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## **SAFETY ALERT No. 17-07**

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### **Master Link Failure CH330.P.320, HA-32 PL Pear Links**

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#### **1. Introduction**

- 1.1 Catastrophic failure of a CH330.P.320, HA-32 PL Pear Link supplied by Survival Systems International UK Limited (SSI UK Ltd.).
- 1.2 The Bahamas Maritime Authority (BMA) wishes to bring the following information referenced in paragraph 1.1 to the attention of all interested parties<sup>1</sup>.

#### **2. Description of incident**

- 2.1 A tender boat onboard a cruise ship registered in the Commonwealth of the Bahamas suddenly fell from its stowed position into the water. The immediate cause was a catastrophic failure of the link that connects the fall block to the release gear/hook (see figure 1). No persons were injured; however, the tender boat itself was a total loss.
- 2.2 An immediate internal investigation was commenced by the Owners who also instructed the vessel's Classification Society to conduct material examination to determine the failure mechanism of the master link. The conclusions drawn from the investigation are detailed below.

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<sup>1</sup> This Safety Alert is provided by the Bahamas Maritime Authority with the aim of highlighting incidents, lessons learnt and to increase awareness, which may help avoid similar incidents occurring elsewhere. Any queries on the content of the information provided should be referred to the party providing the information.

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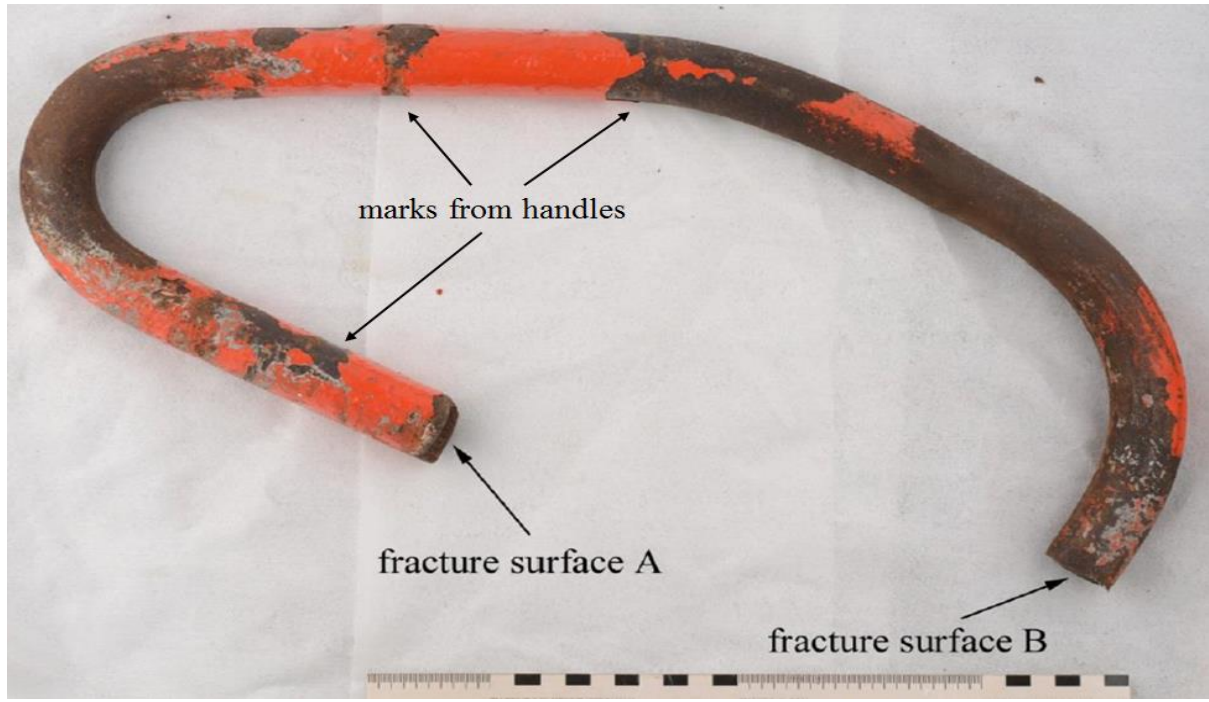


