

102008571-3-1- Restricted

Test report

Typetesting of Logicroof V-RP 1,2mm and V-SR 1,5mm

Roofing membrane of PVC

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Test report

for

Typetesting of Logicroof V-RP 1,2mm and V-SR 1,5mm

Roofing membrane of PVC

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CLIENT'S REF.
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 21 inclusive appendices

ABSTRACT
Introduction:

On behalf of Zavod Logicroof LLC, SINTEF Building and Infrastructure (from now SINTEF) is preparing a new SINTEF Technical Approval. Linked to this SINTEF has performed a full type testing for the roofing membrane, Logicroof V-RP 1,2mm and the accessory product Logicroof V-SR 1,5mm. Information about selected products for testing is shown in table 1.

Test programme:

Properties according to SINTEF guidelines for roofing membranes have been tested according to the relevant EN methods, described in table 4. Artificially ageing of the material has been performed according to EN 1297 (exposure to elevated temperature, UV for 1000 h, and water) Artificial ageing was initialized 13.04.2015 and finished 02.06.2015. Testing of aged material was performed thereafter.

Results:

The results from type testing for fresh material are shown in table 4 and 5. More detailed test results from accredited testing are shown in appendices.

Conclusion:

Zavod Logicroof LLC roofing membrane "Logicroof V-RP 1,2 mm" and the accessory product "Logicroof V-SR 1,5mm" have been tested on fresh and aged material for current properties with satisfactory results regarding SINTEF's guidelines for a Technical Approval.

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Accredited test form EN 12310-2 for Logicroof V-RP 1,2 mm longitudinal and transversal fresh material
Accredited test form EN 12311-2 for Logicroof V-RP 1,2 mm longitudinal and transversal fresh material
Accredited test form EN 12311-2 for Logicroof V-RP 1,2 mm longitudinal and transversal artificially aged material
Accredited test form EN 12316-2 for Logicroof V-RP 1,2 mm transversal (side lap joint) fresh
Accredited test form EN 12317-2 for Logicroof V-RP 1,2 mm transversal (side lap joint) fresh
Accredited test form EN 12311-2 for Logicroof V-SR 1,5 mm longitudinal and transversal fresh material
Accredited test form EN 12311-2 for Logicroof V-SR 1,5 mm longitudinal and transversal artificially aged material

1 Introduction

On behalf of Zavod Logicroof LLC, SINTEF Building and Infrastructure (from now SINTEF) is preparing a new SINTEF Technical Approval. Linked to this SINTEF has performed a full type testing for the roofing membrane, Logicroof V-RP 1,2mm and the accessory product Logicroof V-SR 1,5mm. Information about selected products for testing is shown in table 1.

2 Material and equipment

Zavod Logicroof LLC has provided SINTEF with 3 deliveries with 3 different batches. All 3 deliveries were selected and sent by the client himself. For the first and the second delivery the rolls were labelled with product name and production number as shown in table 1. For the third delivery of finished welded test specimens with over-length and over-width were sent by the client.

The test material is usually stored for minimum 1 month after report has been delivered.

Table 1. Products sent from client

Kolli number	Kind of kolli	Product Name	Prod No	Selected by	Arrival No	Arrival date
1	Roll	Logicroof V-SR 1,5mm	Lot: 12977, 18.03.15	Client	52/15	20.03.2015
2	Roll	Logicroof V-RP 1,2mm	Lot: 12953, 10.03.15	Client	54/15	23.03.2015
3	Package	Welded material Logicroof V-RP 1,2mm	Lot: 12864, 18/12/2014	Client	173/15	06.07.2015

Table 2. Equipment used for testing

NS-EN test method	Necessary equipment	Internal equipment number
General	Measuring device for thickness	MT-367
	Balance	MT-318
	Caliper	MT-388
	Different stamps for cutting test specimens	Different numbering accord. equipment-catalogue of SINTEF
	Measuring tape	MT-241
495-5	Freezer	Not numbered
	6 x magnifier	MT-156
1107-2	Optical measurement	Not numbered
	Heat chamber	Different numbering accord. equipment-catalogue of SINTEF
1297	Combined UV temperature and water unit	Not numbered
1848-2 1849-2	Measuring tape	MT-241
	Measuring device for thickness	MT-367
	Caliper	MT-388
	Balance	MT-318
1850-2	-	-
1928 (A)	Water tightness - unit	Not numbered
12310-2 12311-2 12316-2 12317-2	Lloyd test machine / external laser extensometer / NEXYGEN Batch Version 4.5.1 Issue 3 software	MT-76 + MT-79
	2,5 kN Load cell	MT-77
	Zwick test machine / testXpert II - V3.5 software	MT-411
12691:2001	Freezing room	Not numbered
	Tripod for falling weight guidance 1m height	Not numbered

12691:2006	Tripod for falling weight guidance 2m height	Not numbered
12730	Test unit for loading the puncture tool	Not numbered

Table 3. Spreadsheets and other documents used for generation of results

NS-EN test method	Filename	Version
495-5	Fellesskjema materiallab test_Logicroof.xlsx	07.2015
1107-2		
1849-2		
1928 (A)		
12691:2001		
12691:2006		
12730		
12310-2	Akkrediteringsskjema_ver3.8 - dato special.xlsx	19.12.2014
12311-2		
12316-2		
12317-2		

3 Test methods and results

Results from the type testing are shown in table 4 and 5. More detailed test results from accredited testing are shown in appendices.

Table 4. Results from type testing of Logicroof V-RP 1,2mm on fresh and aged material. Results are written in **bold** if deviating from SINTEF's approval guidelines for roofing membranes made of PVC or TPO.

Property	NS-EN method	Logicroof V-RP 1,2mm			Unit	Change ²⁾ [%]
		Approval guidelines ¹⁾	Test results			
			Fresh	Aged		
Width	1848-2:2001	+	2,05083	-	m	
Length	1848-2:2001	+	-	-	m	
Straightness	1848-2:2001	≤ 20	6	-	mm/ 10 m	
Thickness	1849-2:2001	+	1,17	-	mm	
Weight	1849-2:2001	+	1,47	-	kg/m ²	
Visual defects	1850-2:2001	Pass	Pass	-	-	
Foldability at low temperature	495-5:2013	-30	-40	-40		0
Dimensional stability	L T 1107-2:2001	≤ 0,5	-0,11 -0,12	-	%	
Water tightness at 10kPa	1928:2000 (A)	Pass	Pass	-	-	
Resistance to tearing (trapezoid)	L T 12310-2:2000 ³⁾	≥ 150	240 270	-	N	
Tensile strength	L T 12311-2:2013(A) ³⁾	≥ 600	1258 1159	1228 1130	N/50 mm	-2,38 -2,50
Elongation at max load	L T 12311-2:2013(A) ³⁾	≥ 10	18 22	18 22	%	0 0
Average peel resistance (T-peel)	12316-2:2013 ³⁾	≥ 150	438	-	N/50 mm	
Maximum peel resistance			543	-		
Shear resistance of joints	12317-2:2010 ³⁾	≥ 600	919	-	N/50 mm	
Resistance to puncture:						
- by impact at 23 °C	12691:2006 (A)	≥ 400	800	-	mm	
- by impact at -10 °C	12691:2001	≥ 15	8	-	mm diam.	
- by static loading	12730:2001 (A)	≥ 20	30	-	kg	

¹⁾ SINTEF's Approval guidelines for roofing membranes of PVC or TPO, here for mechanical fixed membranes

²⁾ Property change from fresh to aged material (in general SINTEF allow a change in result with up to -20 %)

³⁾ Accredited testing

L = Longitudinal direction; T = Transversal direction; + = has to be declared; - = not tested; "blank" = not relevant

Table 5. Results from type testing of Logicroof V-SR 1,5mm on fresh and aged material. Results are written in **bold** if deviating from SINTEF's approval guidelines for roofing membranes made of PVC or TPO.

