Welcome to VORTEX Dredge Systems, home of the world's most powerful 4-inch dredge. VORTEX dredges have been designed by ROV operators and divers in direct response to requests from operators in the field.

Our patent-pending design offers a highly efficient, small and powerful alternative to current dredging technology.

Quick mobilization and minimum re-configuration time have been priorities for our clients so we have included in our kit the vast majority of components needed to field-install our dredge on almost any suitably-sized ROV.

Our standard 4-inch dredge has low operating power requirements of 38 lpm (10 gpm) at 206 bar (3000 psi), which enable this dredge to be used on most work class and smaller ROVs currently on the market.

VORTEX has the highest proven suction values in the industry. With 64kPa of vacuum as our standard 4-inch dredge setting, the VORTEX ROV and diver dredge has the power to quickly and efficiently remove material. However, 97kPa of vacuum is available with the Tornado.

VORTEX has experience working in the traditional oil and gas disciplines and the rapidly growing renewable sector such as wind farms, with our equipment often able to remain on board the ROV full time due to the modular installation option VORTEX provides. This dramatically reduces down-time re-configuring tooling.

Global awareness towards energy efficiency has been met by VORTEX with less energy input than our competitors. We have achieved this through careful selection of the best components available, combined with continuous development of new designs. The use of more efficient designs has resulted in the most powerful inlet vacuum specifications on the market. Every customer has the opportunity to maximize their production by choosing a dredge to best match their host hydraulic supply.

As clients are now finding out, if you have a specific host hydraulic supply to meet, VORTEX is also happy to modify a dredge unit to suit your needs.

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For maximum performance, choose a dredge to suit your host hydraulic supply. We can however tailor a dredge to specifically suit your hydraulic supply if by chance your requirements are not covered by our extensive range.

### Choose a Dredge

Shown is our current selection of dredge options. For maximum performance we recommend matching a dredge to suit your host hydraulic supply. We can however tailor a dredge to specifically suit your hydraulic supply if by chance your requirements are not covered by our extensive range.

<table>
<thead>
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<th>Water pump flow m³/hr through</th>
<th>Inlet vacuum KPa</th>
<th>Peak inlet vacuum [Min]</th>
<th>Water pump Flow</th>
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</tr>
</thead>
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<tr>
<td>Electric dredge 2 1/2 inch</td>
<td>50 KPa</td>
<td>50 KPa</td>
<td>64 m³/hr</td>
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<td>620 VAC minimum</td>
<td>4.6 t/hr (average)</td>
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<td>Standard 4 inch</td>
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<tr>
<td>Marina dredge 4&quot; (Under testing)</td>
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<td>310 m³/hr</td>
<td>200 bar</td>
<td>200 bar</td>
<td>200 bar</td>
<td>17 t/hr (average)</td>
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<td>TBA</td>
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<tr>
<td>Standard 6 inch</td>
<td>160 m³/hr</td>
<td>160 m³/hr</td>
<td>15 m³/hr</td>
<td>200 bar</td>
<td>200 bar</td>
<td>60 to 80 t/hr plus</td>
<td>TBA</td>
<td>15 m³/hr (est)</td>
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<tr>
<td>Hurricane 6&quot;</td>
<td>360 m³/hr</td>
<td>360 m³/hr</td>
<td>30 m³/hr</td>
<td>200 bar</td>
<td>200 bar</td>
<td>TBA</td>
<td>TBA</td>
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<td>TBA</td>
</tr>
</tbody>
</table>

For maximum performance, choose a dredge to suit the Hydraulic Supply.
4-INCH DREDGE
‘STANDARD’

The most powerful 4-inch ROV and diver dredge in the world, the VORTEX has removal rate performance more commonly seen in 6 inch dredges.

We have included the option of a jetting head kit, after extensive development to ensure there is no reduction in water flow to the dredge unit which can reduce available working vacuum.

Our client’s have been considered with the most complete dredge system available on the market today.

Applications:
• Salvage and marine science operations.
• Work class ROV construction and drill support.
• Relocation of drill cutting, mud, silt, sand, rocks.
• ROV and diver operated.

