DAB Inspection Report — *Red Eagle* — 31st July 2017

Inspection Report – Red Eagle – 31st July 2017

Background

DAB Fire Engineering Ltd were originally contacted on Tuesday the 18th of July by [redacted] of the Maritime and Coastguard Agency and informed of an accidental CO2 discharge aboard the Red Eagle Passenger ferry. The CO2 system was fitted with DAB CO2 Cylinder Valves (D10963/D) and DAB Manual Pneumatic Actuators (D10964/B).

It should be noted that DAB Fire Engineering Ltd is not the original supplier of the valves and actuators - These were previously supplied by DAB Engineering Company Limited - but as the new manufacturer of DAB products we agreed to help with the incident.

DAB Fire were subsequently contacted by [redacted] of the Marine Accident Investigation Branch and asked if we could help with the inspection and testing of the valves.

26 valves were sent to DAB for inspection and all inspection and testing was witnessed by [redacted].

Initial Inspection

All valves were unpacked and the serial numbers logged as below. A quick visual inspection showed that there were 4 separate dates of valves. The serial numbers of the oldest valves (37000 range) were commensurate with the age of the vessel. (1996) The 39938 valve would be approximately circa 1997/8. These valves are before the date of the electronic records so were unable to date the valves exactly.

The valve marked 73719 was new enough to be included in our serial number log and showed as being supplied to Tyco Engineering Services on 04th September 2000.

The valves marked 97050, 97056, 97057, 97054 and 97059 were part of a batch supplied to Tyco Marine Services on 2nd November 2004.

Externally all valves looked to be in good condition considering their age, with the exception of valve no 97056 which showed discolouration and evidence of rust inside the outlet port.

Leak Testing

All valves were subjected to a standard seat leakage test which consists of pressurising the valve to 40 Bar through the syphon tube thread and applying a soapy solution to the outlet port to produce a film. Any leakage would be demonstrated by a bubble forming and bursting.

All valves passed the leakage test except for valves no 37017 and 97056.

Valve 37017 had a reasonably major leakage and was retested with a flow meter on the outlet to try and measure the leak rate. The leak was over the range of our meter and far in excess of 5 litres per minute.

Valve 97056 had a very minor leak that was far below the range of our flow meter. The bubble forming on the outlet took approx 20 seconds to burst.

Internal inspection.

The leaking valves were disassembled and inspected internally.

Valve 37017

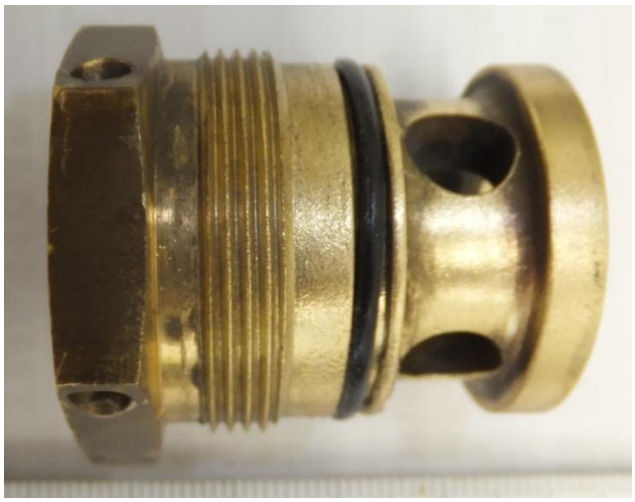
Valve 37017 looked to be in reasonable condition internally, but it was noted that the restrictor wire had dislodged from the servo piston and had been caught between the main seat and the pilot check. This would've caused the leak.

Despite the leak, it was determined that this leak was not the cause of the system activation as the leak would've been obvious when the cylinder was filled and the broken wire had most likely been sitting on top of the main seat for some time and lodged between the pilot check and the seat when the system was activated.

Valve 97056

When valve 97056 was disassembled, it was noted that the outlet side of the valve was heavily discoloured internally and rust had formed in the outlet. As the valve is manufactured from brass and stainless steel it was surmised that the rust had come from the discharge hose fitting which are normally manufactured from zinc plated steel.

Upon further inspection, it was also noted that the bonnet assembly showed signs of pitting associated with being cleaned with a wire wheel, or similar. The valve had obviously been disassembled previously during its service life.



The main seat was inspected using an eye loupe and small flecks of brass swarf were visible in the main seating area. From experience, this brass swarf was the most likely cause of the leak. The leak however, was so slight that it would have taken many months if not longer for the leak to build up pressure inside the manifold and discharge the system.

Activation pressure test.

A new CO2 valve was fitted to our test rig and a pressure of 50 Bar applied to the inlet. A standard D10964 Manual / Pneumatic actuator was fitted to the valve, and pressure increased to the activation port until the valve began to fire. At approximately 60PSI the valve Pilot seat began to open slightly.

Conclusion

Without gaining access to the rest of the CO2 suppression system it is difficult to conclude if the leaking valves were the cause of the accidental initiation of the system. If the complete manifold and pilot system aboard the Red Eagle was 100% sealed then it would be possible for the very minor leak in valve no 97056 to slowly build up over time and provide enough pressure to slowly activate the rest of the system. Once a pressure of 60 PSI is achieved in the manifold the first of the valves would start to open causing a cascade effect in the rest of the system opening the remaining 25 valves.

My recommendation would be for a bleed valve to be fitted to the pilot system to prevent accidental build up of pressure in the future.

DAB has always unofficially suggested a life expectancy of 10 years for all of its products, though the life span may be extended if the products are well maintained.

It was also noted that the system also contained a DAB Pressure Operated Direction valve on the end of the manifold. If this valve is of the same age as the rest of the system it should also be replaced as it is past its service life and is not up to current testing regulations.

[redacted]
DAB Fire Engineering Ltd.
16th August 2017

Annex 'A'

CO2 Bottle	Valve Serial No	Comments
1	37017	No Leak
2	37039	No Leak
3	37012	No Leak
4	37009	No Leak
5	37032	No Leak
6	37049	No Leak
7	37001	Major leak on outlet in excess of 5 litres per minute
8	39938	No Leak
9	37037	No Leak
10	37020	No Leak
11	37045	No Leak
12	37052	No Leak
13	37033	No Leak
14	37034	No Leak
15	37042	No Leak
16	97050	No Leak
17	97056	Very minor leak on outlet.
18	97057	No Leak
19	97054	No Leak
20	73719	No Leak
21	97059	No Leak
22	37031	No Leak
23	37048	No Leak
24	37038	No Leak
25	37053	No Leak
26	37028	No Leak

IMO Circular - MSC.1/Circ.1318

INTERNATIONAL MARITIME ORGANIZATION
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Ref: T4/4.01

MSC.1/Circ.1318
11 June 2009

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved Guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when inspecting fixed carbon dioxide fire-extinguishing systems on board all ships and bring them to the attention of ship designers, shipowners, equipment manufacturers, and other parties concerned.

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ANNEX

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 General

These Guidelines provide the minimum recommended level of maintenance and inspections for fixed carbon dioxide fire-extinguishing systems on all ships, and are intended to demonstrate that the system is kept in good working order as specified in SOLAS regulation II-2/14.2.1.2. These Guidelines are intended to supplement the fire-extinguishing system manufacturer's approved maintenance instructions. Certain maintenance procedures and inspections may be performed by competent crewmembers, while others should be performed by persons specially trained in the maintenance of such systems. The onboard maintenance plan should indicate which parts of the recommended inspections and maintenance should be completed by trained personnel.

2 Safety

Whenever carbon dioxide fire-extinguishing systems are subjected to inspection or maintenance, strict safety precautions should be followed to prevent the possibility that individuals performing or witnessing the activities are placed at risk. Prior to performing any work, a safety plan should be developed to account for all personnel and establish an effective communications system between the inspection personnel and the on-duty crew. Measures to avoid accidental discharges such as locking or removing the operating arms from directional valves, or shutting and locking the system block valve should be taken as the initial procedure for the protection of personnel performing any maintenance or inspections. All personnel should be notified of the impending activities before work is begun.

3 Maintenance and inspection plan

Fixed carbon dioxide fire-extinguishing systems should be kept in good working order and readily available for immediate use. Maintenance and inspections should be carried out in accordance with the ship's maintenance plan having due regard to ensuring the reliability of the system. The onboard maintenance plan should be included in the ship's safety management system and should be based on the system manufacturer's recommendations including:

.1 maintenance and inspection procedures and instructions;

.2 required schedules for periodic maintenance and inspections;

.3 listing of recommended spare parts; and

.4 records of inspections and maintenance, including corrective actions taken to maintain the system in operable condition.

4 Monthly inspections

4.1 At least every 30 days a general visual inspection should be made of the overall system condition for obvious signs of damage, and should include verification that:

.1 all stop valves are in the closed position;

.2 all releasing controls are in the proper position and readily accessible for immediate use;

.3 all discharge piping and pneumatic tubing is intact and has not been damaged;

.4 all high pressure cylinders are in place and properly secured; and

.5 the alarm devices are in place and do not appear damaged.

4.2 In addition, on low pressure systems the inspections should verify that:

.1 the pressure gauge is reading in the normal range;

.2 the liquid level indicator is reading within the proper level;

.3 the manually operated storage tank main service valve is secured in the open position; and

.4 the vapour supply line valve is secured in the open position.

