INCH-POUND

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SUPERSEDING
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MILITARY SPECIFICATION

COMPOSITION CH-6

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

1. SCOPE

1.1 Scope. This specification establishes the requirements for an explosive designated as Composition CH-6.

1.2 Classification. Explosive Composition CH-6 shall have the following classes:

Class 1 - Composition CH-6 which is subjected to calibration testing with a lower sensitivity level of 3.5 decibang (DBg) and an upper sensitivity level of 6.0 DBg.

Class 2 - Composition CH-6 which has the same fixed lower sensitivity level (3.5 DBg) as the Class 1 material when subjected to calibration testing but a different value for the upper sensitivity. This value shall be specified at the time of procurement.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Commander, Indian Head Division, Naval Surface Warfare Center, 101 Strauss Avenue, Indian Head, MD 20640-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1376

SPECIFICATIONS

FEDERAL

RR-S-366	Sieves; Standard, Testing

MILITARY

MIL-G-155	Graphite
MIL-R-398	RDX
MIL-C-51511	Calcium Chloride, Technical

STANDARDS

FEDERAL

FED-STD-313	Material Safety Data, Transportation Data and Disposal for Hazardous Materials Furnished to Government Activities

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage

(Unless otherwise indicated, copies of federal and military specifications and standards are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation (see 6.2).

DRAWINGS

NAVAL SEA SYSTEMS COMMAND (CAGE Code 10001)

LD 70518	Impact Machine
LD 479544	Powder Mobility Gage for CH-6 Explosive
LD 479593	Initiation Sensitivity Test Fixture for CH-6 Explosive

LD 549486	Explosive Properties, List of Drawings, Assemblies, Parts, Specifications, Etc.
LD 1620714	Alternate Dent Block
1620713	Sample Pellet
2426912	Explosives Properties Assembly
2426913	Donor Assembly
2426914	Acceptor Assembly
2426915	Acceptor Body
2426916	Dent Block
2426917	Attenuator
2426918	Holder

(Application for copies should be addressed to the Commanding Officer, Naval Ordnance Station, Crane Division, Naval Surface Warfare Center, Attention: Code 802, Louisville, KY 40214-5001.)

U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER (ARDEC)

7548644	Box, Packing for High Explosives, Assembly, Details, Packing and Marking
7548645	Carton, Packing, Reusable, Collapsible for High Explosives

(Application for copies should be addressed to the Commander, U.S. Army Information Systems Command, Attn: ASQNC-APT-OPT, Picatinny Arsenal, NJ 07806-5000.)

CODE OF FEDERAL REGULATIONS

46 CFR 100-199	Transportation

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

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issue of the document which is DOD adopted is that listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issue of the document not listed in the DODISS is the issue of the document cited in the solicitation (see 6.2).

EXXON CHEMICAL CORPORATION

Vistanex LM-MH	Polyisobutylene

(Application for copies should be addressed to the Exxon Chemical Corporation, P.O. Box 3272, Houston, TX 77253.)

(Non-Government standards and other publications are normally available from the organizations that prepare or 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 document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. Composition CH-6 is a homogeneous explosive mixture of RDX, graphite, calcium stearate and polyisobutylene. This mixture when compared to tetryl, withstands higher temperature before cook off, has higher output, yet matches the sensitivity of tetryl. The flow characteristics of this mixture permit the manufacture of Composition CH-6 pellets of a density of at least 1.61 grams per cubic centimeter (g/cc) and various diameters that will hold together under ordinary handling conditions.

3.2 First article. Unless otherwise specified in the contract or purchase order (see 6.2), a first article sample (see 6.3) shall be tested as specified in 4.4.

3.3 Materials. The materials used in the manufacture of the Composition CH-6 explosive purchased under this specification shall conform to their respective specifications prior to their usage and shall be of the type, grade, and/or class as specified in 3.3.1 through 3.3.3 (see 6.6).

3.3.1 RDX explosive. The RDX explosive shall meet the requirements of MIL-R-398, Type II, Class 1.

3.3.2 Graphite. The graphite material shall meet the requirements of MIL-G-155, Grade I.

3.3.3 Polyisobutylene. The polyisobutylene shall meet the requirements of Polyisobutylene Vistanex LM-MH as manufactured by the Exxon Chemical Corporation, P.O. Box 3272, Houston, TX 77253, or equivalent.

3.4 Chemical and physical properties requirements. Unless otherwise specified in the contract or purchase order (see 6.2), Composition CH-6, Class 1 shall conform to the requirements specified in Table I when tested in accordance with the applicable methods. Composition CH-6, Class 2 shall conform to the requirements of Table I, with the functioning characteristics as specified in the contract or purchase order (see 6.2).

3.5 Workmanship. The manufacturer shall use procedures and controls which will ensure that the Composition CH-6 produced does not contain foreign material such as dirt, rust, paint, metal chips or other foreign substances which may cause a detrimental effect on the safety and reliability of the explosive. The workmanship exhibited in the first article sample shall be evaluated to determine acceptability. The approved standards of workmanship shall thereby become the minimum workmanship standards for the production of the explosive.

TABLE I. Chemical and physical properties requirements.