Property	NS-EN method	Logicroof V-SR 1,5mm			Unit	Change ²⁾ [%]	
		Approval guidelines ¹⁾	Test results				
			Fresh	Aged			
Thickness	1849-2:2001	+	1,43	-	mm		
Weight	1849-2:2001	+	1,86	-	kg/m ²		
Visual defects	1850-2:2001	Pass	Pass	-	-		
Foldability at low temperature	495-5:2013	-30	-45	-45		0	
Tensile strength	L T	12311-2:2013(A) ³⁾	≥ 8 ⁴⁾	19	19	N/mm ²	0
				18	18		0
Elongation at max load	L T	12311-2:2013(A) ³⁾	≥ 10	373	391	%	+4,83
				417	412		-1,20

¹⁾ SINTEF's Approval guidelines for roofing membranes of PVC or TPO, here for mechanical fixed membranes

²⁾ Property change from fresh to aged material (in general SINTEF allow a change in result with up to -20 %)

³⁾ Accredited testing

⁴⁾ Calculated from 600 N/50mm

L = Longitudinal direction; T = Transversal direction; + = has to be declared; - = not tested; "blank" = not relevant

4 FTIR experimental

4.1 Description of measurements

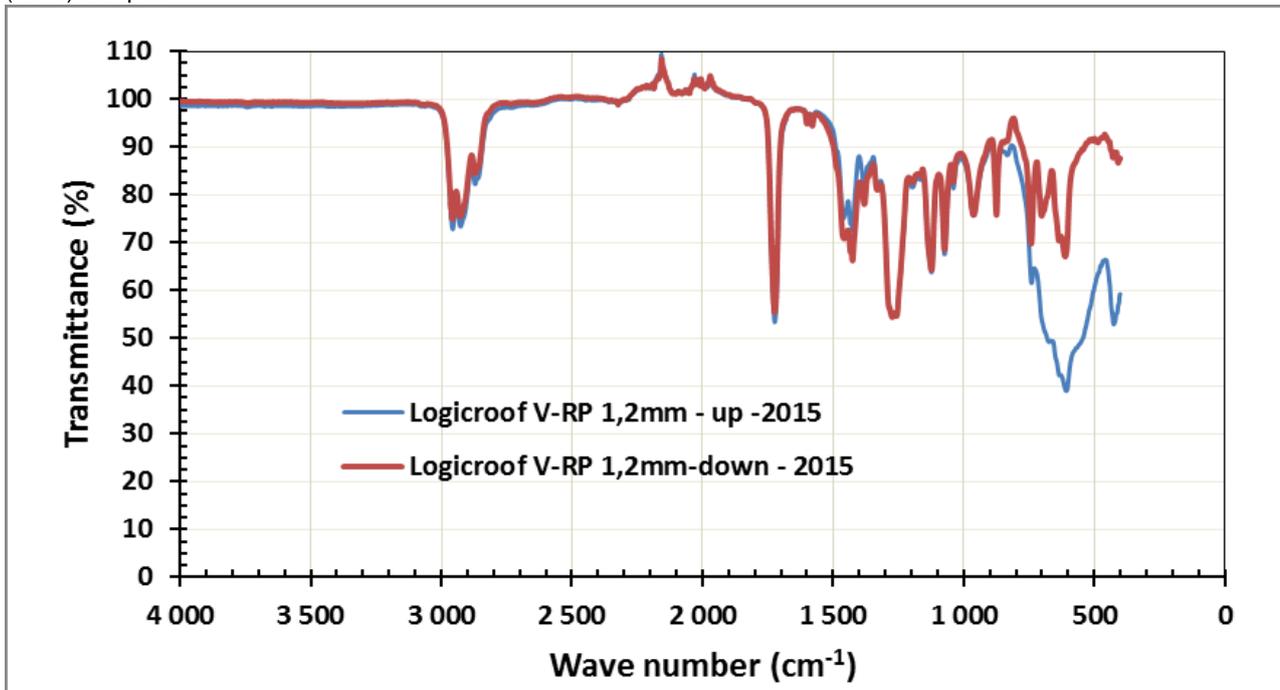
The FTIR material characterization was carried out with a Thermo Nicolet 8700 FTIR spectrometer with a Smart Orbit accessory, i.e. a horizontal attenuated total reflectance (ATR) accessory (single reflection) with a diamond crystal, in the wavelength range 4000 cm⁻¹ (2.5 μm) to 400 cm⁻¹ (25 μm) in an atmosphere with minimalized CO₂ and H₂O content through purging by a Parker Balston 74-5041 FTIR Purge Gas Generator. Each FTIR spectrum presented is based on a recording of 32 scans at a resolution of 4 cm⁻¹. In order to ensure satisfactory contact between the ATR diamond crystal and the sample, a minimum of three or more FTIR spectra were recorded at various locations on the same sample.

The FTIR spectra given in this work have not been ATR corrected, neither with respect to penetration depths nor absorbance band shifts, which both are dependent on the refractive indices of the sample and the ATR crystal (diamond in this case) and the angle of incident radiation. The penetration depth is in addition also dependent on the radiation wavelength, and increases with increasing wavelength (decreasing wave number). That is, non-corrected ATR spectra have much stronger absorbance bands at longer wavelengths (smaller wave numbers) than at shorter wavelengths (larger wave numbers). Note that it should always be stated if an ATR-FTIR spectrum has been ATR corrected or not, e.g. important during computerized database spectra comparison searches.

4.2 Results of FTIR experimental

The results from the FTIR measurements are depicted in Fig.1 as FTIR transmittance versus wave number between 4000 - 400 cm^{-1} for fresh (non-aged) Logicroof V-RP 1,2mm (2015) samples. The FTIR measurements have been performed on the surface of the upwards and downwards facing sides of the samples in fresh (non-aged) condition.

Figure 1. Transmittance versus wave number between 4000-400 cm^{-1} for fresh (non-aged) Logicroof V-RP 1,2mm (2015) samples.



