



Unique Group
Buoyancy & Ballast



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SEAFLEX

Seaflex Application Note **The Use of Seaflex MBUs** **on Pulling Wires**

Helping contractors work more safely,
efficiently and profitably since 1987.

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Buoyancy Modules for Pulling Wire

Introduction

Various different installation scenarios and buoyancy options are possible, however clients will generally use Seaflex 1t or 500kg MBUs for pulling wires.

Seaflex MBUs offer great flexibility for installation purposes and are very often used on various stages of such projects: the pipe pull itself, and then also ancillary operations such as the pull wire installation and the tie-ins.

Underneath you will find an image (fig 1) of our single-attachment 1t MBUs being installed onto McDermott's pulling wire for the Macedon project in Australia, and later in this proposal you will find a list of recent references for the use of Seaflex buoyancy by contractors on such projects right around the world.



Fig 1: Seaflex 1t MBUs on Macedon shore pull head cable, 2012





The Seaflex Solution

We offer 2 main designs of enclosed buoyancy unit for pipeline projects. The first is the multi-attachment horizontally-mounted Inflatable Buoyancy Unit (IBU), and the second is the single-attachment vertically-mounted Mono Buoyancy Unit (MBU).

We would normally propose the use of the more efficient MBU design wherever there is sufficient water to use it, and for a pulling wire we would always recommend the MBU design over the IBU – with its single point of connection it is quick to rig up, and will always be at a favourable angle to the load.

Why do this the hard way?



Rigid buoyancy modules are possible alternatives, however if they are made of decent quality then when compared with the Seaflex solution you can normally expect to find that:

- Seaflex modules are cheaper per ton of capacity to buy
- Seaflex modules are cheaper again to rent
- Rigid modules tend to not be available to rent
- Seaflex modules are far less expensive to transport
- Seaflex modules are far less labour-intensive to use on-site due to their minimal weight compared to rigid modules

Other lower-cost options may be available, but less-engineered solutions do carry a greater risk with them of problems arising which may ultimately cost the project more than is to be saved at time of purchase.

Some of the potential consequences of using low-quality, low-cost alternatives for this type of work can be seen at the end of this link. We would simply ask you to consider not just the immediate dangers involved in the failure of such lifting elements, but also the cost to an installation contractor of the kind of delays to a project which can then result.

<https://www.imca-int.com/alert/1066/loss-of-3-tonne-lift-bags-owing-to-equipment-failure/>





Method of Use

Easily presented to the pulling wire due to its lack of weight (1t unit only 16kg), the Seaflex buoyancy module is then swiftly secured via a simple rigging arrangement as pictured opposite. It is then inflated to full working pressure prior to the pipeline being pulled into position.

Method of Rigging

Generally connected by a soft sling with taped sleeve (Fig 2) or via a simple wire (Fig 3), each at the cost of a few pounds / euros / dollars per unit.



Fig 2



Fig 3





Summary

A safe, efficient and ultimately profitable outcome to such pipeline installations – insofar as it can be influenced by the selection of buoyancy – can be assured via the following outcomes of adopting the Seaflex solution:

Ease of transportation, stowage and handling: up to 500t of capacity in just 1 x 20ft container

Speed of rigging / de-rigging due to lack of weight and minimal points of connection

Flexibility offered by ability to top-up or vent bags during the course of the operation to only provide buoyancy when it is required.

Diver and workboat friendly, due to decreased handling weight and ease of deploying extra buoys onto pipe if required / ease of retrieval via the hose once vented at the end of the job

Fully compliant with **IMCA 5:1 factors of safety**

No capex, no storage or maintenance considerations once the project is complete if rental option is selected.

Possibility of site support from Seaflex technicians if required.

A greater track record than any other manufacturer on the supply of inflatable buoyancy for such installations worldwide, as can be seen from the reference list later on in this proposal as well as the images of the use of MBUs on pulling wires and pipelines which are scattered throughout this Application Note.





Mono Buoyancy Units (MBUs) - Changing the Pipelaying Market

Designed for High Load Angles

Through listening to our customers, Seaflex has developed the MBU - a pioneering way of combining the different and hitherto incompatible operational benefits of our ALBs and IBUs.

