



# SLOVENSKI STANDARD

## SIST EN ISO 8729:2000

01-december-2000

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### **Ships and marine technology - Marine radar reflectors (ISO 8729:1997)**

Ships and marine technology - Marine radar reflectors (ISO 8729:1997)

Schiffe und Meerestechnik - Radarreflektoren für die Schifffahrt (ISO 8729:1997)

Navires et technologie maritime - Réflecteurs radars de marine (ISO 8729:1997)

**Ta slovenski standard je istoveten z: EN ISO 8729:1998**

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#### **ICS:**

47.020.70	Navigacijska in krmilna oprema	Navigation and control equipment
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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN ISO 8729

December 1998

ICS 47.020.70

Supersedes EN ISO 8729:1994

Descriptors: see ISO document

English version

## Ships and marine technology - Marine radar reflectors (ISO 8729:1997)

Navires et technologie maritime - Réflecteurs radars de marine (ISO 8729:1997)

Schiffe und Meerestechnik - Radarreflektoren für die Schifffahrt (ISO 8729:1997)

This European Standard was approved by CEN on 6 December 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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### Foreword

The text of the International Standard ISO 8729:1998 has been prepared by Technical Committee ISO/TC 8 "Ships and marine technology" in collaboration with Technical Committee CEN/TC 300 "Sea-going vessels and marine technology", the secretariat of which is held by DIN.

This European Standard supersedes EN ISO 8729:1994.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

### Endorsement notice

The text of the International Standard ISO 8729:1998 was approved by CEN as a European Standard without any modification.

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# INTERNATIONAL STANDARD

**ISO**  
**8729**

Second edition  
1997-06-15

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## Ships and marine technology — Marine radar reflectors

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Reference number  
ISO 8729:1997(E)

**ISO 8729:1997(E)****Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8729 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation*.

This second edition cancels and replaces the first edition (ISO 8729:1987), which has been technically revised.

Annex A forms an integral part of this International Standard. Annex B is for information only.

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# Ships and marine technology — Marine radar reflectors

## 1 Scope

This International Standard specifies the minimum requirements for a radar reflector intended to enhance returns from small vessels as required by IMO Resolution A.384(X).

It lays down the specification for the construction, performance, installation, testing and inspection of such radar reflectors.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 945:1994, *Marine navigational equipment — General requirements — Methods of testing and required test results*.

IMO Resolution A.384(X) (adopted on 14 November 1977), *Performance standards for radar reflectors*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 radar reflector:** Any passive device which is designed to enhance returns from small radar targets.

**3.2 echoing area:** Area which is  $4\pi$  times the ratio of the power per unit solid angle scattered in a specified direction to the power per unit area in a plane wave incident on the scatterer from a specified direction.

NOTE — It is dependent on the radar operating frequency, and the three-dimensional orientation of the reflector. Polarization of the transmitter and the received wave affects the effective echoing area of the reflector.

In case of free space propagation, the echoing area  $\sigma$ , in square metres, can be measured by the following equation:

$$\sigma = \frac{(4\pi)^3 \times S \times R^4}{P \times G^2 \times \lambda^2}$$

where

$S$  is the receiver power, in watts;

$R$  is the distance between radar and target, in metres;

- $P$  is the transmitting peak power, in watts;  
 $G$  is the antenna gain;  
 $\lambda$  is the wave length, in metres.

**3.3 azimuthal polar diagram:** Polar diagram relating the echoing area of the reflector to the azimuthal angle about its vertical axis.

**3.4 Luneberg reflector:** Reflector, making use of a number of concentric spheres of varying refractive index, capable of focusing incident energy onto a reflecting surface (see figure 1).

**3.5 corner reflector:** Reflector, consisting of three flat conducting surfaces intersecting mutually at right angles, which reflects the greater part of the incident waves parallel to their direction of incidence (see figure 2).

## 4 Construction

### 4.1 Structure and materials

The materials used for the radar reflector shall be of sufficient strength and quality as to make the reflector capable of maintaining reflection performance under conditions of stress due to sea states, vibration, humidity and change of temperature likely to be experienced in the marine environment as specified in 6.2 and 6.3. Use of ferrous metals should be avoided.

### 4.2 Colour

The radar reflector intended for installation on-board vessels shall not be coloured black. It should be of a highly visible colour.

## 5 Performance requirements

The radar reflector shall comply with the following minimum requirements for all frequencies between 9 320 MHz and 9 500 MHz.

### 5.1 Reflecting pattern in horizontal plane

**5.1.1** The maximum echoing area of the radar reflector shall be at least 10 m<sup>2</sup>.

**5.1.2** Its azimuthal polar diagrams shall be such that its response over a total angle of 240° is not less than 2,5 m<sup>2</sup>. The response shall not remain below this level over any single angle of more than 10°.

