REHAU®

RAU-SIK
Silicone Rubber

Material Data Sheet AV 0180 E

Chemical structure
RAU-SIK is a high polymer, cross-linked silicone rubber with added inorganic fillers which, depending on their type, give the vulcanisates special physical and chemical properties.

Characteristic properties
Outstanding resistance to high and low temperatures, outstanding recovery capacity; outstanding resistance to weathering and ageing; excellent electrical properties; physiologically inert.

Thermal properties

Resistance in dry heat
The long-term temperature resistance of RAU-SIK ranges from +180°C to +200°C. At +250°C the vulcanisates lose their elastic characteristics after approx. 2000 hours. At +300°C RAU-SIK has a service life of approx. 200 hours.

Low-temperature resistance
Vulcanisates made of RAU-SIK show excellent resistance to low temperatures. This resistance is inherent in the molecule structure and is not obtained by the addition of plasticizers. Generally, RAU-SIK vulcanisates retain their elasticity down to approx. -60°C. RAU-SIK 8190 remains flexible down to approx. -100°C.

Mechanical properties
At higher temperatures and especially after ageing RAU-SIK is superior to other rubber types. Formulations of particularly high notch strength have been developed for special applications.
As with all the other properties, the elasticity changes only slightly with the temperature (-60°C to +200°C).
The good resistance of most of the RAU-SIK types to permanent deformation by compression even at temperatures up to +200°C should particularly by noted.

Electrical properties
RAU-SIK possesses excellent electrical properties which are only slightly dependent on temperature, frequency and humidity.

Electrical properties of RAU-SIK 8120
Dielectric constant
at 50 Hz: approx. 2.9
DIN 53483
Dielectric loss factor tg $\delta \cdot 10^{-4}$
at 50 Hz: approx. 30
DIN 53483
Dielectric strength: approx. 20 KV/mm
DIN 53481
The electrically conductive RAU-SIK types offer special properties (see Material Data Sheet AV 040).

Chemical resistance
RAU-SIK has a good water resistance up to 100°C and a good resistance to low pressure steam up to approx. 2 bar. Steam of higher temperatures, however, destroys the vulcanisates especially on prolonged exposure.
RAU-SIK has good resistance to weak acids and alkalis.
RAU-SIK vulcanisates, however, are destroyed by strong acids and alkalis especially at higher temperatures.
Its resistance to mineral oils at room temperature and at moderately higher temperatures can be compared with chloroprene rubber. At oil temperatures above 100°C, RAU-SIK surpasses the stability of oil-resistant organic rubber types. RAU-SIK swells in many organic solvents.
With the exception of chlorinated aliphatic hydrocarbons (e.g. carbon tetrachloride) and aromatic hydrocarbons, RAU-SIK is to a great extent unaffected by polar solvents. Non-polar solvents cause a medium to strong swelling. In most cases, the swelling is reversible since RAU-SIK does not contain soluble plasticizers.
Special fluoro silicone materials with a substantially better chemical resistance to unpolar and halogenated solvents are described in detail in Material Data Sheet AV 0140 E.

Weathering and ageing resistance
RAU-SIK has excellent weather resistance, is unaffected by oxidation, humidity, ultraviolet rays and ozone and can therefore be used successfully where other elastomers are subject to fast ageing.
RAU-SIK 8190 has very high radiation resistance.

Combustibility
RAU-SIK is combustible, however, does not form any toxic or corrosive products of combustion. Low-flammable, self-extinguishing types are RAU-SIK 8963, RAU-SIK 8960, RAU-SIK 8964.

Physiological properties
RAU-SIK vulcanisates are tasteless and odourless and physiologically inert. They do not contain any plasticizer or other extractable ingredients.

Colouring
Using stable inorganic pigments, RAU-SIK can be coloured to virtually any required shade.

Bonding
RAU-SIK may be bonded to itself as well as to other materials. We refer to our directions for bonding of RAU-SIK products, AV 0380 E.

Application
The excellent uniformity of the electrical and mechanical properties in a wide range of temperatures of -60°C, alternatively -100°C, to +180°C and for short periods up to 300°C, offers special fields of application for RAU-SIK and foamed RAU-SIK in the form of tubing, profiles, sheets, and mouldings where other elastomers fail.
RAU-SIK and foamed RAU-SIK are indispensable materials in the electrical and mechanical industries, in the automotive industry, for industrial plants, in aircraft construction, in laboratories, in the medical and foodstuff industries.

