



**Bundesstelle für Seeunfalluntersuchung**  
**Federal Bureau of Maritime Casualty Investigation**  
Federal Higher Authority subordinated to the Ministry of Transport,  
Building and Urban Development

**Summary**  
**Investigation Report 554/07**

**Less Serious Marine Casualty**

**Person injured by the fall of a lifeboat on the**  
**MS MSC GRACE**  
**at Neue Weser North-Roads**  
**on 31 October 2007**

1 August 2008

The investigation was conducted in conformity with the law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law / Seesicherheits-Untersuchungs-Gesetz, SUG) of 16 June 2002.

According to this, the sole objective of the investigation is to prevent future accidents and malfunctions. The investigation does not serve to ascertain fault, liability or claims.

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to § 19 paragraph 4 of the SUG.

The German text shall prevail in the interpretation of the Investigation Report.

Issued by:  
Bundesstelle für Seeunfalluntersuchung - BSU  
(Federal Bureau of Maritime Casualty Investigation)  
Bernhard-Nocht-Str. 78  
20359 Hamburg

Head: Jörg Kaufmann  
Tel.: +49 40 31908300  
posteingang-bsu@bsh.de

Fax: +49 40 31908340  
[www.bsu-bund.de](http://www.bsu-bund.de)

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## 1 Summary of the Marine Casualty

The container ship MSC GRACE anchored at the Neue Weser Nord-Reede (Neue Weser North-Roads) on 31 October 2007. The port lifeboat was to be lowered as part of the weekly lifeboat inspection. The inspection was supervised by the first nautical officer. There were no crew members in the boat during the lowering process. As a consequence of the prevailing weather conditions, the lifeboat started to swing strongly which meant that the lowering process was interrupted and the crew heaved the boat back in. A defect in the electric drive of the boat winch led to the boat being heaved back in by crank-handle. When the boat had nearly reached stowing position, the releasing hooks released and the boat fell. The first nautical officer was hit in the back and thrown to the floor. In addition to this there was damage to the davit system. The lifeboat was held against the port side of the MSC GRACE for a time by the painters, but ultimately went adrift. The lifeboat suffered severe damage from the fall and from lying alongside which meant it had to be replaced later on by a new lifeboat.

The floating lifeboat was subsequently towed by a dinghy belonging to the Federal Police vessel BP 24 and returned to the MSC GRACE, where it was brought on deck by the cargo-handling gear of the container ship.

After sailing into Bremerhaven, the first nautical officer was medically treated and taken to hospital.

## 2 Scene of the accident

Type of event: Less serious marine casualty, injured person and fallen lifeboat  
Date/time: 31 October 2007, 11:00<sup>1</sup>  
Location: Neue Weser Nord-Reede  
Latitude/longitude:  $\phi$  53°53.702'N  $\lambda$  007°48.907'E

Section from nautical chart 87, Bundesamt für Seeschifffahrt und Hydrographie (BSH - Federal Maritime and Hydrographic Agency)

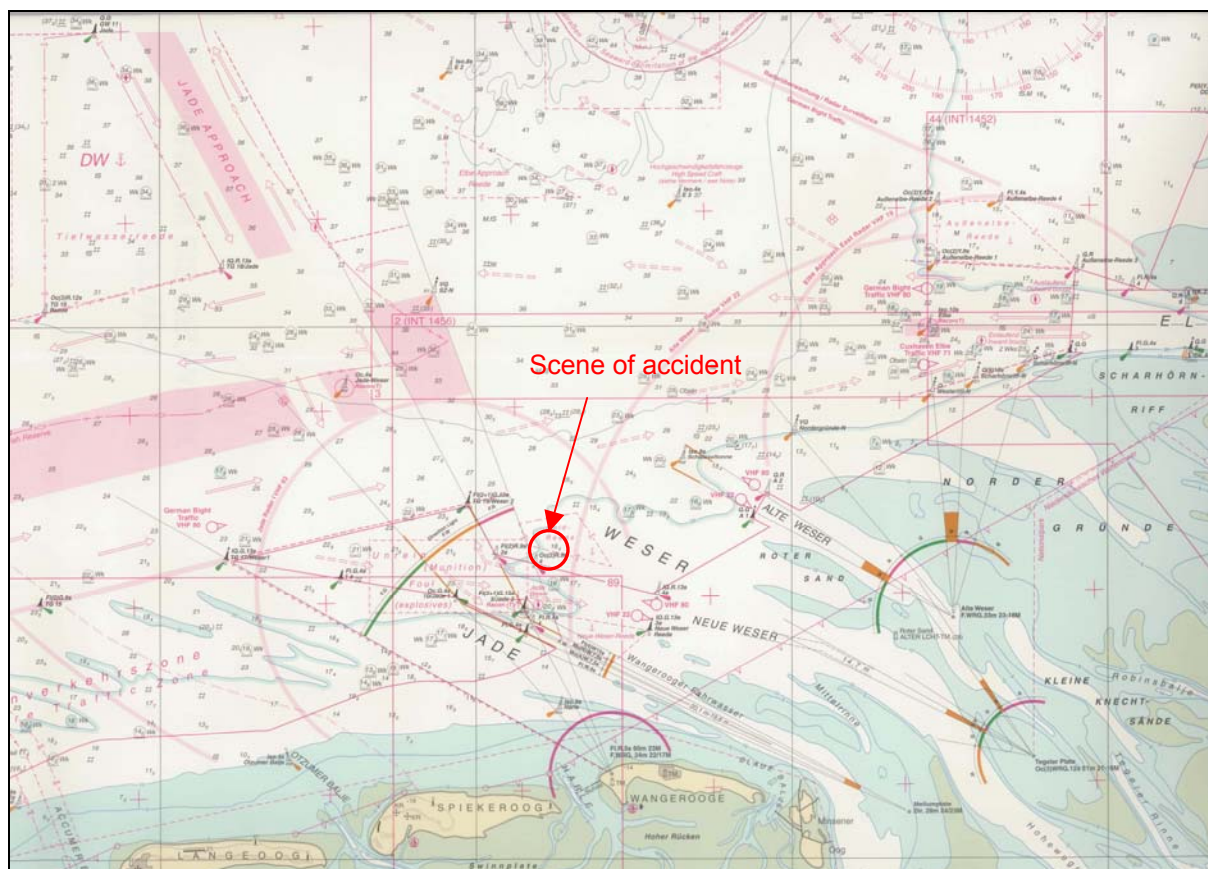


Figure 1: Chart with scene of accident

<sup>1</sup> All times in the report are CET = UTC + 1 h

### 3 Vessel Particulars

#### 3.1 Photo



Figure 2: Photograph of the vessel

#### 3.2 Particulars

Name of the vessel:	MSC GRACE
Type of vessel:	Container ship with cargo-handling gear
Nationality/flag:	Republic of Panama
Port of registry:	Panama
IMO number:	8918057
Call sign:	H9VZ
Owner:	Sinensis International Inc.
Operator:	MSC Ship Management (Hong Kong) Ltd
Year built:	1991
Shipyard/yard number:	Schiffswerft Neptun GmbH, Rostock
Classification society:	Bureau Veritas
Length overall:	154.90 m
Breadth overall:	23.09 m
Gross tonnage:	13,257
Deadweight:	24,330 t
Engine rating:	7,950 kW
Main engine:	Sulzer 5-cylinder
(Service) Speed:	16 kn
Hull material:	Steel
Number of crew:	25

## **4 Course of the accident**

### **4.1 Course of the voyage**

At the time of the accident, the MSC GRACE was operating in a liner service between different ports in the North Sea and Baltic Sea. On 31 October 2007, the container ship had come from Antwerp/Belgium. It was heading for Bremerhaven. Since there was no free berth, the MSC Grace dropped anchor first at 05:12 at the Neue Weser Nord-Reede.

### **4.2 Course of the accident**

The weekly inspection of lifeboats was to be carried out at 11:00. This inspection was to test the lowering function of the port boat. The first nautical officer was in charge here.

At the time of the inspection, the weather conditions at the Neue Weser Nord-Reede were as follows: Wind from SW at 6 Bft, sea level 1-1.5 m.

