DEPARTMENT OF TRANSPORT

MERCHANT SHIPPING NOTICE No. M.1485

Guidelines and Specifications for Radar Reflectors to be fitted to Inflatable Liferafts

Notice to Manufacturers of Liferafts and Radar Reflectors, Shipowners, Masters and Officers of Merchant Ships

1. The Merchant Shipping (Life-Saving Appliances) Regulations 1986 and Chapter III of the 1983 Amendments to the International Convention for the Safety of Life at Sea, 1974 require the carriage of an efficient radar reflector in liferafts on new ships. These reflectors have to be fitted in liferafts which comply with the requirements of the revised Chapter III (Regulation 38.5.1.14), the equivalent requirement in the Merchant Shipping (Life-Saving Appliances) Regulations 1986 being paragraph 1.1.14 of Part IV of Schedule 4. With the coming into force of the Merchant Shipping (Life-Saving Appliances) (Amendment) Regulations 1991, on the 1 July 1991, the fitting of a radar reflector will not be required if a radar transponder is stowed in the liferaft as part of the liferaft equipment.

2. When the Merchant Shipping (Life-Saving Appliances) Regulations 1986 came into force on 1 July 1986 no Administration had approved an efficient radar reflector. Consequently a draft Maritime Safety Committee (MSC) Circular was prepared by the International Maritime Organisation's (IMO) Life-saving Appliances Sub-committee at its 18th Session in June 1986 recommending that until approved radar reflectors for liferafts becoming available, the absence of this item from liferafts should not constitute grounds for detaining or delaying a ship being subjected to a Port State Control inspection.

3. Based upon extensive trials carried out with the co-operation of several radar reflector manufacturers and liferaft manufacturers, the Department, in conjunction with the Defence Research Agency, has developed a specification for this type of equipment which is to be carried in liferafts on United Kingdom registered ships. The specification, at Appendix I, gives the requirements for structure, materials, performance requirements, reflector performance and prototype testing for radar reflectors.

4. Manufacturers requiring approval of a radar reflector should apply in the first instance to the:

Defence Research Agency
Civil Marine Group
ARE Fraser Range
Fort Cumberland Road
Eastney
Portsmouth PO4 9LJ;

requesting that their product be assessed in accordance with the technical specification attached to this Notice. After satisfactorily completing this stage of approval the radar reflector should then be subjected to the carriage tests required of all equipment fitted in a liferaft approved by this Department. These latter tests must be carried out in conjunction with the individual liferaft manufacturer.

5. To date the Department has approved radar reflectors to this Performance and Testing Specification.

6. It is the Department's intention to require the fitting of a radar reflector in new liferafts complying with the above mentioned Regulations as from 1 April 1992. In the case of existing liferafts manufactured to SOLAS 1983 requirements approved radar reflectors should be fitted when next presented for servicing after 1 June 1992. This requirement is only applicable if radar transponders are not stowed in the liferafts as part of the liferaft equipment.

Department of Transport
Marine Directorate
London WC1V 6LP
February 1992

APPENDIX 1

LIFERAFT RADAR REFLECTORS SPECIFICATION AND TESTS

1. **General**

1.1 Radar reflectors intended to enhance the radar echo from liferafts as required by SOLAS 1974, as amended, shall comply with the standards specified below.

1.2 **Structure and Materials**

The form and structure of the radar reflector shall be suitable for packing within a liferaft container and the materials used must be of sufficient strength and quality as to make the reflector capable of maintaining reflection performance under conditions of sea states, vibration, humidity and change of temperature likely to be experienced in the marine environment.

2. **Performance Requirements**

2.1 A liferaft radar reflector shall comply with the following minimum requirements for all frequencies between 9320 Mhz and 9500 Mhz:

.1 A liferaft radar reflector when installed at an approved position shall provide a positive response on the display of a radar installation during 50 per cent of antenna revolutions at a range of four nautical miles.

2.2 The above requirements in 2.1.1 shall be met using a radar installation complying with IMO Resolution A 477(XII), having an antenna height of 15 metres.

3. **Reflective Performance**

3.1 The maximum echoing area of the radar reflector shall be at least $10m^2$ if intended for fitting at 1.5 metres above sea level.

3.2 If the radar reflector is intended for fitting at a height of less than 1.5 metres above sea level then it shall be proved that it has an equivalent performance to meet the requirements of 2.1.1.

3.3 The radar reflector shall have a response over an angular coverage of 360° in azimuth and 15° in elevation.

Any azimuthal polar diagram taken within the angular coverage shall show that:

.1 the reflector has a peak response of at least $10m^2$ (or as required by 3.2).

