



Australian Government

MARB052 Apply knowledge of the principles of magnetic compass adjusting

Release: 2

MARB052 Apply knowledge of the principles of magnetic compass adjusting

Modification History

Release 2. This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application.

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Application

This unit involves the skills and knowledge required to apply knowledge of the principles of magnetic compass adjusting.

This unit includes explaining principles, of magnets, magnetism and magnetic fields, terrestrial magnetism, ship's magnetism and principles of magnetic compass design and construction.

This unit applies to people working in the maritime industry in the capacity of Compass Adjuster for vessels up to or equal to 45 metres in length.

Work is performed under limited supervision and applies to those responsible for adjusting a magnetic compass in the work environment and who are responsible for their own work.

Licensing/Regulatory Information

This unit is one of the requirements to obtain certification as a Compass Adjuster as defined in Marine Order 27.

To undertake this unit of competency a person must hold at least a:

- certificate of competency that permits a person to command a vessel up to 24 metres (Masters up to 24 m Near Coastal (NC)) or an equivalent certificate as a Master recognised by Australian Maritime Safety Authority (AMSA), or
- a current compass adjuster licence issued by a state or territory or AMSA for those vessels.

Training providers seeking to offer this unit of competency must gain AMSA approval before the unit is offered.

Seafarers seeking certification should check with AMSA.

Pre-requisite Unit

Not applicable.

Competency Field

B - Equipment Checking and Maintenance

Unit Sector

Maritime Sector

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Explain principles of magnets, magnetism and magnetic fields

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 Laws of magnetism are explained

1.2 Properties of magnets are described

1.3 Principles of magnetic fields, magnetism and magnets are explained

1.4 Effects of magnets on a magnetic compass needle under varying conditions are described

1.5 Disturbing and restoring forces and position of equilibrium is explained

1.6 Molecular theory of magnetism is explained

1.7 Magnetic effects of electrical currents are described

2 Explain terrestrial magnetism

2.1 Principles of terrestrial magnetism are described

2.2 Magnetic variation is defined, and explanation given as to why it varies depending on location on the earth, time of day and effects of the sun and moon

2.3 Method to determine magnetic variation at a location is described

2.4 Angle of magnetic dip is described

2.5 The earth's total force (T), horizontal force (H) and vertical force (Z) are explained

- | | | |
|---|------------|---|
| | 2.6 | Local magnetic anomaly is described |
| | 2.7 | Terrestrial magnetism and varying strengths in different parts of the world and the effects on deviation are explained |
| 3 Explain ship's magnetism | 3.1 | Effects of the ship's permanent and induced magnetism is described |
| | 3.2 | Forces P, Q and R with the ship upright are described |
| | 3.3 | Induced magnetism in soft iron rods a, b, c, d, e, f, g, h and k are described |
| | 3.4 | Temporary permanent magnetism and its effects at sea are outlined |
| | 3.5 | Causes and effects of Gaussin error are described |
| | 3.6 | Effects of permanent and induced magnetism on directive force are explained |
| | 3.7 | Lambda (λ) and mu (μ) are explained |
| 4 Explain principles of magnetic compass design and construction | 4.1 | Size and relative position of magnetic compass needles are identified |
| | 4.2 | Location of soft iron correctors and permanent magnets with reference to each other and the compass needles are identified and the effect that each corrector has on the other correctors are described |
| | 4.3 | Relative position of lubber mark/line, card, pivot and gimbals axes are identified |
| | 4.4 | Types of correctors used in ships are described and their advantages and disadvantages are outlined |
| | 4.5 | Effects of placing compasses in close proximity to magnetic material, electrical devices and other disturbing influences are described |
| | 4.6 | Components of a magnetic compass are identified |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of

competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment. Non-essential conditions may be found in the MAR training Package Companion Volume Implementation Guide.

Unit Mapping Information

This is a new unit. No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet -
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>

Assessment Requirements for MARB052 Apply knowledge of the principles of magnetic compass adjusting

Modification History

Release 2. This is the second release of this unit of competency in the MAR Maritime Training Package.

- Minor statement changes in unit Application.

Release 1. This is the first release of this unit of competency in the MAR Maritime Training Package.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least one occasion and include:

- explaining methods, procedures, theories and materials needed to identify and adjust compass deviations in a magnetic compass
- explaining the meaning of terms ‘hard’ and ‘soft’ iron, magnetic induction and permeability
- identifying causes of magnetic compass deviation
- outlining the main components of a magnetic compass
- using reference materials, including accessing magnetic models to identify the earth’s forces total (T), horizontal (H), vertical (Z) and dip (inclination), variation (declination) and their annual rates of change and factors effecting temporary changes.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- applicable regulatory requirements, including:
 - International Convention for the Safety of Life at Sea (SOLAS)
 - Marine Orders including Marine Order 505
- calculations used in relation to flux density and magnetic field strength
- coefficient A deviations, including:
 - asymmetrical induced soft iron
 - errors in calculating the sun’s azimuth, observing time or taking bearings
 - physical misalignment of the magnetic compass, pelorus or gyro
- components of a magnetic compass, including:
 - differences between internally and externally gimballed
 - various fluids used as liquid
 - how the magnets are fitted to the card

- expansion arrangements
- internal corrector magnet arrangements on internally gimballed compasses
- definitions, including:
 - flux density (B)
 - intensity of magnetisation (J)
 - magnetic field strength (H)
 - magnetic flux
 - magnetic moment (M)
 - permeability (μ)
 - pole strength (m)
 - susceptibility (k)
- induced magnetism and its effects on the magnetic compass, including:
 - directive force at compass
 - induced fields
 - permanent vertical fields at the compass
 - quadrantal deviations
- information sources and reference materials, including:
 - Admiralty charts
 - calculators used for magnetic models, including:
 - the value of the magnetic field elements T, H, Z, variation and dip
- magnets and magnetic fields, including:
 - ferromagnetic materials
 - flinders bar
 - flux density
 - geomagnetic pole
 - hard iron
 - magnetic flux
 - magnetic moment
 - magneto motive force
 - material coercivity and remanence
 - north magnetic pole
 - quadrantal correctors
 - remanence of the material
 - soft iron
 - south magnetic pole
- magnetic compass binnacle accommodating correcting devices, including:
 - athwartships permanent magnets
 - fore and aft permanent magnets
 - quadrantal correctors

- vertical permanent magnets
- vertical soft iron corrector (Flinders Bar)
- permanent magnetism, including:
 - athwartships force (Q)
 - fore and aft force (P)
 - vertical force $\mathbb{R}$
- ship's magnetism, including:
 - induced magnetism:
 - soft iron rods
 - temporary permanent magnetism
- terrestrial magnetism, including:
 - aclinic line
 - agonic line
 - angle of magnetic dip (inclination)
 - horizontal component of the earth's field (H)
 - isoclinic lines
 - isodynamic line
 - isogonic line
 - magnetic latitude
 - magnetic medium
 - magnetic variation
 - north magnetic pole
 - solar storms
 - south magnetic pole
 - total flux density at the earth's surface (T)
 - true meridian
 - vertical component of the earth's field (Z)
- units of measurement including:
 - ampere per metre (A/m)
 - gamma
 - Gaussian (CGS)
 - MKSA system of units
 - nano-teslas
 - oersted
 - teslas
 - weber.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training

Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Assessment must occur in workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

Resources for assessment must include access to:

- applicable documentation, such as legislation, regulations, codes of practice, workplace procedures and operational manuals
- compass adjusting tools, equipment and materials currently used in industry.

Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=772efb7b-4cce-47fe-9bbd-ee3b1d1eb4c2>