

Main ROV lift wire umbilical and bullet parted

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An ROV vessel was engaged in subsea operation undertaking routine inspection, repair and maintenance (IRM) work.

While an inspection class ROV was being recovered to deck within its tether management system (TMS) via an over-the-side hydraulic LARS system, the main lift wire parted and both the ROV and TMS fell to the seabed.

The winch operator immediately informed the ROV supervisor, who isolated the ROV system and went down to the ROV deck to find the bare main lift wire hanging, no longer over the sheave, but in the water from the LARS skid without the ROV attached. The incident occurred in calm conditions.

The TMS containing the ROV was recovered with the aid of vessel's divers. All operations were suspended to investigate the incident, and the system and failed components quarantined to prevent misdirection or incorrect analysis.

During investigation it was identified that no direct imposed load or snagging occurred during the recovery of the ROV TMS system prior to the failure. This was confirmed by review of CCTV footage.





Initial findings

- The TMS main lift wire and bullet parted. Further inspection identified a failure in the armour wire shield which was found to be dry with no signs of grease or any oil contamination.
- It was noted that the Wirelock® potting compound inside the socket was scattered into small pieces. The armour wire end bends appeared to be existing and no deformation noticed. Exposed armour wire length was 89 cm.

What went wrong?

- The evidence presented post-incident indicated a failure of the system main lift umbilical at the connecting bullet termination point which was secured via a chemical potting compound (Wirelock®).
- The main lift umbilical connection to the TMS had been recently re-terminated. A review of the procedures and certification test records for this work confirmed that:
 - procedures in line with the manufacturer's instructions were followed by certified competent personnel
 - the Wirelock® used was within use-by date

- the system passed an imposed load testing witnessed by third party surveyors.
- A review of the events surrounding the re-termination raised several questions relating to the ambient temperature at the time. Discussion with the manufacturer of the potting compound revealed the following:
 - confirmation that there was no 'product batch' issue with this Wirelock® and that this was an isolated failure
 - clarification that this product could be affected by changes in temperature either during storage or at the time of use
 - the manufacturer commented that past experience showed that in high temperature environments it is good practice to refrigerate the chemical compound for two hours prior to mixing the two-part compound for use.
 - **Their procedures do not record or state this action on the user's documentation, and it is not addressed during technician training** (IMCA bold for emphasis).
- The technician who conducted the re-termination commented that the volume of product used was approximately 30% less than he had anticipated, and the compound did appear to be slightly more glutinous or viscous than usual.
 - This is believed to be due to higher than normal ambient temperatures.
 - The inspection team did consider this to be a factor regarding exposed surface area of the main lift umbilical wire mantel within the bullet, however, the connection did successfully pass an overload test on completion.

What were the causes?

- The **immediate cause** of the parting of the main lift umbilical from the TMS connection bullet, was seen to be failure to follow correct procedures.
- The **root causes** were:
 - failure of the potting compound inside the TMS bullet
 - failure to take into account high ambient temperatures when working with the potting compound.

What actions were taken?

- Amend procedure for potting sockets whilst in high temperature environment and where possible conduct work only within set temperature guidelines given by manufacturers.

- Consider alternative supplier for better temperature range product.
- Changes in procedures to indicate:
 - temperature of environment in which work is conducted
 - volume by weight or volume of compound used
 - compound batch number and storage details.

Members may wish to refer to the

- Wirelock® [Technical Data Manual](#)
- [IMCAR004](#) – The safe and efficient operation of remotely operated vehicles
- [IMCALR011, R011](#) – The initial and periodic examination, testing and certification of ROV launch and recovery systems

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