

Typical Applications

Used in chemical engineering and general machinery construction

- Pumps and valve bodies.
- Gaskets.
- Bearing cages.
- Cores for rotary bush manufacture.
- Parts used in dental medicine.
- Sight tubes (transparent PVC-u)
- Chemical tank construction

Product Description

PVC-u (u = unplasticised, or rigid PVC) is a flame retardant material with exceptional chemical resistance and low stress cracking. PVC-u shows high mechanical strength for continuous operating between -15 °C and +60 °C.

Technical Description

Smiths' range of extruded PVC includes the following grade options -

Grade	Modification	Purpose
PVC-u	None - except colour. Standard colour is dark grey - some sizes are available in red, black, light grey, white, blue, green, yellow and orange.	Base material for for general applications.
PVC-Hi	Impact modified - light grey colour.	Increased impact strength at low temperatures to minus 40 °C.
PVC-ELS	Electrically conductive	To prevent unwanted electrostatic charge.
PVC-C Corzan	Chlorinated grade - light grey colour	Higher rigidity, strength and hardness at temperatures up to 85 °C.

Machinability

PVC-u machines well but ensure the machining area is well ventilated, or extracted, as PVC-u will give off chlorine if accidentally over-heated. Full machining instructions are available on request.

Fabrication

PVC-u is readily fabricated, whether the process be welding, shaping, deep drawing, cutting or bonding. High chemical resistance and good fabrication qualities ensure PVC-u is the ideal choice for chemical systems.

Product Attributes

Good mechanical properties.

Exceptional chemical resistance.

Good impact strength

Useful operating temperature range

Can easily be solvent cemented and welded

Excellent electrical insulation properties

Naturally self-extinguishing

Low moisture absorption

Product sourced from long-standing manufacturer with ISO accreditation

Customer Benefits

Very good all-round material for aggressive chemical conditions

Low cost assembly

Suitable for use in high voltage applications

Does not burn

Helps maintain dimensional stability

Consistent quality ensures uniform characteristics in machining and performance

Product Availability *

Extruded round bar	5mm to 400mm in lengths ≤ 2m. (varies with grade)
Hollow round bar	From 15mm o/d x 5mm i/d to 200mm o/d x 100mm i/d in 2m lengths. 230mm x 150mm in 1 mt lengths.
Transparent tube	From 6mm o/d x 1mm wall to 0mm o/d x 4.9mm wall in 5m lengths. (DIN 8062 dimensions)
Other products	Hexagon & square sections, square & rectangular hollow tubes, angles, flats, channels, 'H' and 'T' profiles, useful clip-on sections, and welding rod.

* Sizes not stocked are available on relatively short delivery time. 1, 2 or 3m lengths supplied or cut to customer requirements.

Chemical Resistance

PVC-u has a very good resistance to acids (except strong, oxidising acids), alkalis and hydrocarbons (except chlorinated hydrocarbons). It has limited resistance to aromatic compounds and should not be considered in contact with ketones or hot water.

Electrical Properties

PVC-u has good insulation properties for electronics applications. PVC-ELS is also available for applications where electrical conductivity is an essential requirement.

	PVC-U	PVC-Hi	PVC-ELS	PVC-C Corzan®	
Mechanical Properties					
Density	1.36	1.38	1.41	1.55	g/cc
Tensile Strength @ yield	55	49	40	57	MPa
@ break	30	30	36	80	MPa
Elongation @ yield	3	10	4	3	%
@ break	≥10	30	20	15	%
Tensile modulus of elasticity	3000	2600	3000	2500	MPa
Flexural Strength	90	80	-	90	MPa
Impact Strength	No break	No break	-	No brk	kJ/m ²
Notched impact strength	3	10	5	8	kJ/m ²
Ball indentation hardness / Rockwell	120	100	-	150	MPa
Hardness (Shore D)	KB600	KB600	-	KB600	V
Electrical Properties					
Volume resistivity	≥10 ¹⁵	≥10 ¹⁵	≤10 ⁶	≥10 ¹⁵	Ohm cm
Surface resistivity	≥10 ¹³	≥10 ¹³	≤10 ⁶	≥10 ¹³	Ohm
Dielectric constant @ 1 MHz	3.0	3.0	-	3.0	-
Dielectric loss factor @ 1 MHz	0.01	0.01	-	0.01	-
Dielectric strength	20 - 40	20 - 40	-	20 - 40	Kv/mm
Tracking resistance - IEC 60112	KB600	KB600	-	KB600	V
Thermal Properties					
Vicat softening point (VST/B/50)	75 ¹	78	-	105	°C
Heat deflection temperature (HDT/B)	72 ²	69	-	102	°C
Coefficient of thermal expansion	0.8	0.8	-	0.6	10 ⁻⁴ /°C
Thermal conductivity @ 20°C	0.14	0.17	-	0.14	W/(mK)
Service temperatures - upper limit	60	60	60	85	°C
without high mech. Load - lower limit	-15	-40	-15	-15	~
Other Properties					
Moisture Absorption - ISO 62	0.20	0.20	-	0.20	%
Suitability for bonding	+	+	+	+	-
Physiological indifference according to FDA or EEC 90/128 - natural colour	+	-	-	-	-
Friction Co-efficient	0.6	0.6	0.6	0.6	DIN 53375
Flammability - Underwriters Laboratory	V-0	V-0	V-0	V-0	UL 94
UV Stability with additives	0	0	-	-	-

Technical Assistance

Our knowledgeable staff backed up by our resident team of qualified metallurgists and engineers, will be pleased to assist further on any technical topic.

UK Service Centres: Quality & Testing:

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|--------------------|---------------|-------------------|---------------|
| Smiths Belfast | 02895 908 897 | Smiths Leeds | 0113 307 5167 |
| Smiths Biggleswade | 01767 604 704 | Smiths Manchester | 0161 794 8650 |
| Smiths Birmingham | 0121 728 4940 | Smiths Norwich | 01603 789 878 |
| Smiths Bristol | 0117 971 2800 | Smiths Nottingham | 0115 925 4801 |
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| Smiths Gateshead | 0191 469 5428 | Smiths Verwood | 01202 824 347 |
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