

MIL-C-18419B(SHIPS)
 AMENDMENT-2
 6 January 1965
 SUPERSEDING ¹
 Amendment-1
 14 April 1964

MILITARY SPECIFICATION
 COMPRESSORS, RECIPROCATING, MOTOR DRIVEN,
 NAVAL SHIPBOARD HIGH PRESSURE AIR SERVICE

This amendment forms a part of Military Specification MIL-C-18419B(SHIPS), 29 June 1962.

Pages 1 and 2, paragraph 2.1: Make the following changes:

Under "Specifications, Federal" add:

"FF-B-185 - Bearings, Roller, Cylindrical; and Bearings, Roller, Self-aligning."

Under "Standards, Military" add:

"MIL-STD-276 - Impregnation of Porous Nonferrous Metal Castings.

"MIL-STD-438 - Schedule of Piping, Valves, Fittings and Associated Piping Components for Submarine Service.

"MIL-STD-777 - Schedule of Piping, Valves, Fittings and Associated Piping Components for Surface Ships."

Under "Drawings, Bureau of Ships" delete "5000-S4800-3000" and add:

"810-1385941 - Fittings, Sil Brzg; WOG, 3000 psi for U/T Inspection.

"810-1385942 - Fittings, Bronze Sil Brzg., WOG, for U/T Inspection.

"810-1385943 - Unions, Sil Brzg., 3000 psi, WOG, IPS for U/T Inspection.

"810-1385944 - Fittings, Sil Brzg., OD, 3000 psi, WOG for U/T Inspection.

"810-1385945 - Bushings, Reducing, CU-NI Sil Brzg., WOG for U/T Inspection.

"810-1385946 - Unions, Bronze Sil Brzg., WOG for U/T Inspection.

"810-1385948 - Unions, Sil Brzg., OD 3000 psi, WOG for U/T Inspection.

"810-1385950 - Bosses, Non-Ferrous, Piping for U/T Inspection.

"810-1385951 - Bushings, Reducing, CU-NI Sil Brzg., IPS, 3000 psi, WOG for U/T Inspection.

"810-1385952 - Bushings, Reducing, CU-NI Sil Brzg., OD 3000 psi, WOG for U/T Inspection."

Under "Publications, Bureau of Ships" delete: "NAVSHIPS 250-637-2" and "NAVSHIPS 250-648-8" and add:

"NAVSHIPS 250-634-6 - Fabrication and Inspection of Brazed Piping Systems."

Page 2, paragraph 2.2: Under "Compressed Air and Gas Institute" in third line change "2nd edition" to "3rd edition".

¹ CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

FSC 4310

MIL-C-18419B(SHIPS)
AMENDMENT-2

Page 3, paragraphs 3.3 through 3.3.1.3: Delete and substitute:

"3.3 General design.-

"3.3.1 The principle of maximum reliability is paramount and no compromise of this principle shall be made with any other basic requirements of design. Where wear or corrosion is unavoidable, the parts subjected to such wear or corrosion shall be of the best material for the purpose in order to reduce those detrimental effects to a minimum. It is the intention of this specification to obtain air compressors of such design that they will have an operating life of at least 50,000 hours with no limitation on the number of starts and stops, and without major overhauls of less than 10,000 hours intervals. Replacement of easily replaceable wearing parts such as cylinder suction and discharge air valves should not be required at intervals of less than 1000 hours. Replacement of piston rings should not be required at intervals of less than 1000 hours for the high pressure stages and of not less than 2000 hours for the first and second stages.

"3.3.1.1 The designer should take cognizance of the conditions under which equipment will be maintained and repaired on shipboard, and of the fact that the personnel responsible for maintenance and repair may not be seasoned mechanics. For example, parts should be so designed that it is impossible to replace them in a wrong position; and adjacent studs should be of the same length, or of large difference in lengths, so that a mistake will not easily occur; serrated surfaces should not be used for accurate positioning unless specifically approved by the Bureau of Ships since areas should be avoided where strong wrenching would cause damage.

"3.3.1.2 In addition to the paramount concept of reliability, the design and construction of all compressors shall incorporate all the following requirements:

- (a) Accessibility for repair.
- (b) Satisfactory operation when inclined as follows:
 - (1) Up to 30 degrees in any direction (permanently inclined).
 - (2) With the ship rolling up to 60 degrees from the vertical to either side, taking 8 seconds for a complete cycle (with direction of crankshaft in fore and aft position).
 - (3) With the ship pitching 10 degrees up and down from the normal horizontal plane, taking 6 seconds for a complete cycle.
- (c) Quiet operation.
- (d) Minimum space and weight.

