

## Technical Brief

Oceania Steel has developed the **ArmorPile™** product line of composite Steel UHMWPR marine piles ranging in nominal diameter from 100mm to 1,500mm with thickness ranging from 3mm to 32mm. Lengths can be made to order up to 18 metres per single length.

### **ArmorPile™** **Composite** **Pipe Pile**

**ArmorPile™** Marine Grade Sleeved Piles is a composite Pile consisting of High Grade LSAW (Longitudinal Submerged Arc Weld) Steel Pipe and **UHMWPE** (Ultra-High Molecular Weight Polyethylene) which has been developed for the Marine Industry and can be used for Mooring Piles, Dolphins, Wave Attenuator Piles etc.

**ArmorPile™** provides a lifespan of up to 50 years depending on treatment and application. The benefits of this composite system are the sleeves will never suffer corrosion, are abrasion resistant, and will withstand the harshest UV environments. **ArmorPile™** offers low maintenance costs with very limited marine growth on the **UHMWPE** surface.

### **Issues with Standard Coatings**

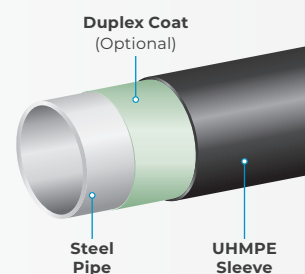
Corrosion of Marine Structures is an issue. Locations with increased humidity and salinity provides an environment for greater corrosion severity.

Standard coated steel piles consist of layers of epoxy or duplex paint systems that protect the underlying steel but relies on the bond to the steel being maintained at all times. Once the bond is compromised accelerated oxidation and ageing occurs and corrosion sets in. Abrasions which result in exposing of steel surface can happen during installation or during serviceability of the structure or element. **Epoxy coatings can be expected to last 10-20 years depending on end use and environment.**

### **Benefits of ArmorPile™** **Composite Pile**

**UHMW-PE** (Ultra-High Molecular Weight Polyethylene) sleeves have been used as an alternative to spray and chemical bonded coatings. **UHMWPE** is similar to **HDPE** but **UHMWPE** can be more easily modified in terms of wall thickness.

Both **HDPE** and **UHMWPE** provide robust wear protection and corrosion resistance requiring little or no maintenance. **ArmorPile™** is heat shrunk tight fitting, and smart looking, whereas **HDPE** sleeves are traditionally installed after the pile is driven and may require grouting of the annulus. **ArmorPile™** offers greater structural integrity, less materials, as well as increased efficiencies during pile installation.



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**FORESHORE MARINE**  
QLD PTY LTD

## Properties

	TEST METHOD	UNIT	HDPE	UHMWPE	STEEL PIPE
Viscosity-Average Molecular Weight	ISO1628-3	104g/mol	<50	300-1050	-
Approx Melting Temperature	ISO11357-3	C°	129	136.00	1410.00
Water Absortion	ISO62-1999	%	<0.01	<0.01	-
Coefficient of Linear Thermal Expansion	ISO11359-2	10 <sup>-4</sup> /C°	1.2	1.50	0.17
Density	ISO1183-1-2004	g/cm <sup>3</sup>	>0.940	0.935-0.945	7.8
(0.45MPa) Heat Deformation Temp	ISO75	C°	71	85	1230
Tensile Strength	ISO527	MPa	<25	>39	550.00
Yield Strength	ISO527	MPa	20	≥22	≥345
Tensile Elongation	ISO527	%	≥350	≥250	20.00
Gap Beam Impact Strength	ISO179	KJ/m <sup>2</sup>	<27	No Fracture	No Fracture
Rockwell Hardness	ISO2039-2	R	33	40.00	45 (C)
Friction Coefficient	ISO9295	-	0.28	0.05-0.11	0.58
Mortar Wear Index	-	-	10	1.00	7.00
Scalling	-	-	Slight	No Scalling	Heavy
Corrosion Resistance	-	-	Common	Excellent	Poor

## Performance

	HDPE	UHMWPE
Diametre (mm)	DN100 - DN3000	DN100-DN2750
Wall Thickness	10mm - 42mm	3mm - 20mm
Anulus to steel	5mm - 100mm	0mm - 2.00mm
Toughness	Tough	Very Tough
Impact Resistance	Medium	High
Abrasion Resistance	Medium	High
Water Absortion	Minor	None
Colour	Black	Black / Grey / White / Orange / Green / Blue / Red
Crack Resistance	Medium	Very High
Adhesiveness	Minor	Highly none-adhesive
Sliding ability	Medium	Very High
Installation Method	Driven 500mm - 1,000mm beneath mudline at seabed.	None - Applied offsite
Installation Plant	Barge / Crane / Vibratory Hammer / Grout Plant	None - Applied offsite
Installation Cost	Medium to High	None - Applied offsite
Sleeve Cost (per Kg)	Low - Medium	Medium
Sleeve Cost (thickness = kg's metre)	Medium - High	Low
Applicable Modifications	Modify Pile Guides & Fenders	None

## Size

(Actual LSAW Pipe and UHMWPE Sleeve Diameters & Thicknesses can be manufactured to Clients Requirements)

LSAW STEEL Outside Diameter (mm)	PIPE DIAMETRE & UHMWPE THICKNESS (MM)			
	UHMWPE Wall Thickness - (mm) Outside Diametres shown in table			
	6 MM	8 MM	10 MM	12 MM
406.40	419.40			
457.20	470.20			
508.00	521.00			
558.80		575.80		
610.00		627.00		
762.00		779.00		
914.40		931.40		
1066.80			1087.8	
1180.00			1201.00	
1219.20				1244.20
1371.60				1396.60
1422.00				1447.00
1524.00				1549.00

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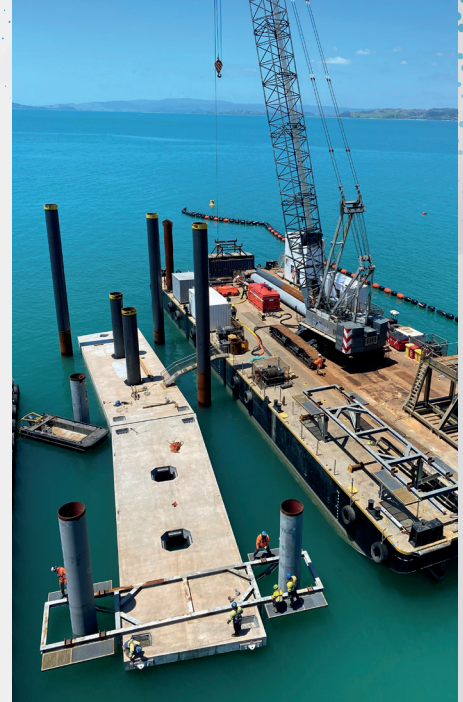
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Kennedy Point Marina Attenuator Piles installed by Heron Construction Co. Ltd, New Zealand



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