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MILITARY SPECIFICATION

TANKS, REMOVABLE, LIQUID PROPELLANT ROCKET ENGINE, GENERAL SPECIFICATION FOR

This Specification is mandatory for use by all Departments and Agencies of the Department of Defense

1. SCOPE

1.1 Scope. This specification covers the general requirements for removable tanks for liquid propellant rocket engine systems.

1.2 Classification. Rocket engine tanks shall be of the following types and classes, as specified (6.3):

Type I - For liquids
Type II - For gases
Class 1 - For aircraft
Class 2 - For vehicle-launched missiles
Class 3 - For remotely launched missiles

2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, drawings, and publications, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

NN-P-515	Plywood, Container Grade
PPP-C-843	Cushioning Materials, Celluosic
PPP-B-601	Boxes, Wood, Cleated-Plywood
TT-S-735	Standard Test Fluids, Hydrocarbon

Military

MIL-P-116	Preservation, Methods of
MIL-D-1000	Drawings, Engineering and Associated Lists
MIL-C-5501	Caps and Plugs, Protective, Dust and Moisture Seal

MIL-S-7742	Screw Threads, Standard Optimum Selected Series, General Specification For
MIL-S-8879	Screw Threads, Controlled Radius Root With Increased Minor Diameter: General Specification For
MIL-C-9437	Crate, Wood Open Fuel Tank External, Assembled
MIL-Q-9858	Quality Program Requirements

STANDARDS

Federal

Fed. Test Method Std. No. 791	Lubricants, Liquid Fuels, and Related Products; Methods of Testing

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property
MIL-STD-143	Specifications and Standards Order of Procedence for the Selection of
MIL-STD-171	Finishing of Method and Wood Surfaces
MIL-STD-186	Protective Finishing Systems for Rockets, Guided Missiles, Support Equipment and Related Materials
MIL-STD-453	Inspection, Radiographic

DRAWINGS

Air Force-Navy Aeronautical Standard Drawing

AN3 through AN20	Bolt, Machine, Aircraft

HANDBOOKS

MIL-HDBK-695	Military Standardization Handbook Rubber Products: Shelf Storage Life

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

2.2 Other publications. The following documents of the issue in effect on date of invitation for bid or request for proposal, form a part of this specification to the extent specified herein.

GOVERNMENT

U. S. Department of Commerce National Bureau of Standards

Handbook H28 (Part I) Screw Thread Standards for Federal Services

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

3. REQUIREMENTS

3.1 Detail specification. A detail specification for tankage may be prepared following the form of this specification, for proposals when the tank is procured independent of the rocket engines, to define detail requirements for each application. Omission of reference in the detail specification to a particular requirement of this specification shall be interpreted as compliance herewith. When departures are necessary from the requirements of this specification, the details of such departures shall be stated as specific requirements bearing the same section, paragraph heading, and numbering as in this specification. When a tank is procured as a component part of the rocket engine, any deviations to the tank specification shall be so specified in the rocket engine model specification.

3.2 Materials. Materials used in the manufacture of rocket engine tankage shall be of high quality and be suitable for the purpose intended, and be procured to Federal or Military specifications, wherever possible. When contractor's specifications are used for materials which affect performance or durability of a tank, such specifications shall be approved by the Government prior to any preliminary and preproduction tests. The use of non-Governmental specifications shall not constitute waiver of Government inspection. The material employed in the construction of any tankage shall be compatible with the fluid which it contains.

3.2.1 Critical materials. The use of critical materials as listed herein shall be held to a minimum. The estimated weight of each of the following materials based on the raw stock and finished parts required in the construction of a rocket engine tank shall be submitted by the contractor with the design drawings at the same time they are submitted for initial release. The final data shall be made available to the procuring activity upon request after completion of 10 production units.

(a) Chromium
(b) Cobalt
(c) Columbium
(d) Molybdenum
(e) Natural rubber
(f) Nickel
(g) Tungsten

be as follows:

3.2.2 Metals. All materials from which the tank is constructed shall be resistant to or suitably protected from corrosion caused by atmospheric conditions as well as attack by the contained propellant. The procedures specified in MIL-STD-171 shall be followed where applicable. The use of dissimilar metals shall be avoided where such metals are in contact with the propellants. Dissimilar metals may be used where contact with the propellant is not involved, provided that suitable precautions are taken to prevent electrolytic corrosion.

3.2.3 Selection of materials. Specifications and standards for all materials, parts, and Government certification and approval of processes and equipment, which are not specifically designated herein and which are necessary for the execution of this specification, shall be selected in accordance with MIL-STD-143 except as provided in the following paragraph.

3.2.3.1 Standard parts. Standard parts (MS and AN) shall be used wherever they are suitable for the purpose, and shall be identified on the drawing by their part numbers. Commercial parts such as screws, bolts, nuts, cotter pins, etc., may be used only if MS, AN, NAS, etc. parts are not available for a particular design application and if they meet the quality standards of these parts.

3.3 Design and construction.

3.3.1 Design standards. MS and AND design standards shall be used wherever applicable.

3.3.2 Drawings. The requirements of the approved manufacturer's drawings or of the procuring activity's drawings are applicable as requirements of this specification.

3.3.2.1 Approval of drawings for preliminary tests. Manufacturer's drawings shall be approved by the procuring activity prior to starting the construction of the preliminary test tanks. The preliminary test tanks are those tanks constructed for the purpose of conducting preliminary tests as specified in 4.4.

3.3.2.2 Release of drawings for preproduction tests. Manufacturer's drawings will be released by the procuring activity prior to starting the construction of tanks for the preproduction test tanks. The preproduction test tanks are those tanks constructed for the purpose of conducting preproduction tests as specified in 4.5.

3.3.3 Capacity. The design gross capacity and the design usable capacity of a tank shall be as specified by the procuring activity or as specified in the rocket engine model specification, whichever is applicable (6.3.7 and 6.3.8).

3.3.3.1 Type I tanks. The gross and usable capacity of type I production tanks shall be within the range of +3 to 0 percent up to a maximum of 0 to +15 gallons of the designed gross and usable capacities of the tank.

3.3.3.1.1 Expansion space. Propellant tank capacity shall include a suitable volume for the expansion of the propellant subject to the approval of the procuring activity. This expansion volume shall be determined on the basis of a 100°F (37.8°C) temperature rise of the propellant if not specified otherwise in the rocket engine model specification or by the procuring activity, from a reference temperature specified in the rocket engine model specification or by the procuring activity. It shall also include any additional capacity that may be necessary for expansion of the propellant resulting from aerodynamic heating.

3.3.3.2 Type II tanks. The gross capacity of type II production tanks shall be within the range of +3 to 0 percent of the designed capacity of the tank.

3.3.4 Type I tank outlets. Unless otherwise specified by the procuring activity, the tank design shall provide full, continuous propellant supply to the rocket engine or boost pump for the design-operating conditions of the aircraft, missile, or vehicle application in which the tank is installed. These requirements shall be achieved under all flight and load conditions for time intervals specified by the procuring activity. The requirement for and the location of drain parts shall be approved by the procuring activity.

3.3.5 Filler connections. Filler connections for fluid tanks shall be subject to approval by the procuring activity.

3.3.6 Durability. The tank shall be constructed to withstand the conditions incident to shipping, storage, installation, and service use.

3.3.7 Access doors. Unless otherwise specified, suitable openings shall be provided for inspection and removal of foreign material.

3.3.8 Weight. The weight of production tanks shall not exceed the maximum value shown on the approved drawings, and unless otherwise specified, shall be within ±3 percent of the average weight of the first 10 tanks.

3.4 Interchangeability. All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of MIL-D-1000.

3.5 Finish of cells or liners. The external surfaces of rubber cells shall be ozone resistant or suitably protected against the action of ozone and the propellant for which the tanks are intended. (Reference MIL-HDBK-695.)

3.6 Threads. Conventional straight screw threads shall conform to the requirements of MIL-S-7742 and Handbook H28, Part I, or MIL-S-8879. Duplicate parts, differing only in thread form, shall not be permitted. Unless otherwise specified, threaded parts smaller than 0.164 inch diameter shall have threads in accordance with MIL-S-7742. When an allowance is required for applications in elevated temperature, corrosive atmosphere, or other conditions which may cause thread seizure, this allowance shall be obtained by increasing the diameters of the internal threads.

