

METRIC
DOD-S-85694
20 October 1986

MILITARY SPECIFICATION
SPECTROMETRIC OIL STANDARDS

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for three blending components (metallo-organic concentrates, sulfonate stabilizer and base oil) and the blended standards for use in calibrating or verifying the calibration of spectrometers used in spectrometric analysis of metallic elements found in oils and other fluids.

1.2 Classification. The blended spectrometric oil standards shall be of the following types, as specified (see 6.2 1):

- Type A - D-19 Spectrometric oil standards (SOS)
 - Type B - D-12 Spectrometric oil standards (SOS)
 - Type C - D-(X) Spectrometric oil Standards (SOS)
- (X)= number of elements in accordance with 3.4 1.3

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC-N/A

FSC 9150

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DOD-S-85694

SPECIFICATIONS

MILITARY

MIL-P-116 - Preservation, Methods of.

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.

MILITARY

MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-290 - Packaging of Petroleum and Related Products.

2.1.2 Other Government publications. The following other Government publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation

PUBLICATIONS

CODE OF FEDERAL REGULATIONS

49 CFR - Transportation, Hazardous Material

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the acquisition activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z129.1 - Precautionary Labeling of Hazardous Industrial Chemicals

(Application for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018)

DOD-S-85694

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 92 - Flash and Fire Points by Cleveland Open Cup.
- ASTM D 97 - Pour Point of Petroleum Oils.
- ASTM D 287 - API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method).
- ASTM D 445 - Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity)
- ASTM D 2273 - Trace Sediment in Lubricating Oils
- ASTM D 2503 - Molecular Weight of Hydrocarbons by Thermoelectric Measurement of Vapor Pressure.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment standards and other publications are normally available from the organization which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. The standards shall be prepared from metallo-organic concentrates, sulfonate stabilizer, and base oil.

3.1.1 Metallo-organic concentrates. The metallo-organic concentrates shall be of an alkylaryl sulfonate or derivative thereof of an element dissolved in a non-additive naphthenic or paraffinic hydrocarbon oil. The same alkylate source shall be used to prepare each of the metallo-organic concentrates. Individual metallo-organic concentrates shall be supplied for any one or combination of 18 (excluding silicon) of the 19 elements listed in Table I.

3.1.1.1 Alkylate. The alkylate shall meet the requirements of Table II.

3.1.1.2 Trace metals. Each of the 18 metallo-organic concentrates shall be certified so as not to contain more than 450 parts per million (ppm) of any one of the other 17 elements, or the silicon or a total of 1,000 ppm of all the other elements listed in Table I.

3.1.2 Sulfonate stabilizer. The sulfonate stabilizer shall be an amine sulfonate prepared by neutralizing one mole of the sulfonic acid used to produce the metallo-organic concentrates with one combining weight of a fatty amine having two amine groups per molecule. The resulting compound shall be equivalent to one free amine and one amine sulfonate per molecule. The stabilizer shall be no less than 78 percent active amine sulfonate. The trace element levels in the stabilizer shall be not greater than 450 ppm by weight for the total of all the elements that are listed in Table I.

DOD-S-85694

3.1.3 Base oil The base oil for blending the standards shall conform to the requirements of Table IV (see 4.4.1).

3.2 Assay The assay for any one of the 19 elements shall be certified accurate to ± 2 in the third significant figure and shall be equal to or greater than the values specified in Table III (see 4.4.2).

3.3 Silicon concentrate The silicon concentrate shall consist solely of a silicon compound. It shall be certified so as not to contain trace elements of more than 450 ppm by weight of any one element or a total of 1,000 ppm by weight of all the other elements that are listed in Table I. The silicon compound shall meet the requirements specified in Table V.

3.4 Blended standards All blended standards shall be prepared using the materials specified herein and utilizing analytical balances that are calibrated no less frequently than once a year.

3.4.1 Spectrometric oil standards (SOS). The spectrometric oil standards (SOS) shall be such that the 0 ppm, 10 ppm, 30 ppm, 50 ppm, 100 ppm, and 300 ppm concentration levels shall provide the same spectrometric readout when compared to the spectrometric readout for the appropriate level of the primary reference standard (PRS) (see 6.3). In each case, the spectrometric readout comparison between the corresponding ppm level shall agree within the limits specified in 4.5.