5 Conclusion

Zavod Logicroof LLC roofing membrane "Logicroof V-RP 1,2 mm" and the accessory product "Logicroof V-SR 1,5mm" have been tested on fresh and aged material for current properties with satisfactory results regarding SINTEF's guidelines for a Technical Approval.

Test report:

<i>Employer:</i> Zavod Logicroof LLC	<i>Title:</i> Testing of resistance to tearing on Logicroof V-RP 1,2 mm - FRESH material
<i>Project number:</i> 102008571-3	

Test object:

<i>Product name:</i> Logicroof V-RP 1,2 mm	<i>Given thickness from manufacturer:</i> 1.2 mm	
<i>Product type:</i> Plastic and rubber sheets for roof waterproofing	<i>Test objects obtained:</i> Sent by employer from factory storage	
<i>Product identification (prod. no., approval no., etc.):</i> Lot: 12953, 10.03.15	<i>Arrival date:</i> 2015-03-23	<i>Arrival number:</i> 54/15

Testing:

<i>Testing performed at:</i> The material laboratory	<i>Preparation of test specimens:</i> The test specimens were taken evenly spread across the width of the sheet in accordance with EN 13416	
<i>Test method:</i> Determination of resistance to tearing EN 12310-2 Trapezoidal - For plastic and rubber sheets	<i>Test conditions:</i>	
	Relative humidity in the room:	41.1 %RH
	Temperature in the room:	21.3 °C
<i>Conditioning at 23±2 °C and 50±5 %RH:</i> 10/6-2015 - 12/6-2015	<i>Deviation from test method:</i> No deviations	
<i>Testing performed date:</i> 2015-12-06		

Results:

<i>Longitudinal direction</i>		<i>Transversal direction</i>	
<i>Sample number</i>	<i>Tear resistance (N)</i>	<i>Sample number</i>	<i>Tear resistance (N)</i>
1	256	1	266
2	244	2	262
3	246	3	270
4	240	4	284
5	226	5	259
Standard dev.*	11	Standard dev.*	10
Mean value ±u**	240 ± 5	Mean value ±u**	270 ± 4

* Standard deviation of single value

** Standard deviation of mean value (standard uncertainty for the series of measurements)

Trondheim, 2015-06-26

for SINTEF Building and Infrastructure, Materials and structures - Trondheim

Bente W. Ofte

The results are only valid for the tested objects. The test method has an expanded uncertainty for each test specimen of 2 % (coverage factor k = 2). Partly or shortened representation of this report is not allowed without a special approval from SINTEF Building and Infrastructure.

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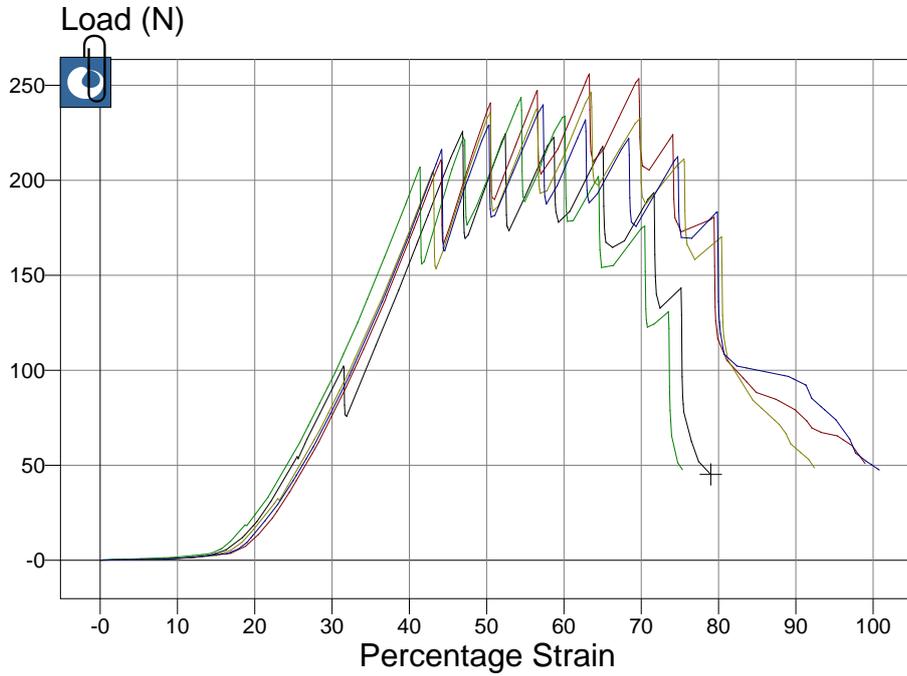
Product name:
Logicroof V-RP 1,2 mm - FRESH material

Accredited test form Version 3.8

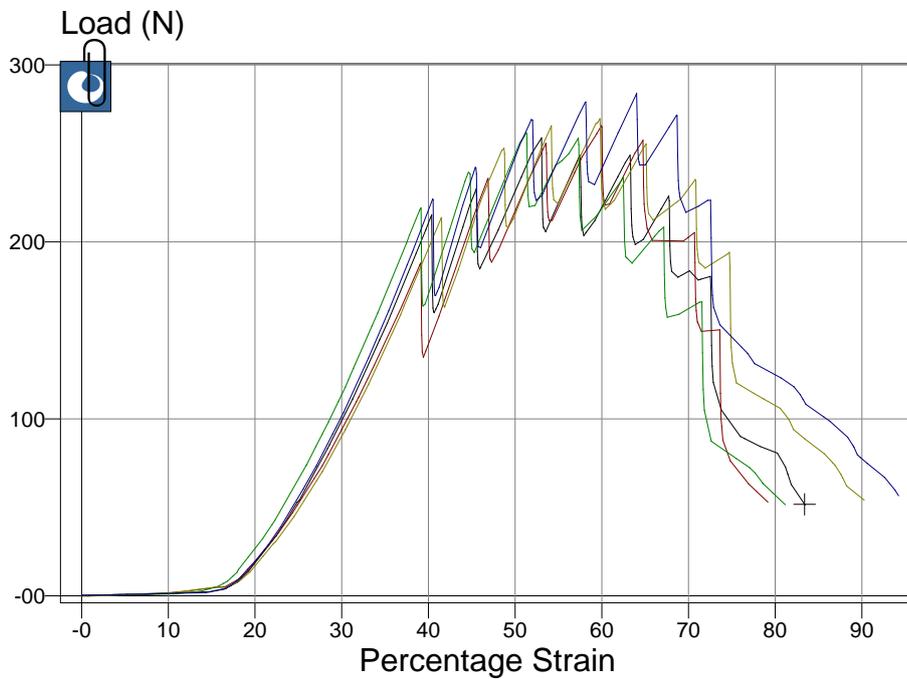
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Tear resistance Longitudinal direction



Tear resistance Transversal direction



The results are only valid for the tested objects. The test method has an expanded uncertainty for each test specimen of 2 % (coverage factor $k = 2$). Partly or shortened representation of this report is not allowed without a special approval from SINTEF Building and Infrastructure.

