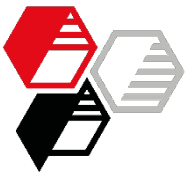


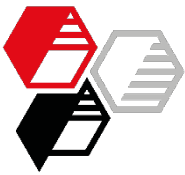
Calcined Neuburg Siliceous Earth in polyphenylene sulfide (PPS)

Author: Petra Zehnder



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- Introduction
- Experimental
- Results
- Summary
- Appendix: table of results



Status Quo

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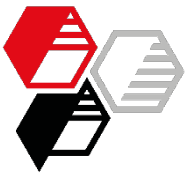
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- PPS is typically used for mechanical, thermal and chemical highly stressed moldings in the automotive, machinery and electrical industries.
- Important properties are – apart from high strength and stiffness – excellent thermal stability and the outstanding chemical resistance to solvents, acids and alkalis.
- Glass beads are often used to customize properties.
- Mineral filled compounds have been hardly available.



Objective

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Assessment of the performance of

Calcined Neuburg Siliceous Earth

versus

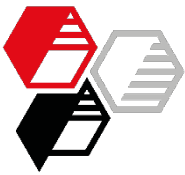
glass beads in PPS regarding

» Flow

» Mechanical properties

- Tensile test
- Flexural test
- Impact strength

» Color of compounds



Calcined Neuburg Siliceous Earth

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A downstream thermal process leads to the calcined products **Silfit** and **Aktifit**, based on SILLITIN Z 86.

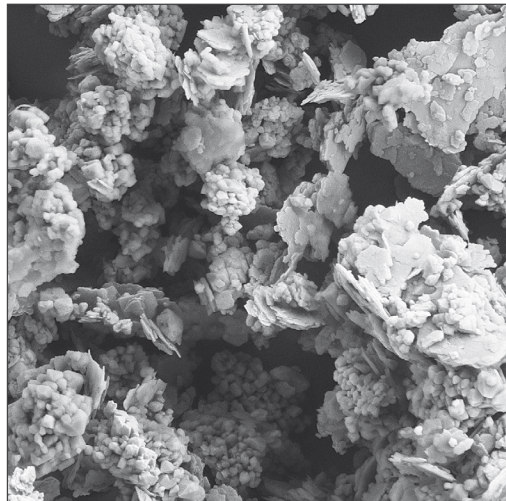
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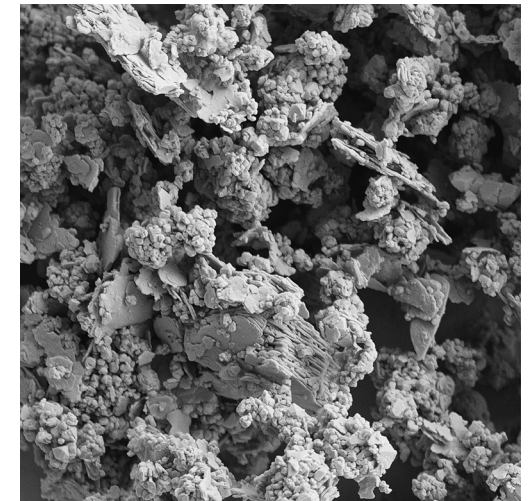
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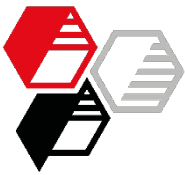
Neuburg Siliceous Earth

Calcination
Process



Calcined Neuburg
Siliceous Earth

Additional application benefits, as well as the removing of crystal water included in the kaolinite. The silica part remains inert.



Fillers and Characteristics

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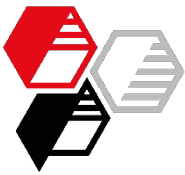
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Filler	Description	Functionalization
Glass beads	d_{50} : 15-30 μm , d_{90} : 30-80 μm	Yes
Silfit Z 91	Calcined Neuburg Siliceous Earth d_{50} : 2 μm , d_{97} : 10 μm	None
Aktifit AM	Basis: Silfit Z 91	Amino
Aktifit PF 115	Basis: Silfit Z 91	Amino



Compounding Injection Molding

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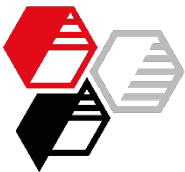
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Composition	60 % PPS 40 % Filler	
Compounding	Twin screw extruder ZSK 30	
Injection molding of test specimens acc. to ISO 1874	Mold acc. to ISO 294 Mold temperature: Melt temperature:	150 °C 315 °C

