



RAU-PCAB

MATERIAL DATA SHEET AV0041 EN

Characterization

RAU-PCAB denotes a range of amorphous, thermoplastic polymer blends based on polycarbonate and ABS (PC + ABS).

Heat distortion resistance, viscosity and rigidity are combined in an ideal way here. Depending on the nature and quantity of the initial components, the profile of properties can be varied within certain limits.

There are basically four product lines:

100 series:	standard types
400 series:	glass fiber reinforcement
600 series:	flame retardant
800 series:	PC + ASA (special case)

Thermal properties

In heat distortion resistance, RAU-PCAB covers virtually the entire range between ABS and polycarbonate. The standard types display Vicat/B50 heat distortion resistance between 110 °C and 129 °C; that of the halogen-free flame retardant types extends to around 110 °C. Unlike pure ABS, a certain thermal reserve exists due to the higher remaining module when the Vicat temperature is exceeded (due to the high glass transition temperature of the PC). The ball indentation test in accordance with IEC 335-1 gives values between 75 °C and 125 °C (special types even greater).

The linear coefficient of thermal expansion is in the range of the ABS and displays slight dependence on the direction of injection (exception: glass fiber reinforcement).

Mechanical properties

The unreinforced types have tensile modulus values between 2000 and 2700 MPa, comparable with ABS. The high impact and notched impact strength over a wide temperature range are excellent. The energy absorption capacity (ISO 6603-02) increases with the proportion of PC.

It is notable that the viscous-brittle transition for RAU-PCAB is at much lower temperatures than for pure polycarbonate. The stress-strain diagrams of the unreinforced types display distinct maxima in the area of the yield strength; the elongation at break extends well beyond 50 %. The mechanical properties change both with temperature and with load period (tracking behavior). RAU-PCAB can be reinforced with glass fibers to improve rigidity and strength.

Electrical properties

With specific surface resistance values above $10^{14} \Omega$ and dielectric strength of $>24 \text{ kV/mm}$, the leakage resistance requirements are fulfilled in the low voltage range up to 1000 V. The electrical properties are not dependent on the moisture content of the surroundings due to the very low water absorbency.

The tracking resistance under CTI (test solution A) is between 150 and 600 V depending on composition, which is adequate for many applications in the electrical sector.

Fire behavior/freedom from halogens

The standard types are normally combustible and achieve UL94/HB or FMVSS 302 = 100 mm/min.

The flame retardant settings are largely based on chlorine and bromine-free flame retardancy systems and are halogen-free in accordance with VDE 0472/part 815 or VDE 0472/part 813. They generally achieve stage UL94/V0 at a wall thickness of 1.6 mm. Certain flame retardant special types meet the requirements of VDE 0604/T1 and/T2 for conductor and appliance trunking in the area of electrical installation and CSTB class M1 or M2 under NF P 92-507, depending on wall thickness. The toxicity, corrosivity and density of the flue gases from these halogen-free special types are significantly below that of PVC or flame retardant polymer compounds containing halogens.

Chemical resistance

The resistance of RAU-PCAB to water and neutral aqueous media is advantageous at temperatures up to 40 °C. Moreover, chemical decomposition (hydrolysis) takes place, whereby the speed is dependent on time and temperature. It is therefore not suitable for continuous operation in contact with hot water.

At room temperature, it is resistant to mineral acids (including higher concentrations), numerous organic acids, and aqueous saline solutions. RAU-PCAB components are not resistant to bases and can be decomposed relatively quickly at high temperatures.

Aromatic compounds, ketones, esters and chlorinated hydrocarbons result in swelling or dissolution, depending on the number of functional groups and possibly the length of the aliphatic residues. Contact with low molecular plasticizers (e.g. from PVC profiles) results in the formation of stress cracks in the case of parts under tension, particularly at high temperatures (alternative: polymer plasticizers). From experience, contact with paraffin oil (aliphatic) is also uncritical over a longer contact period. Fats and oils based on esters of fatty acids must be viewed as critical.

The details in table 2 are based on tests on low-tension parts, which have been stored in the agents at room temperature with no mechanical load for 6 months. The list can serve only to provide rough orientation; the suitability of RAU-PCAB for a certain part is dependent on its specific structure and use.

Practice-oriented preliminary tests are therefore strongly recommended.

Visual properties/coloring

The natural color of RAU-PCAB is opaque due to its rubber component. Only opaque colorings are therefore available, although in many shades.

