

## VERY SERIOUS MARINE CASUALTY

Injury of three rescue boat crew members, onboard the container vessel DORIKOS on 27 August 2015, due to breakage of fall wire whilst the rescue boat was lowered.



Report date: 03 June 2016

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## **FOREWORD**

The sole objective of the safety investigation under the Marine Accidents and Incidents Investigation Law N. 94 (I)/2012, in investigating an accident, is to determine its causes and circumstances, with the aim of improving the safety of life at sea and the avoidance of accidents in the future.

It is not the purpose to apportion blame or liability.

Under Section 17-(2) of the Law N. 94 (I)/2012 a person is required to provide witness to investigators truthfully. If the contents of this statement were subsequently submitted as evidence in court proceedings, then this would contradict the principle that a person cannot be required to give evidence against themselves.

Therefore, the Marine Accidents and Incidents Investigation Committee, makes this report available to interested parties, on the strict understanding that, it will not be used in any court proceedings anywhere in the world.

**GLOSSARY OF ABBREVIATIONS AND ACRONYMS USED IN INVESTIGATION REPORTS**

AIS - Automatic Identification System

AB – Able –Bodied seaman

ARPA - Automatic Radar Plotting Aid

B/C - Bulk Carrier

COLREGS - The Int/nal Regulations for Preventing Collisions at Sea 1972, as amended

DO - Diesel Oil

DOT - Diesel Oil Tank

ECDIS - Electronic Chart Display and Information System

ETA - Estimated Time of Arrival

ETD - Estimated Time of Departure

FO - Fuel Oil

FOT - Fuel Oil Tank

FPT - Fore Peak Tank

DBT - Double Bottom Tank

GPS - Global Positioning System

IFO - Intermediate Fuel Oil

IMO - International Maritime Organization

LT - Local Time

LOT - Lubricant Oil Tank

m - metre

MT - Metric Ton

NM – Nautical Mile

OOW - Officer of the Watch

O.S – Ordinary Seaman

PSN - Position

QM - Quartermaster / Helmsman

RPM - Revolutions per Minute

SAR - Search And Rescue

S.B.E. - Stand By Engine

SOLAS - Safety of Life At Sea Convention

STCW95 - International Convention on Standards of Training, Certification and

Watchkeeping for Seafarers 1978, as amended

VDR - Voyage Data Recorder

S-VDR - Simplified Voyage Data Recorder

VHF - Very High Frequency

VTS - Vessel Traffic Services

UTC - Universal Time Co-ordinated

ZT - Zone Time

## **1.0 SUMMARY**

- 1.1 On 27 August 2015 the container vessel “DORIKOS” IMO Nr 9114191, was at anchor at the outer anchorage (O.P.L) of the port of Valetta, Malta.
- 1.2 At about 08:44 hours UTC during a regular drill the rescue boat fell approximately 7 meters into the water below, causing heavy injuries to the three crew members onboard the rescue boat.
- 1.3 The accident happened when the fall wire of the rescue boat broke, whilst the boat was lowered.
- 1.4 At about 09:15 hours UTC the rescue boat together with the three injured crew was recovered and placed on the deck, and initially treated by the Master and the crew.
- 1.5 At about 11:45 hours UTC the three injured crew members were lowered to a service boat which had arrived alongside and were taken to a hospital at Valetta Malta for further treatment.
- 1.6 The broken wire was newly supplied and installed by the crew in January 2015. It was a galvanized steel wire, 12mm in diameter, verified to be of anti-rotating type, as required.
- 1.7 The rescue boat’s fall wire failed because it had been incorrectly assembled within the housing of the hook. Such incorrect assembly caused the wire to bend sharply at two locations resulting in mechanical damages on the wire surfaces, at the bends position.
- 1.8 The davit hook Makers Messrs Harding issued, subsequent to the incident, a safety documents No 4492, with specific instructions on using the hook and markings to prevent incorrect assembly of the wire to the housing of the hook. This document was forwarded by the vessel’s managers to the DORIKOS and one sister ship under the same Management, to be incorporated in their existing training Manuals.