The Seaflex MBU is enclosed buoyancy, but it has the essential advantage of having a single attachment point like an ALB, which makes it as tolerant to load angle as the parachute-type bag. So, unlike any other enclosed lifting bag in the world that we are aware of, the Seaflex MBU can be used in line with the load, and can be lifted through. Each Seaflex MBU design has been tested and proven to demonstrate a safety factor in excess of 5:1 on a pull through its axis (eg the 5t MBU design has been proven to resist a through-load of more than 25t). These loads are transmitted through the bag via a proprietary through-strop design, and as of today we are the only manufacturers to be able to demonstrate via testing that their product of this type is capable of offering any sort of safety factor over and above the capacity of the bag itself.

Easy to Handle and Deploy

MBUs are a more practical alternative to solid buoyancy in many situations, and are exceptional within towing scenarios. As they can be simply lifted from a single point, they can easily be recovered by crane with no possibility of tearing of the strop pocket or canopy. And 500t of MBU lifting capacity can fit into a single 20ft container.

User-controlled Buoyancy Variation

During the mobilisation phase, and particularly important during demobilisation, the air can be introduced and released in a controlled manner into and from single or multiple units to allow the load to settle gently into the correct position, or to reposition it if required, before the MBUs are vented and released under zero load.

Made to Last

Made of our toughest High Tensile Trevira® Polyester 3/3 base cloth coated with heavy duty UV stabilised PVC coating, MBUs are massively reinforced with six reducing concentric rings of fabric layers at each end, and are terminated with a custom made stainless steel lifting ring fitted into this reinforcement, rather than having an external harness or system of strops, which would lend themselves to being connected onto for convenience, and to damage being caused to the bag as a result.

Tested, Proven, and Changing the Market

Seaflex MBUs are available in 1, 2, 3 and 5 ton lift sizes, and as with all our products they are fully type tested and proven to the relevant international standards.

Since their introduction, many pipelaying contractors who were previously taking standard IBUs from Seaflex or from one of our competitors have now made the switch to be able to benefit from the unique operational advantages of our proprietary MBU design.





Key Features and Benefits at a Glance

For Your Ease of Operation

- Lightweight (approx 1% of capacity) and packed small for easy transportation.
- Fully compliant with IMCA D-016 recommended 5:1 factor of safety.
- Overall assembly physically tested and proven to exceed a 5:1 minimum WLL safety factor. Independent Type Test Certificates are available.
- Fitted with multiple pressure relief valves to ensure safety during use.
- High performance structural fabric canopy.
- RF welded seams.
- Structural through-strop for transmission of lifting loads.

For Your Peace of Mind

- Designed to transmit through-loads via single central connection, can be lifted via this point, can even be moored onto.
- Rental units inspected and tested between every single job.
- Buoyancy of individual or multiple units can be increased or decreased as required from the surface.
- 2 x ¾ inch BSP standard inflation/deflation valves with 3 16 stainless steel male Camlock adapter as standard.
- Leaffield Marine high flow pressure relief valves (PRVs).
- Delivered in an enclosed crate and ready for immediate use with universally compliant documentation: MBU specific log book containing certification, service records and operating manual.