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Test report

Heading	: Test report
Product name	: Logicroof V-RP 1,2 mm
Customer	: Zavod Logicroof LLC
Project number	: 102008571-3
Product identification	: Lot: 12953, 10.03.15
Material	: Plastic sheet for roof waterproofing
Testobject obtained	: Sent from employer
Test standard	: NS-EN 12311-2 A
Testing performed at	: Materiallaboratoriet Trondheim
Date	: 12.06.2015
Thickness of specimen	: 1.2
Pre-treatment	: Fresh material
Conditioning	: 10/6-12/6, 2015
Tester	: BWO
Test climate grC/RF	: 21,3/41,4
Arrival date	: 23.03.15
Arrival number	: 54/15
Preparation of test specimens	: According to EN 13416

Note/deviation from test standard: No deviation

Results:

No.	Direction	F _{max} N/50mm	ε _{Fmax} %	Details about break
1.2	Longitudinal	1241.34	18.4	Breakage on upper gauge mark
1.3		1266.41	17.8	Breakage at upper clamp
1.5		1227.56	18.3	Breakage at upper clamp
1.6		1254.07	18.5	ok
1.7		1301.20	18.8	ok
2.3	Transverse	1188.15	21.3	ok
2.4		1180.59	22.2	ok
2.5		1146.71	22.0	ok
2.6		1121.16	21.5	ok
2.10		1156.88	22.1	ok

Statistics

Longitudinal	F _{max}	ε _{Fmax}
n = 5	N/50mm	%
x	1258.12	18.4
s	28.09	0.4
Transverse	F _{max}	ε _{Fmax}
x	1158.70	21.8
s	26.94	0.4

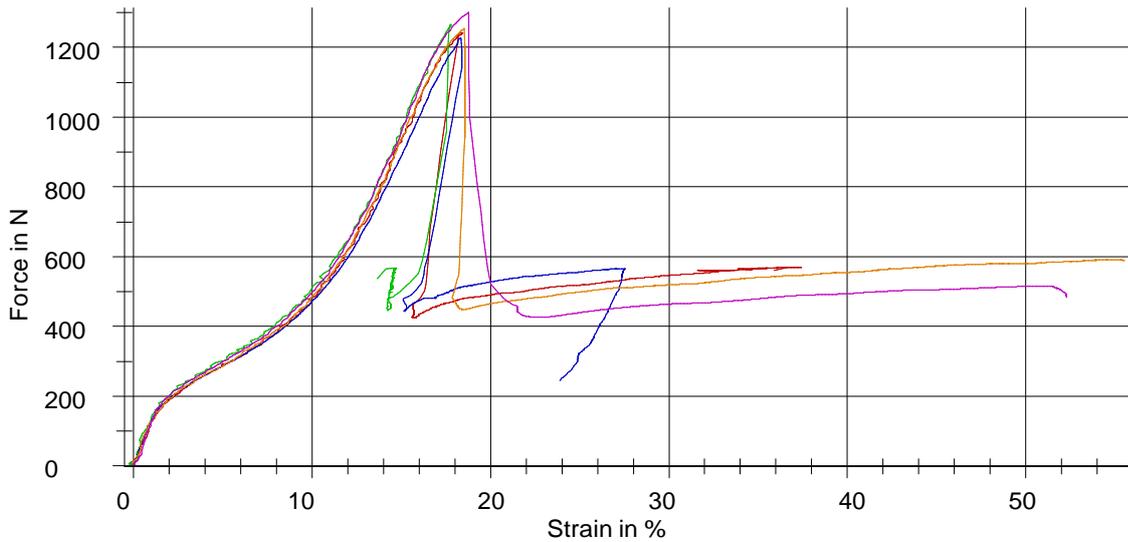
F_{max} = Tensile strenght
 ε_{Fmax} = Strain at maximum
 force x = Average value
 s = Standard deviation

Product name: Logicroof V-RP 1,2 mm

Pre-treatment: Fresh material

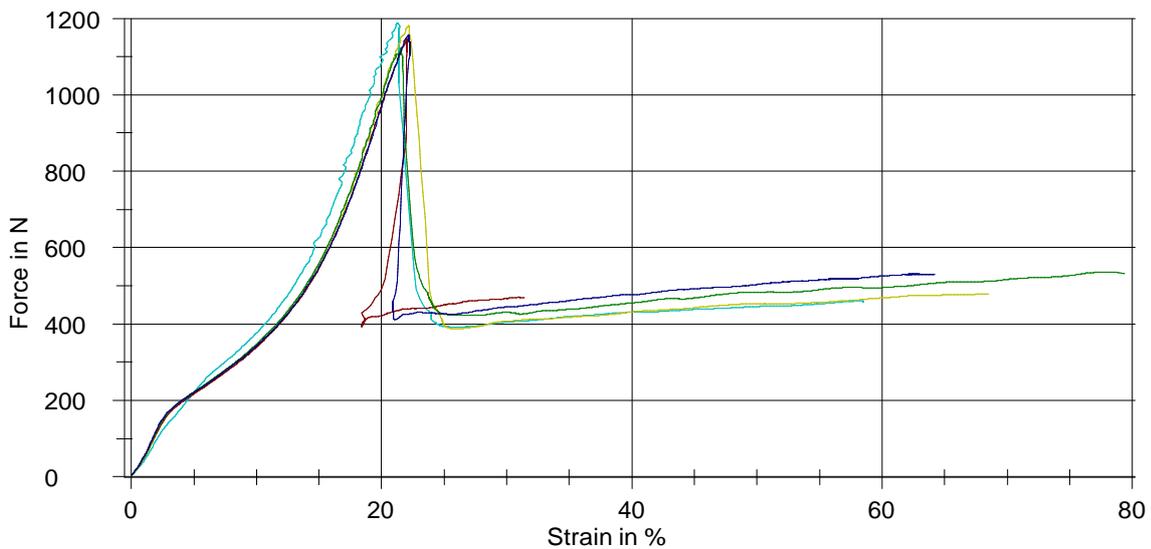
Tensile strenght and elongation

Direction: Longitudinal



Tensile strenght and elongation

Direction: Transverse



The results are only valid for the tested object. The test method has an expanded uncertainty for each test specimen of 3% for tensile strenght and 4% for elongation (coverage factor $k = 4$). Partly or shortened representation of this report is not allowed without special approval from SINTEF Building and infrastructure.

