≥130N·mm/mm minimum value ≥120N·mm/mm	Front lengthways	mean value 210N·mm/mm minimum value 199N·mm/mm	PASS
			Front crosswise	mean value 198N·mm/mm minimum value 181N·mm/mm	PASS
			Back lengthways	mean value 159N·mm/mm minimum value 146N·mm/mm	PASS
			Back crosswise	mean value 154N·mm/mm minimum value 148N·mm/mm	PASS
4	Penetration resistance	≥7.0kN	8.8kN		PASS
5	Shear strength	≥22.0MPa	28.4MPa		PASS
6	Temperature difference resistance	180°Decline rate of peel strength	≤10%	7%	PASS
		appearance	No change	No change	PASS
7	Coefficient of thermal expansion		≤4.0*10^{-5}℃$^{-1}$	2.04*10^{-5}℃$^{-1}$	PASS
8	Heat deflection temperature		≥95℃	117℃	PASS
9	Hot Water Resistance		no abnormalities	no abnormalities	PASS

The ductility and chemical composition of copper coil:

Rm N/mm^2	A11.3 (%)	HV0.5	90 degree bend	Chemical Composition(%)				
				Cu+Al	Ni	Zn	Pb	Fe
381 381	47.5 47.5	87.9	Pass	60.93	<0.20	margin	<0.010	0.049

The ductility and chemical composition of aluminum coil:

Tensile strength	Elongation	Chemical Composition(%)								
		Al	Si	Fe	Cu	Mn	Mg	Ni	Zn	Ti
170	12.7	99.29777	0.04904	0.52189	0.07611	0.00699	0.00029	0.00718	0.00597	0.02032
176	10.1	99.35568	0.04119	0.48844	0.07639	0.00423	0.00033	0.00629	0.00556	0.01745

EN 14041			
Clause	Requirement - Review	Result - Remark	Verdict
4	REQUIREMENTS		—
4.1	Reaction to fire When declared, the floor covering shall be tested and classified according to the requirement of EN 13501-1 and resulting class and subclass shall be declared. If it is decided to make no claim for reaction for fire performance, which marked Class F, no testing is required .....: If the product listed in Table 1, 2 or 3, in the end uses identified in the tables, are classified without further testing in the classes shown and do not require testing in respect of these end uses and classes.....:		P
4.2	Content of pentachlorophenol (PCP) Resilient, textile and laminate floor coverings shall not contain PCP or derivative thereof as a component in the production process of the product or of its raw materials.....:		P
4.3	Formaldehyde emission When formaldehyde-containing materials have been added to the product as a part of the production process, the product shall be tested and classified in to one of two classes: E1 or E2 :		P
4.4	Water-tightness Where required, resilient floor coverings shall meet the requirement of EN 13553.....:		N/A
4.5	Slip resistance		P

	When declared, the floor covering intended to be used in dry and non-contaminated conditions shall have a dynamic coefficient of friction of > 0,30 when tested ex-factory under dry conditions per EN 13893 and shall be declared as technical class DS.....:		
4.6	Electrical behaviour (static electricity) When declared, antistatic floor coverings body voltage shall not exceed 2,0 kV per EN 1815 ..... : When declared, static dissipative floor coverings vertical resistance shall not exceed $10^9\Omega$ per EN 1081.....: When declared, conductive floor coverings vertical resistance shall not exceed $10^6\ \Omega$ per EN 1081.. :		P
4.7	Thermal conductivity If required, the thermal conductivity values shall be verify per EN 12524 or EN 12667.....:		P
5	EVALUATION OF CONFORMITY		—
5.1	General..... :		P
5.2	Type testing..... :	Refer to Clause 4.1 to 4.7	P
5.3	Factory production control..... :		P
6	MARKING		—
	Product which conform to the requirements of this document shall be clearly and indelibly marked by the manufacturer either on their package or on an adhesive label with following information: a) the number and the year of this European Standard b) the manufacturer's or supplier's identification c) the product name and batch number		P

Test Conducted:

EN ISO 1452-1:2009
Plastics piping systems for water supply —Unplasticized poly (vinyl chloride) (PVC-U).General

EN ISO 1452-1:2009			
Clause	**Requirement - test**	**Result**	**Verdict**
4	**Material**		—
4.1	PVC-U compound		—
	The material from which the pipes, fittings and valves are made shall be an unplasticized poly(vinyl chloride) compound. This compound shall consist of PVC-U resin, to which are added those additives that are needed to facilitate the manufacture of pipes, fittings and valves conforming to Part(s) 2, 3, 4 and 5 of EN 1452, as applicable.		P
	None of these additives shall be used separately or together in quantities sufficient to constitute a toxic, organoleptic or microbiological hazard or to impair the fabrication or solvent cementing properties of the product or to impair the chemical and physical or mechanical properties (in particular long-term mechanical strength and impact strength) as specified in the applicable part(s) of EN 1452.		P
4.2	Influence on water intended for human consumption		—
	All plastics and non-plastics materials for components of the PVC-U piping system, e.g. elastomeric sealing rings, solvent cement, lubricants, when in permanent or in temporary contact with water, which is intended for human consumption, shall not adversely affect the quality of the drinking water.		P
	NOTE European Standards on test methods for the assessment of migration, of odour and flavour and for microbiological assessment are under preparation.		P
4.3	Reprocessable and recyclable materials		—
	The use of the manufacturer's own reprocessable material obtained during the production and works testing of products conforming to this standard is permitted in addition to the use of virgin material. Reprocessable material obtained from external sources and recyclable material shall		P

	not be used.		

Test Conducted:

EN ISO 1452-2:2009

Plastics piping systems for water supply -Unplasticized poly (vinyl chloride) (PVC-U).Pipes

EN ISO 1452-2:2009			
Clause	Requirement - test	Result	Verdict
4	**Material**		—
4.1	Pipe material		—
	The material to be used shall conform to EN 1452-1 and to the requirements given in 4.2 and 4.3.		P
4.2	Density		—
	The density, p, at 23 °C of the pipe, when measured in accordance with ISO 1183, shall be between the following limits: 1350 kg/m^3<p< 1460 kg/m^3		P
4.3	MRS-value		—
	The pipe material shall have a minimum required strength, MRS, as defined in EN 1452-1, of at least 25 MPa.		P
	The pipe material shall be evaluated according to ISO/TR 9080 method II D, where an internal pressure test is performed in accordance with EN 921:1995, to find the LCL. This evaluation shall be made with an end cap type a) or b) in accordance with EN 921:1995 and using a pipe series S < 12,5. The MRS-value shall be derived from the LCL and the pipe material shall be classified by the compound manufacturer in		P

	accordance with EN ISO 12162. Where there is available long-term experience with the effect of a change in material/compound, it is not necessary to re-evaluate the MRS. In this case the values determined with 5 test pieces at 20 °C and 60 °C shall be located on or above the 97,5% LCL long-term characteristic curve established prior to the material/compound change.		
5	**General characteristics**		—
5.1	Appearance		—
	When viewed without magnification the internal and external surfaces of pipes shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity to this standard. The material shall not contain any impurities visible without magnification. The ends of the pipe shall be cut cleanly and square to the axis of the pipe.		P
5.2	Colour		—
	The colour of the pipes shall be either grey, blue or cream. The colour of the pipes shall be uniform throughout. For above ground application, cream pipes shall not be used.	The colour of the pipes is cream . See photo .	P
5.3	Opacity		—
	The wall of the pipe shall be opaque and shall not transmit more than 0,2 % of visible light when measured in accordance with EN 578. This requirement does not apply to cream pipes (see 5.2).	≤0.2%	P
6	**Geometrical characteristics**		—
6.1	Measurement of dimensions		—
	Dimensions shall be measured in accordance with prEN 496.	Accordance with prEN 496.	P
6.2	Nominal outside diameters		—
	The nominal outside diameter, c/n, of a pipe shall conform to.	They are conform to.	P
6.3	Mean outside diameters and their tolerances		—
	The mean outside diameter, c/em, of a pipe shall conform to the applicable nominal outside diameter, c/n, within the tolerance given in table!	See table 1.	P
6.4	Wall thicknesses and their tolerances		—
	The nominal wall thickness, en, is classified with the pipe series S. The nominal wall thickness corresponds to the minimum allowable wall thickness.		P
	The nominal wall thickness shall conform to table 2, as appropriate to the pipe series. The tolerance for mean wall thickness, em, shall conform to table 3.		P
6.5	Length of pipe		—