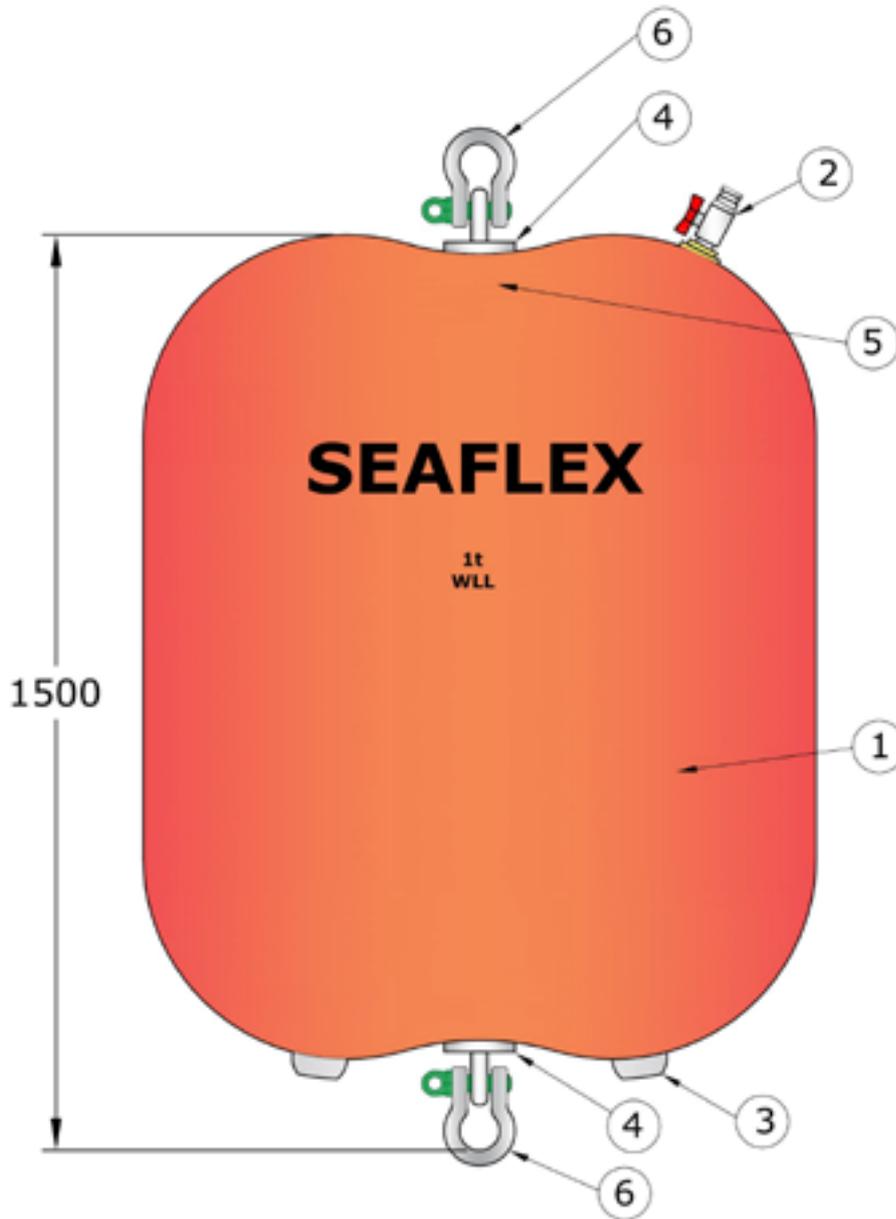
Model No	Inflated (Kgs & Mtrs)			Packed (Kgs & Mtrs)			
	Lift	D	H	Wt	L	W	H
250KG MBU	500	0.6	1	8	0.4	0.2	0.1
500KG MBU	500	0.85	1.5	10	0.3	0.3	0.15
1 MBU	1,000	1	1.5	15	0.6	0.5	0.2
2 MBU	2,000	1.33	1.7	18	0.75	0.6	0.2
3 MBU	3,000	1.5	2.2	27	0.8	0.65	0.2
5 MBU	5,000	1.75	2.2	37	1	0.8	0.2



PRODUCT DETAILS:

Max Height Filled - 1.5m
Max Diameter Filled - 1.0m
Product Weight - 16kg Approx

1t Mono Buoyancy Unit Component List			
Item Number	Component Title	Component Description	QTY Per Unit
1	Canopy	Heavy Duty PVC coated Polyester Base Cloth	1
2	Inflation Part	1" Skin Fitting complete with quarter turn Globe Valve terminating in a 1" Camlock	1
3	PRV	Pressure Relief Valve	2
4	Toggle Assembly	Stainless Steel Toggle complete with Stainless Steel Eyebolt internally	2
5	Internal Strap	Internal Duplex Strap	1
6	Shackles	Galvanized Green Pin Screw Shackles	2



The Lifting Shackle on the top is connected to the Load Shackle on the bottom with a WLL of 1t. So a Crane may be used to lift the MBU from the top with a 1t Load suspended from the bottom Shackle.

