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PORT STATE CONTROL COMMITTEE INSTRUCTION 44/2011/16

GUIDELINES ON INSPECTING LIFEBOAT ON-LOAD RELEASE HOOKS

1. INTRODUCTION

1.1. General

In 1986, on-load release hooks for lifeboats and rescue boats were made mandatory by SOLAS, in response to Norway's worst offshore accident in March 1980. The "Alexander Kielland" platform in the North Sea, Ekofisk field, capsized killing 123 of the 212 persons on board. Some deaths in this accident were attributed to the fact that the lifeboat had no means of release when the weight of the lifeboat was on the hooks and falls. Therefore, **on-load release** systems were seen to offer benefits.

Since 01/07/1986 when the IMO requirement for all new ships to be fitted with on-load release systems came into force (part of the SOLAS 83 amendments) there have been a number of serious accidents during drills and servicing.

Many of these accidents were attributed to:

i lack of maintenance;

ii poor design or

iii inadequate training.

Failures of equipment can result in the premature opening of the on-load hook mechanism, causing the lifeboat to fall from the davits unexpectedly.

A number of current designs of on-load release hooks can be described as **unstable**, in that they are designed to open under the effect of the lifeboat's own weight and often need to be held closed by the operating mechanism. **This means that any defects or faults in the operating mechanism, errors by the crew or incorrect resetting of the hook after being previously operated can result in premature release.**

1.2. Goals and purpose

The purpose of these instructions is to give guidance to the PSCO when inspecting ships fitted with on-load release hooks.

The guidance covers:

i The Inspection of Release Hooks
ii Construction Types
iii Frequently Occurring makes (see Annex 2 and 3)

1.3. Application

The requirement for on-load release mechanisms is for ships built **on or after 01/07/86** and was part of the SOLAS 83 amendments.

Note, ships built before 01/07/86 may be fitted with on-load release hooks. In such a case, although not required by the regulations if they are fitted they must operate correctly and the crew be familiar with their operation. If problems were found with the on-load release mechanism it would not be a defence by the master/owner to say that the ship does not require them, therefore they do not need to work.

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It should be stated on the lifeboat or rescue boat certificate whether or not the lifeboat is fitted with on-load release hooks.

1.4. Relevant documentation

- SOLAS – (83, 88 and 89/90 Amendments) Chapter III Reg 41 Paragraph 7.6 covers ships from 01/07/1986 to 01/07/1998
- LSA Code – The Code became mandatory from 01/07/98 and the Code applies to ships with a keel laid after 01/07/1998.
- MSC/Circ.1205 – Guidelines for developing operation and maintenance manuals for lifeboat systems
- MSC/Circ.1206 Rev 1 – Measures to prevent accidents with lifeboats
- MSC.1/Circ. 1277 Interim recommendation on conditions for authorization of service providers for lifeboats, launching appliances and onload release gear.

1.5. Definitions and abbreviations

On-load release hook	- A design of lifeboat hook that enables the fall blocks to disengage from the lifeboat hooks simultaneously when under load (See Annex 1 for requirements)
Fall block	- The pulley block at the lower end of the lifeboat davit fall wires
Lifeboat Certificate	- Each lifeboat shall have a certificate of approval, endorsed by the Administration, containing such information as; manufacturer's name and address; lifeboat model and serial number; month and year of manufacture; number of persons the lifeboat is approved to carry;

2. INSPECTION OF SHIP

2.1 **Pre-Boarding Preparation**

The requirement for on-load release mechanisms is for ships built on or after 01/07/86. Thus it will be important for the PSCO to check the keel laying date of the ship. Also check to see if any previous deficiencies relate to lifeboat hooks.

