

Damaged high pressure content gauge hoses on bail-outs

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During diving activities on two occasions in the same 24-hour period, a diver noticed that there was no pressure left in his bail-out bottle.

What happened?

The decision was taken by the Dive Supervisor to recover the diver from the water, as per standard protocol. After recovery, the bail-out bottle and appliances were checked, and it was found that the high pressure content gauge hose on the bail-out was damaged.

Both hoses were replaced for new hoses.

What went wrong?

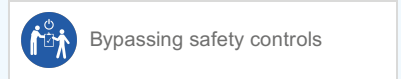
The short interval in which these two incidents happened triggered an investigation which revealed the following:

- There were two types of damage:
 1. Cuts, most likely caused by sharp mussels and stones (Figure 1 above)
 2. Damage caused by bending and overstressing (Figure 2 above).
- Both hoses were leak tested and found to be leaking through holes near the ferrule connector.
- Both hoses were fitted with bend restrictors.
- The hoses were maintained and tested in accordance with [Code of practice for the initial and periodic examination, testing and certification of diving plant and equipment](#)
- The hoses were subjected to a regular visual inspection before every dive.
- Both hoses were in use for up to 4 years and were regularly used.

What were the causes?

Investigation suggested that one type of HP hose is prone to damage near the ferrule connector, caused by bending and stressing, regardless of the use of a bend restrictor present at this location.

IOGP Life Saving Rules:



The damage was not sustained on one single occasion but is believed to have developed over time.

What actions were taken?

There are different types of HP hoses on the market with specific characteristics:

- **Hose type 1:** Fatigue like damage may occur near the ferrule over time. When this damage occurs, it can lead to loss of the bail-out within a dive. In order to reduce the risk of this type of damage occurring, annual replacement may be required, depending on usage.
- **Hose type 2:** Does not show the same fatigue damage development as the construction is more flexible and rugged.

	Hose type 1	Hose type 2
Appearance	Thin, smooth, black, shiny	Thick, black, dull-coloured
Dimensions	Outside diameter 10.8 mm	Outside diameter 12.5 mm
Composition	<p>3 layers:</p> <ul style="list-style-type: none"> • Thin layer, plastic-like type (shrink fit) • Soft woven middle layer • Rigid inner layer, hard plastic-like tube <p>Layers can move freely from each other</p> <p>Outer layer easily cut with knife</p>	<p>3 layers:</p> <ul style="list-style-type: none"> • Thick outer layer, rubber compound • Soft woven middle layer • Flexible thick inner layer, rubber compound <p>Layers are vulcanised to each other</p> <p>In general, hard to cut with a knife</p>
Other findings	Stiff, hard to bend, inner layer tends to buckle	Easier to bend, smaller bending radius, inner layer does not tend to buckle

Members may wish to refer to:

- Bail-out whip failures

according to IOGP's Life Saving Rules.

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