The assigned crew members had prepared the boat for lowering. There was nothing conspicuous noticed during the inspection of the releasing hook, safety pins and other parts. The boat was lowered unmanned using the centrifugal brake. Due to the prevailing sea state and wind, the lifeboat started to swing severely during the lowering process. This led to the decision to heave the boat back in without it having touched the water's surface. The electrical winch suffered a defect during heaving-in. The crank attached to the boat winch was then used to continue heaving the boat in. The crew were able to heave the boat in up to the stop point of the davit arm without any further difficulties. The lifeboat was folded back using the davit arms in the course of being taken up. Shortly before reaching the end position, both releasing hooks suddenly released and the boat fell.

At this point in time, the first nautical officer was under the boat. He was hit in the back by the falling boat and knocked down. He hit the deck with his upper body over a coaming edge.

The falling boat initially fell onto parts of the davit structure. It then slipped further out and bent the outside edge of two railing supports. Subsequently it fell over board and hit the surface of the water. At first the boat was held against the ship by the fore and aft painters. However, due to the movements of the boat generated by the sea state the fore painter came loose. The aft painter was only secured to a narrow metal shackle. This gave way and the port lifeboat drifted away.

### **4.3 Other occurrences**

The vessel's command on the MSC GRACE informed Wilhelmshaven Vessel Traffic Service (VTS), call name "German Bight Traffic", at 11:57 about the occurrence. The decision was then made to weigh anchor and follow the drifting lifeboat. In agreement with the Joint Maritime Situation Centre (Gemeinsames Lagezentrum See) and the VTS, recovery of the lifeboat was to be supported by the Federal Police vessel BP 24. By 12:25, the control boat from the BP 24 had established a towing connection to the lifeboat.



At 13:50, the MSC GRACE picked up the lifeboat with its own cargo-handling gear and placed it on a clear hatch area (Figure 3).



Figure 3: Taking the lifeboat onboard using the MSC GRACE cargo gear and a Federal Police control boat

The MSC GRACE then anchored again at the Neue Weser Nord-Reede. Around 20:00, the Weser pilot reached the ship which then continued its heading for Bremerhaven. After mooring in Bremerhaven around 21:30, the Water Police boarded the ship. At the same time an ambulance team came on board. They examined the first nautical officer and later transported him to hospital.

#### 4.4 Consequences of the accident

The first nautical officer was diagnosed with severe bruising of the rib cage at the hospital. He was treated as an in-patient for several days.

There was no damage to the MSC GRACE itself from the fall of the lifeboat. The davit system had some damage from being hit by the boat.

The port lifeboat suffered serious damage from the fall and from lying alongside. It was taken to land at Bremerhaven and the MSC GRACE continued her voyage with an exemption certificate and additional life rafts.

The Federal Bureau of Maritime Casualty Investigation (BSU) was unaware of any environmental pollution.

## 5 Investigation

### 5.1 Lowering device

The lowering device is located on the boat deck, two decks above the main deck. The davit area is bounded to the aft end and towards the midship side by the vessel's superstructure (Figure 4). The lifeboat can be manned in stowing position. Access is from the next deck up via a platform which is integrated into the davit system. Access to the boat is through a large opening on the side of the top section.



Figure 4: MSC GRACE superstructure

On the walls of the superstructure near the boat deck there is a short description in English as well as drawings and pictograms on how to handle the lashings, the davit system and winch.

The lifeboats are suspended in the davits by cables running over rolls and blocks, the so-called boat runners. The boat runners are guided inside the davit system to the boat winch. The gravity davit system used by the MSC GRACE allows the boat to be lowered to the water independently of electric motors. Lowering start and lowering speed are regulated by a brake integrated into the boat winch. In an emergency, the brake can be operated from the boat via a rerouted cable. For boat drills, this is done using a lever directly on the winch. The MSC GRACE also has a further remote control installed. Using another rerouted cable, this allows for the brake to be

operated from the railing, which enables direct visual contact with the boat when it is being lowered. Lowering by electric winch motor is also possible.

There must be one person on board the vessel to take the boat up again. Heaving-to can be either motor-driven or manual. Due to the failure of the electric winch on the day of practice, the lifeboat was heaved in using one of the cranks attached to the winch.

At the time of the accident, there were several people in direct proximity to the boat: There was the supervising first nautical officer and the operator of the winch crank-handle. Other crew members guided the fore and aft painters. Others took charge of work in connection with securing the boat in the davits.

The falling boat damaged the davits (Figures 5 and 6). The girders were dented from being hit by the boat; the wooden boat blocks were pressed to the side; and two railing supports were bent.