	The nominal pipe length shall be a minimum length which does not include the depth of the socketed portions, as shown in figure 1.		P
6.6	Pipes with sockets		—
6.6.1	Sockets for solvent cementing		—
	The dimensions of sockets for solvent cementing are shown in figure 2. They shall conform to table 4.		P
6.6.2	Sockets for elastomeric ring seal type joints		—
	The minimum depth of engagement, mmin, of single sockets with elastomeric ring seal joints (see figure 3) is based on pipe lengths up to 12 m and shall conform to table 5.		P
	The wall thickness of the sockets at any point, except the sealing ring groove, shall not be less than the minimum wall thickness of the connecting pipe. The wall thickness of the sealing ring groove shall not be less than 0,8 times the minimum wall thickness of the connecting pipe.		P
	The requirements for mean inside diameters, dim, of sockets shall apply at the midpoint of the depth of engagement m.		P
	Figure 3 shows the engagement if the spigot end is pushed to the socket bottom. For assembly instructions see ENV 1452-6.		P
6.7	Pipe ends for ring seal or solvent cement joints		—
	Pipes with plain ends intended to be used with elastomeric ring seal sockets or integral solvent cement sockets shall be chamfered as shown in figure 3. Pipes with plain ends intended to be used for other solvent cement joints shall have all sharp edges removed.		P
7	**Classification and selection of pipes**		—
7.1	Classification		—
	Pipes shall be classified according to their nominal pressure PN and the pipe series S.		P
7.2	Selection of the nominal pressure PN and of the pipe series S for water up to approximately 20 °C	20 °C	P
	The nominal pressure PN, the pipe series S and the design stress, <7S are connected by the following relationship: For PVC-U pipes <7S results from an MRS > 25 MPa divided by the overall service (design) coefficient C. This coefficient shall be 2,5 for nominal outside		P

	diameters up to and including 90 mm and 2,0 for nominal outside diameters greater than 90 mm. Therefore the design stress <7S shall be 10,0 MPa for nominal outside diameters up to and including 90 mm and 12,5 MPa for nominal outside diameters greater than 90 mm. The applicable pipe series shall be taken from table 2.		
7.3	Determination of the allowable operating pressure PFA for water up to 45 °C		P
	The allowable operating pressure, PFA, for temperatures up to 25 °C shall be equal to the nominal pressure, PN. To determine the allowable operating pressure, PFA, for temperatures between 25 °C and 45 °C a supplementary derating factor, fTi shall be applied to the nominal pressure, PN, as follows: [PFA] = fTx[PN] This factor is given in Figure A. 1 of annex A.		P
8	**Mechanical characteristics**		—
8.1	Impact strength		P
	Pipes with a nominal wall thickness of 14,9 mm or less, when tested for resistance to external blows at 0 °C in accordance with EN 744 shall have a true impact rate (TIR) of not more than 10 % when tested at the levels given in table 6.		P
	Pipes in the series S 5 to S 10 shall be tested at the medium level M and pipes in the series S 12,5 to S 20 shall be tested at the high level H.		P
	The type of the striker shall be as given in table 2 of EN 744 depending on the mass of the falling weight. The sampling procedure shall conform to ENV 1452-7.		P
8.2	Resistance to internal pressure		—
	Pipes shall withstand without bursting or leakage the hydrostatic stress induced by internal hydrostatic pressure when tested in accordance with EN 921 using the test conditions specified in table 7. For this test end caps type a) or b) in accordance with EN 921 may be used. The sampling procedure shall conform to ENV 1452-7.		P
9	**Physical characteristics**		—

	When tested in accordance with the test methods as specified in table 9 using the indicated parameters, the pipe shall have physical characteristics conforming to the requirements given in table 9. The sampling procedure shall conform to ENV 1452-7.		P
10	**Chemical characteristics**		—
	The PVC-U pipe shall not contain vinyl chloride monomer (VCM) exceeding 1 ppm when determined by means of gas-phase chromatography using the 'headspace' method according to ISO 6401. The sampling procedure shall conform to ENV 1452-7.		P
11	**Sealing rings**		—
	The material of the elastomeric sealing ring used in joint assemblies for pipes shall be chosen from EN 681-1 and shall conform to the appropriate class.	The material of the elastomeric sealing ring used in joint assemblies for pipes had chosen from EN 681-1	P
	The sealing ring shall have no detrimental effect on the properties of the pipe and shall not cause the test assembly to fail the functional requirements of EN 1452-5.		P
12	**Adhesives**		—
	The adhesive(s) shall have no detrimental effects on the pipe and shall not cause the test assembly to fail to conform to EN 1452-5. The adhesives shall be identified according to ISO 7387-1 and their properties shall conform to the appropriate standards.		P
13	**Performance requirements**		—
	When pipes conforming to this standard are jointed to each other or to components conforming to other Parts of EN 1452, the pipes and the joints shall conform to EN 1452-5.		P
14	**Marking**		—
14.1	General		—
14.1.1	The marking elements shall be printed or formed directly on the pipe with a maximum interval of 1 m in such a way that after storage, weathering, handling and installation (e.g. in accordance with ENV 1452-6), legibility is maintained during the use of the products.		P
14.1.2	Marking shall not initiate cracks or other types of defects which would impair conformity to the requirements of this standard.		P

14.1.3	If printing is used, the colouring of the printed information shall differ from the basic colouring of the pipe.		P
14.1.4	The size of the marking shall be such that the marking is legible without magnification.		P
14.2	Minimum required marking		—
	The minimum required marking on pipes shall conform to table 10.		P
14.3	Additional marking		—
14.3.1	Pipes which conform to this standard, and also conform to other standard(s) may be marked additionally with the number(s) of the other standard(s), together with the minimum required marking in accordance with the other standard(s).		P
14.3.2	It is recommended that those pipes which are purchased specifically for public water supply applications are marked additionally with the word WATER.		P
14.3.3	Pipes which conform to this standard and which are third party certified may be marked accordingly.		P

Test Conducted:

EN ISO 1452-3:2010

Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC-U) — Part 3: Fittings

EN ISO 1452-3:2010			
3	**Definitions, symbols and abbreviations**		
	For the purposes of this standard, the definitions, symbols and abbreviations given in EN 1452-1 apply, together with the following.		
3.1	Definitions		
3.2	Symbols		
	Z Laying length (Z-length) Zd : Z-design length (Zd-length) r bend radius		
4	**Material**		
4.1	Fitting material		
	The fitting material to be used shall conform to EN 1452-1 and to the requirements given in 4.2 to 4.5 of this standard.		
4.2	MRS-value		
	The fittings material shall be evaluated according to ISO/TR 9080:1992 method II D, where the pressure test is made in accordance with EN 12107 (together with EN 921), to find the LCL. The MRS-value shall be derived from the LCL and the fitting material shall be classified by the compound manufacturer in accordance with EN ISO 12162. Where there is available long-term experience with the effect of a change in material/compound, it is not necessary to re-evaluate the MRS. In this case the values determined with 5 test pieces at 20 °C and 60 °C during 1000 h to 5000 h shall be located on or above the 97,5% LCL long-term characteristic curve established prior to the material/compound change.		
4.3	Designation of fittings material		
	The fittings material shall be designated as PVC-U, unless the material has an MRS of not less than 25 MPa, in which case the material shall be designated as PVC-UH.		
4.4	Strength of injection-moulded material		
	When pressure tested in accordance with the procedure described in EN 12107, using injection-moulded tubular test pieces conforming to figure 1, the material shall conform to the requirements given in table 1.		