3.4.1.1 Type A Type A shall be the D-19 spectrometric oil standard (SOS) and shall contain the elements as listed for Type A in Table I.

3.4.1.2 Type B Type B shall be the D-12 spectrometric oil standard (SOS) and shall contain the elements as listed for Type B in Table I.

3.4.1.3 Type C Type C shall be a standard containing one or more of the seven elements as listed for Type C in Table I.

3.4.2 Homogeneity All blended standards shall be homogeneous, free of sediment or precipitate and shall not indicate any mirroring or silvering appearance from the silver element.

3.5 Material stability. All material as defined in 3.1 shall be compatible and stable to the extent that spectrometric analysis of a batch of the Type A blend prepared after the materials have been in storage for 18 months, shall not differ from the spectrometric analysis of the appropriate ppm level of current primary reference standard by more than the limits specified in 4.5.

3.5.1 Blended standards stability Type A, B, and C spectrometric oil standards prepared from the materials, as defined in 3.1, will show shelf life stability not less than 12 months for Type A, not less than 18 months for Type B, and not less than 6 months for Type C standards. Shelf life beyond the above limits shall be established on laboratory test data (see 6.5).

DOD-S-85694

3.6 Material safety data sheets Material safety data sheets shall be prepared and submitted in accordance with FED-STD-313. The blended standards shall have no adverse effect on the health of personnel when used for its intended purpose in accordance with the safety standards issued by the Occupational Safety and Health Administration (OSHA). Questions pertinent to this matter shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency (see 4.7 and 6.2 1g)

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

4.3 Inspection conditions Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in the applicable paragraphs of this specification.

4.3.1 Testing technique The comparison of spectrometric oil standards to the appropriate primary reference standard shall consist of ten analyses, each in an alternate fashion (i.e. one primary reference standard, one spectrometric oils standard, one primary reference standard, etc.). The results shall be obtained with an A/E35U-3 spectrometer or equivalent direct reading, rotating disk electrode, optical emission spectrometer approved by the Joint Oil Analysis Program-Coordinating Group (JOAP-CG).

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the tests specified in Table VI, and the examinations specified in 4.4.1, 4.4.2 and 4.5.

4.4.1 Base oil. Prior to filling the drums with oil for shipment, a 120 ml sample of each batch shall be forwarded to the Joint Oil Analysis Program Technical Support Center (JOAP-TSC), Naval Air Station, Pensacola, FL 32508 (see 6.5). The oil will be analyzed on an emission spectrometer for trace

DOD-S-85694

amounts of the elements listed for spectrometric oil standard, Type A, in Table I. The trace element analysis shall not exceed 1.5 ppm by weight of any one of the 19 elements, except for sodium which shall not exceed 2.5 ppm.

4.4.2 Silicon compound and assay testing. The silicon compound and all the metallo-organic concentrates shall be assayed by the supplier or a laboratory mutually acceptable to the supplier and the JOAP-CG. All analyses shall be less than 12 months old prior to shipment and a certificate of compliance (see 4.2) for each concentrate and batch shall accompany each shipment, except for a supplemental shipment of the same batch within one year of the assay date.

4.5 Blended standards. Quality conformance and stability analyses of blended standards will be done as a statistical analysis and shall be performed on the data generated by the spectrometric analysis to provide the following accuracy index (AI), repeatability index (RI), mean difference (MD), student t test (t test), and the F calculation for each element involved.

4.5.1 Accuracy index (AI). The accuracy index (AI) of primary reference standard shall meet the requirements specified in Table VII in accordance with Figure 1 for the appropriate ppm concentration level. If the primary reference standard does not meet the specified accuracy index, the spectrometer shall be restandardized and again perform the test in accordance with 4.3.1. The accuracy index is defined as follows:

$$AI = |Y - \bar{X}|$$

where Y = nominal value of the PRS in PPM

\bar{X} = average measured value of the SOS in PPM

4.5.2 Repeatability index (RI). The repeatability index (RI) of both the primary reference and spectrometric oil standards shall meet the requirements specified in Table VII in accordance with Figure 1 for the appropriate ppm concentration level. If the results are not satisfactory for both primary reference and spectrometric oil standards, the data shall be subjected to the F calculation in accordance with Figure 1 and as specified in 4.5.4. The repeatability index is defined as follows:

$$RI = \sqrt{\frac{N(\sum Xi^2) - (\sum Xi)^2}{N(N-1)}}$$

where N = number of analysis = 10

X_i = individual analysis result

Σ = summation of the analytical data

4.5.3 Student t test (t test). The student t test (t test) shall not exceed the limit specified in Table VII. If the requirement for the student t test is met, the Spectrometric Oil standard meets the quality assurance requirements and shall be accepted in accordance with Figure 1. The student t test is defined as follows:

$$t \text{ test} = \frac{|\bar{X}_p - \bar{X}_s|}{\sqrt{\frac{S_1^2 + S_2^2}{N}}}$$

DOD-S-85694

where: \bar{X}_p = average value of the PRS in PPM
 \bar{X}_s = average value of the SOS in PPM
 S_1^2 = variance of PRS
 S_2^2 = variance of SOS
 N = number of analysis = 10

In conjunction with the student t test, the confidence interval of the mean difference shall be determined.

The upper limit (U_L) is defined as follows:

$$U_L = (\bar{X}_1 - \bar{X}_2) + t_{.95} \sqrt{\frac{S_1^2 + S_2^2}{N}}$$

The lower limit (L_L) is defined as follows:

$$L_L = (\bar{X}_1 - \bar{X}_2) - t_{.95} \sqrt{\frac{S_1^2 + S_2^2}{N}}$$

where: \bar{X}_1 = average value of PRS in PPM
 \bar{X}_2 = average value of SOS in PPM
 S_1^2 = variance of PRS
 S_2^2 = variance of SOS
 $t_{.95}$ = 2.101 (95th percentile of t distribution with 18 degrees of freedom)

4.5.4 F calculation. The F calculation shall not exceed the limit specified in Table VII. The data will be subjected to the student T test in accordance with Figure 1 if the requirements for the F calculation are met. If the requirements for the F calculation are not met, then an instrument malfunction or procedural error exists and the deficiency shall be corrected and the process restarted in accordance with Figure 1. The F calculation is defined as follows:

$$F = \frac{S_1^2}{S_2^2} \quad \text{or} \quad \frac{S_2^2}{S_1^2} \quad \text{whichever is larger}$$

where: S_1^2 = variance of PRS
 S_2^2 = variance of SOS

4.5.5 Mean difference (MD). The mean difference (MD) is defined as follows:

$$MD = |\bar{X}_p - \bar{X}_s|$$

where: \bar{X}_p = average value of PRS in PPM
 \bar{X}_s = average value of SOS in PPM

4.5.6 Practical tolerance check. A practical tolerance check shall be made in accordance with Figure 1 if the requirements for the student t test are not met. The values of the mean difference tolerance for appropriate concentration levels are given in Table VII. The check may be made by adding or subtracting, as appropriate, one-half of the mean difference tolerance, to the upper and lower confidence limits as determined in accordance with 4.5.3.

DOD-S-85694

If the subsequent extended confidence limits then include zero, the spectrometric oil standard meets the quality assurance requirements and shall be accepted. If the subsequent extended limits do not include zero, the spectrometric oil standard does not meet the quality assurance requirements and shall be rejected.

4.6 Material storage stability. Samples from the first production batch for each of the materials defined in 3.1 shall be stored at room temperature maintained at 25 ± 5 °C, for a 18 month period. The size of the samples shall be as follows: 50 ml for the concentrates, 50 ml for the sulfonate stabilizer, and 3500 ml for the base oil. At the end of the 18 month storage period, the samples shall be examined for conformance to all quality conformance test requirements (see 4.4).

4.6.1 Blended standards storage stability. Two 250 ml samples for each, Type A, B, and C, spectrometric oil standards shall be stored at room temperature maintained at 25 ± 5 °C for the following periods. Type A, 12 months, Type B, 18 months, and Type C, 6 months. At the end of these storage periods, the respective sample shall be examined for conformance to all quality conformance test requirements (see 4.4).

4.7 Acceptance requirements. The acceptance or rejection of blended spectrometric oil standards shall be determined using Figure 1.

4.8 Submission of material safety data sheets. The contractor shall furnish to the contracting activity the toxicological data and formulations required to evaluate the safety of the material for the proposed use through the submission of the material safety data sheets detailed in FED-STD-313.

