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Test Report No. 1.1 / 13525 / 0043.0.1-2016e

General

Issued : 12 July 2017

Order by : **Dörken GmbH & Co. KG**
Wetterstraße 58
58313 Herdecke, GERMANY

Material : PEHD dimpled sheet (black)
DELTA NB
(declaration by customer)

Order date : 07 December 2016 + 15 January 2016

Samples delivered : 15 December 2015

Tests	Standard	Issue	Results as Enclosure No.
1. Wide-width tensile test	DIN EN ISO 10319	09.2015	A1 - A2
2. Determination of the resistance to weathering	DIN EN 12224	11.2000	A3
3. In-plane water flow capacity $q_{\text{stress/gradient}}$	DIN EN ISO 12958	08.2010	A4

The results apply exclusively to the specimens submitted.
The date of testing is reported on the enclosed enclosure/-es.
Results are reported to the accuracy given in the standards. In statistical evaluation, the measured accuracy is taken.

This test report contains 2 pages and 4 enclosure/-es (enclosure/-es A1 - A4).
It may not be published in parts.

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Summary of results

Date / Ref. : 12 July 2017 / fd

Order by : Dörken GmbH & Co. KG , Wetterstraße 58 , 58313 Herdecke, GERMANY

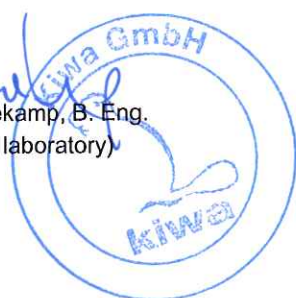
Material : PEHD dimpled sheet (black)
DELTA NB
(declaration by customer)

Test		Standard	Unit	Mean $\bar{x}$	Standard- deviation s	Coef. of variation v in %
Wide-width tensile test		DIN EN ISO 10319 09.2015				
Tensile strength	MD		kN/m	4,6	0,06	1,4
	CMD		kN/m	4,1	0,09	2,3
Strain at maximum load	MD		%	53,6	16,39	30,6
	CMD		%	33,4	2,67	8,0

Test		Standard	Unit	Result		
Determination of the resistance to weathering		DIN EN 12224 11.2000				
residual tensile strength	MD		%		99,6	
residual strain	MD		%		57,0	
residual tensile strength	CMD		%		98,5	
residual strain	CMD		%		88,2	
In-plane water flow capacity $q_{\text{stress/gradient}}$		DIN EN ISO 12958* 08.2010		Hydraulic gradient		
				i = 0,1	i = 1,0	
Test direction: MD	20 kPa		l/(m·s)	0,73	2,50	-
rigid/soft	50 kPa		l/(m·s)	0,64	2,17	-
	100 kPa		l/(m·s)	0,51	1,69	-

* test parameters according to standard: normal compressive stress: 20 kPa, 100 kPa, 200 kPa; gradient: 0,1, 1,0;
test direction: MD and CMD; contact surfaces: soft/soft

