NOTICE OF CHANGE

NOT MEASUREMENT SENSITIVE

MIL-STD-889B
NOTICE 3 (USAF)
17 May 1993

MILITARY STANDARD

DISSIMILAR METALS

TO ALL HOLDERS OF MIL-STD-889B:

1. THE FOLLOWING PAGES OF MIL-STD-889B HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
3	21 November 1979	–	REPRINTED WITHOUT CHANGE
4	17 May 1993	4	7 July 1976

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-889B will verify that page changes and additions indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the military standard is completely revised or cancelled.

Custodians:
Air Force - 11

Preparing activity:
Air Force - 11

Review activities:
Air Force - 13, 17, 99

AMSC: N/A

AREA: MFFP

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

5.1.2 Table II list metals in the order of their relative activity in sea water environment. The list begins with the more active (anodic) metal and procedes down to the least active (cathodic) metal of the galvanic series. A "galvanic series" applies to a particular electrolyte solution; hence for each specific solution which is expected to be encountered for actual use, a different order or series will ensue. Galvanic series relationships are useful as a guide for selecting metals to be joined, will help the selection of metals having minimal tendency to interact galvanically, or will indicate the need or degree of protection to be applied to lessen the expected potential interactions. Generally, the closer one metal is to another in the series, the more compatible they will be, i.e., the galvanic effects will be minimal; conversely, the farther one metal is from another, the greater will be the effect. In a galvanic couple, the metal higher in the series represents the anode, and will corrode preferentially in the environment.

5.1.3 Metals widely separated in the galvanic series must be protected if they are to be joined. Appropriate measures should be taken to avoid contact. This can be accomplished by applying to the cathodic member a sacrificial metal coating having a potential similar to or near that of the anodic member; by sealing to insure that the faying surfaces are water-tight; by painting or coating all surfaces to increase the resistance of electrical circuit.

5.1.4 A small anodic area relative to the cathodic area should be avoided. The same metal or more noble (cathodic) metals should be utilized for small fasteners, and bolts. The larger is the relative anode area, the lower the galvanic current density on the anode, the lesser the attack. The galvanic corrosion effect may be considered as inverse to the anode-cathode area ratio.

5.1.5 Metals exposed to sea water environments shall be corrosion and stress-corrosion resistant or shall be processed to resist corrosion and stress-corrosion. Irrespective of the metals involved, all exposed edges should be sealed with a suitable sealant material conforming to MIL-S-8802. When non-compatible materials are joined, an interposing material compatible with each shall be used.

5.1.6 Materials other than true metals, i.e., non-metallic materials, which must be joined to metals, should be considered as metallic materials, unless there is supporting evidence to the contrary. If these materials are essentially free of corrosive agents (salts), free of

Table I. Guide to use of joined structural metals and alloys, and protective systems for service in sea water, marine atmosphere, and industrial atmosphere.

JOINED TO 2nd METAL OR METAL ALLOY

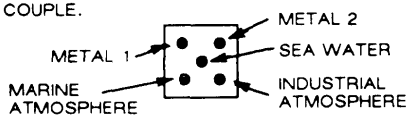
1st METAL OR METAL ALLOY

ACTIVE (ANODIC) — NOBLE (LESS ACTIVE-CATHODIC)