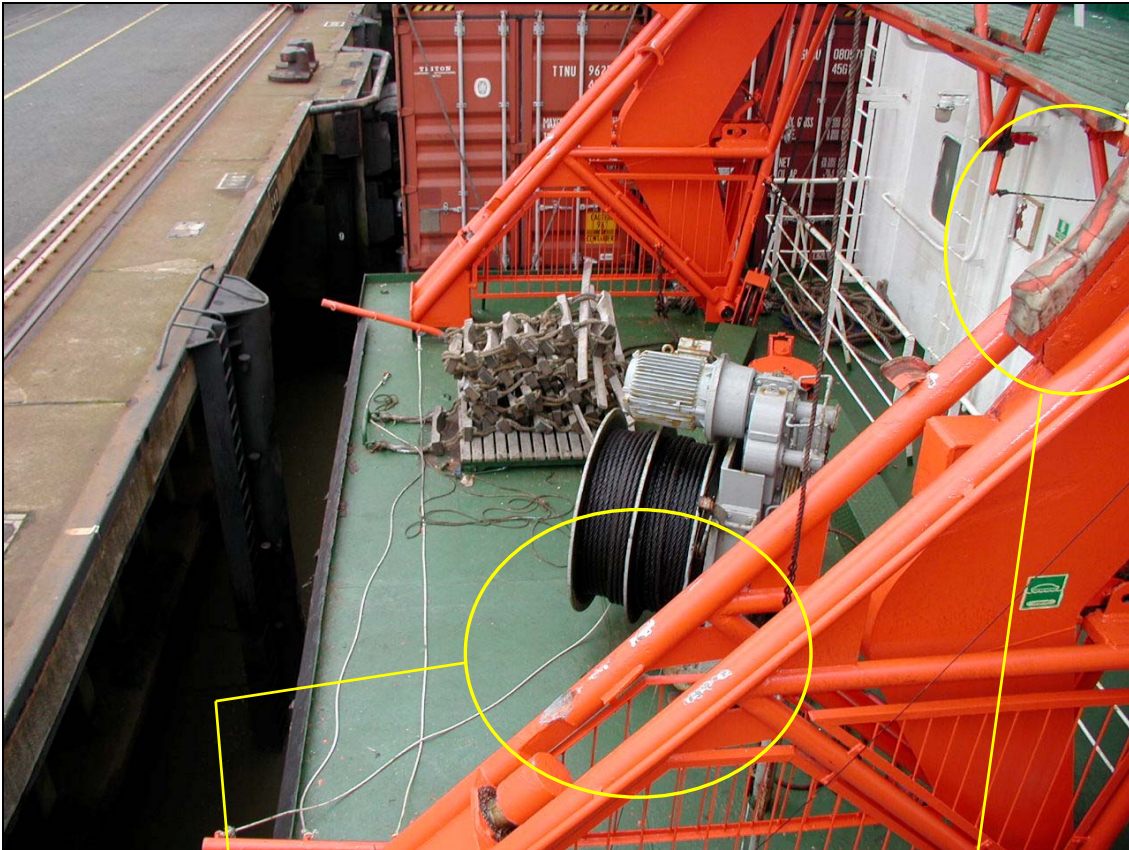


Figure 5: Damage to the davit system

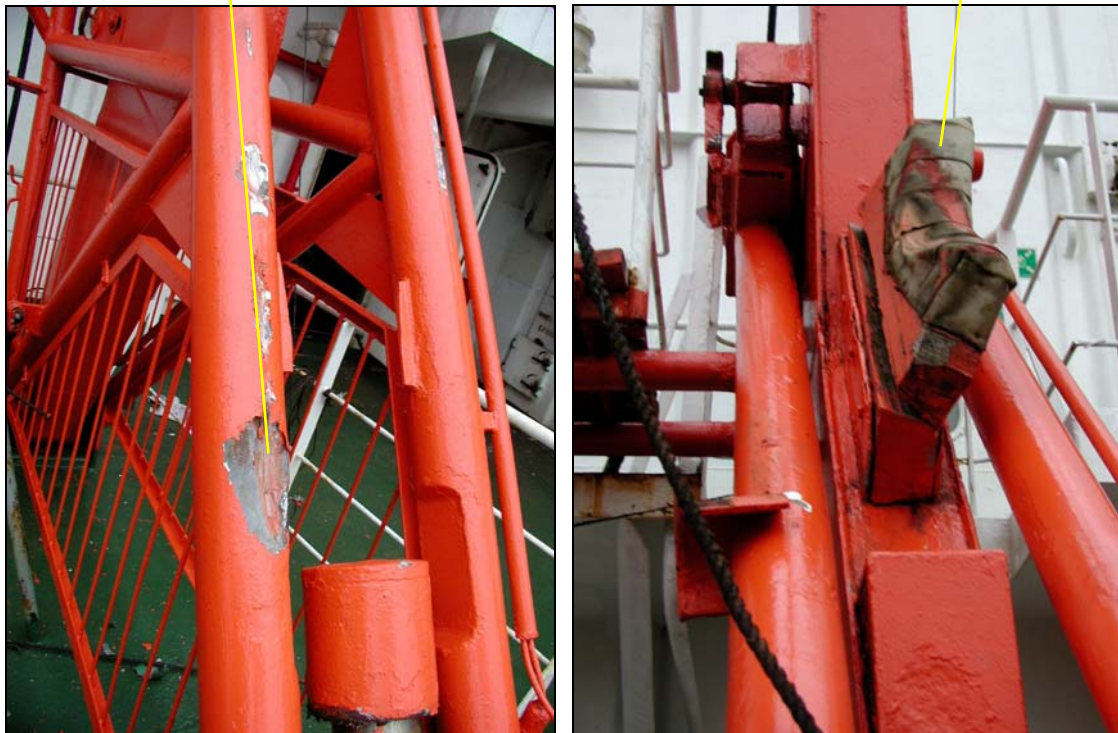


Figure 6: Details of the damage

## 5.2 Port lifeboat

The boat at the centre of the accident could not be examined by the BSU. No further information was gained from questioning the Federal Police officials involved in the recovery of the lifeboat as they had not examined the boat any further. According to their statement, the lifeboat was raised without any further preparations. They hung the crane equipment's metal rings into the releasing hooks and the boat was heaved on deck.

A team from the BSU together with an expert inspected the remaining starboard lifeboat to gain an impression of the function of the boat and the release device. The crew present at that time only had basic information about the fall of the lifeboat. No statements could be made regarding the failure of the boat winch either.

The MSC GRACE lifeboats were manufactured by Schiffswerft Rechlin GmbH. Both boats had the same construction. The port boat had the following features:

Yard number:	GA 7.3/005
Date of manufacture:	27.03.1991
Length overall:	7.30 m
Breadth overall:	3.03 m
Draught:	1.20 m
Weight (inc. persons and equipment):	6,950 kg
Material:	Glass fibre reinforced plastic (GRP)
Number of persons:	32
Motor manufacturer:	Motorenwerke Nordhausen
Motor type:	4 VD 8.8/8.5-2 SRF
Output:	26 kW at 2,500 min <sup>-1</sup>
(Service) Speed:	6 kn
Manufacturer of the releasing hook system:	Schiffswerft Rechlin GmbH

A licence (number HAM 100777/1) was granted for the boats by Lloyd's Register of Shipping on 17 May 1991.

The Schiffswerft Rechlin GmbH is no longer trading.

There is no licensed service company that could carry out maintenance and servicing with original replacement parts.

The lifeboat was severely damaged on the top (area above water level) of the starboard side by its fall and by subsequently hitting the ship's side as it was held against the ship by painter; consequently it was irreparable (Figure 7). It was replaced by a new lifeboat from the manufacturer Jianguyinshi Beihai LSA CO.LTD.



Figure 7: Port lifeboat of the MSC GRACE

### 5.3 Releasing hook system

The MSC GRACE lifeboat was equipped with a centrally activated hoisting system. Since it was impossible to determine the manufacturer from anywhere on the starboard boat system, it is assumed that Schiffswerft Rechlin GmbH also produced the hoisting system.

The centrally activated hoisting system on the lifeboat comprises the following components:

- A directly operable releasing hook aft and a remotely controlled releasing hook forward. A longitudinal eye is hooked into the releasing hook. This longitudinal eye is also secured to a boat runner which is rigged as a double parbuckle. This cable is guided over the davit arm and guidance mechanisms onto the boat winch.
- It can be centrally activated by coupling the fore and aft release rod by cable. This cable runs inside a guide tube on the starboard side of the boat, level with the connection between top and bottom sections.
- There is no integrated hydrostatic interlock.

Certain circumstances require release to be activated when the boat is still fully suspended in the boat runners. This option is called "on-load release". The licence from Lloyd's Register of Shipping states that the releasing hooks are appropriate for on-load release and tested for a safe working load (SWL) of 38 kN.

#### 5.4 Releasing hook

The releasing hook comprises two vertical foundation plates, the actual hook located between these plates and the related mechanism (Figures 8 to 13). The foundation plates are connected to the keel of the lifeboat via a multi-part construction.

The release rod is guided from below inside the releasing hook. The release rod displaces the hook tail of the releasing hook via two connecting elements. Only the hook in its rotary axis and one connecting element have a fixed bearing between the foundation plates (Figure 9 = +). This facilitates the course of movement as illustrated in Figures 10 to 12.

The upper spring stop can move horizontally and is not fixed to the release rod.



