



Technical Construction File

File No.: CE-EM26071706SD

According to the
EN 14509:2013
Self-supporting double skin metal faced insulating panels - Factory made products
- Specifications

Related to the

Product:
Insulation Sandwich Panel with Cold Room Door

Model:
PU Sandwich Panel Series, Rockwool Sandwcih Panel Series,
Cold Storage Door Series

Presented by

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Part I : General

1.1 General description of machine

This product is designed to create a highly sealed and low thermal conductivity enclosure barrier, preventing the exchange of heat between the inside and outside to maintain a constant low temperature within the storage facility.

Following machines were produced in Jul, 2026. And they were selected as samples for test.

Model Name: PU

Series No:



1.2 Variations of the series products

Regarding the whole family of the series, they can be divided into various different groups according to their main features, they are:

PU Sandwich Panel Series, Rockwool Sandwcih Panel Series, Cold Storage Door Series

All models are with the same machine structure but with some small differences as described as the following:

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To present the conformity of this series product with the standard EN 14509:2013, we discuss the conformity systematically with the relative Directive and standards for PU as a basic evaluation in clause.

1.3 List of applicable regulations and standards

Regulations

- /

Standards

- EN 14509:2013

Self-supporting double skin metal faced insulating panels - Factory made products - Specifications

1.4 Quality control system

In order to ensure the conformity of the series production, the HENAN ELEMENT NEW MATERIAS CO., LTD. has taken the related procedures mentioned below:

(1) Apply for the consultant form the qualified body.

The HENAN ELEMENT NEW MATERIAS CO., LTD. has applied for the consultant from Technical Inspection Certification. The complete technical construction file (TCF) have been established before applying for the CE marking certificate.

(2) Carry out the inspection for parts and components according to the TCF.

Before the assemblies of the series production, the QC engineers of ELEMENT has to check and inspect the technical specifications and intended functions of parts and components to ensure the correct use of them according to the contents of TCF and principle described in the related technical information.

(3) Carry out the inspection & testing for the products before packing.

Before packing the products, the QC engineers of ELEMENT have to do the necessary inspection and testing to ensure the conformity of related requirements. In particular, they should do the testing and inspection of electrical characteristics and outer feature.

(4) Carry out the inspection for the package.

After finishing the necessary inspection and testing for the products, an inspection for the packing has to be done to ensure the necessary elements being included in this packing before shipment.

(5) Provision for the change of design.

Any change of the products described in this TCF must be checked in detail and written down again in the TCF by the designer of ELEMENT if the change may effects the related electrical or mechanical characteristics.

(6) Provision for the Quality Assurance.

For the provisions of internal control measures to ensure the conformity of series production of the machines, HENAN ELEMENT NEW MATERIAS CO., LTD. has built an internal quality control system in accordance with the international standard of ISO 9001.

