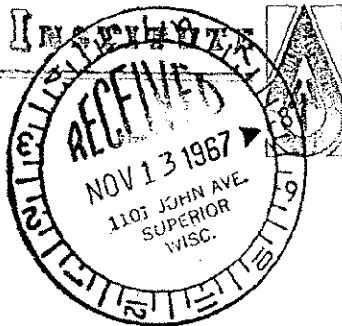


HYDRAULIC INSTITUTE



122 EAST 42nd STREET • NEW YORK, N. Y. 10017

November 9, 1967

To: All Members of the Hydraulic Institute and Non-Members
on the Navy Qualified Products List for Centrifugal Pumps

Subject: Manufacturers' Response to Request for
Suggested Revisions



Gentlemen:

On October 12, 1967, you were requested to submit any comments you might have in connection with the preparation of those revised paragraphs on which the pump manufacturers were asked to submit proposals at the June meeting in Washington. A number of comments were received. These were considered by a Special Sub-Committee meeting in New York on October 31. The results of that meeting are enclosed hereto.

When you read this material you may note that there are comments on other than those specified in the report of the June meeting. Such comments came about through the fact that the Navy had issued revisions to those editions which were considered at the June meeting in Washington, and the Sub-Committee felt that some of this material was not satisfactory as published.

A meeting has been arranged, as you know, with NAVSEC in Washington on November 14. The enclosed material will be submitted for discussion at that time. Please review the material carefully so that a productive discussion can be held on November 14.

Very truly yours,

Frank P. Anderson
Secretary

FPA:eu
Enclosure

These have been recommended by the Navy for consideration. The Navy has made some changes in the material. The material is being reviewed by the Navy. The material is being reviewed by the Navy. The material is being reviewed by the Navy.

Enclosed is a copy of the material which has been reviewed by the Navy. The material is being reviewed by the Navy. The material is being reviewed by the Navy. The material is being reviewed by the Navy.

HYDRAULIC INSTITUTE
122 East 42nd Street
New York, New York 10017

MINUTES: SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

PLACE OF MEETING: HYDRAULIC INSTITUTE, NEW YORK, NEW YORK

DATE AND TIME: TUESDAY, OCTOBER 31, 1967 - - 9:30 A.M.

MEMBERS PRESENT:

I. A. Jelly	Aurora Pump Division
C. G. McGinnis	Ingersoll-Rand Company
R. P. Paashaus	Worthington Corporation
J. J. Faugh	Warren Pumps, Inc.

MEMBERS ABSENT:

B. W. Ellis	Buffalo Pump Division
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OTHERS PRESENT:

M. F. Hagerstrom	Ingersoll-Rand Company
M. J. Neal	Buffalo Pump Division
Frank P. Anderson	Institute Staff

PRESIDING OFFICER:

I. A. Jelly, Chairman

I. APPROVAL OF PREVIOUS MINUTES:

Since this was the first meeting of the Special Sub-Committee, there were no previous minutes to consider, and it was not felt necessary to review the minutes of the parent Committee.

II. PURPOSE OF MEETING:

This meeting was held for the purpose of reviewing and refining the suggested texts elicited by the letter of October 12, 1967, to all members.

For ease in presenting the suggestions relative to each of the four Specifications to be considered at this time, the suggested texts are shown on separate pages attached hereto as Exhibits A, B, C, and D, respectively.

MIL-P-18472 and MIL-P-17881 had been reprinted recently, whereas the other two specifications were still in draft form. For the foregoing reason, the Committee began its analysis in connection with MIL-P-18472 and then proceeded to MIL-P-17881 before beginning work on the remaining two specifications.

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

OCTOBER 31, 1967

SLM00112

III. TIME AND PLACE OF NEXT MEETING:

Since this was a Special Meeting at which the assigned function appeared to have been completed, no plans were made for a specific future meeting. The Chairman, however, was authorized to call such meeting in the event that need should arise.

IV. ADJOURNMENT:

There being no further business, the meeting adjourned.

