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Test report

P 5770-1

Testing order:

**Testing of mechanical properties of
Fosroc Polyurea WPE**

Customer:

**Fosroc International Ltd
1901 City Tower 2, Sheikh Zayed Road, Dubai UEA**

Persons in charge:

**J. Magner
Dipl.-Ing. (FH) N. Treichel**

Date of the test report:

2008-10-30

This test report comprises:

**9 pages
1 enclosure**

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1 SUBJECT

The Polymer Institut has been charged by the Fosroc International Ltd, Dubai, by letter, dated 2008-10-01, to test the mechanical properties of a material designated

Fosroc Polyurea WPE

Range of tests

The tests as listed in the following have been carried out of the material submitted.

Table 1: Range of tests

Sub-clause	Test	Method
3.1	Shore D hardness	ASTM D 2240
3.2	Elongation at break with two test speeds	ASTM D 412
3.3	Tension values at 100 %, 200 % and 300 % elongation with two test speeds	ASTM D 412
3.4	Tear strength with trouser test piece	DIN 53507 respectively DIN ISO 34-1
3.5	Tear strength with angle test piece	ASTM D 624 C respectively DIN ISO 34-1
3.6	Abrasion by Taber Abraser	DIN EN ISO 5470

2 RECEIPT OF SPECIMENS

The following specimens have been received on 2008-09-26 at the Polymer Institut.

Table 2: Receipt of specimens

No.	Designation	Type and measures
1	Fosroc Polyurea WPE	2 free specimens (films), about 560 mm x 230 mm x 2 mm

As to the conditions of preparation of the submitted specimens the following information of the customer is available:

Preparation date : sprayed on 2008-06-13

Apparatus parameters:

Spraying machine:	Glascraft A6000
Spraying gun:	Probler II
Material temperature:	75 °C
Hose heating temperature for the A and B components:	75 °C
Application pressure:	120 bar
Volume ratio (A component/B component):	1: 1
Film thickness:	about 2 mm

2.1 Preparation of specimens and storage at the Polymer Institut

With the submitted specimen, prepared as indicated above, the required test specimens have been prepared as follows for testing in accordance with the above range of tests whilst maintaining the following storage conditions, and stored until the testing:

Preparation and storage conditions: Standard atmosphere DIN 50014-23/50-2

3 TESTING AND TEST RESULT

3.1 Shore D hardness

The Shore D hardness has been determined in accordance with ASTM D 2240 whilst maintaining the following test conditions:

Test apparatus:	Test device 38210 with hardness test device 38229, company. Frank
Test temperature:	23 °C
Test time interval:	3 s

The result is to be taken from table 3.

Table 3: ShoreD hardness

Material	Single values	Median
Fosroc Polyurea WPE	47,1 ; 47,1 ; 45,7 ; 45,1 ; 44,5	45,7

Note

The above Shore D values result in Shore A values > 90.

3.2 Elongation at break and tensile strength with two test speeds

The determination of the elongation at break and of the tensile strength has been carried out in accordance with ASTM D 412 with two test speeds whilst maintaining the following test conditions:

Test apparatus: Universal testing machine 1445, company Zwick, in accordance with ISO 5893
Test specimen: Type Die C in accordance with ASTM D 412
Median of thickness: about 2,0 mm
Test temperature: 23 °C
Test speeds: 200 mm/min and 500 mm/min
Elongation measuring device: Optical pathfinder, company Zwick

The result is to be taken from tables 4a and 4b.

Table 4a: Elongation at break at 200 mm/min and 500 mm/min

Material	Test speed [mm/min]	Single values [%]	Median [%]
Fosroc Polyurea WPE	200	312 ; 313 ; 322	313
	500	321 ; 340 ; 342	340

Table 4b: Tensile strength at 200 mm/min and 500 mm/min

Material	Test speed [mm/min]	Single values [%]	Median [%]
Fosroc Polyurea WPE	200	21,1 ; 21,3 ; 21,3	21,3
	500	21,0 ; 22,2 ; 22,3	22,2

3.3 Tension values at 100 %, 200 % and 300 % elongation with two test speeds

The tension values have been determined with two test speeds in accordance with ASTM D 412 whilst maintaining the following test conditions:

Test apparatus: Universal testing machine 1445, company Zwick, in accordance with ISO 5893
 Test specimen: Type Die C in accordance with ASTM D 412
 Median of thickness: 2,0 mm
 Test temperature: 23 °C
 Test speeds: 200 mm/min and 500 mm/min
 Elongation measuring device: Optical pathfinder, company Zwick
 Force absorbing device: Nominal load 10 kN, company Hottinger

The result is to be taken from table 5.