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Test report

Heading	: Test report
Product name	: Logicroof V-RP 1,2 mm
Customer	: Zavod Logicroof LLC
Project number	: 102008571-3
Product identification	: Lot: 12953, 10.03.15
Material	: Plastic sheets for roof waterproofing
Testobject obtained	: Sent from employer
Test standard	: NS-EN 12311-2 A
Testing performed at	: Materiallaboratoriet Trondheim
Date	: 17.06.2015
Thickness of specimen	: 1.2
Pre-treatment	: Aged material
Conditioning	: 16/6-17/6, 2015
Tester	: BWO
Test climate grC/RF	: 21,8/ 32,8
Arrival date	: 5/4/15
Arrival number	: 23/3-15
Preparation of test specimens	: Sampling according to 13416. Ageing according to EN 1297, 1000 h UV exposure

Note/deviation from test standard : No deviation

Results:

No.	Direction	F _{max} N/50mm	ε _{Fmax} %	Details about break
1.1	Longitudinal	1219.64	18.2	ok
1.2		1149.08	17.0	ok
1.4		1234.71	18.6	ok
1.5		1269.62	18.7	ok
1.6		1268.48	19.1	ok
2.1		Transverse	1196.06	22.2
2.3	1086.52		21.5	ok
2.5	1105.00		21.7	ok
2.7	1047.85		20.2	ok
2.8	1215.75		22.2	ok

Statistics

Longitudinal	F _{max}	ε _{Fmax}
n = 5	N/50mm	%
x	1228.31	18.3
s	49.28	0.8
Transverse	F _{max}	ε _{Fmax}
n = 5	N/50mm	%
x	1130.24	21.5
s	72.42	0.8

F_{max} = Tensile strength
 ε_{Fmax} = Strain at maximum
 force x = Average value
 s = Standard deviation

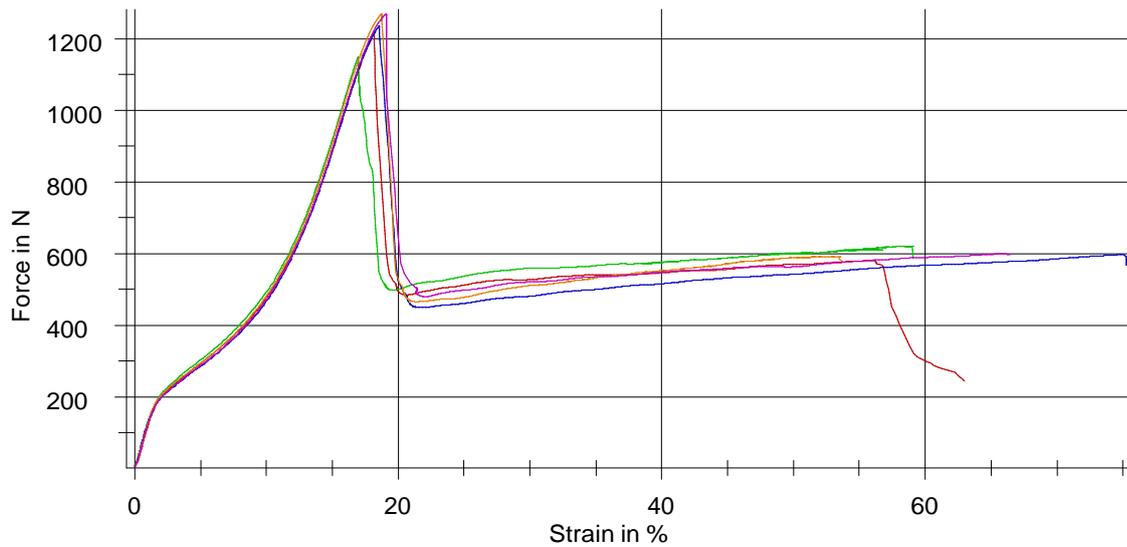
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Product name: Logicroof V-RP 1,2 mm

Pre-treatment: Aged material

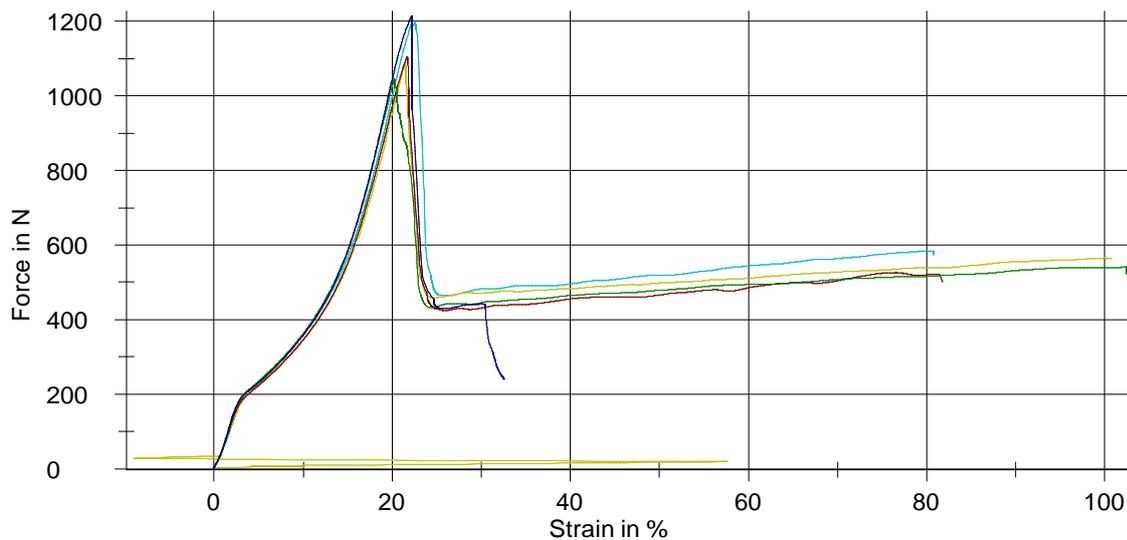
Tensile strenght and elongation

Direction: Longitudinal



Tensile strenght and elongation

Direction: Transverse



The results are only valid for the tested object. The test method has an expanded uncertainty for each test specimen of 3% for tensile strength and 4% for elongation (coverage factor $k = 4$). Partly or shortened representation of this report is not allowed without special approval from SINTEF Building and infrastructure.

