MIL-S-7886B
13 MARCH 1962
SUPERSEDING DATA
(SEE 6.4)

MILITARY SPECIFICATION

SPARK PLUG, SHIELDED, AIRCRAFT RECIPROCATING ENGINE, GENERAL SPECIFICATION FOR

This specification has been approved by the Department of Defense and is mandatory for use by the Department of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 This specification covers aircraft reciprocating engine spark plugs.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

PPP-C-96 — Cans, Metal, 28 Gage and Lighter.

PPP-B-636 — Box, Fiberboard.

PPP-B-665 — Boxes; Paperboard, Metal Stayed (Including Stay Material.

MILITARY

MIL-P-116 — Preservation, Methods of.

MIL-P-3803 — Plastic, Polyethylene, Molded and Extruded Shapes, Sheets, and Tubing.

MIL-G-5572 — Gasoline, Aviation: Grades 80/87, 91/196, 100/130, 116/145.

MIL-O-6081 — Oil; Lubricating Jet Engine.

MIL-L-6082 — Lubricating Oil; Aircraft Reciprocating (Piston) Engine

MIL-C-6529 — Corrosion Preventive Aircraft Engine.

MIL-S-7742 — Screw Threads, Standard, Optimum Selected Series; General Specification for.

MIL-P-7936 — Parts and Equipment, Aeronautical, Preparation for Delivery.

FSC 2925

MIL-E-25111 —Engines, Aircraft, Reciprocating, Qualification Tests for.

STANDARDS

MILITARY

MIL-STD-10 — Surface Roughness, Waviness, and Lay.

MIL-STD-129 — Marking for Shipment and Storage.

MIL-STD-414 — Sampling Procedures and Tables for Inspection by Variables for Percent Defective.

AIR FORCE-NAVY AERONAUTICAL

AN4027 — Gasket - Spark Plug.

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

3. REQUIREMENTS

3.1 Detail requirements for application. Detail requirements applicable to spark plugs for part icular Airframe-engine combinations shall be as specified in the detail specifications listed in Supplement 1 to this specification. In the event of any conflict between requirements of this specification and the detail specifications, the latter shall govern.

3.2 Qualification. Spark plugs furnished under this specification shall be a product which has been tested and has passed the qualification tests specified in 4.3, and has been listed on or approved for listing on the applicable Qualified Products List (see 6.3).

3.3 Materials. Materials shall be suitable for the purpose intended.

3.4 Design and construction. Spark plugs shall conform to figure 1 or 2, as applicable. Spark plugs shall be so designed that cleaning can be accomplished without disassembly, using conventional types of aircraft spark plug cleaners, methods, and practices, and that resetting of the gaps can be accomplished with a gap-setting tool acceptable to the procuring activity. Spark plugs shall be so constructed as to withstand the normal strains, jars, vibrations, and such other conditions as are incident to shipping, storage, installation, and service usage without failure.

3.4.1 Spark gap. Only one nominal gap setting with specified limits shall be permitted for each part number.

3.4.2 Gasket. Each spark plug shall be furnished with a gasket in accordance with Standard AN4027.

3.5 Performance. Spark plugs shall operate satisfactorily when subj ected to the perforance tests specified in 4.7 and 4.8.