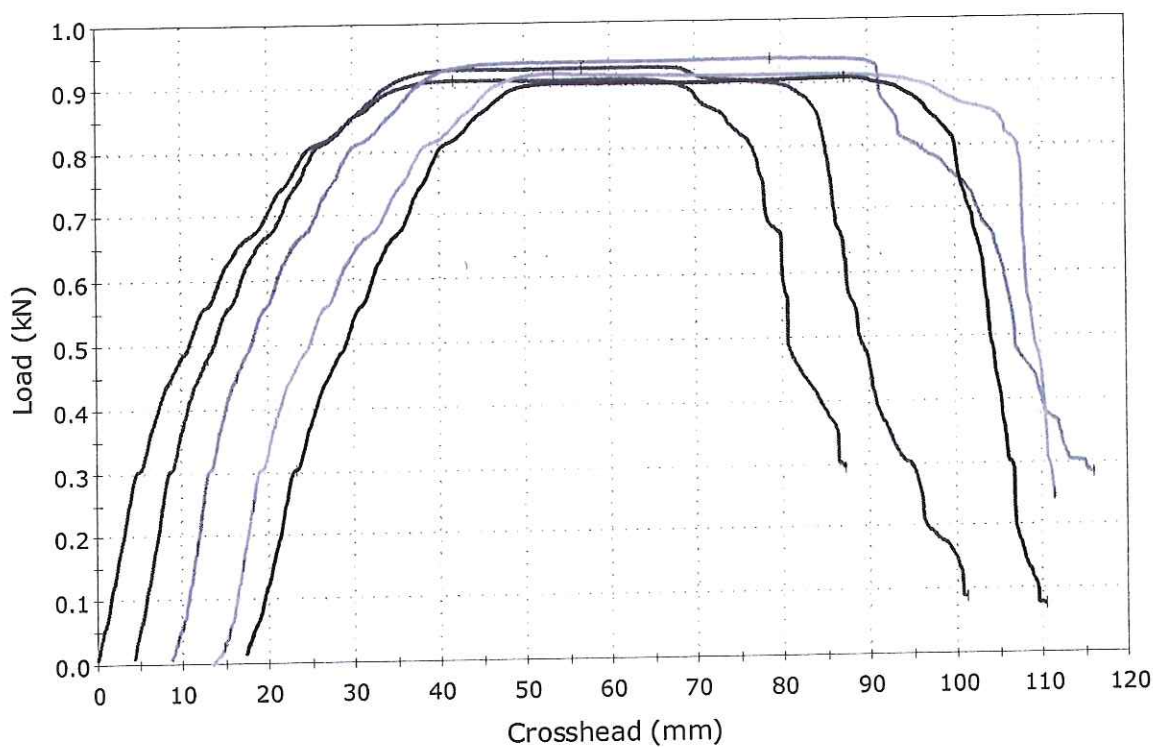

i.V. Matthias Käsekamp, B. Eng.
(Vice head of test laboratory)




i.A. Friederike Schmale
(Physiklaborantin, staff of test laboratory)

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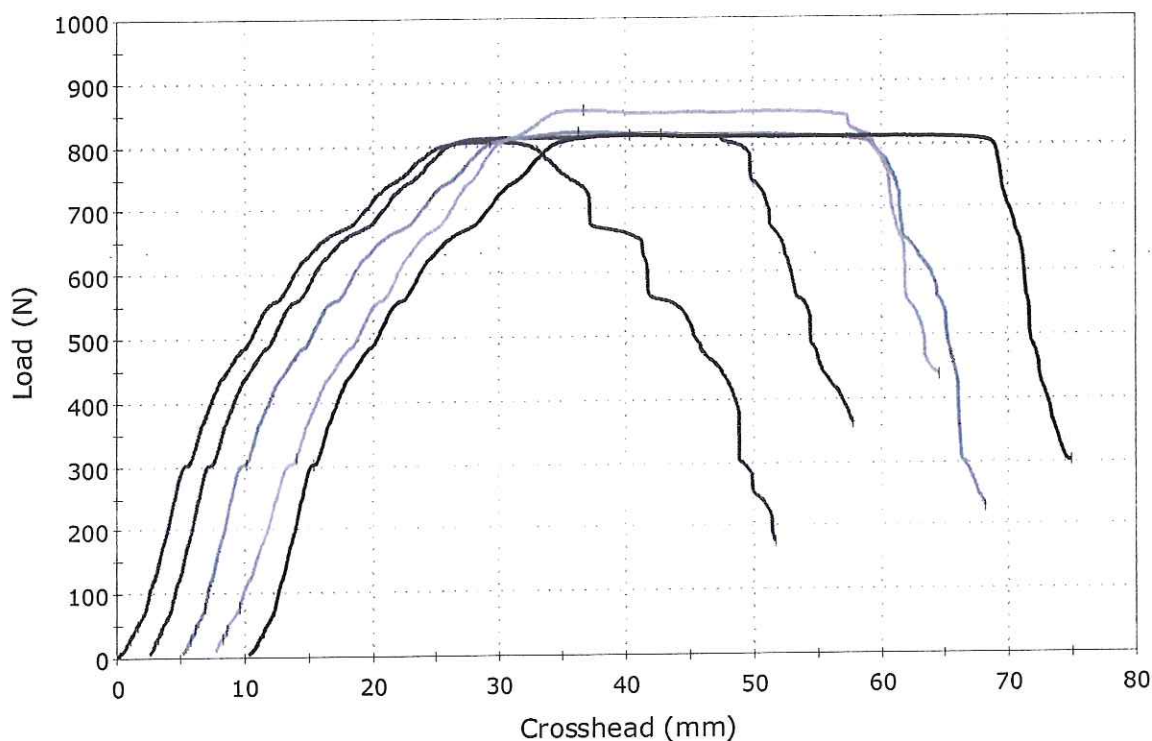
Test standard:	DIN EN ISO 10319 (09.2015)
Order number:	1.1/13525/0043.0.1-2016
Customer:	Dörken GmbH & Co. KG
Material:	DELTA NB
Test direction:	MD
Climate:	23°C / 48% rel. humidity
Date:	02.03.2016
Tester:	ow
Machine:	Instron 5567
Load cell:	30 kN
Extensometer (path):	standard Video Extensometer, Type 2663-822
Pre-load:	1% of Fmax.
Clamping system:	M-50-HJ-ME-2XL (100mm x 240mm)
Specimen width:	200,0 mm
LE:	100,0 mm
Remarks:	-
Test condition:	dry