Property	Requirements		Test method paragraph
	Class 1	Class 2	
Composition:			4.6.1.1
RDX, Percent (%)			
Minimum	97.0	97.0	
Maximum	98.0	98.0	
Calcium Stearate, %			4.6.1.2
Minimum	1.35	1.35	
Maximum	1.65	1.65	
Polyisobutylene, %			4.6.1.3
Minimum	0.40	0.40	
Maximum	0.60	0.60	
Graphite, %			4.6.1.4
Minimum	0.40	0.40	
Maximum	0.60	0.60	
Moisture, % Maximum	0.20	0.20	4.6.2
Granulation, % passing			4.6.3
USSS 30, Minimum	70	70	
USSS 100, Maximum	25	25	
Acid/Alkali content			4.6.4
No NaOH	Colorless	Colorless	
NaOH added	Pink Color	Pink Color	
Flow characteristics	Pass	Pass	4.6.5
Density, g/cc			4.6.6
Maximum	1.67	1.67	
Minimum	1.61	1.61	
Pelleting characteristics			4.6.7
Weight loss Maximum, %	10	10	
Impact			4.6.8
Explosions allowed	0	0	
Sensitivity			4.6.9
Acceptor Loading Pressure, psi	16,000	16,000	
Density, g/cc			
Average (Minimum)	1.642	1.642	
Average (Maximum)	1.712	1.712	
Standard Deviation	0.010	0.010	
Threshold	3.5 DBg	3.5 DBg	
Explosions allowed/samples tested	0/20	0/20	
Functioning			4.6.9
Acceptor Loading Pressure, psi	10,000	As specified	
Density, g/cc			
Average (Minimum)	1.570	As specified	
Average (Maximum)	1.670	As specified	
Standard Deviation	0.016	As specified	
Threshold	6.00 DBg	As specified	
Explosions allowed/samples tested	20/20	Not applicable	
Reliability, %	Not applicable	As specified	

3.6 Safety.

3.6.1 Toxic products and formulations. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the contracting activity to the appropriate departmental medical service who will act as an advisor to the contracting agency (see 4.1.2).

3.6.2 Material safety data sheets. The contractor shall prepare and submit Material Safety Data Sheets in accordance with FED-STD-313 as specified in the contract (see 6.7).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements (examinations and tests) 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All materials shall meet all the requirements of sections 3 and 5. The inspections set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the specification shall not relieve the contractor of the responsibility of ensuring that all materials submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements. However, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Toxicological product formulations. The contractor shall have the toxicological product formulations and associated information for review by the contracting activity to evaluate the safety of the material for the proposed use (see 3.6.2).

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.4).

b. Quality conformance inspection (see 4.5).

4.3 Test equipments, fixtures, and conditions. The test equipments, fixtures, and conditions of 4.3.1 and 4.3.2 are required to perform the tests of 4.6:

4.3.1 Test equipments and fixtures. The following test equipments and fixtures are required to perform the tests specified in 4.6:

a. Standard testing sieves; top plate; bottom plate meeting the requirements of RR-S-366

b. Mechanical Sieve Shaking Machine

c. Powder Mobility Test Fixture for CH-6 Explosive - BUORD LD 479544

d. Westphal Balance for Density Determinations

e. Impact Machine - BUORD LD 70518

f. Explosives Properties Assembly - Drawing 2426912

g. Donor Assembly - DWG 2426913 (Figure 3)

h. Small Scale Gap Test (SSGT) for Testing Donors (Figure 4)

i. Acceptor Body - (Figure 5)

j. Small Scale Gap Test Configuration - (Figure 6)

k. Attenuator - See table for Attenuator in Figure 6.

4.3.2 Test Conditions. Unless otherwise specified (see 6.2), the Composition CH-6 shall be subjected to acceptance tests under the following conditions:

a. Temperature: Room ambient 65 to 95 degrees Fahrenheit (°F) (18.3 to 35.0 degrees Celsius (°C))

b. Altitude: Normal ground

c. Vibration: None

d. Humidity: Room ambient to 95 percent relative maximum.

4.4 First article inspection. First article inspection shall consist of all the tests specified in 4.6. The first article shall be the first production by the contractor, using the same production processes, procedures, and equipment to be used in fulfilling the contract. The first article sample shall be of sufficient quantity to perform the specified tests. Failure to meet the specified requirements shall be cause for rejection of the first article.

4.5 Quality conformance inspection. The quality conformance inspection shall consist of the tests specified in 4.6. Inspections and test procedures shall be submitted for Government approval prior to commencement of production. Inspection shall be performed by the

manufacturer unless otherwise specified in the contract or purchase order (see 6.2). Any deviation from the specified technical requirements shall result in rejection of the batch.

4.5.1 Batch. For the purpose of sampling, a batch of Composition CH-6 shall be limited in weight to 7000 pounds maximum. A batch shall consist of material produced in a single manufacturing run, with no more than one lot of each ingredient material with no change in formulation or process to make the final product homogeneous. Physical blending of more than one batch wet or dry, shall not be permitted. A batch may be formed by reworking one or more batches by the slurry coating process in a crystallization still.

4.5.2 Sampling. Sampling shall be performed on each batch before packing by taking approximately equal quantities of material from each nutche (storage container) and blending into a composite sample of approximately 2 pounds, half of which shall be used for the tests of 4.6. The remaining 1 pound sample shall be retained for possible check analysis. A batch may be divided into more than 1 lot, and the tests performed on the batch may be reported for each of the lots.

