



Technical Construction File

TCF No.: ECO(13)-537-CPR

Type of Equipment:	Terasun Composite Board(TCB & TSM)
Model No.:	1220*2440 3mm~30mm 1200*3000 3mm~30mm 900*3000 3mm~30mm
Issued Date:	2013-09-13
Brand Name/Trade mark:	---
Test standard(s):	EN 12467:2012

Prepared for:

ZHEJIANG TERASUN AIR DUCT CO., LTD
Maren Village, Chongren Industrial Zone, Chongren Town,
Shengzhou City, Zhejiang Province, P.R.C.

Prepared by

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TEST STANDARD

EN 12467:2012

Fibre-cement flat sheets — Product specification and test methods

Report

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Testing laboratory

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Client

Name : ZHEJIANG TERASUN AIR DUCT CO., LTD

Address : Maren Village, Chongren Industrial Zone, Chongren Town,
Shengzhou City, Zhejiang Province, P.R.C.

Manufacturer

Name : ZHEJIANG TERASUN AIR DUCT CO., LTD

Address : Maren Village, Chongren Industrial Zone, Chongren Town,
Shengzhou City, Zhejiang Province, P.R.C.

Test specification

Standard : EN 12467:2012

Test procedure : CE-CPR

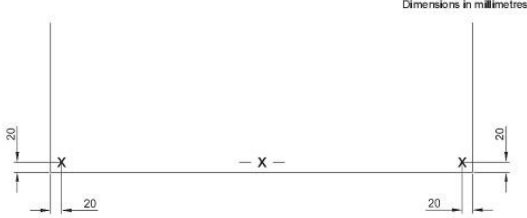
Procedure deviation : N.A.

Non-standard test method : N.A.

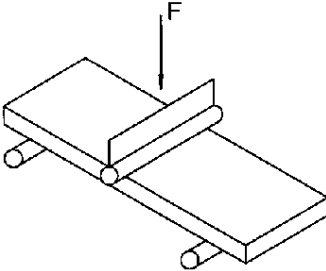
General description

TERASUN Composite board is made through gelling, pressing, and other special techniques and is a new type material renowned for stability in performance. It is a light-weight and high-intensity building material which is characterized by convenience in construction, great performance of processes like sawing, nailing without being warped or cracks, in addition, the surface of the board can be painted or covered with tile or wallpaper, not afraid of insects and not self-heating.

Test Property	Test Method	Test Principle / Requirements	Test Result
Composition	EN 12467:2012 Clause 5.1.1	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.	Pass. Magnesium sulphate cement, natural fiber or glass fiber.
Appearance and finish	EN 12467:2012 Clause 5.1.2	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. Variations of the surface appearance which do not impair the fitness for purpose of the sheets are permitted. The sheets may be supplied with holes for fixing and/or cut to size.	Pass. Grey and Nature.
Classification	EN 12467:2012 Clause 5.2	Category A Sheets which are intended for applications where they may be subjected to heat, high moisture and severe frost. Category B Sheets which are intended for applications where they may be subjected to heat, moisture and occasional frost, e.g. where they are either protected from or not subjected to severe weathering conditions. Category C Sheets which are intended for internal applications, where they may be subjected to heat and moisture, but not to frost. Category D Sheets for rigid underlayer applications.	Pass. Category A
Groups of sizes	EN 12467:2012 Clause 5.2.6	Small size sheets Sheets for which the method of installation includes horizontal overlap. Their dimensions are generally such that their area is $< 0,4 \text{ m}^2$ and have a length/width relation ≤ 3 . Large size sheets Sheets which do not correspond to indicators for small size sheets. Large	Pass. Large size sheets

