



**Intelligent
Solutions for
Conductive
Thermoplastics**

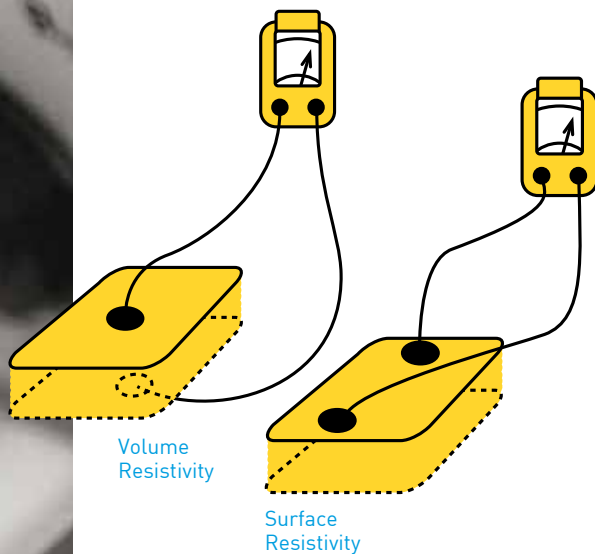
Pushing the Boundaries of Electrical Conductive Engineering Thermoplastics

Electrostatic Discharge (ESD)

All materials are made of atoms and therefore, composed of negative, positive charged and neutral particles. When two materials came in contact with each other the outer shell of electrons becomes shareable. While materials with sparsely filled outer shells tend to gain electrons, materials with weakly bound electrons tend to lose electrons. Thus resulting in one material being positively charged and the other one equally negatively charged. If the material is electrically conductive, excessive charge will be neutralized by either gaining or losing electrons from earth. If the material is insulative, such as with plastics, electrons will not be able to move freely; charges will locally build up and thus electrostatic charging occurs as a consequence. When a statically charged material both accumulates enough voltage and comes near a conductor, static charge discharges with an arc which can yield undesired or even destructive outcomes. This uncontrolled discharge of static charges is called electrostatic discharge (ESD).

The Danger of Static Charges

Accumulation of electro static charges will eventually yield electro static discharge. ESD can damage electronic equipment or even cause an ignition if the environment contains flammable gases or dust. Other hazardous outcomes of the static charge building up are: increased dust accumulation and clinging of the films and fibers to itself or its surroundings. Therefore packages and containers used in the electronics industry and industries that use flammable materials must be able to dissipate static charges. In order to prevent these problems, plastics could be modified to be electrically conductive.



Electrical Resistivity & Surface Resistivity

Electrical resistivity is the property that indicates how strongly material opposes electron flow. The more material allows free movement of electrons, the less the electric resistivity will be measured. Hence there is a reverse relation between conductivity (σ) and resistivity (ρ).

SI unit for electric resistivity (also known as volume resistivity) is $\Omega \cdot \text{cm}$. Volume resistivity indicates the resistivity of a cubic unit. The measurement is done by placing electrode plates on the both side of the specimen with a given dimension. As rated voltage applied, test apparatus measures the electric current which yields the volume resistivity of the material.

Surface resistivity measurement is done by placing electrodes on the surface of the material. The same method is used for volume resistivity measurement, as the rated voltage applied, test apparatus measures the electric current flowing on the surface of the material.

Plastics are inherently insulative and their electric conductivity is increased by using various types of additives and reinforcements. Homogenous distribution of additives and reinforcements in the part will give the best result for conductivity. Final resistivity, therefore, is dictated by the process type, processing parameters and geometry of the final part.

Tailor Made Electrical Conductive Thermoplastics

eurotec®'s vast knowledge of conductive thermoplastics, has enabled the development of a large variety of grades for numerous applications and requirements.

◆ Anti-Static Compounds

(10^{12} to 10^9 ohm); Slow static decay times so that ESD is still a danger. Mainly useful for preventing dust accumulation.

◆ Static Dissipative Compounds

(10^9 to 10^6 ohm); Slow to moderate static decay times. Prevents electrostatic discharge on human contact.