5 Annual inspections

The following minimum level of maintenance and inspections should be carried out in accordance with the system manufacturer's instructions and safety precautions:

.1 the boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that have created uncloseable openings that would render the system ineffective;

.2 all storage containers should be visually inspected for any signs of damage, rust or loose mounting hardware. Cylinders that are leaking, corroded, dented or bulging should be hydrostatically retested or replaced;

.3 system piping should be visually inspected to check for damage, loose supports and corrosion. Nozzles should be inspected to ensure they have not been obstructed by the storage of spare parts or a new installation of structure or machinery;

.4 the manifold should be inspected to verify that all flexible discharge hoses and fittings are properly tightened; and

.5 all entrance doors to the protected space should close properly and should have warning signs, which indicate that the space is protected by a fixed carbon dioxide system and that personnel should evacuate immediately if the alarms sound. All remote releasing controls should be checked for clear operating instructions and indication as to the space served.

6 Minimum recommended maintenance

6.1 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each intermediate, periodical or renewal survey* in cargo ships, the following maintenance should be carried out (to assist in carrying out the recommended maintenance, examples of service charts are set out in the appendix):

.1 all high pressure cylinders and pilot cylinders should be weighed or have their contents verified by other reliable means to confirm that the available charge in each is above 90% of the nominal charge. Cylinders containing less than 90% of the nominal charge should be refilled. The liquid level of low pressure storage tanks should be checked to verify that the required amount of carbon dioxide to protect the largest hazard is available;

.2 the hydrostatic test date of all storage containers should be checked. High pressure cylinders should be subjected to periodical tests at intervals not exceeding 10 years. At the 10-year inspection, at least 10% of the total number provided should be subjected to an internal inspection and hydrostatic test**. If one or more cylinders fail, a total of 50% of the onboard cylinders should be tested. If further cylinders fail, all cylinders should be tested. Flexible hoses should be replaced at the intervals recommended by the manufacturer and not exceeding every 10 years; and

.3 the discharge piping and nozzles should be tested to verify that they are not blocked. The test should be performed by isolating the discharge piping from the system and flowing dry air or nitrogen from test cylinders or suitable means through the piping.

6.2 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each renewal survey* in cargo ships, the following maintenance should be carried out by service technicians/specialists trained to standards accepted by the Administration:

.1 where possible, all activating heads should be removed from the cylinder valves and tested for correct functioning by applying full working pressure through the pilot lines.

In cases where this is not possible, pilot lines should be disconnected from the cylinder valves and blanked off or connected together and tested with full working pressure from the release station and checked for leakage.

In both cases this should be carried out from one or more release stations when installed.

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* Refer to Survey guidelines under the Harmonized System of Survey and Certification, 2007 (resolution A.997(25)).

** Refer to standard ISO 6406 – Periodic inspection and testing of seamless steel gas cylinders.

If manual pull cables operate the remote release controls, they should be checked to verify the cables and corner pulleys are in good condition and freely move and do not require an excessive amount of travel to activate the system;

.2 all cable components should be cleaned and adjusted as necessary, and the cable connectors should be properly tightened. If the remote release controls are operated by pneumatic pressure, the tubing should be checked for leakage, and the proper charge of the remote releasing station pilot gas cylinders should be verified. All controls and warning devices should function normally, and the time delay, if fitted should prevent the discharge of gas for the required time period; and

.3 after completion of the work, the system should be returned to service. All releasing controls should be verified in the proper position and connected to the correct control valves. All pressure switch interlocks should be reset and returned to service. All stop valves should be in the closed position.

APPENDIX

EXAMPLE SERVICE CHARTS

HIGH PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	Number of main cylinders	
3	Main cylinders capacity (each)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Oldest cylinder pressure test date	
8	Protected space(s)	
9	Date flexible hoses fitted/renewed	

Description of inspection/Tests

No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Release controls and distribution valves secured to prevent accidental discharge				
2	Contents in main cylinders checked by weighing				
3	Contents in main cylinders checked by liquid level indicator				
4	Contents of pilot cylinders checked				
5	All cylinder valves visually inspected				
6	All cylinder clamps and connections checked for tightness				
7	Manifold visually inspected				
8	Manifold tested for leakage, by applying dry working air				
9	Main valve and distribution valves visually inspected				
10	Main valve and distribution valves tested for operation				
11	Time delay devices tested for correct setting*				
12	Remote release system visually inspected				
13	Remote release system tested				
14	Servo tubing/pilot lines pressure tested at maximum working pressure and checked for leakages and blockage				
15	Manual pull cables, pulleys, gang releases tested, serviced and tightened/adjusted as necessary				
16	Release stations visually inspected				
17	Warning alarms (audible/visual) tested				
18	Fan stop tested*				
19	10% of cylinders and pilot cylinder/s pressure tested every 10 years				
20	Distribution lines and nozzles blown through, by applying dry working air				
21	All doors, hinges and locks inspected*				
22	All instruction and warning signs on installation inspected				
23	All flexible hoses renewed and check valves in manifold visually inspected every 10 years				
24	Release controls and distribution valves reconnected and system put back in service				
25	Inspection date tags attached				

* If fitted as part of the CO_2 system.

LOW PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	No. of tanks	
3	Tanks capacity (tonnes)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Protected space(s)	

Description of inspection/Tests

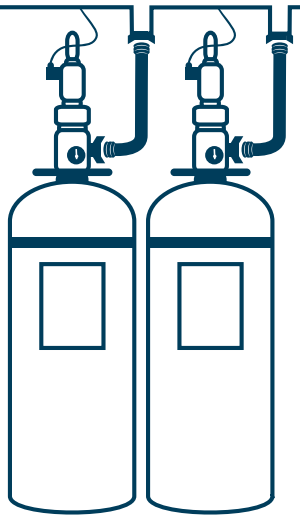
No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Tank main service valve closed and secured to prevent accidental discharge				
2	Distribution valves verified closed				
3	Check correct function of level indicator				
4	Contents of CO_2 tank checked by tank level indicator				
5	Contents of CO_2 tank checked by riser tube reading				
6	Contents of CO_2 tank checked by level control valve				
7	Supports of tank inspected				
8	Insulation on tank inspected				
9	Safety valves of tank inspected				
10	Safety valves of tank tested				
11	Contents of pilot cylinders checked				
12	Start/stop function of cooling compressors tested				
13	All connected electrical alarms and indicators tested				
14	Main manifold valve inspected				
15	Main manifold valve tested				
16	Distribution valves inspected				
17	Distribution valves tested				
18	Release stations inspected				
19	Total flooding release mechanism inspected				
20	Total flooding release mechanism tested				
21	Time delay devices tested for correct setting*				
22	Warning alarms tested				
23	Fan stop tested*				
24	Distribution lines and nozzles inspected				
25	Distribution lines and nozzles tested				
26	Distribution lines and nozzles blown through				
27	All doors, hinges and locks inspected*				
28	All instruction plates inspected				
29	Tank main service valve reopened and secured open				
30	System put back in service				
31	Inspection date tags attached				

* If fitted as part of the CO_2 system.

Fire Industry Association guidance note

Guidance Note

Fire Industry Association



Guidance on the Periodic Testing of Transportable Gas Containers used in Fire Extinguishing Systems

Guidance on the Periodic Testing of Transportable Gas Containers used in Fire Extinguishing Systems

BACKGROUND

There is currently some confusion on the date at which extinguishing agent containers are required to be submitted for periodic testing under the Pressure Equipment Directive, the Transportable Pressure Equipment Directive and The Carriage of Dangerous Goods Regulations, as stated in the relevant Standards.

This FIA guidance gives recommendations on how fire extinguishing system containers should be treated.

PERIODIC TESTING

BS EN 1968:2002, applicable to seamless steel gas containers, BS EN 1802:2002, applicable to seamless aluminium alloy gas containers, BS EN 1803:2002, applicable to welded carbon steel gas containers, all state, in clause 3, that:

- In the case of containers used for emergency purposes eg fire extinguishers, breathing apparatus, it is the responsibility of the person in possession (owner or user) to submit it for periodic inspection within the interval specified in Annex B.
- In Annex B, the interval for containers used for CO_2, Nitrogen and Argon and gas mixtures used as extinguishing agents is 10 years.

In The Safe Use of Gas Containers, a guidance document issued by the Health and Safety Executive, under the heading 'How to reduce risks', sub heading 'periodic examination', makes references to Instruction P200 in ADR, as required by the The Carriage of Dangerous Goods Regulations. Instruction P200 also gives the periodic inspection intervals for CO_2, Nitrogen and Argon containers as 10 years.

Therefore, all fixed extinguishing agent containers (eg HFC-227ea (FM-200), FK 5-1-12

(Novec 1230), HFC-23 (FE-13), HFC-125 (FE-25), IG 541 (INERGEN), IG 01(Argon), IG 55 (ARGONITE), IG 100 (Nitrogen) and CO_2 etc) must be inspected, re-tested and certified accordingly prior to the 10th anniversary of their manufacture or most recent test.

Note 1: Containers found to be in service beyond the 10th anniversary of their manufacture or most recent test should be removed from service.

Note 2: The previous dispensation, under BS 5430 Part 1 and Part 2, for fire protection containers to have retesting deferred to 20 years, no longer applies.

REUSE OF CONTAINER VALVES

For safety reasons container valves should not be reused after removal from containers unless the following conditions are met:

- The valve has been refurbished in accordance with manufacturer's recommendations
- The connection thread to the container and discharge hose are inspected to ensure they are within tolerance and undamaged

Note: Where container valves use a taper thread form to marry to the container these are often found to be outside of the tolerances after a single fitment and removal.

