

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 694

POSITIONING OF MAGNETIC COMPASSES IN SHIPS
(standards.iteh.ai)

[ISO/R 694:1968](https://standards.iteh.ai/catalog/standards/sist/2c1e8de7-1b8a-482a-9b74-03fccc10c0e8/iso-r-694-1968)

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1st EDITION

March 1968

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Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 694, *Positioning of magnetic compasses in ships*, was drawn up by Technical Committee ISO/TC 8, *Shipbuilding details*, the Secretariat of which is held by the Netherlands Normalisatie-instituut (NNI).

Work on this question by the Technical Committee began in 1958 and led, in 1965, to the adoption of a Draft ISO Recommendation.

In October 1965, this Draft ISO Recommendation (No. 858) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Argentina	Finland	Sweden
Australia	India	U.A.R.
Austria	Ireland	United Kingdom
Belgium	Israel	U.S.S.R.
Brazil	Netherlands	Yugoslavia
Canada	New Zealand	
Czechoslovakia	Spain	

Four Member Bodies opposed the approval of the Draft <https://standards.iteh.ai/catalog/standards/sist/2c1e8de7-1b8a-482a-9b74-03fccc40eae9/iso-r-694-1968>

France
Germany
Italy
Japan

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in March 1968, to accept it as an ISO RECOMMENDATION.

POSITIONING OF MAGNETIC COMPASSES IN SHIPS

INTRODUCTION

In order to obtain satisfactory and durable compensation of compasses, this ISO Recommendation should be taken into consideration during the design stage of a ship.

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1. GENERAL

1.1 Scope

This ISO Recommendation deals with the installation in ships of magnetic compasses and binnacles complying with the requirements of the following ISO Recommendations :

- <https://standards.iteh.ai/catalog/standards/sist/2c1e8de7-1b8a-482a-9b74-025e00000000/iso-r-694-1968>
- ISO/R 449, *Magnetic compasses and binnacles, Class A, for use in sea navigation;*
 - ISO/R 613, *Magnetic compasses, binnacles and azimuth reading devices, Class B, General requirements.*

In addition, it covers magnetic elements used in navigational aids.

It should be noted that this ISO Recommendation is established only for general purposes. It is not necessarily applicable to all sea-going ships.

1.2 Compass positions

The specifications governing the minimum distance of a compass from magnetic material take into consideration the accuracy required of that compass for normal navigation.

1.3 Safe distances

Safe distances from the compass are prescribed for magnetic and electrical equipment and inductive circuits. They are defined as the minimum distances considered necessary for any of these items in order to eliminate or greatly reduce interference with the performance of the compass.

1.4 Accuracy of magnetic compasses

The reliability and accuracy of magnetic compasses are dependent to a great extent upon their position in the ship and upon the proximity of magnetic and electrical equipment in relation to that position. Varying degrees of reliability and accuracy are, however, permitted, dependent on the function the compass is intended to perform and the overall length of the ship in which it may be installed.

2. FUNCTIONS OF MAGNETIC COMPASSES

Magnetic compasses are classified according to the functions they are intended to perform in ships. In the following description of the functions of the standard magnetic compass no account has been taken of the possible fitting of one or more gyro-compasses in the ship. The fitting of a gyro-compass should not be taken as a reason for reducing in any way the accuracy to be expected from the ship's standard magnetic compass, which is the primary means of navigating the ship.

The main functions of magnetic compasses in ships are defined as follows :

2.1 Standard compass

Magnetic compass which provides the primary means of navigating a ship.

If there is only one magnetic compass, it is the standard compass.

Such a compass, or a repeater from it, should be sited in the vicinity of the position from which the ship is ordinarily navigated and the view of the horizon from this position should be as uninterrupted as possible, for the purpose of taking bearings. In the sector from right ahead to 115° on either side, the view of the horizon may be interrupted only by masts, derrick posts, cranes and similar obstructions.

