**Buoyancy Solutions** 



# APPLICATION NOTE Salvage Operations Using Seaflex Buoyancy



Buoyancy & Ballast

www.uniquegroup.com

# Introduction Salvage Operations Using Seaflex Buoyancy

For as long as we have been making them, Seaflex buoyancy bags have been used for the salvage of sunken or grounded vessels by vessel owners themselves, diving contractors, salvage specialists, navies and other governmental bodies.

Most salvors will already have a very good idea of what equipment they will need when they contact us. However we are sometimes asked to provide guidance on the right bags for the job and the best way in which to use those bags - and so this document is designed to answer those most frequently asked questions.





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# Frequently Asked Questions Salvage Operations Using Seaflex Buoyancy

### Which type of bag is best suited to my salvage project?

If you can attach a parachute-style Air Lift Bag (ALB) low down enough on the casualty that there is enough water to fully inflate it without it breaking the surface, then ALBs will generally be the right bags to use. Whilst enclosed-style Inflatable Buoyancy Units (IBUs) can be inflated underwater, you would not normally want to do so beyond a maximum of 3-4m depth unless there was some means of controlling the speed of the ascent from the surface – as the air inside them will expand rapidly during those few metres to the surface and and will risk creating more flow than the pressure release valves can handle. Also, if being inflated subsea then it is essential that the larger sizes of IBU are kept totally horizontal. IBUs larger than 10t in size are not suitable for subsea inflation.

Occasionally, for example during a long tow from offshore or in challenging conditions, it may be advisable to use a combination of both types of bag: ALBs to lift from the seabed and then with IBUs fitted to the hull when it is at the surface to provide greater stability during the towing phase.

#### What size of bags should we use?

+ We would always recommend using a larger number of smaller bags rather than a smaller number of larger bags, in case one may be compromised during the operation. Losing one of four 50t bags will normally prove more problematic than losing one of ten 20t bags on that same project. It is Seaflex bags in the range of 5t -20t which are most commonly taken onto such jobs. The salvor will generally have an idea of where the hull is heaviest (ie where the engine room is) and will either attach more bags in that area, or use larger bags in that area.





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# Frequently Asked Questions Salvage Operations Using Seaflex Buoyancy

#### How should we secure them onto the hull?

 As low down as possible. The single-connection ALBs can be connected via a sling directly onto any suitable point which is already on the hull, onto pad-eyes which may be welded onto the hull, or linked in pairs by slings which pass underneath the hull.

### How should we fill them?

 Via a hose connection from the surface. With the use of manifolds, the filling of multiple bags at the same time can be achieved so as to ensure a balanced lift.

#### Can I rent all this equipment from you?

 Yes you can: bags, hoses and manifolds are available for hire from a dozen locations worldwide. Just add air.

### Can you help me carry out this job?

 Yes we can: Seaflex Site Technicians are available to travel anywhere in the world to guide our customers as to the most effective and efficient use of our equipment on their job. They have worked on the salvage of everything from commercial airliners to gin palaces to oil rigs.

#### I've got a salvage challenge I don't think you'll have ever come across before, do you think you can help me?

+ Try us and see! When we haven't been able to solve a salvage challenge in the past using standard Seaflex bags, we've thought up another way around the problem – as you'll see from these images of some special liners we recently designed for a customer looking to displace the water inside containers during the salvage of a cargo ship in the South Pacific.











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# Air Lift Bags - The Professionals' Choice Product Details

## Versatile

+ Seaflex ALBs are immensely versatile, and ideal for safely supporting and lifting loads at or from any depth. The single point attachment is ideal for lightening underwater static structures such as pipes and templates, or for salvaging vessels from the seabed to the surface. They are robust and highly resistant to damage even in the harshest environments. Our larger ALBs can be surface-towed with their under-slung load at up to 1.5 knots in moderate sea states.