REFERENCES

- **Safe Use of Gas Containers , Health And Safety Executive**
  http://www.hse.gov.uk/press/2002/e02100.htm
- **The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (CDG 2009) Update Regulations**
  http://www.hse.gov.uk/cdg/manual/adrcarriage.htm
- **ADR 2015, UNECE**
  http://www.unece.org/trans/danger/publi/adr/adr2015/15ContentsE.html

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Annex D

UR Z17 - Procedural Requirements for Service Suppliers

Z17 Procedural Requirements for Service Suppliers

(1997) (Rev.1 June 1999) (Rev.2 Nov 1999) (Rev.3 July 2002) (Rev.4 July 2003) (Rev.5 Feb 2004) (Rev.6 June 2007) (Rev.7 Nov 2007) (Rev.8 July 2008) (Rev.9 June 2012) (Corr.1 Aug 2012) (Rev.10 Jan 2015) (Rev.11 June 2015) (Rev.12 Nov 2016)

CONTENTS

Revision notes:

1. Rev.4 added in Annex, Section 10, 11 & 12, with reference in 3.1.2.

2. Rev.5 clarified applicability to thickness measurement companies in 3.1.1 and Annex 1, 1.1.

3. Rev.6 is to be uniformly implemented by IACS Societies and Associates from 1 January 2008.

4. Rev.7: Section 13 is added to Annex 1. This section applies to requests for recognition of test laboratories received on or after 1 January 2008.

5. Rev.8: Reference to IACS Recommendations 101 and 102 added.

6. Rev.9: Includes procedures for approval of test laboratories against res. MSC.288(87) and applies to requests for recognition of approval of testing laboratories received on or after 1 July 2013. However, deletion of the reference to PR 34 in Rev.9 applies from 1 July 2012.

7. Rev.10: Full document review carried out - Rev.10 is to be uniformly implemented by IACS Societies from 1 January 2016.

8. Rev.11: Full document review in order to verify the compliance with R.O. Code, IMO Res. MSC 349(92), carried out - Rev.11 is to be uniformly implemented by IACS Societies from 1 July 2016.

9. Rev.12: Section 15 of Annex 1 revised - Rev.12 is to be uniformly implemented by IACS Societies from 1 January 2018.

Z17 (cont)

1. General

1.1 To approve firms providing services, such as measurements, tests or maintenance of safety systems and equipment, the Society is to apply procedures in this unified requirement and relevant Annex 1.

2. Objective

2.1 The objective of this procedure is to set minimum requirements for approval and certification of service suppliers and is applicable to both initial and renewal audits.

3. Definitions

- Manufacturer: A company that manufactures equipment required to be periodically serviced and/or maintained.

- Service Supplier (A Service Supplier or category of Service Supplier may be referred to here after simply as ‘supplier’): A person or company, not employed by an IACS Member, who at the request of an equipment manufacturer, shipyard, vessel's owner or other client acts in connection with inspection work and provides services for a ship or a mobile offshore drilling unit such as measurements, tests or maintenance of safety systems and equipment, the results of which are used by surveyors in making decisions affecting classification or statutory certification and services.

- Agent: A Person or Company authorised to act for or to represent a Manufacturer or approved/recognized service supplier.

- Subsidiary: A Company partly or wholly owned by a Manufacturer or approved/recognized service supplier.

- Subcontractor: A Person or Company providing services to a Manufacturer or approved/recognized service supplier, with a formal contract defining the assumption of the obligations of the service supplier.

Z17 (cont)

4. Application

4.1 This procedure applies to the approval of the following categories of service suppliers:

4.1.1 Statutory services

- Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, inflatable rescue boats, marine evacuation systems
- Firms engaged in inspections and testing of radio communication equipment
- Firms engaged in inspections and maintenance of self contained breathing apparatus
- Firms engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR)
- Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships
- Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems
- Firms engaged in the servicing and maintenance of lifeboats, launching appliances, on-load release gear and davit-launched liferaft automatic release hooks.
- Firms engaged in inspection, performance testing and maintenance of Automatic Identification Systems (AIS)

4.1.2 Classification and/or Statutory services:

- Firms engaged in thickness measurements on ships except

  (1) non-ESP ships less than 500 gross tonnage and

  (2) all fishing vessels.

- Firms carrying out in-water survey of ships and mobile offshore units
- Firms engaged in inspections and maintenance of fire extinguishing equipment and systems
- Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment
- Firms engaged in measurements of noise level on board ships
- Firms engaged in examination of Ro-Ro ship’s bow, stern, side and inner doors
- Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82), as amended, and IACS UI SC223 and/or MSC.288(87), as amended.
- Firms engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service

Z17 (cont)

4.1.3 Where a Society accepts work of a third party (eg., service supplier) approved by itself, the Society shall verify the performance of such services. For statutory service, the flag State may increase the scope of verification to be applied to these services. The process shall be defined within the Society's quality management system. For the purpose of accountability to the flag State, the work performed by the third party (eg., service supplier) constitutes the work of the Society and shall be subject to the requirements incumbent upon the Society under the RO Code IMO MSC.349 (92) and MEPC.237(65).

4.2 Where the results of the following service providers are used by a Surveyor of a Society in making decisions affecting classification services then that service provider must be approved and verified by that Society.

- Firms engaged in thickness measurements on ships except

  (1) non-ESP ships less than 500 gross tonnage and

  (2) all fishing vessels.

- Firms carrying out in-water survey of ships and mobile offshore units

- Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment

4.3 Where such services are used by Surveyors in making decisions affecting statutory certification and service, the firms are subject to approval and verification by the Society where the Society is so authorised by the relevant flag Administration (i.e. the flag of the ship on which the servicing is to be done or the service equipment is to be used). For such services the Society may accept approvals done by:

i. the flag Administration itself,

ii. duly authorized organizations acting on behalf of the flag Administration, or

iii. other organizations those are acceptable to the flag Administration (e.g. other governments, etc.).

4.4 Use of the approved service suppliers is not mandatory for the following services, *unless instructed otherwise by the flag Administration* with respect to statutory certification

- Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems

- Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships

- Firms engaged in measurements of noise level onboard ships

- Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82) as amended and IACS UI SC223 and/or MSC.288(87) as amended

- Firms engaged in examination of Ro-Ro ships bow, stern, side and inner doors

Z17 (cont)

4.5 Detailed requirements specific to the various categories of suppliers are given in Annex 1. National and/or international requirements may give additional requirements. References to such national and/or international requirements are given in Annex 1.

Z17 (cont)

5. Procedure for Approval and Certification

5.1 Submission of documents

5.1.1 The following documents are to be submitted to the Society for review. General requirements concerning suppliers are given in 5.2, and specific requirements as relevant, in Annex 1.

- Outline of company, e.g. organisation and management structure, including subsidiaries to be included in the approval/certification
- List of nominated agents, subsidiaries and subcontractors
- Experience of the company in the specific service area
- For categories of Service Suppliers that require authorization from manufacturers, manufacturer's documentary evidence that the Service Supplier has been authorized or licensed to service the particular makes and models of equipment for which approval is sought shall be provided.
- List of operators/technicians/inspectors documenting training and experience within the relevant service area, and qualifications according to recognised national, international or industry standards, as relevant
- Description of equipment used for the particular service for which approval is sought
- A guide for operators of such equipment
- Training programmes for operators/technicians/inspectors
- Check lists and record formats for recording results of the services referred to in Annex 1
- Quality Manual and/or documented procedures covering requirements in 5.5
- Documented procedures for communication with the crew prior to commencing work, so that it is safe to decommission the equipment being maintained, and to provide a safe system of work in place
- Evidence of approval/acceptance by other bodies, if any
- Information on the other activities which may present a conflict of interest
- Record of customer claims and of corrective actions requested by certification bodies

5.2 General requirements:

5.2.1 Extent of Approval – The supplier shall demonstrate, as required by 5.2.2 – 5.2.11, that it has the competence and control needed to perform the services for which approval is sought.

5.2.2 Training of personnel – The supplier is responsible for the qualification and training of its personnel to a recognised national, international or industry standard as applicable. Where such standards do not exist, the supplier is to define standards for the training and qualification of its personnel relevant to the functions each is authorised to perform. The

Z17 (cont)

personnel shall also have adequate experience and be familiar with the operation of any necessary equipment. Operators/technicians/inspectors shall have had a minimum of one year tutored on-the-job training. Where it is not possible to perform internal training, a program of external training may be considered as acceptable.

5.2.3 Supervision – The supplier shall provide supervision for all services provided. The responsible supervisor shall have had a minimum of two years of experience as an operator/technician/inspector within the activity for which the supplier is approved. For a supplier consisting of one person, that person shall meet the requirements of a supervisor.

5.2.4 Personnel records – The supplier shall keep records of the approved operators/technicians/inspectors. The record shall contain information on age, formal education, training and experience for the services for which they are approved.

5.2.5 Equipment and facilities – The supplier shall have the necessary equipment and facilities for the service to be supplied. A record of the equipment used shall be kept and available. The record shall contain information on maintenance and results of calibration and verifications. The Society shall assess and record the validity of previous measuring results when the equipment is found not to conform to requirements. The Society shall take appropriate action on the equipment affected.

5.2.6 Control of data:
When computers are used for the acquisition, processing, recording, reporting, storage, measurement assessment and monitoring of data, the ability of computer software to satisfy the intended application shall be documented and confirmed by the service supplier. This shall be undertaken prior to initial use and reconfirmed as necessary.
Note: Commercial off-the-shelf software (e.g. wordprocessing, database and statistical programmes) in general use within their designed application range may be considered to be sufficiently validated and do not require any subsequent confirmation.

5.2.7 Where several servicing stations are owned by a given company, each station is to be assessed and approved except as specified in 5.5.3

5.2.8 Procedures – The supplier shall have documented work procedures covering all services supplied.

5.2.9 Subcontractors – The supplier shall give information of agreements and arrangements if any parts of the services provided are subcontracted. Particular emphasis shall be given to quality management by the supplier in following-up such subcontracts. Subcontractors providing anything other than equipment shall also meet the requirements of sections 5.2 and 5.5.