NOTE — Typical azimuthal polar diagrams of two types of marine radar reflector are shown in figures 1 and 2.

**5.1.3** These requirements shall be assessed by reference to related azimuthal polar diagrams about the reflector's vertical axis and tilted from the vertical at angles not exceeding  $\pm 3^\circ$ .

### 5.2 Reflecting pattern in vertical plane

The performance of the reflector, up to at least  $\pm 15^\circ$  from the horizontal shall be such that its response at any inclination remains above 0,625 m<sup>2</sup> over a total angle of at least 240°.

### 5.3 Other requirements

The radar reflector shall be in accordance with the requirements for class X equipment in IEC 945:1994, clause 3.



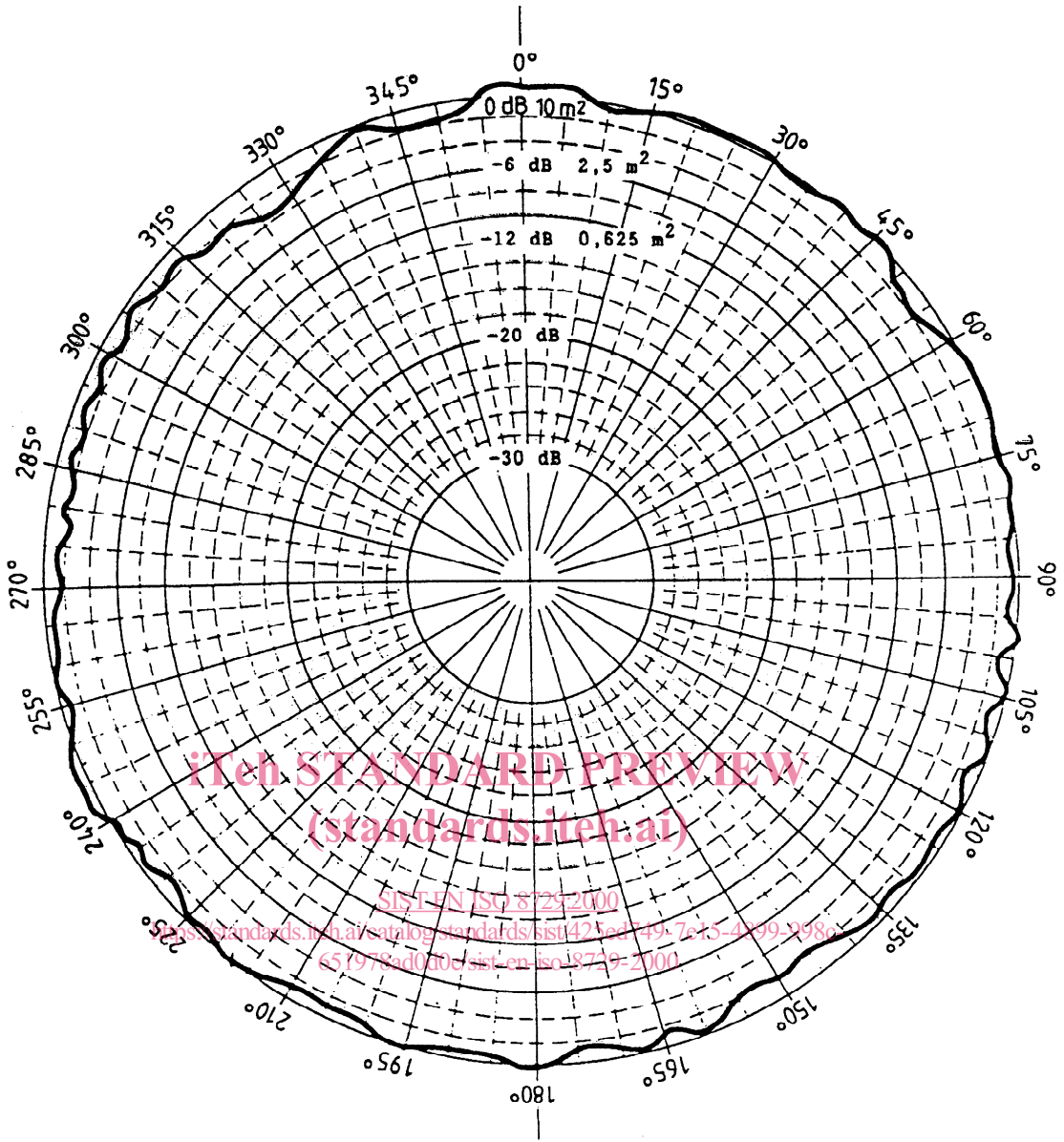


Figure 1 — Example diagram produced by a Luneberg reflector