# Safe and Efficient

+ Our ALBs have been designed to provide the maximum amount of lift for the least overall height. The design brings with it a wide hem, which aids swifter emptying of the bag on emergency inversion - a notable safety benefit. All our ALBs automatically vent excess air as they ascend dynamically with their load. Their single attachment point helps keep them inherently stable, regardless of load orientation or trim.

Our bags are also more efficiently rigged than others, saving shipping weights without compromising on materials, strength, capability or safety. We understand that time is money, especially during diving operations. Seaflex ALBs address the reality of subsea work: poor visibility, currents and surge, fatigued operators. We understand the challenges of rigging and operating a lift bag in less than ideal conditions underwater. Our ALB range has been developed not as a theoretical exercise by a desk jockey, but in conjunction with actual living, breathing users to make it as diver-friendly as anything in its class.

#### **Tested and Proven**

+ The ALB range is, like every Seaflex product, carefully designed, constructed and tested to meet and exceed demanding international standards. As you would expect, Seaflex ALBs fully comply with IMCA D-016 guidelines. But, uniquely within our market, we have drop-tested our ALBs to prove their safety factors and we have tested and demonstrated the performance of our inverter lines. The result? You can rely on Seaflex ALBs to perform safely, effectively and predictably, time after time and year after year. All our ALBs are delivered ready for immediate use with a universally compliant documentation: a unit-specific log book containing certification, service records and operating manual. Another benefit: our ALBs require remarkably little storage space relative to their lift capacity; ALBs capable of 350 tonnes of lift can be stored on a 6 x 6 metre footprint and weigh less than 3.5 tonnes.

#### Off the Shelf or Made to Measure

+ There is most probably an existing Seaflex ALB, or ALB combination, suitable for your exact subsea lifting task. But if there isn't, then our team will draw upon their long experience in this field to design and manufacture a bag to suit your exact requirements.





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# Air Lift Bags - The Professionals' Choice Key Features and Benefits at a Glance

### For Your Peace of Mind

- + Fully compliant with IMCA D-016, and with ABS PDA.
- + 7:1 design WLL factor on the strops.
- + Overall assembly tested and proven to a 5:1 minimum WLL safety factor. Independent Type Test Certificates are available.
- + Tested and proven inverter line attachment point.
- + High performance structural fabric canopy.
- + RF welded seams.
- + Rental units inspected and tested between every single job.

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#### For Your Ease of Operation

- + Seaflex DeeTangler™ to enable simple "sort and check" of the strops subsea to avoid twisting and overloading.
- Unique strop i/d system terminating in a closed ring: no risk of incorrect connection leading to in-service failure.
- + Integral handling ladders on units over 1 ton.
- + 3/4 inch BSP standard inflation valve with 316 stainless steel Camlock end fitting standard on ALBs of 2 tons and above.
- + Base-operated high flow dump valve.
- + Industry-leading height to weight ratio: maximising load freeboard where required.
- Design service available, to provide optimised solutions for specific tasks.
- + Delivered in an enclosed crate and ready for immediate use with universally compliant documentation: ALB specific log book containing certification, service records and operating manual.