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DOCUMENT 1t Mono Buoyancy Unit Specification Sheet	SCALE N.T.S @ A3
PROJECT NUMBER Mono Buoyancy Unit (MBU)	DRAWN GJP
DRAWING NO. 1t - MBU - 55	REVISION 01



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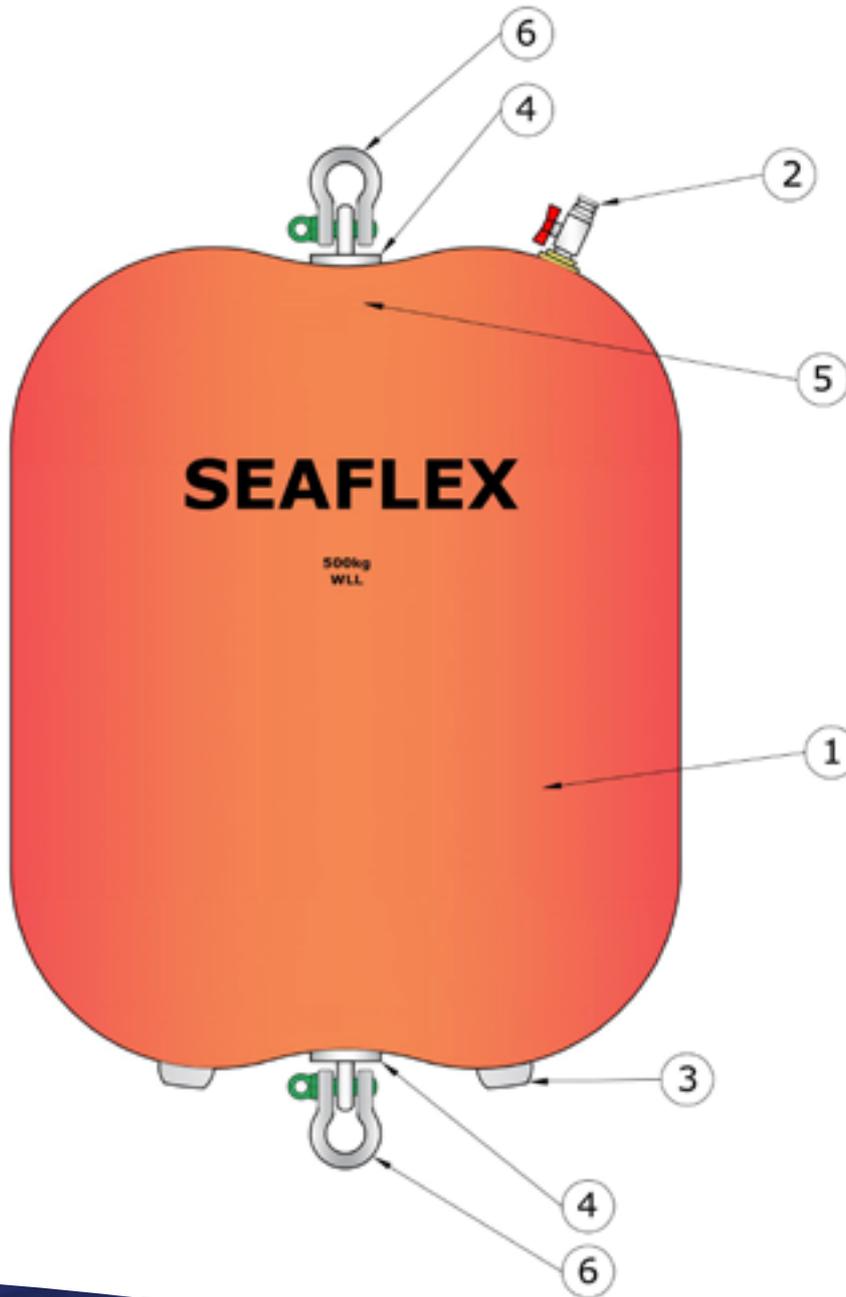
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PRODUCT DETAILS:

Max Height Filled - 1.5m
Max Diameter Filled - 0.885m
Product Weight - 10kg Approx

500kg Mono Buoyancy Unit Component List

Item Number	Component Title	Component Description	QTY Per Unit
1	Canopy	Heavy Duty PVC coated Polyester Base Cloth	1
2	Inflation Port	1" Skin Fitting complete with quarter turn Globe Valve terminating in a 2" Camlock	1
3	PRV	Pressure Relief Valve	2
4	Toggle Assembly	Stainless Steel Toggle complete with Stainless Steel Eyebolt internally	2
5	Internal Strip	Internal Duplex Strip	1
6	Shackles	Galvanized Green Pin Screw Shackles	2



The Lifting Shackle on the top is connected to the Load Shackle on the bottom with a WLL of 500kg. So a Crane may be used to lift the MBU from the top with a 500kg Load suspended from the bottom Shackle.

