



APPLICATION NOTE

The Use of Seaflex Buoyancy for Assisted Lifting of Pipelines



Introduction

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Introduction

+ Whilst most commonly used for the laying of pipelines, whether being pulled from shore or being deployed from a laybarge's stinger, Seaflex buoyancy bags are also commonly used for the lifting of pipelines from the seabed in conjunction with derricks or winches for tasks such as Above Water Tie Ins (AWTIs) or for repair or retrieval operations.

In normal circumstances, we would recommend the use of our parachute-style Air Lifting Bags (ALBs) for general lifting exercises such as diving operations and salvage projects as their open undersides allow the increasing volume of air within them which is generated by the ascent through the water column to freely vent – so not risking damage to the bag via overload of the pressure release valves (PRVs) we fit to all our enclosed types of bags.

However, there are certain scenarios where an enclosed bag – be it one of our Mono Buoyancy Units (MBUs) or Inflatable Buoyancy Units (IBUs) - is the perfect solution for such lifting of pipelines. This application note will identify and explain the advantages of the use of Seaflex enclosed buoyancy bags within some of these scenarios.

Application 1: AWTIs

+ AWTIs typically make use of our IBUs, which are favoured because they sit horizontally to the pipeline so bringing it closer to the surface than vertically-positioned MBUs. However, some customers have selected our MBUs for this purpose, as their single point of connection makes for simpler rigging and quicker connection to / disconnection from the pipeline.

They would normally be taken down by divers and positioned onto the pipeline as it lays on the seabed. Once required to lift, they are inflated via airlines from the surface – and because such AWTIs are invariably under the control of the vessel's davits then the rate of ascent can be controlled such that there is no risk of the units surfacing so quickly that the PRVs are unable to vent quickly enough.

At the end of the AWTI, the IBUs can be used to assist with the re-positioning of the pipeline down onto the seabed, and as the air inside them is compressed during that descent then the airlines at the surface can be used to replenish them as required. Following touchdown, the IBUs can easily be vented via those airlines using differential pressure. Divers are then safely able to release the bags before putting a puff of air into them to allow them to float to the surface for easy retrieval.



On the next few pages you will find a step-by-step schematic of the laying of a pipeline and the replenishment of the air within Seaflex MBUs following such an operation.



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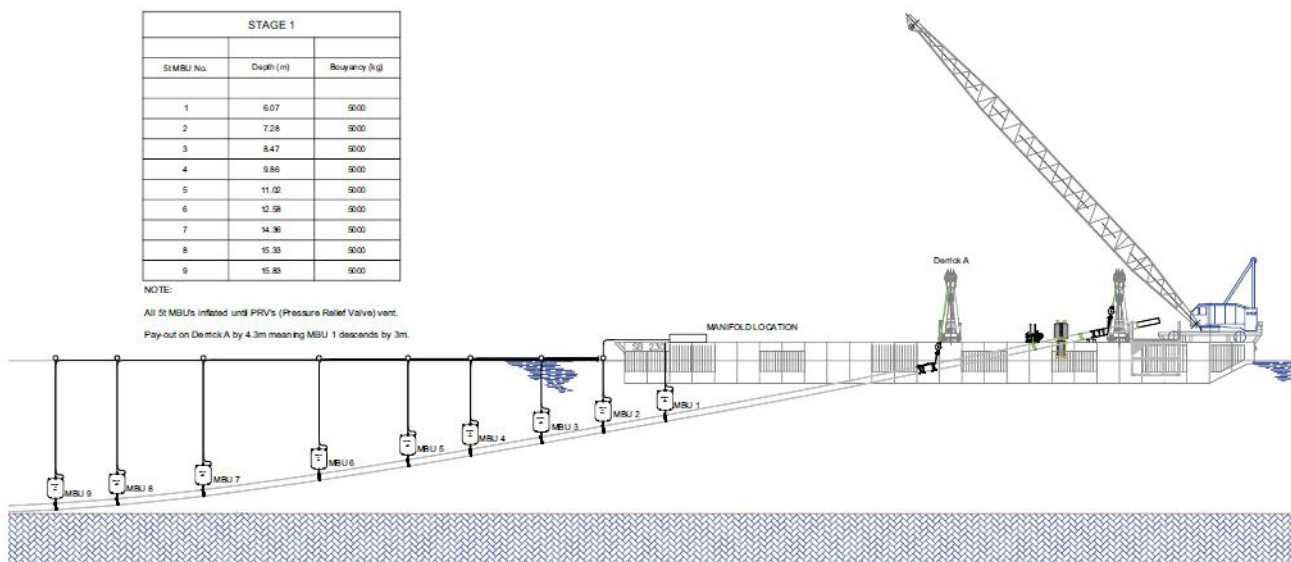
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Schematic Diagrams

