HDPE-Graphene Masterbatch

AROS MB® HDPE - EX

AROS MB® HDPE - EX from Graphmatech is a high-density polyethylene (HDPE) masterbatch (i.e. ready-to-use granular mix) enhanced by our own unique and tailored Aros Graphene® Technology. The masterbatch is part of the AROS MB product range which embodies Graphmatech's expertise in Polymer Graphene Composites. AROS MB HDPE- EX is highly compatible with most standard HDPE grades available off-the-shelf and is easy to process on traditional polyethylene (PE) processing equipment due to its low melt-flow rate (MFR). The masterbatch is suitable for different extrusion techniques such as profiles, sheets and films, and typical extrusion temperatures for processing range from 195°C to 230°C.

Graphene is well known to have better physical and mechanical properties than other traditional additives, so adding AROS MB HDPE - EX into your HDPE will have a major influence on the final gas barrier properties, electrical properties, mechanical and thermal properties. AROS MB HDPE - EX solves the issues with re-agglomeration and non-homogenous dispersion common to traditional graphene solutions and thus eliminates the need for elaborate compounding.

- **ESD properties**
- **Excellent gas barrier properties**
- **Good chemical resistance (details upon request)**
- **Excellent mechanical properties**
- **Compatible with most HDPE grades**
- **Suitable for extrusion of mono-and multi-layer pipe**
- **Suitable for heating/cooling application**
- **Excellent processability**

FORMS OF SUPPLY

Shape	Black pellets 2-3 mm
Category	Can be supplied as a masterbatch or compound
Packaging	Delivered in 1kg, 5kg and 20kg sealed bags, contact us for larger quantities

GAS PERMEABILITY

	Test method	Unit	Reference	5% MB	27% MB	45% MB
H_2 permeability	ASTM D3985 – 17	$[mol \cdot m^{-1} \cdot s^{-1} \cdot MPa^{-1}]$	$3{,}0 \cdot 10^{-9}$	$2{,}6 \cdot 10^{-9}$	$2{,}5 \cdot 10^{-9}$	$1{,}8 \cdot 10^{-9}$

MASTERBATCH PHYSICAL PROPERTIES – TYPICAL VALUES

Properties	Test method	Unit	Values
Bulk Density	ISO 60-1	kg/m3	519,1
Density	ISO-1183-1	kg/m3	979,4
Peak Crystallization Temperature	ISO 11357-3	°C	107,8
Peak Melting Temperature - 2nd heating	ISO 11357-4	°C	131,2
MFR - 190C - 2,16kg	ISO 1133-1 A	g/10min	<10

PROCESSING RECOMMENDATIONS

Zone	Unit	Values
Zone 1	°C	185
Zone 2	°C	195
Zone 3	°C	195
Zone 4	°C	195-210
Zone 5	°C	195-215
Nozzle / Die	°C	195-230

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PHYSICAL PROPERTIES – TYPICAL VALUES

Values measured with different concentration of masterbatch in an HDPE extrusion grade. Samples were produced by compression moulding according to ISO 293/ISO 17855-2.

			Reference	5% MB	15% MB	30% MB
Properties	**Test method**	**Unit**	**Value**	**Values**	**Values**	**Values**
Bulk Density	ISO 60-1	kg/m3	/	459,8	467	475,5
Density	ISO-1183-1	kg/m3	941	944	949,5	954,6
Peak Crystallization Temperature	ISO 11357-3	°C	110,8	108,3	109,9	109
Peak Melting Temperature 2nd heating	ISO 11357-4	°C	127,4	131,8	129,8	131,4
MFR 190C - 2,16kg	ISO 1133-1 A	g/10min	0,55	0,48	0,32	0,22
HDT	ISO 72-2	°C	40	41	43	43
Coefficient of friction (Static)	ISO 8295 (plaque on plaque)		0,26	0,21	0,31	0,4
Coefficient of friction (Dynamic)	ISO 8295 (plaque on plaque)		0,29	0,31	0,31	0,39
IZOD IMPACT	ISO 180/1A	kJ/m2	23P	14P*	6,9P	4,9C
Tensile modulus	ISO 527-2/1B	MPa	749	810	896	945
Stress at Yield	ISO 527-2/1B	MPa	20,4	21,2	22,3	23,1
Strain at break	ISO 527-2/1B	%	518,4	304,1	213,9	27,1
Coefficient of linear Thermal Expansion	ISO 11359-1	10-6/K	264	222	204	205
After flame timeT1+T2	UL94 at 2mm	s	154	171	130	157
Tensile modulus (After Salt Spray)	ISO 527-2/1B, ISO 4611:2010	MPa	753	808	914	986
Stress at Yield (After Salt Spray)	ISO 527-2/1B, ISO 4611:2010	MPa	20,4	21,2	22,5	23,5
Strain at break (After Salt Spray)	ISO 527-2/1B, ISO 4611:2010	%	551,6	231,5	204,6	36,7
Dielectric Constant k'	ASTM D150-18, At 1Mhz		/	2,33	3,28	4,97
Dissipation Factor D	ASTM D150-18, At 1Mhz		/	0,001	0,002	0,031
Apparent Surface Resistivity	ASTM D257-14, At 500V	(ohm/square)	/	5,24E+15	5,24E+15	3,87E+15
Apparent Volume resistivity	ASTM D257-14, At 500V	(ohm.cm)	/	1,1E+16	1,09E+16	8,66E+15