		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
A	MAGNESIUM	1 G	1 C / 2 C	1 C / 3 C	1 / 4	1 / 4	1 / 5	1 / 6	1 / 6	1 / 7	1 / 8	1 / 9	1 / 9	1 / 9	1 / 9	1 / 9	1 / 9	1 / 10	1 / 11	1 / 12	1 / 13	A
B	ZINC, ZINC COATING		2 G	2 C / 3 C	2 C / 4 C	2 C / 4 C	2 / 5	2 / 6	2 / 6	2 / 7	2 / 8	2 / 9	2 / 9	2 / 9	2 / 9	2 / 9	2 / 9	2 / 10	2 / 11	2 / 12	2 / 13	B
C	CADMIUM BERYLLIUM			3 G	3 C / 4 C	3 C / 4 C	3 / 5	3 / 6	3 / 6	3 / 7	3 / 8	3 / 9	3 / 9	3 / 9	3 / 9	3 / 9	3 / 9	3 / 10	3 / 11	3 / 12	3 / 13	C
D	ALUMINUM ALUMINUM-Mg, ALUMINUM-Zn				4 G	4 C / 4 C	4 / 5	4 / 6	4 / 6	4 / 7	4 / 8	4 / 9	4 / 9	4 / 9	4 / 9	4 / 9	4 / 9	4 / 10	4 / 11	4 / 12	4 / 13	D
E	ALUMINUM-COPPER					4 G	4 / 5	4 / 6	4 / 6	4 / 7	4 / 8	4 / 9	4 / 9	4 / 9	4 / 9	4 / 9	4 / 9	4 / 10	4 / 11	4 / 12	4 / 13	E
F	STEELS - CARBON, LOW ALLOY						5 G	5 / 6 C	5 / 6	5 / 7	5 / 8	5 / 9	5 / 9	5 / 9	5 / 9	5 / 9	5 C / 9 C	5 / 10	5 / 11	5 / 12	5 / 13	F
G	LEAD							6 G	6 C / 6 C	6 C / 7 C	6 C / 8 C	6 C / 9 C	6 C / 9 C	6 / 9	6 / 9 C	6 / 9 C	6 / 9 C	6 / 10 C	6 C / 11 C	6 / 12 C	6 / 13 C	G
H	TIN, TIN-LEAD, INDIUM								6 G	6 / 7	6 / 8 C	6 / 9 C	6 C / 9 C	6 C / 9 C	6 C / 9 C	6 C / 9 C	6 C / 9 C	6 C / 10 C	6 C / 11 C	6 / 12	6 / 13	H
I	ST. STEELS - MARTENSITIC, FERRITIC									7 G	7 / 8 C	7 / 9	7 / 9	7 / 9 C	7 / 9	7 / 9	7 / 9	7 / 10	7 / 11	7 / 12	7 / 13	I
J	CHROMIUM, MOLYBDENUM, TUNGSTEN										8 G	8 C / 9 C	8 C / 9 C	8 / 9 C	8 / 9	8 C / 9 C	8 C / 9 C	8 C / 10 C	8 C / 11 C	8 C / 12 C	8 C / 13 C	J
K	ST. STEELS-AUST., PH, SUPER STRENGTH, HEAT RESISTANT											9 G	9 / 9	9 / 9	9 / 9	9 C / 9 C	9 C / 9 C	9 C / 10 C	9 C / 11 C	9 C / 12 C	9 C / 13 C	K
L	BRASS-LEAD BRONZE												9 G	9 C / 9 C	9 C / 9 C	9 / 9 C	9 C / 9 C	9 / 10 C	9 C / 11 C	9 C / 12 C	9 C / 13 C	L
M	BRASS-LOW COPPER BRONZE-LOW COPPER													9 G	9 C / 9 C	9 C / 9 C	9 C / 9 C	9 / 10 C	9 C / 11 C	9 / 12 C	9 / 13 C	M
N	BRASS-HIGH COPPER BRONZE-HIGH COPPER														9 G	9 / 9 C	9 C / 9 C	9 / 10 C	9 C / 11 C	9 / 12 C	9 / 13 C	N
O	COPPER-HIGH NICKEL MONEL															9 G	9 C / 9 C	9 C / 10 C	9 C / 11 C	9 C / 12 C	9 C / 13 C	O
P	NICKEL COBALT																9 G	9 C / 10 C	9 C / 11 C	9 C / 12 C	9 C / 13 C	P
Q	TITANIUM																	10 G	10 C / 11 C	10 C / 12 C	10 C / 13 C	Q
R	SILVER																		11 G	11 C / 12 C	11 C / 13 C	R
S	PALLADIUM RHODIUM GOLD PLATINUM																			12 G	12 C / 13 C	S
T	GRAPHITE																				13 G	T

ACTIVE (ANODIC) — NOBLE (LESS ACTIVE—CATHODIC)

INFORMATION ON THIS CHART IS PRESENTED FOR EQUAL EXPOSED AREAS OF EACH METAL COMPRISING THE COUPLE.



NUMERICAL NOTATIONS REFER TO SURFACE TREATING AND FINISHING SYSTEMS, LISTED IN APPENDIX A FOR EACH METAL GROUP, FOR AMELIORATING CORROSION OF JOINED METALS. THE SYSTEMS ARE ARRANGED IN APPENDIX A IN DECREASING ORDER OF EFFECTIVENESS. AN OPTIMUM SYSTEM IS PRESENTED IN EACH CASE, FOR USE WITH JOINED SIMILAR OR DIFFERENT METALS INTENDED FOR SERVICE IN SEVERE ENVIRONMENT. ALTERNATIVE SYSTEMS ARE GIVEN FOR USE IN SERVICE SITUATIONS THAT PRECLUDE THE MAXIMUM PROTECTIVE SYSTEM, OR FOR MILDER ENVIRONMENT SERVICE APPLICATIONS.

LETTER NOTATIONS, 'C OR I', SIGNIFY COMPATIBILITY OR INCOMPATIBILITY OF JOINED METALS IN THE SPECIFIC ENVIRONMENT. OCCASIONALLY, 'C OR I', IS NOT CLEARLY RESOLVABLE AND IN SUCH BORDERLINE CASES, 'I' IS INDICATED. FURTHER, 'C' INDICATES NEGLIGIBLE GALVANIC INTERACTION BETWEEN BARE, DISSIMILAR METALS WHEN JOINED AND SUBJECTED TO THE SPECIFIC ENVIRONMENT; AND 'I' SIGNIFIES SIGNIFICANT GALVANIC CORROSION OF BARE, DISSIMILAR METALS WHEN JOINED AND SUBJECTED TO THE SPECIFIC ENVIRONMENT.

G: SIGNIFIES COMPATIBILITY OF SAME-METAL COUPLE, BARE, IN SEA WATER, MARINE ATMOSPHERE, OR INDUSTRIAL ATMOSPHERE.