PROPERTIES

Fully crosslinked finished articles made from ISOPLAS crosslinkable polyethylene will exhibit outstanding resistance to rigorous environments. The major areas of property improvement in comparison with conventional and many other thermoplastics are:-

IMPROVED HEAT RESISTANCE
IMPROVED OXIDATION RESISTANCE
IMPROVED WEATHERING RESISTANCE
IMPROVED LOW TEMPERATURE STRENGTH
IMPROVED CHEMICAL RESISTANCE
IMPROVED ENVIRONMENTAL STRESS CRACK RESISTANCE
IMPROVED LONG TERM STRENGTH AT ELEVATED TEMPERATURES
IMPROVED STRESS RESISTANCE AT ELEVATED TEMPERATURES
IMPROVED PERMEATION RESISTANCE

The results of detailed studies into the property achievements described above are available from Micropol's Technical Services Department.

One example of the improved performance of ISOPLAS GRADES is given by data on STRESS RUPTURE AT ELEVATED TEMPERATURES.

The most important property of a pipe is its pressure performance. This property is an outstanding feature of ISOPLAS crosslinkable polyethylene's performance and has been a major reason for its acceptance in the pipe industry in Europe for underfloor heating and domestic hot and cold water pipe systems. The improvement in comparison with conventional polyethylene has allowed it to be used under conditions previously thought to be beyond any polyethylene material.

Long term stress rupture tests on ISOPLAS at 95°C have so far failed to reproduce conventional polyethylene's characteristic fall or "knee". Thus the life of ISOPLAS crosslinkable polyethylene pipes can be successfully extrapolated beyond a design lifetime of 50 years.

Compared with other thermoplastic materials that could be used for pipes to carry hot water, ISOPLAS crosslinkable polyethylene has the major characteristic of the best predictable long term stress rupture resistance. In addition the change from a thermoplastic to a thermoelastic structure considerably improves its performance over polypropylene and polybutylene which will always retain their thermoplastic behaviour. Together with this exceptional stress rupture resistance other improved properties such as resistance to oxidation and outstanding thermal stability have led to ISOPLAS finding an increasing number of outlets in high quality systems and installations where long term security is essential.

Our current customers are offering 10 year warranties on pipe made from ISOPLAS for use in underfloor heating and are guaranteeing a permitted temperature range of -60°C to +92°C under a continuous pressure of 3 bar and are allowing for 50 years working life at conditions within this range. They are also guaranteeing short term exposure to 110°C at the same pressure. Pipe systems based on ISOPLAS ensure optimum quality and safety.

ISOPLAS Grades designed for central heating systems and for hot sanitary water applications have been tested in pipe form at 110°C and have not failed at pressure exceeding the requirements of DIN 16892 at periods well over double the 8000 hours requirement of this standard. Regression curves for individual ISOPLAS grades are available from Micropol.

POTABLE WATER CONTACT APPROVALS HELD BY MICROPOL

Water Research Council UK, Water Regulations Advisory Scheme
Water Fittings and Materials Directory Reference Numbers.
P471 0310502 P501 0308513 P602 9909519

Customers of Micropol have their own approvals from the following countries:

Italy	Gazette Ufficiale No. 104
	Certificate of the Laboratorio di Igiene e Profilassi di Milano
France	L'Institut D'Analyses et D'Essais du Centre-Ouest
Germany	D.V.G.W. K.T.W. Certificate
Switzerland	Bundesamt für Gesundheitswessen (B.A.G.)
Hungary	Staat Liches fur Umweltschultz
Portugal	Instituto Nacional de Saude
Belgium	Examen des Polluant de l'Eau
USA	NSF International ANSI/NSF Standard 61
Australia	AS 3855 or AS 4020
EC	**Formulations now available to meet the new EAS (harmonised) water regulations.**

Details of the approvals and the various migration limits imposed by the National authorities are available.

PROPERTIES

Physical Properties	Test Method	Units	Grade Range				
Mechanical			P381	P471	P501	P651	P602
Density	ASTM D792	g/cm^3	0.944	0.947	0.952	0.960	0.964
Tensile Strength at Yield	ASTM D638	MN/m^2					
at 23°C			23.0	24.0	26.0	31.0	31.0
at 100°C					6.5	9.0	
Elongation at break	ASTM D638	%	250	200	200	70	250
Modulus of Elasticity	ASTM D638	MN/m^2					
at -40°C					1400	2000	
at 0°C					1200	1500	
at +20°C			1100	780	1000	1800	1750
Thermal							
Melt Flow Index	ASTM D1238 190/2.16	g/10 mins					2.0
	190/5		1.75	0.30	5.0	1.5	8.0
Vicat Softening Point	ASTM D1525	°C	126	120	124	130	127
Specific Heat		KJ/kg/°C	1.9	2.0	2.1	2.1	2.0
Coefficient of Linear Expansion	ASTM D696						
at -20°C		PER °C			9.0×10^{-5}	9.0×10^{-5}	
at +20°C				1.3×10^{-4}	1.4×10^{-4}	1.4×10^{-4}	2.5×10^{-4}
at 100°C					5.0×10^{-4}	5.0×10^{-4}	
Thermal Conductivity	BS 874	cal/s/cm/°C	1.03×10^{-3}	1.03×10^{-3}	1.1×10^{-3}	1.1×10^{-3}	1.03×10^{-3}

APPLICATION AREA:

P381 - Pipes for underfloor heating
P501 - Pipes for Hot Sanitary Water
P602 - Injection mouldings
P471 - Alupex Pipes
P651 - Rigid pipes for District Heating Systems

The information given above is typical for the material. It should only be used to compare one material with another and does not guarantee performance under end-use conditions.

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