DIN EN ISO 10319

	max. Load (N)	Fm (kN/m)	Am (%)	Test speed (%/min)
1	910	4,55	38,73	22,80
2	928	4,64	47,72	22,35
3	939	4,70	65,06	22,79
4	919	4,60	40,13	24,37
5	908	4,54	76,11	> 25,65
Mean	921	4,60	53,55	23,59
Standard deviation	12,79	0,06	16,39	1,38
Coef. of variation	1,39	1,39	30,62	5,87

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Test standard:	DIN EN ISO 10319 (09.2015)
Order number:	1.1/13525/0043.0.1-2016
Customer:	Dörken GmbH & Co. KG
Material:	DELTA NB
Test direction:	CMD
Climate:	23°C / 48% rel. humidity
Date:	02.03.2016
Tester:	ow
Machine:	Instron 5567
Load cell:	30 kN
Extensometer (path):	standard Video Extensometer, Type 2663-822
Pre-load:	1% of Fmax.
Clamping system:	M-50-HJ-ME-2XL (100mm x 240mm)
Specimen width:	200,0 mm
LE:	100,0 mm
Remarks:	-
Test condition:	dry

DIN EN ISO 10319

	max. Load (N)	Fm (kN/m)	Am (%)	Test speed (%/min)
1	807	4,03	31,43	23,63
2	817	4,09	38,00	17,99
3	821	4,11	32,22	20,74
4	856	4,28	31,97	22,12
5	817	4,08	33,50	21,27
Mean	824	4,12	33,42	21,15
Standard deviation	18,69	0,09	2,67	2,08
Coef. of variation	2,27	2,27	7,98	9,81



Determination of the resistance to weathering DIN EN 12224 (11.2000)

Test Report No. : 1.1/13525/0043.0.1-2016
Company : Dörken GmbH & Co. KG
Material : DELTA NB
Operator : hs/fd

Date: 15.06.2017

Test parameters

Weathering Tester : UV tester, Type QUV / SPRAY
Luminous intensity : 50 MJ/m²
Test cycle : 5 h drycycle (50 ± 3 °C)
: 1 h wetcycle (25 ± 3°C black sensor panel)
Number of cycles : 71
Test direction : MD (machine direction) /CMD (cross machine direction)
Size of specimen : MD: 60 x 300 mm /CMD: 60 x 300 mm
Duration : 424 h (10-May-16 to 28-May-16)
Test method : DIN EN ISO 10319 (09.2015)
Evaluation : DIN EN 12226 (03.2012)

Results

MD Specimen No.	Tensile strength in N		Strain at max. Force in %	
	ref. specimen	exp. specimen	ref. specimen	exp. specimen
1	310	269	64,9	34,9
2	267	293	76,8	36,7
3	270	271	56,6	31,5
4	275	267	57,0	36,2
5	281	298	50,5	35,1
Mean $\bar{x}$	281	280	61,2	34,9
Standard deviation s	17,2	14,7	10,14	2,05
Coefficient of variation v	6,1%	5,2%	16,6%	5,9%
residual strength/strain %	99,6		57,0	

