



NSCV PART C SUB-SECTION 7C – NAVIGATION EQUIPMENT – Compass adjustment for vessels operating in Restricted Offshore Operations (C), Partially Smooth Water Operations (D) and Smooth Water Operations (E)

This document describes a solution that the National Regulator considers will achieve the outcome required by the applicable standard, within the limits of the service category of the vessel on which the solution is implemented. It is not the only solution that may achieve the required outcome.

NOTE: *This GES was originally endorsed by Peer Advisory Network on 16 November 2010 & 19 April 2011 and was published by the NMSC as GES 2010-05 and GES 2011-01. It was further supported by a streamlining technical working group which convened on the Gold Coast in 2014.*

Application

This equivalent solution is available for the adjustment of compasses for all vessels operating in Areas E and D and for <24m class 2, 3 or 4 vessels in operational area C.

Current Requirement

Clause A.4 of Part C Sub-Section 7C states that:

“The compass or compasses of a vessel shall be adjusted by a person licensed in accordance with Marine Orders Part 21 or appointed by a State Marine Authority for the purpose of adjusting compasses. The compass or compasses shall be adjusted at intervals not exceeding four years or at a lesser interval where any of the conditions listed are met:

- a) the vessel has undergone repairs or alterations which may affect the accuracy of the compass or compasses.*
- b) the vessel has not previously operated from any port or place in Australia.*
- c) the compass or compasses of the vessel are unsatisfactory or unreliable.*

Equivalent Solution and Guidance

Currently any *Non-SOLAS* DCV operating in C, D or E waters is required to have its magnetic compass examined and adjusted by an approved compass adjuster at **maximum** three yearly intervals (*USL Code*) or **maximum** four yearly intervals if operating under the *NSCV*. This requirement is amended by this instruction.

Masters, owners or operators of vessels operating in C, D or E waters are able to conduct an annual compass swing to verify the accuracy (deviation) of a vessel's fitted magnetic compass or compasses. The results of the compass swings are to be recorded in the vessel log and an up to date compass deviation card is to be kept next to the fitted compass as per current requirements. Both of these records are to be made available on request by an attested / accredited marine surveyor or a Marine Safety Inspector (MSI), and at each scheduled periodic survey. If the deviation is equal to or greater than five (5) degrees, the compass shall be adjusted by a person licensed in accordance with Marine Orders Part 21 or appointed by a State Marine Authority for the purpose of adjusting compasses.

For all vessels in operational area D and for <24m class 2, 3 or 4 vessels in operational area C Clause A.4 may be modified as follows:

Prior to first entering into service, the compass or compasses of a vessel shall be adjusted by a person licensed in accordance with Marine Orders Part 21 or appointed by a State Marine Authority for the purpose of adjusting compasses. The compass or compasses shall also be adjusted if any of the conditions listed are met:

- a) the vessel has undergone repairs or alterations which may affect the accuracy of the compass or compasses.
- b) the vessel has not previously operated from any port or place in Australia.
- c) the compass or compasses of the vessel are unsatisfactory or unreliable.

For all vessels in Operational Area E the accuracy of the compass is not deemed critical to safety and AMSA considers that there is a minor risk associated with allowing masters, owners or operators of Class E vessels the flexibility to conduct and record annual Self-assessed compass swings, and produce a deviation card which must be co-located with the compass.

Additional information to assist with the application of this equivalent solution

Magnetic Variation

Magnetic variation is an error on the compass which is induced by the earth's magnetic field not being aligned with the true north (axis of earth's rotation). It is the angle or difference between magnetic north and true north. It occurs because the earth's magnetic poles are well removed from the true poles and because the lines of magnetic force are irregular. It varies from place to place, even on an individual chart, and information about it will be shown on coastal charts in the compass rose or on ocean charts by the isogon lines (lines joining points of equal magnetic variation).

Magnetic variation may be east (compass card rotated clockwise) or west (compass card rotated anti-clockwise) and may change from year to year. The change to be applied may be calculated from information also supplied in the compass rose or on isogon lines. Magnetic variation for the current year will need to be calculated, as shown in the following example:

Mag Var. (2001)	9°43' E
12 years at 2.5' (increasing)	30' +
Mag Var (2014)	10°13' E (10°E) Nearest 1/2°

Note: Magnetic variation in Queensland varies from about 5° E in the Torres Strait to about 12° East Point Danger.

Magnetic Deviation

Magnetic deviation is an error on the compass caused by the ships magnetic field which is impacted or altered by the effects of vessels fitted electrical equipment and ferrous metals. It is the angle or difference between magnetic north and compass north. It may vary dramatically at different positions around the vessel depending on the compasses proximity to magnetic influences. Magnetic Deviation will normally vary depending on the vessels heading (the orientation of the vessel to the earth's magnetic field). For fixed position compasses such as the steering compass, a deviation table showing the amount of magnetic deviation for each ships heading will be needed and must be available next to the compass. This is drawn up as a compass adjuster's declaration by a licensed compass adjuster. It should be regularly checked and recalculated every three years or whenever significant changes to the vessel or its equipment are made.