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Test report

Heading : Test report
 Product name : Logicroof V-RP 1,2 mm
 Customer : Zavod Logicroof LLC
 Project number : 102008571-3
 Product identification : Lot: 12864, 18.12.2014
 Material : Plastic sheets for roof waterproofing
 Testobject obtained : Sent from employer
 Test standard : NS-EN 12316-2
 Testing performed at : Materiallaboratoriet Trondheim
 Date : 07.07.2015
 Thickness of specimen : 1.2
 Pre-treatment : Fresh material
 Conditioning : 6/7-7/7, 2015
 Tester : BWO
 Test climate grC/RF : 22,3/ 46,0
 Arrival date : 6/7-15
 Arrival number : 173/15
 Preparation of test specimens : Welded by employer. Welding ca. 4 cm

Note/deviation from test standard : No deviation

Results:

No.	Specimen no.	R_{av} N/50mm	R_{max} N/50mm	w mm	b_0 mm	Details about break
3	1	411	519,64	42	50	Delamination of sheet (C)
4	2	400	522,39		50	Delamination of sheet (C)
5	3	423	547,19		50	Delamination of sheet (C)
6	4	473	541,85		50	Delamination of sheet (C)
7	5	484	581,50		50	Delamination of sheet (C)

Statistics

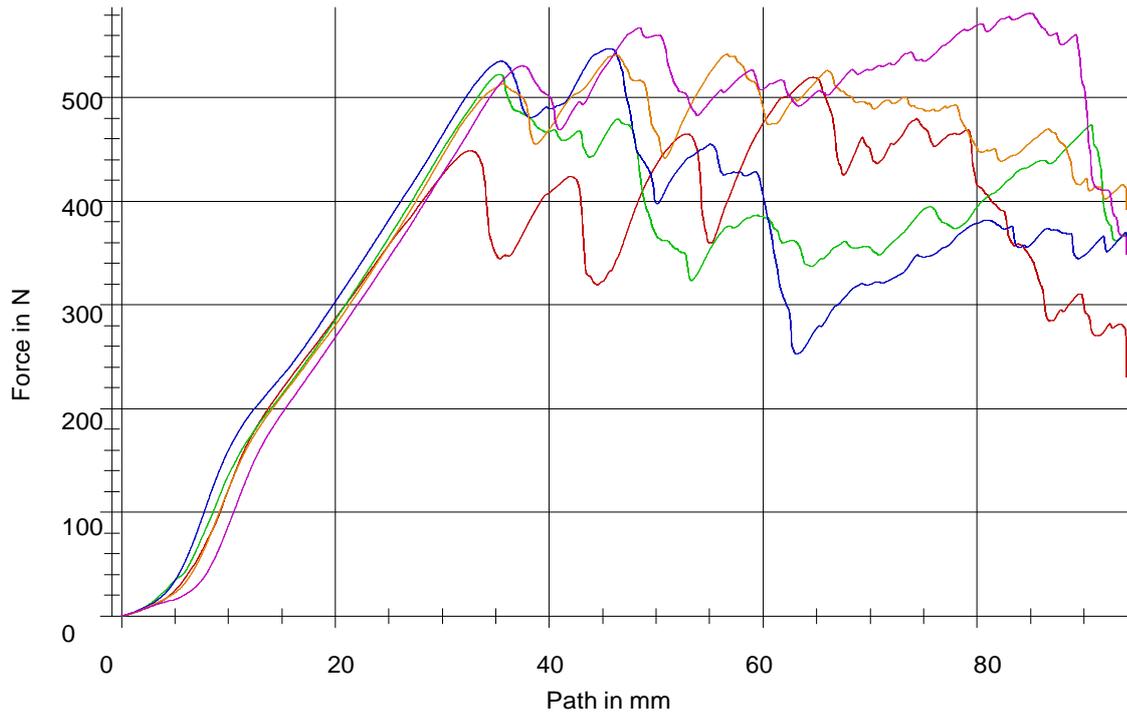
Series	R_{max} N/50mm	R_{av} N/50mm
n = 5		
x	542,51	438
s	24,85	38,0

x = average value
s = standard deviation
R_{av} = average peel resistance
R_{max} = highest peel resistance
W = width of joint
b₀ = length of joint

Product name: Logicroof V-RP 1,2 mm

Pre-treatment: Fresh material

Direction of joint: Sidelap



The results are only valid for the tested objects. The test method has an expanded uncertainty for each test specimen of 3% (coverage factor $k = 2$). Partly or shortened representation of this report is not allowed without a special approval from SINTEF Building and Infrastructure.

Test report

Heading	: Test report
Product name	: Logicroof V-RP 1,2 mm
Customer	: Zavod Logicroof LLC
Project number	: 102008571-3
Product identification	: Lot: 12864, 18.12.2014
Material	: Plastic sheets for roof waterproofing
Testobject obtained	: Sent from employer
Test standard	: NS-EN 12317-2
Testing performed at	: Materiallaboratoriet Trondheim
Date	: 07.07.2015
Thickness of specimen	: 1.2
Pre-treatment	: Fresh material
Conditioning	: 6/7-7/7, 2015
Tester	: BWO
Test climate grC/RF	: 22,3/ 46,0
Arrival date	: 6/7-15
Arrival number	: 173/15
Preparation of test specimens	: Welded by employer. Welding ca. 4 cm
Direction of joint	: Side lap joint

Note/deviation from test standard : Sample for testing of shear resistance was not labelled

Results:

No.	F _{max} N	b ₀ mm	Lenght of joint	Optical assessment/details about break
1	928,4	50	45	Fracture in the material out of joint
2	963,9	50	45	Fracture in the material out of joint
3	925,7	50	45	Fracture in the material out of joint
5	894,6	50	45	Fracture in the material out of joint
7	881,2	50	45	Fracture in the material out of joint

