

RESEARCH REPORT - LABORATORY


PROJECT	:	SBR rubber granulate
PURPOSE RESEARCH	:	Testing the suitability of a rubber granulate for infill in football constructions
PRINCIPAL	:	Granuband B.V. Contact: Mr. A.A. Kösters
EXECUTION	:	ISA Sport Contact: Mr. J.G. Kieft
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CONCLUSION

From the results of the laboratory research it is concluded that the SBR rubber granulate meets the material characteristic requirements of infill rubber to be used for artificial turf constructions. The climatic resistance of the rubber is sufficient.

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Instituut voor Sportaccommodaties B.V.



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RESEARCH DESCRIPTION

Granuband B.V. asked ISA Sport to execute a laboratory research to test the suitability of a SBR rubber granulate to be used as infill rubber in artificial turf football constructions.

To test the quality of the rubber granulate the following characteristics are investigated:

- specific weight;
- bulk density;
- granulate size;
- granulate composition;
- resistance to continuous load;
- abrasion resistance;
- colour;
- flammability;
- smell.

Besides, the composition of the rubber granulate is identified with a Thermogravimetric Analysis (TGA).

The rubber granulate is also subjected to a climatic simulation (according to standard ISO 4892-3). The climatic simulation runs for 3000 hours, which simulates a period of use in practice of five years. After the climatic simulation the following characteristics are examined:

- colour;
- resistance to continuous load;
- abrasion resistance.

All tests are performed at a temperature of approximately 23°C and a relative humidity of approximately 50%.

The results of the research are described in the next pages.

This research is restricted to measurements on the material characteristics of the infill rubber. Other characteristics like sports functional characteristics can only be measured after application in an artificial turf construction. The results of this research therefore give an indication of the suitability.

RESEARCH RESULTS

Description rubber granulate

The SBR rubber sample consists of black spherical, moderate angular granulates.

Test results

Table 1 shows the results of the research. The sample of rubber granulate has also been analysed and the report is enclosed in the appendix (analysis number 2008020222). The result of the TGA analysis is also enclosed in the appendix (analysis number 2008020223).

Table 1: research results

Characteristic	Results		Limit
	Before simulation	After simulation	
specific weight	1027 kg/m ³	-	-
bulk density	427 kg/m ³		
granulate size	0.5 - 2 mm	0.5 - 2 mm	-
granulate composition	no strange constituents	-	-
granulate shape before load	spherical, moderate angular	-	-
resistance to continuous load	80%	78%	≥ 50%
deformation during load	8%	8%	≤ 25%
residual deformation	no visual change	no visual change	no visual change
shape			
abrasion resistance	99%	98%	≥ 95%
colour			
colour	L= 16.3 a= -2.1 b= 1.6	L= 17.0 a= -0.7 b = -1.0	
grey scale	-	4	≥ 3
visual	≥ 95% black	≥ 95% black	
flammability (DIN 51960)	class 2	-	-
smell	weak	-	-

From the results presented in table 1 it is concluded that the SBR rubber granulate meets the material characteristic requirements of infill rubber to be used for artificial turf constructions. The climatic resistance of the rubber is sufficient.



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APPENDIX I

MATERIAL ANALYSIS

Material : infill rubber
Sport : football
Principal : Granuflex

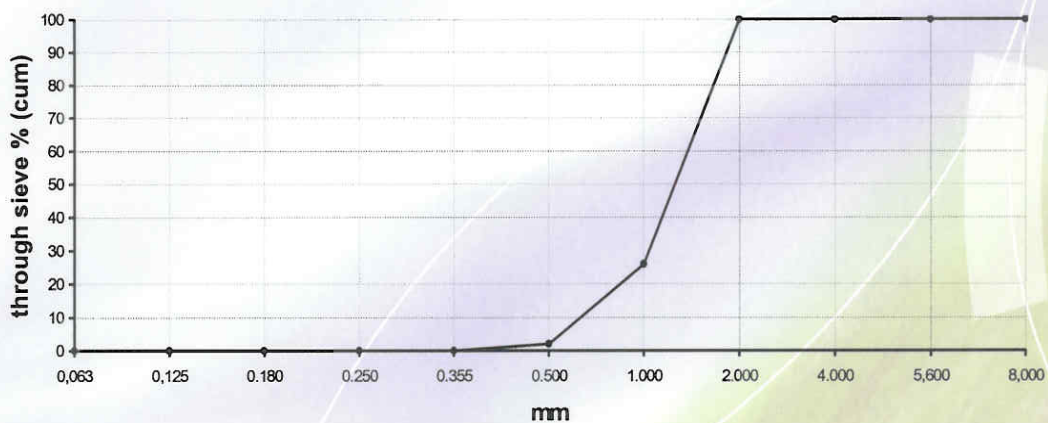
Analysis number : 2008020222
Date : February 26th 2008
Project number : 25080011