2.2 Steering compass

Magnetic compass which provides the primary means by which the ship is steered. If the standard compass sited on the wheelhouse top is of the projector or reflector type, it may also act as the steering compass.

2.3 Stand-by steering and emergency compasses (if fitted)

Magnetic compasses which provide the secondary means by which the ship is steered.

An example of a stand-by steering compass is envisaged, such as a steering compass fitted in a ship's wheelhouse wherein the reflected or projected image of the standard compass is already available, and principally used for steering.

An emergency compass is one fitted for the purpose of conning or steering the ship after damage or breakdown of all other means of doing so.

2.4 Magnetic elements

Used in navigational aids, they are not used for one of the purposes defined in clauses 2.1, 2.2 and 2.3.

3. MINIMUM DISTANCE REQUIREMENTS CONCERNING THE SHIP'S STRUCTURE

- 3.1 *The standard compass* should be so positioned that it complies with the minimum distance requirements for magnetic material which may be regarded as part of the ship's structure, as indicated in the diagram. Any magnetic material in the vicinity of the compass but outside of the minimum distances (see diagram) should be disposed symmetrically relative to the compass.

NOTE. — It is emphasized that these distances are minimum permissible distances and should prove satisfactory in the majority of ships. Special cases will, however, arise, where the masses of iron in the vicinity of the compass are such that the compass does not work satisfactorily and in these cases the distances should of necessity be increased.

- 3.2 For the *steering compasses*, the distance in the diagram may be reduced to 65 % and for *stand-by steering compasses* and *magnetic elements* referred to in clause 2.4 to 50 % of those required for the standard compass, provided that no distance is less than 1.0 m.

For emergency compasses (if fitted), the minimum distance is 1.0 m.

- 3.2.1 For steering compasses, the distance from the deck below the compass may be reduced to 1.0 m provided the distance from the extremities of the iron decks, bulkheads and girders is not less than 65 % of the distances shown in the diagram for the standard compass.
- 3.3 Items which are permanently fixed to the ship's structure should be treated as part of the latter.
- 3.4 By "funnel" is understood that part of the funnel up-take or exhaust pipe which is liable to heating. The funnel casing may be regarded as fixed magnetic material.
- 3.5 Moveable magnetic parts in the vicinity of the steering compass, e.g. the steering gear, should not influence the indication of such a compass.
- 3.6 The steering compass should not be placed in a wheelhouse completely constructed of magnetic material. If the wheelhouse is partly constructed of magnetic material, the magnetic parts should be disposed symmetrically relative to the compass.

4. SAFE DISTANCE REQUIREMENTS FOR MAGNETIC AND ELECTRICAL EQUIPMENT AND ELECTRIC CABLES

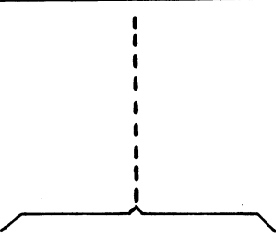
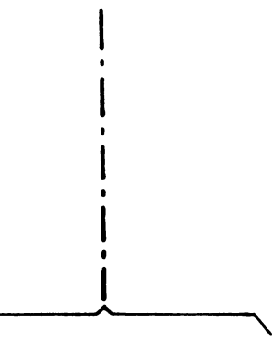
- 4.1 Magnetic and electrical equipment and cables carrying direct current close to a magnetic compass may produce a deviation in that compass.

In order that the removal or replacement of any item of equipment will not introduce any unacceptable deviation, such an item should not be placed closer to the compass than its safe distance.

- 4.1.1 The safe distance for any item, which is defined as the distance measured from the centre of the compass to the nearest point of the item concerned, should be determined by one of the methods defined in the Annex.
- 4.1.2 The safe distances so determined apply to the standard compass. For other compasses, these distances may be reduced as detailed below.