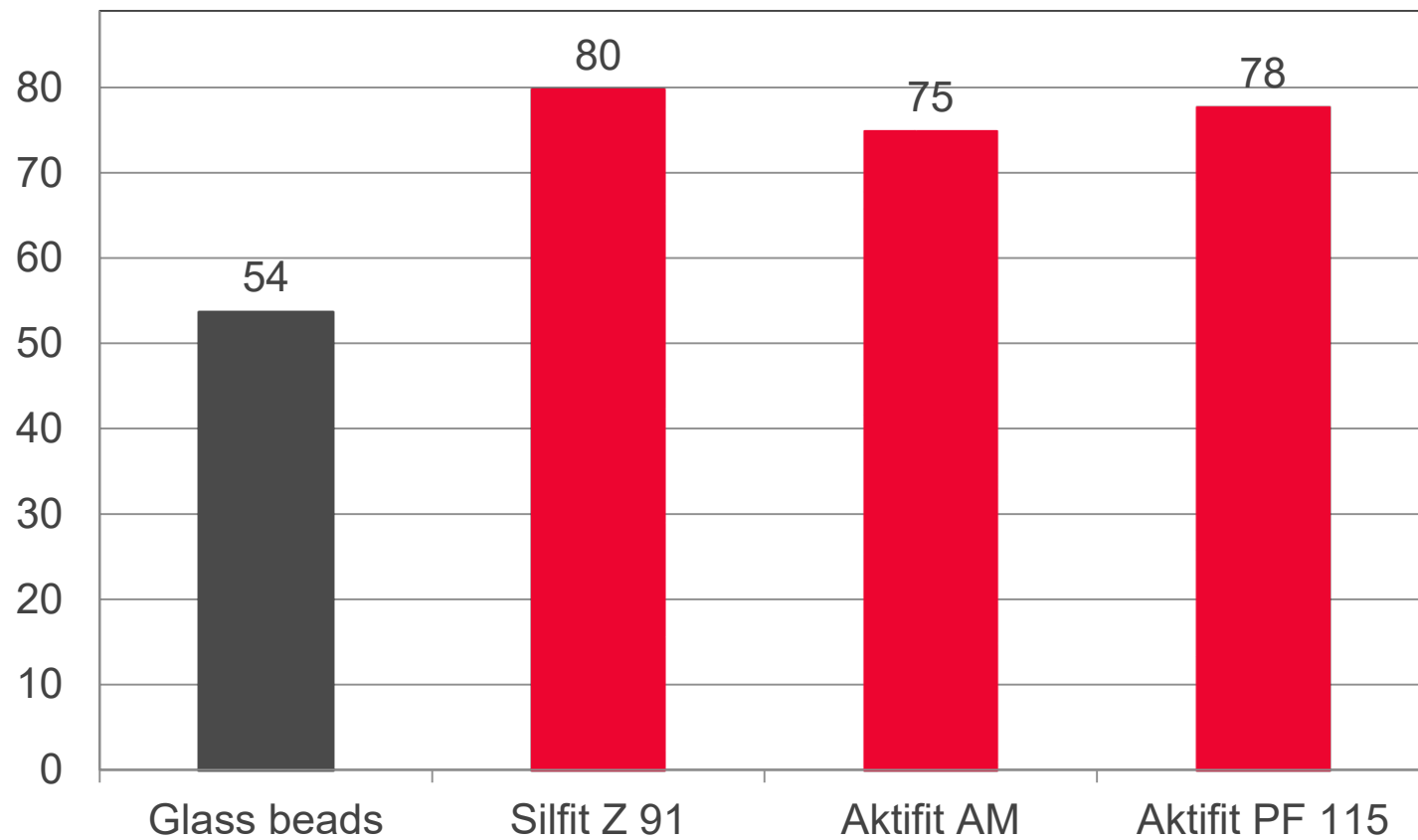


Melt Volume-flow Rate

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DIN ISO 1133; 300 °C, 5 kg

cm³ / 10 min



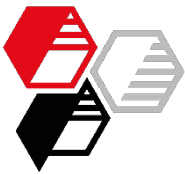
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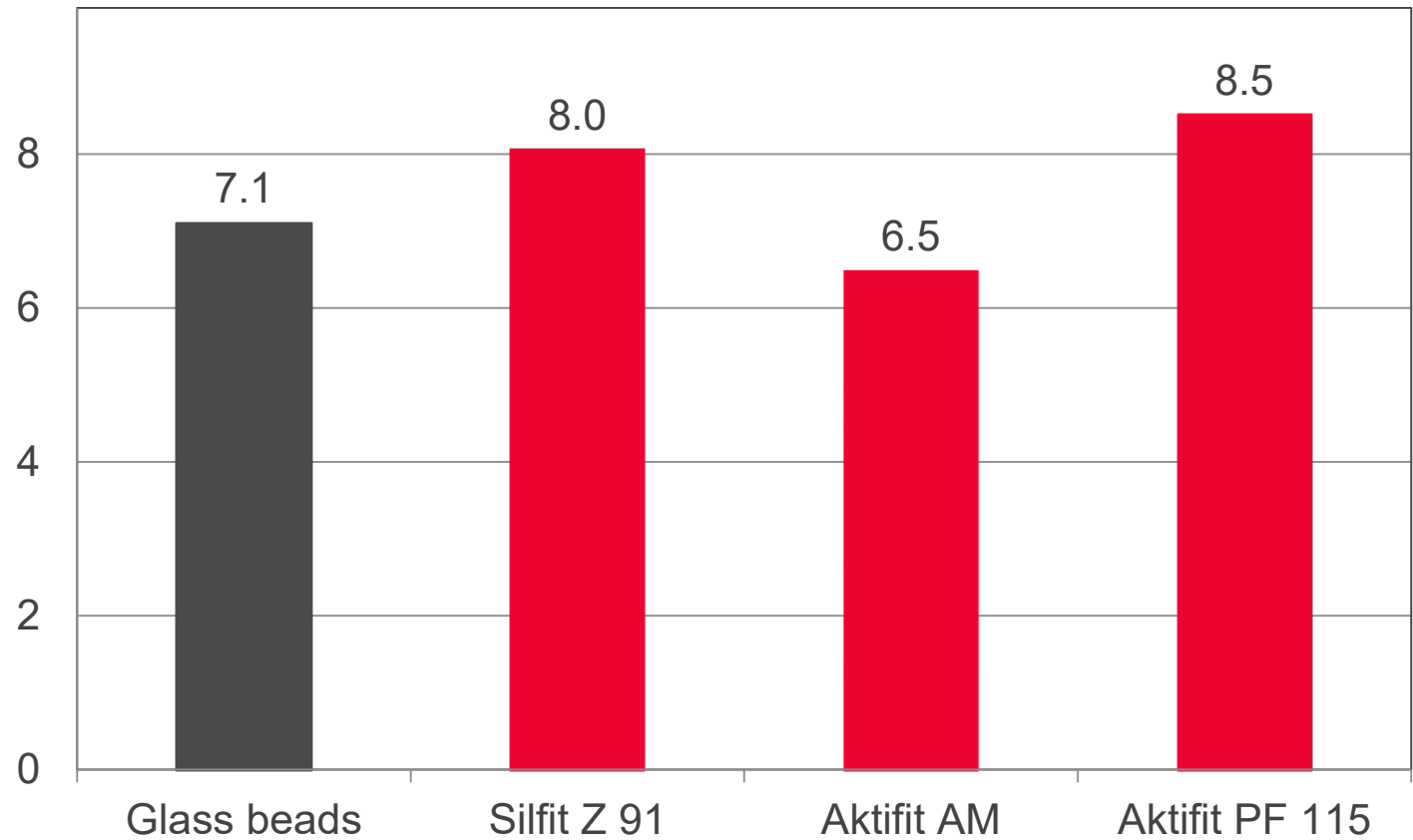