3.6.1 Locking threaded parts. All threaded fasteners shall be securely locked. Self-locking devices shall not be used in conjunction with gaskets or seals where a specified torque is required without the specific approval of the procuring activity.

3.7 Antiseize compounds. Antiseize compounds used in assembly shall be specified on the contractor's drawings and in the preproduction test report.

3.8 Riveting. Rivets through the skin of all-metal tanks are not permitted.

3.9 Markings. Each part or assembly shall be marked with a part number, which shall be the same as the drawing number of that part or assembly. An assembly consists of parts that are permanently fastened together by welding, brazing, soldering, or riveting. Exceptions to this marking are those parts that do not have a suitable or sufficient surface for a part number. In addition, parts shall be serialized in order to provide tracability to records. Indented markings shall not be used in highly stressed areas, nor shall they be used in any way as to adversely affect the structural integrity of the part.

3.9.1 Location of part numbers. The part number shall, when practicable, be located to permit its being read after assembly in the complete unit. The marking shall be such that it will not be effaced or obliterated, as a result of service usage, during the life of the part.

3.9.2 Access door covers. The exterior surface of all access door covers shall be durably and legibly marked "OUTSIDE".

3.9.3 Assembly torque. The torque values required to assemble the fittings and accessories to the tank or cell shall be durably and legibly marked on, or adjacent to, each fitting or accessory involved, on the side to which the torque wrench is applied. Where the torque required to assemble all fittings and accessories is the same, the proper torque value shall be stenciled in a conspicuous place.

3.10 Loading conditions.

3.10.1 Strength. The rocket engine tank and its support shall be capable of providing elastic strength to sustain any and all combinations of loading defined in 3.10.1.1 and 3.10.1.2, and providing ultimate strength integrity for 150 percent of these same conditions of loading. These design load factors may be modified at the discretion of the procuring activity when acceptable substantiating analytical data are furnished by the contractor.

3.10.1.1 Aircraft (class 1) rocket system tankage. All conditions of limit loading for aircraft rocket system tankage shall be determined by the use of load factors specified in figure 1.

3.10.1.2 Aircraft launched rocket system tankage (class 2). All conditions of limit loading for aircraft launched rocket system tankage while attached to the aircraft shall be determined by the use of the load factors specified in figure 2.

3.10.1.3 Remotely launched missile tankage (class 3). The flight maneuver loads shall be specified for each individual rocket system tankage in the rocket engine model specification.

3.10.2 Internal pressure loading conditions. The rocket engine tankage shall be designed to restrain the internal pressurization loading conditions specified in 3.10.2.1 and 3.10.2.2.

3.10.2.1 Limit pressure load. The rocket engine tank shall be designed to withstand, without permanent set in excess of that specified on approved drawings, the conditions specified below. Deviations to requirements of this paragraph for specific applications shall require approval of the procuring activity.

(a) The proof pressure applied under 1 g loading conditions.

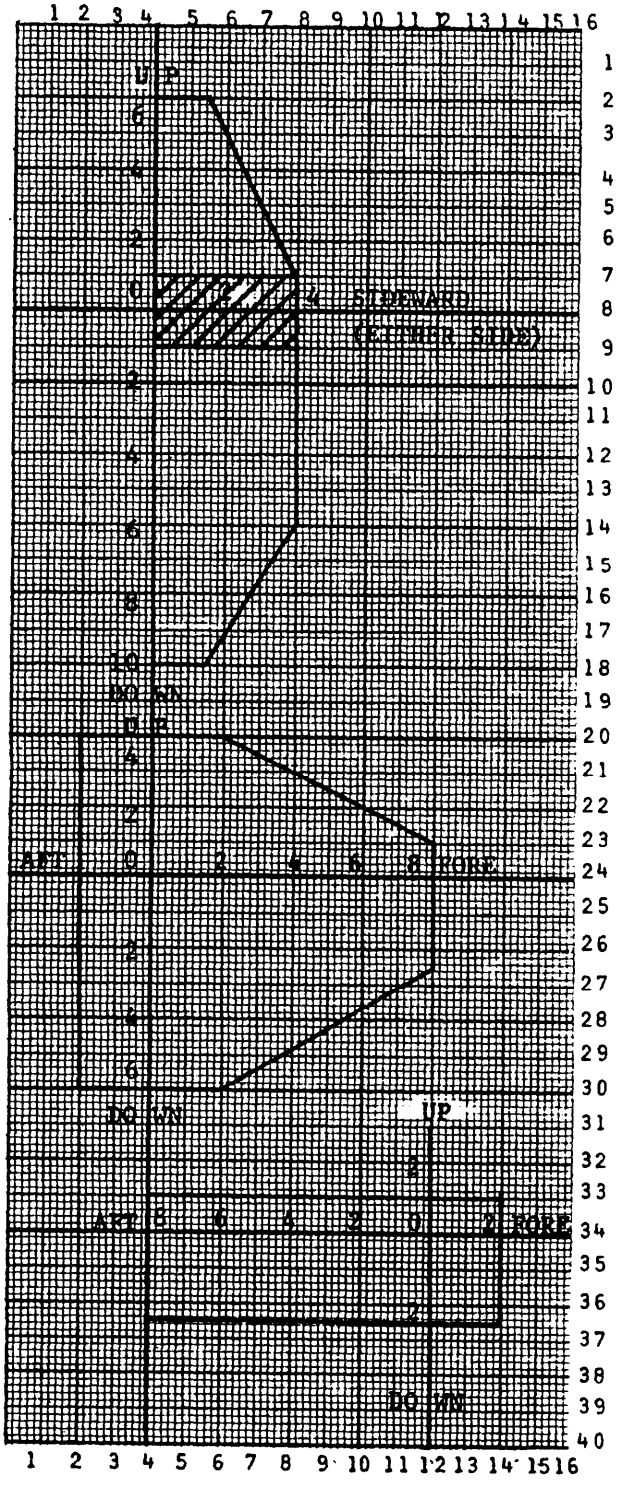
(b) The working pressure applied when the tank is subjected to the limit acceleration specified in 3.10.1.

3.10.2.2 Ultimate pressure load. Rocket engine tankage shall inelastically withstand a single application of the following conditions of loading.

(a) The application of 133 percent of proof pressure simultaneously with an acceleration of 1 g.

(b) The application for working pressure simultaneous with the ultimate acceleration specified in 3.10.

3.11 Performance. The performance of rocket system tankage shall satisfy all the test requirements specified in section 4 of this specification.



FLIGHT
(0 TO MAX THRUST)