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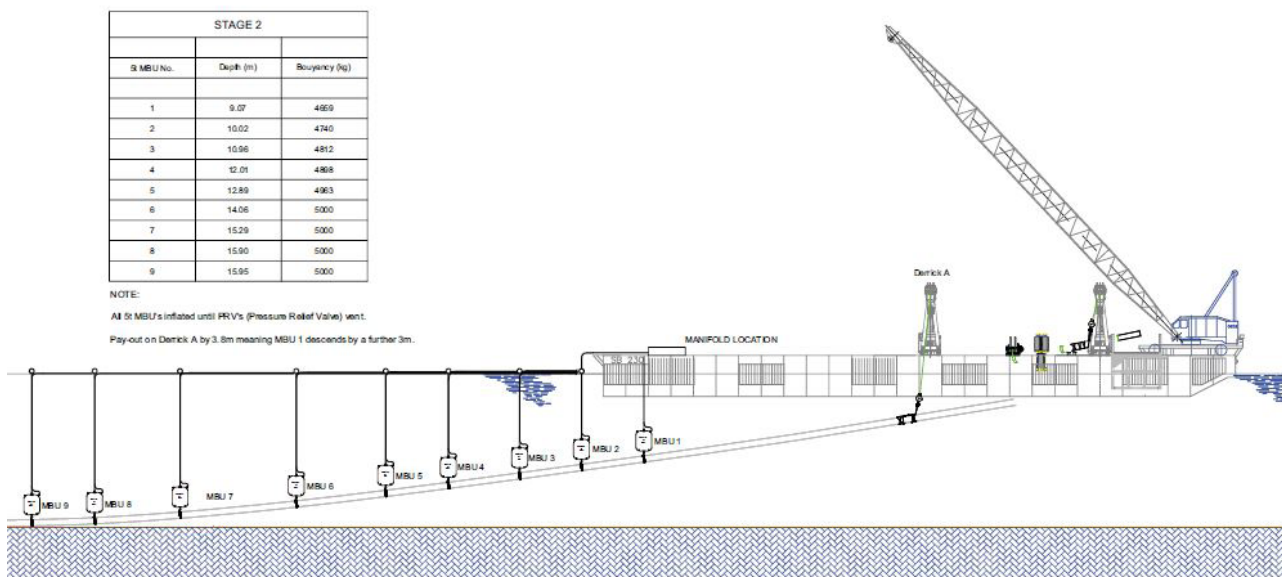
STAGE 1		
S/MBU No.	Depth (m)	Buoyancy (kg)
1	6.07	5000
2	7.28	5000
3	8.47	5000
4	9.86	5000
5	11.02	5000
6	12.58	5000
7	14.36	5000
8	15.38	5000
9	15.83	5000

NOTE:
All 9 MBUs inflated until PRV's (Pressure Relief Valve) vent.
Pay-out on Derrick A by 4.3m meaning MBU 1 descends by 3m.



STAGE 2		
S/MBU No.	Depth (m)	Buoyancy (kg)
1	9.07	4659
2	10.02	4740
3	10.96	4812
4	12.01	4898
5	12.89	4963
6	14.06	5000
7	15.29	5000
8	15.90	5000
9	15.95	5000

NOTE:
All 9 MBUs inflated until PRV's (Pressure Relief Valve) vent.
Pay-out on Derrick A by 3.8m meaning MBU 1 descends by a further 3m.



