MILITARY SPECIFICATION

MOTORS, 60-HERTZ, ALTERNATING CURRENT, INTEGRAL-HORSEPOWER, SHIPBOARD USE

This amendment forms a part of Military Specification MIL-M-17060E(SH) , dated 20 May 1977.

PAGE 1

2.1, under “SPECIFICATIONS, FEDERAL”, delete reference to “QQ-I-666”; add the following:

"FF-B-171 - Bearings, Ball, Annular (General Purpose).
QQ-A-601 - Aluminum Alloy Sand “Castings.”

PAGE 2

2.1, under "SPECIFICATIONS, MILITARY”, delete reference to MIL-P-15137”: delete MIL-G-24508 - Grease, High performance, Ball and Roller Bearing" and substitute “DOD-G-24508 - Grease, High performance, Multi-Purpose (METRIC)”.

2.2, "INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)” add:

IEEE STD 112 - Test Procedures for Polyphase Induction Motors and Generators."

PAGE 3

2.2. under “AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)”, add

“ASTM A 47 - Malleable Iron Castings."

PAGE 7

3.1.12.2: Delete and substitute:

“3.1.12.2 Locked-rotor current. The locked rotor current for 440V a.c. motors shall be in accordance with the values specifies in table IV. Single speed design B motors driving centrifugal auxiliaries with synchronous speeds of 1200 through 3600 r/rein with locked rotor and pull up torques equal to a minimum of 70 percent of full load torque may exceed the values specifies in table IV by no more than 5 percent. For other than 440V a.c. motors, the current ratio shall be inversely proportional to the ratio of applicable voltages. Motors shall withstand locked rotor current for 20 seconds (see 3.4.10).”

TABLE IV: Delete and substitute:

"TABLE IV. Locked-roter current- amperes, maximum.

HP	Designs B, C, and D (see notes 1 and 2)	
	Dripproof protected	All other enclosures
1	15.7	17.3
1.5	20.9	23.0
2	26.1	28.7
3	33.4	36.7
5	48	52.8
7.5	6-6.4	73.0
10	84.7	93.2
15	121	133
20	152	167
25	191	210
30	227	250
40	303	333
50	379	417
60	455	500
75	567	624
100	758	834
125	949	1,044
150	1,135	1,249
200	1,516	1,668
250	1,909	2,100

Notes:
1. Design C - 3 hp through 200 hp only 1800, 1200, 900 r/rein.
2. Design D - Through 150 hp only, 1800, 1200, 900 r/min."

PAGE 14

3.1.22.2.4, line 3: Delete "MIL-G-24508" and substitute "DOD-G-24508".

PAGE 18

Add as paragraphs 3.1.34 through 3.1.34.5:

"3.1.34 Efficiency. Design B continuous duty motors shall meet the requirements of 3. 1.34.1 through 3. 1.34.5 when testes in accordance with 4.3.4.21.

"3.1 .34.1 Single speed design B motors driving centrifugal auxiliaries with synchronous speeds of 1200 through 3600 r/rein shall have a minimum full load efficiency as specifies in 3.1.34.1.1. These motors may exceed maximum weight specifies on figures 1 through 4 by up to 20 percent.

"3.1.34.1.1 Efficiency values shall be as follows:

Motor efficiency minimum.

	Efficiency (Percent)	
Motor HP	Dripproof enclosures	All other enclosures
200 & over	97	97
150	97	97
125	96	97
100	95	97
75	95	96
60	94	96
50	94	95
40	93	95
30	92	94

	Efficency (Percent)	
Motor HP	Dripproof enclosures	All other enclosures
25	92	94
20	92	93
15	91	93
10	90	92
7.5	90	91
5	89	89
3	88	88
2	87	87
1.5	86	86
1	86	86

3.1.34.2 All single speed design B motors rated 900 r/rein and less shall have efficiencies not less than 2 percent less than that specifies in 3.1.34.1.

3.1.34.3 All other single speed design B motors shall have efficiencies not less than 1 percent less than that specifies in 3.1.34.1.

“3. 1.34.4 All multispeed design B motors, for the highest speed only, shall have efficiencies not less than 3 percent less than that specifies in 3.1.34.1.

"3.1.34.5 If for special applications (see 3.1.9), motors are furnished in horsepower ratings other than those shown in 3.1.34.1, the efficiency shall be in accordance with the requirements for the next lower horsepower rating shown in 3. 1.34.1.”