Test Conducted:

EN ISO 1452-4:2009

Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC-U) — Part 4: Valves

EN ISO 1452-4:2009			
Clause	Requirement - test	Result	Verdict
4	**Material**		—
4.1	Valve bodies		—
	The valve body material used shall conform to ISO 1452-1 and to the requirements given in 4.2 and 4.3.		P
4.2	Density		—
	The density, p, at 23 °C of the pipe, when measured in accordance with ISO 1183, shall be between the following limits: 1350 kg/m^3<p< 1460 kg/m^3		P
4.3	MRS-value		—
	The fitting material shall have a minimum required strength, MRS, as defined in ISO 1452-1:2009, 4.4.1. The manufacturer of the compound or formulation shall confirm the MRS by testing as described in ISO 1452-1:2009, 4.4.1, 4.4.2 or 4.4.3, respectively. The MRS value of the valve body material shall be declared by the fitting manufacturer in its technical file.		P
4.4	Additional components		
	Additional components made from other plastics and non-plastics materials, as necessary for the construction of the PVC-U valves, shall fulfil their specific functions without preventing conformity to ISO 1452-5.		P
5	**General characteristics**		—
5.1	Appearance		—
	When viewed without magnification, the internal and external surfaces of valves shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity to this part of ISO 1452. Each end shall be square to its axis.		P
5.2	Colour		—
	The colour of injection-moulded valve bodies shall be grey throughout the wall.		P
5.3	Opacity		—
	The wall of the valve shall be opaque and shall not transmit more than 0,2 % of visible light when measured in	⩽0.2%	P

	accordance with ISO 7686.		
6	**Geometrical characteristics**		—
6.1	Measurement of dimensions		—
	Dimensions shall be measured in accordance with ISO 3126.		P
6.2	Nominal outside diameters		—
	The nominal diameter(s), d n , of a valve shall correspond to, and be designated by, the nominal outside diameter(s) of the pipe(s) for which they are designed.		P
6.3	Valves dimensions		—
	Joint dimensions		P
7	**Classification and selection of pipes**		—
7.1	Classification		—
	Pipes shall be classified according to their nominal pressure PN and the pipe series S.		P
7.2	Determination of the allowable operating pressure for water up to 45 ° C		P
	The allowable operating pressure, PFA, of valves for temperatures up to and including 25 ° C shall be equal to the nominal pressure. To determine the allowable operating pressure of valves for temperatures between 25 ° C and 45 ° C, a supplementary derating factor, f T , shall be applied to the nominal pressure as given in Equation (2): PFA = f T × PN (2) This factor is given in the relevant clause of ISO 16135, ISO 16136, ISO 16137, ISO 16138, ISO 16139 and ISO 21787, as applicable.		P
8	**Mechanical characteristics**		—
8.1	Resistance of valve bodies to internal pressure		P
	Valve bodies, where hydrostatic pressure can be applied, shall be tested in accordance with the procedure and the test parameters given in the relevant clause of ISO 16135, ISO 16136, ISO 16137, ISO 16138, ISO 16139 and ISO 21787, as applicable, using test equipment conforming to ISO 1167-1 and ISO 1167-3.		P
8.2	Crushing test		—
	Injection-moulded parts of valves, on which hydrostatic pressure cannot be applied, shall be tested in accordance with EN 802. The tested valve parts shall not shatter when they undergo a deformation of 20 %. The period between manufacture and testing, t 1 , and the conditioning period, t 2 , shall be not less than 30 min.		P

	The closure speed of the press plates shall be (50 ± 5) mm/min.		
8.3	Durability		—
	The valve shall conform to the relevant clause of ISO 16135, ISO 16136, ISO 16137, ISO 16138, ISO 16139 and ISO 21787, as applicable. NOTE The test method given in ISO 8659 [3] specifies a fatigue strength test to confirm the ability of valves to withstand prolonged use in plastics piping systems for water supply, with repeated opening and closure.		
9	**Physical characteristics**		—
	When tested in accordance with the test methods as specified in Table 1 using the indicated parameters, the injection-moulded PVC-U components, such as valve bodies, shall have physical characteristics conforming to the requirements given in Table 1.		P
10	**Chemical characteristics**		—
	The chemical characteristics shall conform to those required for pipes by ISO 1452-2.		P
11	**Sealing rings**		—
	Sealing rings shall conform to ISO 1452-2.		P
12	**Adhesives**		—
	Adhesives shall conform to ISO 1452-2.		P
13	**Performance requirements**		—
	When valves conforming to this part of ISO 1452 are jointed to each other or to components conforming to other parts of ISO 1452, the valve assemblies and their joints shall conform to ISO 1452-5.		P
14	**Marking**		—
14.1	General		—
	Unless otherwise specified in Table 2, the marking elements shall be either — printed or formed directly on the product, or — put on a plate/label attached to the body of the assembled product in such a way that after storage, weathering, handling and installation, legibility is maintained during the use of the products. NOTE The manufacturer is not responsible for marking being illegible due to actions caused by installation and use such as painting, scratching, covering of the components or the use of detergents, etc.		P

	on the product. Marking shall not initiate cracks or other types of defects which would impair conformity to the requirements of this part of ISO 1452. If printing is used, the colour of the printed information shall differ from the basic colour of the product. The size of the marking shall be such that the marking is legible without magnification.		
14.2	Minimum required marking		—
	The minimum required marking shall conform to Table 2.		P
14.3	Additional marking		—
	Valves conforming to this part of ISO 1452, which conform also to other standard(s), may be additionally marked with the minimum required marking in accordance with this/these other standard(s) in which case table footnote «a» of Table 2 applies. Valves conforming to this part of ISO 1452, which are third party certified may be marked accordingly. For practical reasons, this should be done on a label or on the packaging.		P

EN ISO 15875-2			
4	Material		--
4.1	Pipe material		--
	The material from which the pipes are made shall be polyethylene (PE) which is crosslinked during or after the manufacturing of the pipe. The material may be crosslinked by any process (peroxide, silane, electron beam and azo). which change the chemical structure in such a way that the polymer chains are connected with each other to a three-dimensional net by chemical bonds.		P
4.2	Evaluation of σ LCL -values		--
	The pipe material shall be evaluated in accordance with EN ISO 9080 or equivalent where internal pressure tests are made in accordance with EN 921 :1 994 to find the σ LCL -values. The σ LCL -value thus determined shall at least be as high as the corresponding values of the reference curves given in Figure 1 over the complete range of times. NOTE 1 One equivalent way of evaluation is to calculate the σ LCL-value for each temperature (for example 20 ° C, 60 ° C and 95 ° C) individually. NOTE 2 The reference curves in figure 1 in the temperature range of 1 0 ° C to 95 ° C are derived from the following equation: $\log t = -105{,}8618 - \frac{18506{,}15 \log \sigma}{T} + \frac{57895{,}49}{T} - 24{,}7997 \log \sigma$ To demonstrate conformance to the reference lines pipe samples should be tested at following temperatures and at various hoop stresses such that, at each of the tempeatures given, at least three failure times fall in each of the following time intervals: Tempertures 20; 60-70; 95; ° C Time intervals 1 0-1 00 h, 1 00-1 000 h,1 000-8760 h and above 8760 h In tests lasting more than 8760 h, once failure is reached at a stress and time at least on or above the reference line, any time after that can be considered as the failure time. Testing should be carried out in accordance with EN 921 :1 994. Conformance to the reference lines should be demonstrated by plotting the individual experimental results on the graph. At least 97.5%		P

<table>
<tr><td colspan="4">EN ISO 15875-2</td></tr>
<tr><td></td><td>of them should lie on or above the reference line.</td><td></td><td></td></tr>
<tr><td>4.3</td><td>Influence on water intended for human consumption</td><td></td><td>--</td></tr>
<tr><td></td><td>The material shall conform to EN ISO 1 5875-1 :2003.</td><td></td><td>P</td></tr>
<tr><td>5</td><td>General characteristics</td><td></td><td>--</td></tr>
<tr><td>5.1</td><td>Appearance</td><td></td><td>--</td></tr>
<tr><td></td><td>When viewed without magnification the internal and external surfaces of pipes shall be smooth, clean and free fro scoring, cavities and other surface defects to an extent that would prevent conformance with this standard. The
material shall not contain visible impurities. Slight variations in appearance of the colour shall be permitted. The ends of the pipe shall be cut cleanly and square to the axis of the pipe.</td><td></td><td>P</td></tr>
<tr><td>5.2</td><td>Opacity</td><td></td><td>--</td></tr>
<tr><td></td><td>Crosslinked polyethylene pipes that are declared to be opaque shall not transmit more than 0,2 % of visible light, when tested in accordance with EN 578.</td><td></td><td>P</td></tr>
<tr><td>6</td><td>Geometrical characteristics</td><td></td><td>--</td></tr>
<tr><td>6.1</td><td>General</td><td></td><td>--</td></tr>
<tr><td>6.1.1</td><td>Dimensions shall be measured in accordance with EN ISO 31 26.</td><td></td><td>--</td></tr>
<tr><td>6.1.2</td><td>The maximum calculated pipe value, S calc,max , for the applicable class of service conditions and design
pressure, p D , shall conform to Table 1 .
Table 1 — $S_{calc,max}$-values
<table><tr><td rowspan="2">p_D</td><td colspan="4">Application class</td></tr><tr><td>Class 1</td><td>Class 2</td><td>Class 4</td><td>Class 5</td></tr><tr><td>bar</td><td colspan="4">$S_{calc,max}$-values [a]</td></tr><tr><td>4</td><td>7,6 [b]</td><td>7,6 [b]</td><td>7,6 [b]</td><td>7,6 [b]</td></tr><tr><td>6</td><td>6,4</td><td>5,9</td><td>6,6</td><td>5,4</td></tr><tr><td>8</td><td>4,8</td><td>4,4</td><td>5,0</td><td>4,0</td></tr><tr><td>10</td><td>3,8</td><td>3,5</td><td>4,0</td><td>3,2</td></tr><tr><td colspan="5">[a] The values are rounded to the first place of decimals.
[b] The 20 °C, 10 bar, 50 years, cold water requirement, being higher, determines this value (see clause 4 of EN ISO 15875-1:2003).</td></tr></table>
NOTE The derivation of S calc,max is provided in annex A. The method described takes account of the properties of PE-X under service
conditions for the classes given in Table 1 of EN ISO 15875-1 :2003.</td><td></td><td>P</td></tr>
<tr><td>6.1.3</td><td>The values of outside diameter and/or wall thickness apply to the crosslinked polyethylene</td><td></td><td>P</td></tr>
</table>