◆ Conductive Compounds

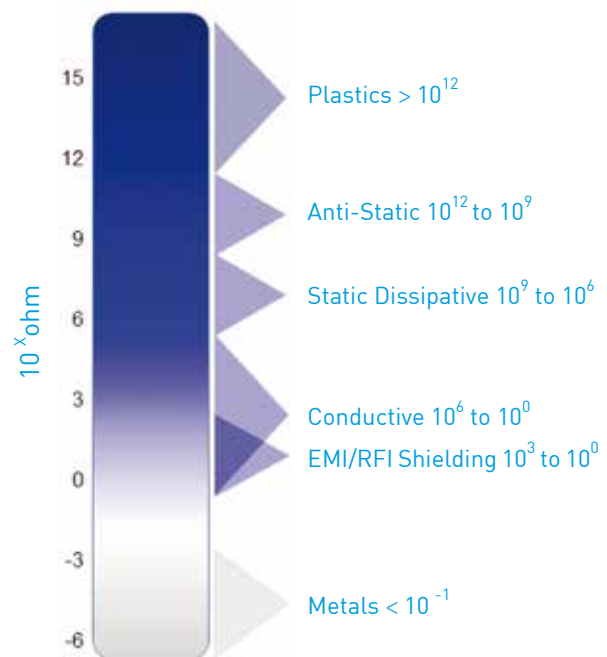
(10^6 to 10^0 ohm); Fast static decay times in milliseconds. Can provide grounding path.

◆ EMI/RF Shielding Compounds

(10^3 to 10^0 ohm); In addition to being highly conductive, these compounds can absorb and reflect electromagnetic radiation.

eurotec® produces permanent conductive compounds using a wide range of polymers, additives and reinforcements to develop grades with a wide range of properties such as:

- ◆ Colourable
- ◆ Transparency
- ◆ FDA compliant
- ◆ Metal detectable
- ◆ Non sloughing
- ◆ Flame retardant, and many more...





Foot Pedal Switch from Tecomid® offers;

Immediate and permanent antistatic effect, exceptional mechanical strength, colourability for aesthetics, and antistatic performance independent from humidity

Chair Wheel from Tecomid® offers;

Excellent static dissipative performance, outstanding surface quality, and exceptional abrasion resistance



ESD Trays from Tecotek® offers;

Protection of sensitive electronic equipment from static charges, excellent toughness and very good dimensional stability

POS Machine Chassis from Tecomid® offers;

Suitability for powder coating, very good stiffness, smooth surface, and excellent dimensional stability



ESD Crates from Tecolen® offers;

Excellent static dissipative performance, outstanding shock absorption, and secure stacking of sensitive goods

Pipette Tips from Tecolen® offers;

Consistent conductivity, smooth surface and excellent chemical resistance



Conductive Tapes from Tecolen® offers;

High durability, great puncture resistance and outstanding static decay times

Fuel Filler Neck from Tecoform® offers;

Consistent surface resistivity, outstanding static decay times, and weight reduction compared to metal equivalents





Radiator Screw from Tecomid® offers;

Suitability for powder coating, economic replacement of metal screws, outstanding mechanical strength to weight ratio, excellent deformation resistance at elevated temperatures

Rapier Gripper from Tecomid® offers;

Excellent conductivity, EMI/RF shielding capability, outstanding fatigue and wear resistance



Conductive Fibers from Tecolen® offers;

Excellent conductivity, easy processing and high strength

Crate Separators from Tecolen® offers;

Excellent static decay times and dimensional stability



Conveyor Belts from Tecolen® offers;

Outstanding static dissipative property, very high load bearing capacity, great toughness, and excellent self-extinguishing performance

Rigid Packages from Tecotek® offers;

Immediate and permanent antistatic effect, dust free packaging, high transparency, and antistatic performance independent from surface scratches



Conductive Films from Tecolen® offers;

Outstanding static dissipative performance, no loss in mechanical strength, and excellent tear resistance

Bubble Packaging Films from Tecolen® offers;

Immediate and permanent antistatic effect, easy colouring, antistatic performance independent from humidity and same physical properties of the polymer



NB30 BK EC 0D
PA6, unfilled, black
Conductive

NB30 BK EC 0E
PA6, unfilled, black
Conductive

NB60 CR10 BK111 IL
PA6, 10% carbon fiber reinforced, impact
modified, black, extrusion grade
Conductive