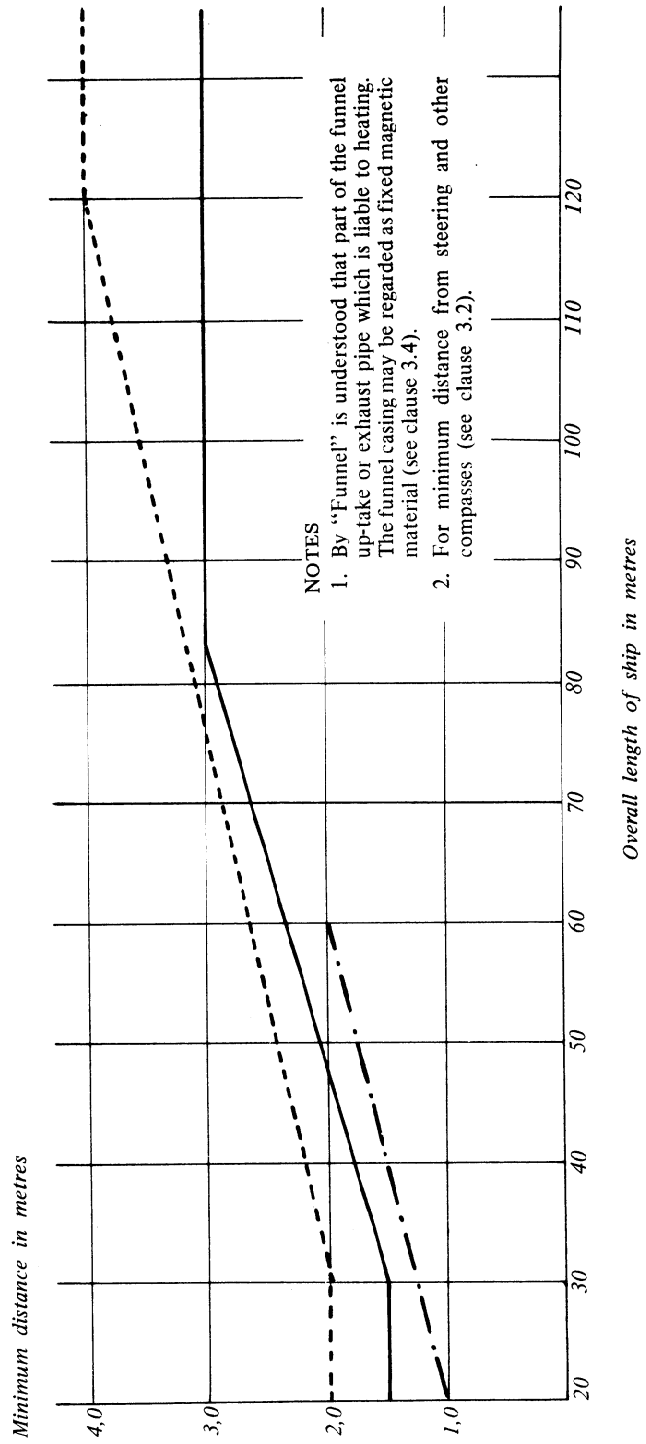
- 4.1.3 For the steering compass of ships of more than 60 m overall length and for the standard compasses of ships designed for restricted service of less than 60 m overall length, these distances may be reduced to 75 % of the safe distances specified.
- 4.1.4 For stand-by steering compasses, for steering compasses of ships of less than 60 m overall length and for magnetic elements referred to in clause 2.4, these distances may be reduced to 50 % of the safe distances specified.
- 4.2 Manufacturers of magnetic and electrical equipment should arrange for the safe distances of such equipment likely to be placed in the vicinity of the magnetic compass to be determined by laboratory test, by the methods described in the Annex. The manufacturer should declare the compass safe distance for each item of equipment.
- 4.2.1 Items for which the safe distance is not known should not be placed nearer to the standard compass or the steering compass than 7 m. This distance may however be reduced to 5 m for standard compasses in ships of less than 60 m overall length.
- For stand-by steering compasses, for steering compasses of ships of less than 60 m overall length, and for magnetic elements referred to in clause 2.4, these distances may be reduced to 3.5 m.
- 4.3 When determining the safe distance of *large items of equipment* such as radar sets, it is sometimes permissible to make a distinction between those items which are readily interchangeable and those which consist of large masses, the exchange of which would entail a considerable amount of work. In such cases, the safe distance of any item which is readily interchangeable is determined in accordance with clause 4.1.1 so that it may be removed or exchanged without appreciably affecting the compass. The remainder of the equipment, comprising the "large masses", is treated as part of the ship's structure (see clause 3.3) and if it is removed or exchanged, the compass affected should be re-adjusted.
- 4.4 *Electric wiring* carrying direct current, other than coils used for compass correction, within 5 m of magnetic compasses, should be arranged non-inductively. Clips and conduits in the vicinity of magnetic compasses should be of non-magnetic material.
- 4.5 Magnetic compasses should not be placed nearer than 2 m to one another or to the magnetic elements referred to in clause 2.4. In ships of less than 60 m overall length, the distance between magnetic compasses may be reduced to 1.8 m, and the distance between a magnetic compass and these magnetic elements to 1.5 m.