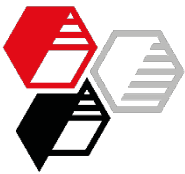
Tensile Modulus

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DIN EN ISO 527-1,-2; 1 mm/min

GPa



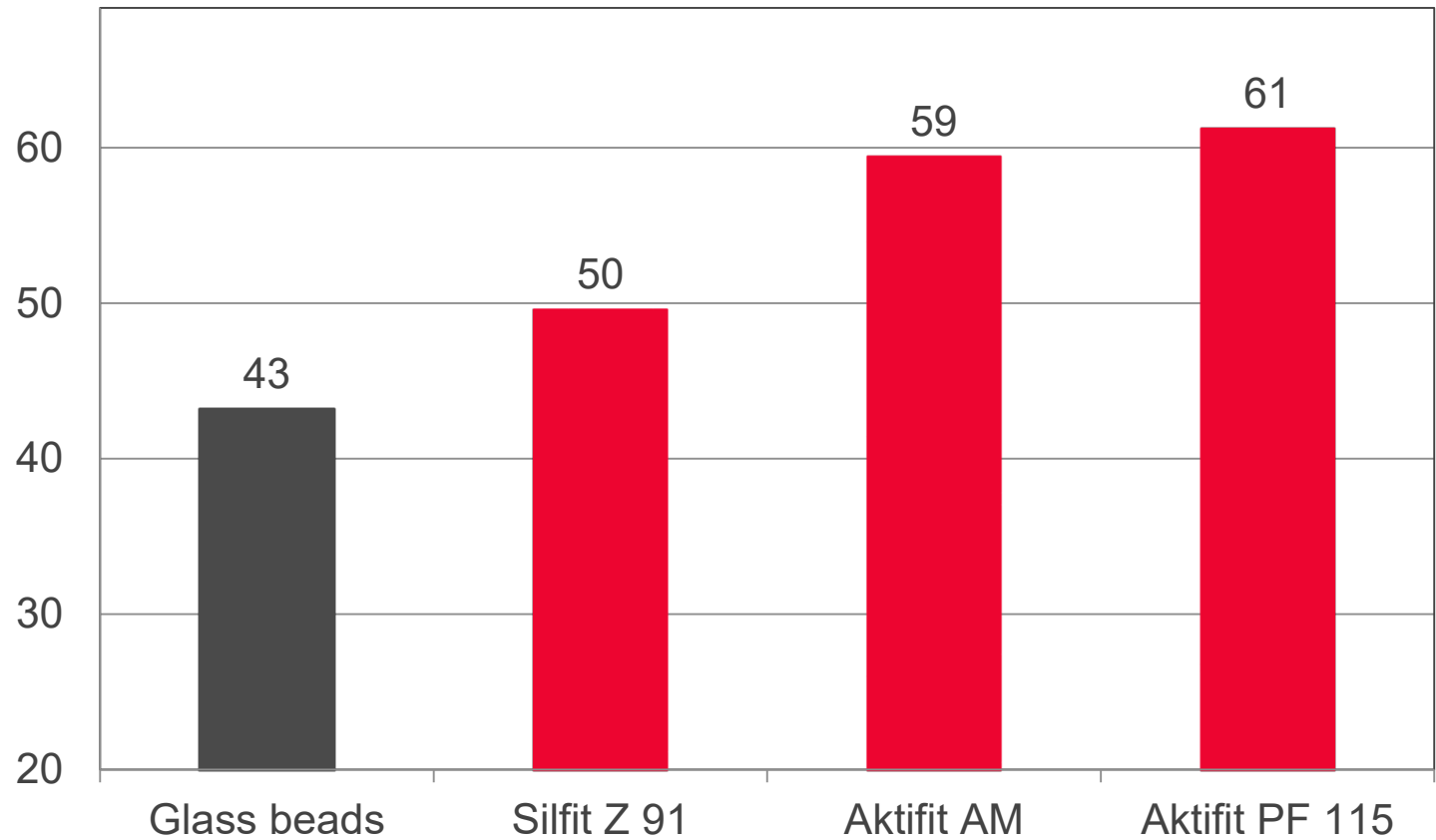


Tensile Strength

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DIN EN ISO 527-1,-2; 5 mm/min