Total Error

The combination of magnetic variation and magnetic deviation is known as compass error (CE) or total error (TE).

Compass Checks

Establishing a true bearing, against which the compass can be compared, can assist a mariner to check the error on a compass. Probably the best true bearing available for this purpose is a transit between two features on a chart, but the bearing of a distant feature from a known position may also be used. A ready-made transit is a set of leads, but any fixed objects that line up on the chart may be selected. In some areas (Moreton Bay for example) a compass adjustment buoy has been set up to provide several transits with other features around the horizon.

Note: You should not attach your boat to the buoy.

Before swinging a vessel to check the deviation, the following precautions should be taken:

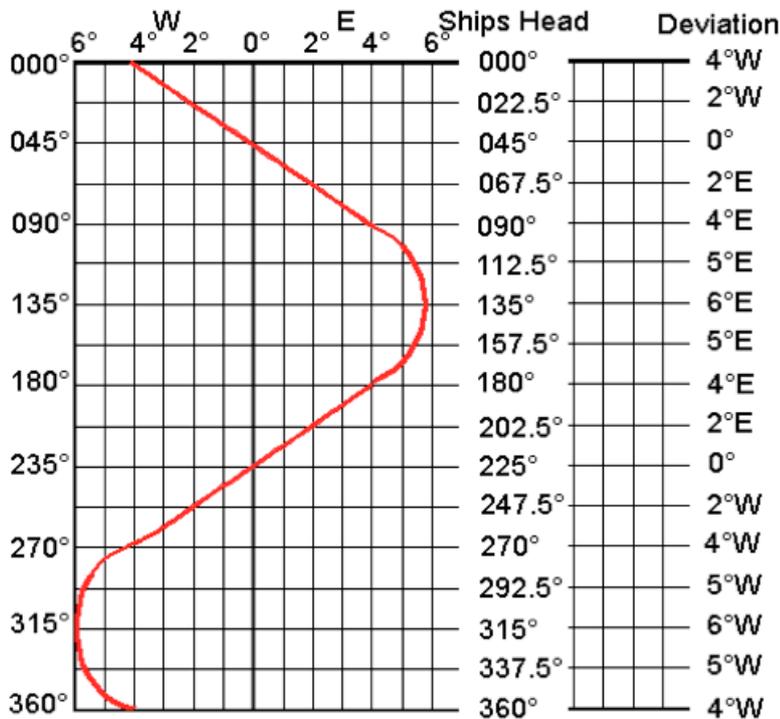
- Check that the compass card is sensitive. To do this, hold a screwdriver or a magnet near the compass to deflect the needle. Remove the screwdriver or magnet and the needle should return to its previous position. The lubber line will indicate the same course as it did previously. Should it not do so, the point of the pivot or the cap is worn. Steering the vessel around through 360° may also check this. If the lubber line does not move smoothly around the compass card, the pivot may be sticking.
- Check that the lubber line is in the fore-and-aft position. It must be parallel to the ships centreline (keel).
- Check that the compass card does not deflect when its light is turned on. (electrical wiring near the compass should be twisted twin wire)

The steps involved in checking a compass for deviation may include:

1. Determine the true bearing of the transit or distant bearing off the chart.
2. Apply variation, which is given for each location, converting the true reading into a magnetic bearing.
3. Take the bearing of the transit (or distant feature) using the vessels compass.
4. Find the difference between this compass reading and the calculated magnetic reading of the transit. This is the compass deviation for the vessels heading at the time.
5. If the compass reads low, label the error east and if the compass reads high label the error west. This process may be conducted while the vessel is at anchor and swung through 360° while staying on the line of transit or distant bearing. It may also be conducted by slowly steering the vessel across the line of transit on the range of headings, taking a bearing each time the features come in line.

Sample Deviation Card

A deviation curve may then be constructed on graph paper from the derived deviation table allowing all easterly deviations to the right of a centre line and all westerly deviations to the left.



When out of sight of land, the compass can be checked against the true bearings of the sun that can be readily calculated, particularly at sunrise and sunset.

Derived Card			
Vessel's head by compass	Hamilton Reach Brisbane River Upstream leads		Deviation
	Compass Bearing	Magnetic Bearing	
North	280°	278°	2° West
North East	282°	278°	4° West
East	281°	278°	3° West
South East	279°	278°	1° West
South	276°	278°	2° East
South West	274°	278°	4° East
West	275°	278°	3° East
North West	278°	278°	Nil

Compass/True Conversions

Whether moving from chart (true) to compass, or compass to chart (true), conversions are to be reviewed to allow for the compass errors and ensure the chart work matches reality.

Note: "unsatisfactory or unreliable" means the compass(s) have a deviation that is equal to or greater than five (5) degrees.