The most important issues for safety regarding this equipment is
i) Maintenance
ii) crew training and familiarity with the equipment on their ship, there at least 70 different makes of on-load release mechanisms in current use. (see Annex 2 and 3 for lists of most frequent makes)

2.2 **Inspection**

2.2.1 In the master's cabin

The PSCO should verify that there is an up to date manual on-board that is applicable to the actual release gear fitted to the lifeboat, not generic. The manual should be reasonably easy for the crew to understand and the responsible officer(s) should be fully conversant with it, it should also be in a language that is understood by the crew. The quality of manuals is recognised as a factor in accidents.
The PSCO would also be looking for well documented maintenance records following the manufacturers' recommendations and these should cover the weekly and monthly checks required by SOLAS Chapter III

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There should also be an annual servicing report with the maintenance carried out by servicing personnel who are certificated by the manufacturer. The report should show that the following was examined for satisfactory condition and operation after the annual winch brake test with the empty boat:

(a) Operation of devices for activation of release gear;
(b) **Excessive free play (tolerances);**
(c) Hydrostatic interlock system, where fitted;
(d) Cables for control and release; and
(e) Hook fastening; including cheek plates, keel bolts etc.

The master must also be able to provide evidence of 5 yearly maintenance and 1.1 load test. (SOLAS Ch III Reg 21 (11.2))

2.2.2 In the lifeboat

The PSCO should check each hook assembly and look for signs of corrosion or damage, is there evidence of lubrication, usually by grease nipples, does it appear that the lubrication is getting through to the required area. Check that any operating cables are in good condition with no signs of fraying and that the outer sheath is intact, the plastic may become brittle with age and crack, this could lead to ingress of moisture and possible internal corrosion which may not be obvious. The PSCO should have a general look at the hook assembly and the release handle assembly.

The LSA Code makes reference to "**clear operating instructions should be provided with a suitably worded warning notice**" The PSCO should ensure that there are clear operating instructions posted in the lifeboat which are understood by the crew.

2.2.3 General

One of the main concerns with some types of on-load release equipment is the fine clearances within the mechanism. A common example of this is the Mills Titan equipment, see Annex 2. This arrangement uses a cam to lock the tail of the hook in place. After a period of time and particularly after several on-load releases during testing, the tail of the hook wears and eventually the situation is such that the force transmitted by the tail of the hook to the cam is "over centre", with the result that the opening force on the hook is taken by the operating cable, in other words it is only the cables that are preventing the hooks from opening with potentially disastrous consequences.
The main concern of the PSCO is to ensure that the equipment is well maintained and that the responsible officers have a thorough understanding of how the equipment operates and the potential consequences of premature release of the hooks.

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Annex 1

Requirements of On-Load Release Equipment

*Every lifeboat to be launched by a fall or falls, except a free-fall lifeboat, shall be fitted with **a release mechanism** complying with the following requirements subject to paragraph .5 below:*

.1 the mechanism shall be so arranged that all hooks are **released simultaneously;**

.2 the mechanism shall have two release capabilities as follows:

.2.1 a **normal release capability** which will release the lifeboat when it is waterborne or when there is no load on the hooks; and

.2.2 an **on-load release capability** which will release the lifeboat with a load on the hooks. This release shall be so arranged as to release the lifeboat under any conditions of loading from no load with the lifeboat waterborne to a load of 1.1 times the total mass of the lifeboat when loaded with its full complement of persons and equipment. This release capability shall be adequately protected against accidental or premature use. Adequate protection shall include special mechanical protection not normally required for off-load release, in addition to a danger sign. To prevent an accidental release during recovery of the boat, the mechanical protection (interlock) should only engage when the release mechanism is properly and completely reset. To prevent a premature on-load release, on-load operation of the release mechanism should require a deliberate and sustained action by the operator. The release mechanism shall be so designed that crew members in the lifeboat can clearly observe when the release mechanism is properly and completely reset and ready for lifting. Clear operating instructions should be provided with a suitably worded warning notice;

.3 the release control shall be clearly marked in a colour that contrasts with its surroundings;

.4 the fixed structural connections of the release mechanism in the lifeboat shall be designed with a calculated factor of safety of 6 based on the ultimate strength of the materials used, assuming the mass of the lifeboat is equally distributed between the falls; and

.5 where a single fall and hook system is used for launching a lifeboat or rescue boat in combination with a suitable painter, the requirements of paragraph 4.4.7.6.2 need not be applicable; in such an arrangement a single capability to release the lifeboat or rescue boat, only when it is fully waterborne, will be adequate.