n_x*	±2
$\ddot{\theta}$	±6
$\ddot{\psi}$	0

*n_x = -3 TO +4 IN REGION MARKED

SYMBOLS -

n_x = FORE-AND-AFT LOAD FACTOR

n_y = SIDE LOAD FACTOR

θ = PITCHING ACC., RAD/SEC^2

Ψ = YAWING ACC., RAD/SEC^2

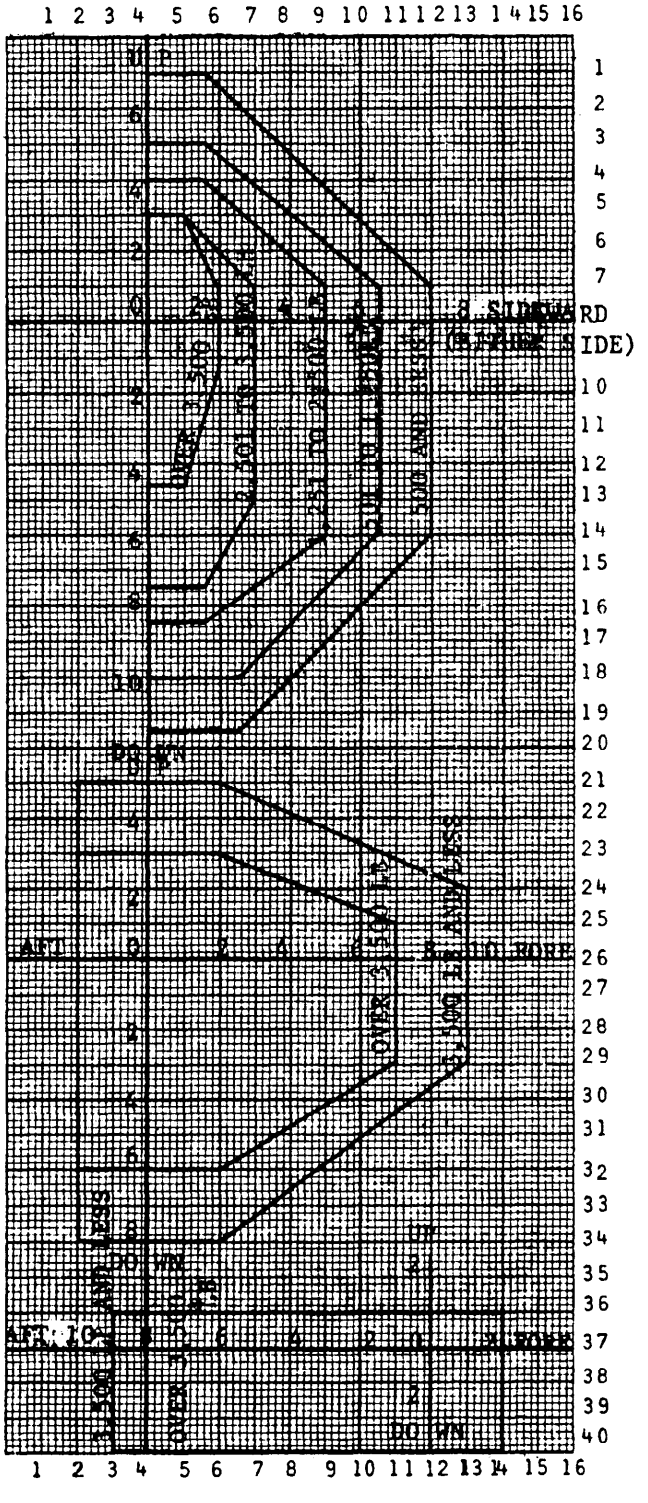
ARRESTED LANDING
(IDLE THRUST)

n_y	±1.5
$\ddot{\theta}$	±12
$\ddot{\psi}$	±6

CATAPULT
(MAX THRUST)

n_y	±1.5
$\ddot{\theta}$	±12
$\ddot{\psi}$	±6

Figure 1. Design limit load factors for rocket engine tanks installed in aircraft



FLIGHT

W	2,500 LB AND LESS	2,501 TO 3,500 LB	OVER 3,500 LB
n_x	±2	±2	±1.5
$\ddot{\theta}$	±6	±5	±2.5
$\ddot{\psi}$	0	0	0

ARRESTED LANDING

W	3,500 LB AND LESS	OVER 3,500 LB
n_y	±1.5	±1.5
$\ddot{\theta}$	±12	±10
$\ddot{\psi}$	±6	±5

CATAPULT

W	3,500 LB AND LESS	OVER 3,500 LB
n_y	±1.5	±1.0
$\ddot{\theta}$	±12	±10
$\ddot{\psi}$	±6	±4

Figure 2. Design limit load factors for rocket engine tanks installed in missiles carried by aircraft

3.12 Identification of product. Rocket system tankage shall be marked for identification in accordance with MIL-STD-130. Each tank data plate shall present the following data.

TANKS, REMOVABLE, LIQUID PROPELLANT, ROCKET ENGINE
Type
Class
Specification MIL-T-5208B
Intended fluid
Working pressure ____ psia from ____°F to ____°F (____°C to ____°C)
Manufacturer's part No.
Manufacturer's serial No.
Manufacturer's construction No. ____ (flexible construction)
Date of manufacture
Manufacturer's name or trade-mark
US

3.12.1 Use of AN, MIL, or NAS designations. AN, MIL, or NAS designations shall not be applied to a product, except for test samples, nor referred to in correspondence, until notice of approval has been received from the procuring activity.

3.13 Workmanship. The quality of workmanship and finish of the tankage structure shall be in accordance with MIL-Q-9858 in order to insure satisfactory operation, reliability, and durability consistent with service life and application of the tank.

3.13.1 Leakage. The leakage of propellant from the rocket engine tank shall not exceed the specified rate using equipment approved by the procuring activity (4.9.11.1).

3.13.2 Cleaning. The tanks and all internal parts shall be thoroughly cleaned of dirt, sand, metal chips, greases, or other foreign materials when being assembled and after final assembly. The tanks shall be cleaned of test fluid after completion of tests and treated or passivated for service with the propellant to be used in the tanks. The tanks shall be sealed following treatment or passivation to prevent contamination. Cleaning and treatment or passivation shall be accomplished to the requirements approved by the procuring activity. After sealing, the tank shall be marked as having been cleaned.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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.

4.2 Classification of tests. The inspecting and testing of tanks shall be classified as follows:

(a) Preliminary tests: For purposes of this specification, preliminary tests are those tests performed on samples of the material and construction to be used in the manufacture of nonmetallic tanks as designated in table I. Preliminary tests are not applicable to metallic tankage.

(b) Preproduction tests: For purposes of this specification, preproduction tests are those tests performed on complete full-scale tankage, or portions thereof, that are required to demonstrate to the procuring activity their adequacy to meet and perform according to specification. Tanks subjected to preproduction test shall not be submitted to the procuring activity for acceptance.

(c) Acceptance tests: Acceptance tests are those tests performed on the tankage submitted to the procuring activity for acceptance. These tests shall demonstrate that the tankage meets the approved design standards, functional performance requirements, and the quality specified by this specification.

4.3 General instructions.

4.3.1 Test data. Data that will verify and demonstrate the structural integrity and functional performance of the tankage shall be taken from tests that provide for the separate application of a series of individual conditions of applied and internal pressurization loads that have been scheduled in a progressive order of severity. Sufficient instrumentation should be used to determine the actual response of the tankage structure to the various conditions of loading as accurately and as completely as possible.

4.3.2 Identification of sample specimens. Sample specimens of the tankage material that are required to be submitted to the procuring activity shall be accompanied by a report of the results of the tests performed on them and shall be plainly identified with tags made from durable material. These tags shall be securely attached to each specimen and marked to provide the following information.

Samples for preliminary or preproduction tests
TANKS, REMOVABLE, LIQUID PROPELLANT, ROCKET ENGINE
Fluid _____ (as applicable)
Working pressure ____ psia ____ from ____ °F to ____°F (____°C to ____°C)
Manufacturer's part No.
Manufacturer's serial No.
Manufacturer's construction No.
Name of Manufacturer
Submitted by (name) (date) for preliminary or preproduction tests in accordance with MIL-T-5208B under authorization (reference authorizing letter)

TABLE I

Preliminary tests

Paragraph	Tests	Metallic shell		Nonmetallic shell				
				Rigid			Flexible	
		Removable liner	Fixed liner	Without liner	Removable liner	Fixed liner	Removable liner	Fixed liner
4.9.3	Handling	x	-	-	x	-	x	x
4.9.4.2	Slosh	x	x	-	x	x	x	x
4.9.5	Fluid resistance 1/	x	x	x	x	x	x	x
4.9.7	Pressure cycling 2/	-	x	x	-	x	-	-
4.9.11.1	Leakage	x	x	x	x	x	x	x
4.9.13	Humidity	x	x	x	x	x	x	x
4.9.14	Fluid resistance of exterior surfaces	x	x	x	x	x	x	x
4.9.15	Permeability 3/	x	-	-	x	-	x	-
4.9.16	Fluid contamination 3/	x	x	x	x	x	x	x
4.9.17	Water resistance	x	-	-	x	-	x	-
4.9.18	Seam adhesion	x	-	-	x	-	x	-
4.9.19	Puncture resistance	x	-	-	x	-	x	-

1/ This test applicable only to type I tanks.
2/ This test applicable only to pressurized tanks.
3/ This test applicable only to hydrocarbon fluid tanks.

Symbols: x Test applicable.
- Test not applicable.