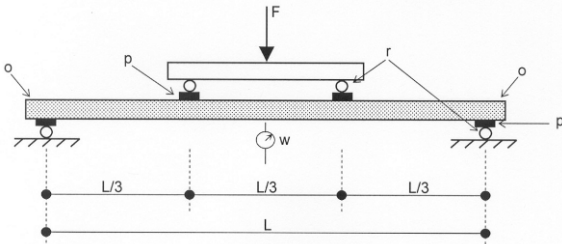
Part II: Assessment report

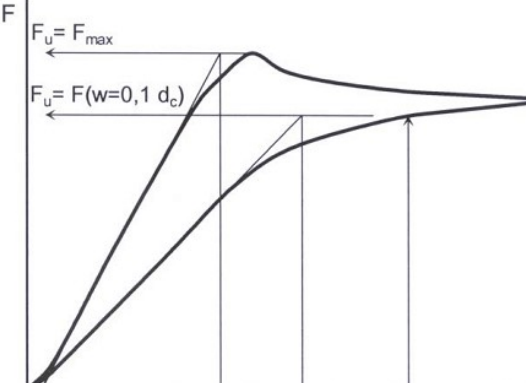
2.1 EN 14509:2013 Assessment report

Test Property	Test Method	Test Principle / Requirements	Test Result				
Metal facings	EN 14509:2013 Clause 5.1.2	Steel faces Steel faces (other than stainless steel) shall be a construction steel according to EN 10346:2009, Table 1 and have a minimum yield strength of 220 N/mm2 and shall conform to the requirements of the appropriate standard given in Table 1. For steels according to EN 10346:2009, Table 1, the steel grade, nominal thickness and tolerance system of each face shall be declared. Tolerances on thickness shall be according to the “special” or “normal” tolerances as described in the relevant standards. <table><caption>Table 1 – Standards for steel with metallic coating</caption><tr><th>Metallic coating</th><th>European Standard</th></tr><tr><td>Zinc, 5 % Al-Zn, 55 % Al-Zn and Aluminium-silicon</td><td>EN 10346</td></tr></table> The minimum nominal metallic coating masses shall be as specified in EN 508-1. Differential zinc coating shall be permitted for the external face of a panel exposed to the climate for all core materials. Organic protective coatings shall be selected according to their durability in the application environment. Organic coated steel sheets shall conform to the requirements of EN 10169. Multi-layer coatings shall conform to EN 508-1. The panel manufacturer shall state the metal grade, thickness and tolerance system of each face. Tolerances on thickness shall be according to “special” or “normal” tolerances as described in the relevant standards. The thickness of steel facing sheets shall be determined in accordance with EN 10143.	Metallic coating	European Standard	Zinc, 5 % Al-Zn, 55 % Al-Zn and Aluminium-silicon	EN 10346	Pass. steel faces. It meets the requirements after checking.
Metallic coating	European Standard						
Zinc, 5 % Al-Zn, 55 % Al-Zn and Aluminium-silicon	EN 10346						
Thermal performance	EN 14509:2013 Clause 5.1.3.1& Clause 5.2.2	The declared and design thermal conductivity of core materials shall be determined in accordance with 5.2.2. The thermal transmittance value for the panel (U), incorporating the design thermal conductivity for the core material (λ_{Design}) and the joints and any profiled facings, shall be determined in accordance with A.10. When determining the thermal transmittance for the panel the following conditions apply: -tests and calculations shall take account of the thermal effect of the profiles of the external and internal faces; -calculations shall take account of the panel-to-panel edge joints (A.10.4). The thermal transmittance (U) of the panel	Pass. MW sandwich panel. The thermal conductivity is 0.019~0.023w/m.k.				

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		shall either be determined by calculation (Equation (A.26)), or using a computer programme in accordance with EN ISO 10211-1 and EN ISO 10211-2 (Finite Element Method). The thermal transmittance (U) of the panel determined by calculation: $U = \frac{1}{R_{si} + \frac{t_{ni}}{2} + \frac{d_c + \Delta e}{2} + \frac{t_{ne}}{2} + R_{se}}$	
Adhesives and bonding	EN 14509:2013 Clause 5.1.4 & Clause 5.2.1.6 & Clause 5.2.3.1	Adhesives and bonding shall conform to 5.2.1.6 and 5.2.3.1. The adhesion between the core and the faces of the panel has a fundamental role in the satisfactory performance of the panel. The surface preparation of the facing material shall be appropriate for the adhesive or the method of adhesion.	Pass. It meets the requirements after checking.
Shear strength (f_{cv}) and shear modulus (G_c)	EN 14509:2013 Clause 5.2.1.2	The shear strength and shear modulus of the core material shall be determined using the four-point bending test (see Figure A.4). The specimen shall be loaded as shown in Figure A.4. The loading rate shall be uniform and such as to result in failure between 1 min and 5 min after the commencement of the test. During the test the deflection shall be measured with a precision of 0,01mm. The loading shall be continued until failure and a load-deflection curve shall be drawn. In the case of thick panels, test procedures using four point loads may be used to achieve shear failure. The tests shall be performed under normal laboratory conditions of temperature and humidity. The metal thickness, excluding all protective coatings, of both faces of each test specimen shall be measured and recorded. The ultimate load carried by the specimen failing in shear shall be measured and the shear modulus calculated from the load deflection curve.	Pass. The shear strength of the core is more than 2450KN/m ² .