5.2.10 Verification – The supplier shall verify that the services provided are carried out in accordance with approved procedures.

5.2.11 Reporting – The report shall be prepared in a form acceptable to the Society. The report should detail the results of inspections, measurements, tests, maintenance and/or repairs carried out. Special guidelines may be given in Annex 1. The report shall include a copy of the Certificate of Approval.

5.2.12 Documented procedures and instructions should be available for the recording of damages and defects found during inspection, servicing and repair work. This documentation is to be made available upon request.

Z17 (cont)

5.3 Auditing of the Supplier – Upon reviewing the submitted documents with satisfactory result, the supplier is audited in order to ascertain that the supplier is duly organised and managed in accordance with the submitted documents, and that it is considered capable of conducting the services for which approval/certification is sought.

5.4 Certification is conditional on a practical demonstration of the performance of the specific service as well as satisfactory reporting being carried out. At renewal audits, evidence of performance, verified by class surveyor, since the previous audit is sufficient to satisfy this requirement.

5.5 Quality System

5.5.1 The supplier shall have a documented system covering at least the following:

- code of conduct for the relevant activity
- maintenance and calibration of equipment
- training programmes for operators/technicians/inspectors
- supervision and verification to ensure compliance with operational procedures
- recording and reporting of information
- quality management of subsidiaries, agents and subcontractors
- job preparation
- periodic review of work process procedures, complaints, corrective actions, and issuance, maintenance and control of documents

5.5.2 A documented Quality system complying with the most current version of ISO 9000 series and including the above items, would be considered acceptable.

5.5.3 If a manufacturer of equipment (and/or its service supplier) applies to a Society for inclusion of its nominated agents and/or subsidiaries in the approval, then it must have implemented a quality system certified in accordance with the most current version of ISO 9000 series. The quality system must contain effective controls of the manufacturer's (and/or service supplier's) agents and/or subsidiaries. The nominated agents/subsidiaries must also have in place an equally effective quality system complying with the most current version of ISO 9000 series. Such approvals shall be based upon an evaluation of the quality system implemented by the parent company against the most current version of ISO 9000 series. The Society may require follow-up audits on such agents or subsidiaries against the most current version of ISO 9000 series to confirm adherence to this quality system.

5.6 Service Suppliers Relations with the Equipment Manufacturer

5.6.1 A company which works as a service station for manufacturer(s) of equipment (and as a service supplier in this field), shall be assessed by the manufacturer(s) and nominated as their agent. The manufacturer shall ensure that appropriate instruction manuals, material etc. are available for the agent as well as proper training of the agent's technicians. Such suppliers shall be approved either on a case by case basis, or in accordance with 5.5.3.

Z17 (cont)

6. Certification

6.1 Upon satisfactory completion of both the audit of the supplier and the demonstration test, as applicable, the Society may issue a Certificate of Approval stating that the supplier's service operation system has been found to be satisfactory and that the results of services performed in accordance with that system may be accepted and utilised by the Society's Surveyors in making decisions affecting classification or statutory certification, as relevant. The Certificate shall clearly state the type and scope of services and any limitations or restrictions imposed including type of equipment and/or names of Manufacturers of equipment where this is a limiting restraint. The supplier may also be included in the Society's record of approved service suppliers.

6.2 Renewal or endorsement of the Certificate is to be made at intervals not exceeding five (5) years by verification through audits that approved conditions are maintained or, where applicable, on expiry of the supplier's approval received from an equipment Manufacturer, whichever comes first. In the latter case, the Society is to be informed in due course by the Service Supplier. Individual Societies may require renewal or endorsement of the Certificate at intervals shorter than five (5) years and may require intermediate audits. For firms engaged in thickness measurements, renewal/endorsement of the Certificate is to be made at intervals not exceeding 3 years by verification that original conditions are maintained.

Z17
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7. Information Regarding Alterations to the Certified Service Operating System

7.1 When any alteration to the certified service operating system of the supplier is made, such alteration is to be immediately informed to the Society. Re-audit may be required when deemed necessary by the Society.

8. Cancellation of Approval

8.1 The Society reserves the right to cancel the approval and to inform the IACS Members accordingly (For Firms engaged in thickness measurements refer to PR23).

8.2 Approval may be cancelled in the following cases:

8.2.1 Where the service was improperly carried out or the results were improperly reported.

8.2.2 Where a Surveyor finds deficiencies in the approval service operating system of the supplier and appropriate corrective action is not taken.

8.2.3 Where alterations have been made to the Company's Quality System relevant to the service supplier certificates, without written notification to the Society.

8.2.4 Where the intermediate audit, if requested as per 6.2, has not been carried out.

8.2.5 Where wilful acts or omissions are ascertained.

8.2.6 Where any deliberate misrepresentation has been made by the Service Supplier.

8.3 A supplier whose approval was cancelled, may apply for re-approval provided it has corrected the non-conformities which resulted in cancellation, and the Society is able to confirm it has effectively implemented the corrective action.

8.4 Expiration or cancellation of the Supplier's parent company approval automatically invalidates approval of all agents and subsidiaries if these are certified according to 5.5.3.

9. Existing Approvals

Approvals for the categories of service suppliers granted before the date of implementation of UR Z17 by a society may remain valid as stated in the respective certificates for a period up to but not exceeding 3 years. Renewals of such certificates must be carried out in accordance with UR Z17.

Z17
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ANNEX 1

Special Requirements for Various Categories of Service Suppliers

1. Firms engaged in thickness measurements on ships

1.1 Extent of engagement – Thickness measurement of structural material of ships except

(1) non-ESP ships less than 500 gross tonnage and

(2) all fishing vessels.

1.2 Supervisor – The responsible supervisor shall be qualified according to a recognised national or international industrial NDT standard (e.g. EN 473 level II as amended or ISO 9712 level II as amended).

1.3 Operators – The operators carrying out the measurements shall be certified to a recognised national or international industrial standard (e.g. EN 473 level I as amended or ISO 9712 level I as amended) and shall have adequate knowledge of ship structures sufficient to elect a representative position for each measurement.

1.4 Equipment – On coated surfaces, instruments using pulsed echo technique (either with oscilloscope or digital instruments using multiple echoes, single crystal technique) are required. Single echo instruments may be used on uncoated surfaces, which have been cleaned and ground.

1.5 Procedures – Documented work procedures are at least to contain information on inspection preparation, selection and identification of test locations, surface preparation, protective coating preservation, calibration checks, and report preparation and content.

1.6 Reporting – The report shall be based on the guidelines given in UR Z7, UR Z7.1, UR Z7.2, Z10.1, Z10.2, Z10.3, Z10.4 and Z10.5, as relevant.

1.7 Verification – The supplier must have the Surveyor’s verification of each separate job, documented in the report by the attending Surveyor(s) signature.

Z17 (cont)

2. Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment

2.1 Extent of engagement – Ultrasonic tightness testing of closing appliances such as hatches, doors etc.

2.2 Operators – The operator is to have the following qualifications:

- Have knowledge of different closing appliances such as hatches, doors etc. including their design, functioning and sealing features
- Have experience with the operation and maintenance of different closing appliances such as hatches, doors etc.
- Be able to document theoretical and practical training onboard in using the ultrasonic equipment specified

2.3 It shall be demonstrated to the Surveyor that the ultrasonic equipment is fit for the purpose of detecting leakages in closing appliances.

2.4 Procedures – The supplier shall have documented work procedures which shall include the manual for the ultrasonic equipment specified, its adjustment, its maintenance, its operation and approval criteria.

Z17 (cont)

3. Firms carrying out in-water survey of ships and mobile offshore units

3.1 Extent of engagement – In-water survey of ships and mobile offshore units by diver or Remote Operated Vehicle.

3.2 Training of personnel – The supplier is responsible for the qualification of its divers and the diving equipment utilised when carrying out inspection. Knowledge of the following shall be documented:

- Ship's underwater structure and appendages, tail shaft, propeller, rudder and its bearings, etc.
- Non-destructive testing in accordance with a recognised national or international industrial NDT standard. This requirement only applies if an in-water survey company performs non-destructive testing
- Bearing clearance measurements on rudders and tail shaft
- Under-water video monitoring with TV-monitors on deck, as well as still picture work
- Operation of under-water communication system
- Special equipment and tools e.g. hull cleaners, grinders, cutters, etc.

3.3 A plan for training of personnel in the reporting system, minimum Rule requirements for relevant ship types, ship's underwater structure, measuring of bearing clearances, the recognition of corrosion damage, buckling and deteriorated coatings, etc. shall be included.

3.4 Supervisor – The supervisor shall be qualified according to the supplier's general requirements and shall have a minimum of two years' experience as a diver carrying out inspection.

3.5 Divers carrying out inspection – The diver carrying out the inspection shall have had at least one year's experience as an assistant diver carrying out inspections (including participation in a minimum of 10 different assignments).

3.6 Equipment – The following shall be available:

- Closed circuit colour television with sufficient illumination equipment
- Two-way communication between diver and surface staff
- Video recording device connected to the closed circuit television
- Still photography camera
- Equipment for carrying out thickness gauging, non-destructive testing and measurements, e.g. clearances, indents, etc., as relevant to the work to be performed
- Equipment for cleaning of the hull
- Remote Operated Vehicle, if applicable

Z17 (cont)

3.7 Procedures and guidelines – The supplier shall have documented operational procedures and guidelines for how to carry out the inspection and how to handle the equipment. These shall include:

- Two-way communication between diver and surface
- Video recording and closed circuit television operation
- Guidance of the diver along the hull to provide complete coverage of the parts to be inspected
- Guidance for the operation and maintenance of the Remote Operated Vehicle, if applicable

3.8 Verification – The supplier must have the Surveyor's verification of each separate job, documented in the report by the attending Surveyor(s) signature.