Test Property	Test Method	Test Principle / Requirements	Test Result															
		sheets may be declared as "small size sheets" provided tolerances for small size sheets apply and are specified in the manufacturer's literature.																
Nominal length and width	EN 12467:2012 Clause 5.3.2	The manufacturer shall specify the nominal length and width of the sheets.	Pass. 1220mm*2440mm															
Thickness	EN 12467:2012 Clause 5.3.3	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. Sheets are normally available in thickness from 3 mm to 30 mm.	Pass. 3mm~35mm															
Tolerances on length and width	EN 12467:2012 Clause 5.3.4.1 & Clause 7.2.3.1	Tolerances on length and width shall be in accordance with Table 1, for the appropriate level. Table 1 — Tolerances on nominal dimensions in accordance with value and level <table border="1"> <thead> <tr> <th>Nominal dimension a^a</th> <th>Level I</th> <th>Level II</th> </tr> </thead> <tbody> <tr> <td>a ≤ 600 mm</td> <td>± 3 mm</td> <td>± 4 mm</td> </tr> <tr> <td>600 mm < a ≤ 1 000 mm</td> <td>± 3 mm</td> <td>± 5 mm</td> </tr> <tr> <td>1 000 mm < a ≤ 1 600 mm</td> <td>± 0,3% a</td> <td>± 0,5% a</td> </tr> <tr> <td>1 600 mm < a</td> <td>± 5 mm</td> <td>± 8 mm</td> </tr> </tbody> </table> <p>^a a is the nominal width or length</p> <p>These tolerances are not applicable to oversize sheets. Avoid taking the measurement over a local deformation which could be considered as a visual defect. Smooth any rough areas.</p>	Nominal dimension a ^a	Level I	Level II	a ≤ 600 mm	± 3 mm	± 4 mm	600 mm < a ≤ 1 000 mm	± 3 mm	± 5 mm	1 000 mm < a ≤ 1 600 mm	± 0,3% a	± 0,5% a	1 600 mm < a	± 5 mm	± 8 mm	Pass. Level II.
Nominal dimension a ^a	Level I	Level II																
a ≤ 600 mm	± 3 mm	± 4 mm																
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1 000 mm < a ≤ 1 600 mm	± 0,3% a	± 0,5% a																
1 600 mm < a	± 5 mm	± 8 mm																
Tolerances on thickness	EN 12467:2012 Clause 5.3.4.2 & Clause 7.2.3.2	Carry out three measurements with a dial gauge, taking each reading to an accuracy of 0,1 mm.  Table 2 — Tolerances on thickness for non-textured sheets <table border="1"> <tbody> <tr> <td>e ≤ 6 mm</td> <td>± 0,6 mm</td> </tr> <tr> <td>6 mm < e ≤ 20 mm</td> <td>± 10 % e</td> </tr> <tr> <td>e > 20 mm</td> <td>± 2 mm</td> </tr> </tbody> </table> <p>For sheets without texture, the maximum difference between extreme values of the</p>	e ≤ 6 mm	± 0,6 mm	6 mm < e ≤ 20 mm	± 10 % e	e > 20 mm	± 2 mm	Pass. Non-textured sheets									
e ≤ 6 mm	± 0,6 mm																	
6 mm < e ≤ 20 mm	± 10 % e																	
e > 20 mm	± 2 mm																	

Test Property	Test Method	Test Principle / Requirements	Test Result				
		thickness measurements within one sheet shall not exceed 10 % of the maximum measured value.					
Straightness of edges	EN 12467:2012 Clause 5.3.5.1& Clause 7.2.3.3	<p>For large size sheets, measure on all four edges the greatest distance between the edge of the sheet and a string or wire stretched from one corner of the panel to the adjacent corner with a steel rule capable of reading to an accuracy of 0,5 mm.</p> <p>The tolerances on the straightness of edges are defined as a percentage of the length of the edge of the relevant dimensions (length or width), and shall be in accordance with Table 4 for the appropriate level.</p> <p>Table 4 — Tolerances on straightness of edges</p> <table border="1"> <thead> <tr> <th>Level I</th> <th>Level II</th> </tr> </thead> <tbody> <tr> <td>0,1%</td> <td>0,3%</td> </tr> </tbody> </table>	Level I	Level II	0,1%	0,3%	<p>Pass.</p> <p>Level I</p> <p>The tolerances on the straightness of edges is 0.1%.</p>
Level I	Level II						
0,1%	0,3%						
Squareness of edges	EN 12467:2012 Clause 5.3.5.2& Clause 7.3.2.4	<p>Place two adjacent corners of the sheets in succession between the arms of the square keeping one side against the full length of the large arm and the other side in contact with the small arm at least at one point.</p> <p>In this position, measure to the nearest 0,5 mm the greatest distance of the sheet edge from the small arm of the square. Report each result.</p> <p>The tolerances on squareness of sheets shall be in accordance with Table 5, for the appropriate level.</p> <p>Table 5 — Tolerances on squareness of edges</p> <table border="1"> <thead> <tr> <th>Level I</th> <th>Level II</th> </tr> </thead> <tbody> <tr> <td>2 mm/m</td> <td>4 mm/m</td> </tr> </tbody> </table>	Level I	Level II	2 mm/m	4 mm/m	<p>Pass.</p> <p>Level I</p> <p>The tolerances on squareness of sheets is 2mm/m.</p>
Level I	Level II						
2 mm/m	4 mm/m						
Apparent density	EN 12467:2012 Clause 5.4.2& Clause 7.3.1	<p>The manufacturer shall specify in his literature the minimum apparent density for each category of sheet.</p> <p>Determine the volume V of the specimen by immersion in water or another method having an equivalent accuracy. In the case of immersion in water, the specimen shall be saturated in water beforehand.</p> <p>Determine the mass m of the specimen</p>	<p>Pass.</p> <p>The density is 0.9~ 1.2g/cm³.</p>				