MPa



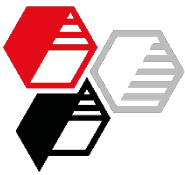
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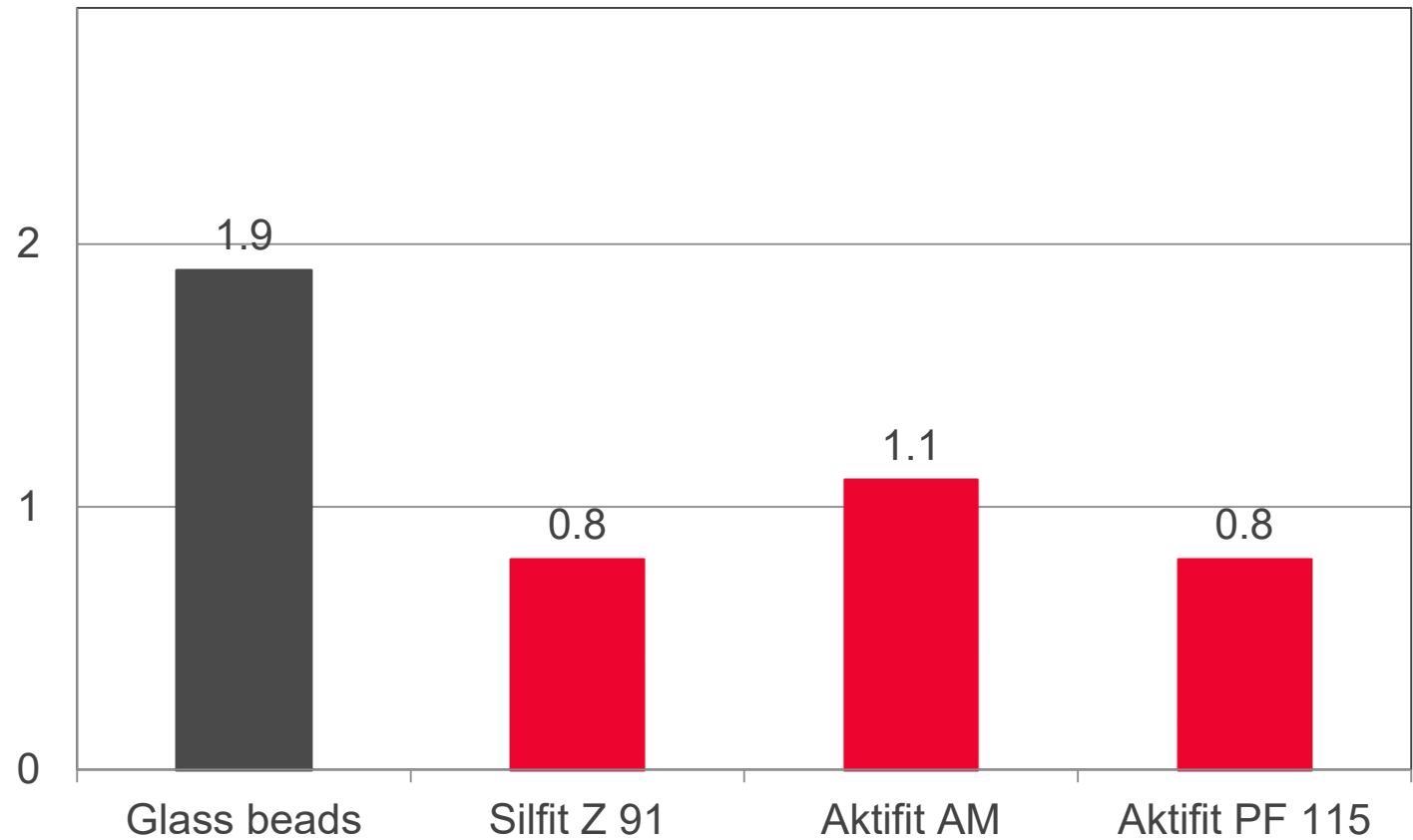
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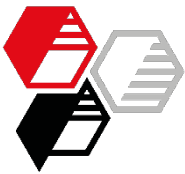