## **2.0 FACTUAL INFORMATION**

### **2.1 SHIP'S PARTICULARS**

The ship's main particulars are as follows:

Name : DORIKOS  
 IMO Nr : 9114191  
 Call Sign : P3AD7  
 Year of Built : 1996  
 GRT : 19,147.00  
 NET : 7,600.00  
 DWT : 24,460.00  
 LoA : 171.07  
 BREADTH : 27.64  
 DEPTH : 16.10  
 CLASS : ABS  
 Owners : Dorikos Navigation Co. Ltd.  
 Managers : Dioryx Maritime Corp.  
 Built by : Hyundai Heavy Ind. Co. Ltd.

### **2.2 RESCUE BOAT PARTICULARS**

Type of boat:	Harding Safety, type MOB 17, Rescue boat		
Manufactured, month/year:	October 1995		
Ship for which intended:	Hyundai, H. 935, “Providencia”, Panama		
Number of persons:	6 persons		
Dimensions in meters:	L.o.a: 5,70	B.o.a: 2,19	H.: 2,12
Dimensions in meters:	L.: 5,30	B.: 2,10	D.: 1,02
Capacity in cubic-meters:	3,10 cubic meters		
Buoyancy capacity in cu.-meters:	1,38 cubic meters		
Materials of hull:	G.R.P. Norpol 85M-85/Spray gun method		
Materials of buoyancy:	Polyurethanfoam		
Type of resin and manufacture:	Isoftalsyre/Jotungruppen, 3235 Sandefjord, Norway		
Type of glass reinforcement:	823-S28-2400 TEX Silenka		
Manufacture name and address:	PPG Fiber Glass Industries BV, Hoogezand, Holland		
Type of lifting arrangement:	Single Point Lifting arrangement		

Weight of boat excluding loose gear: 650 kg  
Weight of boat including loose gear: 710 kg  
Davit load: 1.160 kg

Type of engine: Yanmar D27 Diesel Outboard  
Serial number: 03664

Date of last Survey: 18 January 2015

## **2.3 DAVIT AND DAVIT WINCH PARTICULARS**

### **2.3.1 Davit**

Davit type: S.A 1,2  
Serial no: 1033/95  
S.W.L.: 1200 kp  
120% overload test: 2640 kp  
Post of markings: On davitarm  
Floating block/Hook/Link: SWL: 1,5 T TL: 3,75 T  
Serial and mark no: 1033/95  
Last Survey: 18 January 2015

### **2.3.2 Davit Winch**

Davit type: RWH1,2  
Serial no: 1033/95  
S.W.M.: 295 kpM (1200 kp)  
50% overload test: 443 kpm (1800 kp)  
Pull speed: 18 m/min.  
Lowering speed: 60 m/min.  
Last Survey: 18 January 2015

## **2.4 VOYAGE PARTICULARS**

At the time of the incident the ship was anchored at the outer anchorage of the port of Valetta, Malta awaiting order.

Anchorage position: Lat 35°-53.2N/Long 014°-49.2E

## 2.5 MARINE CASUALTY INFORMATION

Date and Time: 27 August 2015, 08:44 hours UTC

Type of Marine Casualty: Very Serious Marine Casualty

Location of Incident: Outer anchorage, Valetta, Malta

Place onboard: Rescue Boat

Injuries: Three crew members injured.

Damage: Rescue boat fall wire failure, structural damage to rescue boat.

External/Internal Environment: External air temperature: 27°C  
Wind direction: NNE 3  
Sea state: Force 3

Persons onboard the ship: 16 (3 onboard rescue boat)



### **3.0 SEQUENCE OF EVENTS**

#### **3.1 THE RESCUE BOAT FALL WIRE FAILURE**

The container carrier DORIKOS managed by Dioryx Maritime Corp. of Athens, Greece was anchored at the outer anchorage of Valetta, Malta awaiting orders.

In the morning of 27 August 2015 arrangements were made by the Ship's Master for a regular drill of the Rescue Boat launching and maneuvering in the water.

At about 08:30 hours UTC the crew mustered to performed the rescue boat drill as scheduled. The Chief Officer was the person in charge, with the Master supervising the drill from the bridge wing.

