



Combustibility test for plastics according to UL subject 94

The plastic materials are classified as follows:

UL 94 V-0:

The test samples are extinguished within 5 seconds average time (mean of 10 successive tests). None of the test sample burns longer than 10 seconds. None of the test sample emits burning particles.

UL 94 V-1:

The test samples are extinguished within 25 seconds average time (mean of 10 successive tests). None of the test sample burns longer than 30 seconds. None of the test sample emits burning particles.

UL 94 V-2:

Same Test as UL 94 V-1, but the test samples emits burning particles during the test.

The test samples mentioned above are extinguished in all cases. If the test samples keeps burning after 30 seconds, a horizontal test can be carried out to reach the classification UL 94 HB.

CHOICE OF MATERIAL:

Reinforced Polyester

Excellent temperature stability combined with a high degree of impact strength. On the whole, a high stability against chemicals. Good long-time rupture strength.

Noryl

Extremely good mechanical, thermal and electrical properties. Good ageing stability and weathering resistance. High stability against chemicals.

Polyamide

Thermoplast with high temperature stability, extremely solid and tenacious. Good sliding properties and high capacity of resistance to wear. Contact with humidity may result in a change of properties.

Polycarbonate

Thermoplast with high temperature stability with excellent resistance to all kinds of temperature. On the whole, good resistance against chemicals and UV-light.

PC-ABS Blend

Good stability in case of high temperature combined with enormous impact strength as well as toughness at subzero temperature. On the whole, good resistance against chemicals. UV-light may have a negative effect.

ABS

Good resistance against medium temperature combined with good impact strength (only certain types) and antistatic adjustment. On the whole, good resistance against chemicals. UV-light may have a negative effect.

Polystyrene

Normally brittle and resistant to fairly low temperature. SB-types are impact resistant and less sensitive to tearing under pressure. Glossy surface. Metal-cutting is possible.

PMMA (plexiglass®)

Good mechanical properties, slightly brittle. Superior from optical point of view. Permeable to light up to 92% for certain types.

RECOMMENDED APPLICATION:

For dimensionally stable and temperature-resistant parts. Outdoor application.

Dimensionally stable, heat-resistant, self-extinguishing parts, mainly when exchanged with metal. Component parts and cases for entertainment industry and data processing units.

Ideally suited for technical application, especially for machine elements with complicated geometry.

Recommended for cases housing instruments and general indoor and outdoor application. Not recommended for use with strong alkalis or for direct exposure to sunlight.

Ideally suited for indoor use with moderate corrosive conditions. Limited outdoor suitability. Special materials comply with ball-thrust hardness test according to VDE 700 at 125°.

Cases and operating elements of all kinds. Indoor use, also suitable for low temperature. Limited outdoor application. Suitable for galvanic coating.

For cases and operating elements with working temperature of less than 65°. Suitable for indoor use. Exposure to UV-light should be avoided.

Cases and front panels for infrared transmitters and receivers as well as transparent parts.

The plastic and packaging material used by OKW are on the whole harmless and, apart from some exceptions, can easily be recycled and reutilized.

The plastic properties on pages 222/223 are exclusively applicable for the *specified standard test pieces*. Variations may occur as far as cases and technical parts are concerned.



		Modified Polyether PPE (PPO)					Polyamide PA		Poly-carbonate
		PPE + PS		PA 6x	PA 6x	PC			
		Noryl unreinforced	Noryl reinforced		reinforced				
<i>Abbreviation</i> →									
<i>Tradename</i> →									
APPLICATION FOR THE FOLLOWING PRODUCT GROUPS	Abbreviation of product groups, see below this page	NEG type A	NEG type B	MG Cable glands	Handle bar	RB, DT (transparent cover)			
MECHANICAL PROPERTIES	<i>Unit</i>	<i>Testmethod</i>							
Impact resistance	KJ/m ²	ISO 179; DIN 53 453	10		no fracture	30	no fracture		
Notch resistance	KJ/mm ²	ISO 179; DIN 53 453	12	9	no fracture		30		
Ball indentation hardness	N/mm ²	DIN 53 456	113	117	120	150	110		
Ball-thrust hardness test at 125°									
THERMAL PROPERTIES	<i>Unit</i>	<i>Testmethod</i>							
Heat distortion temperature	°C	ISO 75-A; DIN 53 458			100	160	128		
Application temperature ca.	°C		100	110	100	110	110		
Cold distortion temperature	°C		-40	-40	-40	-40	-150		
UL combustibility test	Fire classif.	UL-94	V-0	V-1	HB		HB		
ELECTRICAL PROPERTIES	<i>Unit</i>	<i>Testmethod</i>							
Tracking resistance KC/CTI	Stage	IEC 112			600	500	250		
Specific volume resistivity	Ohm · cm	DIN 53 482; VDE 0303	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁵	10 ¹⁶		
RESTISTANCE OF MATERIAL TO*									
Gasoline			-	-	+	+	-		
Diesel oil			-	-	+	+	○		
Sea water			+	+	+	+	+		
Hydrochloric acid, 10%			+	+	-	-	+		
Weak alkaline solutions			+	+	-	-	-		
Strong alkaline solutions			+	+	-	-	-		
Atmospheric influences			○	○	+	+	+		
Lactic acid			+	+	○	○	+		
Acetone			-	-	+	+	-		