NB40 CR15 BK111
PA6, 15% carbon fiber reinforced, black
Conductive

PROPERTY	CONDITION	UNIT	STANDARD	NB30 BK EC 0D PA6, unfilled, black Conductive	NB30 BK EC 0E PA6, unfilled, black Conductive	NB60 CR10 BK111 IL PA6, 10% carbon fiber reinforced, impact modified, black, extrusion grade Conductive	NB40 CR15 BK111 PA6, 15% carbon fiber reinforced, black Conductive
GENERAL							
Density	-	g/cm ³	ISO 1183	1.19	1.22	1.14	1.19
Molding Shrinkage	Parallel / Normal	%	eurotec®	1.1 / 1.1	1.1 / 1.1	0.3 / 1.1	0.4 / 1.2
Moisture Content	-	%	ISO 960	< 0.2	< 0.2	< 0.2	< 0.2
Moisture Absorption	50% RH, 23°C	%	ISO 62	2.5	2.5	2.5	2.3
MECHANICAL							
Stress at Break	+23°C	MPa	ISO 527	70	70	120	155
Strain at Break	+23°C	%	ISO 527	-	-	4	3
Tensile Modulus	+23°C	MPa	ISO 527	3000	3500	8000	12000
Yield Strength	+23°C	MPa	ISO 527	-	-	-	-
Izod Impact, notched	+23°C	kJ/m ²	ISO 180/1A	6	6	12	6
Izod Impact, notched	-30°C	kJ/m ²	ISO 180/1A	5	5	-	5
Izod Impact, un-notched	+23°C	kJ/m ²	ISO 180/1U	-	-	-	-
Izod Impact, un-notched	-30°C	kJ/m ²	ISO 180/1U	-	-	-	-
THERMAL							
Melting Temperature	10 K/min	°C	ISO 11357	223	223	223	223
Heat Deformation Temperature	0.45 MPa	°C	ISO 75	-	-	-	-
Heat Deformation Temperature	1.80 MPa	°C	ISO 75	75	75	175	200
Vicat Softening Temperature	50N	°C	ISO 306	-	-	-	-
ELECTRICAL & FLAMMABILITY							
Volume Resistivity	-	Ohm.cm	IEC 60093	< 1E+3	<1E+1	<1E+5	<1E+5
Surface Resistivity	-	Ohm	IEC 60093	< 1E+3	<1E+1	-	-
Comparative Tracking Index	solution A	V	IEC 60112	-	-	-	-
Glow Wire Flammability Index	2 mm plaque	°C	IEC 60695	-	-	-	-
Glow Wire Ignitability Temperature	2 mm plaque	°C	IEC 60695	-	-	-	-
Flame Rating	0.75 mm	-	UL94	HB	HB	HB	HB
Flame Rating	1.6 mm	-	UL94	HB	HB	HB	HB

* data are based on dry as molded

NB30 GR13 BK EF PA6, 13% glass fiber reinforced, black Conductive	NB40 GR25 NL AS PA6, 25% glass fiber reinforced, natural Permanent antistatic	NB30 BK ET70 PA6, unfilled, impact modified, flame retardant -halogen (RoHS compliant), black Conductive	NB60 BK012 EP50 PA6, unfilled, impact modified, flame retardant -halogen free, black, extrusion grade Conductive	NA40 CR10 BK111 HS PA6.6, 10% carbon fiber reinforced, heat stabilized, black Conductive	NA40 CN20 BK012 HS PA6.6, 20% carbon fiber reinforced, heat stabilized, black EMI/RF shielding	NA40 CR20 BK111 HS PA6.6, 20% carbon fiber reinforced, heat stabilized, black Conductive	NA40 CR20 BK111 JA PA6.6, 20% carbon fiber reinforced, heat stabilized, PTFE modified, black Conductive	NA40 CR30 BK111 MB PA6.6, 30% carbon fiber reinforced, impact modified, heat stabilized, black Conductive
1.30	1.31	1.34	1.20	1.18	1.28	1.22	1.25	1.23
0.3 / 1.0	0.2 / 1.0	-	-	0.3 / 1.1	-	0.3 / 1.1	0.3 / 1.1	0.3 / 1.1
< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2.0	2.2	1.8	1.8	2.5	2.2	2.2	2.0	1.5
100	90	65	50	150	125	200	190	210
3	-	5	-	2.5	1.5	2.5	2	2
6000	7000	3500	2500	9000	12000	15000	15000	19500
-	-	-	-	-	-	-	-	-
7	11	6	7	5	6	8	8	12
5	10	5	6	-	5	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
223	223	223	223	262	262	262	262	262
--	-	-	-	-	-	-	-	-
170	175	80	60	235	245	245	245	240
-	-	-	-	-	-	-	-	-
<1E+3	-	<1E+3	-	<1E+5	<1E+4	<1E+4	<1E+4	<1E+3
-	<1E+9	<1E+3	<1E+3	-	<1E+3	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	960	-	-	-	-	-
-	-	-	-	-	-	-	-	-
HB	HB	-	V0	HB	HB	HB	HB	HB
HB	HB	V1	-	HB	HB	HB	HB	HB