4.5.2.1 Sample pellets. Composition CH-6 pellets used in the test of 4.6.6 shall be prepared in accordance with Drawing 1620713 which is part of LD 479593 using the CH-6 from composite sample in 4.5.2. Fabricate 20 pellets each as a single lot from which the required test pellets shall be drawn in a statistically random fashion using a table of random numbers or equivalent procedure.

4.5.2.2 Marking of sample containers. Each sample container shall be marked to show the name of the material, manufacturer, plant, lot, batch number, and the date of manufacture.

4.6 Test procedures.

4.6.1 Analysis of Composition CH-6. All analyses utilizing loose bulk material shall be carried out in duplicate on each sample. Riffling of sample is permitted. This provision is not applicable to the tests which utilize pellets. Failure of the composite sample to meet the composition requirements of Table I shall cause rejection of the lot from which the sample is taken.

4.6.1.1 RDX. Transfer an accurately weighed portion of approximately 10.0 grams (g) of the composite sample of Composition CH-6 from 4.5.2 into a tared medium porosity, sintered-glass crucible. Place the crucible containing the sample on a suction flask and fill with 25 milliliters (mL) of hot acetone (55 $\pm$ 5°C) and apply vacuum. Repeat this procedure 7 additional times (total acetone equals 200 mL). Dry the crucible and contents in an oven at 100 $\pm$ 5°C for 40 to 50 minutes. Cool in a desiccator and weigh. All of the above operations, with the exception of the weighing and drying, must be conducted in a hood. Prior to discarding the acetone-RDX solution, it should be mixed with a large volume of water and then filtered to remove the RDX from the solution. The waste RDX should be stored under water until ready for disposal by safe destructive chemical or burning procedures. Calculate the loss in weight as RDX in the sample on a dry basis as follows:

$$Percent\ RDX\ (\%) = \frac{100[A-B-W(M)]}{W(1-M)}$$

where: A = weight of crucible and sample
B = weight of crucible and sample after extraction with hot acetone
M = percent moisture expressed as a decimal
W = weight of sample

4.6.1.2 Calcium stearate. Place the crucible and residue from 4.6.1.1 on the filter flask. Add 12 mL of hot glacial acetic acid (110 ± 5°C) to the crucible and allow to stand for 2 minutes, then apply vacuum. Repeat this procedure twice with the same volume of acetic acid, then once with a filling of the crucible (total volume of glacial acetic acid equals 60 mL). Finally, wash the residue with 25 mL of acetone and discard the acetic acid-acetone solution. Dry the crucible and residue in an oven at 100 ± 5°C for 40 minutes. Cool in a desiccator and weigh. All of the above operations, with the exception of weighing and drying, must be conducted in a hood.

$$Percent\ Calcium\ Stearate\ (\%) = \frac{100(B-C)}{W(1-M)}$$

where: B = weight of crucible and sample after extraction with hot acetone
C = weight of crucible and sample after extraction with glacial acetic acid and acetone
M = percent moisture expressed as a decimal
W = weight of sample

4.6.1.3 Polyisobutylene. Warm the crucible and residue from 4.6.1.2 by placing it in an oven at 100 ± 5°C for 5 minutes, then place it on the filter flask. Add 25 mL of hot toluene (105 ± 5°C) to the crucible and let stand for 2 minutes and apply vacuum. Repeat this procedure 7 more times (total volume of toluene equals 200 mL). Finally, wash the residue with 25 mL of acetone. Discard the toluene-acetone solution. Dry the crucible and residue in an oven at 100 ± 5°C for 40 to 50 minutes. Cool in a desiccator and weigh. All of the above operations, with the exception of weighing and drying, must be conducted in a hood.

$$Percent\ Polyisobutylene\ (\%) = \frac{100(C-D)}{W(1-M)}$$

where: C = weight of crucible and sample after extraction with glacial acetic acid and acetone
D = weight of crucible and sample after extraction with toluene and acetone
M = percent moisture expressed as a decimal
W = weight of sample

4.6.1.4 Graphite. Calculate the weight of the residue remaining in crucible in 4.6.1.3 as percent graphite in the sample on a dry basis as follows.

$$\textit{Percent Graphite}\ (\%) = \frac{100(D-E)}{W(1-M)}$$

where: D = weight of crucible and sample after extraction with toluene and acetone
E = weight of crucible
W = weight of sample
M = percent moisture expressed as a decimal

4.6.2 Moisture. Transfer an accurately weighed portion of approximately 10.0 g of the composite sample of Composition CH-6 from 4.5.2 to a tared weighing bottle with an outside ground cap. Place the bottle and contents with cap removed in an oven at 100 ± 5°C for 40 to 50 minutes; cool in a desiccator, stopper and reweigh. Calculate the loss in weight of the bottle and contents as percent moisture in the sample. Failure of the composite sample to meet the moisture requirements of Table I shall cause rejection of the batch from which the sample is taken.

4.6.3 Granulation. Place a weighed portion of approximately 15 g of the composite sample of Composition CH-6 from 4.5.2 on the specified standard testing sieves of 4.3.1 which is provided with a bottom pan. Cover and shake for 15 minutes in a mechanical shaker geared to produce 300 ± 15 gyrations and 150 ± 10 taps of the striker per minute. Weigh the portion retained by the sieve and calculate on a percentage basis as required. Failure of the composite sample to meet the granulation requirements of Table I shall cause rejection of the batch from which the sample is taken.