Operational Features:
• A completely modular system with many installation options for a variety of ROV's.
• A very comprehensive list of components and spares in one kit dramatically lessens mobilisation time and cost.
• True 4-inch performance with minimum 99 mm internal diameter over entire Venturi dramatically reduces blockages.
• Able to operate on lower hydraulic flow supplies than many competitors.

4-INCH DREDGE
‘TORNADO’

The most powerful 4-inch ROV and diver dredge in the world has just become even more powerful. The standard VORTEX 4-inch at 64kpa vacuum has removal rate performance more commonly seen in 6-inch dredges. The VORTEX 'Tornado' 4-inch dredge is capable of a near perfect vacuum - which to our knowledge, is unheard of with dredge equipment. We have yet to perform removal rate tests, though the increase in vacuum would bring according increases in removal rate performance.

Our client’s have been considered with the most complete dredge system available on the market today.

Applications:
Heavy duty dredge operations:
• Salvage and marine science operations.
• Work class ROV construction and drill support.
• Relocation of drill cutting, mud, silt, sand, rocks.
• ROV and diver operated.

Operational Features:
• A near perfect vacuum available at suction hose inlet.
• Same sized components as standard 4-inch dredge.
• Ideal for hi flow / low pressure hydraulic systems.
• A completely modular system with many installation options for a variety of ROV's.
• A very comprehensive list of components and spares in one kit dramatically lessens mobilisation time and cost.
• True 4-inch performance with minimum 99 mm internal diameter over entire Venturi dramatically reduces blockages.
• Able to operate on lower hydraulic flow supplies than many competitors.

VORTEX ‘TORNADO’ 4-inch vs Competitor (4-inch Venturi Test Data)
6-INCH DREDGE

The Vortex 6-inch is designed for Subsea excavation and disposal of sediments and gravel up to 140 millimetres. It is easily mounted to the ROV and requires no ship deck space and sea fastening. The Vortex 6-inch requires no specialist operator or additional cables between ship and sea floor.

Has optional jetter kit for breaking up seabed. Our low hydraulic consumption leaves enough hydraulic supply on most ROV’s to utilize a purpose built high pressure jetter unit if the task requires one.

Applications:
- Salvage and marine science operations.
- Work class ROV construction and drill support.
- Relocation of drill cutting, mud, silt, sand, rocks.
- ROV and diver operated.

Operational Features:
- Rapid interface to host ROV with adapter plate using standard Perry XL series tooling skid pin pattern.
- True 6-inch performance with 149 mm internal diameter over entire Venturi length greatly reduces chance of blockages.
- Suction capabilities = 64 kpa inlet vacuum.

Product description:
- The 6 inch dredge is a fully modular system designed for multiple integration options installing each component on the host ROV using the supplied brackets and frames.
- The 6 inch dredge has shown real world conditions to provide suction performance of 54 kpa. This HURRICANE 6 inch is capable of higher suction values.

General specifications:
- Based on iron sand and rocks at 2.375kg per litre
- Debris removal rates (ton/hr) 60 to 80 ton plus
- Venturi inner diameter [mm] 150
- Rated maximum stone size 140 mm
- Combined water pump flow = 310 m³/hr plus
- Suction hose diameter 6 in / (150mm)
- Exhaust hose diameter 6 in / (150mm)
- Inlet suction hose length 4 mtr standard to custom length
- Exhaust throw length 1700 mm standard to custom length
- Hydraulic flow required Flow = 26 gpm (100 lpm) MINIMUM
- Coupling compensator NO
- Hydraulic pressure required 206 bar (3000 psi) MINIMUM
- Overrun valve std YES
- Direction run valve std YES
- Operating depths Restricted only by flotation which is 3000 mtr standard rating
- Operate pump in air YES
- Flotation - optional
- Available suction at inlet Standard is 54 kpa plus
- Optional Jetter nozzle water pressure = 45psi plus (3 Bar plus)
**Marine Rotary Hoe**

A new tool to our product range, designed specifically for dredging in difficult soils that may be hard or very ‘sticky’ where water jetting has up till now been the only option. The principle here is to mechanically break up the soil composition and fluidize it in the same motion so it can be sucked away through the mouth of the tool.

