CONTROLS THE MIGRATION OF SEDIMENT INTO WATERWAYS

SILT CURTAIN

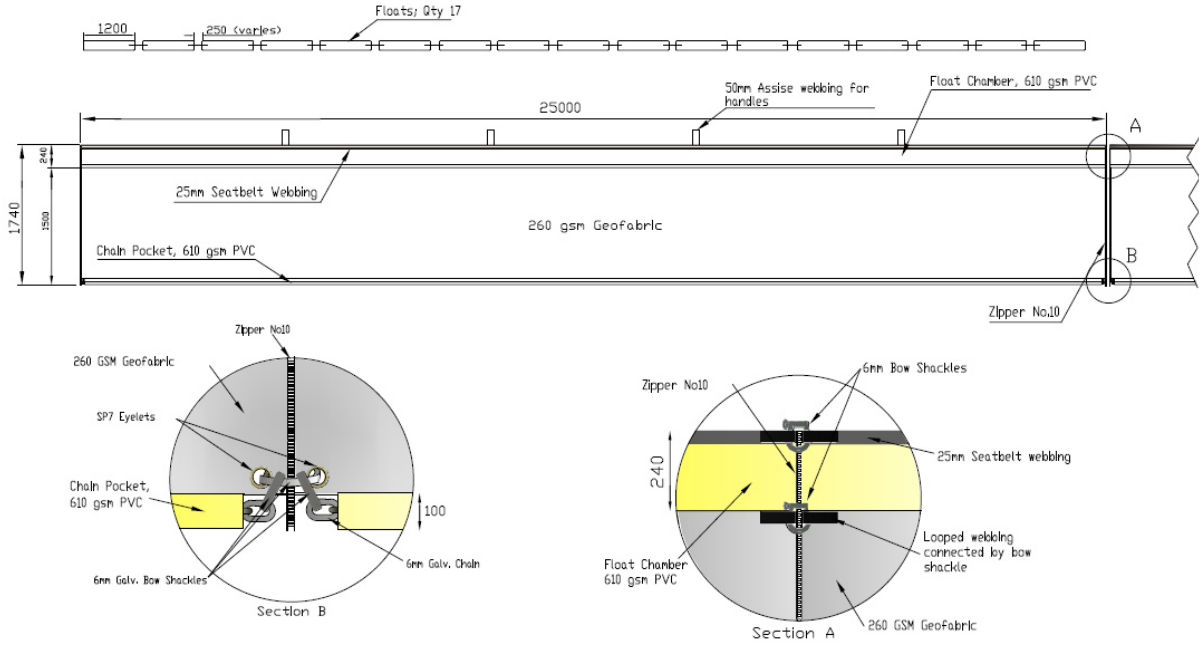
SELECTION GUIDE

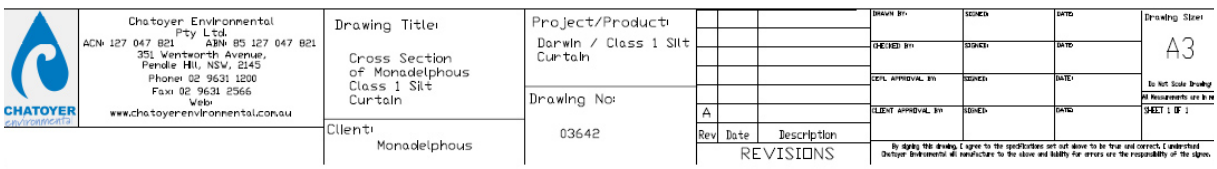
Silt curtains are structures suspended in the water column to control water-borne sediment. They can be either permeable or impervious and are also known as turbidity curtains, flotation curtains or silt screens.

A silt curtain is either a permeable or impervious structure that sits suspended in the water column to control migrating water bourne sediment. Also known as a turbidity curtain or silt screen, the silt curtain's function is to contain disturbed sediment about one to two metres from the surface. This allows suspended sediment to settle and drop within the water column by controlling dispersion. A silt curtain provides the necessary environment and time for the suspended sediment to settle to the bottom.