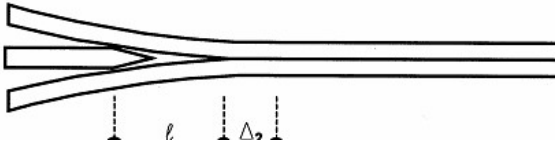
Test Property	Test Method	Test Principle / Requirements	Test Result
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		 The ultimate shear strength f_{cv} of the core material shall be calculated from the maximum load attained in a specimen failing in shear as follows $f_{cv} = k_v \frac{F}{2l}$ For each test specimen, the shear modulus G_C shall be calculated from the slope of the straight part of the load-deflection curve $\left[\frac{\Delta F}{\Delta w} \right]$ as follows: $G_C = \frac{\Delta F l}{6 B d_c}$	
Compressive strength (σ_m) or compressive stress (σ_{10})	EN 14509:2013 Clause 5.2.1.4	The compressive strength of the core σ_m or its compressive stress at 10 % deformation σ_{10} (whichever is reached first) shall be determined in accordance with the method given in A.2 and shall be declared by the manufacturer in megapascals (MPa). The specimen shall be placed between the two parallel stiff loading plates of a compression testing machine. The loading rate shall be sufficient to cause a displacement equivalent to 10 % of thickness ± 25 %, per minute. During the test the displacement shall be measured with a precision of 1 % and a load-deflection curve drawn. The compressive strength f_{cc} of the core material shall be calculated using Equation: $f_{cc} = \frac{F}{A_c}$	Pass. The compressive strength is more than 220 kPa.
Cross panel tensile	EN 14509:2013 Clause 5.2.1.6	The test shall be carried out by loading the specimen continuously, or in at least 10	Pass. The cross panel

Test Property	Test Method	Test Principle / Requirements	Test Result
strength (f_{ct})		increments, using a tensile testing machine. The strain rate shall be 10 mm $\pm$ 10 % per minute. During the test the extension shall be measured with a precision of 1 %. The test shall be continued until the ultimate load (F_u) is reached (Figure A.3). If the specimen does not exhibit a clearly defined ultimate load the test shall be discontinued when the relative deformation exceeds 20 %.  The tensile strength f_{ct} is given by Equation $f_{ct} = \frac{F}{A}$	tensile strength perpendicular to the panel faces is 0.17 MPa.
Bending moment capacity (M_u) and wrinkling stress (σ_w)	EN 14509:2013 Clause 5.2.1.7	The bending moment capacity shall be obtained by testing according to A.5 and shall be declared by the manufacturer in kiloNewton metres per metre width (kNm/m). For panels with flat or lightly profiled faces, the wrinkling stress shall be calculated in accordance with A.5.5 and shall be declared by the manufacturer in megapascals (MPa). Prior to the test a small load, which shall be not greater than 10 % of the failure load, shall be applied for no more than five minutes and then removed. The panel shall be loaded steadily in at least 10 increments until failure occurs. The deflection speed shall not exceed 1/50 of the span per minute at any time during the test. Both the load and the central deflection shall be recorded. The bending moment capacity M_u shall be given by Equation:	Pass. Bending moment in the span +ve bending 4.5 kNm/m -ve bending 4.3 kNm/m Wrinkling stress (face 1) in span 129 MPa Wrinkling stress (face 2) in span 107MPa.

Test Property	Test Method	Test Principle / Requirements	Test Result
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		$M_u = \frac{F_u}{8}$ If the face under tension is flat or lightly profiled the wrinkling stress σ_w shall be given by Equation: $\sigma_w = \frac{M}{e_s}$	
Reduction of tensile strength with time as a consequence of ageing (durability)	EN 14509:2013 Clause 5.2.3.1	Panels shall satisfy the criteria for reduction in tensile strength in accordance with the relevant test method DUR1 and DUR2 (see Table 2) as described in Annex B. Durability tests shall be applied to panels designed for external applications. They are based on the accelerated ageing effect of temperature or humidity, which from long-term experience are critical for each core material. The use of EPS and XPS panels is restricted to applications where temperatures do not exceed +80 °C. Where required, the durability tests may be used to assess the performance of internal sandwich panels. The test shall be carried out at the selected temperature level, T = 90 °C, 75 °C, or 65 °C. The test program shall be as follows: Set 1 (initial set): Condition for 1 week in normal laboratory conditions followed by tensile test; Set 2: Condition for 6 weeks at T °C followed by tensile test; Set 3: Condition for 24 weeks at T °C followed by tensile test; where T is the selected test temperature. The durability criteria shall be satisfied providing the following conditions are met: -f_{ct6} or f_{ct24}, whichever is lowest, shall not be less than 50 % of the initial tensile strength value f_{ct0}; -the mean value of tensile strength f_{ct6} or f_{ct24}, whichever is lowest, of the samples with T °C shall be not less than 0.02 MPa; -the change of thickness of the sections at T °C in test procedure DUR1 shall not be	Pass. f_{ct24} is not less than 50 % of the initial tensile strength value f_{ct0}; -the mean value of tensile strength f_{ct24}, of the samples with 75 °C is not less than 0.02 MPa; -the change of thickness of the sections at 75 °C in test procedure DUR1 is not greater than 5 %, in the central and edge regions.

