

Test Report

No. 15-003209-PR02

(PB-F01-02-en-01)

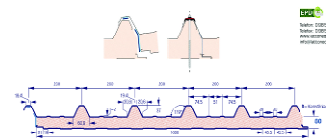
Client	Lattonedil DE GmbH Innovativring 24 91550 Dinkelsbühl Germany
Product	Sandwich panel for roofs
Designation	ISOCOPRE®, Type IC080
Performance-relevant product details	Material: sheet steel internal and external with insulating core made of polyisocyanurate rigid foam PIR WLS 023
Overall dimensions (WxH)	1,920 mm x 2,850 mm
Special features	4.0 ° pitch
Client	-/-

Basis

EN 12114:2000-03
prEN 15601:2006
EN 12211:2000-06
EN 1027:2000-06

Test report 15-003209-PR02
(PB-F01-02-de-01) dated
07.12.2015

Representation



Results

Air permeability of building components according to
EN 12114:2000-03



Positive pressure:

Linear reference leakage Q_{10} = 0.04 m³/(h m)

Negative pressure:

Linear reference leakage Q_{10} = 0.05 m³/(h m)

Alternating positive/negative wind pressures based on
EN 12210:1999-11/AC:2002-08



± 800 Pa – no malfunction

Watertightness in accordance with EN 1027 and prEN 15601



No water penetration at up to 150 Pa

Instructions for use

This test report serves to demonstrate the above mentioned characteristics of a roof construction

Validity

The data and results given refer solely to the tested and described specimen. Classification remains valid as long as the product and the above basis remain unchanged. This test/evaluation does not allow any statement to be made on any further characteristics regarding performance and quality of the construction presented, in particular the effects of weathering and ageing were not taken into account.

Notes on publication

The ift-Guidance Sheet "Advertising with ift test documents" applies.

The cover sheet can be used as an abstract.

The report contains a total of 13 pages.

ift Rosenheim
19.02.2016



Thomas Stefan, Dipl.-Ing. (FH)
Head of Testing Department
Construction Product Testing



Herbert Niedermeier
Operating Testing Officer
Construction Product Testing



1 Object

1.1 Description of test specimen

Test specimen, mounted into a test box made of steel and wood-based panels.

Product	sandwich panel for roofs
Manufacturer	Lattonedil DE GmbH, 91550 Dinkelsbühl - Germany
Date of manufacture	November 2015
System	ISOCOPRE [®] , Type IC080
Overall panel dimensions (W x H)	1,920 mm x 2,850 mm
Number of joints	4.0°
Joint length	2
Core thickness	80 mm
Total thickness	117 mm
Material	<u>internal:</u> sheet steel 0.6 mm, galvanised strip 275 g/m ² with 25 µm polyester coating <u>centre:</u> insulating core made of polyisocyanurate rigid foam PIR WLS 023, approx. 95% closed cell, connected to sheet steel face layers over the entire surface. <u>external:</u> sheet steel 0.6 mm, galvanised strip 275 g/m ² with 25 µm polyester coating
Cladding width	each panel 1,000 mm
Fixing to frame construction	tapping screw 6.3 mm with sealing washer, distance 200 mm
Ridge and eaves connections	Connection via folded steel sheets, screw-fitted to sandwich roof and timber cladding of test box and sealed.

The description is based on information provided by the client and inspection of the test specimen at the ift (item designations / numbers as well as material specifications were provided by the client unless stated "*ift-checked*").

Test specimen representations are documented in the Annex "Representation of product/test specimen". The design details were examined solely on the basis of the characteristics / performance to be classified. The drawings are based on unchanged documentation provided by the client unless stated otherwise; the photographs were taken by the ift Rosenheim unless stated otherwise.