4.6.4 Acid and alkali content test. Place 10.0 ± 0.1 g of Composition CH-6 taken from the composite sample of 4.5.2 in a 100-mL beaker. Add 50 mL of freshly boiled and distilled water, agitate the slurry for approximately 5 minutes at ambient temperature and filter. Add 2 drops of 1% phenolphthalein solution to the filtrate and examine the filtrate for color change. The filtrate shall remain colorless and show no evidence of pink color. Following this add 0.05 ml of 0.1 normal (N) NaOH solution. Failure of the filtrate from the Composition CH-6 sample to remain colorless after addition of the phenolphthalein indicator solution or to change from colorless to a pink color on addition of the 0.1N NaOH solution shall cause rejection of the batch of Composition CH-6 from which the sample is taken.

4.6.5 Flow characteristics. Fill the Powder Mobility Gage shown on Drawing 1518531, which is part of LD 479544, with Composition CH-6 from the composite sample of 4.5.2. Care shall be exercised in filling the gage to prevent packing of the explosive. After completion of the filling operation, release the door and allow the Composition CH-6 to flow from the gage. The occurrence of a sample of the Composition CH-6 which does not flow through the gage orifice on release of the door shall cause rejection of the batch from which the sample is taken.

4.6.6 Density. Select 15 pellets from the lot of sample pellets in accordance with 4.5.2.1. Calculate the average density of the 15 pellet sample. The densities of the pellets shall be measured by the procedures of either 4.6.6.1 or 4.6.6.2. Failure of the pellets to meet the

average density requirements of Table I shall cause rejection of the lot from which the sample pellets were taken.

4.6.6.1 Displacement method. Coat the pellets with a thin film of protective water proofing such as clear acrylic lacquer in an aerosol spray. A weight increase in excess of 0.025 g will make the pellet unacceptable for the test. A small amount of wetting agent shall be added to the water to aid in removal of air from the pellet surface. Density shall be determined by the water-displacement/water-loss method using the Westphal specific gravity balance.

4.6.6.2 Dry measurement method. For each pellet, measure (to the nearest thousandth) the following:

a. The diameter of the pellet in 2 locations, 90° apart. Calculate the diameter (D) of the pellet as follows:

$$D = \frac{D_1 + D_2}{2}$$

where: D_1 and D_2 = Diameter of the pellet in inches at locations 1 and 2.

b. The height of the pellet in 4 places around the edge, each 90° apart. Calculate the height (H) of the pellet as follows:

$$H = \frac{H_1 + H_2 + H_3 + H_4}{4}$$

where: H_1, H_2, H_3, & H_4 = Height of the pellet in inches at each of the 4 places measured.

Each pellet shall also be weighed to an accuracy of ± 0.002 g. Call this weight W. With the above information, the density of the pellet is calculated as:

$$Density\ (g/cc) = \frac{0.077(W)}{D^2(H)}$$

4.6.7 Pelleting characteristics. Select 5 pellets from the lot of sample pellets prepared in accordance with 4.5.2.1. Weigh the 5 pellets and place them in a cylindrical metal can, 5 ± 1 inches (12.7 ± 2.5 centimeters (cm)) in diameter by 9 ± 1 inches (22.86 ± 2.5 cm) high. The can containing the pellets shall be rotated end over end for 10 minutes at 21 revolutions per minute. After completion of the tumbling, the pellets shall be removed from the can, wiped free of dust and reweighed. The weight loss shall be expressed as percent of the total original weight of the 5 pellets. Failure of the 5 pellets to meet the pelleting characteristics requirement of Table I shall cause rejection of the lot from which the sample pellets are taken.

4.6.8 Impact. A 35-milligram (mg) sample of Composition CH-6 shall be taken from the composite sample of 4.5.2 and shall be dried prior to impact testing. Drying shall be done in the same manner as the sample for functioning test of 4.6.9. Impact machine (see LD 70518)

shall be used for impact testing. Place the 35-mg sample on the rough side of a piece of No. 05 sandpaper which is supported on the steel anvil shown on figure 1. Place the hardened steel striker shown on figure 2 over the sample of explosive resting on the sandpaper and anvil. Drop a 2.5-kilogram (kg) steel weight from the height determined by the procedure of 4.6.8.1 in a frictionless guided drop so that it impacts the striker centrally. Repeat this test 15 times using a new sample of Composition CH-6 and a new sheet of sandpaper for each test. The burning or explosion of the Composition CH-6 in one or more of the test drops shall cause rejection of the lot of Composition CH-6 from which the sample is taken.

4.6.8.1 Determination of impact testing height. Employing the same test equipment and test procedure as described in 4.6.8, with the exception that Government furnished tetryl shall be substituted for the Composition CH-6, determine the maximum height, within 1 inch from which the 2.5-kg weight can be dropped without explosion of the tetryl. This maximum no-fire height shall be the maximum height at which 15 successive drops can be made using a new sample of the tetryl each time without the occurrence of an explosion. Ninety percent of this maximum no-fire height, to the nearest ½ inch, shall be the testing height for the Composition CH-6 in 4.6.8.