Z17 (cont)

4. Firms engaged in inspection and maintenance of fire extinguishing equipment and systems

4.1 Extent of engagement – inspections and maintenance of fire-extinguishing equipment and systems such as fixed fire extinguishing systems, portable fire extinguishers and fire detection and alarm systems.

4.2 Extent of Approval

- Service Suppliers are to have professional knowledge of fire theory, fire-fighting and fire-extinguishing appliances sufficient to carry out the maintenance and/or inspections, and to make the necessary evaluations of the condition of the equipment

- In demonstrating professional knowledge, Service Suppliers are to have an understanding of the various types of fires and the extinguishing media to be used on them

- For fixed fire-extinguishing systems, Service Suppliers are to demonstrate an understanding of the principles involved with gas, foam, deluge, sprinkler and water-mist systems, as relevant for the approval being sought

4.3 Procedures

- Service Suppliers are to have documented procedures and instructions on how to carry out the servicing of the equipment and/or system. These are to either contain or make reference to the Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals, as appropriate, and to international requirements

- Additionally they are to make reference to any requirements (e.g. what markings should be appended to the equipment/system)

4.4 Reference Documents - The Service Supplier is to have access to the following documents:

- Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals, as appropriate

- Type Approval certificates showing any conditions that may be appropriate during the servicing and/or maintenance of fire-extinguishing equipment and systems

- SOLAS, MSC.1/Circular.1318 (Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire-Extinguishing Systems), International Code for Fire Safety Systems (FSS Code), ISO 6406 (Periodic inspection and testing of seamless steel gas cylinders), and any documentation specified in the authorisation or license from the equipment manufacturer

- MSC/Circ.670 (Guidelines for the Performance and Testing Criteria and Surveys of High Expansion Foam Concentrates for fixed Fire-Extinguishing Systems)

- MSC/Circ.798 (Guidelines for the Performance and Testing Criteria and Surveys of Medium Expansion Foam Concentrates for fixed Fire-Extinguishing Systems)

- MSC/Circ.799 ((Guidelines for the Performance and Testing Criteria and Surveys of Expansion Foam Concentrates for fixed Fire-Extinguishing Systems of Chemical Tankers)

Z17 (cont)

- MSC.1/Circ.1312 (Revised Guidelines for the Performance and Testing Criteria and Surveys of Foam Concentrates for fixed Fire-Extinguishing Systems as corrected by MSC/Circ.1312/Corr.1)
- MSC.1/Circ.1432 (Revised Guidelines for the maintenance and Inspection of Fire Protection Systems and Appliances)
- IMO Res. A. 951(23) – Improved guidelines for marine portable fire extinguishers
- MSC.1/Circ.1370 – Guidelines for the design, construction and testing of fixed hydrocarbon gas detection systems
- Guidelines adopted by IMO for fire extinguishing equipment and systems specifically intended for service by service suppliers

4.5 Equipment and Facilities

4.5.1 General Requirements

- If Service Suppliers undertake shore-based inspecting and maintenance, they should maintain and implement procedures for workshop cleanliness, ventilation and arrangement, with due cognisance of the spares and extinguishing media being stored, to ensure safe and effective working procedures
- Service Suppliers undertaking inspecting and maintenance of equipment and systems onboard are to provide the appropriate facilities to either complete the work onboard or remove the necessary items to their workshops

4.5.2 Equipment

Sufficient and appropriate spares and tools are to be available as applicable, which should include:

- Various scales to weigh items
- Means to hydrostatically pressure test components/systems/storage bottles
- Liquid/gas, flow meters, as appropriate
- Pressure gauges or manometers
- In the cases of foam concentrates and portable fire-extinguishers, chemical analysis equipment and a testing bay, respectively; and
- Specific equipment/spares as may be specified by Manufacturer
- Level measuring equipment for bottles
- Recharging facilities for pressurized bottles, extinguishers and cartridges

Z17 (cont)

5. Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, inflatable rescue boats, marine evacuation systems

5.1 Extent of engagement

- Servicing of inflatable liferafts, inflatable lifejackets, hydrostatic release units and/or inflatable rescue boats

- Servicing of marine evacuation systems

5.2 Equipment and facilities – IMO Res. A.761(18) as amended by MSC.55(66) gives recommendations on conditions for the approval of servicing stations for inflatable liferafts which shall be observed as relevant. Where inflatable liferafts are subject to extended service intervals, MSC.1/Circ.1328 should also be followed.

5.3 Procedures and instructions – The supplier shall have documented procedures and instructions for how to carry out service of equipment. Where inflatable liferafts are subject to extended service intervals in accordance with the requirements of SOLAS Regulation III/20.8.3, MSC.1/Circ.1328 should be followed in addition to Resolution A.761(18) as amended by MSC.55(66).

5.4 The supplier shall provide evidence that it has been authorised or licensed to service the particular makes and models of equipment for which approval is sought by the equipment's manufacturer.

5.5 Reference Documents - The Service Supplier is to have access to the following documents:

- IMO - Resolution A.761(18) - Recommendation on Conditions for the Approval of Servicing Stations for Inflatable Liferafts - (adopted on 4 November 1993), amended by Resolution MSC.55(66)

- IMO - Resolution MSC.55(66)

- IMO – MSC.1/Circ.1328 – Guidelines for the Approval of Inflatable Liferafts Subject to Extended Service Intervals Not Exceeding 30 Months

- Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals, as appropriate

- Type Approval certificates, showing any conditions that may be appropriate during the servicing and/or maintenance of inflatable liferafts, inflatable rescue boats, inflatable lifejackets, and hydrostatic release units

- LSA code/Chap.IV, 1995 SOLAS Conference Resolution 4 regarding marine evacuation systems

Z17 (cont)

6. Firms engaged in inspections and testing of radio communication equipment

6.1 Extent of engagement

- Surveys, inspection, testing, and/or measurement of radio equipment aboard ships or mobile offshore units for compliance with SOLAS regulations

- Annual testing of 406 MHz satellite EPIRBs for compliance with SOLAS Regulation IV/15.9

- The principles of this section also apply to Service Suppliers involved in inspection, performance testing and maintenance of Automatic Identification Systems (AIS).The Service Supplier is to be familiar with the equipment with which it will be involved, such as being a service agent for the equipment manufacturer

6.2 Reference documents – The supplier shall have access to the following documents:

- SOLAS 1974 as amended

- IMO Res. A.789(19): Specification on the survey and certification functions of recognised organisations acting on behalf of the administration

- MSC/Circ.1040/Rev.1 – Guidelines on Annual Testing of 406 MHZ Satellite EPIRBs

- MSC.1/Circ.1252 – Guidelines on Annual Testing of the Automatic Identification System (AIS)

- SN/Circ.227, SN/Circ.227/Corr.1 and 245 – Guidelines for the Installation of a Shipborne Automatic Identification System (AIS) and amendments thereto

- ITU Radio Regulations

- IMO Performance Standards for the equipment for which the Service Supplier is approved

- Flag State Administration requirements

- Relevant parts, if any, of the Society's Rules and Guidelines

6.3 Supervisor – The supervisor shall have a minimum two years education from a technical school, experience as inspector, and should preferably hold a General Operator's Certificate (GOC) or a GMDSS Radioelectronic Certificate (REC), recognised by the ITU, to operate or test radio transmitters. He should be aware of any local conditions for radio signal propagation, of regional radio stations and their facilities, and of the GMDSS infrastructure.

6.4 Radio inspector – The inspector carrying out the inspection shall have passed the internal training of the supplier in Radiotelephony, GMDSS, and initial and renewal surveys, as applicable. The inspector shall also have at least one year's technical school training or as alternative hold evidence that he followed a technical course approved by the relevant Administration, at least one year's experience as an assistant radio inspector and should preferably hold an appropriate National Radio Operators Certificate, recognised by the ITU, such as a GMDSS General Operator's Certificate (GOC) or a GMDSS Radioelectronic Certificate (REC). He should be aware of any local conditions for radio signal propagation, of regional radio stations and their facilities, and of the GMDSS infrastructure.

Z17 (cont)

6.5 Equipment and facilities

6.5.1 The supplier shall have the major and auxiliary equipment required for correctly performing the inspection. A record of the equipment used shall be kept. The record shall contain information on manufacturer and type of equipment, and a log of maintenance and calibrations.

6.5.2 A standard which is relevant to the radio equipment to be tested shall be available for the equipment and shall be cited in the inspection report.

6.5.3 For equipment employing software in conjunction with the testing/examination, this software shall be fully described and verified.

6.6 Minimum required instruments:

- Equipment for measuring frequency, voltage, current and resistance
- Equipment for measuring output and reflect effect on VHF and MF/HF
- Equipment for measuring modulation on MF/HF and VHF (AM, FM, PM)
- Acid tester for checking specific gravity of lead batteries
- Tester for checking of correct output from Free-Float Satellite EPIRB
- Equipment for testing the performance of Automatic Identification Systems (AIS)

6.7 Procedures and instructions – The supplier shall have documented procedures and instructions for how to carry out testing and examination of radio equipment. Procedures and instructions for operating each item of the testing/inspection equipment shall also be kept and be available at all times.