Values at room temperature: + = constant ○ = conditionally constant - = inconstant

Abbreviation of product groups (catalogue page...):

DC Datec-Controls (31-38)	FG Flat-Pack Cases (169-176)	NEG DIN-Modular Cases (181-198)	TT Toptec Cases (165-168)
DKB Datec-Keyboards (129-132)	Kombi-PG Combi Desk Cases (128)	PG Desk Cases (123-127)	URB Uni-Resist-Boxes (85-88)
DMB Datec-Mobil-Boxes (25-30)	LG Lux Cases (137-146)	RB Robust-Boxes (77-84)	VB Vario-Boxes (47-64)
DPB Datec-Pocket-Boxes (19-24)	MB Hand-Held-Boxes (39-44)	SG Shell-Type Cases (91-104)	WG Wall-mounting Cases (65-76)
DT Datec-Terminals (111-122)	MG Potting Boxes (199-202)	SM Smart-Cases (13-18)	
EG Euro Cases (147-162)	MOT Motec Cases (105-110)	StG Plug Cases (177-180)	

222 * Simultaneous exposure to different media may alter the resistive properties of a material! To be safe, it is advisable to test the cases for sufficient resistance of the material under the conditions of the specific application.

PROPERTIES OF PLASTIC MATERIALS

Thermoplasts							Duroplasts	
Blends	Styrene-Polymerides					PMMA		
	Modified Polystyrene			ABS				
ABS/PC	SB	SB	SAN	ABS		PMMA	Polyester	Duropl. type 3I
Bayblend KU-2 1468	Polyflam SDR 101	BP 5400		Novodur P2 MT-AT	Novodur P2 H-AT	ZK30	reinforced	
StG (live parts)	StG (top parts)	SM, TT, FG, SG, MOT, PG 220, Kombi-PG, WG A9624..	WG (cover), VB (cover)	DPB, DMB, DC, MB, DT, TG, DKB, EG, LG, PG 138/190	RB, MG	DPB SM	URB	MG
	20	no fracture	6	85	80	60	60	6
20	6	9		11	11	3	26	1
100	115	115	165	100	115	105		250
fulfilled, 2 mm imprint.								
110	80	80	99	90	85	89	200	125
100	65	65	70	75	70	70	150	100
-50	-40	-40	-40	-40	-40	-40	-60	
V-0	V-2	HB		HB	HB	HB	V-0	V-1
350	450	200	KB 225	600	600	600	450	125
10 ¹⁶	5x10 ¹⁵	10 ¹⁶	10 ¹⁶	10 ¹⁵	10 ¹⁵	2x10 ¹⁴	10 ⁹	10 ⁹
-	-	-	-	○	○	+	+	+
○	-	-	○	+	+	+	+	+
+	+	+	+	+	+	+	+	+
+	+	+	○	○	○	+	+	+
-	+	+	+	+	+	+	+	+
-	+	+	+	+	+	○	-	○
+	○	○	○	○	○	○	+	+
+	+	+	+	+	+	+	+	+
-	-	-	-	-	-	-	-	+

Abbreviation of Material:

ABS	Acrylonitrile-Butadiene-Styrene	SB	Styrene-Butadiene
PA	Polyamide		
PC	Polycarbonate		
PMMA	Polymethylmethacrylate		
PPE	Polyphenylene-Ether		
SAN	Styrene-Acrylonitrile-Copolymeride		

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