Frank P. Anderson
Secretary

FPA:eu

ATTACHMENTS: Exhibit A - MIL-P-18472E
Exhibit B - MIL-P-17881C
Exhibit C - MIL-P-17639B
Exhibit D - MIL-P-17672A

APPROVED BY COUNSEL: November 9, 1967

MAILED FROM HYDRAULIC INSTITUTE: November 9, 1967

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

OCTOBER 31, 1967

MIL-P-18472E

5 October 1967

(Inc'l. Amendment - 1

20 October 1967)

MILITARY SPECIFICATION
PUMPS, CENTRIFUGAL, CONDENSATE, FEED BOOSTER AND
DISTILLING PLANT

- 3.1 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the reprinted "E" Specification was exactly the same as the previous "D" edition, and therefore, the following text was recommended as a substitute for the reprinted version:

"The pumps quoted to this specification shall be products made by manufacturers who have been qualified to a previous revision of this specification or who have chosen to qualify to this revision by providing the tests and reports required herein prior to quotation. Pumps provided on contract to this specification must be verified by the tests and reports required herein prior to delivery."

- 3.2.1.2 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the reprinted "E" Specification was not entirely acceptable, and therefore, the following additional paragraph, which is underlined, was recommended:

"Each pump shall be designed to have a satisfactory service life of 30 years of which 40 per cent shall be assumed to be actual operation. There shall be no limit on the number of starts during the life of the pump. It shall be assumed that during the life of the pump, parts subject to unavoidable wear and deterioration (with the exception of packing) will be replaced at intervals not shorter than three years. The parts subject to wear, deterioration, and normally requiring replacement at three year intervals during the service life of the pumps (with the exception of packing) shall be designed for a life of 10,000 actual operating hours pumping the fluid specified (see 6.1) and they shall be identified in appropriate drawings and manuals."

The requirement set forth above shall not be construed or interpreted as a warranty requirement nor otherwise affect the manufacturer's warranty."

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

EXHIBIT A
OCTOBER 31, 1967

SLM00114

3.4.2.5 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the reprinted text of the "E" Specification was acceptable as follows:

"Pump units shall not be damaged or caused to malfunction either by internally excited vibrations, or by the environmental vibrations specified in MIL-STD-167. Frequencies shall be as specified (see 6.1)."

3.5.1.3 - While the "E" Specification reprint contains a revision of this paragraph, the manufacturers felt that it was not complete as given and therefore recommended that it be expanded to read as follows, with the revised portions underlined:

"Axial hydraulic unbalance due to the use of single inlet impellers shall not exceed 150 pounds unless fully justified in the design evaluation report."

3.5.1.6 and 3.5.1.7 - These were paragraphs on which the manufacturers had been asked to furnish data limiting K factors. Note was made of the fact that the "E" Specification reprint combined these two paragraphs but, in the process, had omitted the first sentence of 3.5.1.7, and therefore, the following paragraph was recommended in which the revised portions are underlined:

"In single stage, vertical, flexible-coupled pumps, the rotor shall be supported by bearings external to the pump. Water lubricated bearings shall not be used in the pump. Pump casing shall be double volute, diffuser or modified concentric design to minimize radial loading on the shaft:

- (a) Double volute casing.
- (b) Diffusers.
- (c) Concentric.
- (d) Modified Concentric."

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

EXHIBIT A
OCTOBER 31, 1967

3.5.6.6 - While the manufacturers were not asked to provide a revised draft of this paragraph, nor was there record that a change had been requested, the Sub-Committee recommended the following; with the revised portions underlined:

"Fitted bolts or heavy dowel pins shall be provided to insure maintenance of alignment of casing halves in reassembly. Tapered dowel pins shall be corrosion resistant material, shall have the large end threaded and provided with a nut, and shall be secured against coming adrift under shock loading."

4.2 - While the manufacturers had not been asked to develop a revision of this paragraph, it had been previously discussed, and now it was noted that the "E" Specification reprint was a revision of the original text. The revision which was acceptable when taken in conjunction with revised paragraph 3.1, mentioned above, is as follows:

"Qualification Tests^{1/}. - Tests shall be performed at a laboratory satisfactory to NAVSEC. The several qualification tests on one pump design may be conducted concurrently if practicable. The tests shall fully establish that the product has the reliability and performance capability specified herein.

- (a) The performance evaluation tests specified in 4.4.2 through 4.4.2.3.
- (b) The tests specified in 4.4.3.

^{1/} Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3 and 6.4)."

4.2.1 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint and amendment and is acceptable as follows:

"The qualification specified herein shall apply separately to one pump of each class. Separate qualification tests are required on vertical and horizontal units of each class. Qualification will include all sizes for a specific class."