DRAWINGS AND INSTRUCTIONS

Drawings of the intended curtain can be submitted by Chatoyer Environmental, if required, for approval prior to manufacture. Complete specifications and material descriptions of all components can be supplied. Due to the degree of technicality, drawing sign-off by the client is a requirement for all of our customised and heavy duty permanent curtain designs.





SILT CURTAIN COMPONENTS

FREEBOARD

The portion of the silt curtain that sits above the water line.

DRAFT

The submerged portion of the silt curtain.

FLOTATION

Flotation consists of high density closed cell, polyethylene foam. These floats are crumble resistant and oil resistant, ensuring continued flotation. We offer various sizes and configurations.

SKIRT

The material used will depend on the conditions in which the curtain will be installed. Our most commonly used option is a 270gsm non woven geotextile fabric that stops anything larger than 90 microns.

BALLAST

The curtain is maintained in position by applying a ballast of galvanised chain sewn into a chain pocket at the base of the curtain. This ballast extends consistently for the full length of the curtain allowing for continuous tension.

STRENGTH WEBBING

Seat belt webbing will be installed along each section of curtain. One on top of the float, one directly below the float and, for large curtains, one between the ballast and skirt. The webbing will assist in supporting horizontal forces placed on the curtain.

CONNECTORS

The curtains shall be connected using specially moulded ASTM 962 connectors to attach the freeboard section of the curtain. These connectors provide strength and durability in the water. For offshore conditions opt for heavy duty moulded connectors.

Heavy duty marine zipper is utilised to connect the lengths of skirt which allows for identical sections of curtain to be replaced if necessary. Further, a selection of bow shackles will be used to ensure the connection of the curtains.

ANCHOR POINTS

Attachment points are present on all ASTM 962 connectors via stainless steel eye nuts and furnished with a galvanised steel chain, attached with a bow shackle on one side of the skirt and floating buoys.



HOW TO CHOOSE YOUR CURTAIN

Silt curtain effectiveness is considered as the degree of turbidity reduction achieved within the controlled area relative to the turbidity levels outside of the area. Factors which affect this effectiveness are:

- The quantity and type of material in suspension
- The characteristics, design and construction of the silt curtain
- The mooring and square metre area of the silt curtain deployed
- The hydrodynamic conditions experienced such as tidal movement, wind velocity and wave height.

In the instance of typical construction projects and pipeline disposals where suspended solid concentrations are high, a vast majority of the silt will drop to the bottom while only about 5% of the sediment remains suspended in the water column.

The silt curtain is not designed to dam the turbid water but instead provides a control for the dispersion of the sediment laden water and allowing it to settle.

CONSIDERATIONS

1. Is the curtain to be deployed in open water or stable (enclosed) waterways?

   OPEN WATER – ensure the curtain is robust enough to handle all sea states, tidal flow and wind conditions. You may require external (foam filled LDPE) floats and/or heavier duty geotextile to ensure appropriate buoyancy and longevity.

   ENCLOSED WATER - internal floats will generally suffice however you should understand the tidal influences on variable water depths, currents and winds. Internal floats are available in sizes 100mm x 100mm, 150mm x 150mm or 200mm x 200mm. The degree of currents and winds within the water column will also affect the weight of ballast required and connector types.

2. Is the curtain to be deployed for a time period greater than 12 months?

   SHORT TERM DEPLOYMENT – standard PVC construction will generally have sufficient UV stabilisation for short term deployment (<12 months in water).

   LONG TERM DEPLOYMENT – the construction material may need to be of a higher grade than standard PVC. We generally recommend polypropylene coated fabric which provides greater intrinsic strength than a standard PVC.

3. Is there vessel traffic in the area of deployment?

   YES – you may need to gain approval from waterways authorities and consider options to facilitate night time visibility, navigation markers, exclusion zones and more.

   NO – a standard curtain with standard installation should be approved.