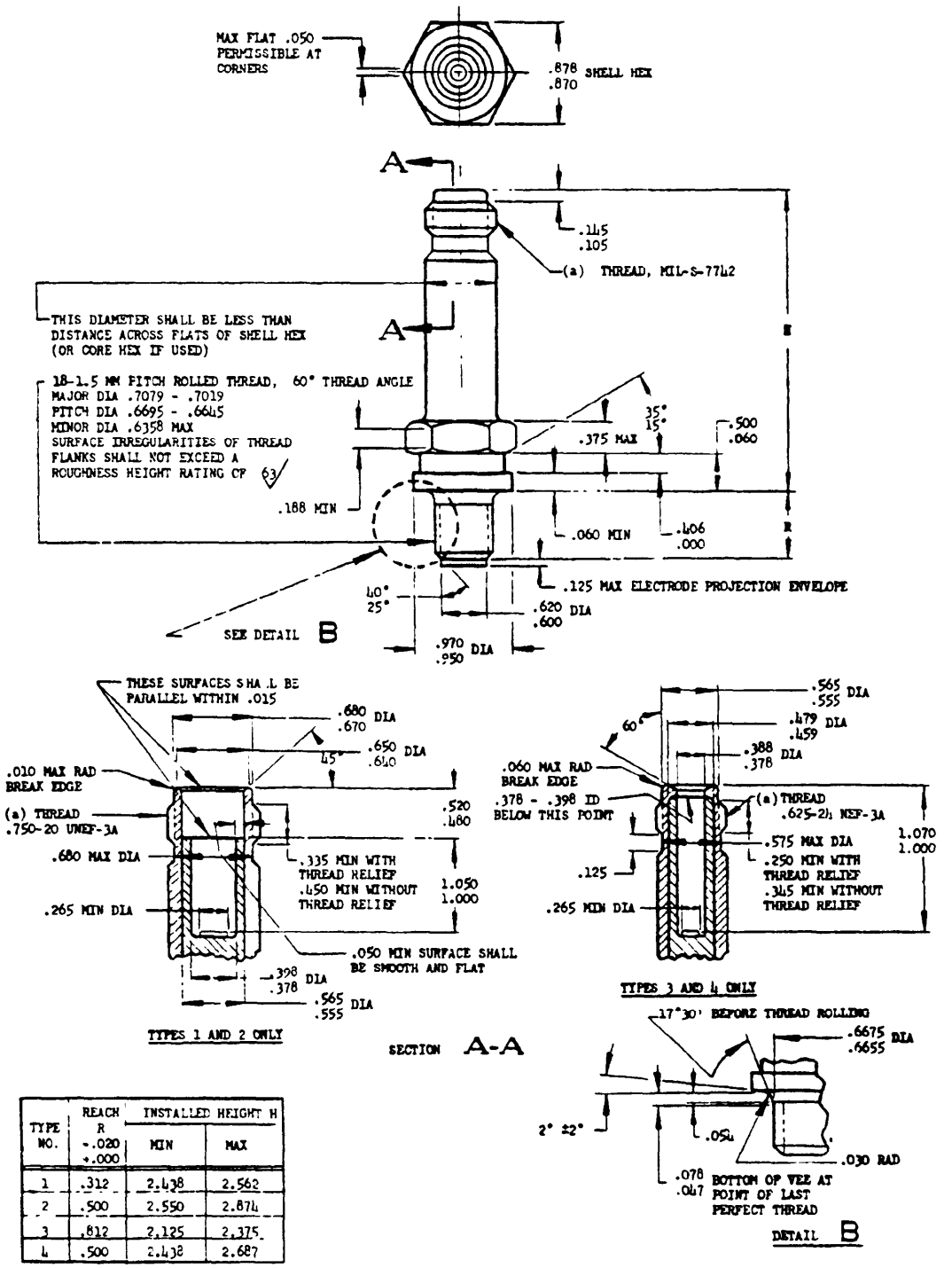
3.6 Identification of product. The following information shall be permanently and legibly marked on the exterior surface of each spark plug:

Manufacturer’s name or trademark, date of manufacture (month and year) , spark plug part, number, and latest change letter.

3.7 Workmanship and finish. Spark plugs shall be clean and free from dirt and metal chips or other foreign matter, both externally and internally. There shall be no loose parts, imperfect weldments, burrs, sharp edges, dents, cracks, or other defects or irregularities.