		Inflated		We	ight		Packed	
odel No	Lift (Kg)	Н x ∅ (Mtr)	Н x ∅ (Ft)	Kg	Lbs	LхWхD(Mtr)	L x W x D (Ft)	No/pallet
50 ALB	250	1.3 x 0.9	4.27 x 2.95	3	6.61	0.4 x 0.2 x 0.4	1.3 x 1.3 x 1.1	40
OO ALB	500	1.7 x 1.2	5.58 x 3.94	5	11	0.5 x 0.3 x 0.5	1.6 x 1.0 x 1.6	30
1t ALB	1,000	1.9 x 1.6	6.23 x 5.25	11	23	0.6 x 0.4 x 0.6	2.0 x 1.3 x 2.0	20
2t ALB	2,000	2.5 x 1.8	8.20 x 5.91	23	51	0.8 x 0.4 x 0.8	2.6 x 1.3 x 2.6	10
3t ALB	3,000	3.2 x 2.0	10.50 x 6.56	32	71	0.8 x 0.4 x 0.8	2.6 x 1.3 x 2.6	6
5t ALB	5,000	3.7 x 2.0	12.14 x 6.56	38	84	0.9 x 0.5 x 0.9	3.0 x 1.6 x 3.0	5
LOt ALB	10,000	4.5 x 2.4	14.76 x 7.87	75	165	1.2 x 0.5 x 1.2	3.9 x 1.6 x 3.9	3
L5t ALB	15,000	5.4 x 2.7	17.72 x 8.86	110	243	1.2 x 0.6 x 1.2	3.9 x 2.0 x 3.9	2
20t ALB	20,000	5.5 x 3.2	18.04 x 10.50	120	265	1.2 x 0.7 x 1.2	3.9 x 3.0 x 3.9	2
25t ALB	25,000	5.9 x 3.8	19.36 x 12.47	175	386	1.2 x 0.9 x 1.2	3.9 x 3.0 x 3.9	1
35t ALB	35,000	6.5 x 4.0	21.33 x 13.12	230	507	1.4 x 1.2 x 1.4	4.6 x 3.9 x 4.6	1
50t ALB	50,000	8.2 x 4.5	26.90 x 14.76	416	917	2.6 x 1.22 x 0.96	8.5 x 4.0 x 3.1	1



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# Inflatable Buoyancy Units Flexible, Multi-Purpose Flotation

### **Reliable and Controllable**

+ Seaflex enclosed IBUs are the system of choice where reliable, controllable buoyancy is required. They are particularly suited for installation buoyancy on pipeline float-outs, beach pulls and river crossings. Our IBUs have also been used in applications such as vessel and platform draught reduction in limited water depths, and as pontoons for temporary bridges and docks.

Constructed from High Tensile Trevira® Polyester 3/3 base cloth coated with heavy duty UV stabilised PVC coating, our IBUs come fitted with stainless steel camlock terminated inflation points and 38 mm diameter pressure relief valves each capable of releasing 80 cubic feet (2.3 cubic metres) of air per minute. The IBU operates at 2 psi over ambient to ensure maximum volume, and therefore full displacement, during operation.

## **Designed for Ease of Handling**

+ The multiple attachment points of our IBUs assist in spreading the lift points across the load. Their relatively low vertical heights and short strop configurations are a key advantage where water depth is limited or a load needs to be supported near to, or on the surface. We have designed-into all our IBUs an intuitive system of ensuring accurate strop spacing; a spacing link strap joins the fixed ring strop terminations together. And, just like our range of ALBs, our IBU's have integral ladders to facilitate handling.

Typical 5 tonne capability IBUs weigh just 46 kg, making them an easily handled item for two rigging crew.

#### **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 single or multiple units to allow the load to settle gently into the correct position, or to reposition it if required, before the IBUs are vented and then released in a completely safe manner with no uplift force remaining.

#### **Optimised for Horizontal Deployment**

+ IBUs are not designed to find their own level on inflation; they must be held approximately horizontal to prevent tearing of the strop pockets. Within this context, and unlike versions of IBUs offered by others, the unique Seaflex end-strop system forces air through the IBU as it is inflated - to prevent bulging and resulting failure. Circumferential strops built into the IBU itself deal with shallow angles, enabling the IBU to cater to load angles of up to 10 or 15 degrees (where greater working angles are expected, Seaflex Mono Buoyancy Units are the perfect answer).

Our IBUs offer significant advantages over ALBs where static as opposed to dynamically-ascending buoyancy is required, especially in relatively shallow water. They are also very stable under way and can be towed, dependent on load and sea state, at up to 2 knots.

#### Extremely Cost-Effective: Hire Options Available, Transport Costs Minimised

 Seaflex has over 25 years' worth of experience of the manufacture, rental and maintenance of the world's largest stock of certified, best in class, IBUs. Our fleet of IBUs have worked in every ocean and sea, and on every populated continent.