CMD Specimen No.	Tensile strength in N		Strain at max. Force in %	
	ref. specimen	exp. specimen	ref. specimen	exp. specimen
1	258	240	31,3	24,4
2	256	282	29,4	26,1
3	289	256	28,9	26,3
4	247	253	32,3	27,3
5	259	259	26,5	26,9
Mean $\bar{x}$	262	258	29,7	26,2
Standard deviation s	15,8	15,3	2,25	1,12
Coefficient of variation v	6,0%	5,9%	7,6%	4,3%
residual strength/strain %	98,5		88,2	

Note : -



Determination of water flow capacity in their plane DIN EN ISO 12958 (08.2010)

Test Report No. : 1.1/13525/0043.0.1-2016
Company : Dörken GmbH & Co KG
Material : DELTA NB
Operator : bh

Date: 23.01.2017

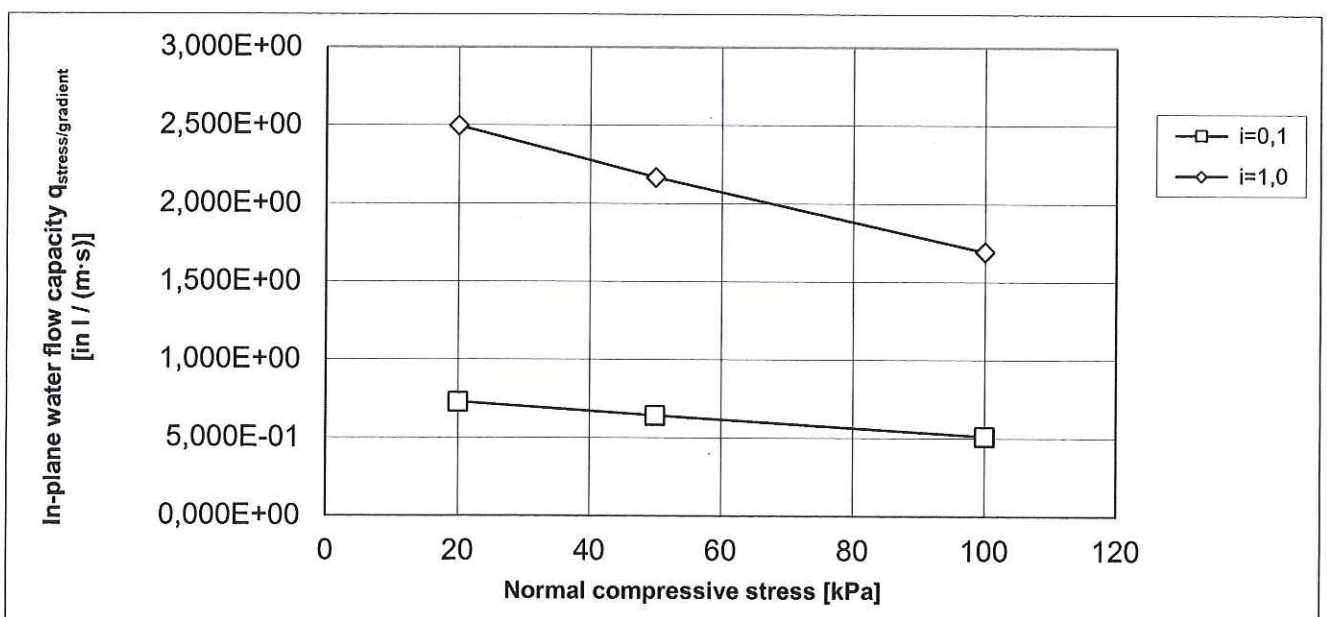
Test parameters

Normal compressive stress : 20 kPa 50 kPa 100 kPa
Hydraulic gradient i : 0,1 1,0
Test direction : MD
Number of stacked specimens : 1
Contact surfaces : rigid/soft
Specimen L x B : 300 mm x 200 mm

MD - machine direction, CMD - cross machine direction

Results

Hydraulic gradient i	Test direction	Normal compressive stress [kPa] / Thickness (1 layer) [mm]			
		20 / -	50 / -	100 / -	- / -
		In-plane water flow capacity $q_{\text{stress/gradient}}$ [l / (m·s)]			
0,1	MD	7,29E-01	6,42E-01	5,11E-01	-
1,0		2,50E+00	2,17E+00	1,69E+00	-
		-	-	-	-

 $1 \text{ m}^2/\text{s} = 10^3 \text{ l} / (\text{m} \cdot \text{s})$ 

Note: -