EN ISO 15875-2			
	pipe and are exclusive of additional outside layers. For pipes with barrier layer 1) , the values of outside diameter and wall thickness may apply to the finished product, including the barrier layer, provided that the thickness of the outside barrier layer, including any adhesive layer, is u 0,4 mm and the design calculation using the values of outside diameter and wall thickness of the base pipe (PE-X) meet the S calc,max values according to Table 1. The manufacturer shall state the dimensions and tolerances of the base pipe in his documentation when different from Tables 2 to 6 of this part of ISO 15875. NOTE For certification purposes, when a plastic barrier layer is embedded in the PE-X pipe wall, this construction is covered by this part of ISO 15875 until such time as the International Standards for such products (see Bibliographic references [7] to [10]) are published.		
6.2	Dimensions of pipes		--
6.2.1	Outside diameters		--
	For the applicable pipe dimension class, the mean outside diameter, d em , of a pipe shall conform to Table 2, 3, 4 or 5, as applicable.		P
6.2.2	Wall thicknesses and their tolerances		--
	For any particular class of service conditions, design pressure and nominal size, the minimum wall thickness, e min , shall be chosen in such a way that the corresponding S series or S calc - value is equal to or less than the values of S calc,max given in Table 1 . For the applicable pipe dimension class, the wall thicknesses, e min and e n respectively, shall conform to Table 2, 3, 4 or 5, as applicable, in relation to the pipe series S and S calc -values, respectively. However, pipes intended to be joined together by fusion shall have a minimum wall thickness of 1 ,9 mm. The tolerance on the wall thickness, e , shall conform to Table 6.		P

EN ISO 15875-2

Table 2 — Pipe dimensions for dimension class A
(sizes conform to ISO 4065:1996 [2] and are applicable for all classes of service conditions)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Mean outside diameter		Pipe series			
				S 6,3	S 5	S 4	S 3,2
				Wall thicknesses			
	d_n	$d_{em,min}$	$d_{em,max}$	e_{min} and e_n			
12	12	12,0	12,3	—	1,3 [a]	1,4	1,7
16	16	16,0	16,3	1,3	1,5	1,8	2,2
20	20	20,0	20,3	1,5	1,9	2,3	2,8
25	25	25,0	25,3	1,9	2,3	2,8	3,5
32	32	32,0	32,3	2,4	2,9	3,6	4,4
40	40	40,0	40,4	3,0	3,7	4,5	5,5
50	50	50,0	50,5	3,7	4,6	5,6	6,9
63	63	63,0	63,6	4,7	5,8	7,1	8,6
75	75	75,0	75,7	5,6	6,8	8,4	10,3
90	90	90,0	90,9	6,7	8,2	10,1	12,3
110	110	110,0	111,0	8,1	10,0	12,3	15,1
125	125	125,0	126,2	9,2	11,4	14,0	17,1
140	140	140,0	141,3	10,3	12,7	15,7	19,2
160	160	160,0	161,5	11,8	14,6	17,9	21,9

[a] A non-preferred wall thickness of 1,1 mm is permitted for d_n = 12.

Table 3 — Pipe dimensions for dimension class B1
(sizes based on copper pipe sizes and applicable for all classes of service conditions)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Mean outside diameter		Wall thickness		S_{calc}
	d_n	$d_{em,min}$	$d_{em,max}$	e_n	e_{min}	
10	10	9,9	10,2	1,5	1,5	2,8
				1,8	1,7	2,4
12	12	11,9	12,2	1,5	1,5	3,4
				2,0	1,9	2,6
15	15	14,9	15,2	1,5	1,5	4,4
				2,5	2,4	2,6
18	18	17,9	18,2	1,7	1,7	4,8
				2,5	2,4	3,2
22	22	21,9	22,2	2,0	2,0	5,0
				3,0	2,9	3,3
28	28	27,9	28,2	2,6	2,6	4,9
				4,0	3,9	3,1

Table 4 — Pipe dimensions for dimension class B2
(sizes based on copper pipe sizes and applicable for all classes of service conditions)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Mean outside diameter		Wall thicknesses	S_{calc}
	d_n	$d_{em,min}$	$d_{em,max}$	e_{min} and e_n	
14,7	14,7	14,63	14,74	1,6	4,1
21	21	20,98	21,09	2,05	4,6
27,4	27,4	27,33	27,44	2,6	4,8
34	34	34,08	34,19	3,15	4,9

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Table 5 — Pipe dimensions for dimension class C (non-preferred pipe sizes used for example for heating systems)

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter	Mean outside diameter		Wall thicknesses	S_{calc}
	d_n	$d_{em,min}$	$d_{em,max}$	e_{min} and e_n	
12	12	12,0	12,3	2,0	2,5
14	14	14,0	14,3	2,0	3,0
15	15	15,0	15,3	2,0	3,2
16	16	16,0	16,3	2,0	3,5
17	17	17,0	17,3	2,0	3,8
18	18	18,0	18,3	2,0	4,0
20	20	20,0	20,3	2,0	4,5

Table 6 — Tolerance on wall thicknesses

Dimensions in millimetres

Minimum wall thickness e_{min}		Tolerance [a] x	Minimum wall thickness e_{min}		Tolerance [a] x
>	≤		>	≤	
1,0	2,0	0,3	11,0	12,0	1,3
2,0	3,0	0,4	12,0	13,0	1,4
3,0	4,0	0,5	13,0	14,0	1,5
4,0	5,0	0,6	14,0	15,0	1,6
5,0	6,0	0,7	15,0	16,0	1,7
6,0	7,0	0,8	16,0	17,0	1,8
7,0	8,0	0,9	17,0	18,0	1,9
8,0	9,0	1,0	18,0	19,0	2,0
9,0	10,0	1,1	19,0	20,0	2,1
10,0	11,0	1,2	20,0	21,0	2,2
			21,0	22,0	2,3

[a] The tolerance is expressed in the form $^{+x}_{0}$ mm, where "x" is the value of the tolerance given. The level of the tolerances conforms to Grade V in ISO 11922-1:1997 [3].

7	Mechanical characteristics		--
	When tested in accordance with the test method as specified in Table 7 using the indicated parameters, the pipe shall withstand the hydrostatic (hoop) stress without bursting. In the case of pipes with (a) barrier layer(s) the test shall be carried out on test pieces without the barrier layer(s).		P

Table 7 — Mechanical characteristics of pipes

Characteristic	Requirement	Test parameters for the individual tests				Test method
		Hydrostatic (hoop) stress MPa	Test temp. °C	Test period h	Number of test pieces	
Resistance to internal pressure	No failure during the test period	12,0 [a]	20	1	3	EN 921 of 1994
		4,8	95	1	3	
		4,7	95	22	3	
		4,6	95	165	3	
		4,4	95	1000	3	
		Test parameters for all tests				
		Sampling procedure	[b]			
		Type of end cap	Type a)			
		Orientation of test piece	Not specified			
		Type of test	Water-in -water			

[a] The test stress is above the minimum expected strength curve as the real short term stress at 20 °C is higher than the strength curve.
[b] The sampling procedure is not specified. For guidance see CEN ISO/TS 15875-7 [4].