In the case of moldings with a smooth external surface, an even, high gloss result is generally obtained with unreinforced types. A reduced gloss level can be achieved with special types or special mold surface treatment.

Weathering behavior/resistance to light

Depending on the specific climate conditions and exposure time, color changes and a decline in mechanical properties may occur with the natural weathering of RAU-PCAB.

However, for certain special types, this decline in properties lies within a scope with which certain approval requirements can still be met, e.g. in the automotive and electrical industries. This is dependent on the exact quality and color match in the individual case (advantageous: carbon black stabilization). The 800 (PC + ASA) series or indeed lacquering of the molding lend themselves for higher requirements. The light fastness of RAU-PCAB is determined by the proportion of ABS component and the coloring. The halogen-free, flame retardant types generally reach level 6 (blue scale, testing in accordance with DIN 53387).

Processing

RAU-PCAB is processed mainly in the injection molding process including gas injection technology. The extrusion process is used for certain applications (special profiles) in the electrical and automotive sectors.

Machining

RAU-PCAB is easy to saw, drill, turn, file, mill and punch. Carbide-tipped tools are recommended particularly for glass fiber reinforced products. Adequate cooling with air and water must be guaranteed so the temperature at the processing location does not exceed the softening temperature of the material.

Lacquering

Moldings with dust and grease-free surfaces are particularly good for lacquering with polyurethane-based lacquering systems. However, unsuitable solvent combinations can cause stress cracks. It is recommended to ask the lacquer manufacturers for special systems for (PC + ASA or PC + ABS).

Printing/labeling

Printing is possible with the familiar printing processes. Likewise, film printing using the hot embossing technique can be used. Specially developed colors can be used for laser labeling.

Metalizing

Metalizing is possible with aluminum, tin, copper or other metals in high vacuum.

The ABS-rich PCAB types are particularly suitable for galvanizing, as the best holds are achieved with these.

Bonding

The bonding of RAU-PCAB moldings both with each other and with other materials can be achieved with appropriate adhesives or diffusion adhesives. The prerequisite is thorough cleaning of the adhesion surfaces to remove grease and other foreign substances, for example using petroleum ether or similar harmless cleaning agents. 2-component adhesives based on epoxy and silicone resins and polyurethane are suitable. Likewise, hot melt adhesives and cyanoacrylate-based adhesives can be used.

Solvent bonding can be carried out with 1.3 dioxolane, an approx. 8 % solution of polycarbonate in 1.3 dioxolane, with MEK or mixtures of MEK and cyclohexanone (e.g. 50:50).

Welding

RAU-PCAB moldings can be joined together with ultrasonic, vibration, friction and heated tool welding.

With ultrasonic welding, it must be ensured that the configuration of the join seams is suitable for welding.

Table 1: Guide values for selected types

Property	Standard	Unit	RAU-PCAB							
			Standard Types			GF 20	Flame Retardant		PC+ASA	
			155	176	189	491	612	648	877	
Density (immersion process)	ISO 1183-1/A	g/cm ³	1.10	1.13	1.15	1.25	1.17	1.18	1.15	
Moisture absorption	acc. to ISO 62	%	0.2	0.2	0.2	0.2	0.2	0.2	0.28	
Water absorption	ISO 62	%	0.7	0.7	0.7	0.6	0.7	0.6	1	
Tensile stress at yield	ISO 527-1	MPa	50	50	55	75	60	65	53	
Tensile strain at yield	ISO 527-1	%	4	4.5	5	2	4	4.5	4.9	
Tensile stress at break	ISO 527-1	MPa	40	45	48	75	45	55	n.t.	
Elongation at break	ISO 527-1	%	>50	>50	>50	2	>50	>50	>50	
Flexural modulus of tension	ISO 527-1	MPa	2100	2200	2300	6000	2700	2600	2300	
Izod notched impact strength	at +23 °C	ISO 180/1A	kJ/m ²	40	45	48	9	50	45	60
	at -30 °C	ISO 180/1A	kJ/m ²	36	41	38	8	18	13	15
Vicat softening temperature (method B 50)	ISO 306	°C	110	118	129	132	88	108	120	
Heat distortion resistance temperature HDT/A	ISO 75-2	°C	100	100	110	120	80	91	106	
Coefficient of linear thermal expansion	lengthwise	DIN 53752	10 ⁻⁵ /K	9	8.5	8	3	7.6	8	7-9
	crosswise	DIN 53752	10 ⁻⁵ /K	9.5	9	8.5	8	8	8	n.t.
Specific surface resistance	DIN IEC 60093	Ohm	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	10 ¹⁴	>10 ¹⁵	10 ¹³	
Determining the proof and comparative tracking index of solid insulating materials (tracking resistance)	DIN EN 60112	Stage	500	300	250	200	300	600	225	
Dielectric strength of insulating materials	DIN EN 60243-2	kV/mm	24	24	24	30	30	35	95 (d = 0.6-0.8)	
Fire behavior UL-94 at 1.6 mm	UL-94	Class	HB	HB	HB	HB	V0	V0	HB	
Fire behavior VDE	VDE 0604-1	-	No	No	No	No	Yes	Yes	No	
Freedom from halogens VDE	VDE 0472-815	-	n.t.	n.t.	n.t.	n.t.	Yes	Yes	n.t.	

