NAVSEA
STANDARD ITEM

FY-05

ITEM NO: 009-18
DATE: 30 AUG 2002
CATEGORY: I

1. SCOPE:

1.1 Title: Magnetic Material; control

2. REFERENCES:

2.1 None.

3. REQUIREMENTS:

3.1 Provide and implement a procedure for maintaining a maximum permeability factor of 2.0 on board mine warfare ships and craft for material and equipment installed, repaired, or relocated during the accomplishment of work required by the Job Order. The procedure shall have been reviewed and accepted by the SUPERVISOR prior to the implementation.

3.1.1 The procedure requires a one-time submittal/acceptance unless Standard Items and/or references change or are updated.

3.1.2 Describe a receipt inspection system to verify Government, contractor, and subcontractor furnished material is in compliance with the permeability limits.

3.1.3 Describe controls used in fabrication work to ensure compliance with the permeability limits after fabrication.

3.1.4 Describe the method used to determine magnetic content of materials removed from or brought on board the ship or craft including monitoring station locations.

3.1.5 Identify type of instrumentation, conforming to Method 3 of ASTM A342, used to measure the magnetic permeability of material.

3.1.6 Describe the record and reporting system utilized to list material required, but determined to have exceeded the permeability factor 2.0 after fabrication and the maximum dimension of the part exceeds two inches or the maximum dimension of all parts having a similar function in a 30 foot section of the ship exceeds 60 inches. This list shall include material and equipment removed, repaired, installed, or relocated. The record and reporting system shall contain description, magnetic dimensions, approximate weight,

location installed on board ship or craft, and a record verifying that the item is contained in the current "Location of Magnetic Material Book" or a record of waiver granted for installation.

3.2 Submit a request for deviation to the SUPERVISOR for items not having a ship specific waiver and not contained in the current "Location of Magnetic Material Book" prior to installation of any new or existing material and/or equipment required but determined to exceed the permeability limit described in 3.1.6.

3.2.1 Submit one legible copy, in hard copy or electronic media, of a report furnishing documentation provided by supplier, as required by 3.1.6.

4. NOTES:

4.1 The magnetic field of mine warfare ships and craft consists of the superposition of the magnetic field from four basic sources: ferrous field, eddy current field, ship service stray field, and minesweep generator stray field. The stray field sources are the electric currents in cables and wiring associated with the operation of the equipment of the ship or craft. The ferrous field and eddy current field sources are as follows:

4.1.1 Ferrous Field Source: The ferrous field sources are the items on or part of the ship or craft which use a material in their construction that exhibits a relative magnetic permeability different than 1.0, the relative magnetic permeability of air. Each ferrous field source acts like a bar magnet whose magnetic field depends upon the material's relative magnetic permeability, volume (not mass), and shape of the earth's magnetic field. At a point or location external to a ferrous field source, the magnetic field of this source is essentially the same whether the source is hollow (such as a block or pedestal). A material whose relative magnetic permeability is 2.0 or less is arbitrarily defined to be nonmagnetic when used in conjunction with mine warfare ships and craft; otherwise, the material is said to be magnetic. Whether the material of an item is classified magnetic or nonmagnetic, according to the above arbitrary definition, a change in relative magnetic permeability of the material will, in general, result in a change in the magnetic field associated with this item.

4.1.2 Eddy Current Field Source: The eddy current field sources are the items on or part of the ship or craft which use a material in their construction that exhibits an electrical conductivity. A material whose electrical conductivity is less than 10.0 percent of the electrical conductivity of copper (1.7241 x 10-6 ohm-cm at 20 degrees Centigrade) is arbitrarily defined to be nonconductive when used in conjunction with mine warfare ships and craft; otherwise, the material is said to be electrically conductive. Each eddy current field source acts like a generator when it oscillates in the earth's magnetic field due to the rolling and pitching of the ship or craft. The current in this source, resulting from the generator action, has associated with it a magnetic field - an eddy current field. The magnitude of this field is dependent upon the conductivity of the material,

the size of the electrical path in the material, the cross-sectional area of the electrical path, and the orientation of the source with respect to the earth's magnetic field due to the rolling and pitching of the ship or craft.

4.1.3 If an item is both highly magnetic and electrically conductive, such as mild steel or steel, the ferrous field will mask out the eddy current field. If an electrically conductive item is located inside a highly magnetic enclosure, such as mild steel or steel, the enclosure will mask the magnetic effects of its contents and will appear as if it were a solid magnetic block.

4.2 The SUPERVISOR will provide written direction for accomplishment of one of the following prior to reinstallation of temporarily removed existing or new material/equipment as a result of the deviation request.

4.2.1 Authorization for deviation request.

4.2.2 Identification and authorization of an acceptable Contractor Furnished Material (CFM) substitute material or equipment.

4.2.3 Receipt of an acceptable Government Furnished Material (GFM) substitute material or equipment.

4.2.4 Technical direction and information for manufacturing of acceptable material or equipment.

4.2.5 Other direction as determined acceptable by the ship class planning yard or higher authority.