



MATERIAL GUIDE

The table below summarises the performance of different materials with more detail provided after the table:

Requirement	HDPE/PP	Concrete	FRP/GRP	PVC
Material life	Very good	Satisfactory	Can decay	Good
Abrasion resistance	Very good	Very poor	Poor	Good
Seismic performance	Very good	Poor	Poor	Satisfactory
Hydraulic efficiency	Very good	Satisfactory	Very good	Very good
Weight	Light	Very heavy	Very light	Heavy
Homogeneity	Yes	Yes	No	Yes
Water permeability	No	Yes	Yes	No
Chemical resistance	Very good	Very poor	Good	Good
Biological resistance	Very good	Poor	Very poor	Very good
Recycled in NZ	Very good	Rare	Nil	Rare
Ease of modification	Very good	Satisfactory	Poor	Poor
Brittleness	No	Some	Yes	Yes
Tensile Strength	Very good	Good	Satisfactory	Satisfactory
Compressive Strength	Good	Very good	Very good	Good
Deformation Recovery	Good	Nil	Nil	Nil



Busting some myths...

There are a number of incumbent technologies – concrete, FRP/GRP and PVC – that have no desire to be supplanted by HDPE. As a result, there are some myths floating around which need to be addressed:

Fat adhesion

There is no evidence that fat or waste adheres to HDPE, nor can any information be found on the issue globally. None of the proofs or studies of the Hazen-Williams nor Darcy-Weisbach equations have identified this as an issue.

Microplastics

Nor is there any evidence that microplastics emanate from HDPE more than an FRP tank and its epoxy layers or from the PVC pipes that initially handle the waste, in fact as the Darmstadt data below shows, less abrasion must mean less free particles.

Biological adhesion

The evidence shows that HDPE is the most resistant to the formation and adhesion of biofilms, which enable microbial accumulation and invasion.

Temperature

HDPE operates happily in the range of temperatures found in the global environment, and hence is used in the icy wastes of the Arctic and the scorching sands of Egypt (see pics below). It is not suitable for sustained use with liquids over 60C as this can degrade the material, but INFRAPIPE supplies the potable water, waste water and stormwater requirements which are for ambient temperature.

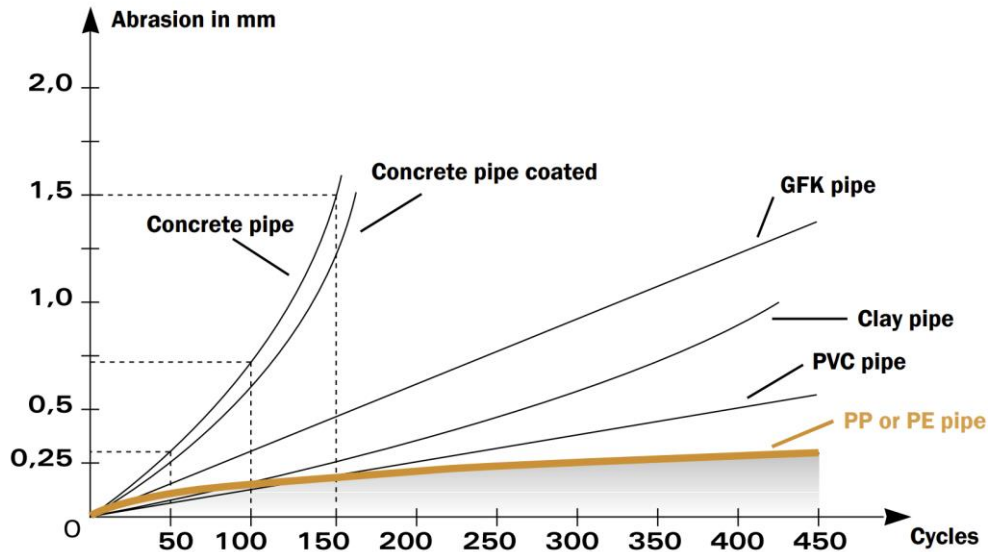
Material life – product life

The latest meta study by TEPPFA (see [INFRAPIPE website](#)) confirmed that the expected life of HDPE pipes is well in excess of 100 years.



Abrasion resistance – product life

HDPE has the optimum abrasion resistance of any pipe material as proven in numerous tests:



Abrasion curve of various pipe materials according to the Darmstadt procedure.

NB The above diagram is taken from a European paper, GFK is GRP/FRP.

The Darmstadt procedure, which has been the standard for abrasion testing since the 1960s, simulates the abrasion and resulting wear of liners and pipes that would occur in actual operating conditions by tilting a pipe section containing a mix of sand, gravel and water through 22.5 degrees above and below the horizontal for at least 100,000 cycles. The results for PP or PE pipe show a much greater resistance to abrasion and hence operating life is significantly longer.

Seismic performance – product life

HDPE pipes and tanks have high flexibility allowing them to absorb seismic energy without breaking or cracking unlike more rigid alternatives. The ductile nature of PE allows the structure to deform without breaking, allowing them to stretch and elongate rather than fracture. [See this survey of pipes after the Japanese earthquake of 2011.](#)



Hydraulic efficiency

The smoothness of pipe materials has been established as the Colebrook-White coefficient. Note this takes no account of degradation over time; a pipe with poor abrasion performance will have an even greater loss of performance. A lower figure is more efficient:

Material	Colebrook-White coefficient
HDPE/PP	0.0015
Concrete	0.15
FRP/GRP	0.06
PVC	0.03

Source: [CivilWeb](#)

Homogeneity

A material which is protected by an exterior layer is at risk should this sacrificial layer be penetrated through damage or abrasion.

Supporting terms

Conversion table

Euroflo™ "Size"	Actual ID	Infrapipe™ Size
160	150	150
200	180	200
250	220	225
315	280	300
400	350	375
500	430	450
630	530	525
800	640	600 / 700
1000	850	800 / 900
1200	1030	1000
1550	1400	1350 / 1500
1750	1600	1600
1950	1800	1800
2150	2000	2000