Figure 8: Front releasing hook on the starboard lifeboat with securing cable

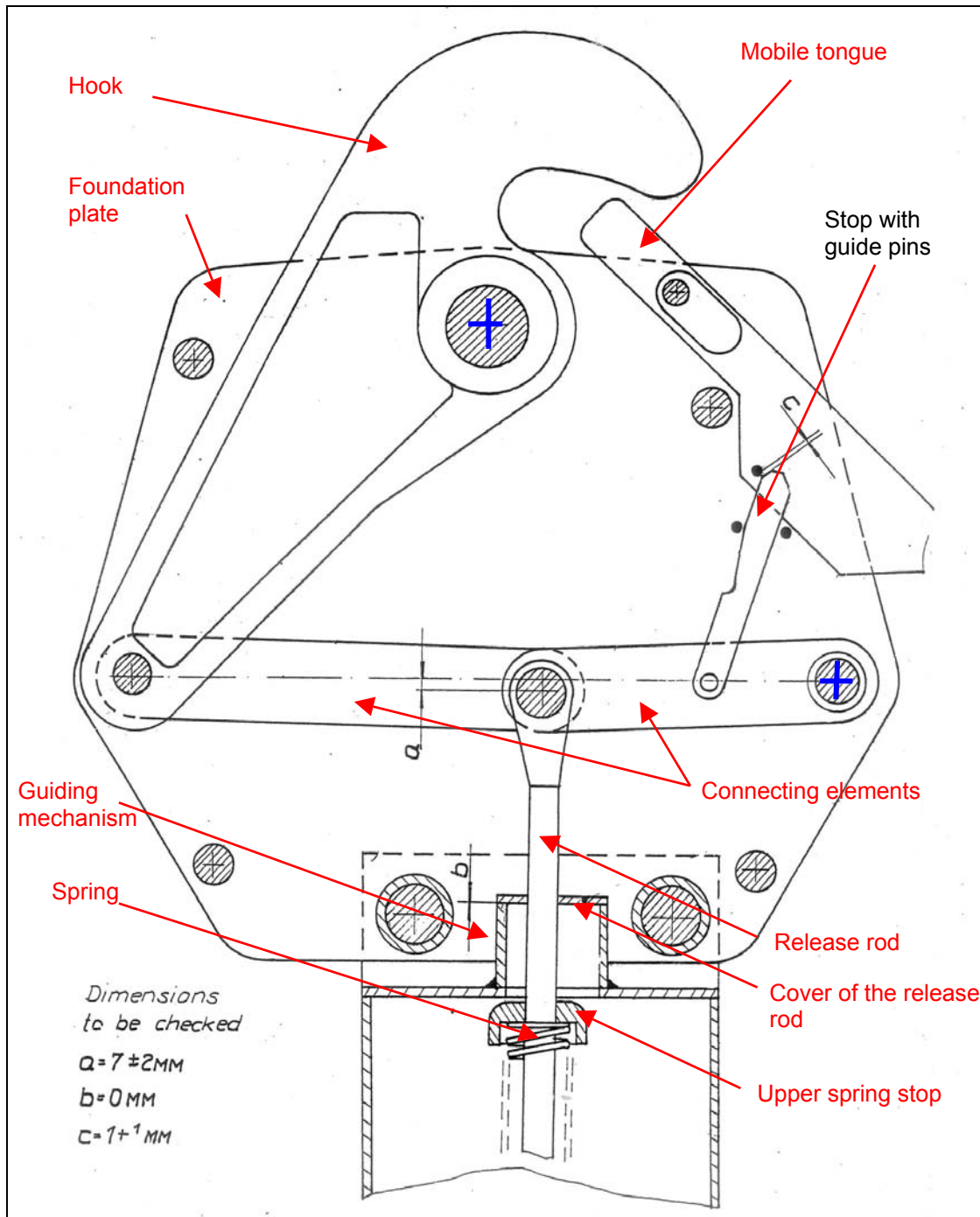


Figure 9: Releasing hook in closed position, + = fixed rotary axes

In Figure 9, the releasing hook is pictured in a self-locking position. This position is characterised by two features. Firstly the cover (which is securely fixed to the release rod) is lying without a gap ( $b$ ) on the guiding mechanism of the release rod. Secondly, the arms of the connecting elements do not form a horizontal line but are at an obtuse angle to each other. The load applied to the releasing hook by the suspended boat consequently generates a downward motion of the release rod.



Ref.: 554/07

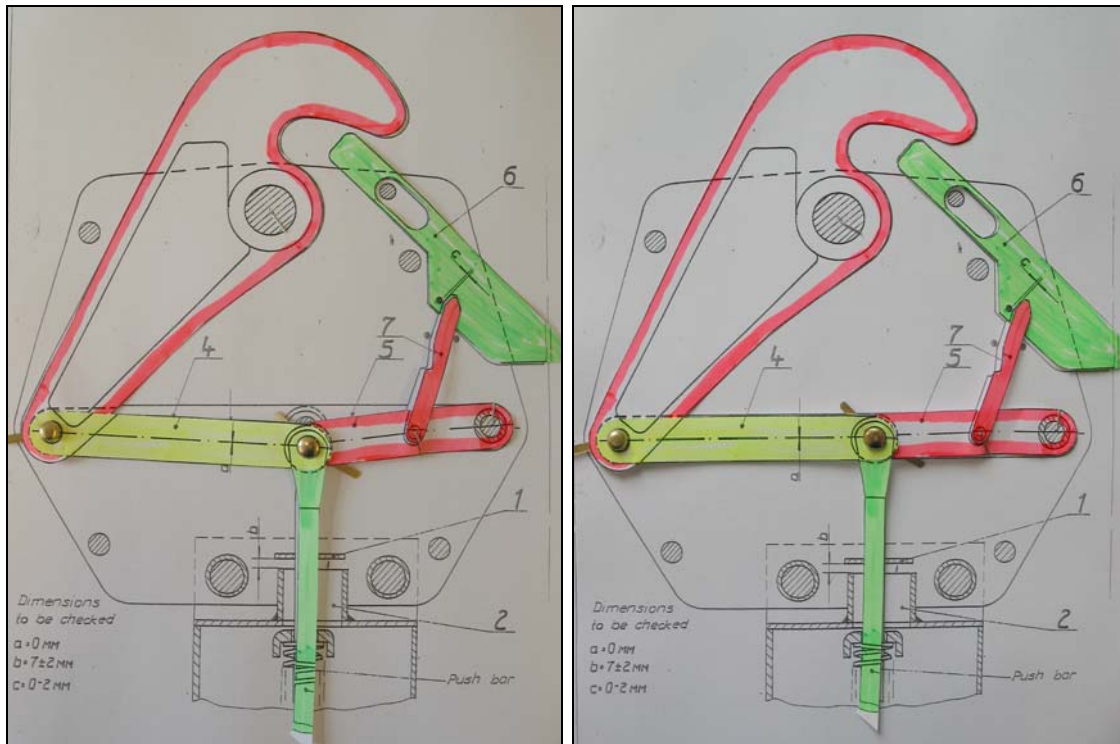


Figure 10: Releasing hook, left in closed position; right in blocked position<sup>2 3</sup>

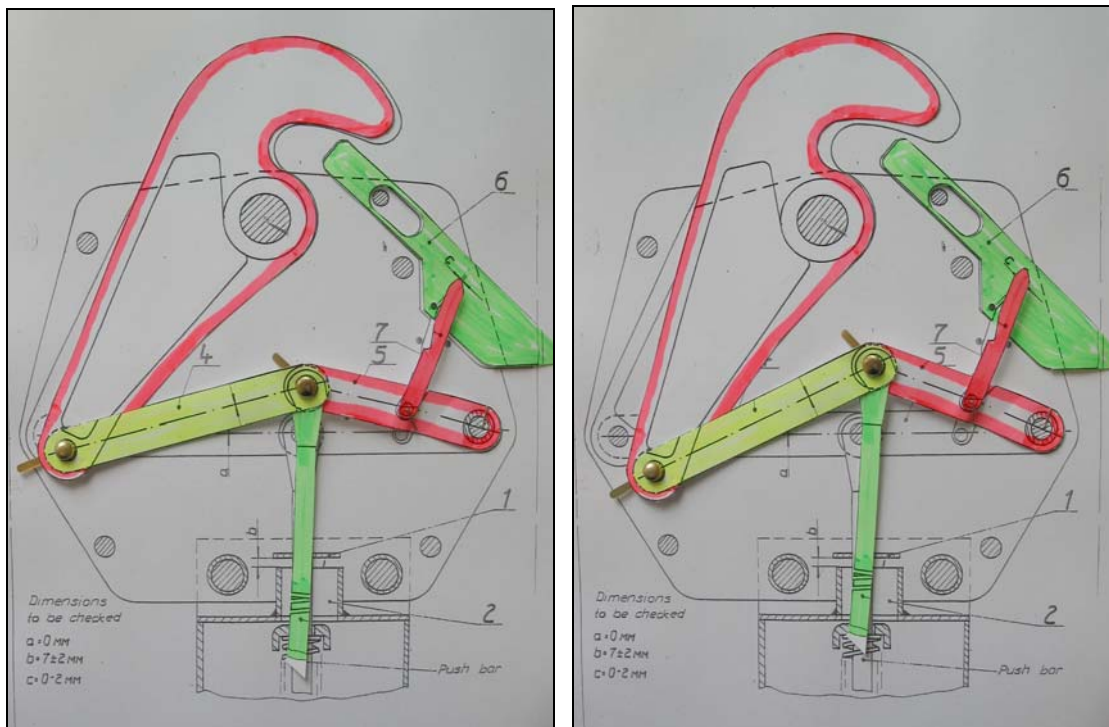


Figure 11: Opening process of the releasing hook

<sup>2</sup> Figures 10 to 12 do not reproduce the correct position of the cover in the corresponding positions of the releasing hook.

<sup>3</sup> The technical drawing labels for these positions state "closed" and "blocked position".