1.2 Sampling

The below sampling data were provided to the ift:

Sampling by:	Lattonedil DE GmbH, 91550 Dinkelsbühl - Germany
Date:	
Verification:	A sampling report has not been provided to the ift.
Delivered on:	23.11.2015
ift specimen No.:	15-003209-PR02 / 40333-002



2 Procedure

2.1 Basis *) referring to method/s **)

Testing

EN 12114 : Thermal performances of buildings - Air permeability of building components and building elements - Laboratory test method

EN 12211:2000-06 – Windows and doors - Resistance to wind load – Test method

prEN 15601:2006 - Hygrothermal performance of buildings - Resistance to wind-driven rain of roof coverings with discontinuously laid small elements - Test method

EN 1027:2000-06 – Windows and doors - Watertightness – Test method

*) and the equivalent national versions, e. g. DIN EN

**) In absence of any standards that to our knowledge, cover this specific construction, a test method on the basis of existing standards had been agreed beforehand with the client

2.2 Brief description of procedure

EN 12114 : 2000-03 - Thermal performances of buildings - Air permeability of building components and building elements - Laboratory test method

Air permeability is tested on the visible face in accordance with EN 12114 at positive and negative pressures, in steps up to a maximum test pressure differential of 1,000 Pa. The test specimen is exposed to three pressure pulses $\Delta p_{\max} + 10\%$. This was followed by measurement of the airflow rate at the following test pressure differentials [Pa].

10, 18, 32, 56, 100, 178, 316, 562, 1000

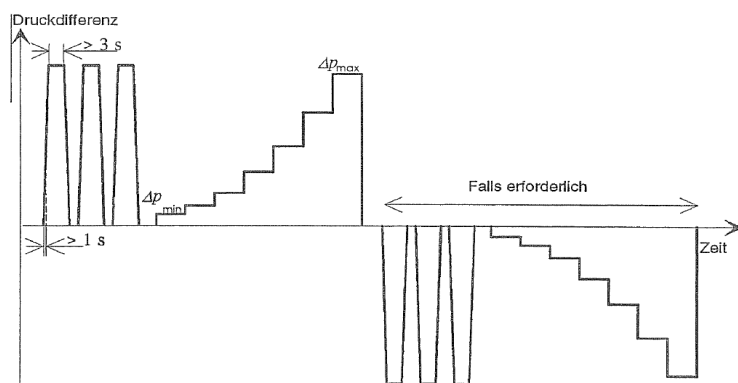


Illustration Test sequence for air permeability

Resistance to wind load - Deflection and alternating negative/positive pressures– in accordance to EN 12211

The wind load is applied in the form of 50 cycles of alternating negative/positive pressure loads of $\pm \Delta p_2 = \Delta p_1 - 50\%$.

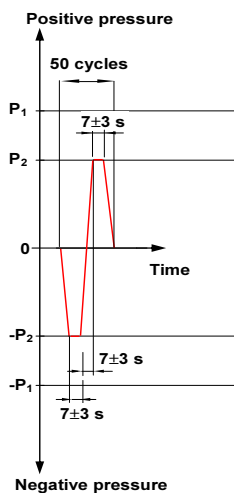


Illustration Test sequence for resistance to wind load

Watertightness – in accordance with prEN 15601 and EN 1027

Watertightness is tested in accordance with EN 1027 up to the maximum test pressure difference. The external face of the test specimen is subjected to constant spraying of water by an upper row of nozzles at a flow rate of approx. 2 l/min per nozzle while increments of positive test pressure are applied at regular intervals.

Due to the fact that only a partial section of the roof surface was tested, run-off surface water was also taken into account. The quantity of water was specified on the basis of prEN 15601, Table 1. This way a roof length of 15.0 m was simulated.

The run-off water R_{ro} in l/min is given by the following equation:

$$R_{ro} = \text{roof surface of test specimen [in m}^2\text{]} \times 2 \text{ l/min m}^2$$