4.3.3 Reporting requirements for preliminary and preproduction tests. Preliminary and preproduction test reports that are required to be submitted by the contractor to the procuring activity shall include the signature of inspection personnel that have been authorized and approved by the procuring activity to certify the accuracy and correctness of the results reported. The report shall provide a discussion and the details of the test plan and shall define all procedures followed and those loading and operational conditions that were used to verify and demonstrate the structural integrity and functional performance of the tankage. The report shall provide the following data for each tankage tested.

Fluid(s)
Government drawing No. _____ (if applicable)
Manufacturer's name _____
Manufacturer's drawing No. _____
Material or construction
Tank capacity _____ (US gallons or cu ft)
Tank weight _____ (lb)
Dimensions _____ (diameter, length, width, height, etc.)
Weight per sq ft of cell construction _____ lb (flexible cells or liners)
Ply by ply weight per sq ft _____ lb (flexible cells or liners)
Ply by ply thickness _____ in. (flexible cells or liners)
Description and manufacturer's stock No. of each ply _____ (flexible cells or liners)
Working pressure ____ psia from ____ °F to ____°F (____°C to ____°C)

In the event that any of the above data is classified information, the deviation from the specified value may be substituted for the actual value.

4.3.4 Notification of approval or disapproval.

4.3.4.1 Material subjected to preliminary tests. Written notification of approval or disapproval will be given by the procuring activity to the tank manufacturer.

4.3.4.2 Tanks subjected to preproduction tests. Formal notification of approval or disapproval will be given by the procuring activity to the vehicle manufacturer. A copy of such notification will be supplied to the tank manufacturer.

4.3.5 Prior approval. Changes made in the design or material which affect contract requirements covering weight, performance, cost, interchangeability, or affect durability of either parts or the complete tank which have previously passed preproduction test shall be submitted to the procuring activity for approval. Unless otherwise specified, the tank shall satisfactorily pass the preproduction test prior to acceptance of the modified tank. The right is reserved to require the submission of a representative sample or of complete tanks to a Government laboratory or procuring activity for any tests considered necessary to check conformance of the tanks with the requirements of this specification.

4.4 Preliminary tests.

4.4.1 Sampling. Preliminary test samples shall consist of the following:

(a) All tanks:

(1) Two test tanks, cylindrical in form, with outside dimensions 18 inches in diameter and 24 inches long.

(2) If, in the opinion of the contractor, the above configuration is not applicable, a scale model or actual tank approved by the procuring activity may be utilized.

(b) Tanks which have liners:

(1) One sample of liner, 3 feet square, containing a seam, if used.

4.4.2 Tests. The sample test tanks and liners, if used, shall be subjected to the applicable tests listed in table I and described in 4.9 of this specification.

4.5 Preproduction tests.

4.5.1 Sampling instructions. Preproduction test samples shall consist of a sufficient quantity of tanks to complete all the required preproduction tests, together with the tank support jig and mounting structure to simulate the actual installation. The request for authorization for preproduction tests shall include the following detailed information relative to the tank or cell that is to be tested:

(a) One copy of manufacturer's material, fabrication, and inspection specification.

(b) Model designation of vehicle for which tank or cell is intended.

(c) Detail drawings of all fittings and attachment points, with sections of same showing ply buildup.

(d) Detailed perspective drawing of inner-layer ply showing seam laps and fitting attachments.

(e) Vehicle contractor's applicable tank or cell drawings.

(f) A reproducible isometric drawing, similar to figure 3, on 8-1/2 by 11 inch paper showing fitting locations, overall dimensions, weight, capacity, surface area, part numbers, and construction number.

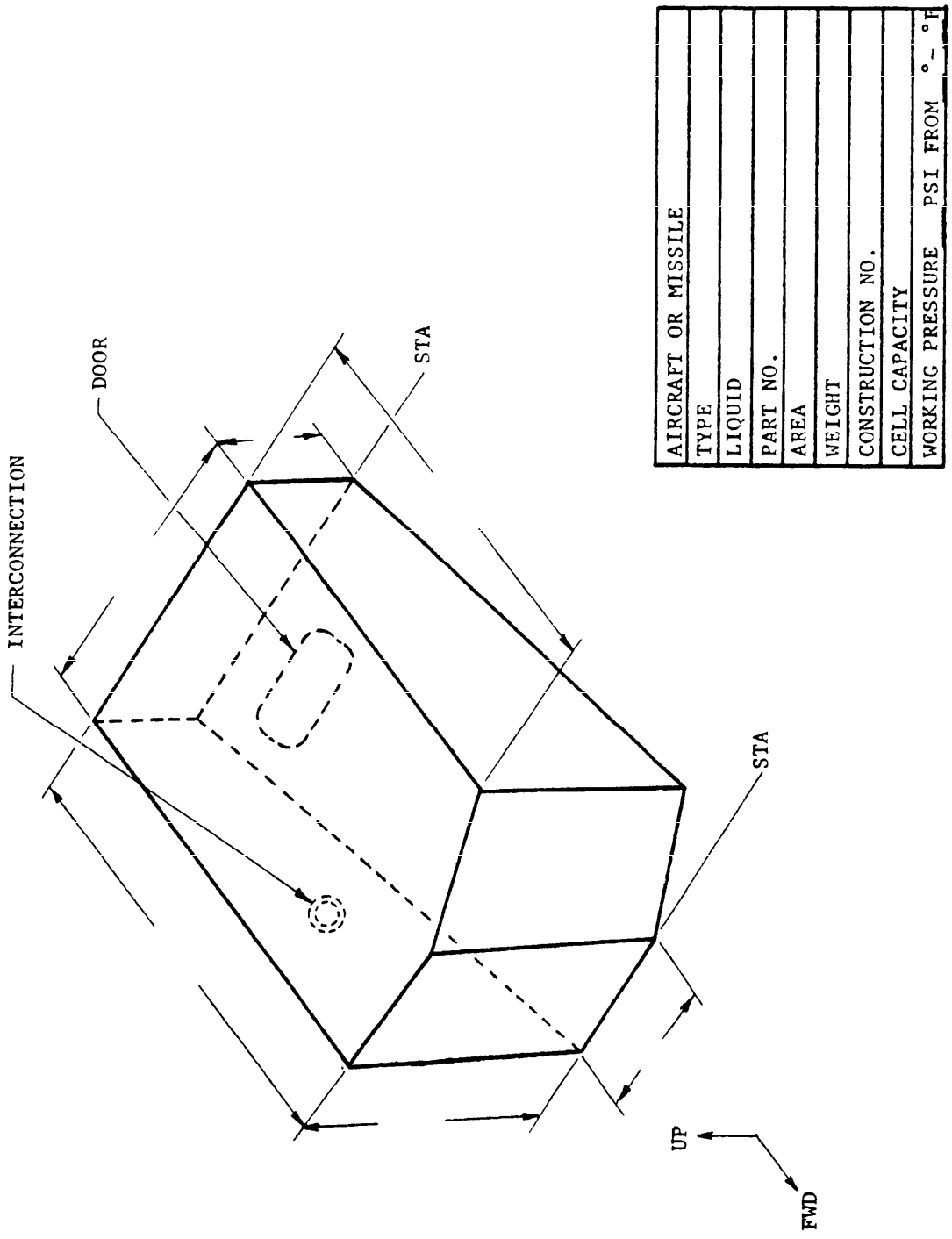


Figure 3. Tank diagram

(g) A tank or cell location chart with data as shown in figure 4.

(h) Type of fluid(s) for which intended.

(i) Working pressure ____ psia from ____°F to ____°F (____°C to ____°C)

4.5.2 Tests. The tank and liner, if used, shall be subjected to the applicable tests listed in table II and described in 4.9 of this specification.