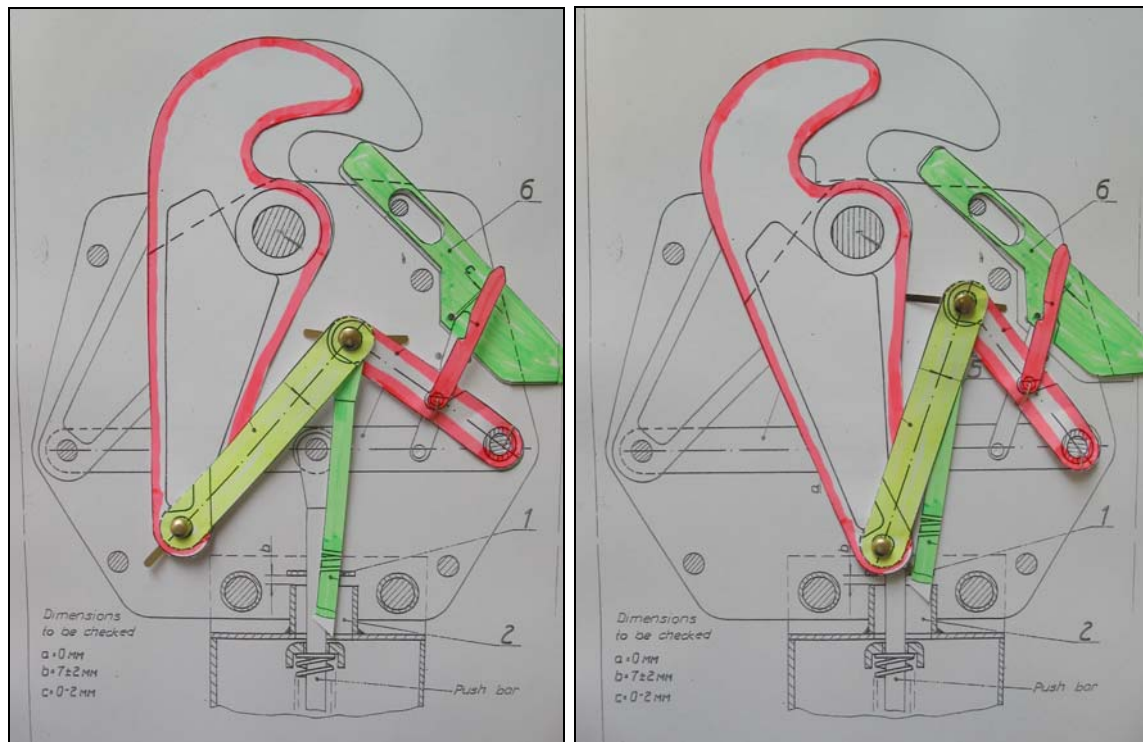


Figure 12: Releasing hook, on right in fully open position

## 5.5 Release unit

The entire system is operated (unlocked, released and secured) directly at the aft releasing hook.

The mechanism is located between two steel plates (foundation plates) which simultaneously form the connection of the releasing hook with the keel (Figures 13 and 14).

An intermediate element that only rests on the release lever is moved up as a result of the upward motion of the single-bearing release lever. The movement of the release lever is against a spring. The spring is pushed onto the release rod (see Figure 9).

Two mechanical locks must be activated first to be able to move the release lever. Firstly a safety pin must be removed from both foundation plates and a segmented disk (lock washer) after a 180° rotation around the longitudinal axis. Only then is it possible to lift the lock washer (which is hanging down due to the force of gravity) on an outward projecting arm.

The intermediate element (like the release lever) is a one-sided lever. The release rod and another component are secured to its free end; the segmented disk lies against this component in a secured position (Figure 15). A drum is located outside the foundation plates on the side of the lever's rotary axis. The drum turns with a movement of the intermediate element. A cable is placed onto the drum and tightened. With the aid of the cable, the movement of the release lever on the aft releasing hook is transferred to the fore releasing hook, where there is a similar drum. As a result of the rotational direction being opposite to that of the aft drum, the intermediate element here is also moved up which presses the release rod up to open the hook (Figure 16). At the same time, a spring is tensioned on the front releasing hook.

No independent release is possible on the front releasing hook.

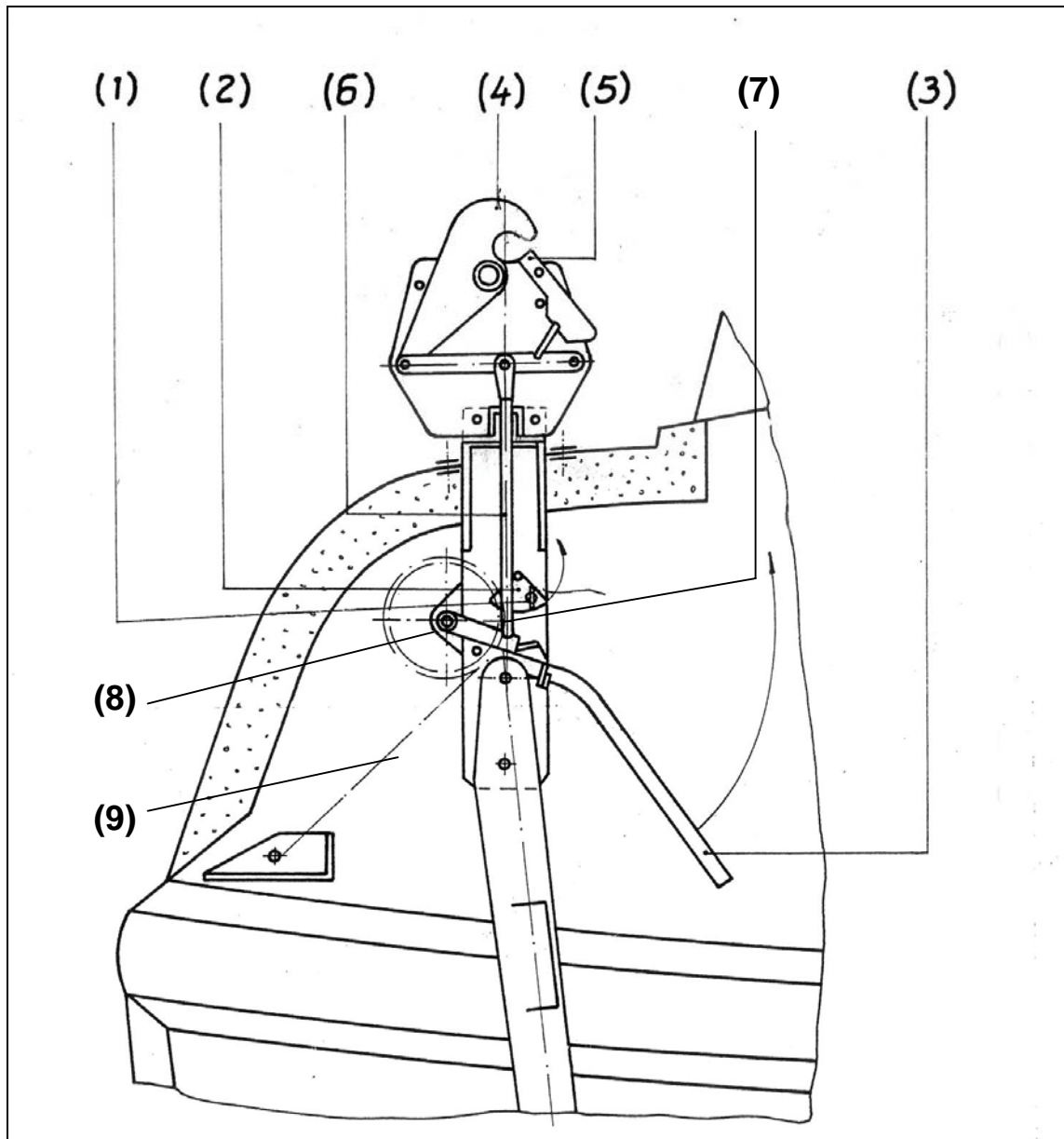


Figure 13: Release unit on the aft releasing hook; 1 – safety pin, 2 – safety washer, 3 – release lever, 4 – hook, 5 – mobile tongue, 6 – release rod, 7 – intermediate element, 8 – drum, 9 – cable

There is no link between release lever and intermediate element. Consequently the release system (including the releasing hook) is reset to its starting position not by a downwards movement of the release lever but purely by relieving the springs in the fore and aft releasing hooks.

If the system is set according to the design, the release system can only be secured by the segmented disk when the releasing hook is back in closed position. Only then will the connected release rod move down enough for the segmented disk to fall back into starting position.

Now it can be further secured using the safety pin.