Test Property	Test Method	Test Principle / Requirements	Test Result
		greater than 5 %, in the central and edge regions. The test report shall state the temperature at which the specimen passed the DUR1 test. The color limitation and reflectivity range shall be declared according to the following acceptance criteria: Durability pass: suitable for all colors (T = 90 °C test); Durability pass: suitable for light and very light colors. Reflectivity 40-90. (T = 75 °C test); Durability pass: suitable for very light colors only. Reflectivity 75-90. (T = 65 °C test).	
wedge test	EN 14509:2013 Annex B.5	The wedge test shall be used to control the adhesion between the adhesives and the normal internal coated surface of the facings. The wedge shall be pressed between the two faces, thus causing an initial crack whose length shall be measured (Figure B.3). The wedge shall be loaded with a force of 3 N. The specimen shall then be immersed for 24 h in water heated to 70 °C.  The initial crack shall not extend for more than 30 mm and shall not grow by more than a further 20 mm after immersion for 24 h in heated water. If the crack appears in the bond with the face material and not within the adhesive material itself, this shall be classed as a failure of the wedge test.	Pass. The initial crack does not extend for more than 30 mm and does not grow by more than a further 20 mm after immersion for 24 h in heated water.
Resistance to point loads and access loads – ceiling panels	EN 14509:2013 Clause 5.2.3.2	A load of 1.2 KN shall be applied unless required otherwise by national regulatory requirements. The load shall be applied at mid-span on the edge rib or on the edge of a flat panel through a timber block measuring 100 mm x 100 mm. Panels shall sustain a point load giving rise to three possible outcomes: a) if the panel carries the applied load without permanent visible damage, there are no restrictions for occasional access onto the roof or ceiling either during or after erection; b) if the panel supports the load but with	Pass. The panel carries the applied load without permanent visible damage, there are no restrictions for occasional access onto the roof or ceiling either during or after erection.

Test Property	Test Method	Test Principle / Requirements	Test Result																				
		permanent visible damage, measures shall be taken to avoid damage during erection (e.g. walking boards). Furthermore, there shall be no provision for access to the roof after building work is completed; c) if the panel fails to support the load it shall be used only on roofs or ceilings where no walking access is possible/permitted. This limitation shall be clearly indicated on the panel (or elsewhere).																					
Reaction to fire	EN 14509:2013 Clause 5.2.4.2	The reaction to fire classification of the product shall be determined according to EN 13501-1. The classification shall apply to panel applications defined in Clause 1 (Scope) of this European Standard.	B-s ₂ , d ₀ ,t ₂ .																				
Fire resistance	EN 14509:2013 Clause 5.2.4.3	Where required, the fire resistance classification of the product shall be determined according to EN 13501-2.	60 minutes no failure.																				
External fire performance – roofs	EN 14509:2013 Clause 5.2.4.4	Where the manufacturer wishes to declare external fire performance (e.g. when subject to regulatory requirements), the product shall be tested and classified in accordance with EN 13501-5. These products shall be given a BROOF classification in all the test methods. Test arrangements for external fire performance tests shall be in accordance ENV 1187 together with the additions set out in C.3.2 to C.3.5.	The fire resistance classification is B-s ₂ , d ₀ ,t ₂ .																				
Dimensional tolerances for sandwich panels	EN 14509:2013 Clause 5.2.5	<table><tr><th>Dimension</th><th>Tolerance (maximum permissible)</th></tr><tr><td>Thickness of the panel *</td><td>D ≤ 100 mm ± 2 mm D > 100 mm ± 2 %</td></tr><tr><td>Deviation from flatness (according to the length of measurement L)</td><td>For L = 200 mm – Deviation from fls For L = 400 mm – Deviation from fls For L > 700 mm – Deviation from fls</td></tr><tr><td>Depth of metal profile (ribs) (mm)</td><td>5 < h ≤ 50 mm ± 1 mm 50 < h ≤ 100 mm ± 2,5 mm</td></tr><tr><td>Depth of stiffeners and light profiling</td><td>d_s ≤ 1 mm ± 30 % of d_s 1 mm < d_s ≤ 3 mm ± 0,3 mm 3 mm < d_s ≤ 5 mm ± 10 % of d_s</td></tr><tr><td>Length of the panel</td><td>L ≤ 3 m ± 5 mm L > 3 m ± 10 mm</td></tr><tr><td>Cover width of the panel</td><td>w ± 2 mm</td></tr><tr><td>Deviation from squareness</td><td>0,006 × w (nominal cover width)</td></tr><tr><td>Deviation from straightness (on length)</td><td>1 mm per metre, maximum 5 mm</td></tr><tr><td>Bowing</td><td>2 mm per metre length, maximum 10 m 8,5 mm per metre width for flat profiles</td></tr></table>	Dimension	Tolerance (maximum permissible)	Thickness of the panel *	D ≤ 100 mm ± 2 mm D > 100 mm ± 2 %	Deviation from flatness (according to the length of measurement L)	For L = 200 mm – Deviation from fls For L = 400 mm – Deviation from fls For L > 700 mm – Deviation from fls	Depth of metal profile (ribs) (mm)	5 < h ≤ 50 mm ± 1 mm 50 < h ≤ 100 mm ± 2,5 mm	Depth of stiffeners and light profiling	d _s ≤ 1 mm ± 30 % of d _s 1 mm < d _s ≤ 3 mm ± 0,3 mm 3 mm < d _s ≤ 5 mm ± 10 % of d _s	Length of the panel	L ≤ 3 m ± 5 mm L > 3 m ± 10 mm	Cover width of the panel	w ± 2 mm	Deviation from squareness	0,006 × w (nominal cover width)	Deviation from straightness (on length)	1 mm per metre, maximum 5 mm	Bowing	2 mm per metre length, maximum 10 m 8,5 mm per metre width for flat profiles	Pass. It meets the requirements after checking.
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Water	EN 14509:2013	The test shall be carried out in accordance	Class B																				