4.6.9 Sensitivity and functioning tests. A representative sample of explosive Composition CH-6 from 4.5.2 shall be dried a minimum of 4 hours at 50°C under vacuum of 28.5 inch mercury just prior to loading (see LD 549486). Moisture content at time of loading must not exceed 0.2%. The Composition CH-6 material shall be loaded according to the procedures of paragraphs 4.6.9.1 and 4.6.9.2.

4.6.9.1 Loading and calibration of donor assemblies. A minimum batch of 50 donors for class 1 and 60 donors for class 2 material shall be prepared in accordance with NAVORD Drawing 2426913 (see figure 3). Five sample donors shall be selected from each batch in accordance with MIL-STD-105, Inspection Level II. These donors shall be assembled in the test arrangement (see figure 4) and fired against the dent block (NAVORD Drawing 2426916) or alternate dent block (NAVORD LD 1620714) by initiating the detonator (Dupont No. 6 or equivalent blasting cap) using the recommended manufacturer's power requirements for initiation. To be acceptable for use in the sensitivity test, the average depth of dent produced in the block by the donors must be between 60 and 69 mils and the standard deviation must not exceed 5.0 mils. Each block shall be used only once. The measurement of the indentation depth shall be made in accordance with 4.6.9.4.

4.6.9.2 Preparation of acceptor specimen for sensitivity/functioning test. The explosive Composition CH-6 shall be loaded in 8 equal weight increments. The first trial loading shall be with 8 equal increment weights, given in Tables II and III. The acceptor body (NAVORD Drawing 2426915) shall be weighed before and after loading (see figure 5). If all 8 increments fit in the acceptor body with room to spare, adjust the subsequent acceptor by measuring the remaining unloaded column height and increasing equally the weight of each increment to meet the tolerance shown in NAVORD Drawing 2426914. If all 8 increments do not fit into the acceptor body, adjust the individual increment weight equally (based on the actual weight of explosive contained in the body) to meet the tolerances given in NAVORD Drawing 2426914. The acceptors shall have a black mark placed on the fill end and be weighed with a minimum

accuracy of ± 5 mg before and after loading. The density of each individual acceptor shall be determined in terms of grams/cubic centimeters (g/cc) and reported to three decimal places. The average density shall be in accordance with those shown in Tables II and III, and the calculated standard deviation of the densities shall be no greater than 0.010 g/cc for the sensitivity test hardware, and no greater than 0.016 g/cc for the functioning test hardware. Only these acceptors that meet the density requirement specified will be used in the sensitivity and functioning tests of 4.6.9.3.

TABLE II. Class 1 explosive acceptor test assemblies.

Test	Average Loading Density (g/cc)	Maximum Standard Deviation of Density (g/cc)	Acceptor Loading Pressure (psi)	Number of Tests Required	Initial Loading Increment (g)
Sensitivity	1.677 ± 0.035	0.010	16,000	20	0.16
Functioning	1.620 ± 0.050	0.016	10,000	25	0.15

TABLE III. Class 2 explosive acceptor test assemblies.

Test	Average Loading Density (g/cc)	Maximum Standard Deviation of Density (g/cc)	Acceptor Loading Pressure (psi)	Number of Tests Required	Initial Loading Increment (g)
Sensitivity	1.677 ± 0.035	0.010	16,000	20	0.16
Functioning[1]	Specified	Specified	Specified	35	Specified

[1] Density, loading pressure, and initial increment shall be specified at the time of order (see 6.2).

4.6.9.3 CH-6 sensitivity and functioning tests.

4.6.9.3.1 Sensitivity test assemblies. Twenty explosive properties assemblies shall be prepared in accordance with NAVORD Drawing 2426912 (see also figure 6) using a random selection of the acceptable donors prepared in accordance with paragraphs 4.6.9, 4.6.9.1 and 4.6.9.2. The 20 assemblies shall be made with 3.5 DBg attenuators (446 ± 2 mils). The acceptors shall be assembled with the fill end (black mark) placed flush against the dent block NAVORD Drawing 2426916 or alternate dent block NAVORD LD 1620714. The concentricity of the acceptor and the dent block shall be within 0.250 inch. The longitudinal axis of the donor, acceptor, and barrier shall be made concentric by taping with 2 wraps of masking tape around the periphery of these pieces to form a single unit.

4.6.9.3.2 Sensitivity test. Assemble the 20 assemblies with 3.5 DBg (446 ± 2 mils) attenuators. The 20 assemblies are to be tested and the attenuator size and the results ("go" or "no go") shall be recorded for each test. For the sensitivity test, any dent greater than 2 mils

shall be considered a "go" and any dent less than or equal to 2 mils shall be considered a "no go". The dents obtained in the witness blocks shall be measured in accordance with 4.6.9.4.

4.6.9.3.3 Functioning test assemblies. Twenty-five Class 1 and 35 Class 2 explosive properties assemblies shall be prepared in accordance with NAVORD Drawing 2426912 (see also figure 6) using a random selection of the acceptable donors prepared in accordance with paragraphs 4.6.9, 4.6.9.1 and 4.6.9.2. Of the 25 Class 1 assemblies, 20 assemblies shall be made with 6 DBg attenuators (250 +3, -2 mils) and 5 shall be made with no attenuators. Of the 35 Class 2 attenuators, 5 shall be made with no attenuators and the size of the other 30 shall be specified at the time of purchase. The acceptors shall be assembled with the fill end (black mark) placed flush against the dent block NAVORD Drawing 2426916 or alternate dent block NAVORD LD 1620714. The concentricity of the acceptor and the dent block shall be within 0.250 inch. The longitudinal axis of the donor, acceptor, and barrier shall be made concentric by taping with 2 wraps of masking tape around the periphery of these pieces to form a single unit.