Where rescue boats are not fitted with an onload release capability because they comply with paragraph .5 above the PSCO should check that the crew understand and can demonstrate the use of the painter to take the weight off the falls when the boat is in the water and ‘trailing’ with way on the ship.

Where rescue boats are fitted with an onload release capability the crew should be able to demonstrate a thorough understanding of the hook mechanism. Crew should be able to explain the difference between the normal release function and the onload release function. The onload release function must never be operated with the rescue boat out of the water and it is a common misunderstanding that it should be operated a meter above the water in the same way as the liferaft off load release mechanism.

Rescue boat davits are often used as combined liferaft/rescue boat davits and a separate hook is provided for the liferaft and the rescue boat. Crew should be thoroughly familiar with each hook and its correct application.

Some manufacturers make a single hook that combines the different functions of a liferaft and rescue boat hook in a single unit (Ned Deck CAR 35). Crew must understand the correct operation of this type of hook depending on the boat/liferaft attached to it.

Most current on-load release systems are of a similar concept. The tail of the hook is prevented from opening by some sort of locking arrangement, usually a cam. A release cable is connected to the cam rotation mechanism of the forward and aft hooks and led to the lifeboat conning position where both

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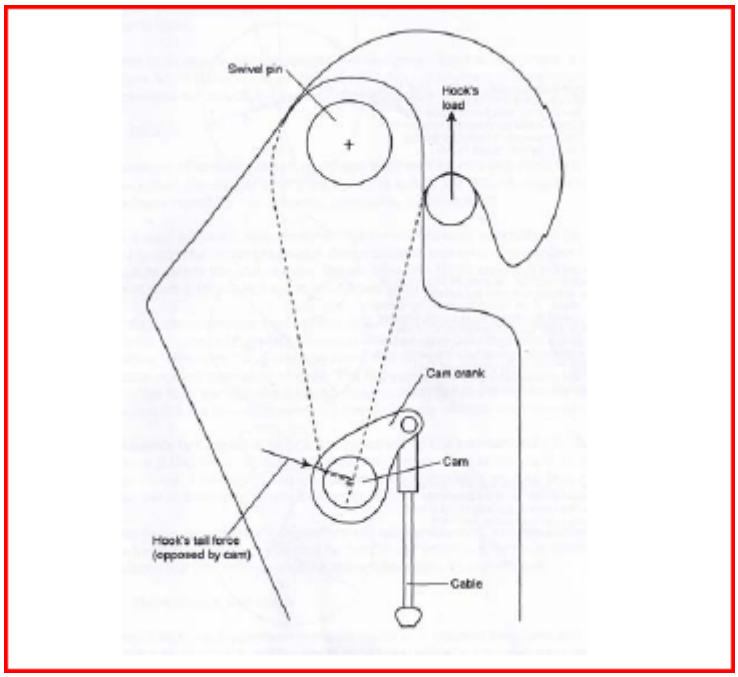
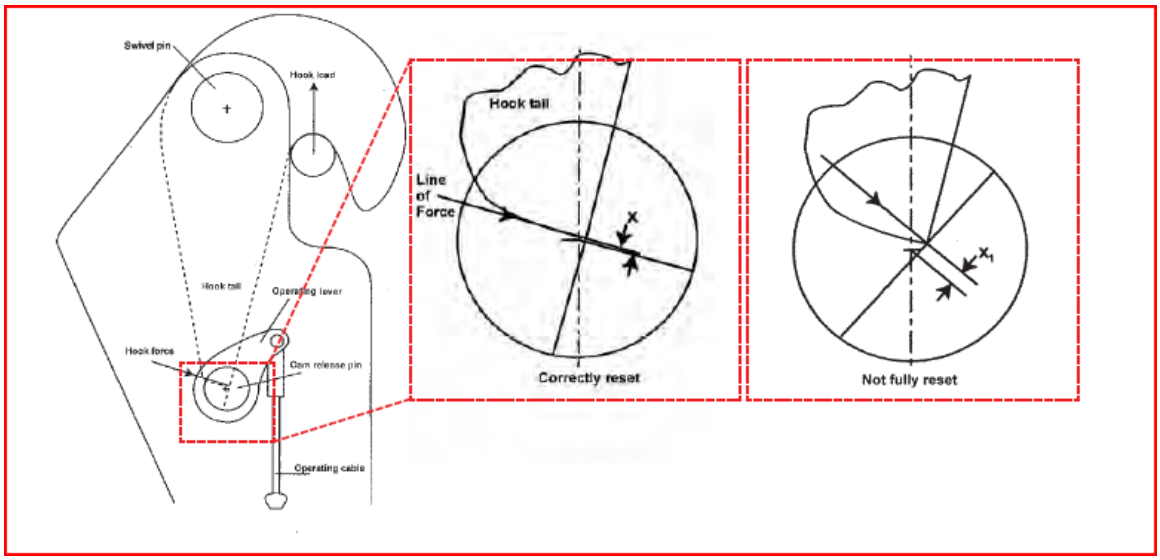
cables are connected to an operating lever. Under normal circumstances when the lifeboat is waterborne a hydrostatic interlock allows the lever to be operated. By operating the lever the cables rotate the cams and release the tail of the hook allowing the hook to open and release the fall blocks. In an emergency and when it is necessary to open the hooks under load, the hydrostatic interlock is **overridden** and the lever operated which allows the cams to rotate and open the hooks. The concept is “fail unsafe” in that reliance is placed on the cam mechanism to prevent the hook from opening under load. The design also has to allow the cam mechanism to rotate under considerable load from the hook tail and it is this that makes fine clearances necessary, see drawings below.