Table 5: Tension values at 100 %, 200 % and 300 % elongation

Elongation [%]	Test speed [mm/min]	Tension [MPa]	
		Fosroc Polyurea WPE	
		Single values [MPa]	Median [MPa]
100	200	8,9 ; 9,8 ; 9,9	9,8
	500	10,1 ; 10,2 ; 10,2	10,2
200	200	12,7 ; 13,7 ; 13,8	13,7
	500	13,9 ; 14,0 ; 14,2	14,0
300	200	19,3 ; 20,4 ; 20,6	20,4
	500	19,6 ; 19,6 ; 20,2	19,6

3.4 Tear strength with trouser test piece

The tear strength with trouser test piece has been determined in accordance with DIN 53507 respectively DIN ISO 34-1 whilst maintaining the following test conditions:

Test apparatus: Universal test machine 1445, company Zwick, in accordance with ISO 5893
 Test specimen: Type A in accordance with DIN 53507 respectively figure 1 in accordance with DIN ISO 34-1
 Median of thickness: 2,0 mm
 Test temperature: 23 °C
 Test speed: 100 mm/min
 Force absorbing device: Nominal load 10 kN, company Hottinger

The result is to be taken from table 6.

Table 6: Tear strength with trouser test piece

Material	Specimen No.	Median [N/mm] 1)	Span [N/mm] 2)	Standard deviation of medians	Mean value of medians [N/mm]	Mean value of spans [N/mm]
Fosroc Polyurea						
WPE	1	27,8	15,2	0,06	27,8	13,7
	2	27,9	10,6			
	3	27,8	15,2			

¹⁾ Mean tear strength of the evaluated range of single values

²⁾ Span between value at the greatest upper force peak and value at the lowest lower force peak in the evaluated range of single values

3.5 Tear strength with angle test piece

The tear strength with angle test piece has been determined in accordance with ASTM D 624 respectively in accordance with ISO 34-1 whilst maintaining the following test conditions:

Test apparatus: Universal test machine 1445, company Zwick, in accordance with ISO 5893
Test specimen: Angle test specimen in accordance with DIN ISO 34-1, sub-clause 6.4, figure 2, Method B and procedure a
Median of thickness: 2,0 mm
Test temperature: 23 °C
Test speed: 500 mm/min
Force absorbing device: Nominal load 10 kN, company Hottinger

The result is to be taken from table 7.

Table 7: Tear strength with angle test piece

Material	Single values [kN/m]	Median [kN/m]	Span [kN/m]
Fosroc			
Polyurea WPE	98 ; 90 ; 95	94	8

3.6 Abrasion by Taber Abraser

The abrasion has been determined in accordance with DIN EN ISO 5470 whilst maintaining the following test conditions:

Test apparatus: Abraser type 5130
Test temperature: 23 °C
Abrading wheel type: CS 17
Revolutions: 1000
Loading: 1000 g

The result is to be taken from table 8.

Table 8: Abrasion Taber Abraser

Material	Single values [mg/revolution]	Mean value * [mg/revolution]
Fosroc		
Polyurea WPE	0,011 ; 0,009 ; 0,010	0,01

* rounded to 0,01 mg/revolution

4 SUMMARY

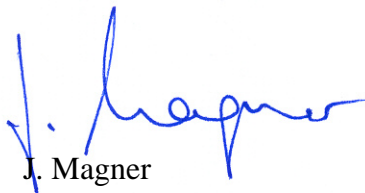
The Polymer Institut has been charged by the Fosroc International LtD, Dubai, by letter, dated 2008-10-01, to test the mechanical properties of the material designated

Fosroc Polyurea WPE

The tests have been carried out during the time period from 2008-10-06 to 2008-10-16.
The results are to be taken from clause 3.


Flörsheim-Wicker, 2008-10-30

The head of the testing laboratory


J. Magner



The person in charge


Dipl.-Ing. (FH) N. Treichel