Test Property	Test Method	Test Principle / Requirements	Test Result
		<p>after drying it in a ventilated oven maintained at 100 °C to 105 °C for 24 h. The apparent density is given by the formula:</p> $d = \frac{m}{V}$ <p>When tested in accordance with the method specified in 7.3.1 the density shall be not less than this value.</p>	
Moisture movement	EN 12467:2012 Clause 5.4.3 & Clause 7.3.7 & Annex C	<p>Condition specimens at (30±2) % relative humidity at a temperature of (23 ± 2) °C until the weight loss or gain during a 24 h period is not greater than 0,1 % of the specimen weight.</p> <p>Remove specimens from the conditioning chamber and immediately measure their lengths and weights and record these values.</p> <p>Replace the specimens in conditioning chamber and increase the humidity to (90 ± 5) %, maintaining temperature at (23 ± 2)°C.</p> <p>When specimens have reached a steady state condition (i.e. weight gain or loss in any 24 h period does not exceed 0,1 % of specimen weight) reweigh specimens and immediately measure specimen lengths. Record these values.</p>	Pass. Less than 0.25%.
Mechanical characteristics – Bending strength	EN 12467:2012 Clause 5.4.4 & Clause 7.3.2	<p>Arrange the test piece with the underside against the supports and load the test piece by means of the central loading bar. Load the specimen such that breakage occurs within 10 s and 30 s. A constant rate of deflection is preferred.</p>  <p>Where this facility is not available a constant rate of loading is acceptable. For non-textured specimens measure the</p>	Pass. Bending Strength: Transverse ≥ 10.3N/mm ² Vertical ≥ 8.5N/mm ² Class 2.

Test Property	Test Method	Test Principle / Requirements	Test Result																																
		<p>thickness at two points, either before breaking along the loading line or after breaking along the broken edge as shown in Figure 4.</p> <p>The modulus of rupture MOR, in megapascals, for each breaking load direction is given by the formula:</p> $MOR = \frac{3Fl_s}{2be^2}$ <p>The minimum modulus of rupture of the sheets in the weaker direction shall be not less than 70 % of the specified value in Table 6 for the average of the two directions.</p> <p style="text-align: center;">Table 6 — Minimum modulus of rupture (MOR)</p> <table border="1"> <thead> <tr> <th colspan="2">min. MOR in the wet condition</th> <th colspan="2">min. MOR in the ambient condition</th> </tr> <tr> <th colspan="2">MPa</th> <th colspan="2">MPa</th> </tr> <tr> <th>Classes</th> <th>Category A & B</th> <th>Classes</th> <th>Category C & D</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4</td> <td>1</td> <td>4</td> </tr> <tr> <td>2</td> <td>7</td> <td>2</td> <td>7</td> </tr> <tr> <td>3</td> <td>13</td> <td>3</td> <td>10</td> </tr> <tr> <td>4</td> <td>18</td> <td>4</td> <td>16</td> </tr> <tr> <td>5</td> <td>24</td> <td>5</td> <td>22</td> </tr> </tbody> </table> <p><small>NOTE 1 Where manufacturers state minimum product MOR this should be at the 4% acceptable quality level (AQL).</small></p> <p><small>NOTE 2 For textured sheets the MOR cannot be used for calculating mechanical performance.</small></p>	min. MOR in the wet condition		min. MOR in the ambient condition		MPa		MPa		Classes	Category A & B	Classes	Category C & D	1	4	1	4	2	7	2	7	3	13	3	10	4	18	4	16	5	24	5	22	
min. MOR in the wet condition		min. MOR in the ambient condition																																	
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4	18	4	16																																
5	24	5	22																																
Water impermeability	EN 12467:2012 Clause 5.4.5 & Clause 7.3.3	<p>Place and seal the frame on top of the face of the specimen and fill with water to a height of 20 mm above the face of the sheet. Place the specimens in a controlled environment at $(23 \pm 5) ^\circ\text{C}$ and $(50 \pm 10) \%$ relative humidity so that the underside can be viewed without moving the specimen during the test. The duration of the test shall be 24 h.</p> <p>Examine the under face after 24 h , traces of moisture may appear on the under surface of the sheet, but in no instance shall there be any formation of drops of water.</p>	Pass. There is no instance any formation of drops of water.																																
Freeze-thaw	EN 12467:2012 Clause 5.5.2 & Clause 7.4.1	<p>specimens to the relevant number of freeze-thaw cycles as specified in Table 7:</p> <p>-cool (freeze) in the freezer which shall reach a temperature of $(-20 \pm 4) ^\circ\text{C}$ within 1 h to 2 h and hold at this temperature for a further 1 h,</p> <p>-heat (thaw) in the water bath which shall reach a temperature of $(20 \pm 4) ^\circ\text{C}$ within 1 h to 2 h and hold at this temperature for a further 1 h.</p>	Pass. No distortion after 100 repeated cycles of freezing and thawing. The ratio R_L is 0.87.																																