5. PACKAGING

5.1 Preservation. Polyethylene plastic screw cap bottles conforming to MS36476-3 shall be used. The dimensions of the bottles shall be as specified (see 6.2). The bottles shall have a polyethylene dispenser cap and sealer tip. The sealer tip shall snap on easily and reseal after using. The dispenser cap shall have no openings. The cap shall be further secured to the bottle using a white 40mm x 25mm cellulose band.

5.2 Packing. The polyethylene bottles (see 5.1) shall be packed in spirally wound composite telescopic cans conforming to MIL-C-3955C. Type, grade, style and class shall be as specified (see 6.2). Overpack of the telescopic cans for domestic and foreign shipment shall be in accordance with MIL-P-116, Method III and applicable ICC regulations.

5.3 Marking. Marking shall be in accordance with MIL-STD-129 and Title 49 CFR of the Code of Federal Regulations and shall include any additional marking specified by the acquiring activity (see 6.2.1). Unit, intermediate and shipping containers shall be marked with the applicable precautionary marking detailed in ANSI Z129.1.

6. NOTES

6.1 Intended use. The blended standards covered by this specification are intended for use in calibration of spectrometers used in spectrometric analysis for metallic elements found in oils and other fluids.

DOD-S-85694

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification
- b. Type required (see 1.2)
- c. Quantity desired
- d. Dimension of containers (see 5.1).
- e. Type, grade, style and class of packing (see 5.2)
- f. Any special markings (see 5.3).
- g. FAR clause 52.223-3.

6.3 Primary reference standards. All primary reference standards shall be prepared and verified by the Joint Oil Analysis Program Technical Support Center (JOAP-TSC), Naval Air Station, Pensacola, FL 32508. Primary reference standards shall contain the elements as listed for Type A in Table I and shall be used for quality assurance testing of SOS Types A, B and C. PRS shall have a shelf life of 6 months.

6.4 Miscellaneous Type Spectrometric Oil standards From time to time, by mutual agreement of Joint Analysis Program Coordinating Group (JOAP-CG), a requirement may be established for a single standard containing up to three of the elements listed as Type C in Table I (i. e. molybdenum, boron, and zinc) Such standards shall be prepared utilizing materials conforming to this specification and be verified against the primary reference standard Type A in accordance with this specification.

6.5 Testing facility. The testing facility shall be the Joint Oil Analysis Program Technical Support Center (JOAP-TSC), Naval Air Station, Pensacola, Florida 32508, or a laboratory mutually acceptable to the supplier and the JOAP-CG.

6.6 Subject term (Key Word) listing.

Alkylaryl sulfonate
 Calibration
 Metal content in oil and other fluids
 Metal content, oil
 Metallo-organic concentrates
 Metallo-organic sulfonates
 Primary Reference standards
 Spectrometer calibration
 Spectrometric analysis
 Spectrometric Oil standards
 Spectrometry
 Sulfonate stabilizer
 Wear detection

DOD-S-85694

Custodians:

Army - ME

Navy - AS

Air Force - 68

Preparing activity:

Navy - AS

(Project 9150-0733)

Review activities

Army - AM, AV

Air Force - 20

DOD-S-85694

TABLE I. List of elements by type.

Element (chemical symbol)	Spectrometric Oil Standard		
	Type		
Aluminum (Al)	A	B	
Chromium (Cr)	A	B	
Copper (Cu)	A	B	
Iron (Fe)	A	B	
Lead (Pb)	A	B	
Magnesium (Mg)	A	B	
Molybdenum (Mo)	A		C
Nickel (Ni)	A	B	
Silicon (Si)	A	B	
Silver (Ag)	A	B	
Sodium (Na)	A	B	
Tin (Sn)	A	B	
Titanium (Ti)	A	B	
Zinc (Zn)	A		C
Barium (Ba)	A		C
Boron (B)	A		C
Cadmium (Cd)	A		C
Manganese (Mn)	A		C
Vanadium (V)	A		C