At about 08:40 hours the rescue boat was ready for launching following an engine test and inspection of the wire and unlashng of the boat. Three crew members, one 3<sup>rd</sup> officer and two ABs their personal protective equipment including lifejackets, hard hats and safety harness lanyards.

At about 08:42 hours UTC the Chief Officer obtained permission from the Master and operated the winch to swing the davit out and at about 08:44 hours he started lowering the boat to the water. When the boat was about 27 meters above the water, the fall wire suddenly broke and the rescue boat fall on the water with the three crew members onboard.

#### **3.2 RESCUE AND RECOVERY**

The deck crew immediately started pulling the floating boat using the forward painter and brought the boat close to the accommodation ladder within the reach of the ship's crane. In the meantime the Master contacted the Managers' head office and arrangements were made for a service boat to proceed towards the vessel for the evacuation of the injured crew.

At about 09:15 hours the rescue boat together with the three crew members onboard, was recovered and placed on the ship's deck. First aid was provided to them by the Master and the crew. The service boat arrived alongside the vessel at about 11:45 hours and the three injured crew were lowered to the boat and taken ashore for medical treatment at Valetta's hospital.

#### **4.0 DAVIT and WINCH SYSTEM**

DORIKO’S rescue boat is lowered and hoisted on a single fall wire by a Harding SA1.2 Davit and a winch type RWH 1,2.

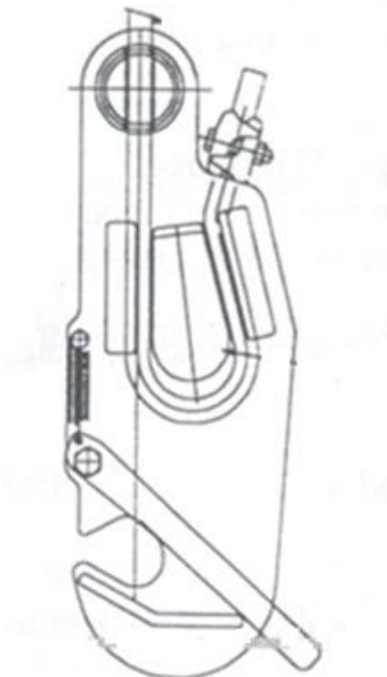
The SA 1.2 davit had a SWL of 1200 kp and both mechanical power and gravity is used for launching.

The winch system is hydraulically controlled. The hydraulic pressure is derived by a power pack with a working pressure of 220 bar. An adjustable hydraulic relief valve is provided which is set at 240 bar.

The launching arrangement (Davit and Winch system) was tested on installation onboard to 2640 kp i.e. 120% overload.

The fall wire was 34 m long made of galvanized steel, 12 mm diameter and was of anti-twist type, with a minimum breaking load of 7950 kp. The wire test certificate was dated 12/01/2015.

The fall wire connecting hook was made by Harding type RH 1.5. The assembly of one free end of the fall wire on the winch drum is done by fixing it by a wire lock on the drum. The fixing of the other free end of the fall wire at the hook is done with the use of a wedge lock device after the wire is passed through the hook housing passage as indicated herebelow.



## **5.0 EXAMINATIONS AFTER THE ACCIDENT**

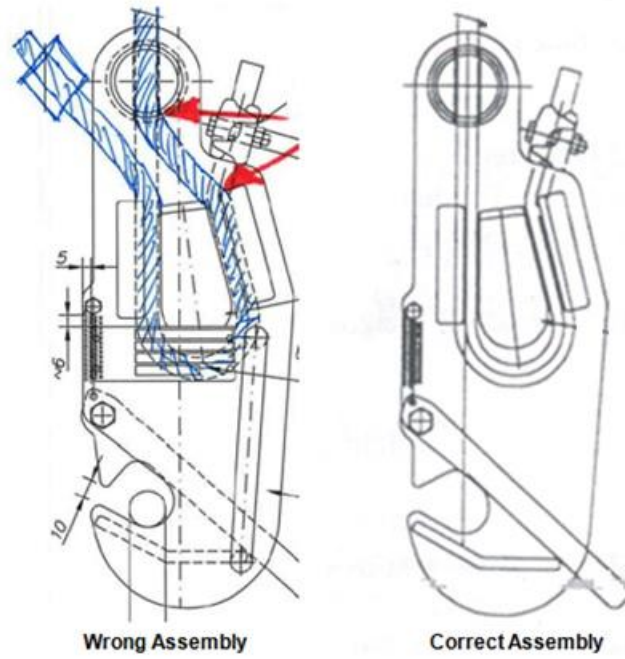
### **5.1 FALL WIRE**

The fall wire was found to have failed at a position of approximately 0.42 m from the end of the wire.