Condition	weak smell	[MN/K7.6]
Rubber size	0.5 - 2 mm	[MN/SA1.1]
Specific weight	1027 kg/m ³	[MN/K3.1]
Strange constituents	none	[MN/VB1.1]
Resistance to fire	class II: flammable	[MN/B1.1]
Structure	closed	
Shape	spherical, moderate angular	[MN/K7.1]
Colour	>95% black	[MN/K0.1]
Abrasion resistance	99 %	
Volumetric weight (loose condition)	427 kg/m ³	[MN/K3.3]
Resistance to continuous load		
deformation during load	80%	
deformation	8 %	
shape	spherical, moderate angular	

Granular size grading [MN/SA1.2A]

< 8.000 mm	100 %
< 5.600 mm	100 %
< 4.000 mm	100 %
< 2.000 mm	100 %
< 1.000 mm	26 %
< 0.500 mm	2 %
< 0.355 mm	0 %
< 0.250 mm	0 %
< 0.180 mm	0 %
< 0.125 mm	0 %
< 0.063 mm	0 %

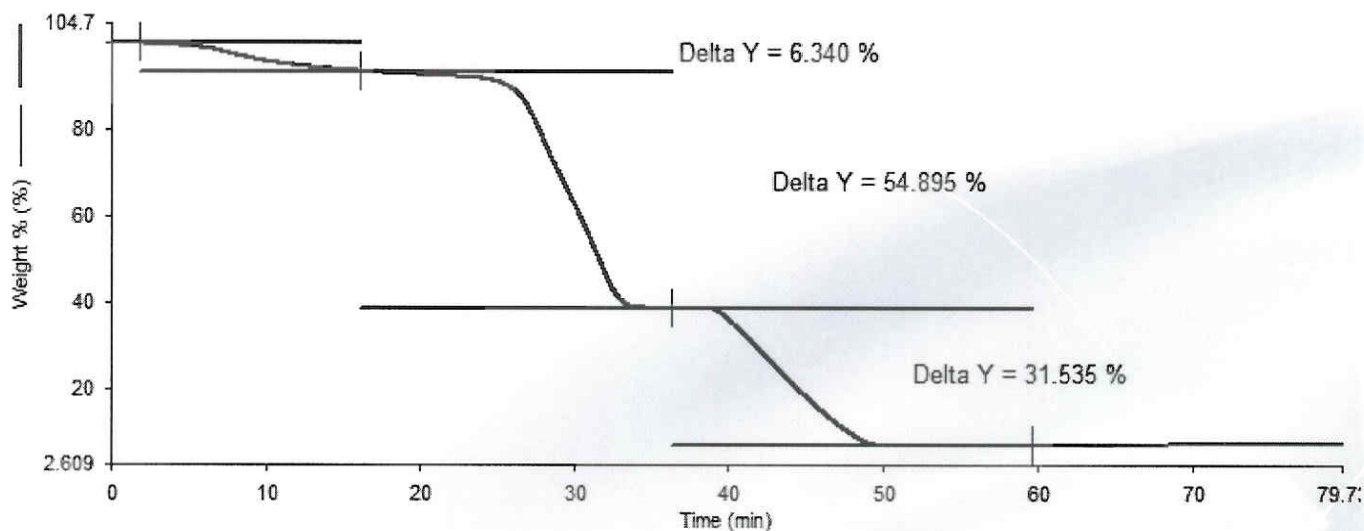
Granular size distribution




Nicole Salzmann
Head Laboratory

Material : infill rubber
Sport : football
Principal : Granuflex

Analysis number : 2008020223
Date : February 27th 2008
Project number : 25080011



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|--|--|
| 1. Heat from 30.00 °C to 300.00 °C at 40.00 °C/min | 4. Heat from 620.00°C to 880.00°C at 10.00°C/min |
| 2. Hold for 15.0 min at 300.00°C | 5. Hold for 15.0 min at 880.00°C |
| 3. Heat from 300.00°C to 620.00°C at 20.00°C/min | |