Z17 (cont)

7. Firms engaged in inspections and maintenance of self contained breathing apparatus

7.1 Extent of Engagement - inspections and maintenance of self-contained breathing apparatus, Emergency Escape Breathing Devices (EEBD)

7.2 Extent of Approval

- The supplier shall document and demonstrate that it has knowledge of the equipment and systems sufficient to carry out the inspections and testing of self-contained breathing apparatus to identify standards and to make the necessary evaluation of the condition of the equipment

- In demonstrating professional knowledge, Service Suppliers are to have an understanding of the operational requirements involved with self-contained breathing apparatus and how these are to be maintained

- Additionally, Service Suppliers are to demonstrate the necessary safety requirements applicable to such equipment

7.3 Procedures

- Service Suppliers are to have documented procedures and instructions on how to carry out the servicing of the equipment and/or system. These are to either contain or make reference to the Manufacturer's servicing manuals, servicing bulletins, instructions and training manuals, as appropriate

- Additionally they are to make reference to any requirements (e.g. what markings should be appended to the equipment/system) and how they should be applied

7.4 Reference Documents - The Service Supplier is to have access to the following documents:

- Manufacturers' servicing manuals, servicing bulletins, instructions and training manuals, as appropriate

- Type Approval certificates showing any conditions which may be appropriate during the servicing and/or maintenance of self-contained breathing apparatus

7.5 Equipment and Facilities

7.5.1 General Requirements

- If Service Suppliers undertake shore-based inspecting and maintenance, they should maintain and implement procedures for workshop cleanliness, ventilation and arrangement, with due cognisance of the spares and pressurised bottles being stored, to ensure safe and effective working procedures

- Service Suppliers undertaking inspecting and maintenance of equipment and systems onboard are to provide the appropriate facilities to either complete the work onboard or remove the necessary items to their workshops

Z17 (cont)

7.5.2 Equipment

- Sufficient and appropriate spares and tools are to be available for repair, maintenance and servicing of self-contained breathing apparatus in accordance with the requirements of the Manufacturers

- These are to include, as required by the self-contained breathing apparatus equipment and/or systems:

    - Various scales to weigh items

    - Means to hydrostatically pressure test components/systems/storage bottles

    - Flow meters; and

    - Pressure gauges or manometers

    - Equipment for checking air quality

    - Recharging facilities for breathing apparatus

Z17 (cont)

8. Firms engaged in examination of Ro-Ro ships bow, stern, side and inner doors

8.1 Extent of engagement - inspection of securing and locking devices, hydraulic operating system, electric control system for the hydraulics, electric indicator systems, and supporting, securing and locking devices and tightness testing.

8.2 The supplier is to be certified to the most current version of ISO 9000 series.

8.3 Supervision - In addition to 5.2.3, the requirement to have had a minimum of two years experience as operator/technician/inspector within the activity, a Supervisor is to have a minimum two years related education from a technical school.

8.4 Training of personnel - Operators carrying out Non-Destructive Examination (NDE) are to be qualified to a recognised National or International Standard for the methods used.

8.5 Reference documents - The supplier shall have access to the following reference documents:

- IMO - International Convention on the Safety of Life at Sea (SOLAS) 74/78, as amended
- ISO 9002:1994 - Quality systems - Model for quality assurance in production, installation and servicing
- UR Z24 - Survey Requirements for Shell and Inner Doors of Ro-Ro ships, or its equivalent, by the relevant class society

8.6 Required Equipment

8.6.1 For Inspection of Supporting Securing and Locking Devices, Hinges and Bearings:

- Equipment for measuring clearances (i.e. feeler gauges, vernier calipers, micrometers).
- Non-destructive examination (i.e. dye penetrant, magnetic particle inspection)

8.6.2 For Tightness Testing:

- Ultrasonic leak detector or equivalent

8.6.3 For Inspection of Hydraulic Operating System:

- Pressure gauges
- Particle counter for analysing the quality of hydraulic fluid

8.6.4 For Inspection of Electric Control System and Indication System:

- Digital multi-meter
- Earth fault detector

8.7 Procedures and Instructions

8.7.1 The supplier shall have access to drawings and documents, including the Operating and Inspection Manual.

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8.7.2 The supplier shall have access to the service history of the doors.

8.7.3 The supplier should use, complete and sign a checklist which has been found acceptable by the classification society.

Z17 (cont)

9. Firms engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR)

9.1 Extent of engagement – Testing and servicing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in accordance with SOLAS Chapter V Regulation 18.8 and IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR), as applicable.

9.2 Extent of Approval

9.2.1 The supplier shall provide evidence that he has been authorised or licensed by the equipment's manufacturer to service the particular makes and models of equipment for which approval is sought.

9.2.2 Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has elected to apply IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the following is to apply:

- The Manufacturer is responsible for appointing Manufacturer's Authorised Service Stations to carry out annual performance testing

- The Manufacturer is required to be an Approved Service Supplier and is to satisfy the requirements for Service Suppliers engaged in annual performance testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR), as applicable

- The Manufacturer's Authorised Service Station is not required to be an Approved Service Supplier

- The Manufacturer is to demonstrate that IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) is applied in its entirety

9.3 Procedures

9.3.1 The Service Supplier shall have documented procedures and instructions.

9.3.2 Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has selected to apply IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the following is to apply:

- The Manufacturer is to have documented procedures for the assessment and authorisation of Manufacturer's Authorised Service Stations who carry out annual performance testing

- The Manufacturer is to have documented procedures for the review of Manufacturer's Authorised Service Stations annual performance test reports, analysis of the Voyage Data Recorder (VDR) and Simplified Voyage Data Recorder (S-VDR) 12 hour log and the issue of annual performance test certificates to the Owner/Operator

Z17 (cont)

- The Manufacturer is to maintain a list of Manufacturer's Authorised Service Stations that can be accessed (by any available means, e.g. via a nominated contact point or from the Manufacturer's website) upon request

9.4 Reference Documents

9.4.1 The Service Supplier is to have access to the following documents:

- IMO - International Convention on the Safety of Life at Sea (SOLAS), 74/78, Ch V, Reg 18.8. – Approval, surveys and performance standards of navigational systems and equipment and voyage data recorder

- IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) - (11 December 2006)

- IMO - Resolution A.861(20) (adopted on 27 November 1997) as amended by IMO Resolution MSC.214(81) and revised by IMO Resolution MSC.333(90) - Performance Standards for Shipborne Voyage Data Recorders (VDRs)

- IMO - Resolution MSC.163(78) - Performance Standards for Shipborne Simplified Voyage Data Recorders (S-VDRs) - (adopted on 17 May 2004), as amended by IMO Resolution 214(81)

9.4.2 The Service Supplier is to have access to applicable industry performance standards, e.g.:

- IEC 61996 - Maritime navigation and radiocommunication equipment and systems - Shipborne voyage data recorder (VDR)

- IEC 61996–2 - Maritime navigation and radio communication equipment and systems – Shipborne voyage data recorder (VDR) – Part 2: Simplified voyage data recorded (S-VDR) – Performance requirements, method of testing and required test results

9.4.3 The Service Supplier is also to have access to any documentation specified in the authorisation or license from the equipment manufacturer.

9.5 Equipment and Facilities - In addition, the Service Supplier shall have equipment as specified in the authorisation or license from the equipment Manufacturer.

9.6 Reporting - Test Report

9.6.1 The Service Supplier shall issue a certificate of compliance as specified in the International Convention on Safety of Life at Sea (SOLAS 1974), as amended, Ch V, Reg 18.8.

9.6.2 Annual Performance Test of VDR and S-VDR should be recorded in the form of the model test report given in the Appendix to MSC.1/Circular.1222, signed and stamped by the Service Supplier and attached to the annual performance test certificate.

9.6.3 Where the Service Supplier is also the Manufacturer of the Voyage Data Recorder (VDR) or Simplified Voyage Data Recorder (S-VDR) and has selected to apply IMO - MSC.1/Circular.1222 - Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR) in its entirety for the purpose of acting as a Service Supplier engaged in annual performance testing, the Manufacturer is to make arrangements for the following:

Z17
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- Review of the Manufacturer's Authorised Service Station annual performance test report
- Analysis of the recorder's 12 hour log
- Checking of the master record/database for the recorder

9.6.4 Issue of the annual performance test certificate to the Owner/Operator within 45 days of completion of the annual performance test.

Z17 (cont)

10. Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems

10.1 Extent of engagement – Luminance measurements on board ships of low location lighting systems using photo luminescent materials.

10.2 Operators – The operator is to have the following qualifications:

- Have adequate knowledge of the applicable international requirements (namely SOLAS reg. II-2/13.3.2.5, IMO Res. A.752(18) - Guidelines for the Evaluation, Testing and Application of Low-Location Lighting on Passenger Ships, ISO 15370-2010, FSSS Code Chapter 11)

- Be able to document theoretical and practical training onboard in using equipment specified

10.3 Equipment – The measuring instrument shall incorporate a fast-response photometer head with CIE (International Commission on Illumination) photopic correction and have a measurement range of at least 10^{-4} cd/m^2 to 10 cd/m^2.

10.4 Procedures – Documented work procedures are at least to contain information on inspection preparation, selection and identification of test locations.

10.5 Reporting – The report shall conform to Annex C of ISO 15370-2010.

10.6 Verification – The supplier must have the Surveyor's verification of each separate job, documented in the report by the attending Surveyor's signature.

10.7 Reference Documents

The Service Supplier is to have access to the following documents:

- IMO - International Convention on the Safety of Life at Sea (SOLAS), 74/78 Ch II-2, Pt D, Reg 13.3.2.5 – Marking of escape routes

- IMO – Fire Safety Systems (FSS Code), Ch 11 – Low-location lighting systems

- IMO - Resolution A.752(18) - Guidelines for the Evaluation, Testing and Application of Low-Location Lighting on Passenger Ships - (adopted on 4 November 1993)

- ISO 15370:2010 - Ships and marine technology - Low-location lighting on passenger ships – Arrangement

- MSC/Circ.1168 – Interim guidelines for the testing, approval and maintenance of evacuation guidance systems used as an alternative to low-location lighting systems

Z17 (cont)

11. Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships

11.1 Extent of engagement – Sound pressure level measurements of public address and general alarm systems on board ships.