DOD-S-85694

TABLE II. Alkylate physical properties

Characteristics	Requirements	Test paragraph
Gravity at 15.5 ° C, API	32.5 ± 1.5	4.4
Viscosity, mm ² /s		4.4
at 37.8°C	30.0 ± 2.0	
at 98.9°C	5.0 ± 0.5	
Pour point, maximum	-45.6°C	4.4
Flash point, minimum (COC) ^{1/}	204.4°C	4.4
Molecular weight, average	425 ± 25	4.4

^{1/} (COC) - Cleveland Open Cup, ASTM D92 (see 2.2)

TABLE III Element assay

Element	Requirements (percent by weight)
Aluminum (Al)	2.00
Barium (Ba)	7.00
Boron (B)	1.00
Cadmium (Cd)	8.00
Chromium (Cr)	1.75
Copper (Cu)	3.50
Iron (Fe)	2.00
Lead (Pb)	9.00
Magnesium (Mg)	1.75
Manganese (Mn)	2.50
Molybdenum (Mo)	3.00
Nickel (Ni)	3.00
Silicon (Si)	12.00
Silver (Ag)	4.50
Sodium (Na)	3.50
Tin (Sn)	4.00
Titanium (Ti)	4.50
Vanadium (V)	1.50
Zinc (Zn)	3.00

DOD-S-85694

TABLE IV. Base oil physical properties

Characteristics	Requirements	Test paragraph
Oil	Mid-continent, solvent refined, virgin oil	
Viscosity, mm ² /s at 100°C	18 min., 26 max.	4 4.1
Flash Point, minimum (COC)	232°C	4.4.1
Trace Sediment		4.4.1
Solids	4 mg/liter	
Fibrous	1.3 mg/liter	
Trace Elements	pass 4.4.1	4 4.1

TABLE V. Silicon compound physical properties.

Characteristics	Requirements	Test paragraph
Gravity at 15.5 ° C, API	22.5 ± 1.0	4.4
Viscosity at 25 ° C, mm ² /s	1440 ± 150	4 4
Flash point, minimum (COC)	165.6°C	4.4

TABLE VI. Quality conformance inspection.

Physical property	ASTM test method
Gravity, API	D 287
Viscosity	D 445
Pour point	D 97
Flash point (COC)	D 92
Molecular weight	D 2503

DOD-S-85694

TABLE VII. Stability analysis limits

Element	AI						RI						MDT <u>1/</u>						t test	F calc		
	0	3	10	30	50	100	0	3	10	30	50	100	0	3	10	30	50	100				
Fe	06	08	12	35	58	80	05	05	09	24	40	80	10	10	15	25	30	50	2	101	3	18
Ag	06	09	13	42	72	160	05	05	09	24	40	80	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Al	08	14	20	37	54	95	05	05	07	15	25	50	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Cr	08	10	18	33	51	96	05	05	07	15	25	50	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Cu	06	07	14	34	55	88	05	05	10	27	45	50	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Mg	07	08	15	40	65	135	05	05	10	27	45	90	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Na	14	19	43	116	189	37.1	05	06	16	48	80	90	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Ni	07	07	12	32	51	100	05	05	07	15	25	90	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Pb	15	18	24	44	66	122	09	09	10	20	31	160	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Si	09	08	09	28	48	74	05	05	07	15	25	50	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Sn	15	18	24	44	66	122	05	09	10	20	31	60	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Ti	10	11	17	39	61	120	05	05	07	18	30	50	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
B	08	11	17	39	61	117	05	05	07	18	30	60	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Ba	08	11	17	39	61	117	05	05	07	18	30	60	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Cd	08	11	17	39	61	117	05	05	07	18	30	60	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Mn	08	11	17	39	61	117	05	05	07	18	30	60	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Mo	13	12	22	46	70	120	05	05	09	24	40	80	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
V	08	11	17	39	61	117	08	08	09	18	30	60	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Zn	07	15	31	81	131	256	05	06	13	36	60	120	10	10	15	25	30	50	2	101	3	18

1/ Mean Difference Tolerance

Note The column headings, 0, 3, 10, 30, 50 and 100 denotes the concentration in parts per million (ppm)