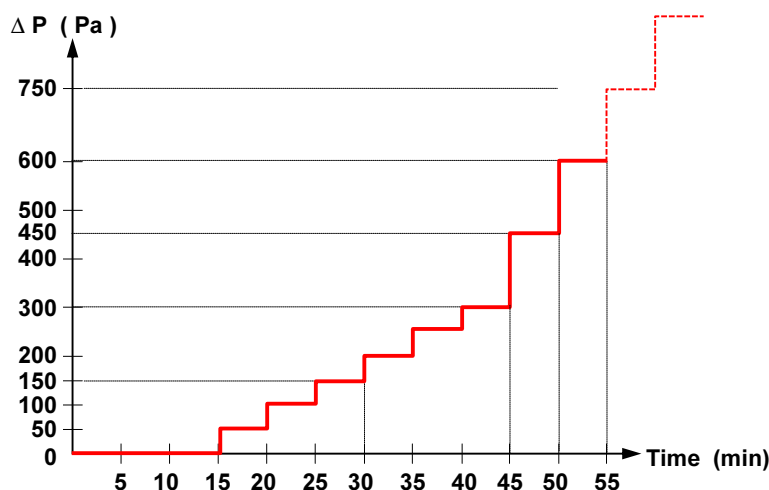


Illustration Test sequence for watertightness

2.3 Test sequence

No.	Test	Standard/s
1	Air permeability of building components	EN 12114
2	Resistance to wind load – Alternating negative/positive pressures	in accordance with EN 12211
3	Watertightness	in accordance with prEN 15601 EN 1027



3 Detailed results

Test record air permeability of linear joints

Project No.	15-003209/PR02	Task No.	15-003209
Client	Lattonedil DE GmbH, Dinkelsbühl		
Basis of test	DIN EN 12114:2000-03		
Test equipment	Pst/020591 - AWW test rig 2		
Test specimen	ISOCOPRE® 80 sandwich panel for roofs		
Test specimen No.	40333-002		
Date of test	26.11.2015		
Testing personnel in charge	Herbert Niedermeier		
Test engineer	Herbert Niedermeier		

Information on test configuration / Test method

Test method There are no deviations to the test method according standard/basis.

Ambient conditions Temperature 19,9 °C Air humidity 45,1 % Air pressu 973 hPa

The ambient conditions are in accordance with the standard requirements.

Testing

Test according to DIN EN 12114

Dimensions of test specimen	Width	x	Height	
	1920	x	2850	in mm
Joint length	Number	x	Length	
	2	x	2850	in mm
Joint length	5,70	m		
Area	5,47	m ²		
p _{min} selected:	10	Pa		
p _{max} selected:	1000	Pa		
Pressure pulses	0	1	2	3 4 5 6 7 8



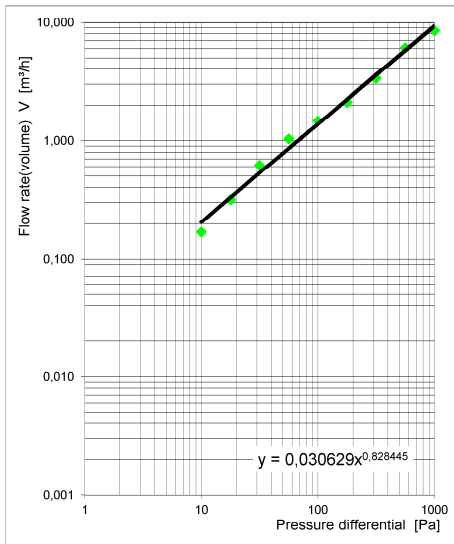
PRESSURE

Flow rate (volume) 1	Zero measurement (joints covered)									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	2,90	4,64	6,92	9,80	13,98	19,65	28,30	42,66	66,28	

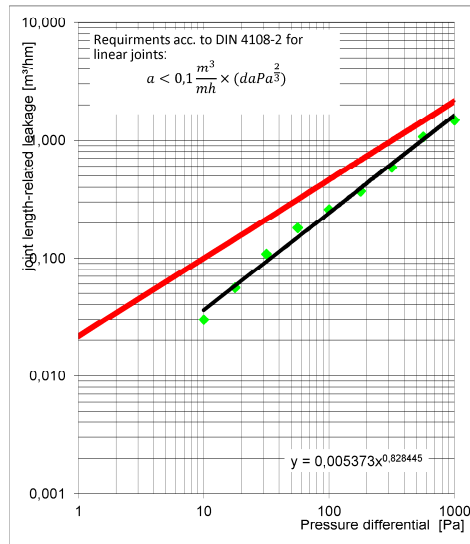
Flow rate (volume) 2	Joints not covered									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	3,07	4,96	7,54	10,84	15,46	21,77	31,67	48,79	74,80	

Flow rate (volume) 2 - 1	Leakage of joint									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	0,1700	0,3200	0,6200	1,0400	1,4800	2,1200	3,3700	6,1300	8,5200	
joint length-related in m³/hm	0,0298	0,0561	0,1088	0,1825	0,2596	0,3719	0,5912	1,0754	1,4947	