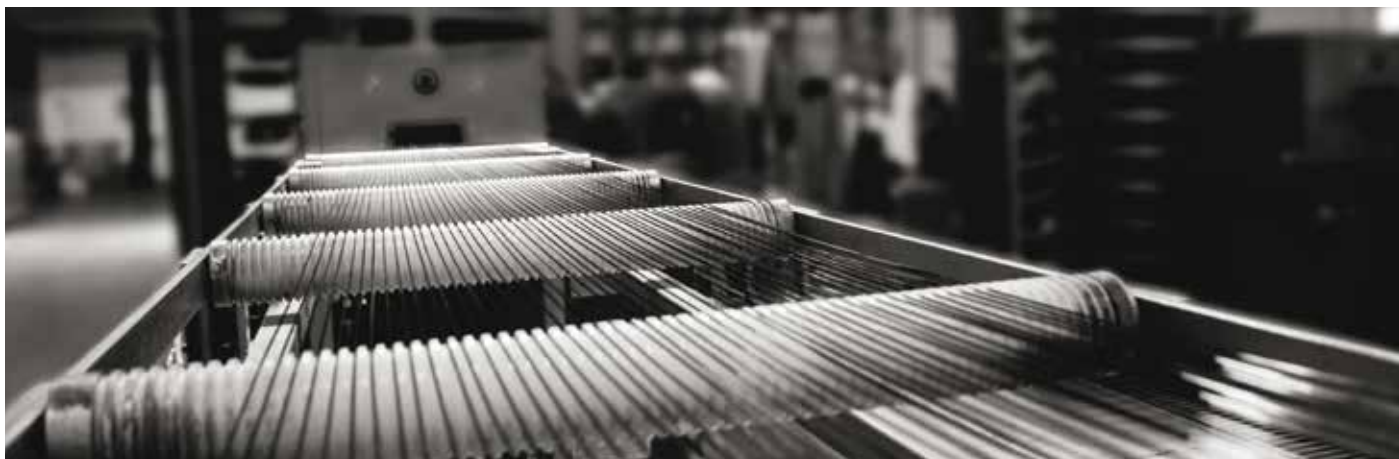
All information in this complete document presents current state of knowledge and experience. The information and data may not be valid when any mentioned material is used in combination with other materials. These data do not guarantee certain values since may vary on processing conditions and end-use conditions. All information and data are provided for reference purposes only and should not be used alone to create specification limits and design basis. It is strongly recommended to test the product under own processing conditions and test facilities to determine the suitability for the required application and use.

			Tecodur®			Tecotek®			
NA40 CR30 BK111 PA6.6, 30% carbon fiber reinforced, black Conductive	NA40 CR45 BK111 HS PA6.6, 45% carbon fiber reinforced, heat stabilized, black Conductive	NA40 CR40 BK111 XA70 PA6.6, 40% carbon fiber reinforced, flame retardant - halogen (RoHS compliant), heat stabilized, black Conductive	PB70 CR20 BK111 EC PBT, 20% carbon fiber reinforced, black Conductive	PB70 CR30 BK111 PBT, 30% carbon fiber reinforced, black Conductive	PB70 GR15 BK111 EF PBT, 15% glass fiber reinforced, gas injection grade, black Conductive	PC40 BK EC 0B PC, unfilled, black Static dissipative	PC40 SR15 BK002 TD70 PC, 15% steel fiber reinforced, flame retardant - halogen (RoHS compliant), black EMI/RF shielding	PC30 KR27 BK016 TD70 PC, 27% carbon fiber/steel fiber reinforced, flame retardant - halogen (RoHS compliant), black EMI/RF shielding	PS00 BK EC PS, black Static dissipative
1.27	1.34	1.52	1.40	1.41	1.41	1.25	1.40	1.40	1.09
0.2 / 1.0	-	-	-	-	-	-	-	0.2 / 0.6	-
< 0.2	< 0.2	< 0.2	< 0.08	< 0.08	< 0.08	< 0.1	< 0.1	< 0.1	-
1.9	1.5	-	0.2	0.2	0.2	0.2	0.2	0.2	-
225	250	220	120	150	80	70	65	130	20
2	1.5	1	1.5	1.5	2	-	-	1.5	-
20000	30000	40000	16000	24000	5500	2750	3250	15000	2500
-	-	-	-	-	-	-	-	-	-
10	14	12	7	7	7	7	7	8	5
-	-	11	6	6	6	6	-	7	4
-	-	-	45	45	-	-	-	-	-
-	-	-	40	40	-	-	-	-	-
262	262	262	225	225	225	-	-	-	-
-	-	-	-	-	-	-	-	-	-
250	255	250	190	200	195	125	115	120	65
-	-	-	-	-	-	-	-	-	-
<1E+3	<1E+1	<1E+1	<1E+3	<1E+3	<1E+6	<1E+8	-	<1E+2	-
-	-	<1E+1	-	-	-	<1E+8	<1E+3	-	<1E+6
-	-	-	-	-	-	-	-	-	-
-	-	960	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
HB	HB	-	HB	HB	HB	HB	V0	V0	HB
HB	HB	V0	HB	HB	HB	HB	V0	V0	HB