Test Property	Test Method	Test Principle / Requirements	Test Result
permeability	Clause 5.2.6	with EN 12865 – procedure A The following criteria shall be used to define water tightness: no water penetrates through the panel assembly to the inside of the building, which would continuously or repeatedly wet the inside face of the assembly or any part of the specimen intended to remain dry; any water penetrating through the joint system or fixings is of the order of a few small drops and is estimated to dry out. One of the following three test classes shall be used: Class A: Demanding applications with heavy rain and wind. The assembly shall be watertight up to 1 200 Pa; Class B: Normal applications. The assembly shall be watertight up to 600 Pa; Class C: Low requirement applications. The assembly shall be watertight up to 300 Pa.	
Air permeability (m ³ /m ² .h at 50 Pa)	EN 14509:2013 Clause 5.2.7	The assembly shall not be less than 1 200 mm x 2 400 mm. The air permeability shall be measured with a pressure difference of 50 Pa between the inside and outside of the test assembly. The air permeability (air loss) shall be determined in terms of m³/m².h at 50 Pa.	Air permeability is 11 m ³ /m ² .h at 50 Pa.
Water vapour permeability	EN 14509:2013 Clause 5.2.8	For the purposes of this European Standard, the water vapour transmission coefficient for the metal facings used is considered to be infinity. Metal faced sandwich panels are therefore considered to be impermeable to water vapour.	Impermeable
Airborne sound insulation (R _w (C;Ctr))	EN 14509:2013 Clause 5.2.9	The sound reduction indices R in each one-third octave band in the range from 100 Hz to 3 150 Hz shall be determined using the method described in EN ISO 140-3. The following single number rating shall be declared in accordance with EN ISO 717-1: R_w(C;Ctr).	Airborne sound insulation R _w is 39dB.
Sound absorption (α _w)	EN 14509:2013 Clause 5.2.10	The mounting of the test specimens shall conform to the normal assembly in a building with the same connections and seals between the elements. The test specimen shall be placed directly against one of the internal surfaces (wall, ceiling or floor) of the chamber. A reflective frame shall be installed round the test specimen.	Sound absorption α _w is 19dB(A).

Test Property	Test Method	Test Principle / Requirements	Test Result
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		The result shall be declared as a single number rating (α_w) in accordance with EN ISO 11654	
Mechanical resistance to design loads	EN 14509:2013 Clause 5.3.1	The product shall have sufficient mechanical resistance to the design loads arising from the actions of self-weight, snow, wind, temperature and pressure gradients and access, where these loads shall be factored such that, either alone or in combination, they do not impair the performance of the product in service. The safety of the product shall be verified by design procedures based on the limit state concept. This requires that the ‘design value of the resistance’ shall be greater than the ‘design value of the effect of the actions’ and shall be satisfied at both the serviceability limit state and the ultimate limit state.	Pass. It meets the requirements after checking.
Actions and combinations of actions	EN 14509:2013 Clause 5.3.2	In design for mechanical resistance the following actions: permanent actions, variable actions and actions due to long-term effects, shall be taken into account in the calculations.	Pass. It meets the requirements after checking.

Annex 1 Photos