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Schematic Diagrams

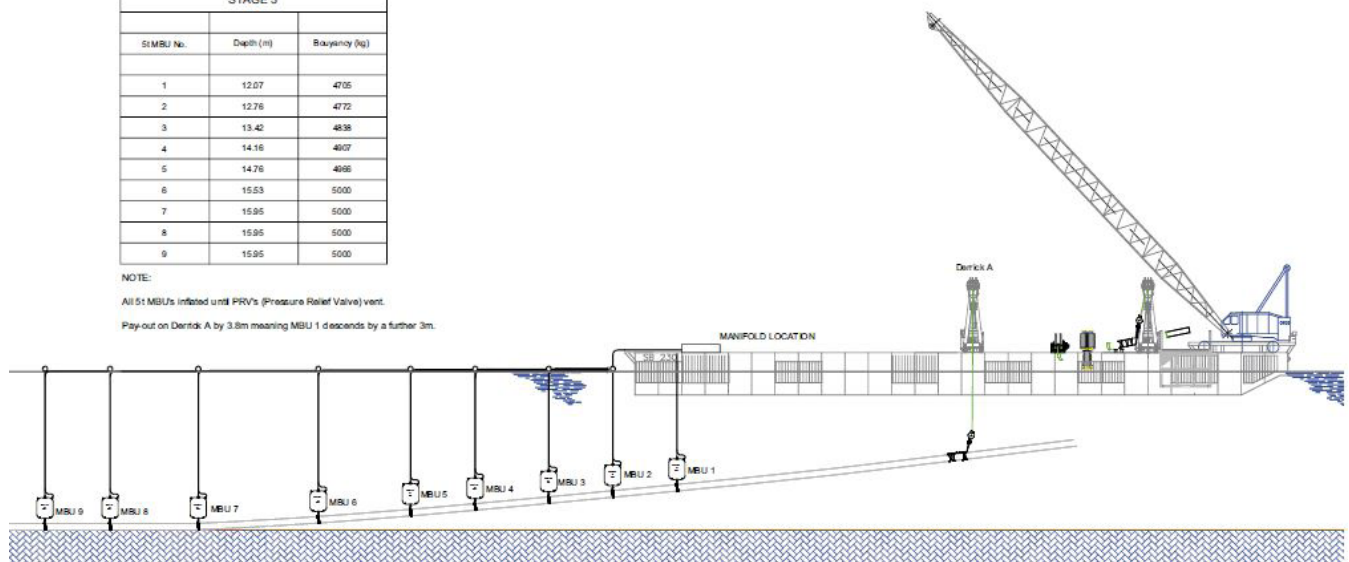
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STAGE 3		
SIMBU No.	Depth (m)	Buoyancy (kg)
1	12.07	4705
2	12.76	4772
3	13.42	4838
4	14.16	4907
5	14.76	4966
6	15.53	5000
7	15.95	5000
8	15.95	5000
9	15.95	5000

NOTE:

All 9 MBUs inflated until PRV's (Pressure Relief Valve) vent.

Pay-out on Derrick A by 3.8m meaning MBU 1 descends by a further 3m.