V: corrected air flow rate under reference conditions through test device (20 °C / 50 % rel. humidity / 1013 hPa air pressure)



Graph 1 Flow rate (volume) V



Graph 2 Joint length-related leakage Q

Results leakage of linear joints

Characteristic values	Results		
	Value	95% confidence	Unit
Air flow coefficient C ¹⁾²⁾	0,0306	± 0,01023	m³/(h Pa ⁿ)
Leakage exponent n ²⁾	0,8284	± 0,069	--
Equivalent leakage area A _L ³⁾	14,03	± 4,70	mm²
¹⁾ Air flow rate of test specimen at 1 Pa pressure differential			
²⁾ C and n n acc. to empirical leakage equation V = C x Dpn			
³⁾ at 10 Pa pressure differential			
Linear reference leakage at 10 Pa Q ₁₀	0,0362		m³/(h m)
Linear reference leakage at 100 Pa Q ₁₀₀	0,2438		m³/(h m)

The linear joint is practically airtight as set out in DIN 4108-2, Clause 7, requirement a < 0.1 m³/hm x (daPa^{2/3}).



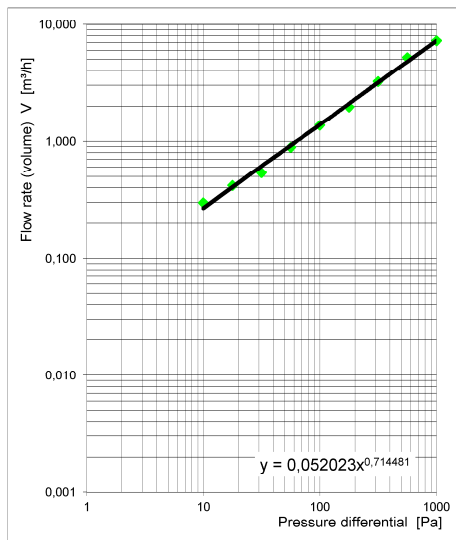
OPTIONAL NEGATIVE PRESSURE

Flow rate (volume) 1	Zero measurement (joints covered)									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	2,99	4,55	6,64	9,14	12,79	17,64	24,33	33,05	44,17	

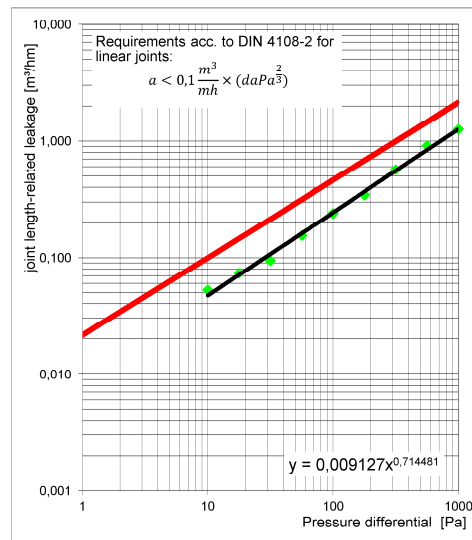
Flow rate (volume) 2	Joints not covered									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	3,29	4,97	7,18	10,03	14,17	19,62	27,57	38,26	51,42	

Flow rate (volume) 2 - 1	Leakage of joints									
Pa	10	18	32	56	100	178	316	562	1000	
V in m³/h	0,3000	0,4200	0,5400	0,8900	1,3800	1,9800	3,2400	5,2100	7,2500	
joint length-related in m³/hm	0,0526	0,0737	0,0947	0,1561	0,2421	0,3474	0,5684	0,9140	1,2719	

V: corrected air flow rate under reference conditions through test device (20 °C / 50 % rel. humidity / 1013 hPa air pressure)



Graph 1 Flow rate (volume) V



Graph 2 Joint length-related leakage Q

Results leakage of linear joints

Characteristic values	Results		
	Value	95% confidence	Unit
Air flow coefficient C ¹⁾²⁾	0,0520	± 0,01029	m³/(h Pa ⁿ)
Leakage exponent n ²⁾	0,7145	± 0,041	--
Equivalent leakage area A _L ³⁾	18,33	± 3,63	mm²
¹⁾ Air flow rate of test specimen at 1 Pa pressure differential			
²⁾ C and n acc. to empirical leakage equation V = C x Δp ⁿ			
³⁾ at 10 Pa pressure differential			
Linear reference leakage at 10 Pa Q ₁₀	0,0473		m³/(h m)
Linear reference leakage at 100 Pa Q ₁₀₀	0,2451		m³/(h m)

The linear joint is practically airtight as set out in DIN 4108-2, Clause 7, requirement a < 0.1 m³/hm x (daPa^{2/3}).