Tensile Strain at Break

DIN EN ISO 527-1,-2; 5 mm/min

%



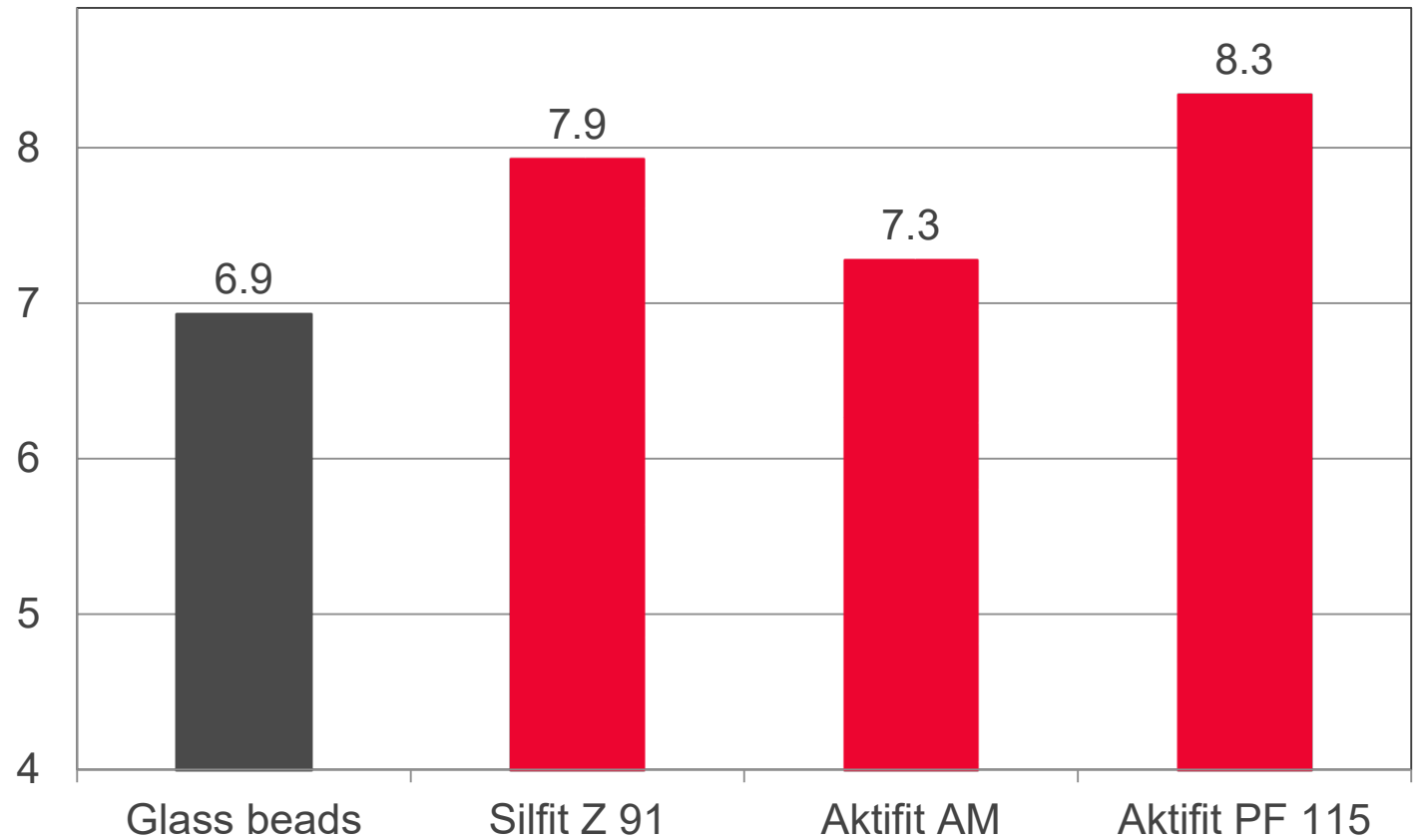


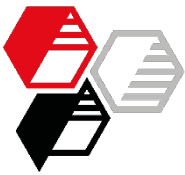
Flexural Modulus

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DIN EN ISO 178

GPa



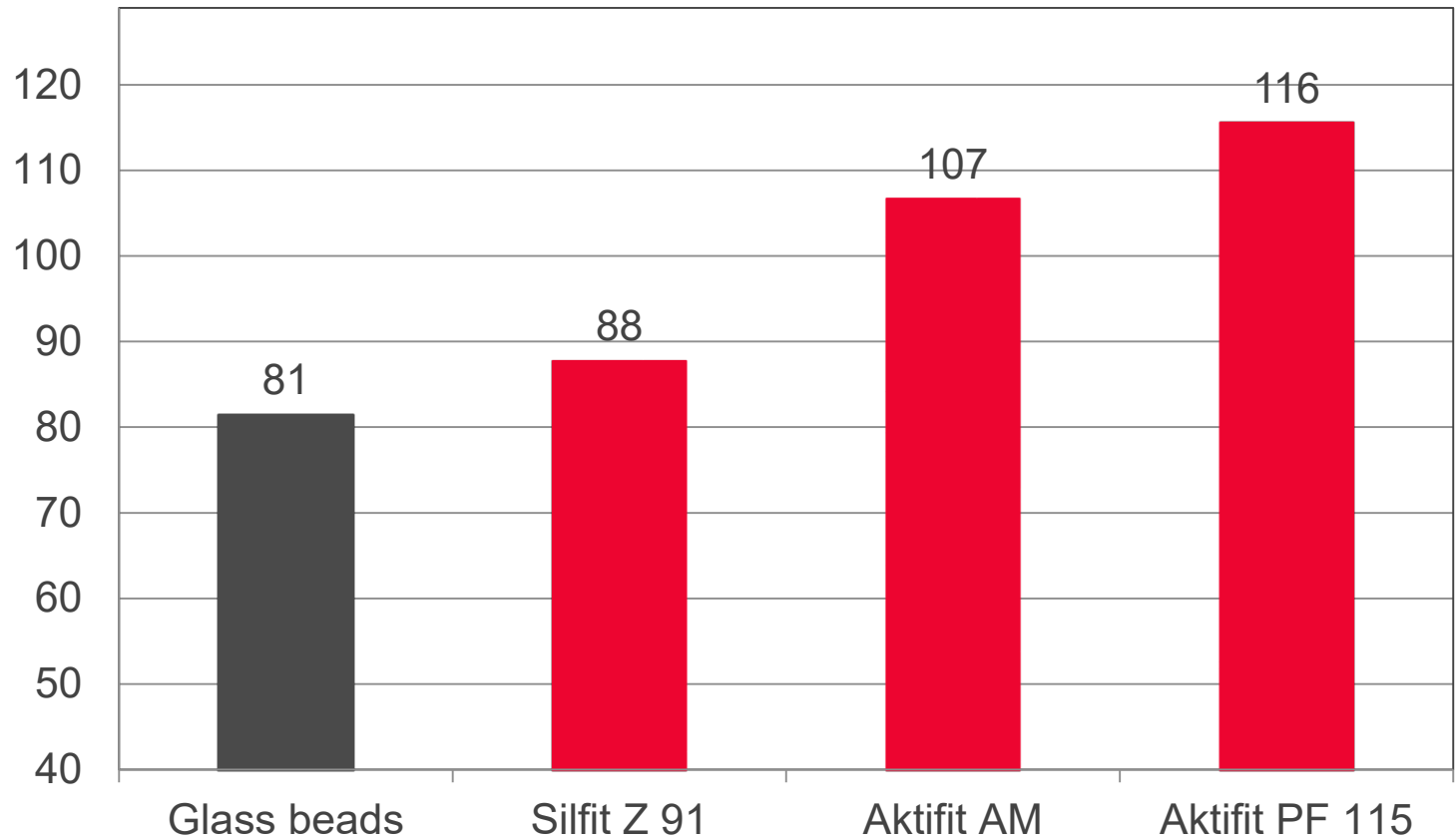


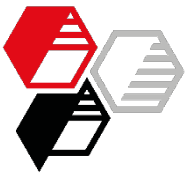
Flexural Strength