8	Physical and chemical characteristics		--
	When tested in accordance with the test methods as specified in Table 8 using the indicated parameters, the pipe shall conform to the requirements given in this table.		P

<table>
<tr><td colspan="4">EN ISO 15875-2</td></tr>
<tr><td></td><td>
Table 8 — Physical and chemical characteristics of pipes
<table>
<tr><th rowspan="2">Characteristic</th><th rowspan="2">Requirement</th><th colspan="2">Test parameters</th><th rowspan="2">Test method</th></tr>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Longitudinal reversion</td><td>≤ 3 %</td><td>Temperature
Duration of exposure for:
$e_n \leq 8$ mm
8 mm < $e_n \leq 16$ mm
$e_n > 16$ mm
Number of test pieces</td><td>120 °C

1 h
2 h
4 h
3</td><td>Method B of EN 743:1994 (oven test)</td></tr>
<tr><td>Thermal stability by hydrostatic pressure testing</td><td>No bursting during the test period</td><td>Sampling procedure
End cap
Orientation
Type of test
Hydrostatic (hoop) stress
Test temperature
Test period
Number of test pieces</td><td>a
Type a)
Not specified
Water-in-air
2,5 MPa
110 °C
8760 h
1</td><td>EN 921:1994</td></tr>
<tr><td>Crosslinking
- peroxide
- silan
- electron beam
- azo</td><td>
≥ 70 %
≥ 65 %
≥ 60 %
≥ 60 %</td><td colspan="2">Shall conform to EN 579</td><td>EN 579</td></tr>
<tr><td colspan="5">a The sampling procedure is not specified. For guidance see CEN ISO/TS 15875-7 [4].</td></tr>
</table>
</td><td></td><td>--</td></tr>
<tr><td>9</td><td>Performance requirements</td><td></td><td>--</td></tr>
<tr><td></td><td>When pipes conforming to this standard are jointed to each other or components conforming to EN ISO 1 5875-3 [5] , the pipes and the joints shall conform to EN ISO 1 5875-5.</td><td></td><td>P</td></tr>
<tr><td>10</td><td>Marking</td><td></td><td>--</td></tr>
<tr><td>10.1</td><td>General requirements</td><td></td><td>--</td></tr>
<tr><td>10.1.1</td><td>Marking details shall be printed or formed directly on the pipe not less than once per meter in such a way that after storage, handling, and installation (e.g. in accordance with ENV 1 21 08 [1]) legibility is maintained.</td><td></td><td>P</td></tr>
<tr><td>10.1.2</td><td>Marking shall not initiate cracks or other types of defects which adversely influence the performance of the pipe.</td><td></td><td>P</td></tr>
<tr><td>10.1.3</td><td>If printing is used, the colouring of the printed information shall differ from the basic colouring of the pipe.</td><td></td><td>P</td></tr>
<tr><td>10.1.4</td><td>The size of the marking shall be such that the marking is legible without magnification.</td><td></td><td>P</td></tr>
<tr><td>10.2</td><td>Minimum required marking</td><td></td><td>--</td></tr>
<tr><td></td><td>The minimum required marking of the pipe is specified in Table 9.</td><td></td><td>P</td></tr>
</table>

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Table 9 — Minimum required marking

Aspects	Marking or symbol
Number of this standard	EN 15875
Manufacturer's name and/or trade mark	Name or code
Nominal outside diameter and nominal wall thickness	e.g. 16 x 2,2
Pipe dimensions class	e.g. A
Material	[a]
Application class combined with design pressure	e.g. Class 2/10 bar
Opacity	opaque [b]
Manufacturer's information	[c]

[a] For material crosslinked by
peroxide : PE-Xa
silan : PE-Xb
electron beam : PE-Xc
azo : PE-Xd

[b] If declared by the manufacturer.

[c] For proving traceability the following details shall be given:
a) the production period, year and month; in figures or in code;
b) a name or code for the production site if the manufacturer is producing in different sites.

EN 1090-1			
Clause	Requirement - Test	Result - Remark	Verdict
4.1.2	**Constituent products for steel components**		-
	Constituent products for steel components shall be in accordance with the European Standards referred to in the relevant Clauses of EN 1090-2.	Has checked with EN 1090-2	P
4.1.3	**Constituent products for aluminium components**		-
	Constituent products for aluminium components shall be in accordance with the European Standards referred to in the relevant Clauses of EN 1090-3.	Not applicable	N/A
4.2	**Tolerances on dimensions and shape**		-
	The geometrical tolerances specified in EN 1090-2 and EN 1090-3 for the essential tolerances shall apply to all components.	The products design according to EN 1090-2 requirements of Tolerances.	P
	If any special tolerances apply these shall be stated in the component specification.		P
4.3	**Weldability**		-
	If steel and aluminium structural components are to be declared as weldable they shall be made of weldable constituent products according to EN 1090-2 or EN 1999-1-1 as appropriate. If relevant to the performance of a steel product the through-thickness properties shall be declared.		P
4.4	**Fracture toughness**		-
	Steel components shall be manufactured from constituent products that meet the fracture toughness properties required.		N/A
	The constituent products specified in the component specification shall be used.		-
4.5	**Structural characteristics**		-
4.5.1	**General**		-
	Structural characteristics of a component covered in this European Standard refer to its load bearing capacity, fatigue strength and resistance to fire.	Design calculation checked and Material certification checked.	P
	NOTE Structural characteristics can also include characteristics that are related to the Serviceability Limit State which covers functional requirements related to the use of the component.		-

	These characteristics are not included as requirements in this European Standard but can be specified in the design brief for the component.		-
	The required structural characteristics shall be achieved by:		-
	an adequate structural design, if and as required for the component, and		-
	manufacturing the component according to the component specification developed in accordance with EN 1090-2 or EN 1090-3.		-
4.5.2	**Load bearing capacity**		-
	Declaration of the load bearing capacity may refer to the resistance of the cross sections of the component, expressed as a characteristic value or as a design value.		P
	Alternatively the load bearing capacity may be expressed in terms of the loads the component can carry according to the applied design provisions, expressed as a characteristic value or as a design value.		-
4.5.3	**Fatigue strength**		-
	Declaration of the fatigue strength of a structural component shall be specific to fatigue actions against which the fatigue strength has been assessed.	The design calculation passed.	Pass
	Fatigue strength in this standard refers to situations for which the loads are such that the influence of repetitive loads needs to be considered to assess the structural characteristics of the component.		-
	NOTE 1 Requirements for fatigue strength are needed for certain component applications where the specific requirements should be given in the design brief in terms of stress range(s), number of cycles, etc, and where the requirements are formulated according to the provisions in the relevant Eurocode.		-
	NOTE 2 Fatigue strengths are related to cross sectional resistance or resistance of a given structural detail and are usually expressed by reference to S-N diagrams.		-
	The conceptual strategy for determination of fatigue strength should be based on the approaches given in the relevant Eurocode.		-
	Information on the strategy should be given in the design brief.		-
4.5.4	**Resistance to fire**		-

	Declaration of the fire resistance of a structural member may refer to the fire exposure represented by the standard temperature-time relationship to be used for assessment of the performance characteristics R, E, I and M in the classification according to EN 13501-2.		P
	Combinations of these designatory letters, as appropriate, are to be supplemented by a number which in elapsed completed minutes of the nearest lower class during which the functional requirements are satisfied, to provide the classification of performance.		P
	The classification periods against any of the characteristics shall be declared in minutes, using one of the periods: 15, 20, 30, 45, 60, 90, 120, 180, 240 or 360.		P
	Alternatively a declaration of fire resistance under a given set of actions on the component during a fire exposure may be referenced to other specified fire exposures than the standard temperature-time relationship such as the parametric temperature-time curves according to Annex A of EN 1991-1-2.		P
	The requirements to resistance to fire of a component is under the responsibility of each Member State and is generally dependent on the type of structure/building it will be in, where in the structure/building and finally its function in the structural system. This shall appear from the design brief.		P
	NOTE The requirements of a component can include requirements to more than one performance characteristic.		P
4.6	**Reaction to fire**		-
	Declaration of the reaction to fire shall be in accordance with the classes and test requirements given in EN 13501-1.		P
4.7	**Dangerous substances**		-
	Dangerous substances in this standard refer to the material properties with regard to emission of radioactivity or release of cadmium.	Not applicable	N/A
	Only constituent products shall be used for which any emission of radioactivity and any release of cadmium is non-existent or limited to be within an accepted limit in the territory of intended destination.		P