PAGE 19

3.4 through 4 3.4.3: Delete:

PAGES 20 and 21

TABLE XIII: Delete and substitute new TABLE XIII.

'TABLE XIII. Minimum material requirements for service A motors.

Item	Limitations	Material	Specification or remarks
Motors	All sizes	Silicone	Materials containing silicone shall not be used except in brushless motors,
Ball bearings	All sizes	----------	General application FF-B-171 Noise quiet application MIL-B-17931.
Ball bearings caps	All sizes	Steen/ Malleable iron Nodular graphitic iron Aluminum	ASTM A 47 MIL-I-24137 Commercial treated for corrosion resistance
Brushes	All sizes		MIL-B-3743
End shields	All sizes	Steen/ Malleable iron Nodular graphitic iron	ASTM A 47 MIL-I-24137
Eyebolts, lifting	Where used	Steel	MIL-S-1222, grade 5, galvanize in accordance with ASTM A 153
Fans - external and internal	All sizes ------ --- ------ ---	Steen/ Aluminum Malleable iron Nodular graphitic iron	QQ-A-601 ASTM A 47 MIL-I-24137
Fans - external	External fan for totally encloses fan cooled motors	Plastic, molded thermosetting	MIL-M-14
Flanges - armature, rotor	Where uses	Steen/ Nodular graphitic iron	MIL-I-24137
Frames	All sizes --------- ---------	Steen/ Malleable iron Nodular graphitic iron	ASTM A 47 MIL-I-24137

See footnote at end of table.

TABLE XIII. Minimum material requirements for service A motors. Continued

Item	Limitations	Material	Specification or remarks
Grease cups and pipes Grease	All sizes Bearings total temperature Of 149°C and below	Steen/ Petroleum	Treated for corrosion DOD-G-24508
Hand-hole or access covers	All sizes	Transparent plastic	MIL-E-917
Insulation - ground and phase, lead and connection, collector ring, spacers and separators, washers, bushings, tubes, wedges and lead clamp.	Class B, F, H or N	All types and classes	MIL-E-917
Lead wire	Class B, F, H or N	All types and classes	MIL-E-917, except silicone rubber of MIL-W-16878, type FF of MIL-M-16878/8 may be substitutes for type FFW of MIL-M-16878/9 with prior acceptance by NAVSEA .
Oil, lubricating	Maximum oil sump temperature 82°C		MIL-L-17331 Navy symbol 2190TEP
Oil discs	All sizes	Steen/	- - --- -- - --- - -- - - ---
Part covers for totally enclosed type machines where the cover acts as a shield only, and not as a support for another part such as an auxiliary or brake.	All sizes ----------	Steen/ Malleable iron	- - --- - - - - -- -- -- - -- -- ASTM A 47
		Nodular graphitic iron	MIL-I-24137
Quills and spiders Scraper	Where uses All sizes	Steen/ Brass	-- --- - -- - - - -- - - -- Commercial

See footnote at end of table.

TABLE XIII. Minimum material requirements for service A motors. - Continued

Item	Limita-tions	Material	Specification or remarks
Shafts	Close-couples pumps	- - ---- - -- - --	Corrosion-resistsant material
	All other motors	Steel	Tensile strength not less than 75,00~ lb/in^2 and elonga-tion not less than 20 percent in 2 inches.
Sleeve bearings	All sizes	Bronze	QQ-C-390, alloy 910
		Babbit anti-friction metal	QQ-T-390, grade 2
Terminal boxes and terminal box covers	All sizes	Steen/	- -- -- - --- - -- - - - - -- -
		Malleable iron	ASTM A 47
		Nodular graph-itic iron	MIL-1-24137
Wire electric	All types	Copper	MIL-E-917
Varnish, insulating	All classes		MIL-I-24092
Wire, end turn banding	All sizes	Steel and non-magnetic alloy	MIL-W-30508
Wedges	All sizes	Steel	Commercial
		Brass	Commercial

1/ unless otherwise indicated steel parts may be fabricate, from cast or wrought material. Cast steel shall be in accordance with grade B of MIL-S-15083, as required.

Note : Alternate wire sizes - sizes other than those in MIL-E-917 may be uses provides the design is such as to permit rewinding with a size and shape specifies in MIL-E-917 and having an equivalent or higher temperature rating."

PAGE 22

3.5.l.6(e): Delete and substitute:

"(e) For 3600 r/rein motors, bearings shall not exceed size 312 for arive end, nor exceed size 311 for opposite (foot-ens)."