STANDARD COMPASSES

Ships in which a class "A" compass is prescribed	Ships in which a class "A" compass is prescribed	Fishing vessels and ships designed for restricted service of less than 60 m overall length
<p>Uninterrupted fixed magnetic material</p> <p>End parts of fixed magnetic material such as top edges of walls, partitions and bulkheads, extremities of frames, girders, stanchions, beams, pillars and similar steel parts.</p> <p>Magnetic material subject to movement at sea such as davits, ventilators, steel doors, etc. Large masses of magnetic material with variable fields such as funnels.</p>		

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<https://standards.iteh.ai/standard/ISO/694-1968/11888-482a-9674>



ANNEX

DETERMINATION OF SAFE DISTANCES

The safe distance for any item of equipment should be determined by one of the two alternative methods described below. Each item should be tested in the position and attitude relative to the compass or magnetometer at which the error produced at the compass would be a maximum, provided the item can be fitted in this way.

METHOD A : TESTING IN THE EARTH'S LOCAL MAGNETIC FIELD

The safe distance for any item is defined as the distance, measured between the nearest point of the item and the centre of the compass or magnetometer at which it will not produce a deviation in the standard compass or more than $\frac{0.045^\circ}{H}$, where H is the horizontal magnetic field strength in oersted.*

Each item should be tested

- (a) in the magnetic condition in which it is received;
- (b) after magnetization in a d.c. field of $1.5 \cdot \frac{10^3}{4\pi}$ A/m with a superimposed stabilizing a.c. field of $18 \cdot \frac{10^3}{4\pi}$ A/m r.m.s. at 50 Hz.* (If damage to the equipment under test might result, the stabilizing field should be omitted). The direction of the field is that in which, as estimated by inspection or from drawings, the resultant magnetization will be greatest (e.g. the long axis of a ferromagnetic box);
- (c) in the energized condition, if the item is capable of being energized electrically.

The greatest distance obtained from all these tests is the safe distance.

<https://standards.iteh.ai/catalog/standards/sist/2c1e8de7-1b8a-482a-9b74->

METHOD B : TESTING IN A REDUCED MAGNETIC FIELD

The safe distance for any item is defined as the distance, measured between the nearest point of the item and the centre of the compass, at which it will not produce deviation in the standard compass of more than 0.5° , when tested in a horizontal magnetic field strength of $0.06 \cdot \frac{10^3}{4\pi}$ A/m.*

Each item should be tested

- (a) in the magnetic condition in which it is received;
- (b) in the energized condition, if the item is capable of being energized electrically.

The greatest distance obtained from these tests is the safe distance.

* The ampere per metre is the unit of magnetic field strength in the International System (SI) and corresponds to $4\pi \cdot 10^{-3}$ oersted.