n.t. = not tested

Table 2: Chemical resistance of RAU-PCAB at room temperature

1. Hydrocarbons		Result	
n-hexane		0	
Super gasoline, containing aromatics		–	
Heating oil		0	
Petroleum ether, free of aromatics		0	
Benzene		–	
Naphthalene		–	
Nitrobenzene		–	
Toluene		–	
2. Alcohols		Result	
Ethyl alcohol, 96 %		0	
Isopropanol		0	
Phenol		–	
Glycol		0	
Glycerine		0	
3. Ketones		Result	
Acetone		–	
Methyl isobutyl ketone		–	
4. Silicone oils		Result	
Baysilone M 300		+	
5. Acids		max. concentration	Result
Hydrochloric acid	20 %		+
Nitric acid	10 %		+
Phosphoric acid	30 %		+
Sulfuric acid	30 %		+
Citric acid	10 %		+
Lactic acid	10 %		+
Acetic acid	10 %		+
Oleic acid			–

6. Bases		Result
Aniline		–
Sodium hydroxide solution	10 %	–
Ammonia solution, diluted		–
7. Halogens		Result
Bromine		–
Chlorine		–
Iodine		–
8. Oils, fats		Result
Soya oil		–
Olive oil		–
Lard		–
Butter		–
9. Saline solutions		Result
Potassium carbonate, sat.		–
Sodium thiosulfate		+
Sodium hypochloride		+
Seawater		+
10. Cleaning agents		Result
Curd soap solution	2 %	+
Detergent, Persil		0
Cleaning agent, Dor		–
11. Other media		Result
Diethyl ether		–
Urea		+
Trichloroethylene		–
Nitrobenzene		–
Hydrogen peroxide		+

+ = Resistant
 0 = Partially resistant
 – = Not resistant

This document is protected by copyright. All rights based on this are reserved. No part of this publication may be translated, reproduced or transmitted in any form or by any similar means, electronic or mechanical, photocopying, recording or otherwise, or stored in a data retrieval system.

Our verbal and written advice relating to technical applications is based on experience and is to the best of our knowledge correct but is given without obligation.

The use of REHAU products in conditions that are beyond our control or for applications other than those specified releases us from any obligation in regard to claims made in respect of the products.

We recommend that the suitability of any REHAU product for the intended application should be checked. Utilization and processing of our products are beyond our control and are therefore exclusively your responsibility. In the event that a liability is nevertheless considered, any compensation will be limited to the value of the goods supplied by us and used by you.

Our warranty assumes consistent quality of our products in accordance with our specification and in accordance with our general conditions of sale.