4.6.9.3.4 Functioning test. Assemble 5 functioning test assemblies as described in 4.6.9.3.3, without any barriers. Initiate the detonator as described in 4.6.9.1 and measure the dent as described in 4.6.9.4. Calculate the average depth of the five dents. Use 75% of that value or greater as a "go" and a dent value less than 75% of the average as a "no go". Twenty Class 1 assemblies shall be assembled with 6 DBg (250 +3, -2 mils) attenuators. Thirty Class 2 assemblies shall be assembled in accordance with the procedures specified at the time of ordering (see 6.2). The assemblies are to be tested. The size attenuator and the result ("go" or "no go") shall be recorded for each test. The dents obtained in the witness blocks shall be measured in accordance with 4.6.9.4.

4.6.9.3.5 Acceptance criteria. The CH-6, Class 1 material shall be considered to have passed the functioning density requirements if the average density of the acceptors is between 1.570 g/cc and 1.670 g/cc and the standard deviation of the density is less than 0.016 g/cc. The CH-6 Class 2 material shall be considered to have passed the functioning density requirements if the average density of the acceptors is within the specified range and the standard deviation of the density is less than the specified values (see 3.4). The CH-6 material shall be considered to have passed the density requirements for sensitivity if the average density of the acceptors is between 1.642 and 1.712 g/cc and the standard deviation of the density is less than 0.010 g/cc. The explosive material shall be considered to have passed the functioning test if all 20 Class 1 assemblies fired with 6 DBg attenuators achieve "go" results as described in 4.6.9.3.4 or if all 30 Class 2 assemblies fired in accordance with the procedures specified meet all the requirements of the specified procedure (see 4.6.9.3.4). The explosive shall be considered to have passed the sensitivity test if all 20 assemblies fired with 3.5 DBg attenuators achieve "no go" results as described in 4.6.9.3.2. Failure of the explosive material to pass both the functioning and sensitivity tests shall cause rejection of the batch or lot from which the sample material is taken.

4.6.9.4 Measurement of indentation depth. The depth of indentation made in the block by the explosion of the donor or acceptor, as applicable, shall be measured with a dial indicator with an accuracy of 0.0001 inch or better. The point of the dial shall have an approximate 30° included angle and the end of the point shall have a radius of 0.025 $\pm$ 0.002 inch. Before measuring the depth of indentation in the block, remove any foreign material, such as deposits,

from the dent. Zero the indicator with the point of the probe in the deepest part of the dent. Then take the readings on the surface of the block at 4 points near the periphery of the block. These points shall be approximately 1.125 inches away from the periphery and 90° apart. The dent shall be computed as the average of the 4 readings.

4.7 Inspection of packaging. Packaging shall be examined for conformance to section 5.

5. PACKAGING

5.1 Packing. Packing shall be level A or C as specified in the contract or purchase order (see 6.2).

5.1.1 Level A. The Composition CH-6 shall be packed and marked in accordance with Drawing 7548644.

5.1.2 Level C. The composition shall be packed and marked in accordance with Drawing 7548645.

5.2 Marking. Precautionary and explosive markings shall be in accordance with Code of Federal Regulation, Title 49, CFR Parts 100 to 199. In addition to any special markings required by the contract or purchase order (see 6.2), unit packages, intermediate packages, and shipping containers shall be marked in accordance with the requirements of MIL-STD-129.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The CH-6 Explosive is to be used in explosive loads and boosters for various Navy fuzes.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.1 and 2.2).

c. If a first article is not required (see 3.1).

d. Chemical and physical requirements of Composition CH-6, Class 1 if other than as specified in 3.4.

e. Functioning characteristics of Composition CH-6, Class 2 (see 3.4 and Table III).

f. The agency and place where the inspection is to be performed if other than as specified (see 4.1 and 4.5).

g. Inspection (test) conditions, if other than as specified (see 4.3.2).

h. Size of the 30 CH-6 Class 2 explosive properties assemblies for the functioning tests (see 4.6.9.3.3).

i. Assembly and test procedures for the 30 CH-6 Class 2 functioning test assemblies (see 3.6.9.3.4).

j. Level of packing required (see 5.1).

k. Any special marking required (see 5.2).

l. That the explosive safety precaution requirements of the "Contractors' Safety Manual for Ammunition, Explosives and Related Dangerous Materials", DOD 4145.26M are applicable (see 6.4).

6.3 First article. When a first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractors current inventory (see 3.2), and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.4 Safety precaution. The safety precaution requirements of the "Contractors Safety Manual for Ammunition, Explosives and Related Dangerous Material" (DOD 4145.26M) are applicable and should be specified in the contract as required by the Federal Acquisition Regulation (FAR) 23.3.

NOTE: When this document is used as part of the description of work to be accomplished by a Government Activity, the safety precaution requirements of "Ammunition and Explosives Ashore" (OP5) should be made applicable.