Statistics

Series	F _{max}
n = 5	N/50mm
x	918,8
s	32,3

x = average value

s = Standard deviation

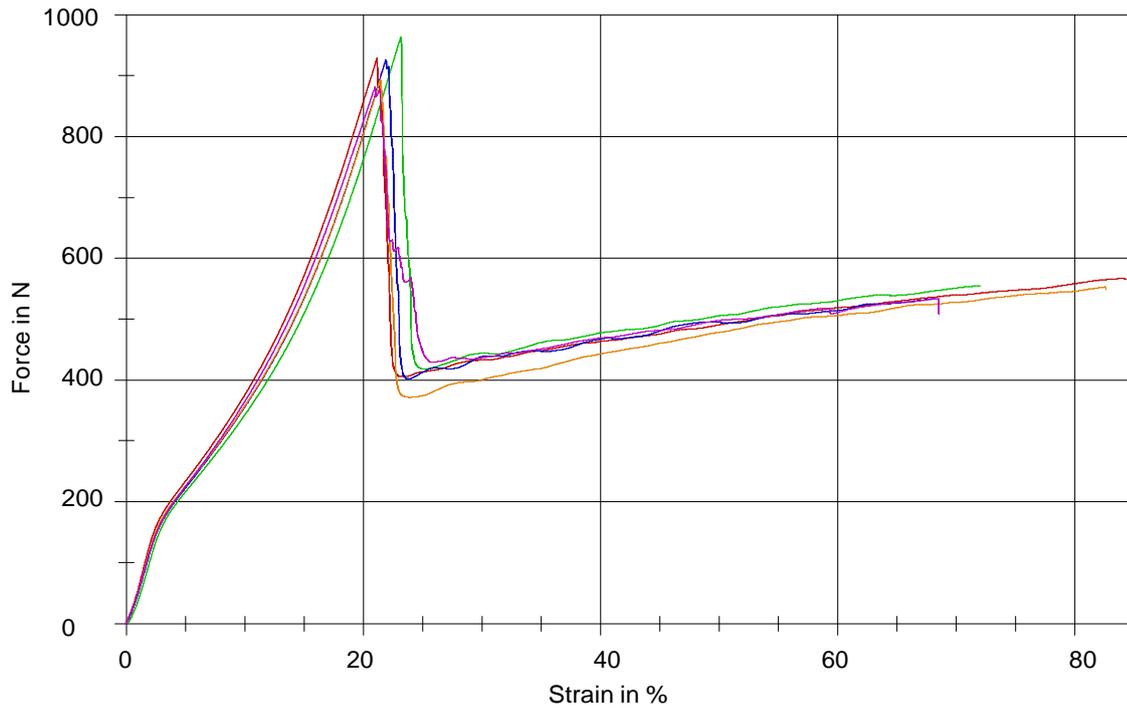
F_{max} = maximum force

b₀ = width of joint

Product name: Logicroof V-RP 1,2 mm

Pre-treatment: Fresh material

Direction of joint: Sidelap



The results are only valid for the tested objects. The test method has an expanded uncertainty for each test specimen of 3% (coverage factor = 2). Partly or shortened representation of this report is not allowed without a special approval from SINTEF Building and Infrastructure.

Test report

Heading	: Test report
Product name	: Logicroof V-SR without reinforcement
Customer	: Zavod Logicroof LLC
Project number	: 102008571-3
Product identification	: Lot: 12977, 18.03.15
Material	: Plastic sheet for roof waterproofing
Testobject obtained	: Sent from employer
Test standard	: NS-EN 12311-2 B
Testing performed at	: Materiallaboratoriet Trondheim
Date	: 16.06.2015
Thickness of specimen	: 1.5
Pre-treatment	: Fresh material
Conditioning	: 12/6-16/6, 2015
Tester	: BWO
Test climate grC/RF	: 21,8/35,4
Arrival date	: 20.03.15
Arrival number	: 52/15
Preparation of test specimens	: According to EN 13416

Note/deviation from test standard: No deviation

Results:

No.	Direction	F _{max} N/50mm	ε _{Fmax} %	Details about break
1.1	Longitudinal	19.34	385.1	ok
1.2		18.56	359.5	ok
1.3		18.46	357.6	ok
1.4		19.40	372.3	ok
1.5		19.33	391.9	ok
2.2	Transverse	17.81	422.1	ok
2.5		17.14	413.2	ok
2.6		17.49	417.7	ok
2.7		16.81	390.4	ok
2.8		18.27	441.3	ok

Statistics

Longitudinal	F _{max}	ε _{Fmax}
n = 5	N/50mm	%
x	19.02	373.3
s	0.47	15.2
Transverse	F _{max}	ε _{Fmax}
x	17.51	416.9
s	0,57	18.3

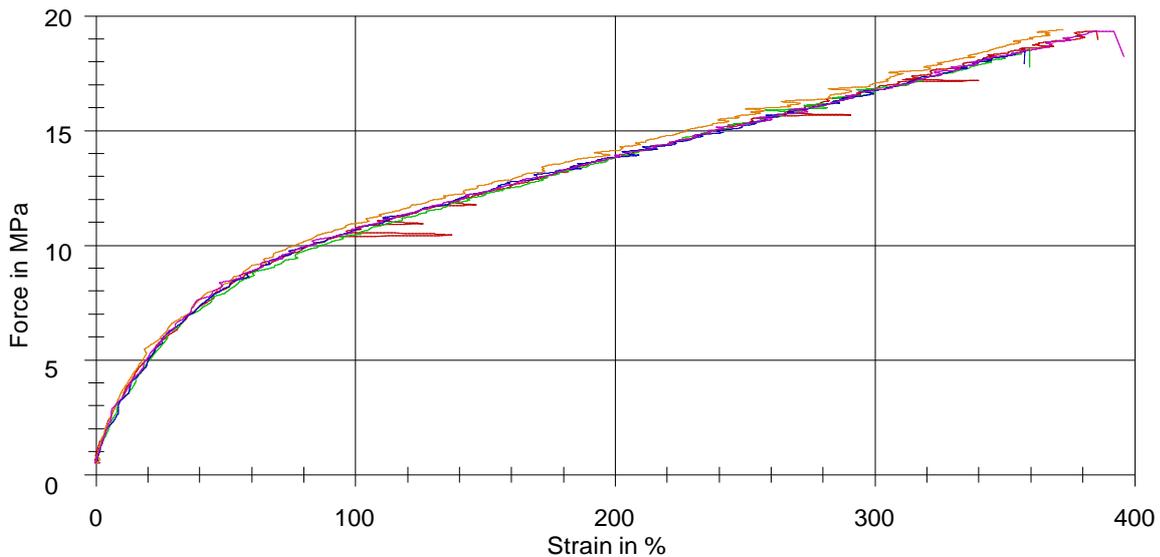
F_{max} = Tensile strenght
 ε_{Fmax} = Strain at maximum
 force x = Average value
 s = Standard deviation

Product name: Logicroof V-SR without reinforcement

Pre-treatment: Fresh material

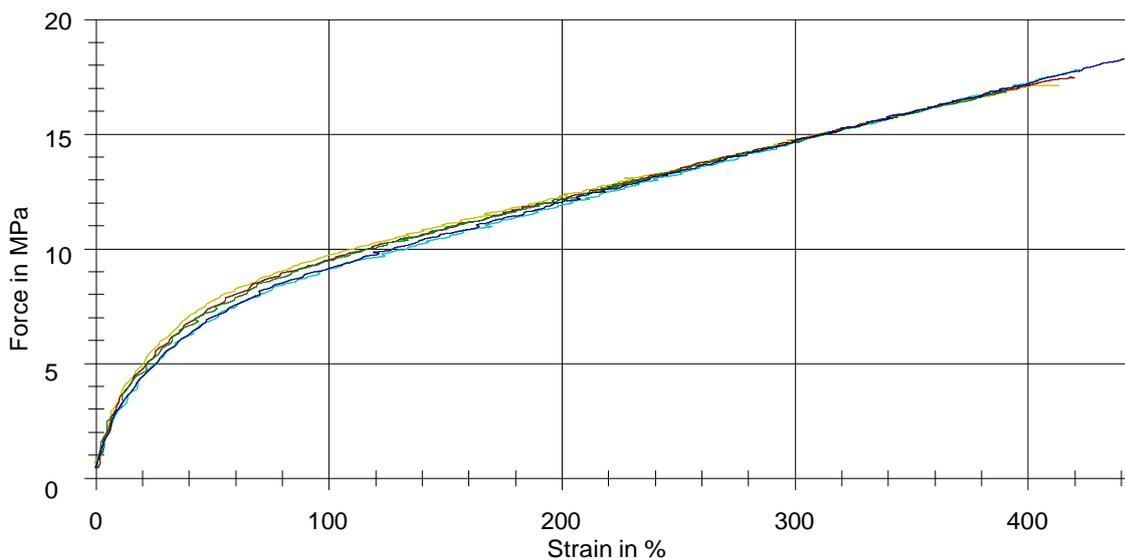
Tensile strenght and elongation

Direction: Longitudinal



Tensile strenght and elongation

Direction: Transverse



The results are only valid for the tested object. The test method has an expanded uncertainty for each test specimen of 3% for tensile strenght and 4% for elongation (coverage factor $k = 4$). Partly or shortened representation of this report is not allowed without special approval from SINTEF Building and infrastructure.