4.6 Acceptance tests. The acceptance tests shall consist of individual tests and sampling tests.

4.6.1 Individual tests. Each tank shall be subjected to the following tests, as described in 4.9 of this specification.

(a) Examination of product

(b) Installation

(c) Leakage

(d) Proof pressure

(e) Radiographic inspection (of welds, when specified)

4.6.2 Sampling tests.

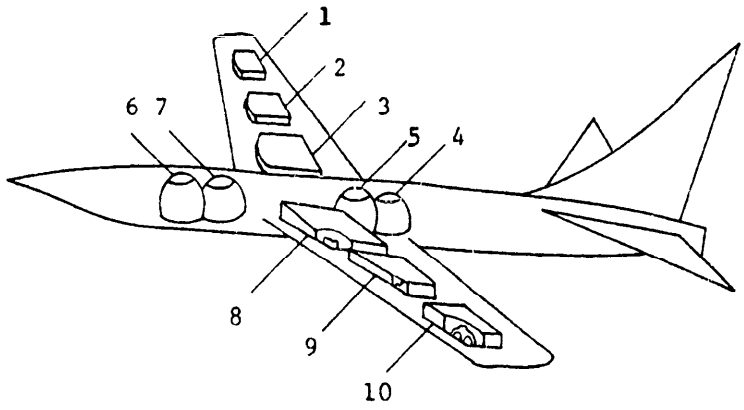
4.6.2.1 Sampling. Tanks shall be selected by the Government Inspector in accordance with the following schedule. A lot shall consist of all tanks produced at a particular plant for a particular installation and approved under the same test and identified with the manufacturer's same construction number. At the discretion of the procuring activity, sampling tests may be waived when the total quantity of tanks procured is less than 50.

Number of samples	Number in lot
1	0 to 50
1	Each additional 60-day production or 500 tanks, whichever occurs first.

4.6.2.2 Tests. Samples shall be subjected to the following tests, as described in 4.9 of this specification.

(a) Slosh-vibration

(b) Fluid resistance (type I tanks)



TANK DATA

NO. FROM SKETCH	CAPACITY (GALLONS) OR CU FT	TYPE	FLUID	AIRFRAME MFG PART NO.	TANK MFG	DRY WT (LB)	MATL	SPEC NO.	APPROVAL DATE

Figure 4. Sample of tank location chart

TABLE II

Preproduction tests

Paragraph	Tests	Metallic shell			Nonmetallic shell				
					Rigid			Flexible	
		All metallic	Removable liner	Fixed liner	Without liner	Removable liner	Fixed liner	Removable liner	Fixed liner
3.13.2	Cleaning	x	x	x	x	x	x	x	x
4.9.2	Installation	x	x	x	x	x	x	x	x
4.9.3	Handling	-	x	-	-	x	-	x	-
4.9.4.1.3	Vibration - Type II tank 1/	x	x	x	x	x	x	-	-
4.9.4.3	Slosh-vibration 2/	x	x	x	x	x	x	x	x
4.9.5	Fluid resistance 2/	x	x	x	x	x	x	x	x
4.9.6	Low-temperature leakage	x	x	x	x	x	x	x	x
4.9.7	Pressure cycling 3/	x	x	x	x	x	x	-	-
4.9.8	Accelerated load	x	x	x	x	x	x	x	x
4.9.9	Capacity	x	x	x	x	x	x	x	x
4.9.10	Weight	x	x	x	x	x	x	x	x
4.9.11.1	Leakage	x	x	x	x	x	x	x	x
4.9.11.2	Proof pressure 4/	x	x	x	x	x	x	x	x
4.9.11.3	Burst pressure 4/	x	x	x	x	x	x	x	x

1/ This test applicable only to type II tanks.
2/ This test applicable only to type I tanks.
3/ This test applicable only to pressurized tanks.
4/ This test not applicable to flexible liners installed in integral tanks.

Symbols: x Test applicable.
- Test not applicable.

(c) Accelerated load

(d) Pressure, proof

(e) Pressure cycling

4.6.3 Rejection and retest. When sampling tests are specified on a number of items that are selected as representative of a certain quantity, and one or more of this number fails to meet the specified test(s), acceptance of all items shall be withheld until the extent and cause of failure is determined. For operational reasons, individual tests may be continued pending investigation of a sampling test failure, but the final acceptance of the product is contingent upon the procuring activity's decision regarding the overall conformance of the product to specification requirements. Rejected units shall be replaced or reworked to correct the defects, after which all necessary tests shall be repeated. Rejected equipment shall not be resubmitted for inspection without furnishing all particulars concerning previous rejections and the measures taken to correct the defect(s). If investigation indicates that the defects may exist in items previously accepted, full particulars concerning the defect(s) found, including recommendations for correction shall be furnished to the procuring activity.

4.7 Additional tests. Additional tests, if necessary, for the purpose of testing special features of the tank and fluids shall be as mutually agreed upon between the contractor and the procuring activity.

4.8 Test conditions. Unless otherwise specified by the procuring activity, the following test conditions shall apply during the tests performed in accordance with this specification.

4.8.1 Test fluids. The tank shall be tested, using the type of fluid(s) for which the tank is intended. The test fluid(s) shall conform to approved specifications. However, if a test fluid other than that shown in the rocket engine model specification will permit required performance data to be obtained in a less hazardous and more economical test, the substitute fluid may be used upon approval of the procuring activity.

4.8.2 Tank mounting structure. The tank mounting structure shall correspond as closely as possible with respect to shape, dimensions, and material to the tank supporting structure in the vehicle. The necessary stops, cushions, and pads, identical with those used in the finished vehicle, for mounting and supporting the tank, shall be provided. The test tank shall be mounted in the test structure in a manner which simulates the actual installation. In addition, all lines attached to the tank in the actual installation shall be included. The length and configuration of these lines shall be as in the actual installation from the tank to the first support.

4.8.3 Tank support jig. The support jig shall be suitable for carrying the mounted sample tank and designed for bolting to the vibrator and rocket assembly. The jig framework shall be sufficiently rigid to prevent the possibility of additional stresses being imposed on the mounted tank owing to flexure of the jig framework.

4.8.4 Special environmental. If the test methods specified herein do not truly represent the tank environment, for example, temperatures resulting from aerodynamic heating in excess of +160°F, (71.1°C), the test method shall be modified as agreed upon by the contractor and the procuring activity to simulate operational conditions.

4.9 Test methods.

4.9.1 Examination of product. Each tank shall be carefully examined to determine conformance with all the requirements of this specification for which no specific tests are described.

4.9.2 Installation. The tank dimensions shall be checked, using a test jig fabricated in accordance with design requirements furnished by the vehicle manufacturer. In the case of X and Y models, the actual structure may be used in lieu of a jig. The location of all fittings and the tank dimensions shall be within the allowable tolerances.

4.9.3 Handling. The handling test shall consist of the following:

(a) Type I, class 1 and 2 tanks: The cell or cells shall be folded, prepared for packaging, and unfolded 20 times; installed, removed, and reinstalled in the test structure 5 times, using a procedure specified by the contractor and approved by the procuring activity. The cell or cells shall be inspected for flaws after folding, preparing for packing and unfolding 20 times and following each installation in the test structure.

(b) Type I, class 3 tanks: The cell or cells shall be installed in the test structure, removed, prepared for packaging, and reinstalled 5 times, using a procedure specified by the contractor and approved by the procuring activity. The cells shall be in a satisfactory condition upon completion of these tests.

4.9.4 Vibration and slosh.

4.9.4.1 Vibration.

4.9.4.1.1 Type I tank.

4.9.4.1.1.1 Procedure I. The tank filled with the quantity of the intended fluid specified by the procuring activity shall be vibrated throughout the frequency range specified by the procuring activity and all resonances determined. The vibration input shall simulate actual tank vibration encountered in the vehicle. The tank shall then be

vibrated at the most critical resonant frequency for 25 hours at an input acceleration agreed upon by the contractor and procuring activity while being pressure cycled from zero psig to maximum working pressure at a rate of 1 cycle per minute during the first hour and alternate one-hour periods thereafter. The tank shall then be drained, inspected for damage, and leakage tested (4.9.11.1).

4.9.4.1.1.2 Procedure II. The tank, filled two-thirds full with the intended fluid, shall be vibrated throughout the frequency range specified by the procuring activity, and all resonances determined. The vibration input shall simulate actual tank vibration encountered in the vehicle. The tank shall then be vibrated at the most critical resonant frequency for 15 hours at an input acceleration agreed upon by the contractor and the procuring activity while being pressure cycled from zero psig to maximum working pressure at a rate of 5 cycles per hour during the first hour and alternate 1-hour periods thereafter. The tank shall then be drained, inspected for damage, and leakage tested (4.9.11.1).