4. QUALITY ASSURANCE PROVISIONS

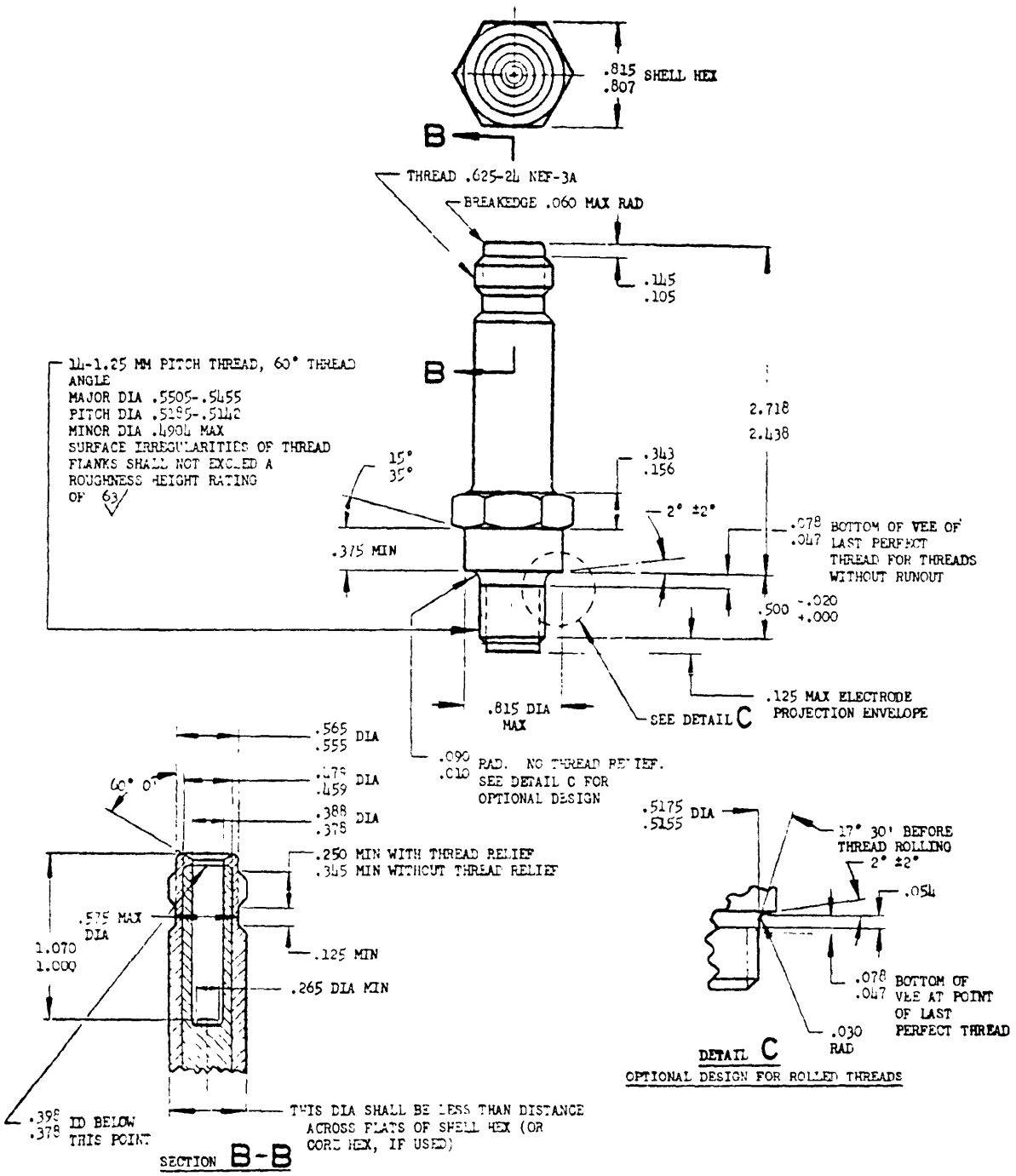
4.1 Inspection responsibility. The supplier is responsible for the performance of all inpection requirements as specified herein, Except as otherwise specified, the supplier may