Mills Titan (now Umoe Schat-Harding)





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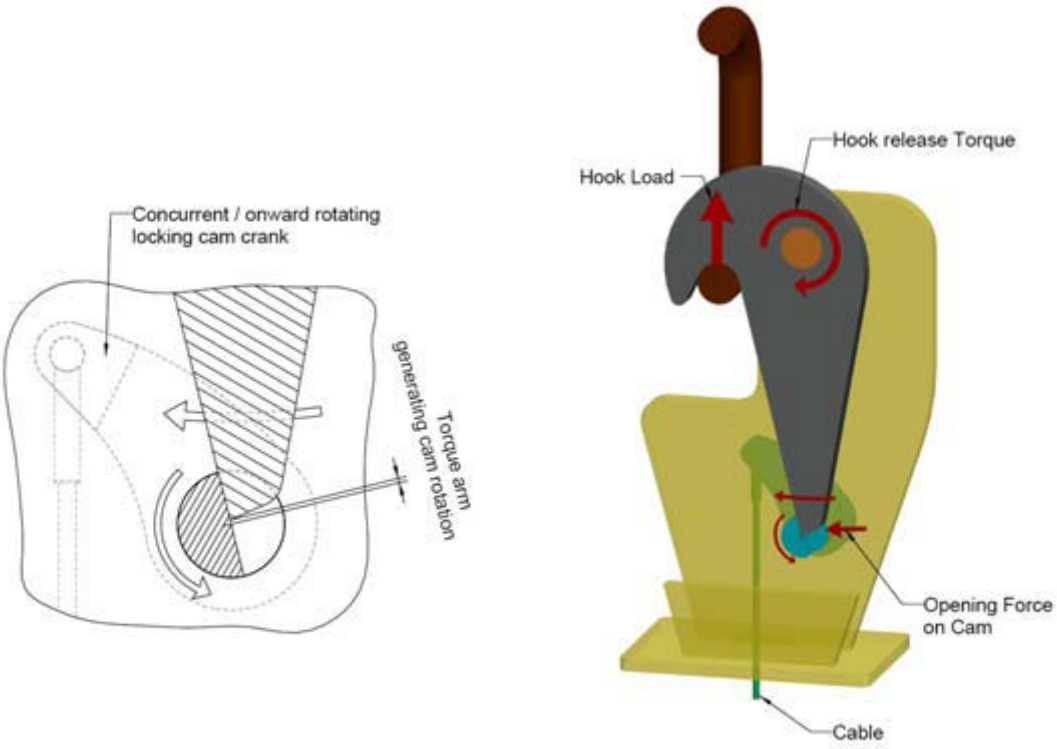
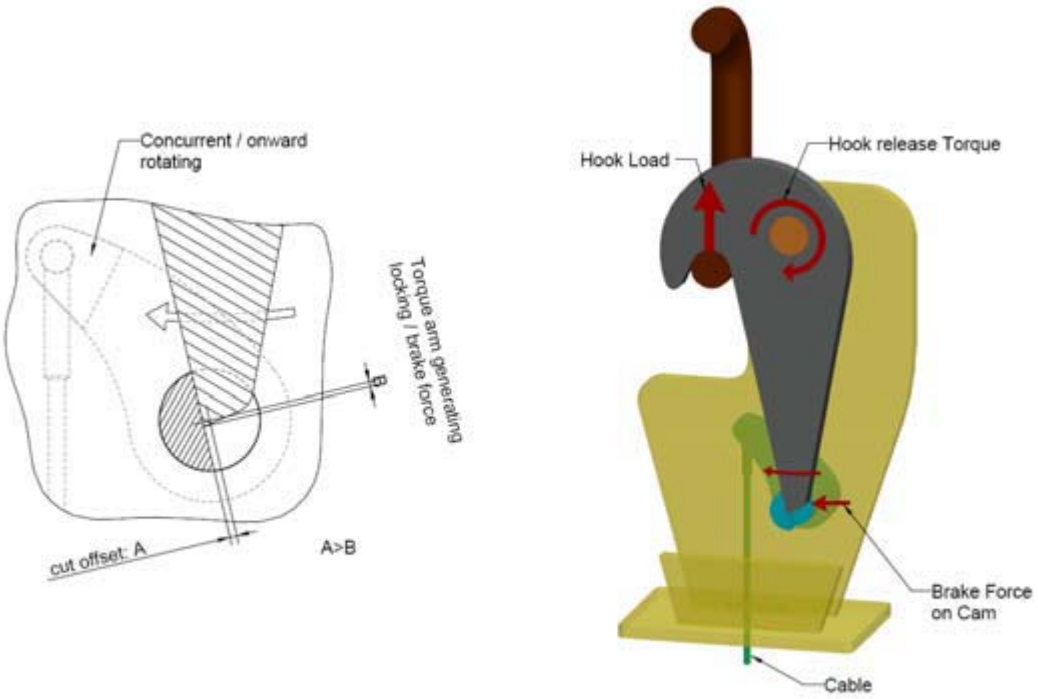