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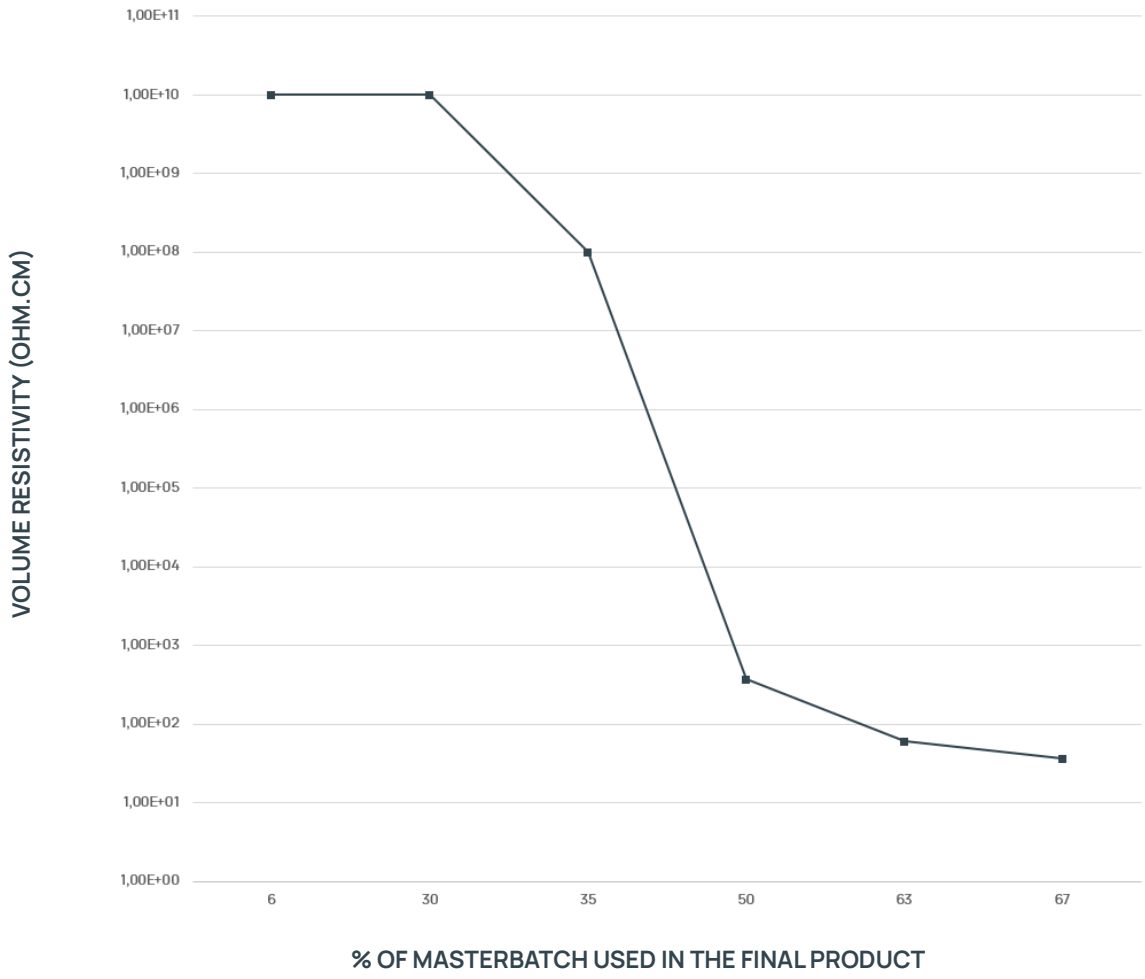
VOLUME RESISTIVITY VS. % OF MASTERBATCH USED

Test method: ASTM D257



CONTACT GRAPHMATECH

Are you curious to learn more about AROS MB HDPE or a possible collaboration?

Contact our team at sales@graphmatech.com or visit our website Graphmatech.com