With a shipping weight of approximately 1% of inflated lifting capacity, Seaflex IBU's are first choice for contractors requiring significant, compact lift; a single 20 foot shipping container can hold a massive 500 tonnes of buoyancy.





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# Inflatable Buoyancy Units Key Features and Benefits at a Glance

# For Your Peace of Mind

- + 5:1 design WLL factor (strops 7:1).
- + Fitted with multiple pressure relief valves to ensure safety during use.
- + High performance structural fabric canopy.
- + RF welded seams.
- + Unique end-strop design prevents stress and bulging on the extremities of the IBU.
- + Rental units inspected and tested between every single job.

#### For Your Ease of Operation

- + Ideally suited to extreme shallow waters.
- + Buoyancy of individual or multiple units can be increased or decreased as required from the surface.
- + Webbing harness includes multiple fixed steel lifting rings fitted with spacing straps.
- + Integral end strops to prevent rotation.
- + Integral handling ladders.
- + 2 x 3/4 inch BSP standard inflation/deflation valves with 316 stainless steel male Camlock adapter as standard.
- + Leafield Marine high flow pressure relief valves (PRVs).
- + Delivered ready for immediate use with universally compliant documentation: IBU specific log book containing certification, service records and operating manual.



#### Inflated (Kgs & Mtrs) Model No Lift L Н Ø 250 IBU 250 1 1 07 0.6 500 IBU 500 1.1 1.0 0.8 1t IBU 1,000 1.6 1.2 1.0 2t IBU 2,000 16 14 1.3 3t IBU 3,000 2.0 2.0 1.5 5t IBU 5,000 3.5 20 1.5 10t IBU 10.000 3.5 2.5 2.0 20t IBU 20,000 5.0 3.4 2.3 35t IBU 35,000 6.5 3.4 2.6

# Packed (Kgs & Mtrs)

Wt	L	W	D	No/Pallet
5	0.40	0.20	0.10	40
9	0.50	0.25	0.15	30
12	0.60	0.25	0.20	20
19	0.70	0.35	0.25	11
34	0.80	0.40	0.35	6
46	0.90	0.50	0.35	5
68	1.10	0.80	0.30	3
120	1.20	0.90	0.35	2
300	1.50	1.00	0.50	1



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# **Seaflex Application Note**

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 Kencara 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	Acergy	Mono Buoyancy Units for Mexilhao Oil Pipeline Installation – Brazil



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# Seaflex Air Bags for Lifting (and possibly towing) Project Data Capture Form

### **Operational Notes**

- + Unless in ultra-shallow water, or with an ultra-slow rate of ascent under crane control, enclosed buoyancy bags would never be used for lifting objects from the seabed to the surface. However, in certain circumstances (eg long tows in rough conditions) then it may be advisable to fit enclosed bags at the surface to assist with the next stage of the operation.
- + Generally speaking most clients looking to lift or salvage something from the seabed to the surface and then either load it onto a barge or tow it away will have a very clear idea of how they plan to take care of the operation and the sizes and styles of bag which will be required for each step of the operation.
- + The form underneath is designed to capture the details of more unusual lifts, so that Seaflex can offer advice as to the best way to undertake such lifts with the assistance of air bags.

Project Basics	Client Notes
Where is the project taking place?	
When is the project taking place?	
What is the likely duration of the project?	
What is to be lifted?	
What weight is this object in water?	
What is the water depth in this location?	
What, if any, attachment points are there on the object?	
Do you have any drawings, sketches or pictures of the object (ideally including dimensions)?	
Is your preference to hire or to purchase this equipment?	
Project Basics	Client Notes
Does the object have to be moved (towed)? If so, how far?	
Please provide an overview of likely sea state and tidal effect.	

Are there any other operational considerations of which we should be aware?

Please complete this questionnaire as fully as possible, attach whatever extra documents may be necessary, and return to Unique Seaflex.



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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.





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Unique Group's Buoyancy & Ballast products are available for hire or purchase from more than 20 other worldwide locations via our network of independent partners. Please contact us for more details.

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