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ISSUE TITLE	ISSUE
500kg Mono Buoyancy Unit Specifications Sheet	N.T.S @ A3
PROJECT NUMBER	DATE
Mono Buoyancy Unit (MBU)	GJP
ISSUE NO.	REVISED
500kg - MBU - 05	01



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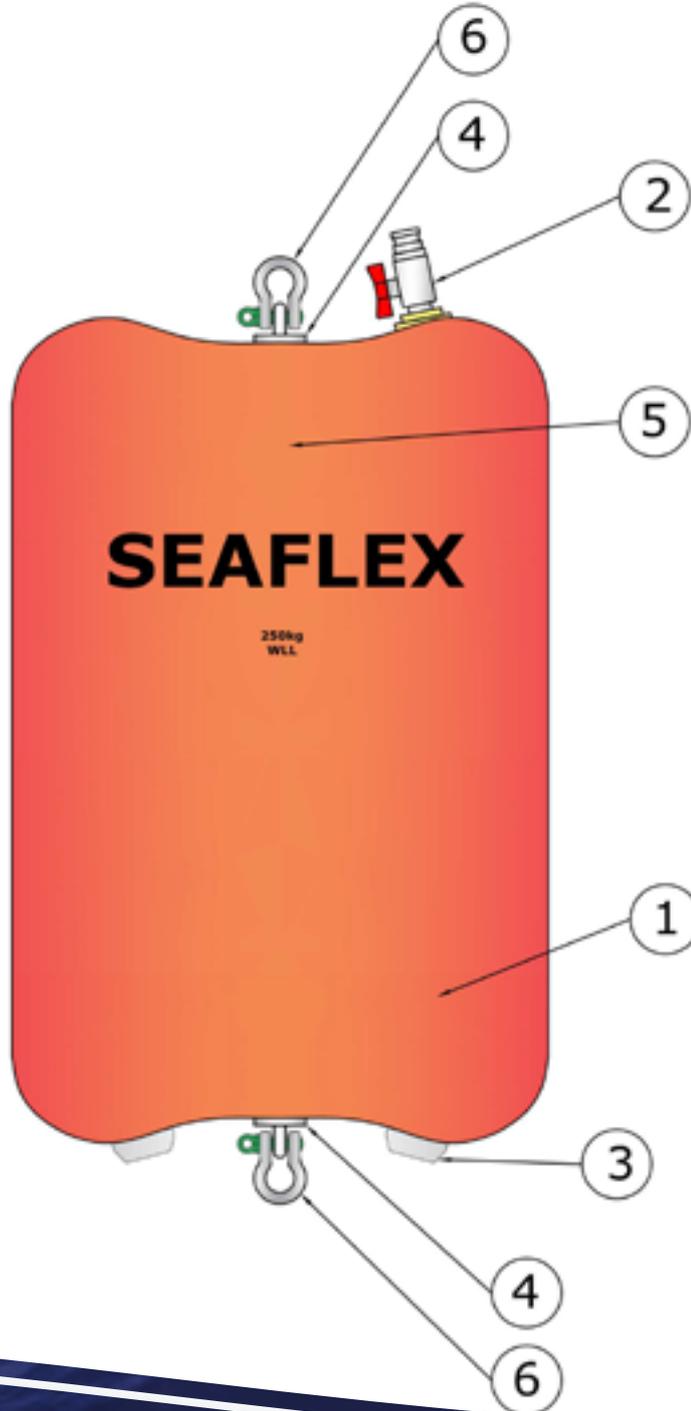
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PRODUCT DETAILS:

Max Height Filled - 1.0m
Max Diameter Filled - 0.6m
Product Weight - 8kg Approx

250kg Mono Buoyancy Unit Component List

Item Number	Component Title	Component Description	QTY Per Unit
1	Casing	Heavy Duty PVC coated Polyester Base Cloth	1
2	Inflation Port	2" SxH Fitting complete with quarter turn Globe Valve terminating in a 2" Camlock	1
3	PRV	Pressure Relief Valve	2
4	Toggle Assembly	Stainless Steel Toggle complete with Stainless Steel Eyebolt Internally	2
5	Internal Strip	Internal Duplex Strip	1
6	Shackles	Galvanised Green Pin Screw Shackles	2



The Lifting Shackle on the top is connected to the Load Shackle on the bottom with a WLL of 250kg. So a Crane may be used to lift the MBU from the top with a 250kg Load suspended from the bottom Shackle.