"3.3.1.3 To be in consonance with 3.3.1.2(d) the dry weight of compressors with 440 volt (v.) alternating current (a.c.) motors, less motor controllers, but including all other appurtenances, shall not exceed 4000 pounds. The corresponding weight with 230 v. direct current (d.c.) motors shall not exceed 5000 pounds.

"3.3.1.4 Reliability analysis.- In order to achieve the desired reliability the contractor shall submit an analysis of those factors effecting reliability, as highlighted in 3.3.1. The analysis shall be such that the composite reliability of the compressor, including essential appurtenances, can be predicted in terms of mean-time-between-failures (MTBF). MTBF is the time which equipment (parts, material) can be expected to operate satisfactorily before failure occurs.

"3.3.1.4.1 The reliability analysis shall include, but shall not be limited to the following:

- (a) List of those parts which experience and judgement show are subject to wear and service failures.
- (b) Specific design features employed to attain the required service life of the parts. Some suggested design features are: choice of materials, compatibility of materials, hardness, surface finishes, fits, clearances, and so forth. Include calculations when applicable.
- (c) Complete calculations of temperatures throughout the air path.
- (d) Choice and analysis of all bearings.
- (e) Inter and after cooler design data.
- (f) How failure of one part affects other parts.

"3.3.1.4.2 The reliability analysis shall include preventive maintenance and servicing requirements necessary to the achievement of the predicted MTBF. Any unusual steps or precautions necessary in carrying out maintenance and servicing requirements shall be pointed out.

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"3.3.1.5 The reliability analysis shall be submitted at the same time, or prior to, the submittal of class A and class D drawings for approval (see 3.7.7.2). Approval of the reliability analysis is a requisite for approval of new class A and class D drawings. In the case of class A drawings approved prior to the requirement for reliability analysis, such reliability analysis shall be submitted to the Bureau of Ships for approval prior to using the class A drawings on any contract or order involving a bidding invitation dated subsequent to the date of this specification amendment."

Page 4, paragraph 3.3.4(c), after "Relative humidity": Delete "50 percent" and substitute "0.0 percent (dry air)".

Page 4, paragraph 3.3.5.1: Delete and substitute:

"3.3.5.1 The design of all complete air compressor units shall be such that they are capable of passing the type A, high impact (H.I.) shock tests for grade A, class III, equipment in accordance with MIL-S-901. A shock test with the compressor solidly mounted is considered proof of class III capability (see 4.5.4). NAV-SHIPS 250-660-30 may be used as a guide for design of shock resistant Naval equipment."

Page 4, paragraph 3.3.6.2, last sentence: Delete and substitute:

"The compressor manufacturer will not be required to furnish any mounting members, motion limiting, or vibration buffering devices between the isolation mounts and the ship's structure."

Page 4, paragraph 3.3.7, first sentence: Delete and substitute:

"Gage board temperature indicating and alarm instrument, drain valves and all features of an operational nature shall be located on or operable from one side, designated as the operating side of the compressor, so as to be accessible if the compressor is installed adjacent to a bulkhead."

Page 5, paragraph 3.3.14.1, line 3: After "MIL-B-17931" insert "or FF-B-185".

Page 5, paragraph 3.3.15.3, line 3: Between "bearings," and "gears" insert "wrist pin bearings,".

Page 6, paragraph 3.3.16, third sentence: Delete and substitute:

"All top and bottom bearing surfaces shall be machine finished, except bottom of subbases designed for center-of-gravity sound-isolation support."

Page 6, paragraph 3.3.17, third sentence: Insert a period after "bearings" and delete the remainder of the sentence.

Page 6, paragraph 3.3.19.1.3, line 3: Delete "motor" and substitute "water".

Page 8, paragraph 3.3.20.5, first sentence: Insert a period after "minimum" and delete the remainder of the sentence.

Page 9, paragraph 3.3.25: Delete and substitute:

"3.3.25 Piping,-

"3.3.25.1 All piping and fittings shall conform to MIL-STD-438 or MIL-STD-777 except as modified herein. Where ultrasonic inspection requirements are invoked components to the following Bureau of Ships drawings shall be used: 810-1385941 to 810-1385946 inclusive, 810-1385948, 810-1385950 to 810-1385952 inclusive.

"3.3.25.2 Unions or flanges shall be used for compressor water connections to external shipboard piping systems. The unions and flanges shall be in accordance with MIL-F-1183 and MIL-F-20042 respectively. When space or weight savings can be effected, terminal connections to compressor component parts may have unions partially integrated with such parts, and may utilize the brazed or welded ring and male union nut type of construction with soft copper gaskets. Tapered pipe thread connections shall not be used except for fittings such as plugs for core holes, or the dead ends of cross-drilled passages, which are intended to keep openings