Chemical resistance of RAU-SIK

Testing agent	Testing temperature (°C)	Change shore hardness A (points)	Volume swelling (%)	Evaluation
Acetic acid	20	- 1	- 1	serviceable
Acetic anhydride	20	- 1	+ 1	good
Formic acid conc.	20	- 1	+ 2	good
Hydrochloric acid 10%	20	0	0	good
Hydrochloric acid 30%	20	+ 5	+ 1	conditionally serviceable
Hydrogen peroxide 10%	20	- 1	0	good
Hydrogen peroxide 30%	20	0	0	good
Nitric acid 10%	20	- 2	0	serviceable
Nitric acid 65%	20	+ 6	+ 3	non-serviceable
Phosphoric acid 30%	20	0	- 1	serviceable
Phosphoric acid 85%	20	0	- 1	conditionally serviceable
Phtalic anhydride	150	- 1	+ 2	good
Sulphuric acid 10%	20	+ 1	- 1	serviceable
Ammonia conc.	20	+12	+ 2	good
Calcium hydroxide sat.	20	+ 1	0	good
Potassium hydroxide solution 50%	20	- 1	- 1	non-serviceable
Sodium hydroxide solution 10%	20	- 3	+ 1	good
Sodium hydroxide solution 50%	20	- 3	+ 3	non-serviceable
Detergent solution 1%	20	0	- 1	good
Potassium chromate 20%	20	0	0	good
Sodium carbonate sat.	20	- 2	0	good
Sodium chlorate 20%	20	- 1	+ 1	good
Sodium perchlorate 20%	20	- 1	+ 1	good
Solution of sodium chloride 10%	20	- 2	0	good
Acetamide	150	+ 3	+ 1	good
Acetone	20	- 10	+ 32	serviceable
Benzyl alcohol	20	- 2	+ 1	good
Butanol	117	- 32	+ 97	serviceable
Butylacetate	20	- 25	+152	non-serviceable
Chloroform	20	- 29	+244	non-serviceable
Diacetone alcohol	20	- 1	+ 3	good
Dibutylether	20	- 30	+147	non-serviceable
Dimethyl formamide	100	1	+ 2	good
1,4 Dioxan	101	- 25	+ 77	non-serviceable
Ethanol	20	- 5	+ 7	good
Ethyl acetate	20	- 22	+110	non-serviceable
Glycerine	100	- 1	0	good
Glycol	20	- 1	0	good
Isopentyl alcohol	132	- 46	+155	non-serviceable
Isopropyl alcohol	20	- 14	+ 24	good
Methanol	65	- 4	+ 3	good
Methylene dichloride	20	- 22	+154	non-serviceable
Methyl ethyl ketone	80	- 24	+102	non-serviceable
Petroleum ether	20	- 25	+244	non-serviceable
Stearic acid	150	+21	- 4	non-serviceable
Tetrahydrofuran	65	- 28	+218	non-serviceable
Brake fluid	100	- 2	+ 3	good
Cyclohexane	20	- 26	+233	non-serviceable
Diesel oil	20	- 22	+ 90	non-serviceable
Gasoline 90/110	20	- 24	+239	non-serviceable
Gear oil SAE 90	150	- 1	+ 3	serviceable
Hexane	20	- 23	+239	non-serviceable
Linseed oil	100	- 2	- 1	serviceable
Mineral oil ASTM 1	150	- 4	+ 4	good
Mineral oil ASTM 2	150	- 7	+ 9	less serviceable
Mineral oil ASTM 3	150	- 42	+ 41	non-serviceable
Motor oil SAE 20	150	- 23	+ 22	serviceable
Olive oil	100	- 2	0	good
Silicone fluid AK 350	150	- 13	+ 25	non-serviceable
Styrol	20	- 21	+ 90	non-serviceable
Toluene	20	- 24	+179	non-serviceable
Turpentine	20	- 27	+195	non-serviceable
Xylol	20	- 24	+170	non-serviceable
Ball bearing grease	150	- 18	+ 20	conditionally serviceable
Coconut butter	100	- 3	+ 3	good
Margarine	100	- 2	0	good
Vaseline	150	- 9	+ 15	conditionally serviceable

Table

Chemical resistance of RAU-SIK
The table overleaf shows model values relating to a standard RAU-SIK mixture with a Shore A hardness of 60. It should be noted that the properties of RAU-SIK can vary greatly as a result of formulation modifications determined by the intended application.

We recommend that specific preliminary tests be carried out under the likely operating conditions to assess the suitability of RAU-SIK. The table gives RAU-SIK different suitability gradings based on the effects which various other substances have on it; these gradings are to be interpreted as follows:

Good:
The properties of RAU-SIK remain virtually unchanged even after prolonged exposure to the chemicals in question.

Serviceable:
Constant exposure to the substance in question induces slight and for the most part reversible changes in the material properties. Eventually the material may even be destroyed completely.

Conditionally serviceable:
The material can still be used even if it is to be subjected to sporadic or partial and short-term contact with the substance in question.

Non-serviceable:
The substance in question will destroy the material immediately or will change its properties in such a way as to render it unusable (e.g. by causing extreme swelling).

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