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DRAWING TITLE 250kg Mono Buoyancy Unit Specification Sheet	SCALE N.T.S @ A3
PROJECT NUMBER Mono Buoyancy Unit (MBU)	DRAWN GJP
CHECKED BY 250kg - MBU - SS	REVISION 01



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Unique Seaflex Flexible Buoyancy Selected References 2009-Date

Date	Client	Project/Description
March 2016	Valentine Maritime	Inflatable Buoyancy Units for HAIL project, Abu Dhabi
February 2016	Bumi Armada	Mono Buoyancy Units for Filanovsky Pipeline Work, Russia
November 2015	Technip Paris	Inflatable Buoyancy Units for Moho Nord Shore Pull - Congo
August 2015	Sapura Kencana TLO	Inflatable Buoyancy Units for Thai Binh Pipeline Installation - Vietnam
July 2015	Nestoil	Air Lift Bags for Oil Pipeline Lift and Repositioning - Nigeria
July 2015	Gareloch Support Services	Inflatable Buoyancy Units for HDPE Pipeline Installation - Scotland
July 2015	Technip Norge	Air Lift Bags for Various Subsea Works – Norway
June 2015	Sigur Ros (Petronas)	Mono Buoyancy Units for Jacket Tow-Out Contingency - Turkmenistan
May 2015	Acciona	Mono Buoyancy Units for La Chira HDPE Pipeline Installation - Peru
March 2015	Boskalis	Mono Buoyancy Units for Shah Deniz Pull Wire - Azerbaijan
January 2015	Azevedo Engineering	Inflatable Buoyancy Units for Pipeline Intervention - Brazil
December 2014	Petrobras	Mono Buoyancy Units for Various Tie-In Operations - Brazil
August 2014	DEME	Mono Buoyancy Units for Various Works - Ghana
July 2014	Harkland	Air Lift Bags for Diving Works - UK
June 2014	Subsea7	Air Lift Bags for Diving Works - Nigeria
May 2014	Allseas	Mono / Inflatable Buoyancy Units for Wheatstone Pipeline -Australia
March 2014	Saipem Russia	Inflatable Buoyancy Units for Filanovsky Pipeline Installation - Russia
February 2014	OAS	Mono Buoyancy Units and Bungs for Pile Installation - Uruguay
December 2013	Saipem France	Mono Buoyancy Units for CRX Pipeline Intervention - Congo
July 2013	Siemens	Water-filled Inflatable Buoyancy Units for Platform Ballasting - Denmark
June 2013	Tideway	Mono Buoyancy Units for Pull Wire Installation - Venezuela
May 2013	NPCC	Mono Buoyancy Units for Oil Pipeline Installation – Abu Dhabi
April 2013	West African Ventures	Mono Buoyancy Units for Pipeline Installation Buoyancy – Nigeria
February 2013	Leighton Offshore	Mono Buoyancy Units for Oil Pipeline Installation – Malaysia
November 2012	McDermott Offshore	Mono Buoyancy Units for Macedon Gas Pipeline Installation - Australia
August 2012	RJG Construction	Mono Buoyancy Units for Outfall Installation - Canada
August 2012	Clough Offshore	Mono Buoyancy Units for Gas Pipeline Installation - Australia
June 2012	Lundin Offshore	Air Lift Bags to disconnect FPSO - Tunisia
March 2012	Boskalis Offshore	Mono Buoyancy units for Nordstream Pulling Wire Installation - Russia
January 2012	SICIM	Mono Buoyancy Units for Twin Pipeline River Crossing - Columbia
December 2011	Hallin Marine	Air Lift Bags for Barge Salvage – Singapore
November 2011	Bouygues	Inflatable Buoyancy Units for Work Platform Float Out – France
August 2011	Prodive Monaco	Air Lift Bags for Trawler Salvage – France
August 2011	Saipem France	Inflatable Buoyancy Units for Pipeline Installation Buoyancy - Angola
July 2011	Visser & Smit	SeaSerpent Cable Installation Buoyancy – UK
July 2011	Subsea7 France	Air Lift Bags and Mono Buoyancy Units for Subsea Works – Angola
May 2011	Caldive Pte	Mono Buoyancy Units for Pipeline Installation Buoyancy – Australia
February 2011	Indian High Commission	Inflatable Buoyancy Units for Frigate Salvage – India
November 2010	Jan der Nul	Mono Buoyancy Units for South Riding Oil Pipeline Installation – Bahamas
November 2010	Bibby Offshore	Air Lift bags for Subsea Works – Scotland
August 2010	Bam Nuttal	Air Lift Bags for Container Recovery – Scotland
July 2010	Allseas Engineering	Mono Buoyancy Units for Gas Pipeline Installation - Trinidad
July 2010	CTC Marine	SeaSerpent Cable Installation Buoyancy – UK
July 2010	Spiecapag	Mono Buoyancy Units for Soyo LNG 3 Gas Pipeline Installations – Angola
June 2010	Arbeit Kaiserschleuse	Inflatable Buoyancy Units & WaterLoad Bags - Lock Gate - Germany
March 2010	Petroleum Marine Services	Inflatable Buoyancy Units for Steel Pipeline Installation – Egypt
Sept 2009	UMC International	Air Lift Bags for Drydock Draft Reduction – Ireland
Sept 2009	Plasticos P'ductos Aquaticos	Mono Buoyancy Units for HDPE Water Intake Installation – Spain
March 2009	Aceryg	Mono Buoyancy Units for Mexilhao Oil Pipeline Installation – Brazil



