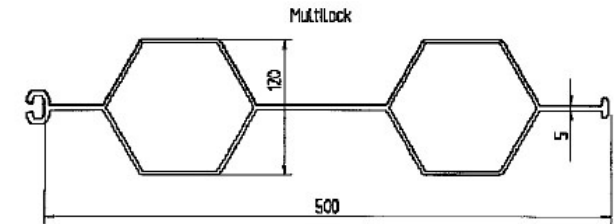
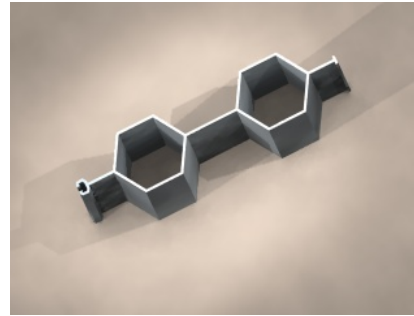
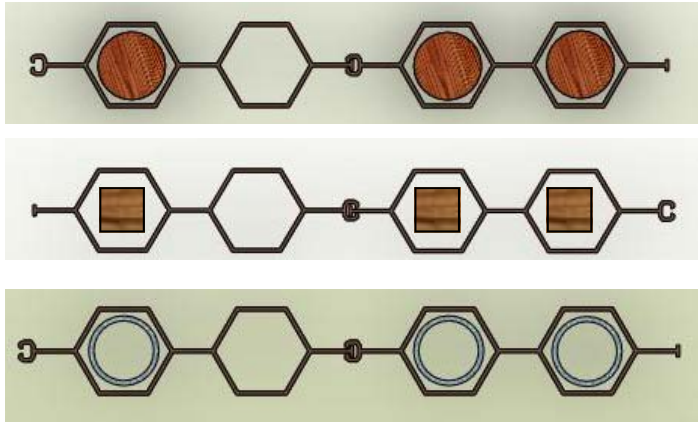




APE Plastic Piling

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MultiLock Plastic Pile Specifications as of 2/9/2008



The MultiLock product can be used on its own as a conventional sheet pile or can be used as a king panel with timber or steel inserts. The use of timber or steel will increase the bending moment of the piled wall. Information on how to establish the combined bending moment is shown overleaf. In the table below the data has been structured to indicate the number of piles, plastic timber or steel required or permissible over a linear distance of 1 metre. This is important as the bending moments and section modulus stated are relate to units per metre.

Pile		MultiLock	Softwood C1 Post		Hardwood Post		Steel Tube			
Quantity per metre wall		2	2	4	2	4	2	4	2	4
Allowable Bending Moment (M)	kNm/m	3.94	2.24	4.47	3.52	7.04	7.91	15.81	12	24
Section Modulus (Z)	cm ³ /m	175	196	392	100.5	201	33.6	67.3	48	96
Moment of Inertia (I)	cm ⁴ /m	1050	491	982			150	300	214	428
Stiffness EI	kNm ² /m	24	88	177	68	137	314	628	477	953
Flexural Strength f _{m, kar}	Mpa	60								
Design Flexural Strength f _{u, d}	Mpa	22.5								
Modulus of Elasticity (E) Serviceability Limit State	Mpa	2300	9000		17800		2.1 E+11		2.1 E+11	
Effective Pile Width	mm	500								
Depth/Diameter of Section	mm	120	100	100	80x80	80x80	88.9	88.9	88.9	88.9
Thickness (if Section or Tube)	mm	5					3	3	5	5
Material		PVC	C1	C1	Azobe	Azobe	Steel FeE235			
Weight per m (product)	Kg	6.2								

Bending Moments and Hybrid

MultiLock alone has a bending moment of 3.94 kNm/m, the manufacturers and their design engineers Geoconsult Noord, have based the product concept on an additive method, when used as a hybrid system with timber or steel; where both pile and post or tube are present. Note in a king panel design, there are clearly regions of the wall which are solely the tube or post.

With two hexagonal tubes built into its design, either or both of these can be used, so long as the space between post/tube does not exceed 50cm. See below for examples

Pile Options	MultiLock	MultiLock plus 1 C1 timber post	MultiLock plus 2 C1 timber post	MultiLock plus 1 88.9mm OD 3mm Steel Tube	MultiLock plus 288.9mm OD 3mm Steel Tube
Bending Moment	3.94	3.94 + 2.24	3.94 + 4.47	3.94 + 7.91	3.94 + 15.81
Total Bending Moment	3.94	6.18	8.41	11.85	19.75

Independent Analysis by the Caparo Innovation Centre, commissioned by APE, has stated where a design needs to be considered as conservatively as possible, the bending moments of hybrids should be based upon the stiffer of the two elements alone, as this will be supporting the loads, rather than a distribution between pile and post. In this more conservative approach the bending moment is based on a single element and so hybrid benefits are not taken into account.