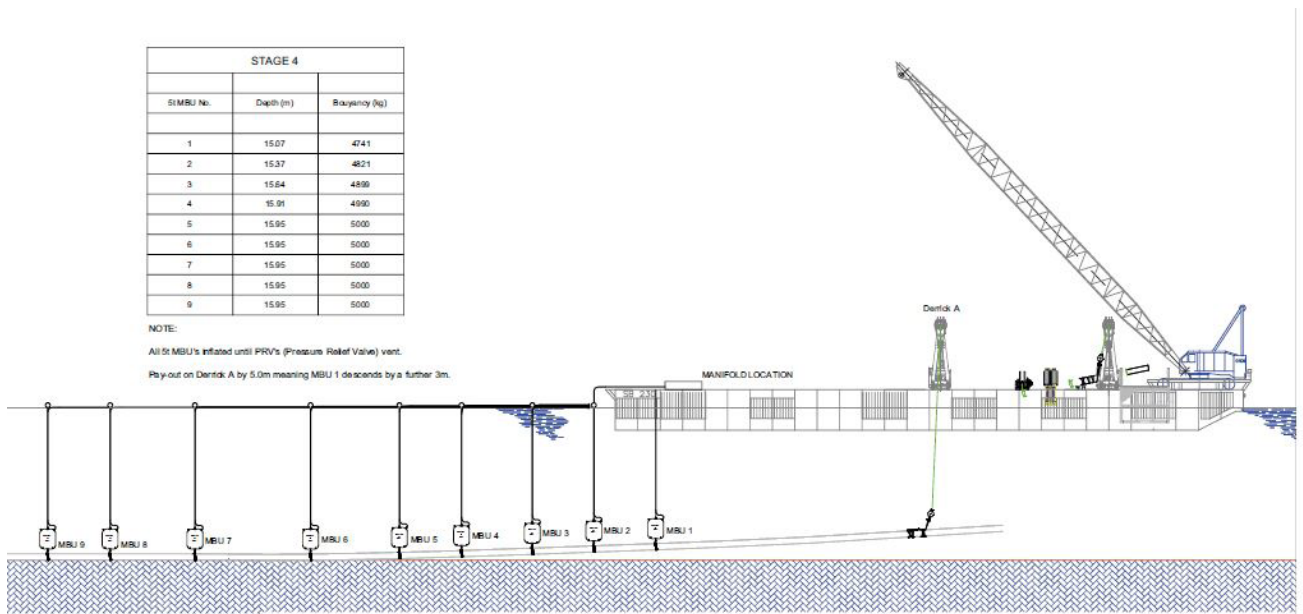


STAGE 4		
SIMBU No.	Depth (m)	Buoyancy (kg)
1	15.07	4741
2	15.37	4821
3	15.64	4899
4	15.91	4990
5	15.95	5000
6	15.95	5000
7	15.95	5000
8	15.95	5000
9	15.95	5000

NOTE:

All 9 MBUs inflated until PRV's (Pressure Relief Valve) vent.

Pay-out on Derrick A by 5.0m meaning MBU 1 descends by a further 3m.



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Schematic Diagrams

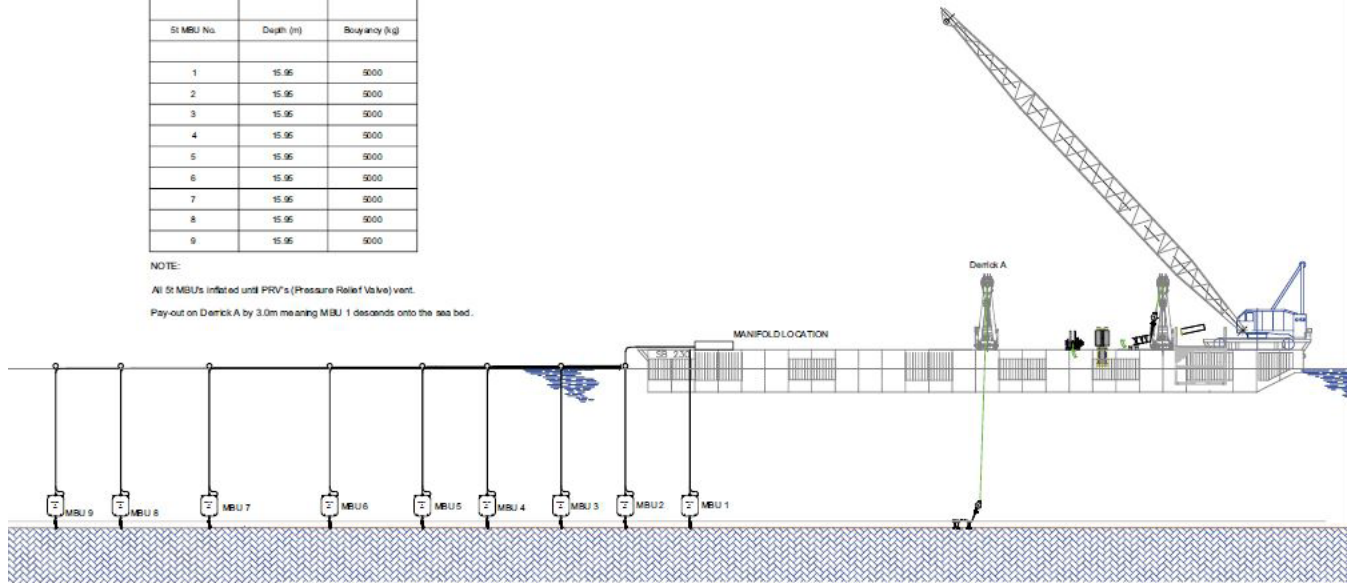
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STAGE 5		
St MBU No.	Depth (m)	Buoyancy (kg)
1	15.96	5000
2	15.96	5000
3	15.96	5000
4	15.96	5000
5	15.96	5000
6	15.96	5000
7	15.96	5000
8	15.96	5000
9	15.96	5000

NOTE:

All St MBUs inflated until PRV's (Pressure Relief Valve) vent.