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Our Credentials

Seaflex manufactured our very first range of lift bags for rental and sale to service the diving industry in 1987, in sizes up to 500kg.

Over 25 years later, our biggest standard bag is 200 times larger than that at an industry-leading 100,000kg and we employ around 30 skilled staff at our custom-built 30,000 square foot manufacturing facility in Cowes on the Isle of Wight.



In 2011 Seaflex was acquired by the Unique Maritime Group, a global provider of integrated support services for the offshore sector. Unique Maritime Group's expanding network of companies are specialists in ROV, diving, survey, NDT and engineering services. With the benefit of UMG's global footprint and support structure, Seaflex is these days even better placed than ever to meet the needs of its customers – no matter where in the world they are working, nor how challenging or urgent their requirement may be.

As you would expect of a company working in an industry where the concepts of quality and safety are paramount, all our work is carried out within a system which complies with the ISO 9001- 2008 Quality Management Standard for full traceability – and we now have also gained ISO 14001 Environmental accreditation and ISO 18001 Health and Safety accreditation for our manufacturing operation. We have also had independent verification of the compliance of our Seaflex WaterLoad™ bags with LEEA 051 guidelines and of our Buoyancy bags with the requirements of IMCA D-016. ABS have also issued us with full Product Design Assessment (PDA) certification for our main products.

But any company can talk about the vast amounts of testing, certification and accreditation which have been carried on their products – fewer companies can substantiate such claims. Seaflex is one of those which can back up their claims – however, our credibility does not come from bits of paper: it comes from our customers, from the work we have been doing with them for over 25 years, and from the fact that they keep coming back to us time and time again.



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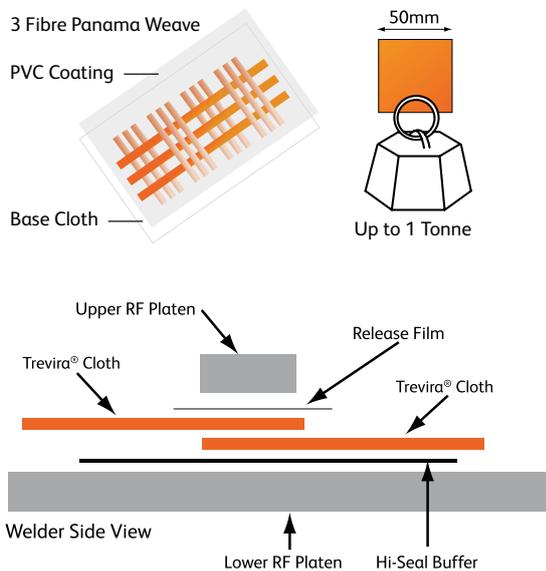
Technology, Service and Support

MANUFACTURING TECHNOLOGY

All Seaflex products are designed and manufactured in the UK.