TYPE NO.	REACH R +.000 -.020	INSTALLED HEIGHT H MIN	MAX
1	.312	2.438	2.562
2	.500	2.550	2.674
3	.812	2.125	2.375
4	.500	2.438	2.687

(a) MAJOR, PITCH, AND ROOT DIAMETERS SHALL BE CONCENTRIC WITH EACH OTHER WITHIN .002 TIR.
SURFACE ROUGHNESS IN ACCORDANCE WITH MIL-STD-10.
UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES .003 to .015.
THE ANGULARITY OF THE THREAD FORM WITH THE GASKET SEAT SHALL BE UNIFORM WITHIN .005 TIR MEASURED AT A DIAMETER OF .875 ON THE GASKET SEAT.
DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ±.010, ANGLES ±0° 30'.

FIGURE 1. 18MM Aircraft reciprocating engine shielded spark plugs



(a) SPECIFICATION MIL-S-7742. MAJOR, PITCH, AND ROOT DIAMETERS SHALL BE CONCENTRIC WITH EACH OTHER WITHIN .002 TIR. SURFACE ROUGHNESS IN ACCORDANCE WITH MIL-STD-1 . UNLESS OTHERWISE SPECIFIED, BREAK ALL SHARP EDGES .003 TO .015. THE ANGULARITY OF THE THREAD FORM WITH THE GASKET SEAT SHALL BE UNIFORM WITHIN .005 TIR MEASURED AT A DIAMETER OF .750 ON THE GASKET SEAT.

DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES DECIMALS ±.010, ANGLES ±0° 30'.

FIGURE 2. 14MM Aircraft reciprocating engine shielded spark plugs, type 5

utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. 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.

4.2 Classification of tests. The inspection and testing of spark plugs shall be classified as follows:

(a) Qualification tests (4.3).
(b) Acceptance inspection (4.4).

4.3 Qualification tests.

4.3.1 *Sampling instructions.* Qualification test samples shall consist of a sufficient number of spark plugs to equip a minimum of 3 engines, plus 10 percent, for which they are designed and 25 additional plugs for laboratory test purposes. Each spark plug part number shall be approved separately. Each sample shall be identified as required and forwarded to the testing location designated by the procuring activity in the letter of authorization. The samples shall be plainly identified by securely attached durable tags marked with the following information:

Sample submitted by (manufacturer's name) (date) for qualification tests in accordance with Specification MIL S-7886B under authorization (reference letter of authorization).

4.3.1.1 The above samples submitted for qualification tests shall be accompanied by a complete manufacturer's test report showing results of the manufacturer's tests on additional spark plugs of each part number. The bench tests conducted by the manufacturer shall include the tests specified in 4.7.1 to 4.7.5, inclusive. The test results shall indicate conformance to all requirements of tests conducted.

4.3.1.2 *Manufacturer's drawings.* Two copies of manufacturer's drawings submitted with the qualification test sample shall include a cutaway section showing all parts in their normal assembled position and shall specify part numbers of all parts and subassemblies.

4.3.2 Tests. Qualification tests of spark plugs shall consist of the following tests:

(a) Laboratory tests
All items of groups A and B tests (4.4.1 and 4.4.2).

(b) Engine ground tests (4.7.6, 4.7.7, and 4.7.8). In engine for which plugs are designed.

(c) Engine-airframe flight test
In the flight vehicle of intended end use (4.8).

4.4 Acceptance inspection. Acceptance inspection shall consist of groups A and B inspection.

4.4.1 *Group A inspection.* Group A inspection shall consist of the following:

Examination	(4.7.1)
Resistor	(4.7.2)
Gas leakage (new spark plugs)	(4.7.3)
Dielectric strength	(4.7.4)

4.4.2 *Group B inspection.* Group B inspection shall consist of the heat rating test (4.7.5) .