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DIN EN ISO 178

MPa

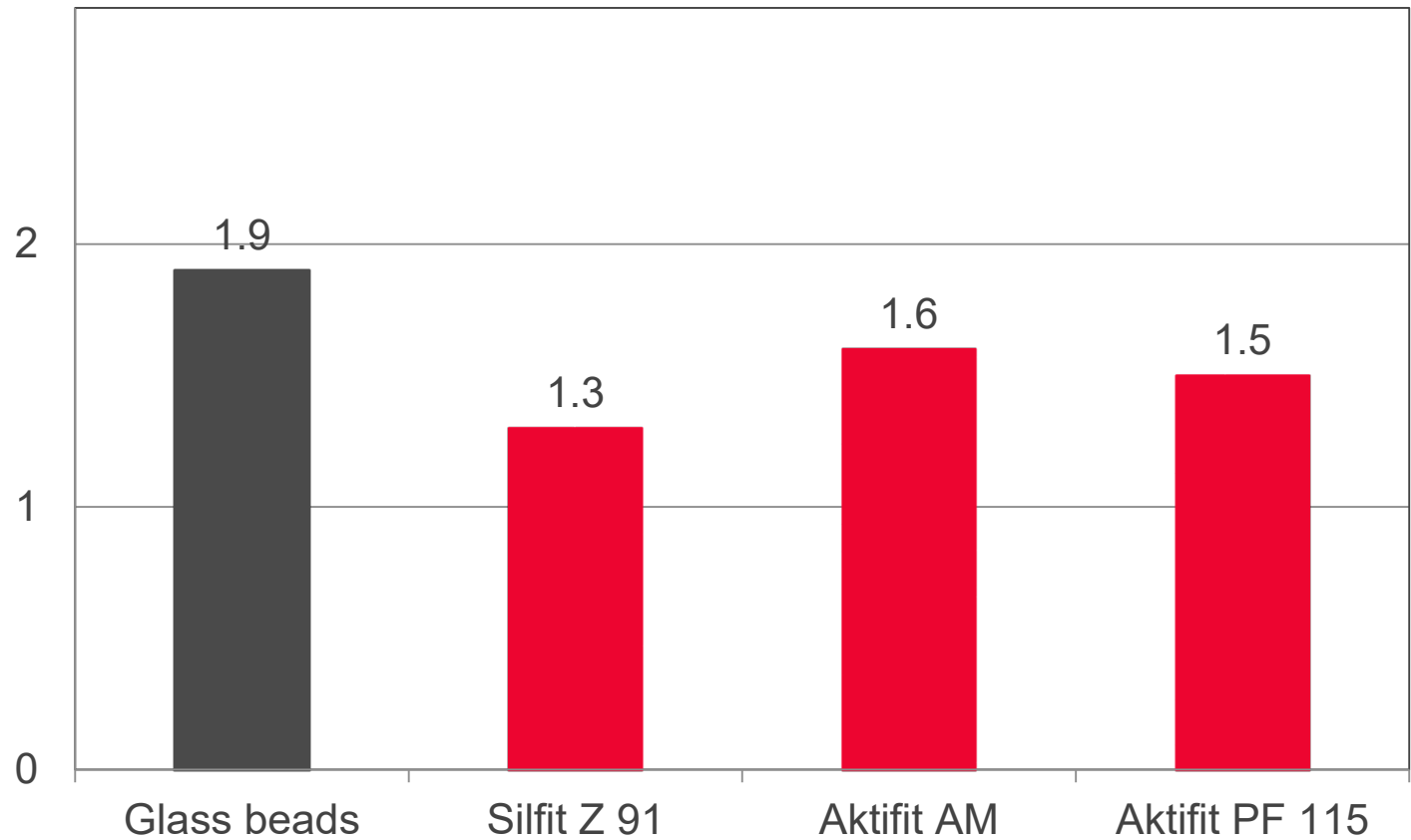


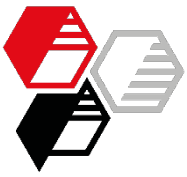


Flexural Strain at Break

DIN EN ISO 178

%



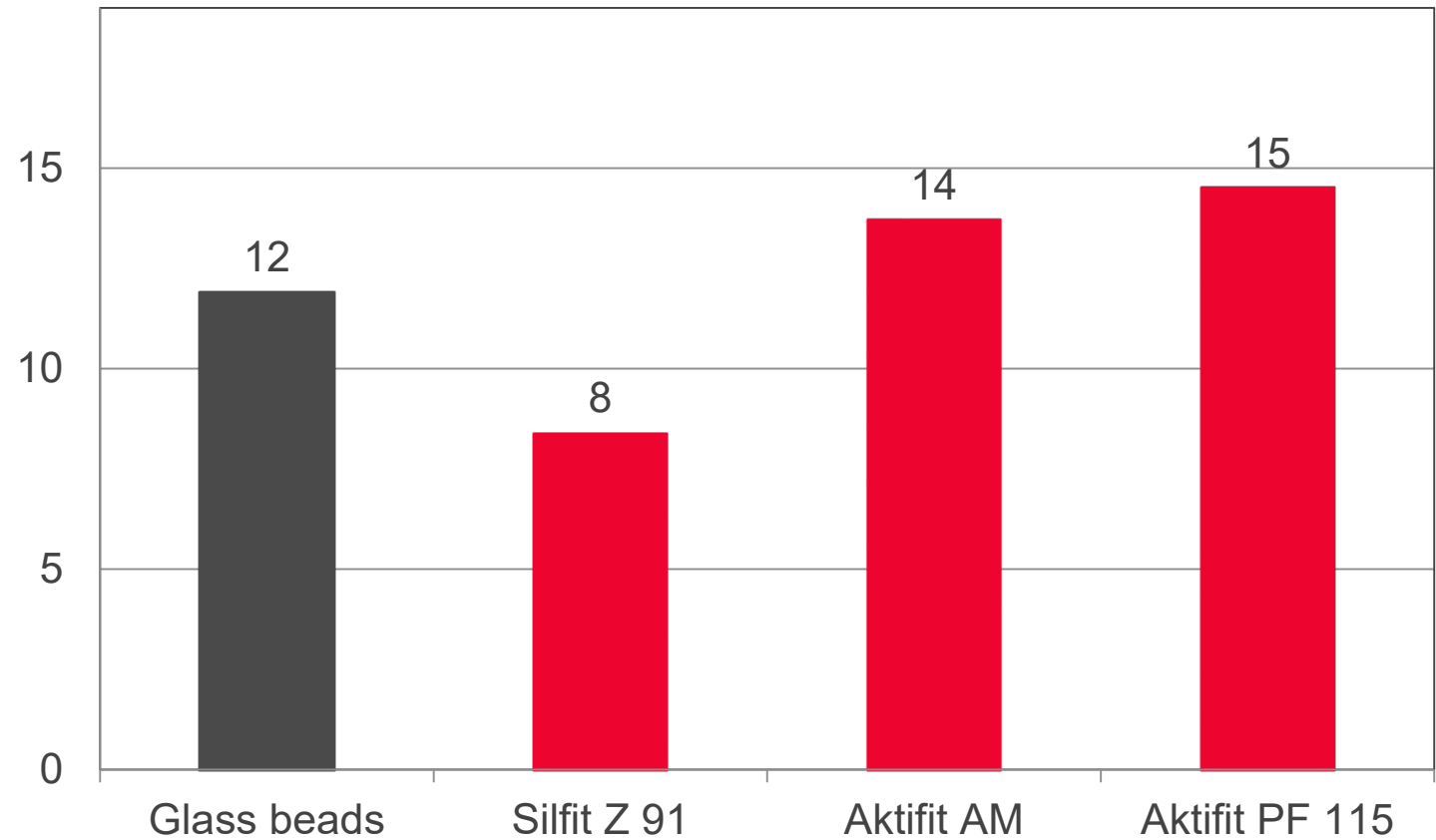


Charpy Impact Strength

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DIN EN ISO 179-1/1eU, 23 °C

kJ / m^2