11.2 Operators – The operator is to have the following qualifications:

- Have adequate knowledge of the applicable international requirements (SOLAS Reg. III/4 and III/6, LSA CODE Chapter VII/7.2, IMO Code on alarms and indicators, 1995)
- Be able to document theoretical and practical training onboard in using equipment specified

11.3 Equipment – The measuring instrument shall be an integrating sound level meter with frequency analyser capabilities complying with IEC (International Electrotechnical Commission) 60651 and IEC 61672, type 1 precision class with, at least an A-weighting frequency response curve and 1/3 octave and 1 octave band filters, complying to IEC 61260, as appropriate for the measurements to be carried out. In addition microphones shall be of the random incidence type, complying with IEC 60651.

11.4 Procedures – Documented work procedures are at least to contain information on inspection preparation, calibration, selection and identification of test locations.

11.5 Reporting – The report shall describe, as a minimum, the environmental conditions of the tests and, for each test location, the ambient noise level or the speech interference level, as appropriate for the measurements to be carried out. The report shall conform to any other specific requirement of the Society.

11.6 Verification – The supplier must have the Surveyor's verification of each separate job, documented in the report by his signature.

11.7 Reference documents

The Service Supplier is to have access to the following documents:

- SOLAS 74/78, Ch III, Pt A, Reg 4 – Evaluation, testing and approval of life-saving appliances and arrangements
- SOLAS 74/78, Ch III, Pt B, Reg 6 – Communications
- International Life-Saving Appliance (LSA) Code, Ch VII, Reg 7.2 – General alarm and public address system
- IMO - Code on Alarms and Indicators, 1995 as amended
- IEC 60651 (2001-10) - Sound level meters
- IEC 61672 - Electroacoustics - Sound level meters
- IEC 61260 - Electroacoustics - Octave-band and fractional-octave-band filters

Z17 (cont)

12. Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82) as amended and IACS UI SC223 and/or MSC.288(87) as amended

12.1 Laboratories

12.1.1 Extent of Engagement - Testing of coatings systems according to IMO Resolution MSC.215(82), as corrected by IMO MSC.1/Circ.1381 and amended by IMO Resolution 341(91) and IACS UI SC223 and/or MSC.288(87), as corrected by IMO MSC.1/Circ.1381 and amended by IMO Resolution 341(91).

12.1.2 The laboratory is to provide to the Society the following information:

- A detailed list of the Laboratory test equipment for the coating approval according to the IMO Resolution MSC.215(82) as amended and/or MSC.288(87) as amended.
- A detailed list of reference documents comprising a minimum those referred to in IMO Resolution MSC.215(82) as amended and/or MSC.288(87) as amended for the coating approval.
- Details of test panel preparation, procedure of test panel identification, coating application, test procedures and a sample test report.
- Details of exposure method and site for weathering primed test panels.
- A sample daily or weekly log/form for recording test conditions and observations including unforeseen interruption of the exposure cycle with corrective actions.
- Details of any sub-contracting agreements (if applicable).
- Comparison test report with an approved coating system or laboratory if available.

12.1.3 Reporting – Reference is made to the following IACS Recommendations:

- Rec. 101: IACS Model Report for IMO Resolution MSC.215(82) Annex 1 “Test Procedures for Coating Qualification”
- Rec. 102: IACS Model Report for IMO Resolution MSC.215(82) Annex 1 “Test Procedures for Coating Qualification”, Section 1.7 – Crossover Test

12.1.4 Audit of the test laboratory is to be based on this procedure and the standards listed in the IMO Resolution MSC.215(82) as amended and/or MSC.288(87) as amended for the coating approval.

Z17 (cont)

13. Firms engaged in the servicing and maintenance of lifeboats, launching appliances, on-load release gear and davit-launched liferaft automatic release hooks

13.1 Extent of engagement – Servicing and maintenance of lifeboats, launching appliances, on-load release gear and davit-launched liferaft automatic release hooks.

13.2 Extent of Approval

13.2.1 The contents of this procedure apply equally to manufacturers when they are acting as Service Suppliers.

13.2.2 Any Service Supplier engaged in the thorough examination, operational testing, repair and overhaul of lifeboats, launching appliances, on-load release gear and davit-launched liferaft automatic release hooks carried out in accordance with SOLAS regulation III/20 should be qualified in these operations for each make and type of equipment for which they provide the service, and provide manufacturers documentary evidence that they have been so authorized or they are certified in accordance with an established system for training and authorization in accordance with MSC.1/Circ.1277, as amended.

13.2.3 In cases where an equipment manufacturer is no longer in business or no longer provides technical support, Service Suppliers may be authorised for the equipment on the basis of prior authorization for the equipment and/or long term experience and demonstrated expertise as an authorized service provider.

13.3 Qualifications and Training of Personnel

Service Suppliers should be trained and qualified in the operations for which they are authorised, for each make and type of equipment for which they provide the service. Such training and qualification should include, as a minimum:

13.3.1 Employment and documentation of personnel certified in accordance with a recognized national, international or industry standard as applicable, or an equipment manufacturer's established certification program. In either case, the certification program should be based on the guidelines in the appendix for each make and type of equipment for which service is to be provided.

13.3.2 The education and training for initial certification of personnel should be documented and address, as a minimum:

- Causes of lifeboat accidents
- Relevant rules and regulations, including International Conventions
- Design and construction of lifeboats, including on-load release gear and launching appliances
- Education and practical training in the procedures specified in annex 1 of MSC.1/Circ.1206/Rev.1 for which certification is sought
- Detailed procedures for thorough examination, operational testing, repair and overhaul of lifeboats, launching appliances and on-load release gear, as applicable; and
- Procedures for issuing a report of service and statement of fitness for purpose based on MSC.1/Circ.1206/Rev.1 (annex 1, paragraph 15)

Z17 (cont)

13.3.3 The education and training for the personnel should include practical technical training on actual inspection and maintenance using the equipment (lifeboats, launching appliances and/or on-load release gear) for which the personnel are to be certified. The technical training should include disassembly, reassembly, correct operation and adjustment of the equipment. Classroom training should be supplemented by field experience in the operations for which certification is sought, under the supervision of an experienced senior certified person.

13.3.4 At the time of initial certification and at each renewal of certification, the service supplier shall provide documentation to verify personnel's satisfactory completion of a competency assessment using the equipment for which the personnel are certified.

13.3.5 The Service Supplier shall require refresher training as appropriate to renew the certification.

13.4 Reference Documents - The Service Supplier is to have access to the following documents:

- IMO - MSC.1/Circ.1206/Rev.1, as amended, Measures to Prevent Accidents with Lifeboats

- IMO – MSC.1/Circ.1277, as amended, Interim Recommendation on Conditions for Authorization of Service Providers for Lifeboats, Launching Appliances and On-Load Release Gear

- IMO – Resolution A.689(17), recommendation on testing of life-saving appliances and, for life-saving appliances installed on board on or after 1 July 1999, Resolution MSC.81(70), revised recommendation on testing of life-saving appliances

- For servicing and repair work involving disassembly or adjustment of on-load release mechanisms, availability of the equipment manufacturer's specifications and instructions

- Type Approval certificate showing any conditions that may be appropriate during the servicing and/or maintenance of lifeboats, launching appliances and on-load release gear

13.5 Equipment and Facilities - The Service Supplier is to have access to the following:

- Sufficient tools, and in particular any specialized tools specified in the equipment manufacturer's instructions, including portable tools as needed for work to be carried out on board ship

- Access to sufficient materials, spare parts and accessories as specified by the equipment manufacturer for repairing lifeboats, launching appliances and on-load release gear, as applicable

- For servicing and repair work involving disassembly or adjustment of on-load release mechanisms, availability of genuine replacement parts as specified or supplied by the equipment manufacturer

13.6 Reporting - The report should conform to the requirements of MSC.1/Circ.1206/Rev.1 (annex 1, paragraph 15). When repairs, thorough examinations and annual servicing are completed, a statement confirming that the lifeboat arrangements remain fit for purpose should be promptly issued by the Service Supplier.

Z17 (cont)

14. Firms engaged in measurements of Noise level Onboard Ships

14.1 Extent of engagement

Sound pressure level measurements onboard Ship.

14.2 Supervisor

The supervisor shall have a minimum of 2 years of experience as an operator in sound pressure level measurements.

14.3 Operators

The operator is to have the following qualifications:

- Knowledge in the field of noise, sound measurements and handling of measurement equipment
- Adequate knowledge of the applicable international requirements (SOLAS Regulation II-1/3-12, as amended, and IMO Code on noise levels onboard Ships, as amended,)
- At least 1 year's experience, including participation in a minimum of 5 measurement campaigns as an assistant operator
- Training concerning the procedures specified in IMO Code on Noise Levels onboard Ships
- Be able to document theoretical and practical training onboard in using a sound level meter

14.4 Equipment

14.4.1 Sound level meters

Measurement of sound pressure levels shall be carried out using precision integrating sound level meters. Such meters shall be manufactured to IEC 61672-1(2002-05)1, as amended, type/class[1] standard as applicable, or to an equivalent standard acceptable to the Administration[2].

[1] Recommendation for sound level meters.
[2] Sound level meters class/type 1 manufactured according to IEC 651/IEC 804 may be used until 1 July 2016.

14.4.2 Octave filter set

When used alone, or in conjunction with a sound level meter, as appropriate, an octave filter set shall conform to IEC 61260 (1995)[3], as amended, or an equivalent standard acceptable to the Administration.