Play-out on Derrick A by 3.0m meaning MBU 1 descends onto the sea bed.



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Application 2

Lifting and Retrieval of a Pipeline Through a Stinger

+ Whereas most AWTIs will involve bringing a pipeline up on davits alongside a barge, we have also been involved in projects where the pipeline needs to be retrieved back up the stinger – for example during start-ups where the lay barge picks up the end of a pipe laid during an earlier phase of the operation and then continues to work with it.

Although these kinds of operations are often carried out at depths for which we would normally recommend our Air Lift Bags, these parachute-style bags will be prone to inverting as they surface and filling with water - so increasing weight and drag on the way up the stinger. Given their single point of connection and the reasonable width of stingers to accommodate them our vertically positioned MBUs have been used for this sort of operation.

This type of operation will generally involve positioning the end of the stinger over the end of the pipeline (on the seabed) and passing a winch wire down through the stinger before divers take it down to the end of the pipe to then recover the pipe back up the stinger with the aid of buoyancy.

The ascent rate must be very carefully monitored. For example, each of our 5t MBUs is fitted with four x PRVs each of which can vent at approximately 80 cubic feet per minute. A 5t MBU has a volume of 175 cubic feet, and during the last phase of such an ascent when the MBU is pulled from 30ft to the surface, the volume of air inside each bag doubles. This means that the MBU needs to dump 175 cubic feet of air in a timescale commensurate with the maximum vent rate of four PRVs. One PRV could dump 175 cubic feet of air in just over 2 minutes, so four could dump 175 cubic feet in a quarter of this in just over 30 seconds working at maximum capacity. However, given the operational risks involved then we would strongly recommend a factor of safety of 6:1 being applied and for the last 30 feet of the ascent - where the increase in volume of air is at its greatest - to be undertaken no quicker than over the course of 3 minutes.



Advantages

Benefits of Seaflex buoyancy

Some of the benefits of using Seaflex-style air-filled buoyancy units within this type of application are that it is:

- + Backed up with project engineering experience and guidance from the manufacturer, along with onsite support from a Seaflex technician if so required.
- + Flat-packed for efficient and cost-effective transport and stowage.
- + Weighing less than 1% of its uplift capacity: eg 5t unit less than 50kg.
- + Quick to rig, and easy to vent for ultra-safe recovery.
- + Immediately available for rental or purchase from the world's largest stock of such equipment.
- + If rented, then subject to the highest testing and re-certification standards in the industry.



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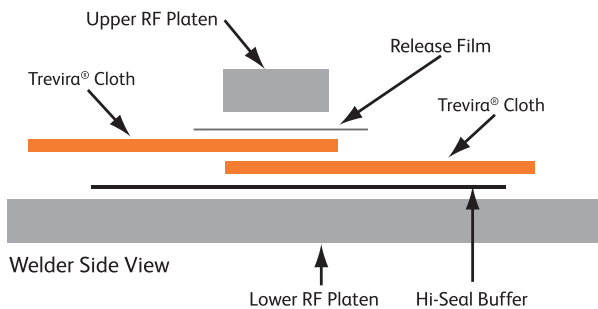
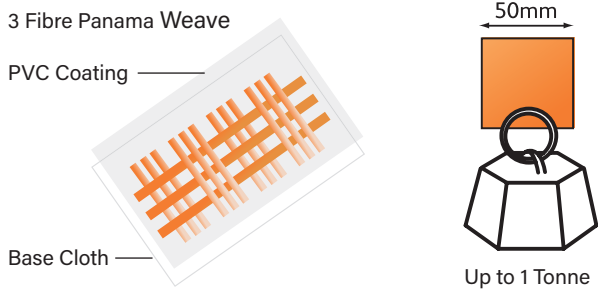
Technology, Service and Support

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.