Guidance for the Operation of Enclosed Cylindrical Lift Bags

JWA developed its Enclosed lift bags to overcome the danger of air loss from Open Parachute lift bags at the surface. Though **The International Marine Contractors Association (IMCA)** and their document **IMCA LR 007, D 016 Rev. 5 January 2022** does not give guidance on the use of Enclosed Lift bags, all JWA lift bags meet these requirements where possible.

First published in 1993 by IMCA's forerunner the AODC, the objectives of the document are to provide clear lift bag safe use guidance on:

- Fitness for purpose
- Operational considerations
- Safety precautions to be taken into consideration during their use
- Examination and testing criteria
- Maintenance, which should be carried out to ensure the continuing integrity of each bag between its periodic tests

While JW Automarine are a leader in the development and production of these bags, the guidance detailed here should always be seen as a starting point for safe use.

Assessment of Requirement

Before lift bags are used in underwater engineering tasks, a proper assessment of the task to be performed should be made.

This assessment should include:

1. Calculations of the weight to be lifted or moved.
2. Calculations of the size of the lift bag and type (enclosed or open) required.
3. Calculations, where possible, to determine the centre of buoyancy and centre of gravity should be made so that steps can be taken to prevent the object being lifted spinning or turning over.
4. The number of lift bags required.
5. The positioning and attachment of the lift bag.
6. Calculated safety factors for all the above.

Note 1 – The primary use of enclosed lift bags is for surface buoyancy and support. Due to being enclosed, if the bags are used for subsea recovery, the venting of expanding air can only be accomplished through the pressure relief valves or via controlled venting.

If an enclosed lift bag Is not vented correctly during a subsea lift, the bag will fail.

Note 2 - Open bottom lift bags should be used where any form of ascent is planned, such as vessel salvage or raising objects from the seabed. Being open bottomed the expansion of air on ascent is exhausted from the bottom of the bag. This is especially important if additional "break out" buoyancy is required.

Note 3 – The pressure relief valves fitted to JWA bags will vent approximately 1.7 ft^3 (c.48 litres) of air per second, or 102ft^3 per minute (c. 2900 litres). They are set to the working pressure of 2 psi and will maintain the internal pressure at 2 psi above ambient.

Note 4 – When rigging and installing totally enclosed cylindrical lift bags it is most important to ensure that they are operated in the horizontal plane ±5°.

Should they be inclined at more than 5°, excessive angle tension will be placed on the cradle straps and securing panels, to such an extent that the straps could tear away from the air bag.

Totally enclosed cylindrical lift bags should never be rigged in the vertical position

Note 5 – To achieve a horizontal lift, it may be necessary to consider a lifting beam or 'strongback' between the load and the lift bag.

Note 6 - Ensure that the bags anchor points are kept the same distance apart as the cradle straps, not tethered together on the same pick-up point.

Note 7 - When attached to the underside of a load, great care is necessary to ensure that airbags are not 'pinched' or 'strangled' as for example by the bilge of a vessel. In such cases, air will not be free to pass to all the bags, hence reducing the potential lift.

Note 8 - Towing speed should be kept to 2 - 3 knots depending on sea state. Exceeding this recommended speed could cause pressure build up in front of the bag, causing the bag to vent and so reduce volume.

Pre-Use Inspection

1. Each bag has its own Logbook that details all the information about the bag.
2. In the logbook is a certificate, check the inspection date on the certificate as LOLER states that the straps of a lift bag are "lifting equipment" and should be checked every 6 months.
3. Also in the Logbook is a checklist, this details all the pre use checks that must be undertaken.
4. Unroll the bag on a clear and clean area, checking first for any sharp objects that may puncture or damage the bag.
5. Now follow the details of the checklist, being:

Check the general condition of the lift bag material

a. General condition / appearance of bag material / fabric and eyelets.
b. Check condition of the inlet and relief valves for damage or debris.
c. Safe working load is clearly identified on the bag.
d. Serial number is clearly shown on the lift bag.
e. Details on certificate agree with the serial number on the bag.

Check the general condition of the rigging

a. General condition / appearance of rigging items.
b. Check the condition of the webbing slings.
c. Check the condition of the stitching on the webbing slings.
d. Check the slings are not crossed or twisted.
e. Check the condition of the shackles.
f. All shackles and links are in place and secure.
g. Webbing slings, shackles and links are of the appropriate SWL.
h. Details on the certificate agree with ID on the rigged items.

Check the functional items on the lift bag

a. Condition / appearance of the pressure relief valves.
b. Confirm all relief valves are free from blockages / mud etc.
c. Ensure all relief valves vent correctly.
d. Ensure all relief valves re-seat correctly.
e. Condition / appearance of the quarter turn valve(s).
f. Function of the quarter turn valve(s), confirm opens / closes.
g. Confirm quarter turn valve(s) are free from blockages / mud.

General Hints on the use of Enclosed Cylindrical Lift Bags

1. Always use a total lifting force at least equal to the weight of the load, but remember too little will not lift, too much may cause the load to ascend out of control.
2. Place the bag so as to minimize stress differentials. Uneven lifting stress may well cause physical damage to the load, as well as endanger divers.
3. Attach and inflate bags methodically when used in groups or clusters to avoid one forcing another to collapse.
4. Bags should be inflated evenly on the load to prevent rolling or tipping.
5. After use, whether in salt or fresh water, the bags should be washed off, lightly scrubbed if necessary to remove mud, oil, tar etc, then hung up to dry.
6. Inspect all of the lifting straps carefully. Damaged straps or fastenings may govern the success or failure of the next task.