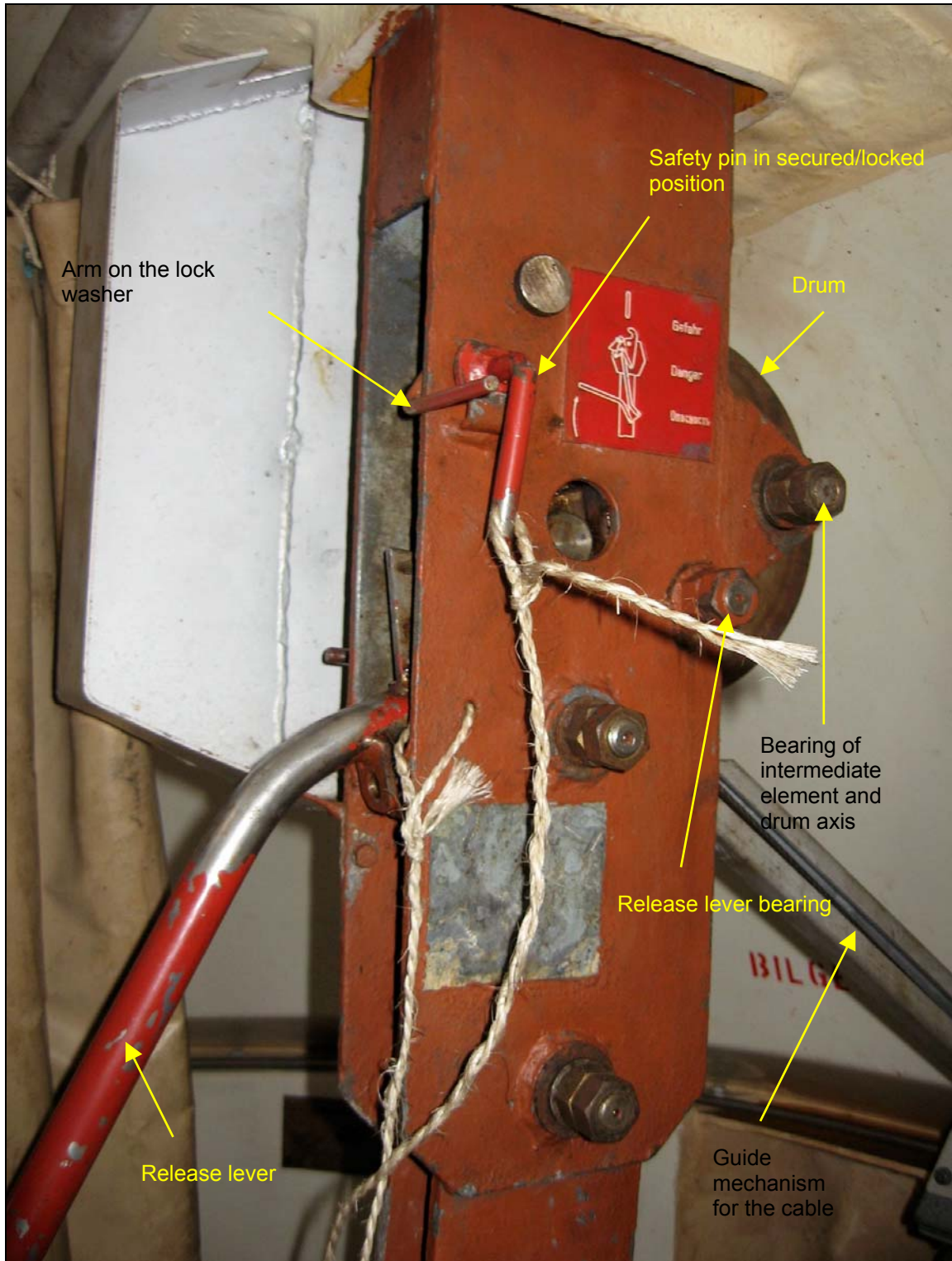


Figure 14: Release unit (view from port)

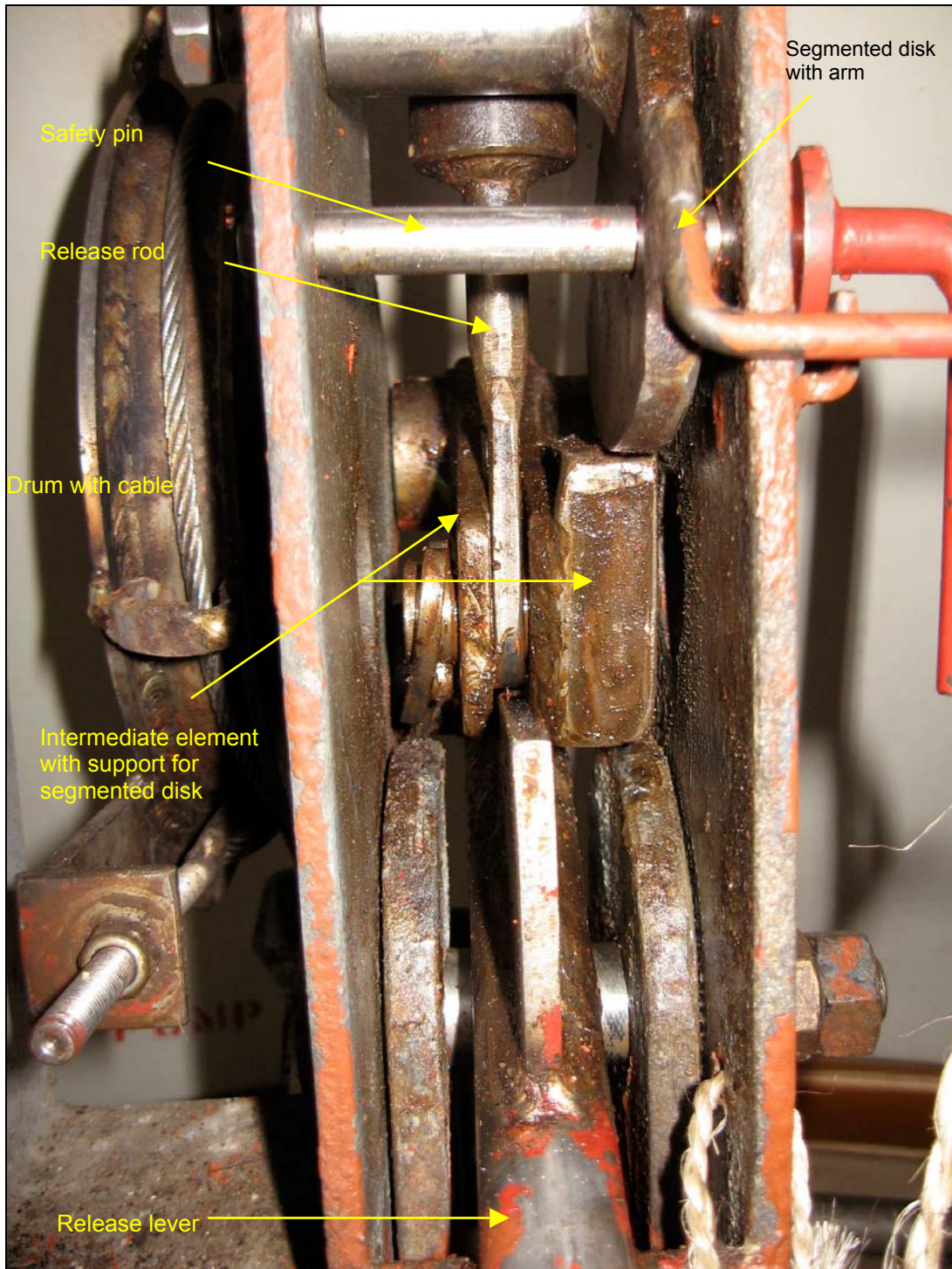


Figure 15: Release unit (view from aft)