REHAU SALES OFFICES

AE: Middle East, Phone: +9714 8835677, dubai@rehau.com **AR: Buenos Aires**, Phone: +54 11 489860-00, buenosaires@rehau.com **AT: Linz**, Phone: +43 732 381610-0, linz@rehau.com **Vienna**, Phone: +43 2236 24684, wien@rehau.com **AU: Adelaide**, Phone: +61 8 82990031, adelaide@rehau.com **Brisbane**, Phone: +61 7 55271833, brisbane@rehau.com **Melbourne**, Phone: +61 3 95875544, melbourne@rehau.com **Perth**, Phone: +61 8 94564311, perth@rehau.com **Sydney**, Phone: +61 2 87414500, sydney@rehau.com **BA: Sarajevo**, Phone: +387 33 475-500, sarajevo@rehau.com **BE: Brussels**, Phone: +32 16 3999-11, bruxelles@rehau.com **BG: Sofia**, Phone: +359 2 89204-71, sofia@rehau.com **BR: Arapongas**, Phone: +55 43 3152 2004, arapongas@rehau.com **Belo Horizonte**, Phone: +55 31 33097737, belohorizonte@rehau.com **Caxias do Sul**, Phone: +55 54 32146606, caxias@rehau.com **Mirassol**, Phone: +55 17 32535190, mirassol@rehau.com **Recife**, 51030-320 Bairro-Boa viagem-Recife-PE, Phone: +55 81 32028100 **Sao Paulo**, Phone: +55 11 461339- 22, saopaulo@rehau.com **BY: Minsk**, Phone: +375 17 2450209, minsk@rehau.com **CA: Moncton**, Phone: +1 506 5382346, moncton@rehau.com **Montreal**, Phone: +1 514 9050345, montreal@rehau.com **St. John's**, Phone: +1 709 7473909, stjohns@rehau.com **Toronto**, Phone: +1 905 3353284, toronto@rehau.com **Vancouver**, Phone: +1 604 6264666, vancouver@rehau.com **CH: Berne**, Phone: +41 31 7202-120, bern@rehau.com **Vevey**, Phone: +41 21 94826-36, vevey@rehau.com **Zurich**, Phone: +41 44 83979-79, zurich@rehau.com **CL: Santiago**, Phone: +56 2 540-1900, santiago@rehau.com **CN: Guangzhou**, Phone: +86 20 87760343, guangzhou@rehau.com **Beijing**, Phone: +86 10 64282956, beijing@rehau.com **Shanghai**, Phone: +86 21 63551155, shanghai@rehau.com **CO: Bogota**, Phone: +57 1 2637768, bogota@rehau.com **CZ: Prague**, Phone: +420 2 72190-111, praha@rehau.com **DE: Berlin**, Phone: +49 30 66766-0, berlin@rehau.com **Bielefeld**, Phone: +49 521 20840-0, bielefeld@rehau.com **Bochum**, Phone: +49 234 68903-0, bochum@rehau.com **Frankfurt**, Phone: +49 6074 4090-0, frankfurt@rehau.com **Hamburg**, Phone: +49 40 733402-100, hamburg@rehau.com **Leipzig**, Phone: +49 34292 82-0, leipzig@rehau.com **Munich**, Phone: +49 8102 86-0, muenchen@rehau.com **Nuremberg**, Phone: +49 9131 93408-0, nuernberg@rehau.com **Stuttgart**, Phone: +49 7159 1601-0, stuttgart@rehau.com **DK: Copenhagen**, Phone: +45 46 7737-00, kobenhavn@rehau.com **EE: Tallinn**, Phone: +372 6 0258-50, tallinn@rehau.com **ES: Barcelona**, Phone: +34 93 6353-500, barcelona@rehau.com **Bilbao**, Phone: +34 94 45386-36, bilbao@rehau.com **Madrid**, Phone: +34 91 6839425, madrid@rehau.com **FI: Helsinki**, Phone: +358 9 877099-00, helsinki@rehau.com **FR: Agen**, Phone: +33 5536958-69, agen@rehau.com **Lyon**, Phone: +33 472026-300, lyon@rehau.com **Metz**, Phone: +33 3870585-00, metz@rehau.com **Paris**, Phone: +33 1 348364-50, paris@rehau.com **Rennes**, Phone: +33 2 996521-30, rennes@rehau.com **GE: Tiflis**, Phone: +995 32 559909, tbilisi@rehau.com **GB: Glasgow**, Phone: +44 1698 50 3700, glasgow@rehau.com **Manchester**, Phone: +44 161 7777-400, manchester@rehau.com **Slough**, Phone: +44 1753 5885-00, slough@rehau.com **GR: Athens**, Phone: +30 210 6682-500, athens@rehau.com **HR: Zagreb**, Phone: +385 1 