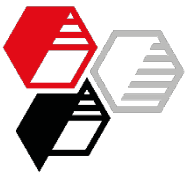
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Color of Compounds

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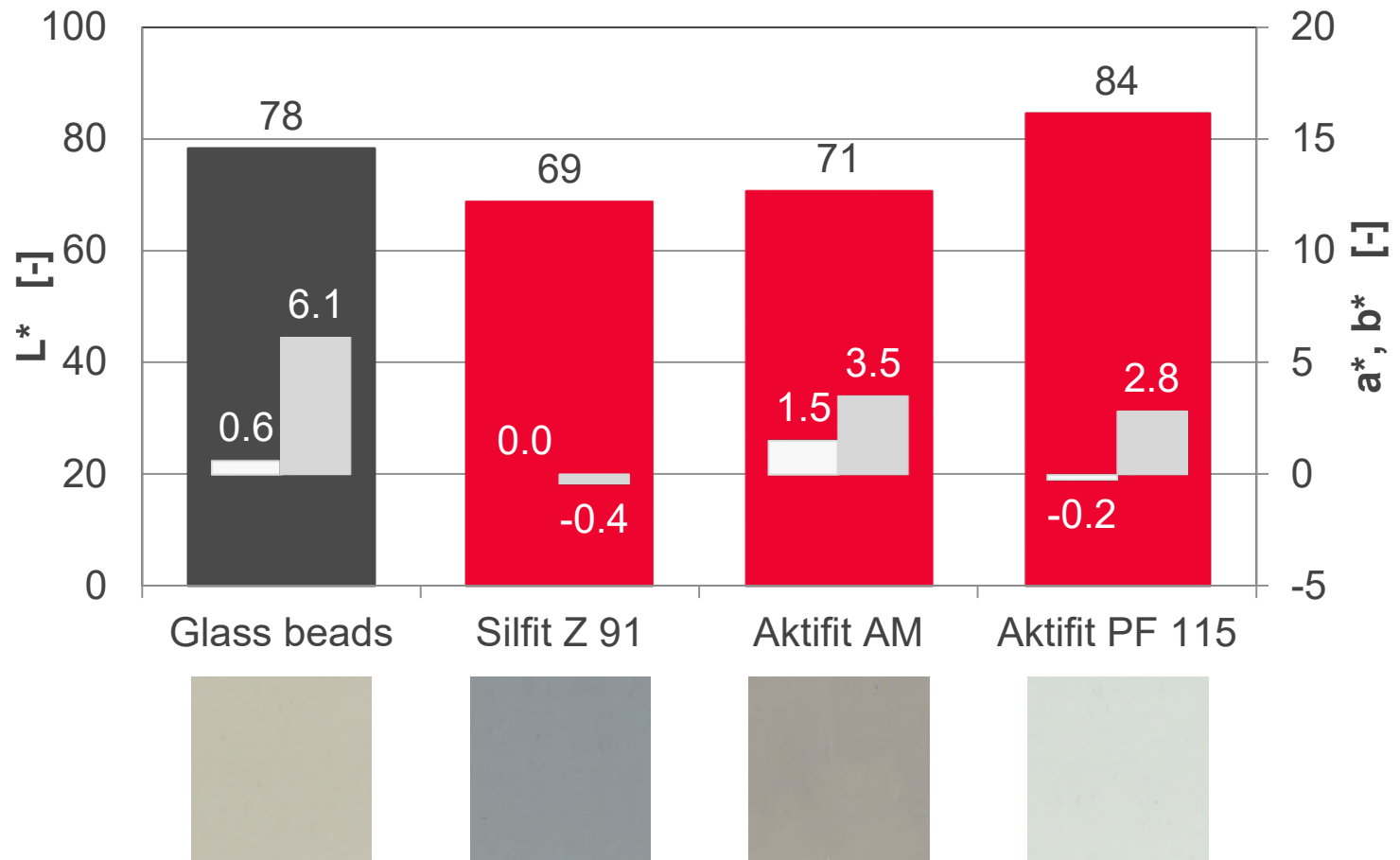
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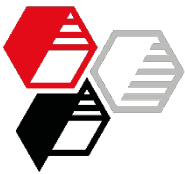
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Performance PPS