This tool retrofits to the suction inlet hose of our existing 3, 4 and 6-inch dredges with simple cam locks and adapter as shown.

**Specifications:**
- Weight = 23 kg
- Hydraulic supply = 20 lpm (5 gpm) and 103 bar (1500 psi)
- Tyne rotation = 250 RPM
- Rotational torque = 30 ft / lb (40 Nm)
- 6-inch (150mm) inside diameter
- Officially tested on land in AP 40 crushed aggregate (rocks and sand) at 100 to 150 kPa
- Officially tested on land in volcanic ash / clay soils at 90 kPa
- Self clearing tynes
- Self adjusting linkages
- Environmentally friendly bearings - no oil
- Supplied as stand alone tool with hydraulic hoses, pressure reducing cross port relief valve, cam lock adapter to suit host dredge system and ROV handle shown.

*R* Specifications are subject to change without notice.

**Riser Pump**

**Specifications:**
- Hydraulic requirement: Pressure = 3000 psi (206 bar)
- Flow = 19.8 gpm (75 lpm)
- Performance: See attached flow chart
- Weight of pump = 43 kg in water

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**Dredge Jetter Kit**

Designed to retrofit over the existing suction inlet nozzle, the optional jettek kit has been designed to maximize use of water pressure from water pump whilst not reducing the suction created at the inlet. This retrofit system keeps unnecessary weight to a minimum in a simple, robust quick to attach kit, to suit 3 and 4-inch dredge kits.

**Dyneema Cutter**

This cutter gives a great deal of flexibility in sub-sea soft rigging cutting.

**Specifications:**
- Cutting force = 9900 lb / 4490 kg
- Weight = 20 kg
- Standard ROV handle options = Fish tail or multi grip
- Length = 815 mm
- Jaw opening at tips = 102 mm
- Jaw opening at widest = 146 mm
- Hydraulic supply = 2000 psi minimum

**Sample cuts shown are:**
- Yellow cable is 40 mm Kevlar reinforced ROV power and telemetry tether.
- Grey rope is 60 mm DYNEEMA SK75
  - Threaded into: Blue rope is 75 mm DYNEEMA SK75 (rated at 340t lift)
  - For a total of around 110 mm diameter shown in this cut
- 5000 kg lifting strips

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**Riser Pump Performance Graph**

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**Riser Pump Performance Graph:**

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  - For a total of around 110 mm diameter shown in this cut
- 5000 kg lifting strips
**SUB SEA OIL Absorption Tool**

**Introduction and assembly:**
Please find included one Marine Guardian system which has been built specifically for the purpose of absorbing hydrocarbon based contaminants from dilution in water. The funnel will need to be placed above the area of contamination so as to draw away contaminated water and pump it through the filter system. There is no known limitation to how much water can pumped through the filter system.

The Marine Guardian filter system has been seen to absorb 15 litres of EP80 oil at 50% filter saturation. These absorption rates may change depending on type and quantities of contaminants. You can orient the ROV handle in which ever rotation suits your application. Pump mounting brackets are also supplied. Item 9. You can mount the outlet nozzle Item 7 in which ever orientation suits your situation. The pressure reducing valve supplied Item 4 is set to restrict hydraulic supply from the ROV to the specifications required. Item 8 is the water pump inlet.

![Image of Marine Guardian system](image_url)

**Specifications:**
- **Hydraulic requirement:** Pressure = 1500 psi (103 bar) Flow = 5.2 gpm (20 lpm)
- Pump Performance: Approximately 230 lpm pumped from funnel through filters
- Each filter tested to absorb 1.5 litres of EP80 oil at 50% filter saturation
- Weight of pump = 43 kg in water
- Each filter gives approximately 7 kg of buoyancy in water before flooding from dry
- Each filter gives approximately 0.5 kg of buoyancy in water when flooded with water
- Each filter weighs approximately 8 kg in air when flooded with water
- Each filter weighs approximately 2.4 kg in air when flooding with water and drained for 12 hours
- Each filter weights approximately 1.5 kg in air when dry
- Any substance captured in the filters will be added to these weights
- Filter frame = 57 kg with filters dry
- 470 mm (including mounting brackets) x 750 mm (w) x 1150 mm (h)