3.5. 106(f): Add:

"(f) Other types proposes for special application requirements shall be *reviewed* by the command or agency concerned."

PAGE 24

305.1.9, line 3: Delete "standara balance" and substitute ‘precision balance".

3.5.1.10: Ada at end of paragraph, “Mufflers shall not be uses”.

PAGE 25

TABLE XVII: Delete and substitute:

“TABLE XVII. Airborne noise limits (sound pressure levels in dB re 20µPa.

Hp	Enclosure type	Synchronous speed r/min	Octave band center frequency in Hz								
			31.5	63	125	250	500	1K	26	4K	8K
1 through 60	DPP	3600	85	80	75	72	69	66	65	65	65
75 through 250			85	80	79	79	83	75	77	71	71
1 through 250	DPP	1800 & below	85	80	75	72	69	66	65	65	65
1 through 10	All other		85	80	75	72	69	66	65	65	65
15 through 75	enclosures	3600	85	80	75	79	80	75	75	75	74
100 through 150			85	80	75	79	82	81	79	75	74
1 through 30	All other	1800	85	80	75	72	69	66	65	65	65
40 through 150	enclosures	and below	85	80	75	79	81	80	77	70	65

"

PAGE 27

3.5.4.9: Delete and substitute:

"3.5.4.9 Structureborne noise. Structureborne noise of motors, when tested as specifies in 4. 304.6.1 and 4.3.4.6.2, shall not exceed the limits specified in MIL-STD-740 as type 3 equipment. The following factors shall be considered by the contractor in the aesign as necessary, to meet the noise limitations.

(a) Precision machining of rolling, rubbing and fitted parts.
(b) Maximum effort shall be made in the production phase to minimize the amount of corrections requires during the final balancing phase.
(c) Provisions shall be made for in place balancing of rotating parts and access shall be provided for this in place balancing.
(a) Sharp cutoffs and turbulence shall be avoided in air cooling systems. Ventilation ducts and housings shall be damped, as necessary to prevent flow excited vibration.
(e) Most favorable combination of the following:
(1) Number of slots per pole pitch.
(2) Number of slots magnetically under one pole.
(3) Slot frequency as a function of the natural frequency of the magnetic frame.
(4) Skewing of stator slots.
(5) Skewing of rotor slots."

PAGE 34

TABLE XIX: Under "Description of test" column, add: 'Efficiency (may be conducted concurrent with load test)". Under 'Applicable test paragraph" column, "Periodic tests", add: "4.3.3.21".

PAGE 40

4.3.4.20: Delete and substitute:

"4.3.4.20 Sealed insulation system. Each stator including lead connections shall be subjected to and meet the requirements for short term test procedures of IEEE-STD-429 (ANSI C50-26) except that submergence shall be 24- hours and the minimum insulation resistance shall be 100 megohms. Insulation resistance reading shall be measured and recorded once per minute for the first ten minutes then once per hour for the first five hours with a final submerges reading at 24 hours. Insulation resistance shall be measured immediately after removal from submergence, and one hour after removal from submergence."

Add as paragraph 4.3.4.21:

"4.3.4.21 Efficiency. Motor efficiency shall be determined by IEEE-STD-112, method B for dynamometer, method C for duplicate machines with loss segregation identification, as required in method E for either method. Test record shall include both data with identification of stray losses in watts."

TABLE XX: Under "Description of test" column, add: 'Efficiency (may be conducted concurrent with load test)". Under "Applicable test paragraph" column, "Periodic tests", add: "4.3.3.21".

PAGE 41

5.1, line 1: Delete 'repair parts and tools".

PAGE 42

6.1.1, item "(p)": Delete.

PAGES 45 and 46

Add as paragraphs 6.5 and 6.5.1:

"6.5 Provisionin~. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specifies in the contract.

"6.5.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should be specified."

PAGES 61 and 62

Delete and substitute the attached figure 6:

PAGE 65

APPENDIX A: Paragraph 40.1.1: Delete and substitute:

"40.1.1 Place to test. Suitability tests shall be conducted at the contractors plant, at commercial laboratory or Government laboratory having necessary equipment and facility to conduct the tests specifies ‘herein. Surveillance and verification of test results to be provided by government inspector."

LAST PAGE

DD Form 1426, STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL: Delete address and substitute:

‘COMMANDER
NAVAL SEA SYSTEMS COMMAND (SEA 3112)
DEPARTMENT OF THE NAVY
WASHINGTON, DC 20362"

Preparing activity:
Navy - SH
(Project 6105-N125)