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

EXHIBIT A
OCTOBER 31, 1967

4.2.2 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint and is acceptable as follows:

"The potential supplier desiring qualification of a specific pump class shall submit design data and calculations, as specified in 3.10 through 3.10.5, to NAVJEC for review and approval as a prerequisite to the performance of the qualification tests specified herein. The design record, as specified in 3.11 through 3.11.2, shall be submitted upon completion of the qualification tests."

4.4.3 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint and amendment and is acceptable as follows:

"Design evaluation tests. - One pump of each class, design and size complete with the driver and all appurtenances and controls shall successfully undergo the design evaluation tests specified herein. Design changes which in the opinion of the procuring agency may detrimentally affect the reliability of a previously tested and accepted pump design shall be cause to require new design evaluation tests in part or in full. It shall be at the discretion of the procuring agency to require new design evaluation tests when an accumulation of several design changes, each of itself apparently not significant to pump reliability, collectively considered render suspect the validity of any one or all of the previously performed design evaluation tests. An endurance test need not be performed provided that the vendor can demonstrate to the satisfaction of the command or agency concerned that the pump to be offered has proved satisfactory in previous Navy shipboard service under conditions equally as strenuous as those specified in the ordering data. The design evaluation tests shall consist of the following:

- (a) Endurance test (see 4.4.3.1).
- (b) Shock test (see 4.4.3.2).
- (c) Inclined operation test (see 4.4.3.3).
- (d) Vibration test (if specified in 6.1) (see 4.4.3.4)."

4.4.3.1.1 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint and amendment and is acceptable as follows:

"Prior to commencement of the endurance test and immediately after completion of the 500 hour operating run, the pump shall be disassembled to the extent necessary and the critical dimensions and running clearance, or parts subject to wear, erosion and derangement, measured, calculated and recorded. All components such as pump impellers and casings subject to erosion, corrosion, cavitation, and wear, the effects of which are not subject to routine measurement shall be listed in the inspection record and after completion of the test the condition of each component shall be determined and recorded."

- 4.4.3.1.4 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint. This reprinted text was acceptable with a revision indicated by underlining as follows:

"The pump shall be monitored during the endurance test to accurately record the conditions of operation, the capacity delivered, the total head developed, the speed at which operated and the general performance observed. Data shall be collected and the pump inspected at twelve hour intervals. For each periodic inspection, in addition to all measured data, the record shall indicate the following:

- (a) The pump packing leakage rate.
- (b) The conditions of the bearings.
- (c) The airborne noise level (normal-abnormal).
- (d) The vibration level (normal-abnormal).
- (e) The smoothness of operation (normal-abnormal).
- (f) All other abnormal findings.
- (g) All adjustments made.
- (h) Changes made in the conditions or method of operation."

- 6.3 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "E" Specification reprint and that the reprint was now incompatible with 3.1, mentioned above. Accordingly, the following underlined revisions are recommended:

"With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL 18472 whether or not such products have actually been so listed by that date. In this regard, bids from manufacturers who were listed on the applicable Qualified Products List to the previous issue of this specification will be acceptable provided that qualification for each class pump is performed on the initial contract awarded to such manufacturer. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C. 20360, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4)."

MILITARY SPECIFICATION

3, CENTRIFUGAL, BOILER FEED, (MULTI-STAGE)

made by manu-
of this speci-
y providing the
ups provided on
sts and reports

Manufacturers had not been asked to develop
on of this paragraph, it was noted that the
"C" Specification was exactly the same as the
"B" edition, and therefore, the following text
recommended as a substitute for the reprinted version:

Products made by manu-
facturers who have been qualified to a previous revision of this speci-
fication shall be products made by manu-
facturers who have chosen to qualify to this revision by providing the
tests required herein prior to quotation. Pumps provided on
this specification must be verified by the tests and reports
in prior to delivery."

life of 30
operation.
life of the
pumps, parts
exception of
less than three
years requiring
life of the pumps
life of 10,000
be appropriate

Manufacturers had not been asked to develop
on of this paragraph, it was noted that the reprinted
specification was not acceptable without the following additional
paragraph: (The initial paragraph is quoted in connec-
tion with comments on MIL-P-18472E.)

Text set forth above shall not be construed or interpreted as a
limitation nor otherwise affect the manufacturer's warranty."

Manufacturers had not been asked to develop
on of this paragraph, it was noted that the re-
text of the "C" Specification was acceptable as

inter-
manu-

not be damaged or caused to malfunction either by internally
induced vibrations, or by the environmental vibrations specified in
Section 6.1. Frequencies shall be as specified (see 6.1)."