4.9.4.1.2 Type II tank. The tank, pressurized to maximum working pressure, shall be vibrated throughout the frequency range specified by the procuring activity, in each of three mutually perpendicular planes and all resonances determined. The pressurization gas shall be approved by the procuring activity. The tank shall then be vibrated at the most critical resonant frequency for 25 hours while being pressure cycled from maximum working pressure to zero psig at a rate and with an input acceleration agreed upon by the contractor and the procuring activity. The tank shall then be inspected for damage.

4.9.4.2 Slosh.

4.9.4.2.1 Type I, class 1 and 2 tanks. The tank shall be filled two-thirds full with the intended fluid and sloshed until a total of 40,500 cycles have been completed in approximately 15 hours with the sloshing rate varied from 14 to 60 cycles per minute at a total rocking angle varied from 30 degrees to 5 degrees. With the exception of tanks that are intended for use with fluids having boiling points below -65°F (-53.9°C) or freezing points above -65°F (-53.9°C), the tank and fluid shall be maintained at a maximum temperature of -65°F (-53.9°C) during the first four hours of sloshing, then the fluid recirculated and raised 30°F (16.7°C) per hour until the tank and fluid are at a minimum temperature of +160°F (71.1°C), and maintained at that temperature for the remainder of the test. Upon completion of the test, the tank shall be drained, inspected for damage, and leakage tested (4.9.11.1).

4.9.4.2.2 Type I, class 3 tanks. The tank shall be filled two-thirds full with the intended fluid and sloshed until a total of 13,500 cycles have been completed in approximately 5 hours with the sloshing rate varied from 14 to 60 cycles per minute at a total rocking angle varied from 30 degrees to 5 degrees. With the exception of tanks that

are intended for use with fluids having boiling points below -65°F (-53.9°C) or freezing points above -65°F (-53.9°C), the tank and fluid shall be maintained at a maximum temperature of -65°F (-53.9°C) during the first hour of sloshing, then the fluid recirculated and raised 115°F (63.9°C) per hour until the tank and fluid are at a minimum temperature of +160°F (71.1°C) and maintained at that temperature for the remainder of the test. Upon completion of the test, the tank shall be drained, inspected for damage, and leakage tested (4.9.11.1).

4.9.4.3 Slosh-vibration.

4.9.4.3.1 Type I, class 1 and 2 tanks. Unless otherwise specified, the tank shall be subjected simultaneously to the following tests.

(a) The test outlined in 4.9.4.2.1.

(b) The test outlined in 4.9.4.1.1.1.

(c) Four expulsion tests at the flow rate and conditions specified in the vehicle specification, with at least two tests at the low-temperature condition and one test at the high-temperature condition.

4.9.4.3.2 Type I, class 3 tanks. Unless otherwise specified, the tank shall be subjected simultaneously to the following tests.

(a) The test outlined in 4.9.4.2.2.

(b) The test outlined in 4.9.4.1.1.1.

(c) Two expulsion tests at the flow rate and conditions specified in the vehicle specification, with at least one test at the low-temperature condition and one test at the high-temperature condition.

4.9.5 Fluid resistance (type I tanks). The effect on tanks of varying the chemicals in fluids, within the specification limits of the fluids, drying in air, or the worst combination thereof shall be determined. Any unsatisfactory condition or indication of fluid leakage shall be cause for rejection.

4.9.5.1 Repeated use and continuous storage. Each tank shall be subjected to the following tests.

(a) The tank shall be aged for a period of four days in the fluid with which it is to be used at ambient temperatures, drained to the extent normally encountered in use, and allowed to set for one day at ambient temperatures and conditions normally encountered in service use.

(b) The tank shall be aged for a period of four days in the fluid with shich it is to be used at a temperature of +160°F (71.1°C), drained, and maintained for a period of two days at an ambient temperature of +160°F, (71.1°C) under conditions normally encountered in use. This test shall be repeated for a total of two cycles.

4.9.5.2 Single use and limited storage. Each tank shall be subjected to the following tests.

(a) The tank shall be aged for a period of two days in the fluid with which it is to be used at ambient temperatures, drained to the extent normally encountered in use, and allowed to set for one day at ambient temperatures and conditions normally encountered in service use. This test shall be repeated for a total of two complete cycles.

(b) The tank shall be aged for a period of two days in the fluid with which it is to be used at a temperature of +160°F (71.1°C), drained, and maintained for a period of one day at an ambient temperature of +160°F (71.1°C) under conditions normally encountered in use. This test shall be repeated for a total of two cycles.

4.9.6 Low-temperature leakage. Tanks utilizing fittings which incorporate organic or inorganic materials to effect a seal shall be tested for leakage upon completion of the fluid resistance test, 4.9.5. The tank shall be subjected to hot air dry-out at a temperature of +160°F (71.1°C) for a period of 7 days. The tank shall then be refilled with the fluid for which it is to be used and allowed to remain at -65°F (-53.9°C) for a minimum period of 3 days. The tank shall then be returned to room temperature and allowed to stand in order to check leakage. The tank shall then be drained and examined for any unsatisfactory conditions or indications of fluid leakage. Any leakage shall be considered as a tank failure.

4.9.6.1 Low-temperature leakage (alternate procedure). In lieu of using a complete tank for this test, the following procedure may be used if prior approval has been granted by the procuring activity. The test shall be made on a representative sample of typical fittings with all components and gaskets installed to duplicate tha actual tank installation. The jig shall be used with a fluid head equivalent to the actual tank installation. The procedures described in 4.9.4.1.1.1 and 4.9.4.1.1.2, as applicable, and in 4.9.6 shall be followed. Any leakage from fittings shall constitute failure.

4.9.7 Pressure cycling. The tank shall be filled with the intended fluid and pressure cycled at a rate agreed upon by the contractor and the procuring activity from atmospheric to working pressure at ambient temperature for a total of 2,000 cycles for class 1 tanks and 500 cycles for class 2 tanks.

4.9.8 Accelerated load. The tank, filled with the applicable fluid under the normal working pressure, shall be mounted in a structure providing support equivalent to the vehicle structure for which it is designed. A load test shall be conducted to determine the suitability of the tank installation under the most critical combination of the vehicle design accelerations and operating pressures. The tests shall be conducted to simulate such loading conditions. Either dynamic or static tests may be used as specified by the procuring activity in accordance with the loads specified in 3.10. Any failure, or deflection of the tank sufficient to cause interference with the functional operation of components at the limit loads, shall be cause for rejection. This tank installation shall withstand the ultimate loads for a period of three minutes. This test is not applicable if all loads are carried by the aircraft structure, provided the surrounding structure is adequately tested to insure satisfactory performance under all design loads.

4.9.9 Capacity. The capacity of the finished tank shall be checked to determine compliance with the tolerance requirements as specified in 3.3.3.

4.9.10 Weight. The weight of the finished tank shall be checked to determine compliance with the tolerance requirements as specified in 3.3.8.

4.9.11 Pressure test.

4.9.11.1 Leakage. Tanks, except removable liners, shall be tested for leakage by one of the following procedures: (a) Use of a halogen "sniffer", or (b) other methods of equivalent sensitivity and reliability as approved by the procuring activity. The leak detection gas to be used shall be approved by the procuring activity. The test pressure shall start at a low differential pressure and be increased at a uniform rate to the working pressure or to 0.75 times proof pressure, whichever is lower. The maximum test pressure shall be maintained for a minimum of one hour. Any evidence of external or internal leakage greater than the specified maximum rate shall be cause for rejection of the tank.

4.9.11.1.1 Removable liners. The liner, supported as necessary to maintain shape shall be tested for leakage by one of the following procedures: (a) Use of a halogen "sniffer", or (b) other methods of equivalent sensitivity and reliability as approved by the procuring activity. Evidence of leakage which adversely affects the function of the liner shall be cause for rejection.

4.9.11.2 Proof pressure. Proof pressure tests shall be conducted on pressurized tanks. Hydrostatic pressure equal to proof pressure shall be imposed on the tank and held for a minimum of two minutes. Evidence of permanent set in excess of that specified on approved drawings, distortion, or failure of any kind shall be cause for rejection.

4.9.11.3 Burst pressure. Burst tests shall be conducted on all tanks which contain pressure. The minimum bursting pressure shall be 1.33 times the proof pressure. During these tests, the pressures causing initial yield of the material shall be determined.