Hook with Flat to Flat Cam solution
Cam cut in shaft center



Hook with Flat to Flat Cam solution
Cam cut offset shaft center

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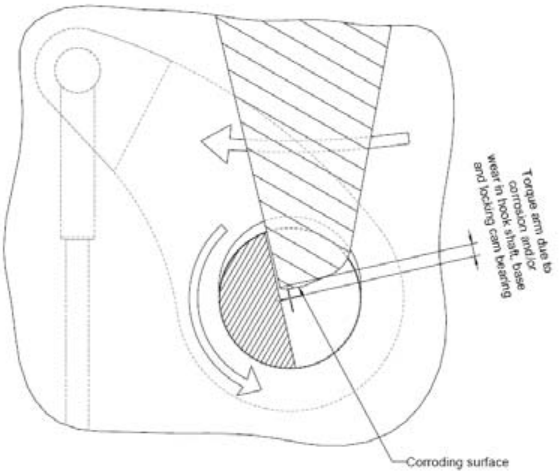

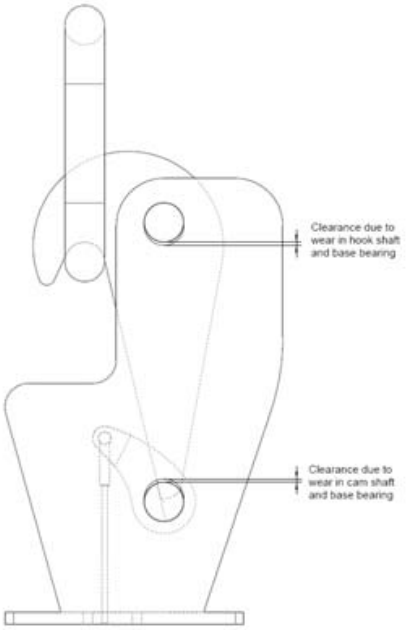

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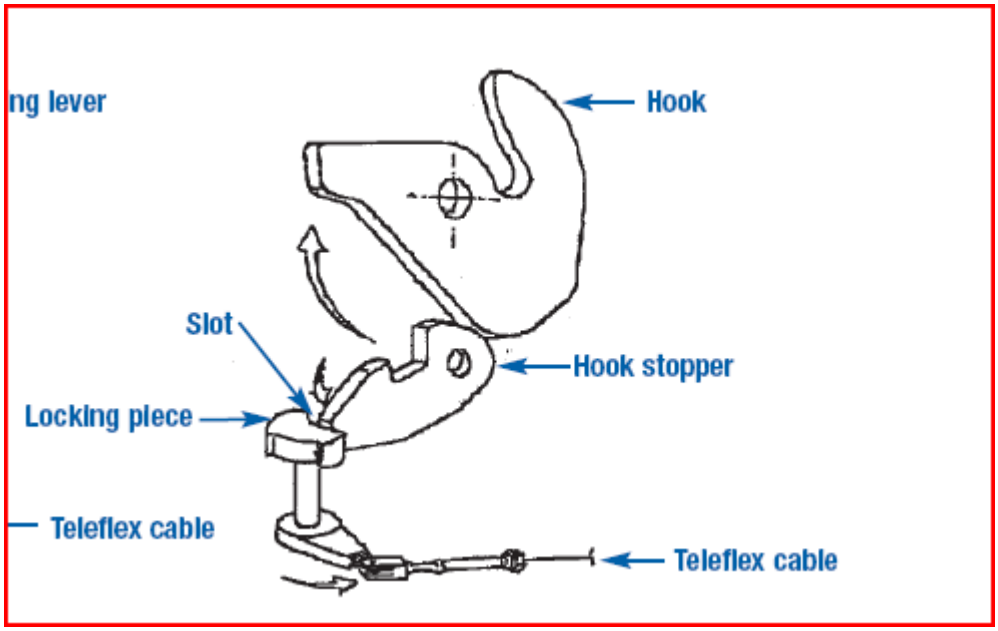