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Test report

Heading	: Test report
Product name	: Logicroof V-SR without reinforcement
Customer	: Zavod Logicroof LLC
Project number	: 102008571-3
Product identification	: Lot: 12977, 18.03.15
Material	: Plastic sheet for roof waterproofing
Testobject obtained	: Sent from employer
Test standard	: NS-EN 12311-2 B
Testing performed at	: Materiallaboratoriet Trondheim
Date	: 17.06.2015
Thickness of specimen	: 1.5
Pre-treatment	: Aged material
Conditioning	: 16/6-17/6, 2015
Tester	: BWO
Test climate grC/RF	: 22,2/32,9
Arrival date	: 20.03.15
Arrival number	: 52/15
Preparation of test specimens	: According to EN 13416
	: Ageing according to EN 1297, 1000 h UV exposure

Note/deviation from test standard: No deviation

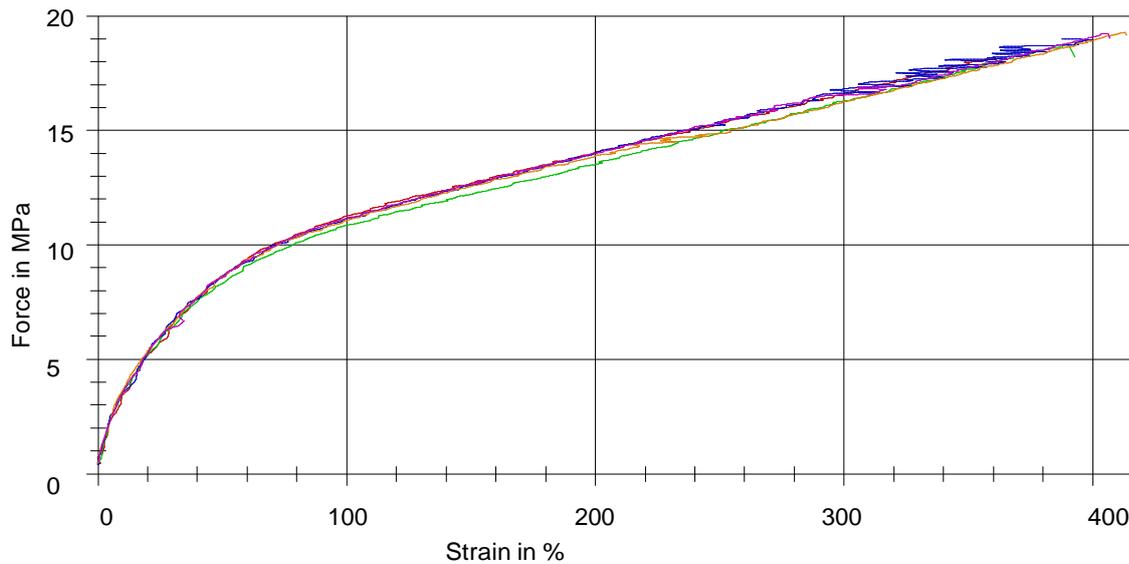
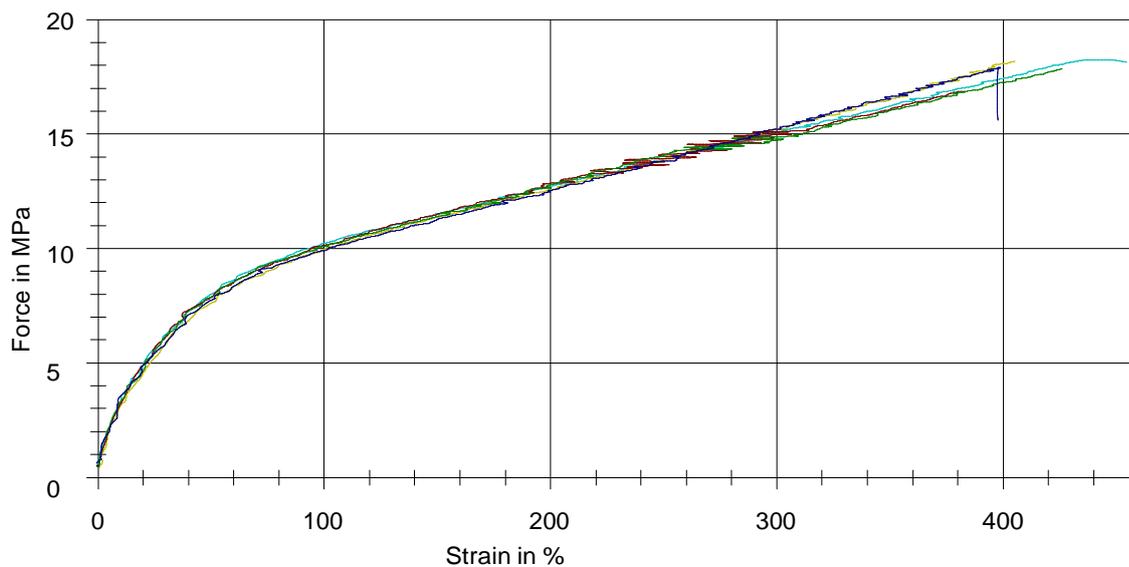
Results:

No.	Direction	F _{max} N/50mm	ε _{Fmax} %	Details about break
1.1	Longitudinal	18.11	356.9	ok
1.2		18.72	390.5	ok
1.3		18.99	389.3	ok
1.4		19.28	413.1	ok
1.5		19.24	406.3	ok
2.1	Transverse	18.25	448.7	ok
2.2		18.17	405.1	ok
2.3		16.87	382.8	ok
2.4		17.85	425.9	ok
2.5		17.92	397.7	ok

Statistics

Longitudinal	F _{max} N/50mm	ε _{Fmax} %
n = 5		
x	18.87	391.2
s	0.48	21.7
Transverse	F _{max}	ε _{Fmax}
x	17.81	412.0
s	0.55	25.7

F_{max} = Tensile strenght
 ε_{Fmax} = Strain at maximum
 force x = Average value
 s = Standard deviation

Product name: Logicroof V-SR without reinforcement**Pre-treatment: Aged material****Tensile strength and elongation****Direction: Longitudinal****Tensile strength and elongation****Direction: Transverse**

The results are only valid for the tested object. The test method has an expanded uncertainty for each test specimen of 3% for tensile strength and 4% for elongation (coverage factor $k = 4$). Partly or shortened representation of this report is not allowed without special approval from SINTEF Building and infrastructure.

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