[3] Octave-band and fractional-octave-band filters

14.4.3 Sound Calibrator

Sound calibrators shall comply with the standard IEC 60942 (2003-01), as amended, and shall be approved by the manufacturer of the sound level meter used.

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(cont)

14.4.4 Calibration

Sound Calibrator and sound level meter shall be verified at least every two years by a national Standard laboratory or a competent laboratory accredited according to ISO 17025 (2005), as amended. A record with a complete description of the equipment used shall be kept, including a calibration log.

14.4.5 Microphone wind screen

A microphone wind screen shall be used when taking readings outside, e.g. on navigating bridge wings or on deck, and below deck where there is any substantial air movement. The wind screen should not affect the measurement level of similar sounds by more than 0.5 dB(A) in "no wind" conditions.

14.5 Procedures and instructions

14.5.1 The supplier shall have documented procedures and instructions to carry out service of the equipment.

Documented work procedures are at least to contain information on inspection preparation, selection and identification of sound level measurement locations, calibration checks and report preparation.

14.5.2 The supplier shall have access to the following documents:

- SOLAS 1988, as amended (Reg.II-1/3-12)

- Resolution A.468(XII) and IMO Resolution MSC.337(91) code on noise levels on board ships

- Resolution A.343(IX) Recommendation on methods of measuring noise levels at listening posts

- The Society’s Rules and Guidelines

14.6 Reporting

A noise inspection report shall be made for each ship. The report shall comprise information on the noise levels in the various spaces on board. The report shall show the reading at each specified measuring point. The points shall be marked on a general arrangement plan, or on accommodation drawings attached to the report, or shall otherwise be identified.
The format for noise inspection reports is set out in appendix 1 of IMO Code on Noise Levels onboard Ships and may conform to any other specific requirement of the society (refer to IMO circular MSC.337(91)).

14.7 Verification

The supplier must have the Surveyor’s verification of each separate job, documented in the report by his signature.

Z17 (cont)

15. Firms engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service

15.1 Extent of engagement

Firms carrying out the following:

- Global Vacuum Testing of Primary and Secondary Barriers
- Acoustic Emission (AE) Testing
- Thermographic Testing

15.2 Requirements for firms engaged in global testing of primary and secondary barriers

15.2.1 Testing Procedures – Testing is to be carried out in accordance with cargo containment system designer's procedures as approved by the society.

15.2.2 Authorization - The supplier is to be authorized by the system designer to carry out the testing.

15.2.3 Equipment – Equipment is to be maintained and calibrated in accordance with recognized national or international industrial standards.

15.2.4 Reporting – The report is to contain the following:

- Date of testing
- Identity of test personnel
- Vacuum decay data for each tank
- Summary of test results

15.3 Requirements for firms engaged in acoustic emission (AE) testing

15.3.1 Testing procedures – The supplier is to have documented procedures based upon recognized national or international industrial standards to perform ultrasonic leak test using AE sensors for the secondary barrier of membrane cargo containment systems. The procedures are to include details of personnel responsibilities and qualification, instrumentation, test preparation, test method, signal processing, evaluation and reporting.

Note: The differential pressure during testing should not exceed the containment system designer's limitations.

15.3.2 Supervisor – The responsible supervisor shall be certified to a recognized national or international industrial standard (e.g. Level II, ISO-9712 as amended or SNT-TC-1A as amended) and have one year experience at Level II.

15.3.3 Operators – The operators carrying out the acoustic emission (AE) testing shall be certified to a recognized national or international industrial standard (e.g. Level I, ISO-9712 as amended or SNT-TC-1A as amended) and shall have adequate knowledge of ship structures sufficient to determine sensor placement.

Z17 (cont)

15.3.4 Equipment – Equipment is to be maintained and calibrated in accordance with recognized national or international industrial standards or equipment manufacturer's recommendations.

15.3.5 Evaluation of acoustic emission (AE) testing – Must be carried out by the supervisor or individuals certified to a recognized national or international industrial standard (e.g. Level II, ISO-9712 as amended or SNT-TC-1A as amended) and have one year experience at Level II.

15.3.6 Reporting – The report is to contain the following:

- Date of testing
- Supervisor and operator(s) certifications
- Description of time and pressure of each cycle of test
- List and sketch detailing location of possible defects

15.4 Requirements for firms engaged in thermographic testing

15.4.1 Testing Procedures – Testing is to be carried out in accordance with the cargo containment system designer's procedures as approved by the society.

15.4.2 Authorization - The supplier is to be authorized by the system designer to carry out the testing.

15.4.3 Supervisor – The responsible supervisor shall be certified to a recognised national or international industrial standard (e.g. Level II, ISO-9712 as amended or SNT-TC-1A as amended) with additional certification in infrared/thermal testing. ~~Certification by the supplier is not allowed and must be obtained through an independent certification body.~~ SNT-TC-1A certified personnel must provide evidence that training on Level II or above has been administered by an independent training body centrally certified to ASNT or a comparable nationally recognized certification scheme.

15.4.4 Operators – The operators carrying out the imaging shall be certified to a recognized national or international industrial standard (e.g. Level I, ISO-9712 as amended or SNT-TC-1A as amended) with additional certification in infrared/thermal testing and shall have adequate knowledge of ship structures sufficient to determine position for each identified image, and of the containment system to understand the basis of the testing. ~~Certification by the supplier is not allowed and must be obtained through an independent certification body.~~ SNT-TC-1A certified personnel must provide evidence that training on Level I or above has been administered by an independent training body centrally certified to ASNT or a comparable nationally recognized certification scheme.

15.4.5 Equipment – Thermal cameras and sensors are to be in accordance with the system designer's procedures with regards to sensitivity, accuracy and resolution.

Equipment are to be in accordance with recognized standard (IEC, etc.) with regards their safety characteristics for the use in hazardous areas (in gas explosive atmosphere), maintained and calibrated in accordance with the maker's recommendations.

15.4.6 Evaluation of thermographic images – Must be carried out by the supervisor or individuals certified to a recognized national or international industrial standard (e.g. Level II, ISO-9712 as amended or SNT-TC-1A as amended) with additional certification in

Z17 (cont)

infrared/thermal testing. ~~Certification by the supplier is not allowed and must be obtained through an independent certification body.~~ SNT-TC-1A certified personnel must provide evidence that training on Level II or above has been administered by an independent training body centrally certified to ASNT or a comparable nationally recognized certification scheme.

15.4.7 Reporting – The report is to contain the following:

- Date of testing
- Supervisor and operator(s) certifications
- Differential pressures of all phases
- List and sketch detailing location of thermal indications
- Thermographic images of all phases of testing for thermal indications
- Evaluation of thermal images indicating possible leaks

End of Document

MCA Safety Bulletin No. 12

SAFETY BULLETIN NO. 12

Date of issue: September 2018

Maritime & Coastguard Agency

SAFETY BULLETIN 12 - Accidental CO_2 releases onboard 2 UK Merchant Vessels

The Issue

The Maritime & Coastguard Agency is aware of two serious and potentially near fatal accidental CO_2 releases on UK ships in the last two years. In both cases the CO_2 leaked from the manifold into the CO_2 room. In both cases the remote release valves were untouched and the CO_2 alarms operated, alerting the crew and averting fatalities. However, these incidents follow a concerning pattern of similar incidents. The MCA would like to remind operators that CO_2 is highly asphyxiating, a 9% concentration causes unconsciousness within minutes and 17% causing death within just a couple of minutes. CO_2 is also both colourless and odourless.

Key findings of a recent MAIB investigation:

- Many systems are designed such that a single leaking valve can discharge the entire system.
- Lack of clarity on life/service intervals and maintenance requirements of cylinder valves.
- There is perceived over reliance on shore-based contractors who may have poor knowledge of the specific system fitted onboard.
- CO_2 leaked from the systems and was not contained by the pipework and manifold.

Image - Common arrangement of pilot bottles connected to system with flexible pipes

Some key areas that should be highlighted which will reduce the risk of reoccurrence of similar incidents;

- When bottles are required to be refilled, it is important that valves should be either serviced or replaced at least in line with manufacturers recommendations. With

regards maintenance of the valves the MCA and MAIB would like to draw the attention of service agents and ships operators to BS EN ISO 22434:2011 - Transportable gas cylinders - Inspection and maintenance of cylinder valves which provides relevant guidance on the issue of maintenance where manufacturers are silent on the issue.

- MCA interpretation of MSC.1/Circ.1318 requires that 10% of high pressure CO_2 cylinders are hydrostatically tested at their 10 year anniversary. Furthermore, in line with BS EN 1968-2002 – All remaining cylinders must be hydrostatically tested by the 20 year anniversary.
- Flexible pipework must be replaced at intervals specified by the manufacturer or at the 10 year anniversary whichever is sooner as per MSC.1/Circ.1318.
- The IMO FSS Code, chapter 5.2.1.1.3 requires that crew should be checking quantities of fire extinguishing medium. Given the numbers of bottles involved, methods such as weighing of cylinders are highly impractical. There are now commonly available simple methods such as ultrasonic liquid level gauges which facilitate easy in situ level testing which operators should consider in order that their crews can readily and safely check the levels of CO_2 thus enabling early detection of a potential problem. The UK would consider this appropriate as per the IMO FSS Code Chapter 5.2.1.1.3 and this could be built into the planned maintenance system.
- The MCA would remind operators of the benefit of marking the cylinders and checking CO_2 levels at least annually.
- The MCA would also recommend that operators test and ensure the correct operation of any pressure switches and alarms within their systems.

Further information

For further information please contact marinetechnology@mcga.gov.uk or phone on +44 2038 172000