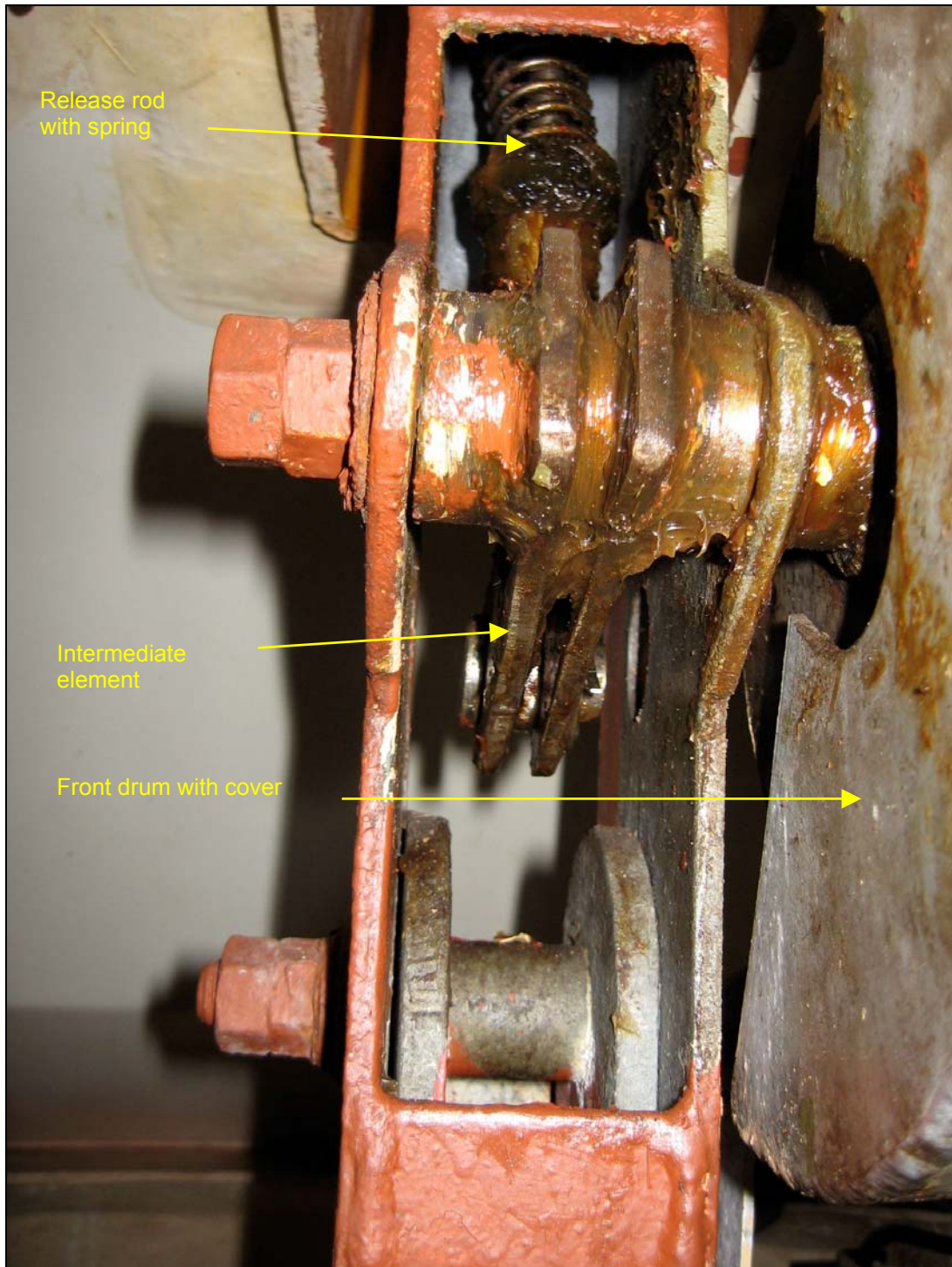


Figure 16: Fore releasing hook (view from front)

## 5.6 Labelling

Apart from the hazard notice on the release unit, the starboard lifeboat had no description from the manufacturer about the components of the releasing hook or the process for releasing and securing. Seamen had taken the initiative and drawn a schematic drawing of the release process and attached it in the boat (Figure 17). Another description of the releasing and securing process (likewise drawn up by seamen) was secured in a plastic envelope in the aft area of the boat. Neither

illustrations corresponded to the recommended symbols used by SOLAS<sup>4</sup> Chapter III Regulation 9 No. 3.

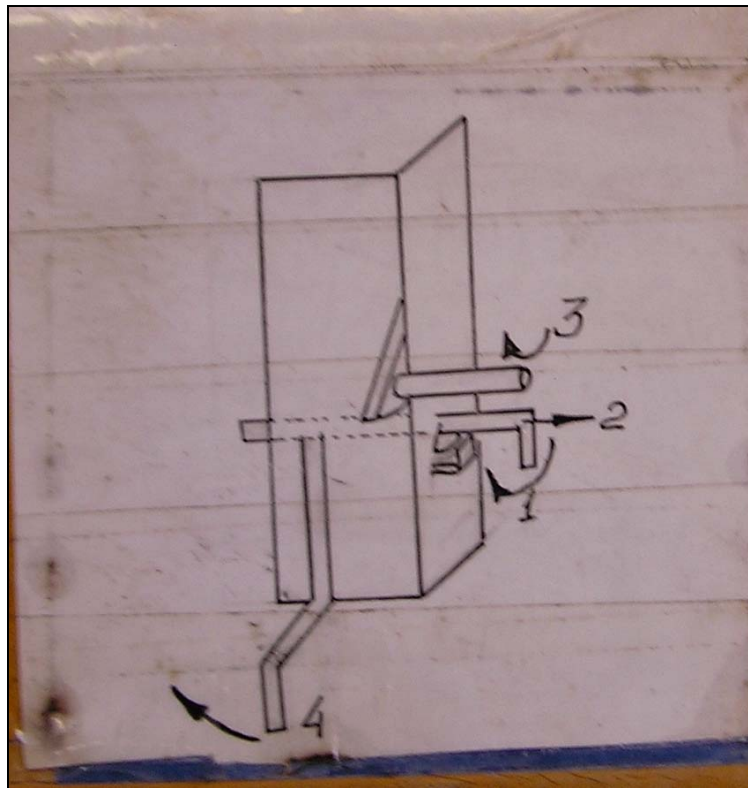


Figure 17: Schematic illustration of the work steps required for the release process

## 5.7 Manual

There is a manual from the lifeboat manufacturer Schiffswert Rechlin GmbH onboard the MSC GRACE. The manual, which is written in English, is subdivided into the following sections: technical details, design and working principles, how to use the boat and maintenance. In the section on how to use the boat, the release and restoring processes are described over three pages (including Figure 13).

The manual does not contain any basic description of the principle of the interplay between forward and aft releasing hooks. There are hardly any warning instructions. There are no step-by-step schematic illustrations of the actions required to release and secure the device.

Only in the appendix under *Releasing hooks – Test and setting instructions* does the manual describe that when the hook is fully reset, the cover on the release rod must lie on the guide (Figure 9:  $b = 0 \text{ mm}$ ). Furthermore, this is also the only place to explain that the connecting elements must form an obtuse angle (Figure 9:a =  $7 \pm 2 \text{ mm}$ ). Due to limited visibility inside the releasing hook, the possibilities for checking and controlling the situation are non-existent or only limited. There are no technical aids or displays available to enable a quick overview of the status and condition of the releasing hook.

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<sup>4</sup> SOLAS – International Convention for the Safety of Life at Sea

## 5.8 Boat manoeuvre

The vessel's command of the MSC GRACE supplied copies of the boat drill reports and photos relevant to the lifeboats. The assessment showed that 33 boat drills in relation to the lifeboats were carried out between 9 September 2005 and 8 October 2007. For seven of the boat drills, the boats were lowered down to water level. For five further manoeuvres, the crew members released the boats and manoeuvred them.

## 5.9 Technical acceptance test

According to records, the last service by a specialist company on the port lifeboat was on 25 January 2007 by Aqua Safety Equipment N.V. in Antwerp. The identically named test lists (*Launching Appliances and Life/Rescue Boat Check Lists*), that were submitted, were on the one hand dated with 03 May 2007 and on the other hand had no date.

When work was concluded, a 5-year certificate was issued according to SOLAS Chapter III Regulation 20 and MSC/Circ. 1093 and 1206<sup>5</sup>.

The 5-year certificate for the starboard lifeboat had a test date of 3 May 2007. The test list submitted for this had a date of 28 March 2007. None of the test lists contained the corresponding boat serial number. Both certificates showed the same serial number of the boat (006/91). Even on request to the service company, the boat data or allocations were not altered.

A certificate was issued by Lloyd's Register for the port lifeboat on 28 January 2007.

The following entry was found for the period January to March 2007 from an examination of the records presented by the vessel's command of the MSC GRACE concerning *Live [sic] Saving Equipment Inventory and Planned Maintenance Programme: STBD lifeboat for repairs (incident during load test)*. On request, the service company communicated the following: "*The accident was caused by miss operational [sic] of the equipment by the crew during the overload test on board. When the SB lifeboat was fully loaded with a capacity of 10% SWL, our technicians commend [sic] to remove the lashings in order to carrying out [sic] a dynamic test on the brakes & the on-load release mechanism. Unfortunately, they forgot to remove the lashings of 1 davit arm, when we ordered to lower [sic] the lifeboat, the accident occurred while one side started lowering & another side stayed in position [sic]. The lifeboat smashed against the vessel's hull & caused damages [sic] on the GRP of the lifeboat.*"

## 5.10 Servicing

According to the reports submitted, the boats were regularly serviced by the crew.