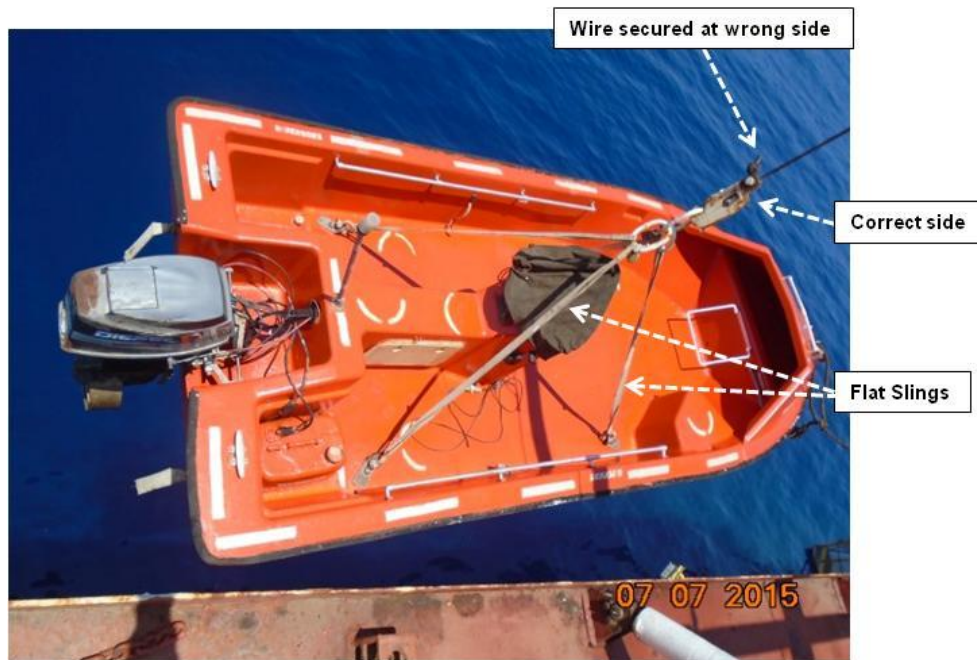
The 0.42 m section of the wire had been disconnected from the housing of the hook and therefore the way of its assembly at the time of the incident was not readily obvious. When it was installed within the housing of the hook, the broken end of the wire appeared to be outside of the hook as indicated in the blow photo.



Subsequent investigation however was made, on the request of the ship’s Management Company, by the hook Makers’ technical department, which revealed that the wire had been wrongly assembled during last renewal and its breakage position was within the hook housing as shown below:



The Makers came to this conclusion when their technical team observed on a photo taken by the crew on the previous drill done on 7<sup>th</sup> July 2015, that the secured end of the wire at the hook was at the wrong side of the hook. The relevant photo is reproduced herebelow for ready reference.



The broken wire sections were taken from the vessel and submitted by the ship’s Management Company to the Department of Metallurgy and Materials Engineering of the University of Malta for a Technical Examination. The relevant report (Appendix 1) includes the following Conclusions and recommendations.

### Quote

*The wire rope provided was examined using several testing and characterisation methods. The principal scope of this report was to ascertain that the mechanical and metallurgical properties of the wire rope under investigation were in accordance with the specifications of its grade.*

*The analysis conducted revealed little overall damage to the wire except for superficial corrosion of the outer wires. Tensile testing showed that the rope was indeed capable of supporting in excess of the minimum breaking load indicated in the manufacturer’s test certificate, while hardness and diameter measurements were found to be satisfactory.*

*Any damage found on the rope was restricted to the location of rupture. Fractographic examination showed ductile and fatigue-type failure, the latter emerging from mechanical damage to the external wires.*

### Unquote

## **5.2 RESCUE BOAT**

The rescue boat was removed ashore and the physical damages were inspected and are included in the relevant report (Appendix 2).