Test Property	Test Method	Test Principle / Requirements	Test Result														
		<p>During both the cooling and heating (freezing and thawing) cycles position the specimens to enable free circulation of the conducting medium (air in the freezer or water in the bath) around them. The temperature indicated refers to the temperature of the media, i.e. air or water.</p> <p>Each freeze/thaw cycle shall take between 4 h and 6 h but an interval of 72 h maximum may be taken between cycles during which the specimens shall be stored in water at 20 °C.</p> <p>When tested in accordance with 7.4.1, after 100 freeze-thaw cycles for Category A and 25 cycles for Category B and D, the ratio RL as defined in 7.4.1.4 shall be not less than 0,75.</p>															
Heat-rain	EN 12467:2012 Clause 5.5.3 & Clause 7.4.2	<p>Fix the specimens to the test frame in accordance with the manufacturer's recommendations and the following:</p> <ul style="list-style-type: none"> -edge fixing distance-minimum specified; -spacing between fixings-maximum specified; -include all waterproofing and other attachments normally specified; -include joints in both directions. <p>Subject the assembled frame to the test cycle in accordance with Table 11:</p> <p style="text-align: center;">Table 11 — Heat-rain cycle</p> <table border="1" data-bbox="657 1413 1174 1637"> <thead> <tr> <th>Cycles</th> <th>Duration</th> </tr> </thead> <tbody> <tr> <td>Water spray</td> <td>2 h 50 min ± 5 min</td> </tr> <tr> <td>Pause</td> <td>10 min ± 1 min</td> </tr> <tr> <td>Radiant heat</td> <td>2 h 50 min ± 5 min</td> </tr> <tr> <td>Pause</td> <td>10 min ± 1 min</td> </tr> <tr> <td>Total cycle</td> <td>6 h ± 12 min</td> </tr> <tr> <td>Repeat all steps</td> <td></td> </tr> </tbody> </table> <p>When tested in accordance with 7.4.2, after 50 heat-rain cycles for Category A and 25 cycles for Category B, any visible cracks, delamination, warping and bowing or other defects in the sheets shall not be of such a degree as to affect their performance in use.</p> <p>(a) Water tightness is tested according to 5.4.4.</p>	Cycles	Duration	Water spray	2 h 50 min ± 5 min	Pause	10 min ± 1 min	Radiant heat	2 h 50 min ± 5 min	Pause	10 min ± 1 min	Total cycle	6 h ± 12 min	Repeat all steps		<p>Pass.</p> <p>After 50 heat-rain cycles, any visible cracks, delamination, warping and bowing and other defects in the sheets are not to affect their performance in use.</p>
Cycles	Duration																
Water spray	2 h 50 min ± 5 min																
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Repeat all steps																	