Manufacturers were asked to submit a revised text and
add the following with the revisions indicated by
underlining:

be of the one
design shall use
loading on the shaft:

1 be of the double volute, diffuser or concentric casing design
radial bearing loads. Single volute casings will be permitted
volute cutwaters are staggered in such manner as to minimize
loading loads."

While the manufacturers were not asked to provide a
draft of this paragraph, nor was there record that
one had been requested, the Sub-Committee recommended
the following, with the revised portions underlined:

For heavy dowel pins shall be provided to insure maintenance of
casing halves in reassembly. Tapered dowel pins shall be
of sufficient material, shall have the large end threaded and pro-
tected, and shall be secured against coming adrift under shock

either by
vibrations
specified (see 6.1)"

EXHIBIT C
OCTOBER 31, 1967

COMMITTEE;
REVIEW MILITARY SPECIFICATIONS

EXHIBIT B
OCTOBER 31, 1967

6.3 - While the manufacturers had not been asked to develop a revision of this paragraph, it was noted that the original text had been revised in the "C" Specification reprint and that the reprint was now incompatible with 3.1, mentioned above. Accordingly, the following underlined revisions are recommended:

"With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL 17881 whether or not such products have actually been so listed by that date. In this regard, bids from manufacturers who were listed on the applicable Qualified Products List to the previous issue of this specification will be acceptable provided that qualification for each class pump is performed on the initial contract awarded to such manufacturer.

The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C. 20360, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualifications SD-6" (see 6.4)."

3.2.12.4 - The manufacturers were requested to develop a revised draft of this paragraph, and therefore, the following is recommended, the underlining indicating the actual revisions:

"Fitted bolts or heavy dowel pins shall be provided in flexible-coupled class C-2 pumps to insure maintenance of alignment of casing halves in reassembly. Tapered dowel pins shall be corrosion resistant material, shall have the large end threaded and provided with a nut, and shall be secured against coming adrift under shock loading."

3.2.12.9 - The manufacturers were requested to develop a revised draft of this paragraph. The following is recommended; the underlining indicating the actual revisions:

"Casing thickness shall include an allowance for corrosion and the possibility of core shift. The minimum casing thickness shall be 1/2 inch, excluding nozzles, for pumps with a rated total head of 100 psi and above."

4.2 - The manufacturers were requested to develop a revised text for this paragraph. The text now included in MIL-P-17639B is acceptable, provided that paragraph 3.1 is revised as recommended above so that consistency will exist. The present text of paragraph 4.2 is quoted as follows:

"Qualification. - Tests shall be performed at a laboratory satisfactory to NAVSEC. The several qualification tests on one pump design may be conducted concurrently if practicable. The tests shall fully establish that the product has the reliability and performance capability herein specified. The following tests shall be performed:

- (a) The performance evaluation test specified in 4.4.2 through 4.4.2.4.
- (b) The design evaluation tests specified in 4.4.3 through 4.4.3.2.6 and 4.4.3.4 through 4.4.3.4.1."

4.2.1 - The manufacturers were requested to develop a revised draft of this paragraph. The following, which is the same as paragraph 4.2.1 of MIL-P-18472E, is recommended:

"The qualification specified herein shall apply separately to one pump of each class. Separate qualification tests are required on vertical and horizontal units of each class. Qualification will include all sizes for a specific class."

4.2.2 - The manufacturers were requested to develop a revised draft of this paragraph. The following, which is consistent with paragraph 4.2.2 of MIL-P-18472E, is recommended:

"The potential supplier desiring qualification of a specific pump class shall submit design data and calculations to NAVSEC for review and approval as a prerequisite to the performance of the qualification tests specified herein. The design record shall be submitted upon completion of the qualification tests."

6.3 - While the manufacturers had not been asked to develop a revision of this paragraph, the text contained in MIL-P-17639B was not acceptable, and the following underlined portion is recommended:

"With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. In this regard, bids from manufacturers who were listed on the applicable Qualified Products List to the previous issue of this specification will be acceptable provided that qualification for each class pump is performed on the initial contract awarded to such manufacturer. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C. 20360, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.4)."