The weight of the boat was also checked and found to be normal.

### **5.3 INSPECTIONS AND TESTS ONBOARD “DORIKOS”**

On 15 September 2015 a Surveyor from MICS, Malta (Marine and Industrial Consultancy Services Limited) attended onboard and carried out surveys including operational and load test of the rescue boat davit, with satisfactory results. Subsequent test to confirm the opening pressure of the winch relief valve, revealed that the valve was in the fully closed condition, and it was therefore adjusted to open at 220 bars per Makers’ instruction Manual (Appendix 3).

### **5.4 POST ACCIDENT SAFETY DOCUMENT BY MAKERS**

On 5 October 2015 the davit hook Makers (Harding) forwarded to the ship’s Managers a Safety document No 4492 with instructions on using the hook type RH 1.2, supplementing the existing instructions.

The ship’s Managers forward the Makers’ instructions to the ship’s Master (and also to the Master of a sistership under the same Management) to be incorporated in the existing training manuals.

## **6.0 ANALYSIS**

### **6.1 PURPOSE**

The purpose of the analysis is aiming to determine the proximate causes and the circumstances of the accident, so that to draw up recommendations for the prevention of similar accidents occurring in the future.

### **6.2 FAILURE MECHANISM**

Evidently the failure of the fall wire occurred as a result of incorrect assembly of the wire end to the hook. The incorrectly assembled wire end, was thereafter subject to mechanical stresses on the wire outer surface in way of bending within the hook housing, leading to its failure.

The wire was ascertained to be within the specification of its grade and in accordance with its test certificate.

### **6.3 HUMAN FACTOR**

Our investigation on the human factor contribution to the casualty under investigation revealed the following:

- 6.3.1 The last assembly of the failed wire to the hook was carried out on 27 January 2015 with the vessel at sea (position 09 17N/013 43W).
- 6.3.2 The assembly was performed by a team of three crew members (Bosun and 2 ABs) under the supervision of the Chief Officer. Therefore, inadequate supervision was a factor because supervision failed to recognize the wrongful act (wrong assembly of the wire) of the crew, and correct it.
- 6.3.3 The Makers’ instruction manual was onboard and was available to the crew members, for reference. The schematic diagrams in the manual provided sufficient information on the correct way of the wire assembly to the hook. The crew assigned the job, was adequately exposed to the information needed to perform the job, but did not absorb it, consequently used a wrong assembly technique of the wire to the hook. It is a technical/procedural knowledge error.
- 6.3.4 A review of the crew Certificates of Competency revealed that all the crew were properly certified for their rank. Furthermore the below table indicate that the crew involved in the wire replacement, were with adequate experience. Nevertheless, proper certification and experience as well as exposure to information in the past does not imply "*knowledge*" of the particular job. Lack of knowledge does not imply deficiency in the crew’s training. It is again a technical/procedural knowledge error.

Rank	Years at rank	Years at sea	Years with the company	Months onboard
Chief Officer	3	16	16	3 months
Bosun	6	21	21	5 ½ months
AB (1)	17	17	5	5 months
AB (2)	18	18	18	12 days

Note: AB2 was only 12 days onboard, however he had a total of 18 years with the Company, as AB and he was familiar with the ship on which he had serviced on previous occasions.

**7.0 CONCLUSIONS**

- 7.1 The fall wire was in good condition. Its failure was the result of wrong assembly of the wire end to the hook housing.
- 7.2 The assembly of the wire to the hook was last done during wire renewal in January 2015 by the crew.

7.3 The Direct Cause of the accident was a Technical/procedural knowledge error (The wrongful acts of the crew engaged in the connection of the wire to the hook.) The contributing causes of the accident were: Inadequate Supervision.

## **8.0 RECOMMENDATIONS**

A circular or safety alert to be sent by the Management Company to all vessels of its fleet within 3 months containing brief description of the accident, stating the lessons learned from the accident, and stressing the importance of the correct assembly of wires to hooks, blocks etc.