4.5 Acceptance inspection **procedure.**

4.5.1 *Inspection lot.* Except as specified in the procurement document for group B inspection, an inspection lot shall consist of spark plugs of the same part number produced under essentially the same manufacturing conditions and submitted for acceptante at the same time.

4.5.2 *Sampling instructions.*

4.5.2.1 *Group A inspection.* Each spark plug shall be subjected to the group A inspection, Spark plugs which have been rejected may be reworked to correct the defects and resubmitted for inspection or replaced with new spark plugs.

4.5.2.2 *Group B inspection A* sampling plan conforming to Standard MIL-STD-414 shall be applied as specified in the procurement document (see 6.2).

4.6 Test condition. Unless otherwise specified. the installation torque for 14-mm spark plugs shall be 240 ± 20 pound-inches, and for 18-mm spark plugs shall be 330 ± 30 pound-inches.

4.7 Test methods. At the conclusion of any of the tests specified herein, spark plugs shall be inspected and shall show no evidence of mechanical failure.

4.7.1 Examination. Spark plugs shall be examined to determine conformance with the manufacturer's drawings aind all the requirements of this specification for which no test method is specified.

4.7.2 Resistor. Each spark plug shall be checked for stability of internal resistance and contact by measurement of the center wire resistance by the use of a low voltage ohmmeter (8 volts or less). Center wire resistance values of any resistor type spark plug shall be as specified in the manufacturer's drawings or specifications.

4.7.3 Gas leakage. The gas leakage of each spark plug shall be measured by any method which has been approved by the procuring activity. The rate of gas leakage shall not exceed the following values when the firing end of the spark plug is pressurized at 800 psi.

(a) New spark plugs — 0.6 cc per minute (for group A inspection, the gas leakage may be determined for a 15-second interval).

(b) Post-test spark plugs (after engine operation) — 4.0 cc per minute.

4.7.3.1 For 5 of the 25 spark plugs to be subjected to the heat rating tests during qualification tests, the shell threads shall be cleaned and then lubricated with grade 1010 oil conforming to Specification MIL-O-6081 The spark plug, with gasket conforming to Standard AN4027, shall be installed in a pressure bomb and torqued to 125 percent of maximum installation torque. The assembly shall then be immersed in water, and nitrogen gas at 800 psi applied to the firing end of the spark plug. The nitrogen which leaks past component parts will displace the winter, and the volume displaced will be a measure of the gas leakage which shall not exceed 0.6 cc per minute. This method for measuring gas leakage shall be used as the referee test.

4.7.4 *Dielectric strength,* The gap shall be pressurized or immersed in a suitable insulating liquid to prevent firing when a potential of 9,000 volts rms minimum, 60 cycles, is applied between the center electrode and shell for a period of 3 seconds for group A inspection and 1 minute for all other tests. There shall be no breakdown of the spark plug insulation.

4.7.5 *Heat rating.* The spark plugs shall be installed in a 17.6 test engine manufactured by the Laboratory Equipment Corporation, Mooresville, Indiana. The following standard conditions shall apply during the test:

Speed 2,700 rpm, nominal.
Compression ratio 5,6 to 1.
Spark advance 40 degrees BTDC.
Fuel 98 percent 1 degree benzol, 2 percent Specification MIL-L-6082, grade 1100 non-additive aviation oil,

with 3cc /gal. TEL (This may be obtained from the Standard Oil Co. (Indiana) as Formula No. L-7646.).
Mixture strength — that giving maximum thermal plug temperature.
Inlet air temperature 225° ± 5‘ F.
Inlet air humidity 75 ± 25 grains of moisture per pound of dry air.
Coolant flow 5 ± ½ gallon per minute.
Jacket inlet temperature 265° ± 5° F.
Oil temperature 190° ± 10° F.