**SUCTION Anchor Manager**

**General specification:**
- **Hydraulic:**
  - Std Hydraulic Input: 70 l/min
  - Max Hydraulic Pressure (Hyd motor): 350 bar
- **Product:**
  - Max water flow (Q= 70 l/min hyd): 150 m³/hr
  - Max press. Differential: 4.6 bar (Note: pump discharge orificed to provide optimum safe performance at lower caisson pressures)
- **Misc data:**
  - Connections: 3” ID hose
  - Weight in Air: 58 kg approx
  - Materials of construction: Stainless Steel
    - Thermoset Epoxy Resin
    - UHMWPE

**GAS Sampling Tool**

**Product description:**
- Tooling designed to capture gas or liquids escaping underwater for the purpose of recovery to surface for analysis.
- This tool is designed to be deployed from the surface with zero pressure in the containment bottles.
- Sample filling relies on pressure differential between the isolated sea level pressure inside the bottles and the surrounding ambient sea water pressure.

**General specification:**
- Complete tool Weight empty in air = 48.5 lb (22kg)
- Complete tool Weight empty in fresh water = 35 lb (16 kg)
- Containment bottle volume (Combined total of four bottles) = 0.475 gallon (1.8 litre)
- Potential gas sample volume when stored at 69 bar (1200psi) = 5.1 cubic ft (146 litre)
- Potential liquid sample volume = 0.475 gallon (1.8 litre)
- Main relief valve setting as of 20 Nov 2012 = 1200psi (82.7 bar) (subject to change as per client request)
- Complete tool dimensions = 35 inch (890 mm) long x 7 inch (180 mm) diameter
- Main isolation valve rated to 7250 psi (500 bar)
- Secondary isolation valve rated to 3000 psi (206 bar)
- Sample bleed off valve rated to 3000 psi (206 bar)
- Pressure gauge = 0 to 3000 psi (206 bar)
- Standard funnel diameter = 6 inch (150mm) Capacity = 780ml (0.82 quart).
- Extra funnel diameter = 10 inch (254mm) Capacity = 6 litre (6.3 quart).

**Depth rating – limited to ratings of valves and gauge as above.**
- Example: 3000 lbf/square inch (PSI) = 6,741 foot seawater = 2,054 meter seawater

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Please find included one Marine Guardian system which has been built specifically for the purpose of absorbing hydrocarbon based contaminants from dilution in water. The funnel will need to be placed above the area of contamination so as to draw away contaminated water and pump it through the filter system. There is no known limitation to how much water can pumped through the filter system.

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![Image of Marine Guardian system](image_url)

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- Each filter weights approximately 1.5 kg in air when dry
- Any substance captured in the filters will be added to these weights
- Filter frame = 57 kg with filters dry
- 470 mm (including mounting brackets) x 750 mm (w) x 1150 mm (h)
**Electric Dredge**

"Commissioning February 2013."

**General specification:**
- 2 ½" dredge Motor.
- 3ph 2 pole star wound Squirrel cage motor.
- 660V 60hz
- Output 5kW
- Full load current – 6.2 amps.
- Forced cooling oil circulation.
- External compensator.
- 49kg in air.

**ROV Oil Spill Mats**

Non-slip surface of mat. Allows oil and fuel to soak into absorbent pad whilst repelling water. Tie off points on each corner to secure in windy / wet locations.

**HYDRATE Brush**

Introduction:
To be used in conjunction with Vortex reverse flow dredge or with Vortex water pump only as the motive water source. Water jets on four sides and front of Hydrate cleaning brush utilizing high volume water (62 m³/hr with Tornado pump) and up to 80 psi water pressure (with Tornado pump) generate severe turbulence to break up and disperse the hydrate build up with water pressure and flow. Mechanical action of bi-directional rotary bush serves to further break up hydrates. Soft bristles avoid damage to sensitive EFL and HFL assets.