.2 the mean radar cross section of the reflector shall be not less than $2.5m^2$ (or –6db with respect to the figure derived in 3.2 if applicable).

.3 Any areas below $2.5m^2$ (or –6db with respect to the figure derived in 3.2 if applicable) in the response shall be distributed uniformly around 360° of azimuth.

3.4 In addition the azimuthal polar diagram in the horizontal plane (which may be assessed over an angular band of ± 2° in elevation), shall be such that its echoing area over a total angle of 210° is not less than $2.5\ m^2$ (or –6db with respect to the figure derived in 3.2 if applicable). The response shall not remain below this level over any single angle of more than 15°.

4. **Prototype Tests**

4.1 The following tests and inspections shall be carried out by an independent laboratory recognised by the Department of Transport. They will normally be carried out on at least two units in the following order:

— visual inspection of the structure and materials;

— performance tests;

— dry heat test;

— low temperature test;

— corrosion test;

— mechanical strength test;

— drop test.

After each test, a visual inspection shall be carried out to verify the physical durability of the reflector.

On completion of these tests, a general performance test shall be carried out to verify conformity with the performance requirements.

4.2 **Performance Test**

The performance test shall be carried out in a chamber or on a test site where the background noise level. has been reduced to the equivalent of an echoing area of 0.01 m^2 (–30db wrt 10 m^2) or less at frequencies between 9320 MHz and 9500 MHz. The test shall consist of measurement of polar patterns of the reflector within the volume defined in 3.3. If the reflector is inflatable then it is to be inflated to the manufacturers instructions with the performance tests carried out 4 hours after this initial inflation.

4.3 **Dry Heat Test**

The reflector, in its packed state, shall be placed in a chamber at normal room temperature. Then the temperature shall be raised to and maintained at 65°C ± 3°C for a minimum period of 7 hours. The reflector shall then be removed from the chamber, exposed to normal temperature for a period of 30 minutes and then deployed in its normal operating mode.

4.4 **Low Temperature Test**

The reflector, in its packed state, shall be placed in a chamber at normal room temperature. Then the temperature shall be reduced to and maintained at –30°C ± 3°C for a minimum period of 10 hours. The reflector shall then be removed from the chamber, exposed to normal room temperature for a period of 30 minutes and then deployed in its normal operating mode.

Note: The duration of this test will be increased to 24 hours if packed into a liferaft container.

4.5 **Corrosion Test**

The reflector shall be placed in a chamber fitted with apparatus such as a spray gun capable of spraying in the form of a fine mist a salt solution (5 per cent natrium chloride solution). The equipment in its deployed condition shall be sprayed simultaneously on all its external surfaces with the salt solution for a period of 100 hours. The temperature shall be maintained at + 35°C ± 2°C during this period.

4.6 **Mechanical Strength Test**

If the reflector is designed to be rigged outside the raft it shall be mounted in the recommended way, shall be subjected to a jet of water delivered at a rate of 2,300 litres per minute through a 62.5 mm hose from a point 3.5 m away and level with the reflector for a period of 1 minute on each face of the reflector or 5 minutes total whichever is the longer. There must be no damage to the reflector or liferaft at the conclusion of this test.

4.7 **Drop Test**

The reflector, included in an operationally packed liferaft shall, with the liferaft, be drop tested from a minimum height of 18 m into the water. If the liferaft is to be stowed at a height greater than 18 m, it shall be dropped from the height that it is to be stowed. There must be no damage to the reflector or the liferaft at the conclusion of this test.

Note: Test 4.6 and 4.7 are to be conducted with a Department approved inflatable liferaft or may be tested in conjunction with a suitable inflatable liferaft undergoing prototype approval tests.

5. **Marking and Instructions**

Each reflector shall be marked indelibly with:

.1 the manufacturer's name or trade mark;

.2 the words “DOT (UK) APPROVED”;

.3 the serial number;

.4 date of manufacture (month and year).

The following instructions shall also be included if the reflector is not automatically deployed or an integral part of the liferaft:

.5 clear instructions for the deployment and mounting;

.6 any procedure needed to maintain performance eg for topping-up inflation if of the inflatable type.

6. **Installation**

The radar reflector manufacturer shall specify suitable installation instructions for attaching the reflector onto a liferaft. Arrangements shall be provided on the reflector so that it can be secured in its correct orientation on the liferaft.

7. Inflation

For all reflectors that are of the inflatable type, a suitable adaptor is to be provided that is compatible with the liferaft topping-up pump.

8. **Servicing**

At each service of the liferaft the radar reflector shall be inspected visually and if of an inflatable type subjected to an inflation test for 1 hour.

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