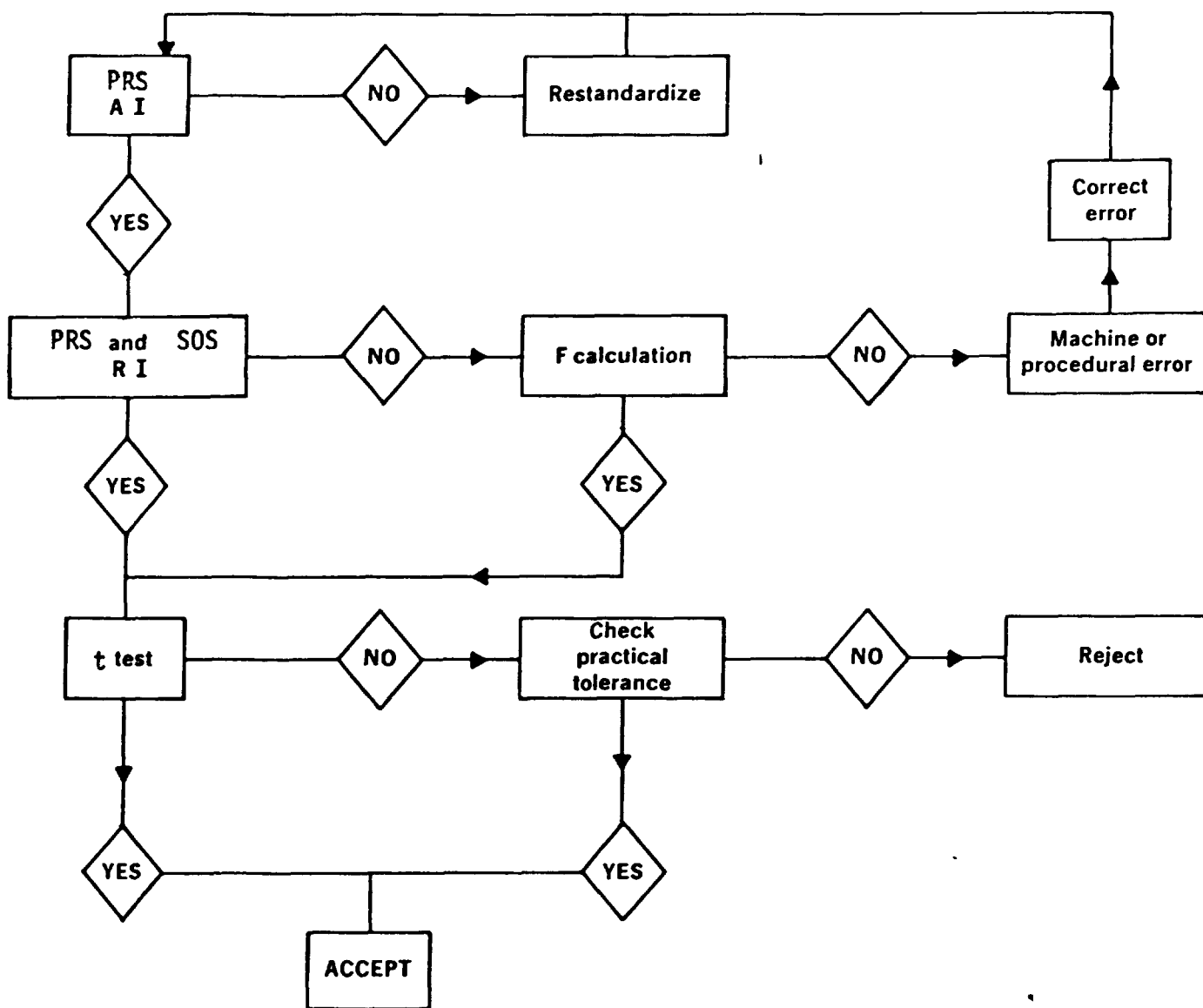


FIGURE 1. Quality acceptance requirements

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NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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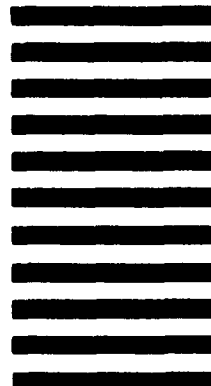


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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER D07-S-35694		2. DOCUMENT TITLE SPECTROMETRIC OIL STANDARDS	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify) _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording			
b. Recommended Wording			
c. Reason/Rationale for Recommendation			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	

(TO DETACH THIS FORM, CUT ALONG THIS LINE)