Watertightness - Test in accordance with prEN 15601, EN 12211 and EN 1027

Project No. 15-003209/PR02 **Task No.** 15-003209
Client Lattonedil DE GmbH, Dinkelsbühl
Basis of test EN 12211:2000-06 - Windows and doors - Resistance to wind load - Test methods
 prEN 15601:2006 - Hygrothermal performance of buildings -
 Resistance of wind-driven rain of roof coverings with
 discontinuously laid small element - Test method
 EN 1027:2000-06 - Windows and doors - Watertightness - Test method

Test equipment Pst/020591 - AWW test rig 2
Test specimen ISOCOPRE® 80 sandwich panel for roofs

Test specimen No. 40333-002
Date of test 02.12.2015
Testing personnel in charge Herbert Niedermeier

Information to test configuration / Test method

Test method There are no deviations to the test method according standard/basis.

Ambient conditions Temperature 19 °C Air humidity 46 % Air pressure 976 hPa

The ambient conditions are in accordance with the standard requirements.

Testing

Test area 1920 mm x 2850 mm

Test at alternating negative/positive wind pressures on the basis of EN 12211

Table: Pressure pulses

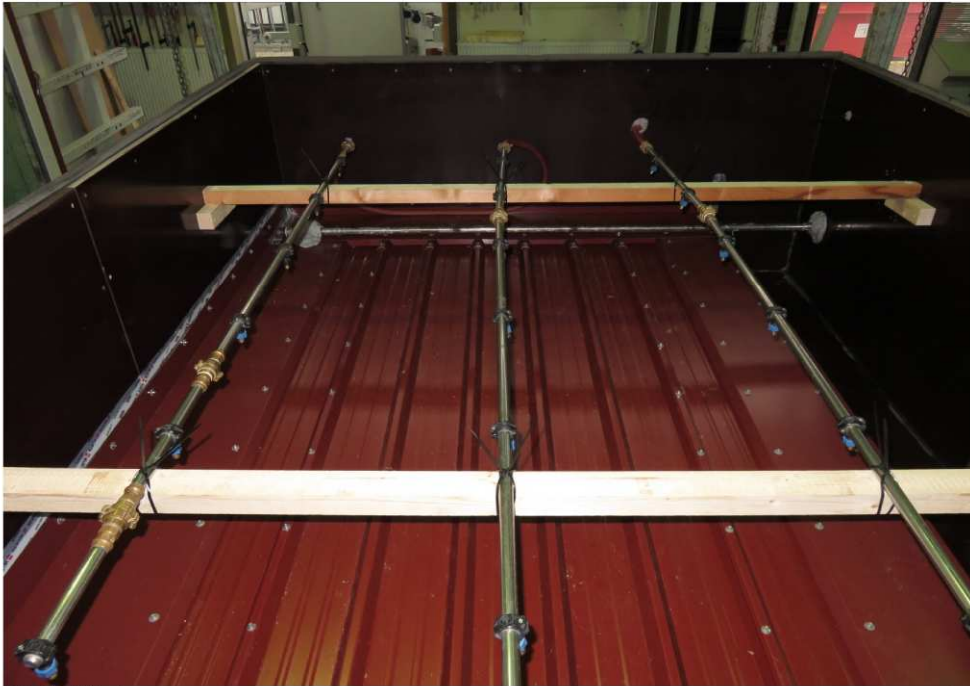
p ₂	Pa	200	400	600	800	1000
passed					✓	