MIL-P-18682A
1 October 1966

MILITARY SPECIFICATION
PUMPS, CENTRIFUGAL, MAIN CONDENSER CIRCULATING,
NAVAL SHIPBOARD

- 3.1 - While the record does not show that the manufacturers had been asked to comment on this paragraph, the following text is recommended, as being parallel to the corresponding paragraph recommended in MIL-P-18472E, MIL-P-17881C, and MIL-P-17639B:

"The pumps quoted to this specification shall be products made by manufacturers who have been qualified to a previous revision of this specification or who have chosen to qualify to this revision by providing the tests and reports required herein prior to quotation. Pumps provided on contract to this specification must be verified by the tests and reports required herein prior to delivery."

- 3.2.2.2-While the manufacturers had not been asked to develop a revision of this paragraph, the text of MIL-P-18682A was not acceptable, and the following, which is the same as that recommended for MIL-P-18472E, MIL-P-17881C, and MIL-P-17639B, is recommended with the additional paragraph underlined:

"Each pump shall be designed to have a satisfactory service life of 30 years of which 40 per cent shall be assumed to be actual operation. There shall be no limit on the number of starts during the life of the pump. It shall be assumed that during the life of the pump, parts subject to unavoidable wear and deterioration (with the exception of packing and seals) will be replaced at intervals not shorter than 3 years. The parts subject to wear, deterioration, and normally requiring replacement at 3 year intervals during the service life of the pump (with the exception of packing and seals) shall be designed for a life of 10,000 actual operating hours, and they shall be identified in appropriate drawings and manuals.

"The requirement set forth above shall not be construed or interpreted as a warranty requirement nor otherwise affect the manufacturer's warranty."

- 3.2.3.3 - While the record does not show that the manufacturers had been asked to develop a revision of this paragraph, the text contained in MIL-P-18682A was not acceptable, and the following paragraph, which corresponds to paragraph 3.4.2.5 of MIL-P-18472E, is recommended:

"Pump units shall not be damaged or caused to malfunction either by internally excited vibrations, or by the environmental vibrations specified in MIL-STD-167. Frequencies shall be as specified (see 6.1)."

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

EXHIBIT D
OCTOBER 31, 1967

SLM00123

- 4.4.3 - While the manufacturers had not been asked to develop a revision of this paragraph, the following is a recommended revision, which is the same as corresponding paragraphs in MIL-P-18472E and MIL-P-17881C:

"Design evaluation tests. - One pump of each class, design and size complete with the driver and all appurtenances and controls shall successfully undergo the design evaluation tests specified herein. Design changes which in the opinion of the procuring agency may detrimentally affect the reliability of a previously tested and accepted pump design shall be cause to require new design evaluation tests in part or in full. It shall be at the discretion of the procuring agency to require new design evaluation tests when an accumulation of several design changes, each of itself apparently not significant to pump reliability, collectively considered render suspect the validity of any one or all of the previously performed design evaluation tests. An endurance test need not be performed provided that the vendor can demonstrate to the satisfaction of the command or agency concerned that the pump to be offered has proved satisfactory in previous Navy shipboard service under conditions equally as strenuous as those specified in the ordering data. The design evaluation tests shall consist of the following:

- (a) Endurance test (see 4.4.3.1).
- (b) Shock test (see 4.4.3.2).
- (c) Vibration tests (if specified (see 6.1) (see 4.4.3.3).
- (d) Fatigue life proof test (see 4.4.3.4)."

- 4.4.3.1.1 - While the manufacturers had not been asked to develop a revision of this paragraph, the following is a recommended revision, which is the same as corresponding paragraphs in MIL-P-18472E and MIL-P-17639B:

"Prior to commencement of the endurance test and immediately after completion of the 500 hour operating run, the pump shall be disassembled to the extent necessary and the critical dimensions and running clearance, or parts subject to wear, erosion and derangement, measured, calculated and recorded. All components such as pump impellers and casings subject to erosion, corrosion, cavitation, and wear, the effects of which are not subject to routine measurement shall be listed in the inspection record and after completion of the test the condition of each component shall be determined and recorded."

- 6.3 - While the manufacturers had not been asked to develop a revision of this paragraph, the text contained in MIL-P-18682A was not acceptable, and the following underlined portion is recommended:

"With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. In this regard, bids from manufacturers who were listed on the applicable Qualified Products List to the previous issue of this specification will be acceptable provided that qualification for each class pump is performed on the initial contract awarded to such manufacturer. The attention of the

6.3 - (Contd.)

suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C. 20360, and information pertaining to qualification of products may be obtained from that activity. Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.4)."

SPECIAL SUB-COMMITTEE;
COMMITTEE TO REVIEW MILITARY SPECIFICATIONS

EXHIBIT D
OCTOBER 31, 1967