Tecolen®

Tecoform®

	PM30 NL AS PMMA, unfilled, natural Permanent antistatic	CP10 BK EC 0C PPCP, unfilled, black Conductive	CP20 BK EC PPCP, unfilled, black Conductive	CP30 BK EC 0B PPCP, unfilled, black Static dissipative	CP30 BK EU71 PPCP, flame retardant - halogen (RoHS compliant), black Conductive	OE00 BK EC PE, unfilled, black, extrusion grade Conductive	OE10 NL EC 0B PE, unfilled, natural, extrusion grade Static dissipative	PO20 NLEM POM, metal detectable, suitable for food contact Permanent antistatic	PO00 BK EC 0E POM, unfilled, black Conductive
	1.16	1.00	0.99	0.97	1.15	1.14	0.98	1.48	1,42
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	60	20	25	20	20	15	10	-	50
	-	10	-	-	>100	>100	>100	-	-
	2750	1300	1250	1250	2000	500	100	2500	2250
	-	-	-	-	-	-	-	55	-
	3	25	60	60	12	25	25	8	7
	-	-	-	-	7	-	8	7	6
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	165	165	165	165	115	115	165	165
	-	-	-	-	-	-	-	-	-
	70	45	50	50	50	40	35	95	75
	-	-	-	-	-	-	-	-	-
	-	<1E+3	<1E+2	<1E+6	<1E+3	<1E+1	-	<1E+12	<1E+1
	<1E+10	<1E+3	<1E+2	<1E+6	-	<1E+1	<1E+9	<1E+12	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
	HB	HB	HB	HB	-	HB	HB	HB	HB
	HB	HB	HB	HB	V1	HB	HB	HB	HB



Tecomid® PA6, PA6.6, PA6.6/6, and PA blends

Tecomid® HT PPA

Tecodur® PBT, and PBT blends

Tecopet® PET

Tecotek® PC, and PC blends

Tecotek® PPO, and PPO blends

Tecolen® PP, and PE speciality

Tecoform® POM





Established in 2004 and based in European Free Zone/Corlu, eurotec® is a leading manufacturer of engineering plastics for various sectors, primarily automotive and transportation, electrical/electronic, home appliances, sports and leisure, safety equipment, garden and power tools, medical industry, construction & agricultural equipment, furniture industries.

Making a difference via its unique structure and approach to business, eurotec® sells more than half of its products in international markets and has managed to be the leader in the market with the help of its high quality products, sustained quality, multi-alternative solutions and understanding of aesthetics.

eurotec® supports its advanced technology with its dynamic and experienced human resources. Aiming to manufacture the best in the most efficient way and with the most possible competitive attitude, eurotec® supports its objective by continuous development efforts that involve offering a wide range of high quality products.

Adopting team work as a business philosophy, eurotec® views its customers as a part of this team. As customer needs and requests are forwarded accurately and completely to the R&D Department as a result of mutual information exchange, a product and application development process customized according to the customer needs are planned and implemented. Thanks to this process, we ensure that special products in desired colours and quality meet the requirements of the customer from each and every aspect and that they are designed in the shortest time possible with minimum amount of trials.

Tests are conducted in latest technology R&D and Quality laboratories, in compliance with ISO and other generally accepted international standards by using automatic and semi-automatic equipment to obtain reliable and reproducible results. eurotec® offers the following comprehensive services to its customers and business partners;

- ◆ Development of customized products, applications and colours at pilot facilities
- ◆ Material identification
- ◆ Flame and fire resistance tests
- ◆ Accelerated ageing tests against environmental and extraordinary conditions/ influences
- ◆ Colour and gloss measurements
- ◆ Mechanical and physical tests
- ◆ Electrical and thermal tests
- ◆ Instrumental analysis
- ◆ Rheology and process ability applications
- ◆ Customer process simulations and
- ◆ Other tests specific to the customer



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