	Materials used in coatings shall not release or emit any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material, or permitted in national provisions of the member state of destination.		P
4.8	**Impact resistance**		-
	Impact resistance is a material characteristic which expresses the same properties of steel as fracture toughness. There are no additional requirements.	The material certification same	P
4.9	**Durability**		-
	The component specification shall specify any requirements for corrosion protection. See EN 1090-2 for carbon steel, EN 1993-1-4 for stainless steel and EN 1999-1-1 for aluminium.	Not Applicable.	N/A
	NOTE 1 The durability of components is dependent on their use and the exposure they are subject to and any protection applied.		P
	NOTE 2 The performance characteristics of structural components manufactured from steel or aluminium adequately designed and manufactured are not subject to degradation except where corrosion is allowed to occur. Corrosion can be prevented by the use of protection systems.		P
	The service life of a component is preserved by adequate maintenance of the component.		P
	NOTE 3 For components made from weather-resistant steels to EN 10025-5 or stainless steels to EN 10088 a service life of the component can be estimated. EN 1993-1-4 gives guidance related to durability of stainless steel.		P
	NOTE 4 EN 1999-1-1 gives guidance related to durability of aluminium alloys. For aluminium components under normal exposure conditions corrosion protection is normally not required.		P
	NOTE 5 EN 1090-2 and EN 1090-3 give guidance for application of a corrosion protection system and give requirements for surface preparation of the steel and aluminium respectively as a pre-treatment prior to any subsequent application of a protection system, depending on the exposure conditions.		P
5 **5.1**	**Evaluation methods** **General**		-

	The term 'evaluation method' is used for all kinds of methods used to demonstrate compliance with the requirements, e.g. physical testing, measurements of geometry and structural calculations whether assisted or not by physical testing.		Pass
5.2	**Constituent products**	Steel Structure complied with.	P
	The constituent products shall be evaluated by checking that the inspection documents for the products used comply with the requirements of the component specification.	Not Applicable	N/A
	The evaluation of constituent products shall also include a check that the geometry of the products is correct, using methods and instruments in accordance with 5.3.		P
5.3	**Tolerances on dimensions and shape**		P
	Geometrical tolerances shall be measured using methods and instruments selected from those listed in ISO 7976-1 and ISO 7976-2 and in accordance with provisions given in EN 1090-2 and EN 1090-3. Accuracy of measurements shall be assessed in accordance with ISO 17123-1.	Standards applied with in EN 1090-2.	Pass
5.4	**Weldability**		P
	For weldability, reliance may be placed on properties associated with constituent materials and components provided these are given by reference to a European Technical Specification and inspection documents.		P
5.5	**Fracture toughness**		Pass
	For fracture toughness of the constituent products, reliance may be placed on properties for impact strength associated with materials and components used as constituent products provided these are given by reference to a European Technical Specification and inspection documents.		P
	If data for the constituent products are not available, fracture toughness may be assessed using Charpy impact tests carried out in accordance with EN 10045-1. For steel components provisions for evaluation of the test results are given in EN 1993-1-10.		P
	Testing the fracture toughness of aluminium constituent products is not required.		P
5.6	**Structural characteristics**		-

5.6.1	**General**		P
	Assessment of structural characteristics shall be based on: a) the structural design, and b) the manufacturing characteristics of the component.	Design Calculation checked.	P
5.6.2	**Structural design**		-
	An adequate structural design may be demonstrated by: a) structural calculations, or b) structural testing supported by structural calculations for the component.	Design Calculation checked.	P
5.6.2.1	**Structural calculations**		-
	Structural calculations may be used to determine the structural design characteristics of the component and that the requirements given in the design brief are met.		P
	The structural design calculations shall be in accordance the relevant Eurocodes. In a general case this requires the use of:		P
	a) EN 1990, Eurocode*: Basis of structural design;*		P
	b) EN 1991, Eurocode *1: Actions on structures* (all relevant parts);		-
	c) EN 1993, *Eurocode 3: Design of steel structures* (all relevant parts)		-
	d) EN 1994, *Eurocode 4: Design of composite steel and concrete* structures (all relevant parts for the steel parts in composite structures);		-
	e) EN 1998, Eurocode *8: Design of structures for earthquake* resistance (all relevant parts);		-
	f) EN 1999, *Eurocode 9: Design of aluminium structures* (all relevant parts).		-
	To determine the structural characteristics of a component, provisions given in the National Annexes to the Eurocodes for the country where the component shall be used apply.	The calculation of structural calculations	P
5.6.2.2	**Structural testing**		-
	Structural testing shall be based on European Standards, and be accompanied by structural calculations.	Not applicable	N/A
	NOTE 1 There is presently no general European Standard available for structural testing.		-

	NOTE 2 For components where declaration of conformity is made according to method 3b, see Annex A, national provisions for structural testing can be relevant.		-
	NOTE 3 Testing procedures for cold formed members and sheeting are given in Annex A of EN 1993-1-3:2006 and EN 1999-1-4.		-
	NOTE 4 Provisions for evaluation of the results from structural testing are given in Annex D of EN 1990:2002.		-
5.6.3	**Manufacturing characteristics**		-
	The manufacturing characteristics shall be assessed in relation to the requirements in the component specification.		P
	The manufacturing of components shall be inspected and evaluated in accordance with the requirements for inspection to the specified execution class and tolerance requirements in compliance with the provisions in EN 1090-2 for steel structures or EN 1090-3 for aluminium structures.		P
5.7	**Resistance to fire**		-
	The component specification shall specify all necessary information on the evaluation methods to be used; either they are performed by calculation or by testing.		P
	Performance characteristic R: A component's resistance to fire may be evaluated according to test results and the classification standard EN 13501-2, or by using a calculation method from the Eurocodes listed in 5.6.2 and a fire exposure according to the standard temperature-time relationship referred to in EN 13501-2.		P
	Performance characteristic I: A component's integrity as a separating element may be evaluated according to test results and the classification standard EN 13501-2, or by using a calculation method according to EN 1994-1-2, and a fire exposure according to the standard temperature-time relationship referred to in EN 13501-2.		P
	Alternatively, if the evaluation of fire resistance or integrity is based on calculation according to another specified fire exposure than the standard temperature-time relationship, the characteristic should not be designated R or I as these are designations for class of resistance according to EN 13501-2.		P
	Performance characteristics E and M:		P

	These performance characteristics may only be evaluated based on testing in accordance with the classification standard EN 13501-2.		P
5.8	**Reaction to fire**		-
	Constituent products of steel and aluminium fall within Class A1 of the European classification with respect to reaction to fire, and no further documentation is required. Galvanized steels and anodized aluminium components are also Class A1.		P
	In the case of coated components it shall be demonstrated that the component has a fire classification that complies with the requirements according to its use and function.		P
	Classification shall be performed in accordance with EN 13501-1.		P
	NOTE Reaction to fire of coatings applied to steel or aluminium components for durability or other purposes can be other than Class A1.		P
	Information on reaction to fire of organically coated steel sheets is given in EN 14782 and EN 14783.		P
5.9	**Dangerous substances**		-
	The requirement in 4.7 is fulfilled if the constituent products comply with the European Standards referenced in EN 1090-2 for steel or EN 1090-3 for aluminium.	Not applicable.	N/A
	No further testing is required unless protective coatings are used for which a possible emission cannot be assessed indirectly by control of the raw coating material.		P
5.10	**Impact resistance**		-
	Impact resistance of steel products is assessed by evaluation of the fracture toughness of the product.	Same as the Fracture toughness	P
5.11	**Durability**		-
	There is no direct method for testing durability.	Not applicable	N/A
	Durability is indirectly evaluated by checking the exposure of the component and by evaluating any requirements for surface protection given in the component specification.		P
6	**Evaluation of conformity**		-