6.5 Hazard notice. The Composition CH-6 described herein is a high explosive and consequently presents a hazard in manufacture, handling, storage, and shipment. The contractor should recognize this hazard and take appropriate measures to guard and protect

against fire, explosion, adverse environment, corrosive atmosphere, rough handling, and electrically induced incidents.

6.6 Advisory manufacturing process for Composition CH-6. The following procedures are used in the manufacturing of Composition CH-6:

6.6.1 Materials. The materials used in the manufacturing process of Composition CH-6 are as follows:

a. RDX - meeting the requirements of MIL-R-398, Type B, Class 1.

b. Graphite - meeting the requirements of MIL-G-155, Grade I.

c. Polyisobutylene - Vistanex LM-MH, manufactured by Exxon Chemical Corporation, P.O. Box 3272, Houston, TX 77253, or equivalent.

d. Calcium Chloride, Anhydrous - meeting the requirements of MIL-C-51511, Type II, Grade B, Class 1.

e. Sodium Stearate - Technical grade.

6.6.2 Composition. The composition of Composition CH-6 is as given in 3.4, and Table I.

6.6.3 Procedure. The materials are processed as follows in an agitated jacketed vessel:

a. The RDX is mixed with 10 parts of water by weight and the slurry is heated to 75°C.

b. The polyisobutylene is dissolved in 35 parts n-octance by weight and the solution added slowly to the heated RDX water slurry of (a).

c. The RDX, water, polyisobutylene, and n-octane mixture is digested at 78°C to 82°C for 10 minutes.

d. The sodium stearate is mixed with 13 parts of water by weight and the graphite is mixed with the sodium stearate solution to obtain wet blending of the graphite.

e. The calcium chloride is dissolved in 20 parts of water by weight.

f. The sodium stearate-graphite solution of (d) and then the calcium chloride solution of (e) are added slowly to the RDX, water, polyisobutylene, and n-octane mixture of (c) with a short period of agitation after the addition of each solution. For each 100 parts of product by weight, 1.51 parts of sodium stearate by weight and 1.1 parts of calcium chloride by weight are used. Calcium stearate is precipitated in the presence of the RDX, water, polyisobutylene, and n-octane mixture by the reaction of sodium stearate with calcium chloride.

g. The n-octane is removed by distillation and the slurry cooled to about 50°C.

h. The mixture is filtered and washed with distilled water to remove absorbed acids or alkalis after which it is dried at 70°C on trays over steam coils.

6.7 Specification information. This specification is under the technical cognizance of the Naval Surface Warfare Center/White Oak, Code R12, Silver Spring, MD 20903-5000, which prepared it for the Naval Sea Systems Command.

6.8 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed material safety data sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.9 Subject term (key word) listing.

Acceptor body
Attenuator
Calcium chloride anhydrous
Density
Donor assembly
Explosive properties assembly
Flow characteristics
Functioning characteristics
Graphite
Pellets
Polyisobutylene
Powder mobility test fixture
RDX
Sensitivity
Sieves; standard, testing
Sodium stearate
Westphal balance

6.10 Changes from previous issue. Marginal notations are not included in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
Navy - OS
Army - AL

Preparing Activity:
Navy - OS
(Project 1376-N394)

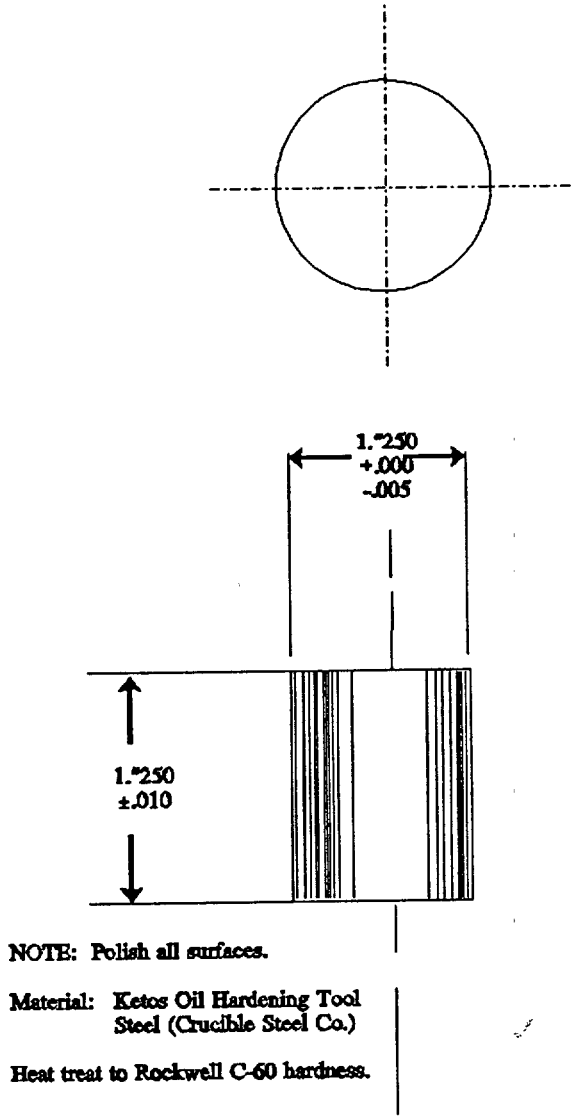
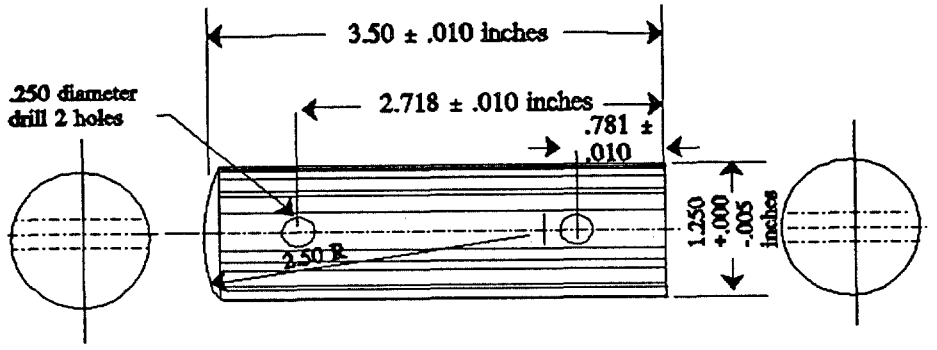