4. How deep should the curtain be?

As a rule of thumb, turbidity is most active in the top two metres of the water column. Since the purpose of a silt curtain is to disrupt the water flow and allow the suspended solids to settle, your curtain should be deep enough to:

- Provide sufficient disruption to the water flow (current),
- Remain clear from the sea bed (or river bed) at low tide, and
- Take into consideration any EPA or other environmental requirements.

Unless required by regulatory or project requirements, a silt curtain does not need to go down to the sea or river bed to be effective. Allow a minimum half metre gap between the curtain and the sea bed at low tide. If the silt curtain is too deep, slack can be generated in the curtain skirt at low tide. This can create issues during periods of high wind as the curtain slack will billow and cause considerable forces against the curtain and mooring systems. Examples of airborne silt curtains have been cited due to incorrect skirt depths in wind prone areas. Some other issues arising with silt curtains that incorporate full depth skirts are:

- In calm water, sediment could build up over the ballast chain and start to drag the curtain down. This is also known as 'making sand' as the curtain moves back and forth over the bottom.
- In moving water, the curtain needs to be able to move freely allowing the forces of the water to pass through and under the curtain.
- A totally contained area through total depth silt curtains may have an adverse affect on marine fauna.

DESIGN SUMMARY CONFIGURATION MATRIX

The below table indicates recommended fabrication aspects for different curtain depths (internal floats) in Class 2 and Class 3 designs. Consultation with a technical expert is recommended.

Curtain Depth	Class 2 Enclosed Water		Class 3 Open Water	
	Float Size (mm)	Ballast Chain (mm)	Float Size (mm)	Ballast Chain (mm)
1 metre	100	6	150	8
2 metre	100	6	150	8
3 metre	100	6	150	8
4 metre	100	6	150	8
5 metre	150	8	150	10
6 metre	150	8	150	10
7 metre	150	8	150	10
8 metre	150	10	200	13
9 metre	150	10	200	13
10 metre	150	10	200	13

This is a guide only and alternative configurations may be required for the hydrodynamic conditions.

- **Low Risk -** calm water with little or no current, tidal flow , wave or wind action
- **Medium Risk -** consider current, tidal flow, wave and wind action on curtain
- **High Risk -** take care to fully understand natural forces on curtain

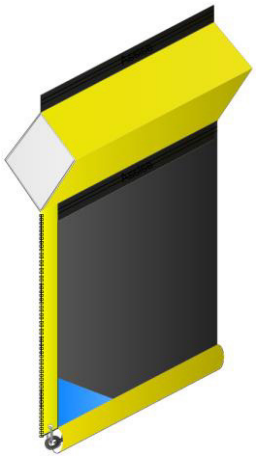
DESIGN SUMMARY – CLASS 2

MEDIUM RISK APPLICATIONS - MOST POPULAR DESIGN

Moderate wind and/or water forces.

Example: river, calm harbour

Application of Project	Medium term projects in sheltered water
Float Chamber Material	610gsm PVC
Float Size	100mm x 100mm or 150mm x 150mm
High Tensile Webbing Strips 50mm	1 above float chamber 1 below float chamber
Skirt (270gsm non woven geotextile)	Up to 8m depth
Galvanised Chain Ballast Thickness	6mm - 8mm
Connectors	Marine grade #10 zipper on skirt supported by lacing Standard ASTM 962 extruded aluminium connectors on float chamber
Triangle Patch Stitching (for tensile strengthing)	2 patches
Other	Handles Shackles Anchoring points Optional Toggle pins Reflective bouys



OPTIONS & ACCESSORIES

- External Floats
- HiVis (solar lights, reflective floats)
- Woven Geotextile
- Reinforce With Added Webbing
- Heavy Duty Moulded Connectors
- Anchor Set
- Tidal Riser
- Towing Bridle
- Installation / Removal

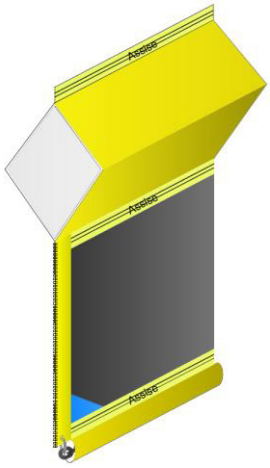
DESIGN SUMMARY – CLASS 3

HIGH RISK APPLICATIONS

Strong wind and water forces.