The power output for the final expected 10-inches Hg MAP shall be increased in increments not to exceed 2 inches of manifold pressure (at least 3 minutes shall be allowed between each increase for conditions to stabilize) until continuous preignition occurs as evidenced by an abrupt and abnormal increase in the thermal plug temperatures. Manifold pressures shall be then decreased in 1-inch increments until the spark plug operates continuously without preignition for 3 minutes. The rating of the spark plug shall be determined as the indicated mean effective pressure, expressed in pounds per square inch, corresponding to this manifold pressure and as corrected for engine variability. The individual ratings shall be within the limits of 90 percent and 110 percent of the average of all the ratings of the samples tested, For group B tests, the ratings shall be within the limits established by the qualification tests. Upon completion of the heat rating test, the spark plugs shall be subjected to the following tests:

Resistor . . . .(4.7.2)
Gas leakage (post-test spark plug values applicable) ..... (4.7.3)
Dielectric strength . . . . . (4.7.4)

Spark plugs subjected to this testing shall not be shipped as part of any contract or order,

4.7.6 *Thermal shock.* A full set of spark plugs shall be installed in a service engine and subjected to a water spray under the following conditions:

With the engine operating at normal rated sea level power and speed and with the mixture control in the full rich position, readings shall be taken of engine rpm, manifold pressure. carburetor air temperature, etc. With no change in engine controls, a water spray, using tap water at the rate of 10 gallons per minute, shall be directed into the cooling air stream ahead of the spark plugs for a period of 5 minutes. The spray shall then be shut off and sufficient time allowed for the engine to resume normal operating temperature. This spraying cycle shall be repeated for a total of seven times. The engine shall not malfunction due to spark plugs during this test. Upon completion of the thermal shock test, the spark plugs shall be subjected to the following tests:

Gas leakage (post-test spark plug values applicable) ..... (4.7.3)
Dielectric strength . . . . . (4.7,4)

4.7.7 *Ground endurance test.* A ground endurance test of a least 1 50 hours shall be made with plugs installed in a minimum of one-half the cylinders of a representative service engine of the model for which the spark plugs is intended to be used. Spark plugs of an approved type, where available, shall be installed in approximately one-half the cylinders. The test shall be conducted in accordance with the 150-hour endurance run for the particular model of engine as specified in Specification MIL-E-25111 or as specified by the procuring activity, except that the spark plugs shall not be removed for servicing unless engine malfunctioning attributable to spark plugs is indicated. All spark plugs shall have the gaps set accurately to 0 001 inch tolerance and a record shall be made of all gaps at the time of initial installation, Spark plug gaps shall be checked to ascertain the rate of electrode erosion. The fuel shall be that recommended for the particular engine being used. The fuel shall contain the maximum amount of tetraethyl lead as permitted under Specification MIL-G-5572. The specific fuel consumption shall

be maintained within limits of -1-3, –O percent of the minimum guaranteed values specified in the engine model specification for the corresponding powers and speeds. Where lead content or fuel-air ratios deviate from specified values, a record shall be maintained of the actual test conditions. After the ground endurance test, the average increase in the gap between electrodes shall be determined at room temperature. Performance of the test spark plugs shall be comparable to that of the approved spark plugs, where applicable. Upon completion of ground endurance testing, the spark plugs shall be subjected to the following tests:

Resistor	(4.7.2)
Gas leakage (post-test spark plug values applicable)	(4.7.3)
Dielectric strength	(4.7.4)

Failure of the spark plugs to satisfactorily pass the above tests shall be cause for rejection.

4.7.8 *Resistance to* fouling. Fouling-resistant characteristics of the sparkplugs shall be determined by making comparative tests with spark plugs of an approved design in an aircraft engine under conditions conducive to fouling. The fouling characteristics of the test spark plugs shall be comparable to the approved spark plugs, where applicable

4.8 **Engine-airframe flight tests.** Engine-airframe flight tests shall be as specified in the applicable detail specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging.

5.1.1 *Preservation.* Each spark plug shall be cleaned in accordance with any applicable method of Specification MIL-P-116. Corrosion preventive compound conforming to Specification MIL-C-6529, type II, shall be applied to the threaded portion of the plug if the threaded surfaces *are* unplated.