Our bag canopies are constructed from High Tensile Trevira® Polyester base cloth (either 2 /2 or 3 /3 fibre panama pattern weave) coated with heavy duty UV stabilised PVC coating or, for special applications, polyurethane. Trevira is incredibly strong; a 50 mm wide 3/3 strip has a break load of approximately 1 tonne.

The panels for our bags are precision cut on our 15 metre long, 3 metre wide advanced automated table for perfect repeatability. Once inspected and approved panels are assembled by skilled personnel to using Radio Frequency welding to strict quality control standards.



CERTIFICATION

All our work is carried out within a system which complies with the ISO 9001-2009 Quality Management Standard as audited by Lloyds Register Quality Assurance for full traceability – and we have now gained ISO 14001 and ISO 18001 accreditation.

SERVICE

Whether for hire or sale, all Seaflex products are sent out fully tested and inspected against their build criteria. And we do also offer on-site support to our clients in the use of our products – this most often happens within the more complex buoyancy applications for our products.

In the event that your Seaflex product should suffer minor damage in service, we can supply an approved, boxed field service kit comprising of patches, a professional quality heat gun and instruction manual to make good minor leaks prior to product refurbishment.

We can also advise on the viability of carrying out more extensive repairs, which would typically be undertaken either at our factory or at one of our approved service centres.

SUPPORT

Our support philosophy is “Wherever, Whenever”. This underlines the Seaflex commitment to not just sending out tested, proven products in proper shipping crates and with the most comprehensive documentation package in the business – but to assisting our customers in every way possible throughout their time using our products, whether the job is a hire project or an equipment sale.

We offer worldwide support to our customers via either email or phone from head office in the UK and via our ever-growing network of offices and partners around the world.

You can put your trust in Seaflex – we won't let you down.





Our Philosophy

Whenever, Wherever

We have a simple philosophy here at Seaflex: we will do everything within our power to deliver what our customers need from us, whenever they need it and wherever they need it.

That simple philosophy is born of several different levels of understanding:

- An expert understanding of how to design, manufacture, prove, deliver and support best-in-class bags for ballast or buoyancy.
- An in-depth understanding of the regulatory environments in which we and our clients operate – both onshore and offshore.
- The desire to understand our clients' businesses, and to work with them to achieve the best possible technical and financial outcome for them.

We are not complacent: we are only where we are due to our ability to keep our band of loyal customers happy, whilst adding to them by demonstrating to others the value which we can bring to their businesses. If we let that slip then we are nowhere. And that is why we keep investing in our business: to better serve your business. Hence the brand new factory capable of producing 3,500 tons of lift and water load testing capacity each and every month. And hence us holding and managing the largest global rental fleet of buoyancy and ballast bags.

As you continue to invest in us, we'll continue to invest in you. We are always happy to hear from customers new and old alike as to how we may better serve you. We will travel the world to meet with you at your convenience, and the doors of our factory are always open and the kettle is always on for visits from those who would like to see what we do, and how we do it, for themselves.





To Conclude Our Story

Thank you for making it this far with us. Each of the elements of the Seaflex story, and each of the products you have read about, is designed to make life easier and more profitable for those who choose to work with us.

When these elements and these products are combined, the benefits to our customers become exponential - as can be seen from the example underneath relating to 5t pipeline buoyancy modules.

	5000KG STEEL BUOY	5000KG SOLID PLASTIC BUOY	5000KG SEAFLEX MBU
# Connections to Load	Typically 4+	Typically 4+	1
Approximate Handling and Rigging Time	15 minutes	15 minutes	5 minutes
Approximate Weight	2000kg	1000kg	40kg
# Per 20ft Container	4-6	4-6	100
Approx Purchase Cost	USD 5000-7500	USD 7500-10000	Approximately 50% cheaper (rental option approximately 75% cheaper, duration-dependent)

Table contents are a synthesis of customer interviews conducted March-April 2015. All prices are indicative, and subject to currency fluctuations and regional variation.





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