3444-711, zagreb@rehau.com **HU: Budapest**, Phone: +36 23 5307-00, budapest@rehau.com **ID: Jakarta**, Phone: +62 21 45871030, jakarta@rehau.com **IE: Dublin**, Phone: +353 1 816502-0, dublin@rehau.com **IN: New Delhi**, Phone: +91 11 450 44700, newdelhi@rehau.com **Mumbai**, Phone: +91 22 67922929, mumbai@rehau.com **IT: Milan**, Phone: +39 02 95941-1, milano@rehau.com **Pesaro**, Phone: +39 0721 2006-11, pesaro@rehau.com **Rome**, Phone: +39 06 900613-11, roma@rehau.com **Treviso**, Phone: +39 0422 7265-11, treviso@rehau.com **KZ: Almaty**, Phone: +7 727 394 1304, almaty@rehau.com **LT: Vilnius**, Phone: +3 705 24614-00, vilnius@rehau.com **LV: Riga**, Phone: +3 71 67 609080, riga@rehau.com **MA: Casablanca**, Phone: +212 522 250593, casablanca@rehau.com **MK: Skopje**, Phone: +3 892 2402-670, skopje@rehau.com **MX: Celaya**, Phone: +52 461 61880-00, celaya@rehau.com **Monterrey**, Phone: +52 81 81210-130, monterrey@rehau.com **NL: Nijkerk**, Phone: +31 33 24799-11, nijkerk@rehau.com **NO: Oslo**, Phone: +47 22 5141-50, oslo@rehau.com **NZ: Auckland**, Phone: +64 9 2722264, auckland@rehau.com **PE: Lima**, Phone: +51 1 2261713, lima@rehau.com **PL: Katowice**, Phone: +48 32 7755-100, katowice@rehau.com **Poznań**, Phone: +48 61 849-8400, poznan@rehau.com **Warsaw**, Phone: +48 22 2056-300, warszawa@rehau.com **PO: Lisbon**, Phone: +3 51 21 94972-20, lisboa@rehau.com **TW: Taipei**, Phone: +886 2 87803899, taipei@rehau.com **RO: Bacau**, Phone: +40 234 512066, bacau@rehau.com **Bucharest**, Phone: +40 21 2665180, bucaresti@rehau.com **Cluj**, Phone: +40 264 415211, clujnapoca@rehau.com **RU: Chabarowsk**, Phone: +7 4212 411218, chabarowsk@rehau.com **Yekaterinburg**, Phone: +7 343 2535305, jekatarinburg@rehau.com **Krasnodar**, Phone: +7 861 2103636, krasnodar@rehau.com **Moscow**, Phone: +7 495 6632060, moscow@rehau.com **Nizhny Novgorod**, Phone: +7813 786927, nischnijnowgorod@rehau.com **Novosibirsk**, Phone: +7 383 2000353, novosibirsk@rehau.com **Rostov-on-Don**, Phone: +7 8632 978444, rostov@rehau.com **Samara**, Phone: +7 8462 698058, samara@rehau.com **St. Petersburg**, Phone: +7 812 3266207, stpetersburg@rehau.com **Woronesch**, Phone: +7 4732 611858 **RS: Belgrade**, Phone: +3 81 11 3770-301, beograd@rehau.com **SE: Örebro**, Phone: +46 19 2064-00, oerebro@rehau.com **SG: Singapore**, Phone: +65 63926006, singapore@rehau.com **SK: Bratislava**, Phone: +4 21 2 682091-10, bratislava@rehau.com **TH: Bangkok**, Phone: +66 2 7443155, bangkok@rehau.com **TR: Istanbul**, Phone: +90 212 35547-00, istanbul@rehau.com **UA: Dnepropetrovsk**, Phone: +380 56 3705028, dnepropetrovsk@rehau.com **Kiev**, Phone: +380 44 4677710, kiev@rehau.com **Lviv**, Phone: +380 32 2244810, liviv@rehau.com **Odessa**, Phone: +380 48 7800708, odessa@rehau.com **US: Detroit**, Phone: +1 248 8489100, detroit@rehau.com **Grand Rapids**, Phone: +1 616 2856867, grandrapids@rehau.com **Los Angeles**, Phone: +1 951 5499017, losangeles@rehau.com **Minneapolis**, Phone: +1 612 253 0576, minneapolis@rehau.com **ZA: Durban**, Phone: +27 31 657447, durban@rehau.com **Johannesburg**, Phone: +27 11 201-1300, johannesburg@rehau.com. If there is no sales office in your country please contact: REHAU AG + Co, Sales Office International Business Development, Ytterbium 4, D-91058 Erlangen, Phone: +49 9131 92-5888, salesoffice.ibd@rehau.com