**General specification:**
- Hydraulic requirement: Pressure = 1500 psi (103 bar) minimum. Supplied PRV valve is pre-set to limit pressure seen at tool if 3000psi is sent to tool.
- Hydraulic flow = 4.2 gpm (16 lpm) Minimum
- Brush RPM = 1950 RPM (with OMM 8 motor)
- Brush torque = 11Nm (with OMM 8 motor)
- Weight of tool in air = 7kg
- Weight of tool in water = …6 kg
- Tool dimensions: 55 cm long x 16 cm mm wide x 16 cm high (with class 1 to 4 brush installed).
- Class 1 to 4 brush = 18 cm long x 16 cm diameter.
- Core & bristles = polypropylene, Plug ends = Sanilite.
- General cleaning brush = 14 cm long x 15 cm diameter.
- Core = Sanilite, bristles = polypropylene

**DREDge Direction Reversing Valve**

Introduction:
- Simple to retrofit to all Vortex 4 inch dredge systems via industry standard cam locks.
- This tool is designed to reverse the flow through the Venturi to clear the suction hose inlet nozzle in the event of debris blocking the inlet nozzle.
- Reversing valve Weight in air = 27 lb (12.5kg)
- Ball valve weight in air = 8.8lb (4 kg)
- Reversing valve dimensions = 13 inch (338 mm) long x 7 inch (182 mm) diameter.
- Hydraulic pressure required to operate ball valve = 34 to 206 bar (500 to 3000psi.)
- Depth rating – 3000mtr plus
- Inside diameter = 4 inch (100mm)
**SEABED Sample Grab Tool**

**Product description:**
- Design brief was to allow more flexibility to work in rough sea state when deploying tool through splash zone to avoid premature triggering of bucket closing mechanisms.
- This new design incorporates 650mm of vertical travel before bucket closes mechanism is activated, dramatically increasing deployment capabilities in rough sea state.

**General specification:**
- Maximum working load = 150kg
- Serial number = STOS DGV2-R31
- Sample buckets capacity = 0.01 cubic meter (collective total of four buckets)
- Overall height = 1296mm
- Overall width = 1200mm
- Gross weight = 115kg

**MARINE Growth Sample Tool**

**Product description:**
- This tool is designed to remove samples of marine growth from its habitat, suck the samples from the removal area and contain the samples in one of seven numbered sample bags for the purpose of recovery to deck and further scientific analysis of the samples.
- This tool is used in conjunction with a Vortex dredge pump and 2.5 inch Venturi to create the vacuum needed to suck the samples to the bags.
- Sample ‘bags’ are built with cam lock fittings to minimize on deck time of the ROV when swapping out used sample bags.
- This tool is supplied in a frame to simplify interface with host ROV.

**General specification:**
- Hydraulic Requirement:
  - Dredge pump: Pressure = 3000psi (206 bar)  
    Flow = 10.5 gpm (401pm)
  - Carousel location cylinder: Pressure = 500 psi (34 bar) minimum 3000psi (206 bar) maximum.  
    Flow = 1.5 gpm (61pm) Minimum (always set speed of cylinder as per following instructions)
- Weight of tool = 50kg in air
- Weight of tool = 30kg in fresh water
- Individual sample bag size by volume = approximately 2 Litres.
- This tool has been commissioned with 60psi (4.1 bar) in the carousel and bag circuit.
- NOTE Always function test the carousel through one full function with dredge pump switched on after each launch at around 10mtr depth. This will bleed out the air from the carousel components.
### Product description:
- Available exclusively from Ashtead Technology, the Vortex Multi Cutter is a flexible hydraulic cutter, suitable for cutting a wide range of materials from wires, casing, dynema and aluminium to mooring lines, dredge hose, hydraulic hose etc.
- Can be used as a full grab cutter or a basic half blade cutter, with or without grab arm mounts, and can also be operated in air.
- Motor can be operated in air
- Vortex Multi Cutter is powered by the proven Vortex dredge motor / mechanical sealing system for continued, oil tight reliability.
- Three blade options are available in the kit to allow cutting of for example:
  - Fiber rope up to 160mm or more
  - Steel pipes up to 150mm diameter
  - Pennant steel wire rope up to 75mm or more
  - Mooring line up to 160mm