The new port lifeboat was also inspected during the investigator's stay onboard the MSC GRACE. Two things were apparent. On the one hand, there was the inconsistent description of the release process on a notice attached inside the boat

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<sup>5</sup> Circular from the ship's safety committee of the International Maritime Organisation of the United Nations



by the manufacturer. Text and pictorial labels for normal release use different terms. The release rod that was connected with the bowden cable coming from the hydrostatic interlock was called a "push rod" on the pictorial labels. In contrast, it was called a "pull rod" in the text (Figure 18). On the other hand, the section of text describing how to reset the hook under Point 2 was formulated as follows: "Ensure that both hooks are in correct position for locking. The red arrow mark on the hooks is vertical." In fact there was no visible mark on the releasing hook as the crew had painted over the releasing hook (Figure 19).

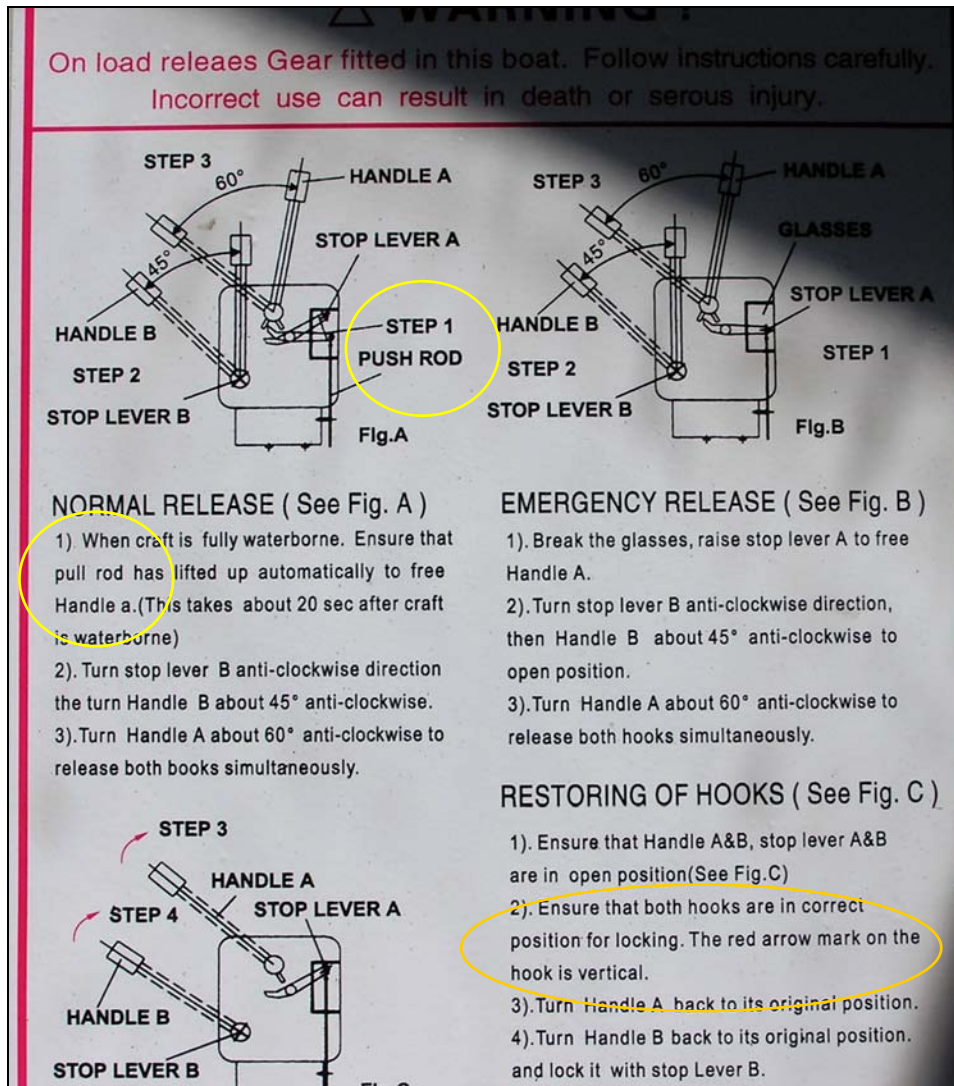


Figure 18: Description of the release process in the new port lifeboat

When the Bremerhaven waterway police inspected the site of the accident, they identified and criticised a nearly complete split in the remote control cable between the winch brake lever and the operator's station at the railing (Figure 20).



Figure 19: Aft releasing hook on the new port lifeboat, marking no longer visible



Figure 20: Damage remote control cabler

### **5.11 Measures by the vessel operator**

A circular from the vessel operator regarding safety when handling lifeboats was handed over by the vessel's command. This circular (O)18 from MSC Ship Management (Hong Kong) Ltd. dated 21 February 2008 gives a further reminder about the necessary codes of conduct. Apart from this, it also describes in detail how to attach and use the safety cables (safety strops) for the lifeboats (see also Figures 8 and 19).

According to this, the safety strops are to be attached immediately before a boat drill or any service work.

During the inspection of the MSC GRACE, it was observed that both lifeboats were attached to safety strops although no work was being carried out and the crew were not doing any boat drills.

### **5.12 Other accidents**

On 9 January 2008, another accident with a lifeboat of the same type occurred on the sister ship MSC INDIA during a voyage in the Baltic Sea. Three persons were inside the port lifeboat as part of an inspection of the boat motor. Suddenly the releasing hooks released and the lifeboat plunged into the water without any safety devices being able to hold the boat. The MSC INDIA returned to the accident location and recovered those involved in the accident. One seaman was killed by the fall; the other two were partially severely injured and taken by air for further treatment. The lifeboat was recovered by the Swedish coast guard.

The fall is currently being investigated by the Marine Casualty Investigation Branch of the Panama Maritime Authority.

## **6 Summary**

The fall of the MSC GRACE lifeboat is not directly due to human error as at that time there were no persons in the boat. Since the lifeboat itself was not available for examination, no further technical examinations or appraisals could be carried out.

The investigators were unable to gather any reliable statements concerning the condition of the release unit. However, it is assumed that the release lever was secured at the time of the fall. Nevertheless, either wear, or an incorrect setting or a technical fault caused the single, supposedly secured release system to malfunction. The problematic issue in relation to the releasing hook is apparent from the fall of the lifeboat onboard the sister ship MSC INDIA.

Due to the deficient manual, the crew only had limited opportunity to understand the functioning principle of the hook and to carry out important inspection work. From this perspective, the investigation's assessment is covered by the findings of the Federal Bureau of Maritime Casualty Investigation on the maritime accidents Ref. 21/06 – Fall of the TMS OLIVER JACOB lifeboat and Ref. 215/07 – Fall of the FOREST-1 lifeboat.

We also refer to investigation report Ref. 215/07 of the BSU in respect of the manufacturer of the lifeboat who is no longer trading and the associated problematic issues regarding servicing and maintenance.

## 7 Sources

- Determinations of the Bremerhaven Waterway Police
- Witness accounts
- Written statements of the vessel's command and crew members
- Extracts from the logbook, bridge book and records of boat drills and service work on the MSC GRACE
- Manual of the lifeboat manufacturer Schiffswerft Rechlin GmbH
- Certificates and service records of the service company
- Certificates from the classification society Lloyds Register
- Nautical chart of the Federal Maritime and Hydrographic Agency/Bundesamt für Seeschifffahrt und Hydrographie (BSH)
- Figures:
  - Fig. 2 and 4 Mathias Kokartis, [www.nok-ships.de](http://www.nok-ships.de)
  - Fig. 3 Federal police, BP 24
  - Fig. 5, 6, 7, 14 - 16, 19 Bremerhaven Waterway Police
  - Fig. 8, 10, 11, 12 Federal Bureau of Maritime Casualty Investigation
  - Fig. 9, 13 Manual of Schiffswerft Rechlin GmbH
  - Fig. 17, 18, 20 Jan Hatecke Dip. Eng.