4.9.12 Radiographic inspection. Radiographic inspection of materials shall be in accordance with MIL-STD-453. Laboratories performing radiographic inspection shall be certified in accordance with MIL-STD-453.

4.9.13 Humidity. A 12- by 12-inch sample of the composite cell construction shall be subjected for a total period of 15 days to the following 24-hour cycle.

(a) Eight hours at 130° ±3°F (54.5°C ±1.6°C) and 100 percent relative humidity.

(b) Four hours cooling to approximately 70° ±3°F (21.1°C ±1.6°C).

(c) Eight hours at 70° ±3°F (21.1°C ±1.6°C) and 100 percent relative humidity.

(d) Four hours heating to 130° ±3°F (54.5°C ±1.6°C).

There shall be no corrosion, peeling, cracking, warping, blistering, delamination, or discoloration of the cell after this period.

4.9.14 Fluid resistance of exterior surfaces. Upon request by the procuring activity, the tank shall be placed in a container sufficiently large to permit immersion of one-half the depth of the tank in the intended fluid. The tank shall be immersed for 24 hours at the ambient temperature. The tank shall then be removed and examined. The exterior surface of the tank construction shall show no unsatisfactory condition.

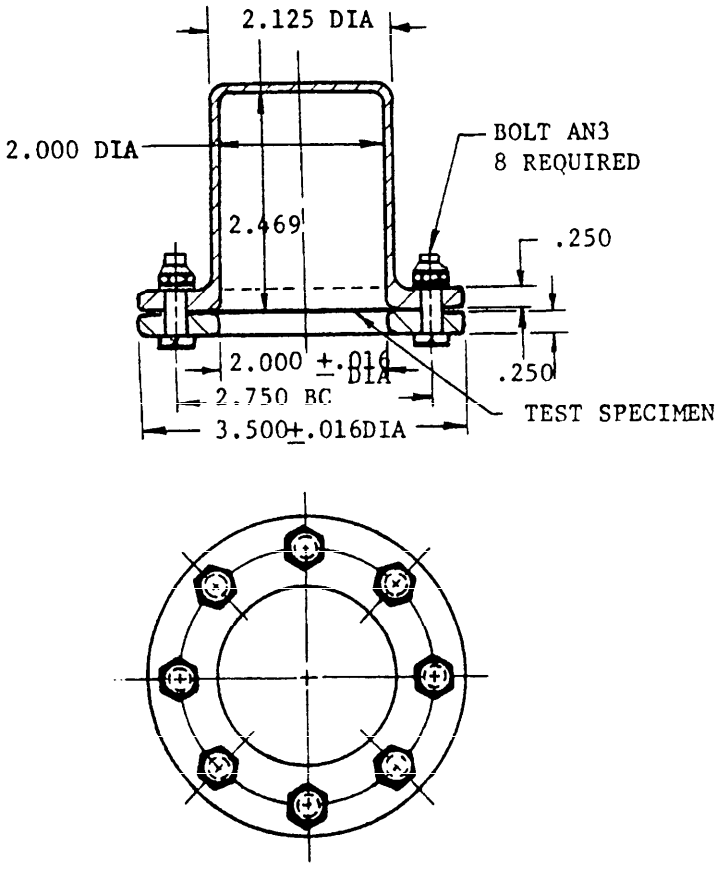
4.8.14.1 Fluid resistance of exterior surface (alternate procedure). In lieu of using a complete tank for this test, the following procedure may be used if prior approval has been granted by the procuring activity. The test shall be made on a representative sample of a section of the tank, including welded or other joints and typical fittings. Test procedures in 4.9.14 shall be followed.

4.9.15 Permeability (hydrocarbon fluid).

4.9.15.1 Test apparatus. The test apparatus shall consist of the following:

(a) Permeability cup and ring constructed in accordance with figure 5.

(b) A nylon solution shall be used for sealing test disk to permeability cup.



DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ±.010.

Figure 5. Diffusion cup assembly

4.9.15.2 Preparation of test specimens. The uncured inner liner shall be applied to a 10- by 10-inch piece of corrugated fiberboard coated on one side with a suitable water-soluble breakaway agent. The exposed surface of the inner liner shall be coated with prime cement and barrier resin (if required) in accordance with applicable manufacturing specifications. The assembly shall be wrapped with cellophane and covered with a suitable waterproof bag. The assembly shall be vulcanized, using the same method as in regular production. After vulcanization, the waterproof bag and cellophane shall be removed, and the inner liner shall be removed from the fiberboard, using water if necessary. Free moisture shall be wiped from the assembly, and it shall be conditioned 24 hours at a constant temperature of 77° ±5°F (25°C ±2.8°C) and a relative humidity of 40 ±5 percent. Two suitable 2.5-inch disks shall be cut from the vulcanized panel. One hundred milliliters of type III test fluid conforming to TT-S-735 shall be placed in the permeability cup as shown in figure 5. A suitable nylon solution shall be applied to the face of the cup flange covering the area inside the bolt circle. The nylon solution shall be allowed to come almost to dryness, then the test disk shall be applied to the cup with the barrier, if any, facing outward. The assembly shall be completed by attaching the bolting ring and tightening the bolts in accordance with the following schedule.

Inner liner type	Bolt torque
Gun stock	5 - 10 inch-pounds
Coated fabrics	15 - 20 inch-pounds
Unsupported plastic films	20 - 25 inch-pounds

4.9.15.3 Method of conducting test. Permeability cups, prepared as specified in paragraph 4.9.15.2 shall be placed in a suitable rack at a constant temperature of 77° ±5°F (25°C ±2.8°C) and relative humidity of 40 ±5 percent. After allowing one hour for equilibration, the cup shall be weighed to the nearest 0.005 gram and placed in the rack with the face of the cup facing upward. The cup shall be kept at the above constant temperature for 24 hours, then weighed to check for excessive vapor loss. The bolts shall be retorqued if necessary. The cup shall be inverted (test disk down) in a rack that permits free access to air to the test disk. Cups shall be weighed at the end of the third, fifth, and eighth day after inverting. Defective films or leaks caused by faulty assembly will usually be found when making the weighing on the third day. The diffusion rate calculation shall be made on the fifth to the eight day period and expressed as fluid ounces per square foot per 24 hours. The permeability shall be less than 0.025 fluid ounces per square foot per 24 hours for each sample tested. Diffusion expressed in fluid ounces per square foot per 24 hours equals the gram loss of the test specimen per 24 hours multiplied by a factor K which is defined as follows:

$$K = \frac{144}{(\text{sp gr})\ (29.573)\ (3.142)\ (R)^2}$$

Where sp gr = specific gravity of test fluid at 77°F (25°C)
R = inside radius of test cup expressed in inches.

Alternate test methods may be used for other materials if approved by the procuring activity.