Figure 1: Fractured master link with handles removed

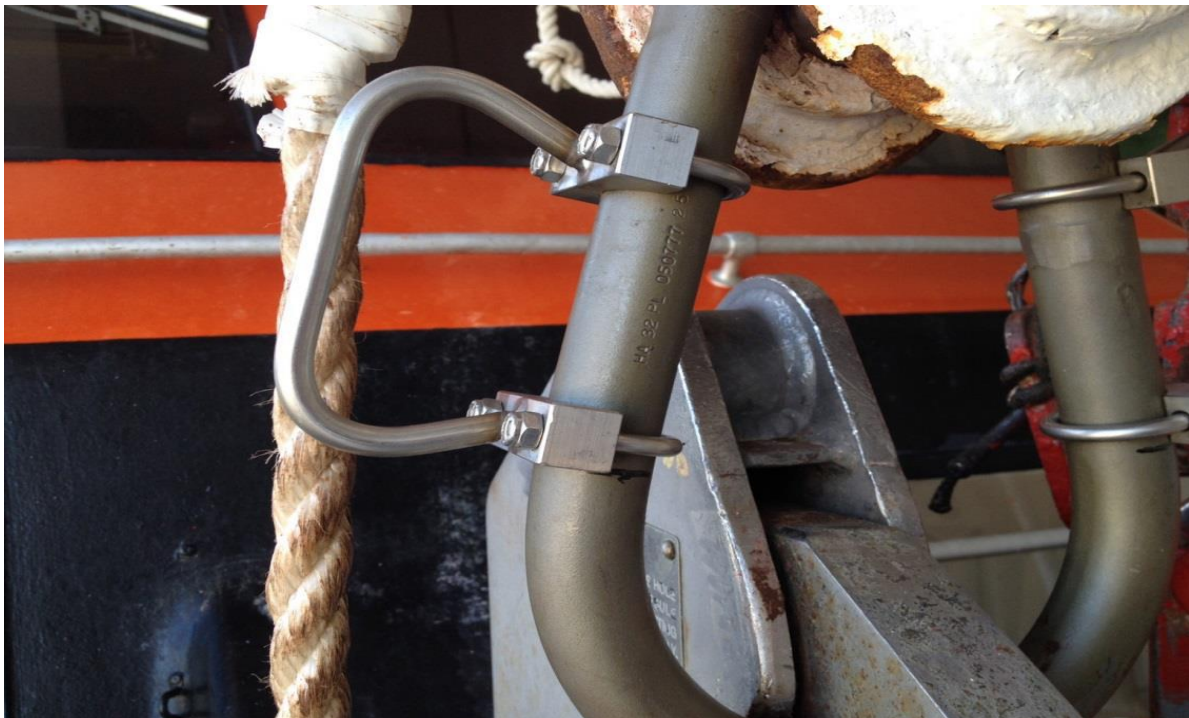


Figure 2: Master link in service with bolted on stainless steel handles



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### 3. Causal Factors

- 3.1 The failed connecting link material composition was not in accordance with the supplied certificate. The break load tests conducted on the intact link which is most likely to be from the same batch based on chemical analysis proved that the break load was below what was described on the original certificate in 2009 and below that of the minimum required by the LSA Code (Chapter VI, 6.1.1.6). The certificate and LSA Code both specify a minimum safety factor of 6:1; the actual measured safety factor was between 4.1:1 and 4.6:1 at the time of testing.
- 3.2 The master link suffered a fatigue fracture. The initiation of this is most likely attributed to the location of the stainless steel handle which was attached to the straight part of the link in vicinity of the fracture. The mechanism is believed to be either corrosion fatigue (galvanic corrosion) or fatigue initiated from a minor indent at the surface.
- 3.3 The material used was high tensile strength steel, with increased notch sensitivity. The link was fitted with bolted on stainless steel handles (as per original design and delivery) which serve as an originator of notches into the link, if subjected to outside force or if tightened too hard these can cause potential galvanic corrosion generated by exposure to the marine environment, due to material difference compared to the links themselves.
- 3.4 The addition of these stainless steel handles obstructs complete visual inspection of the links.

### 4. Conclusion

- 4.1 Despite annual and 5-yearly inspection by service agents, the substandard condition of the connecting link was not uncovered. No non-destructive testing (NDT) was carried out to verify the condition of the links, and the bolted-on handles were not removed to ensure full visual inspection nor were the dimensions of the connecting links measured to uncover potential reduction in diameter as a result of corrosion.
- 4.2 The connecting links were of a substandard material at the time of failure, below LSA Code safety factor requirements, fitted by design with



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handles that obstruct visual inspection and cause galvanic corrosion. This overall resulted in the crack originating, propagating without being noticed and caused final catastrophic failure.

### **5. Recommendation**

- 5.1 It is recommended that the above information is taken into consideration and the condition of master links be verified by a competent authority to ensure the structural integrity is not compromised. SSI UK Ltd. recommends replacement of lifting links every 5 years.

### **6. Validity**

- 6.1. This alert is valid until further notice.

### **7. Revision History**

Rev.0 (19 January 2017)