5.1.2 *Unit packaging.*

5.1.2.1 Levels A, B, and C. Each plug shall be individually packaged in a semirigid polyethylene tube having a thickness of 0.025 ± 0.005 inch with end closures heat sealed. The material for the polyethylene containers shall be in accordance with Specification MIL-P-3803.

5.1.3 *Intermediate packaging.* Fifty each spark plugs packaged as specified in 5. 1.2.1 shall be further packaged in intermediate containers conforming to Specification PPP-B-636, PPP-B-665 or PPP-C-96. Suitable cushioning material shall be provided to prevent free movement of the unit packages.

5.2 Packing.

5.2.1 *Levels A, B, and C. The levels* of packing shall be in accordance with Specification MIL-P-7936 and the level or levels required will be specified in the invitation for bid, contract, or procurement description.

5.3 Marking and labeling. Use of labels for marking intermediate containers is acceptable when applied in accordance with Standard MIL-STD-129,

5.3.1 *Unit packages.* Each unit package shall be durably and legibly marked with the following information, either around the circumference of the container or within the container, if visible, in such a manner that the markings will not become damaged when any of the containers are opened:

SPARKPLUG (14 MM or 18MM type ....., as applicable)

Manufacturer's part number

..... Inch electrode gap

Name of manufacturer

Name of contractor (if different from manufacturer)

5.3.2 *Intermediate packages.* Each intermediate container shall be durably and legibly marked with the following information as indicated:

(a) On the side of the can:

SPARK PLUG, Shielded, Aircraft Reciprocating Engine

Specification MIL-S-7886B (add detail specification number)

Manufacturer's part number

..... Inch electrode gap

Contract or order No. .....

Name of contractor (if different from manufacturer')

(b) On the top of the can:

Quantity (of spark plugs)

Federal stock number .....,

Date of preservation of manufacture (month and year)

5.3.3 Shipping containers. Each shipping container shall be marked as specified for intermediate packages and marked to indicate presence of preservation. In addition, each shipping container shall be marked in accordance with the requirements applicable to the individual Services, as specified in Standard MIL-STD-129.

6. NOTES

6.1 Intended use. Sparkplugs covered by this specification are intended for use in military reciprocating aircraft engines.

6.2 Ordering data. Procurement documents should include the following:

(a) Title, number, and date of the applicable detail specification.

(b) Manufacturer's name and part number.

(c) Level of packaging and packing (see 5.1.2 and 5.2.1).

(d) A sampling plan including lot size, level of inspection, and upper and lower acceptable quality levels, in accordance withstandard MIL-STD-414 (see 4.5.2.2).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for such products as have, prior to the time set for opening of bids, been tested and approved for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. 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 specified on the applicable detail specification; and information pertaining to qualification of products may be obtained as specified therein.

6.3.1 *Qualified Products List* ***(QPL).*** Spark plugs which are suitable for a particular airframe-engine combination will be listed in the applicable supplemental specification QPL (see 3.1). .

6.4 Superseding data. This specification supersedes Specifications MIL-P-007886A-

(USAF) dated 22 April 1957, MIL-P-7886 dated 19 March 1952, MIL-S-8829 (Aer) dated 19 May 1959 and Standards MS24471 dated 18 June 1957, MS24472 dated 15 August 1958, MS24473 dated 15 August 1958, MS33508 dated 28 March 1952, AND102O6 dated 28 March 1952, AND10217 dated 30 January 1945, and AND10219 dated 30 January 1945.

6.5 Detail specification. The detail specification should specify the performance reliability requirements and test procedures for the detail engine-airframe flight tests (see 4.8).

Custodians:
Arm y-TC
Navy-Wep
Air Force-SAA

Preparing activity:
Navy-Wep

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1 DOCUMENT NUMBER	2 DOCUMENT TITLE

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	☐ VENDOR
	☐ USER
b ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ 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)*

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