Example: open ocean, harbour, river mouth

Application of Project	Long term projects in open water
Float Chamber Material	900gsm PVC
Float Size	150mm x 150mm or 200mm x 200mm
High Tensile Webbing Strips 50mm	1 above float chamber 1 below float chamber 1 above chain pocket (uses updgraded load strap)
Skirt (270gsm non woven geotextile)	Up to 20m depth
Galvanised Chain Ballast Thickness	8mm 13mm
Connectors	Marine grade #10 zipper on skirt supported by lacing Heavy duty ASTM 962 extruded aluminium connectors on float chamber
Triangle Patch Stitching (for tensile strengthing)	2 patches
Other	Handles Shackles Anchoring points Optional External floats Toggle pins Reflective bouys



OPTIONS & ACCESSORIES

- External Floats
- HiVis (solar lights, reflective floats)
- Woven Geotextile
- Reinforce With Added Webbing
- Anchor Set
- Tidal Riser
- Towing Bridle
- Installation / Removal
- Heavy Duty Moulded Connectors

THE CHATOYER ADVANTAGE

- Over 50,000 metres of silt curtain manufactured in the last five years for the Australian, New Zealand and Pacific environments.
- Our technical experience translates to exceptional design and technical support.
- We ensure quality construction from our purpose built factory.
- Our materials and components are reliable and durable.
- Our curtains are delivered fully assembled and ready for immediate deployment.

DEPLOYMENT

Silt curtains supplied by Chatoyer Environmental are packed with the skirt furled and multiple sections connected and packed on pallets. This allows the silt curtain to be immediately deployed on site.

In projects that require a large length of silt curtain and hence numerous pallets, each pallet will be clearly identified and numbered. Pallet sections will be joined in consecutive fashion and pallets should be laid down as near as possible to the deployment zone.

Once the desired length of silt curtain is connected, the furled curtains can be towed to site at a maximum two to three knot speed. Ensure the curtain remains furled and is only unfurled once the silt curtain is secured to the anchoring system and in the desired position.

After the furled curtain has been anchored, the curtain should be checked to confirm the skirt is not twisted around the floatation chamber. Once the furled and untwisted curtain is anchored in the right location, remove the ties furling the curtain and allow the silt curtain system to drop into place. In the instance where the curtain needs to be manoeuvred back to its correct deployment position, refurl the curtain before dragging the silt curtain through the water. The movement of a silt curtain with its skirt deployed through water places undue pressure on the system.

MAINTENANCE

If the silt curtain system is to be deployed for an extended period (greater than 12 months), it is recommended that a maintenance schedule be implemented to maximise the effectiveness and longevity of the silt curtain.

Typical maintenance activities include:

- Monitoring the curtain skirt against the sea bed to ensure it is free moving and not anchored under sand or dispersed mud.
- Replacing worn or broken anchor lines.
- Reviewing the integrity of the PVC floatation chamber and connection points such as ASTM connectors and zips.
- Removal of marine growth from the curtain.
- Hardware is often placed under pressure, especially at anchoring points and the wear and tear on these parts should also be considered.

RECOVERY

To recover the silt curtain, refurl the curtain skirt and remove the mooring systems. Tow the system back to the launching site for removal from the waterway and disposal.

If the curtain is to be reused, it can be cleaned down with a high pressure washer to remove silt and sediment from the filter media. Once dry, the curtain can be packed on a pallet and stored. If serviced and stored properly, a high quality silt curtain system can be reused numerous times.

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Custom heavy duty Silt Curtain being deployed
Barangaroo, Sydney, NSW

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