6.1	**General** The conformity of a component or kit with the requirements of this European Standard and with the stated	Initial type testing has done. Factory has ISO 9000 and the quality control has confirmed.	P
	values (including classes) shall be demonstrated by: a) initial type testing, see 6.2; and		-
	b) factory production control by the manufacturer, including inspection and testing of products sampled from production in accordance with a prescribed plan by the manufacturer, see 6.3		-
	A family of welded steel components may be characterized by the parent material and the welding process used.		-
	Materials of lower strength and materials which are more weldable may be included in the same family.		-
	A family of welded aluminium components may be characterized by the material group and the welding process applied whereby 7xxx alloys cover all other alloys, 6xxx alloys cover 5xxx alloys and 3xxx alloys, 5xxx alloys and 3xxx alloys may be regarded as one group.		-
	Non-welded components in the same execution class may be treated as a family.		-
6.2	**Initial type testing**		-
6.2.1	**General**		
	Initial type testing is the complete set of tests or other procedures, determining the performance of samples of products representative of the product type. The intention is to demonstrate and assess that the manufacturer has the capabilities to provide structural components and kits according to this European Standard.		P
	The assessment is related to two possible tasks performed by the manufacturer:		P
	a) Initial type calculation (ITC) to assess the structural design capabilities, where the manufacturer shall declare structural characteristics governed by design of the component;		P
	b) Initial type testing (ITT) to assess the manufacturing capabilities.		P
	Initial type testing shall be performed:		P
	1) at the commencement of the production of a new component or the use of new constituent products (unless a component of the same family);		P

	2) at the commencement of a new or modified method of production if this would affect a characteristic subject to evaluation;		P
	3) if production is changed to a higher execution class.		P
	In case of type testing of components or kits for which initial type evaluation in accordance with this standard has already been performed, type evaluation may be reduced: characteristics need not be reevaluated, provided the characteristics of constituent products and components used in the manufacturing process maintain their declared characteristics.		P
	Constituent products and components CE marked in accordance with appropriate harmonised European specifications may be presumed to have the performances stated with the CE marking.		P
	if it has been established that the performance characteristics compared with the already evaluated components or kits have not been affected; or in accordance with the rules for grouping into families or direct extended application of test results.		P
	If components are used whose characteristics have already been determined by the component manufacturer on the basis of conformity with other product standards (e.g. manufacturing using constituent products declared as conforming to a European Technical Specification), these		P
6.2.2	**Characteristics**		-
	All characteristics for which the manufacturer provides a declaration shall be determined using initial type testing, with the following exceptions: a) reaction to fire of a component which may be assessed indirectly by controlling the component's constituent products;		P
	b) release of dangerous substances which may be assessed indirectly by controlling the content of the component's constituent products;		-
	c) durability of all characteristics, which is ensured by correct specification to avoid corrosion or to limit its effect by a prescriptive requirement for corrosion protection of the components.		-
6.2.3	**Use of historical data**		-
	Evaluations previously performed in accordance with the provisions of this European Standard (same component type, same characteristic(s), same test method, same sampling procedure, same system of attestation of conformity etc.) may be taken into account.	Pass	P

6.2.4	**Use of structural calculations for conformity assessment**		-
	If structural calculations are used to determine characteristic or design values to be declared, the conformity evaluation of these characteristics (ITC) shall be based on the manufacturer's personnel resources (employed directly or by a sub-contractor), equipment and procedures used to perform structural calculations for the range of components to be manufactured.		P
	Procedures for the structural design process shall be documented and shall encompass handling of design assumptions, design methods, design calculations including any use of computer programs and results of the calculations with demonstration of procedures for corrective actions to be taken in case of non conformity.		P
	In cases where the manufacturer produces components in accordance with calculations and component specifications provided by the purchaser, the conformity evaluation shall check that the components or kits comply with the component specification.		P
6.2.5	**Initial type calculation**		-
	An initial type calculation carried out for a component can be used for documentation of subsequent manufactured components with the same performance characteristics.	Type Calculation checked.	P
	A new or revised type calculation shall be carried out if there is a change in one or more of the structural performance characteristics that are affected by a change in the design brief of the component.		
6.2.6	**Sampling, evaluation and conformity criteria**		-
	The number of samples to be evaluated representing a component or family of components shall be in accordance with Table 1.	The samples are enough as the forms required.	P
6.2.7	**Declaration of performance characteristics**		-
	All performance characteristics given in Table 1 shall be declared by the manufacturer of the component. NPD may be declared if this complies with the method for declaration, or if there are no requirements for the performance characteristic where the component shall be used.	Declaration in Attached.	P

6.2.8	**Recording of results from evaluations** The results from all Initial Type Evaluations shall be recorded and held by the manufacturer for at least five years.	Results keep more than 5 years.	P
6.2.9	**Corrective actions**		-
	If corrective actions are needed to satisfy the requirements of this European Standard, the corrective actions shall be carried out as given in EN 1090-2 for steel components and EN 1090-3 for aluminium components.	Complied with EN 1090-2	P
6.3	**Factory production control**		-
6.3.1	**General**		-
	The manufacturer shall establish, document and maintain a factory production control (FPC) system to ensure that products placed on the market conform to the declared performance characteristics.	FPC checked. The manufacture has the ISO 9000 cert.	P
	The FPC system shall consist of written procedures, regular inspections and tests and/or assessments and the use of results to control the component's constituent products, equipment, the production process and the manufactured component.		P
	A FPC system conforming to the requirements of EN ISO 9001 and made specific to the requirements of this European standard shall be considered to satisfy the above requirements.		P
	NOTE A quality system does not necessarily need to be in accordance with EN ISO 9001 to satisfy the requirements to FPC of this European Standard.		P
	The results of inspections, tests and assessments stated in the manufacturer`s FPC system shall be recorded.		P
	The action to be taken if control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer's FPC procedures. The assessment of FPC shall be as Annex B.		P
6.3.2	**Personnel**		-
	The responsibility, authority and the relationship between personnel that manage, perform or verify work affecting product conformity, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-conformity from occurring, actions in case of non-conformities and to identify and register any conformity problems.	The manufacture deals the rules about how to educated the staff.	P

	The FPC system shall describe measures to ensure that personnel involved in activities influencing the conformity of the components have adequate qualifications and training for the range of components and execution classes to be exercised by the manufacturer.		P
	Weighing, measuring and testing equipment influencing the conformity of the components shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.	The equipment list has been checked. The equipment maintenance record checked.	P
	Equipment used in the manufacturing process shall be regularly inspected and maintained to ensure that use, wear and failure does not cause significant inconsistency in the manufacturing process.		-
	Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures.		P
	The records shall be retained for the period defined in the manufacturer's FPC procedures.		P
6.3.4	**Structural design process**		-
	In the case of structural design carried out by the manufacturer, the FPC system shall ensure compliance with the design brief, identify the procedures for checking the calculations and those individuals responsible for the design.	The design progress complied with.	P
	The records shall be sufficiently detailed and accurate to demonstrate that the manufacturer's design responsibilities have been carried out satisfactorily.		P
	A record of the documents shall be retained for a period defined in the manufacturers FPC procedure.		P
6.3.5	**Constituent products used in manufacture**		-
	The manufacturer shall implement a written inspection procedure for checking and recording that constituent products conform to the specification, and for tracing that they are correctly used in component manufacture.		P
	The requirements for traceability of constituent products given in EN 1090-2 and EN 1090-3 shall be complied with.		P
	The specification for the constituent products used in manufacture shall be retained according to the manufacturer`s FPC procedures.		P
	NOTE The requirements for traceability in EN 1090-2 and EN 1090-3 are dependent on execution class.		P

6.3.6	**Component specification**		
	The manufacture of components shall be controlled using a component specification giving all the necessary information of the component in sufficient detail to enable it to be manufactured and for its conformity to be evaluated.	The component specification complied with.	P
	The execution class to be applied shall be given in the component specification, see EN 1090-2 and EN 1090-3.		P
	The manufacturer shall implement a written inspection and test plan for checking and recording that manufactured components conform to their component specification.		P
	The component specification shall be prepared from design information.		P
	To the extent that the manufacturer undertakes the preparation of the component specification from design information Clause 6.3.4 applies.		P
	Annex A gives guidance on preparation of the component specification.		P
	NOTE In many cases the responsibility for preparation of the component specification will have been shared between the manufacturer and the purchaser (or designers acting on their behalf).		P
	A manufacturer's declaration that a component complies with its component specification does not cover those aspects of design not undertaken by the manufacturer, nor does it cover that they have been correctly incorporated into its component specification.		P
6.3.7	**Product evaluation**		-
	The manufacturer shall establish procedures to ensure that the declared values and classes of all of the characteristics are maintained.		P
	The means of production control of characteristics and the sampling methods for a component or family to be evaluated shall be in accordance with Table 2.		P
	If the component specification includes a prescribed inspection and test plan for component properties then those requirements shall be followed in addition to the requirements given in Table 2.		P
6.3.8	**Non-conforming products**		-
	The manufacturer shall have written procedures that specify how to deal with non-conforming products. Such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.		P

