

Loss of 3 tonne lift bags owing to equipment failure

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A Member has reported an incident in which links failed on a number of 3 tonne (closed, salvage type) lift bags. The incident occurred when the diver was filling lift bags during a saturation dive.

What happened?

Diver 1 filled lift bag No. 2 and disconnected the air hose once the bag was fully inflated to prepare to move to the next lift bag, No.4. At this moment the No. 2 lift bag broke away from the connecting shackle on the webbing strap installed on the pipe-line. The event was clearly observed by both the diver and the Diving Supervisor. Diver 1 then also noticed that Lift Bag No. 3 was also missing. In the position where Lift bag No. 2 had been installed, the diver recovered the triangular lifting link which had failed. The link was recovered to the surface for inspection.

The vessel Master had observed the lift bag coming to the surface close to the air dive station and informed Saturation Dive Control that the starboard azimuth thruster had been stopped in order to prevent the bag from entering. The bag had drifted with the current towards the stern of the vessel and then disappeared from view. Dive Control were informed of the degraded status caused by the intentional stopping of one of the thrusters and the decision was taken to abort the dive. The divers were safely recovered to the bell.

Our member noted the following:

- The primary cause of the incident was the failure of the stainless steel lifting link.
- Had the diver or his umbilical not been clear, the results of the failure of the lifting link would have been catastrophic.
- It appears that this was caused by the failure of the material (stainless steel) of which the lifting link was made.
- The lift bags were new and each bag had a certificate.
- The safety factor recorded in the certificate is 6 times the normal operating load, i.e. 3 tonnes SWL with a safety factor of 6.

Metallurgical analysis of the failed ring was conducted, and it was discovered that:

- tests show it starting to fail at 10KN = 1 tonne – rather than 18 tonnes (3 tonnes SWL with a safety factor of 6) as in the certificate.
- the rings were bent and welded during production, which compromises strength significantly.

The conclusion reached by our member is that the supplied lift bag certificates were counterfeit and the equipment supplied was incorrectly designed.

Prevention:

- After careful examination of the failed material, it was decided to condemn all of the remaining 3 tonne bags and before recovery of the remaining bags on the pipe-line, the ROV was used to puncture the bags so that divers could safely recover the deflated bags.

The broken lifting link is shown in the accompanying photos together with a link from another bag for comparison.

Important Note:

The lift bags involved in this incident were not designed or manufactured by an IMCA member company.

IMCA member's have recorded a number of incidents of unplanned release of lift bags to the surface but in all cases the cause was human error rather than equipment failure. Failure of lifting equipment, whether subsea or otherwise, through corrosion or other metallurgical issue is something that also arises from time to time.

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