Test Property	Test Method	Test Principle / Requirements	Test Result
		(b) Warping and bowing are visually assessed.	
Warm water	EN 12467:2012 Clause 5.5.4 & Clause 7.3.5	Immerse the 10 specimens of the second lot in water at (60 ± 2) °C saturated with product of the same composition, for (56 ± 2) days. At the end of this period, condition the specimen in accordance with Table 10, then carry out the bending strength test in accordance with 7.3.2. After 56 days at 60 °C, the ratio R_L as defined in 7.3.5.4 shall be not less than 0.75.	Pass. The ratio R_L is not less than 0.75.
Soak-dry	EN 12467:2012 Clause 5.5.5 & Clause 7.3.6	the relevant number of soak-dry cycles as specified in Table 7 consisting of: -immersion in water at ambient temperature (more than 5 °C) for 18 h; -drying in a ventilated oven of (60 ± 5) °C and relative humidity of less than 20% for 6 h. The 20% humidity shall be achieved for at least 3 h prior to the conclusion of the 6 hours drying. If necessary, an interval up to 72 h between cycles is allowed. During this interval, specimens shall be stored in immersed conditions. After the required number of cycles, place the specimens in a laboratory atmosphere for 7 days. When tested in accordance with 7.3.6, after 50 soak-dry cycles for Category A and 25 cycles for Categories B, C and D the ratio R_L as defined in 7.3.6.4 shall be not less than 0,75.	Pass. After 50 cycles, the ratio R_L is not less than 0.75.
Reaction to fire	EN 12467:2012 Clause 5.6.1 & Clause 7.5	Sheets shall be tested and classified in accordance with EN 13501-1. The sheets to be tested shall, where the test method requires, be installed, in addition to the general provisions given in the test method, in a manner representative of their intended use in accordance with the manufacturer's specifications.	Pass. Class A
Release of dangerous substances	EN 12467:2012 Clause 5.6.2	For products containing substance(s) defined in Council Directive 76/769/EEC, the content shall be declared by the manufacturer. This	Pass. It does NOT contain any Toxic ingredients ,

Test Property	Test Method	Test Principle / Requirements	Test Result
		applies to substances contained in the original formulation or created during the manufacturing process. In addition see Annex ZA.	Asbestos, Formaldehyde and Ammonia

A.1 Photos

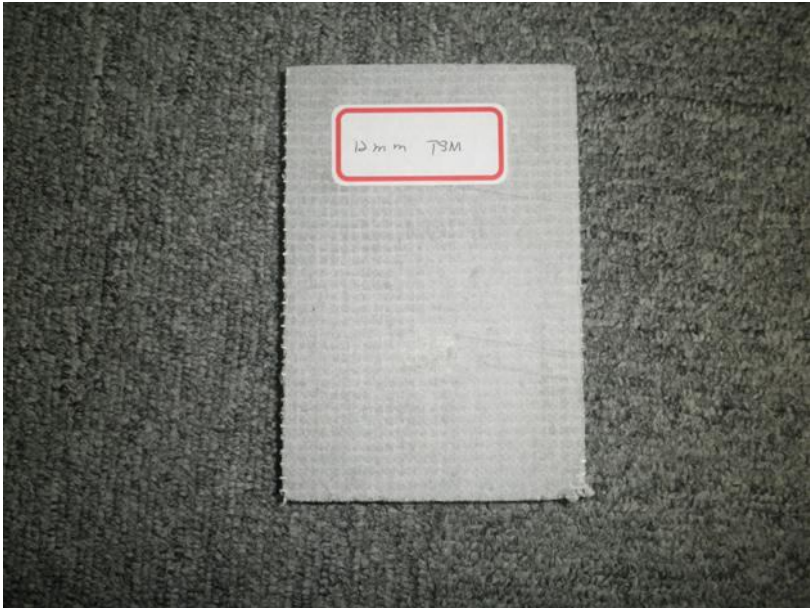


Fig.1

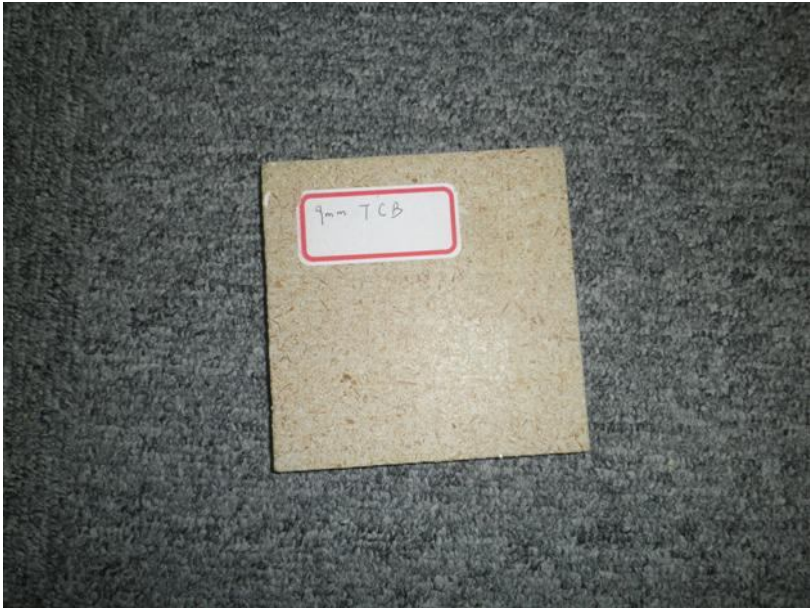


Fig.2