50 cycles at p₂ ± 800 Pa

No malfunctions were detected

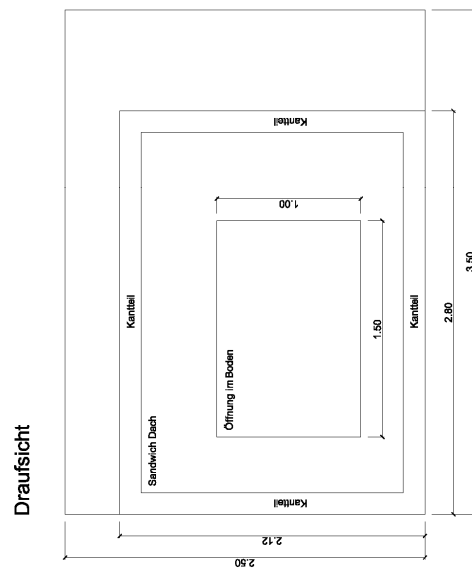
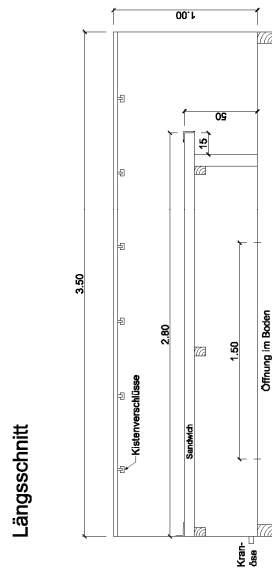
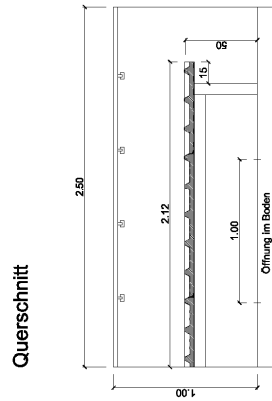
Watertightness test in accordance with prEN 15601 and EN 1027 for a 4.0° pitched roof

Climate zone:	Central Europe
Roof length above test specimen	15,00 m
Roof length above test specimen	28,80 m ²
Roof length test specimen	2,85 m
Roof length test specimen	5,47 m ²
Panel width:	1,92 m

**Photo 1** Test specimen

Run-off water R_{ro} :	57,6 l/min
Water flow rate	
Nozzle rows	10,94 l/min 656 l/h

No water penetration detected at up to 150 Pa.



Drawing 1 Test specimen in test box



Photo 1
Test configuration

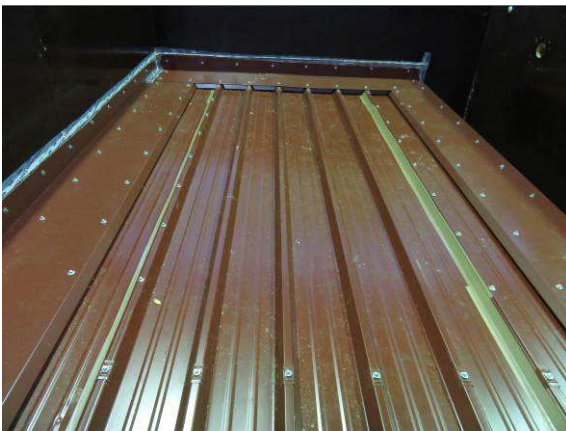


Photo 2
Covering external joints for zero measurement



Photo 3
Covering internal joints for zero measurement

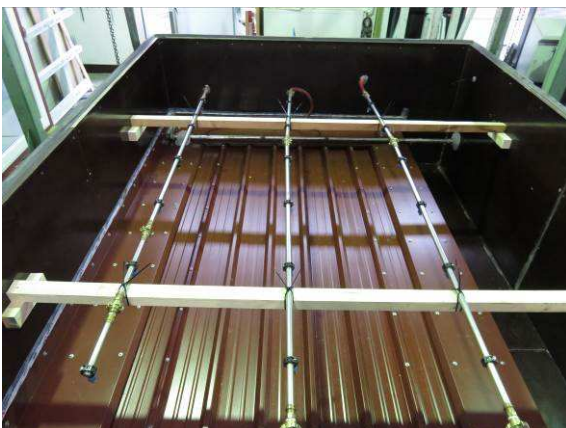


Photo 4
Installation of spray unit for watertightness test



Photo 5
Water line for surface water