	The procedures shall conform with EN 1090-2 or EN 1090-3 as appropriate.		P

- End of Report -

Photo documentation

Type of equipment: Expandable house

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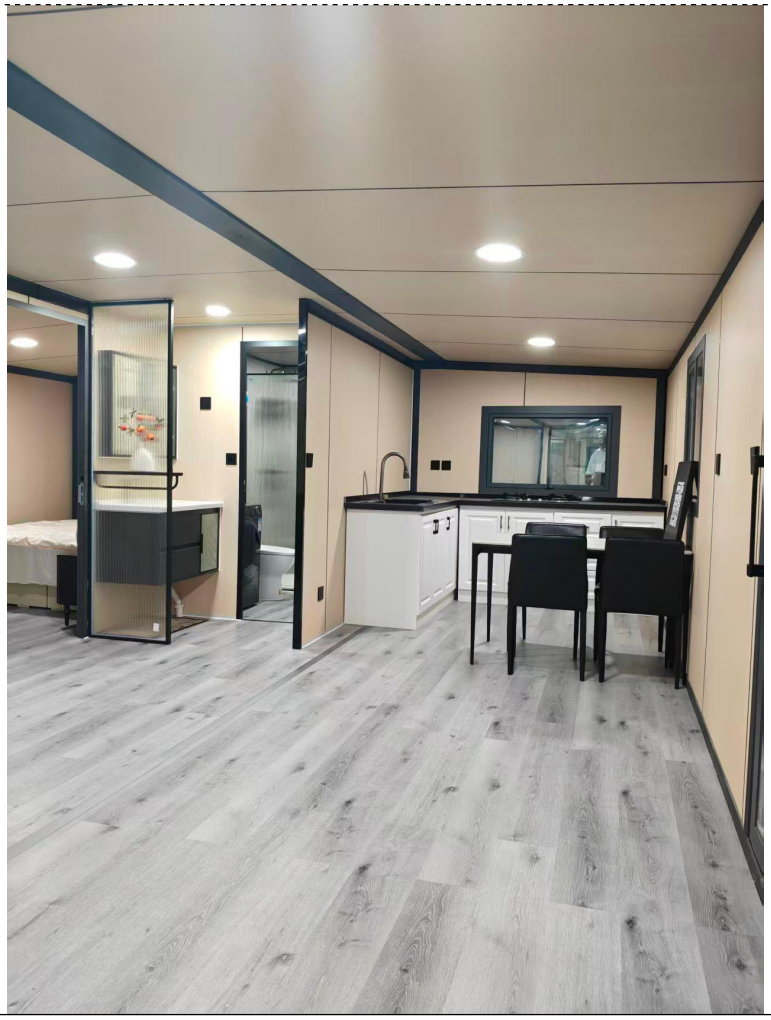
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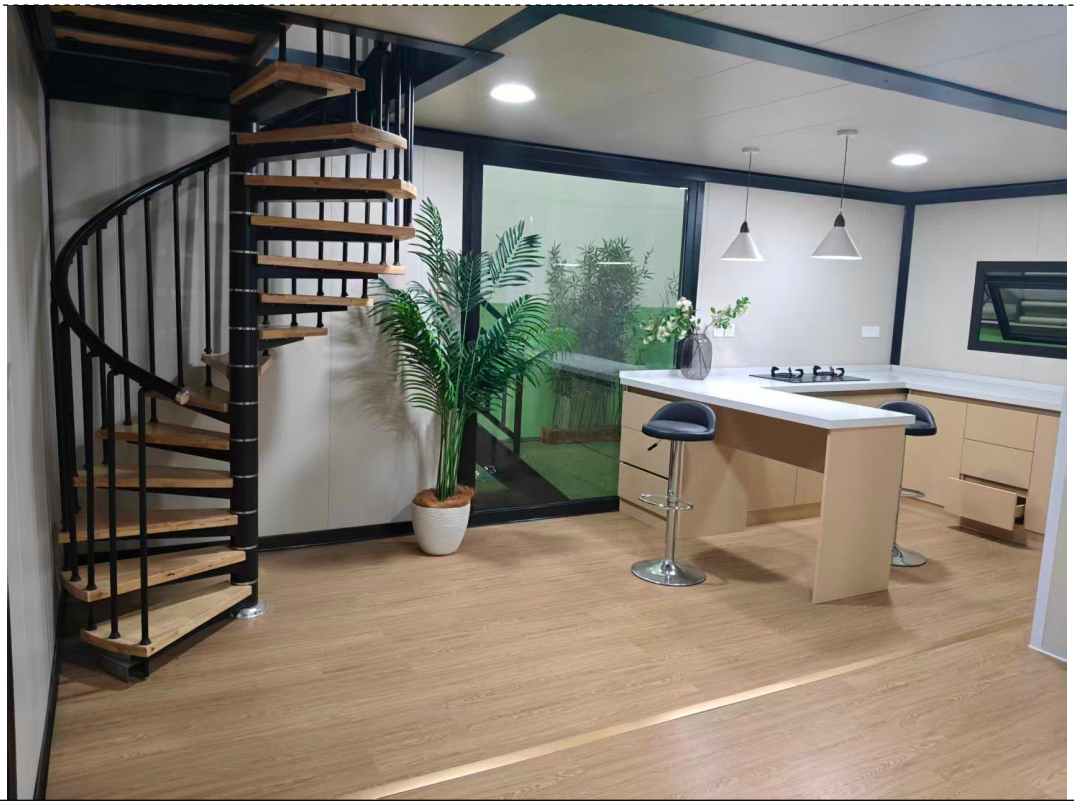
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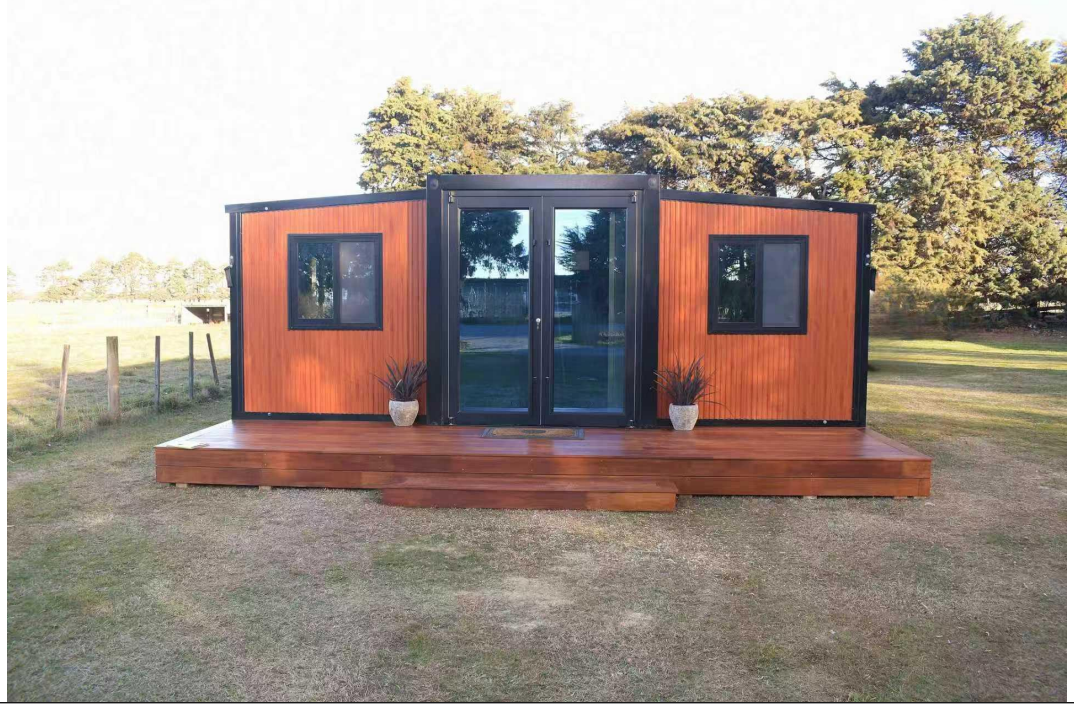
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