### General specification:
- **Actual depth of cut with 400mm blade =** 130mm
- **Actual depth of cut with 500mm blade =** 155mm
- **Cutter motor hydraulic flow required =** 20 lpm (5 gpm) minimum
  - 50 lpm (13 gpm) maximum
- **Cutter motor hydraulic pressure required**
  - 103 bar (1500 psi) minimum
  - 241 bar (3500 psi) maximum
- **Overrun valve standard YES**
- **Direction valve standard YES**
- **Coupling compensator required = NO**
- **Grab arm hydraulic pressure required =** 200 psi minimum / 1000 psi maximum
- **Operating depths = Unrestricted**
- **Operate Motor in air YES**
- **Half blade tool weight in air =** 30 kg
- **Full grab tool weight in air =** 24 kg

### Specifications

<table>
<thead>
<tr>
<th><strong>4-INCH 'STANDARD'</strong></th>
<th><strong>4-INCH 'TORNADO'</strong></th>
<th><strong>6-INCH DREDGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Removal rates based on</strong></td>
<td>Actual material moved during testing using Magnetite black iron sand and rocks weighing 2.375 kg per litre</td>
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<tr>
<td>* 40 to 50 ton/hr - using 38 lpm (10 gpm) and 206 bar (3000 psi)</td>
<td>* 60 plus ton/hr - using 82 lpm (21.6 gpm) and 193 bar (2800 psi)</td>
<td>* 60 to 80 ton per hr plus</td>
</tr>
<tr>
<td>* 17 to 22 cubic meter/hr - using 38 lpm (10 gpm) and 206 bar (3000 psi)</td>
<td>* 27 plus cubic meter/hr - using 82 lpm (21.6 gpm) and 193 bar (2800 psi)</td>
<td>* Rated maximum stone size = 140 mm</td>
</tr>
<tr>
<td>* 10 to 12% solids by volume</td>
<td>* 17 plus % solids by volume</td>
<td>* Water pump flow = 205 m³/hr</td>
</tr>
</tbody>
</table>

| **Hydraulic supply required** | 38 lpm (10 gpm) and 206 bar (3000 psi) | to achieve 97 kpa = 61 lpm (16 gpm) and 124 bar (1800 psi) | 100 lpm (26 gpm) and 206 bar (3000 psi) |
| **Hydraulic hoses supplied** | Pressure and return = 3 mtr long, 4250 psi (293 bar) rated, -8 jic female swivel ends | Pressure and return = 3 mtr long, 4250 psi (293 bar) rated, -12 jic female swivel ends | Pressure and return = 3 mtr long, 4250 psi (293 bar) rated, -12 jic female swivel ends |
| **Suction capabilities** | 64 kpa (19 in/hg) using 38 lpm (10 gpm) and 206 bar (3000 psi) | 97 kpa (24 in/hg) using 81 lpm and 2800 psi | 64 kpa (19 in/hg) using 100 lpm and 3000 psi |
| **Complete kit in box** | 390 kg and 1020 mm high x 1000 mm wide x 1620 mm long | N/A | N/A |
| **Water pump weight in air** | 46 kg | 46 kg | N/A |
| **Water pump weight in water** | 44 kg | 44 kg | N/A |
| **Suction hose diameter** | 100 mm | 100 mm | 150 mm |
| **Actual internal dredge diameter** | 99 mm | 99 mm | 145 mm |
| **Potential debris diameter** | 98 to 99 mm | 98 to 99 mm | 149 mm |
| **Weight of optional aluminium frame** | 9 kg, 600 mm high x 420 mm wide x 700 mm long | N/A | N/A |
| **Complete skid** | N/A | N/A | 185 kg in air and neutral in water |

*All options and data accurate at time of writing and subject to change without notice*