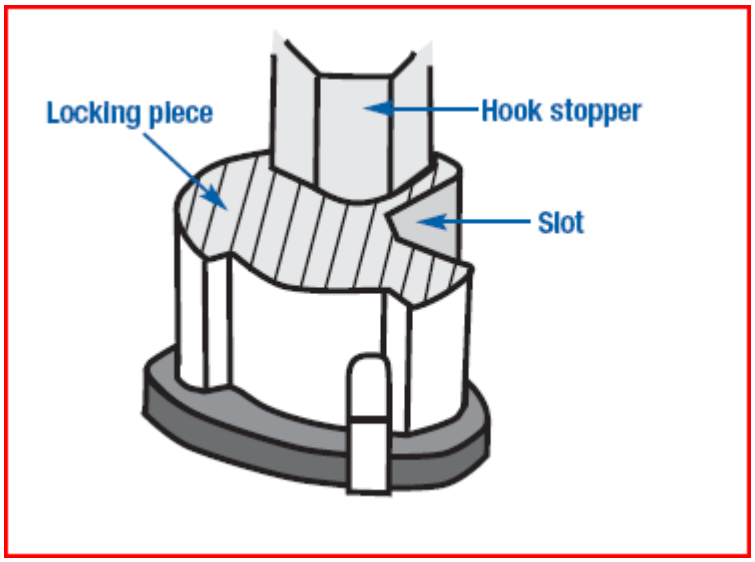

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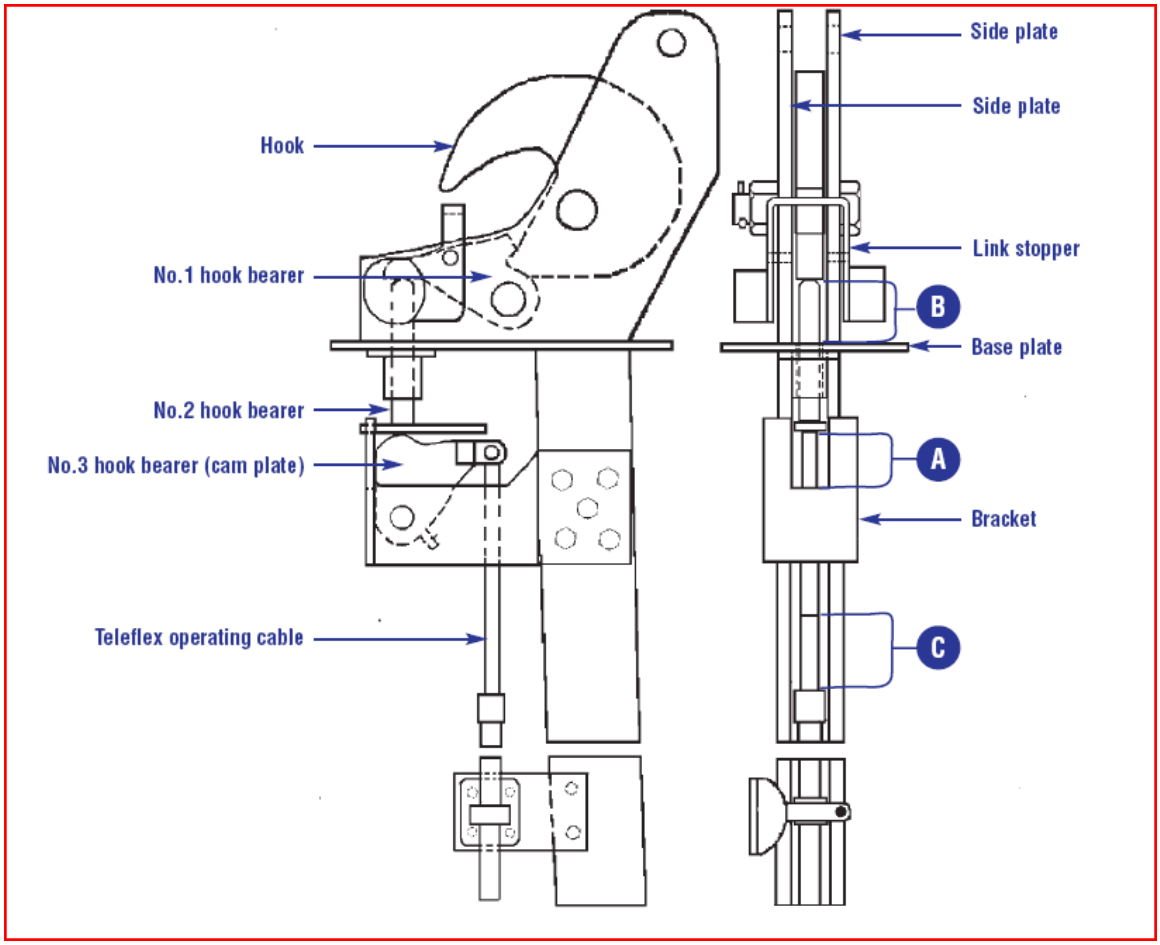
Shigi SK5