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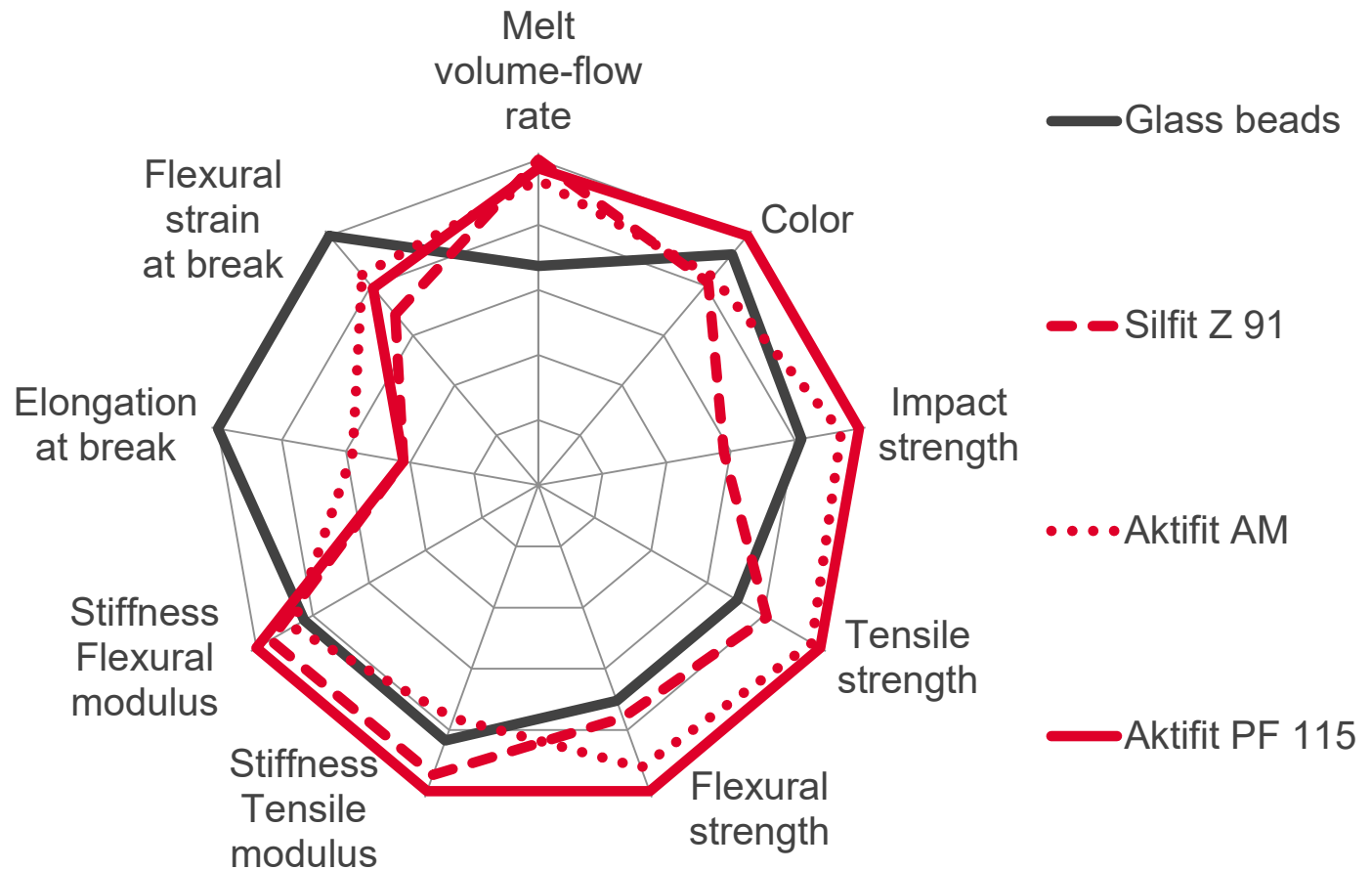
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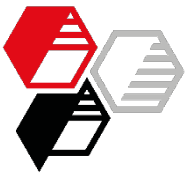
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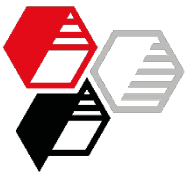
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Aktifit AM vs. surface treated glass beads in PPS:

- significant higher melt flow rate
- markedly higher strength at reduced strain at break
- higher impact strength
- lower yellowish tint of the compound

Aktifit PF 115 offers additionally:

- higher stiffness
- higher flexural strength
- brighter, almost white color of the compound



We supply material for good ideas!

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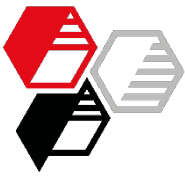


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		Glass beads	Silfit Z 91	Aktifit AM	Aktifit PF 115
Melt Volume-flow Rate	cm ³ /10 min	54	80	75	78
Tensile Modulus	GPa	7.1	8.0	6.5	8.5
Tensile Strength	MPa	43	50	59	61
Tensile Strain at Break	%	1.9	0.8	1.1	0.8
Flexural Modulus	GPa	6.9	7.9	7.3	8.3
Flexural Strength	MPa	81	88	107	116
Flexural Strain at Break	%	1.9	1.3	1.3	1.5
Impact Strength 23 °C Charpy, 1eU	kJ/m ²	12 C	8 C	14 C	15 C
Notched Imp. Strength 23 °C Charpy, 1eA	kJ/m ²	1.4 C	1.0 C	1.0 C	1.0 C
Color Value CIELab L*	-	78.1	68.6	70.5	84.4
a*	-	0.6	0.0	1.5	-0.2
b*	-	6.1	-0.4	3.5	2.8