4.9.16 Fluid contamination (hydrocarbon fluid).

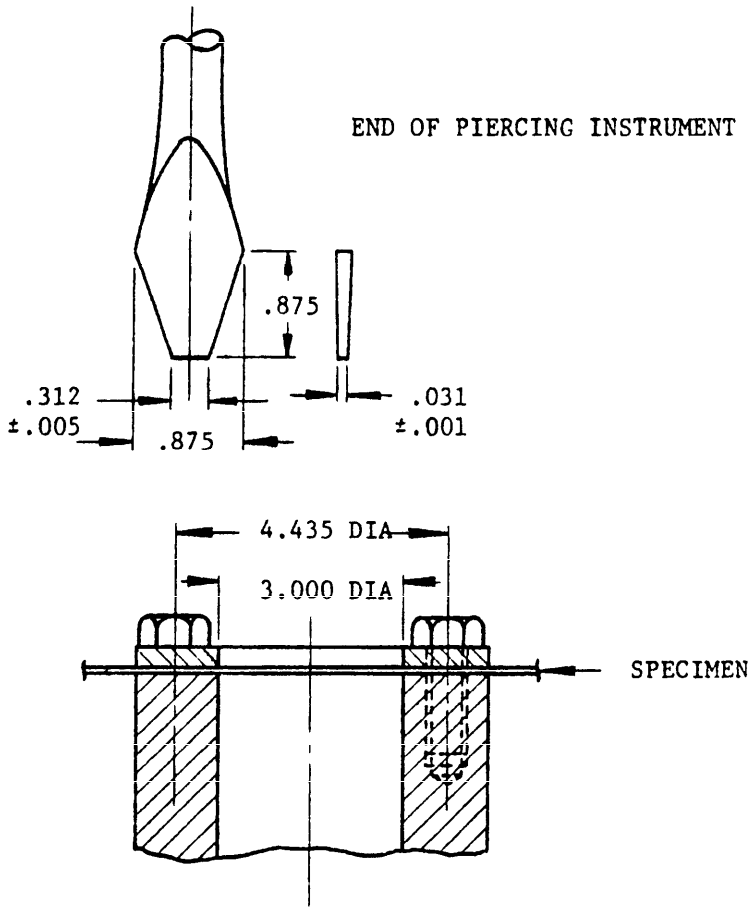
4.9.16.1 Nonvolatile gum residue. A five-gram sample of the inner layers, up to the barrier, shall be diced up into approximately 0.062-inch squares and placed in a flask containing 250 milliliters of test fluid conforming to TT-S-735, type III, and allowed to stand for 48 hours at 77° ±5°F (25°C ±2.8°C). The contaminated test fluid shall be decanted off, and the nonvolatile gum residue determined by Federal Test Method STD No. 791, except that the total evaporation time shall be 45 minutes. The nonvolatile material shall not exceed 60 milligrams per 100 milliliters of the contaminated fluid.

4.9.16.2 Stoved gum residue. The beakers containing the nonvolatile material shall be placed in an appropriate bath maintained constantly at a temperature of 572° ±9°F (300°C ±5°C) for 30 minutes. After cooling in a closed container, the beakers shall be weighed. The stoved gum residue shall not exceed 20 milligrams per 100 milliliters of the contaminated fluid, after necessary corrections have been made for preformed gums originally present in the test fluid.

4.9.17 Water resistance. The tensile strength of the inner-layer ply, without barrier, shall be determined before and after immersion in water for 72 hours at a temperature of 120°F ±4°F (48.9°C ±2.2°C). The tensile strength reduction shall be reported to the activity responsible for approval.

4.9.18 Seam adhesion. The seam adhesion of the liner to itself shall be tested along the length of the seam by the strip-back method using a jaw separation rate of 2 inches per minute. In cases where the adhesion of the seam is less than the strength of the material, the adhesion shall be a minimum of 12 pounds per inch.

4.9.19 Puncture resistance. A sample of the cell wall shall be fastened in a specimen holder in accordance with figure 6. A piercing instrument with its end in accordance with figure 6 shall be forced against the cell wall at approximately the center of the area enclosed by the specimen holder. The force required to puncture the cell wall shall be not less than 15 pounds.



DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ±.010.

Figure 6. Specimen holder

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be Level A or C as specified by the procuring activity (6.2).

5.1.1 Level A. Unless otherwise specified, each tank shall be preserved and packaged in accordance with Method III of MIL-P-116. Tank openings, fittings, etc., shall be adequately sealed to prevent entrance of dirt or other foreign materials. Closures conforming to MIL-C-5501 shall be used wherever practical. All component parts, tools, etc., that are not installed on the tanks, but are shipped with the tanks shall be preserved and packaged in accordance with the applicable method of MIL-P-116. Methods selected shall be consistent with the nature of the equipment, accessory, or part and its function, and shall be the minimum required to provide adequate protection against corrosion, other forms of deterioration and physical damage during shipment and storage. The packaged items shall be adequately secured to the interior surface of the shipping container.

5.1.2 Level C. Tanks shall be preserved and packaged to provide adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use. This level may conform to the supplier's commercial practice provided the latter meets the requirements of this level.

5.2 Packing. Packing shall be Level A, B, or C as specified by the procuring activity (6.2).

5.2.1 Level A or B. Tanks preserved and packaged as specified in 5.1.1 shall be packed in exterior shipping containers conforming to PPP-B-601 and MIL-C-9437. Cushioning, blocking, and bracing of metal and other noncollapsible tanks shall conform to the requirements of MIL-STD-186.

5.2.1.1 Rigid tanks. Each tank assembly shall be packed in an open crate conforming to MIL-C-9437.

5.2.1.2 Flexible tanks. Each tank assembly shall be packed in a cleated plywood exterior shipping container conforming to PPP-B-601. Plywood shall conform to Type I or II, class 2 of NN-P-515. Bladder type tanks when packed for shipment shall be so folded as to contain the least number of tight or sharp folds or creases. Adequate padding or cushioning conforming to PPP-C-843 shall be used at all unavoidable sharp folds. Extending metal parts, plugs, etc. shall be adequately wrapped or cushioned to prevent damage to the tank.

5.2.2 Level C. Each tank shall be overpacked in shipping containers that will provide adequate protection at the lowest rate against damage during direct domestic shipment from the supply source to the first receiving activity for immediate use. This level shall conform to applicable carrier rules and regulations and may be the supplier's commercial practice provided the latter meets the requirements of this level.

5.3 Marking. In addition to any special marking required by the contract or purchase order (6.2) interior and exterior containers shall be marked in accordance with the requirements of MIL-STD-129. The shipment marking nomenclature and stock number shall be as follows: Tank, removable, liquid propellant rocket engine, Type ____, Class ____, Capacity ____, MIL-T-5208, Manufacturer's Part No. ____, Manufacturer ____, Federal Stock No. ____.

6. NOTES

6.1 Intended use. Removable tanks covered by this specification are intended for carrying engine fluids used in liquid propellant rocket engine systems.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.

(b) Type and class of tank required (1.2).

(c) Selection of applicable levels of preservation, packaging, and packing (5.1 and 5.2).

(d) Whether special marking is required (5.3).

6.2.1 Approval of preproduction test samples. In the procurement of nonmetallic tanks, the right is reserved to reject any samples submitted for preproduction tests when the materials and construction have not been tested in accordance with the requirements of the preliminary tests. The invitation for bids and the contract should specify the point of inspection for these tests.

6.3 Definitions.

6.3.1 Tank, aircraft (class 1) and vehicle-launched missile (class 2). Aircraft and vehicle-launched missile denotes a tank for a liquid propellant rocket engine system installation in either an inhabited flight vehicle or a flight vehicle in which the rocket engine is operated prior to or during launching from an inhabited vehicle.

6.3.2 Tank, remotely launched missile (class 3). Remotely launched missile denotes a tank for a liquid propellant rocket engine system installed in a flight vehicle other than that specified in 6.3.1.

6.3.3 Tank, nonmetallic. Nonmetallic denotes a tank incorporating integral nonmetallic materials. (See tables I and II.)

6.3.4 Pressure, burst. Burst pressure is the pressure which, once applied to an item, results in exceeding its ultimate strength.

6.3.5 Pressure, proof. Proof pressure is the test pressure to which an item is subjected without deformation adversely affecting rocket engine tank operation, or permanent set. Proof pressure is 1.5 times the nominal working pressure for aircraft and vehicle-launched missile rocket engine tanks plus the difference between the nominal working pressure and maximum transient pressure.

6.3.6 Pressure, nominal working. Nominal working pressure is a maximum pressure to which the component is subjected under steadystate condition.

6.3.7 Capacity, gross. The gross tank capacity is the internal fluid volume of the tank at a specified temperature.

6.3.8 Capacity, usable. The usable tank capacity is the fluid volume of the tank available for the engine under specified operating conditions.

6.3.9 Allowable permanent set. Allowable permanent set is the amount of material strain permissible.

Custodians:

Army - MI
Navy - AS
Air Force - 12

Preparing activity:

Air Force - 12

Project No. 2845-0008

Review activities:

Air Force - 12, 19, 70
AS, MI

Reviewer/user information is current as of the date of this document. For further coordination of changes to this document, draft circulation should be based on the information in the current DOD Index of Specifications and Standards.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R006

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION MIL-T-5208B Tanks, Removable, Liquid Propellant Rocket Engine, General Specification For

ORGANIZATION *(Of submitter)*	CITY AND STATE

CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)*	DATE

DD FORM 1 APR 63 1426 REPLACES NAVSHIPS FORM 4863, WHICH IS OBSOLETE C-8278

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