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Annex 2

Summary of Manufacturers of davit-launched release mechanisms from CIC carried out in Paris MoU Sep – Nov 2009	**# of inspections**
Umoe Schat-Harding (incl. Mills Titan brand)	215
Shigi Shipbuilding Co., Ltd.	209
Jiangyin shipbuilding factory (new name Jiangsu Yangzijang Shipbuilding)	121
Qingdao Beihai Shipbuilding Heavy Industry Co., Ltd. Marine Machinery Branch	118
Fassmer	97
NORSAFE A.S.	76
Ernst Hatecke GmbH	74
Ishihara Dockyard Co., Ltd.	66
Hyundai Lifeboats Co., Ltd.	56
RUSSIA	45
Wuxi Hai Hong Boat Making Co., Ltd.	42
Nishi-F Co., Ltd.	39
IHI Marine United Inc.	33
Tsuneishi holdings corporation	33
Shanghai Shenkong Machinery co.	32
Mansei Industry Co., Ltd.	29
Sekigahara Seisakusho Ltd.	24
Montmontaza Greben Shipyard	20
Oriental Precision & Engineering Co., Ltd.	15
Pesbo S.A.	12
Kangnam Cooperation	11
Watercraft hellas S.A.	11
Beiyang boatbuilding co	10
Hoei Senpaku Co., Ltd.	10
Tsuji Heavy Industries Co., Ltd.	10

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Annex 3

COMMON MANUFACTURERS DEFICIENCIES FROM TOKYO MoU CIC

Code	Manufacturers Name	Inspections	Total Deficiencies	Deficiencies per inspection
94	Schat-Davit Company	**6**	**2**	**0.33**
95	Schat-Harding	**69**	**9**	**0.13**
97	Sekighara Seisakusho Ltd	**39**	**2**	**0.05**
102	Shigi	**573**	**75**	**0.13**
114	Tor Hooks	**8**	**1**	**0.13**
116	Tsuji Heavy Industries	**17**	**1**	**0.06**
117	Tsuneishi	**94**	**16**	**0.17**
121	Ustka Shipyard	**8**	**3**	**0.38**
135	William Mills	**54**	**7**	**0.13**
136	Wuxi Dongwu Marine Equipment Co., Ltd.	**13**	**1**	**0.08**
137	Wuxi Hai Hong Lifeboat Making	**63**	**27**	**0.43**
139	Wuxi Wen Jiao	**11**	**1**	**0.09**
141	Zhenjian Marine Auxiliary Machinery Works	**30**	**8**	**0.27**
1041	Ningbo Asian F.R.P. Boat Manufacturing Co Ltd	**5**	**4**	**0.80**
1044	Ningbo New Marine Lifesaving Equipment Co. Ltd	**4**	**1**	**0.25**
1051	Shang Hai Gaoshen Machinery Factory	**4**	**1**	**0.25**
1052	Shang Hai Ming Jiang Shaft Factory	**1**	**1**	**1.00**
1053	Shang Hai Shen Kong Machinery	**55**	**26**	**0.47**
1066	Veb Schiffswerft	**7**	**2**	**0.29**

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