Conductive Compounds and Concentrates

Permanent Electrical Conductivity

Hubron's Conductive Compounds and Concentrates impart permanent electrical conductivity.

Conductive polymers and plastics are increasingly desired for a growing number of sophisticated end-uses. Most plastics are naturally non-conductive, hence their wide use as electrical insulators. Because of their ease of fabrication, chemical inertness and low density, however, polymers are highly desirable materials as a replacements to conventional materials. When some transfer of electrical charge is needed, modifications to the polymer must be made to increase conductivity.

This has resulted in plastics being formulated for use in four distinct application categories of increasing conductivity:

1.Insulating (e.g. wire coating)
2.Dissipative ("anti-static" polymers)
3.Conductive (materials capable of conducting modest amounts of electrical current)
4.Highly Conductive or Shielding (materials capable of conducting significant amounts of electrical current)

The tendency of materials to conduct electricity is generally expressed in terms of surface resistivity Ohms per square (Ω^2) - i.e. how resistant they are to the transfer of electrons. Generally thermoplastic polymers have a surface resistivity of 10^{12} to 10^{16} Ω^2 which characterises low transfer of electrons making them effectively insulators.To overcome this limitation, electrically conductive additives are added to the polymer compound.

The secret behind the best selection of compound/ concentrate lies in three important factors:
•Selecting the optimal carbon particulate type for the purpose;
•Formulating the compound/concentrate to get the optimal balance of appearance, physical, chemical and electrical properties
•Optimising the melt processing and fabrication

Electrical Conductivity

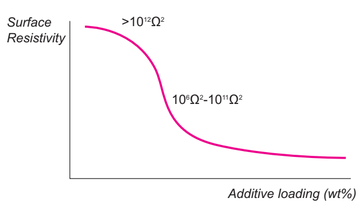
After exceeding a certain loading level of conductive particles, a polymer compound changes the electrically insulating base polymer into electrically conductive plastic. The decrease in electrical surface resistivity is due to the increased amount of particles and can be described using a percolation model. The percolation behaviour depends upon the aspect ratio of the particle, the particle size and its density and the chemical structure.

The percolation curve illustrates the relationship between the quantity by weight of added conductive additive and the achieved electrical resistivity. There is a narrow threshold in which the electrical resistivity dramatically drops. After this threshold level, increasing the amount of conductive additive will only marginally improve the electrical properties.

With its extensive knowledge of dispersion of carbon nano-particles into polymers, Hubron has developed a range of conductive compounds and concentrates based on carbon particulates (high structure carbon black, graphite's, graphene's and carbon nanotubes) incorporated into specially selected polymer grades to offer the most reliable and cost-efficient choice for producing electrically conductive plastic compounds. We are also able to develop a grade just suitable for you.

Speak to us about your needs and let us give you the winning formula.

Percolation model



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Conductive Compounds Grades

Grade	Polymer Type	Typical MFI (dg/min)	Surface Resistivity (Ω^2)	Flexural Modulus (MPa)	Tensile Strength (MPa)	Izod Impact (KJm^{-2})	Process: *Blown Film*	*Blow Moulding*	*Sheet*	*Extrusion*	*Injection Moulding*	Typical Use	Comments
PEB4055	LLDPE	7.5(MFI_{10}@190C)	$<10^4$	300	12.3	66.0	●		●	●		Conductive PE Film >25µm	Low resistivity IIde compound developed for film and sheeting
PECB8017	HDPE	5.0($MFI_{21.6}$@190C)	$<10^4$	1203	13.0	8.0		●	●	●	●	Sheet and Profile Extrusion	Low resistivity hdPE compound developed for sheet and Profile Extrusion
PECB8024	LDPE	38.0($MFI_{21.6}$@190C)	$<10^5$	286	9.0	45.0					●	Injection moulded parts, inc large mouldings	High impact,static dissipative grade, ideal for static safe packaging
PPCB8050	PP	35.0($MFI_{5.0}$@230C)	$<10^5$	918	17.8	41.0	●	●	●	●	●	Injection moulded with integral subparts	Low resistivity PP compound with excellent processing properties
PPCB8060	PP	69.0($MFI_{5.0}$@230C)	$<10^3$	771	15.6	41.3	●				●	Large and complex Injection Mouldings with integral subparts	Low resistivity PP compound with excellent high flow properties
PPCB8514	PP	9.0($MFI_{5.0}$@230C)	$<10^4$	1382	17.1	23.1	●		●	●		Film and Sheet extrusion	Low resistivity PP compound with good extrusion characteristics
PSCB8101	PS	30.0($MFI_{21.6}$@200C)	$<10^4$	2993	19.7	2.2			●	●	●	Sheet extrusion, injection moulding and thermoforming	Low resistivity PS compound with excellent high flow properties
PSCB8018	PS	20.0($MFI_{10.6}$@200C)	$<10^4$	1600	18.8	9.0			●	●	●	Sheet extrusion, injection moulding and thermoforming	Low resistivity PS compound with excellent high flow properties
PACB252	ABS	26.0($MFI_{21.6}$@200C)	$<10^5$	1737	10.9	3.4			●	●	●	Sheet extrusion and injection moulding for electronic components	Low resistivity grade with excellent melt strentgh and flow properties, ideal extrusion
PUCB112	PU	13.1($MFI_{10.0}$@190C)	$<10^3$	33	12.0 (yield)	No Break				●	●	Low resistivity flexible mouldings and extrusion profiles	Can be diluted with other polymers to give dissipative properties. 79 Shore hardness

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Conductive Concentrates Grades

Grade	Carrier Type	Typical MFI (dg/min)	Typical Surface Resistivity @ 50% dilution (Ω^2)	Polymer Compatibilty: *LDPE*	*LLDPE*	*HDPE*	*PP*	*ASA/ ABS*	*SAN*	*EPS*	*GPPS*	*HIPS*	*PA*	*PC*	*EVA/ PVC*	*TPU/ TPV*	Comments
PEB309	LDPE	16.0($MFI_{21.6}$@190C)	10^7	●	●	●										●	Suitable for blown film and moulding applications
PEB5502	HDPE	5.0($MFI_{21.6}$@190C)	10^7			●											Suitable for direct addition and compounding
PECB8519	HDPE	0.5($MFI_{21.6}$@190C)	10^6			●											Developed for pipe, suited to sheet and profile extrusion and geomembrane
PPB129	PP	15.0($MFI_{21.6}$@230C)	10^5				●										Suitable for direct addition and compounding
PSB317	PS	8.0($MFI_{21.6}$@200C)	10^7					●	●	●	●	●					Suitable for moulding, compounding and profile extrusion
PVB312	Universal	11.0($MFI_{21.6}$@190C)	10^5	●	●	●	●	●	●			●		●	●	●	Conductive concentrate on a universal carrier
PVB327	Universal	25.0($MFI_{21.6}$@190C)	10^5	●	●	●	●	●	●					●	●	●	Conductive concentrate on a universal carrier
NBB310	PA6	60.0($MFI_{10.0}$@275C)	10^8										●				Suitable for direct addition and compounding