FIGURE 1. Anvil.



NOTE: Polish all surfaces.

Material - Ketos Oil Hardening Tool Steel
(Crucible Steel Co.).

Heat treat to Rockwell C-60 hardness.

FIGURE 2. Striker.

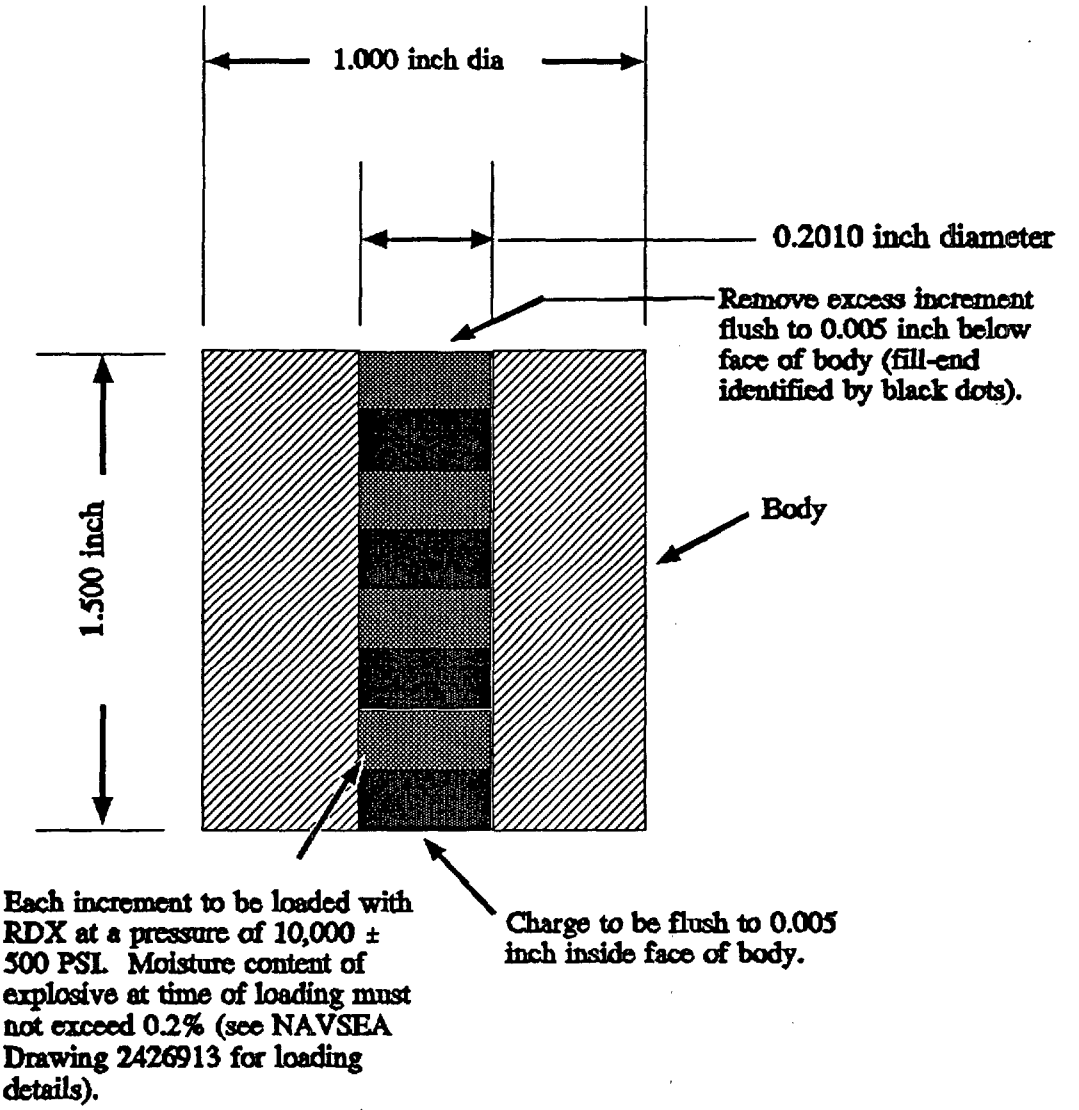


FIGURE 3. Donor assemblies for small scale gap test.

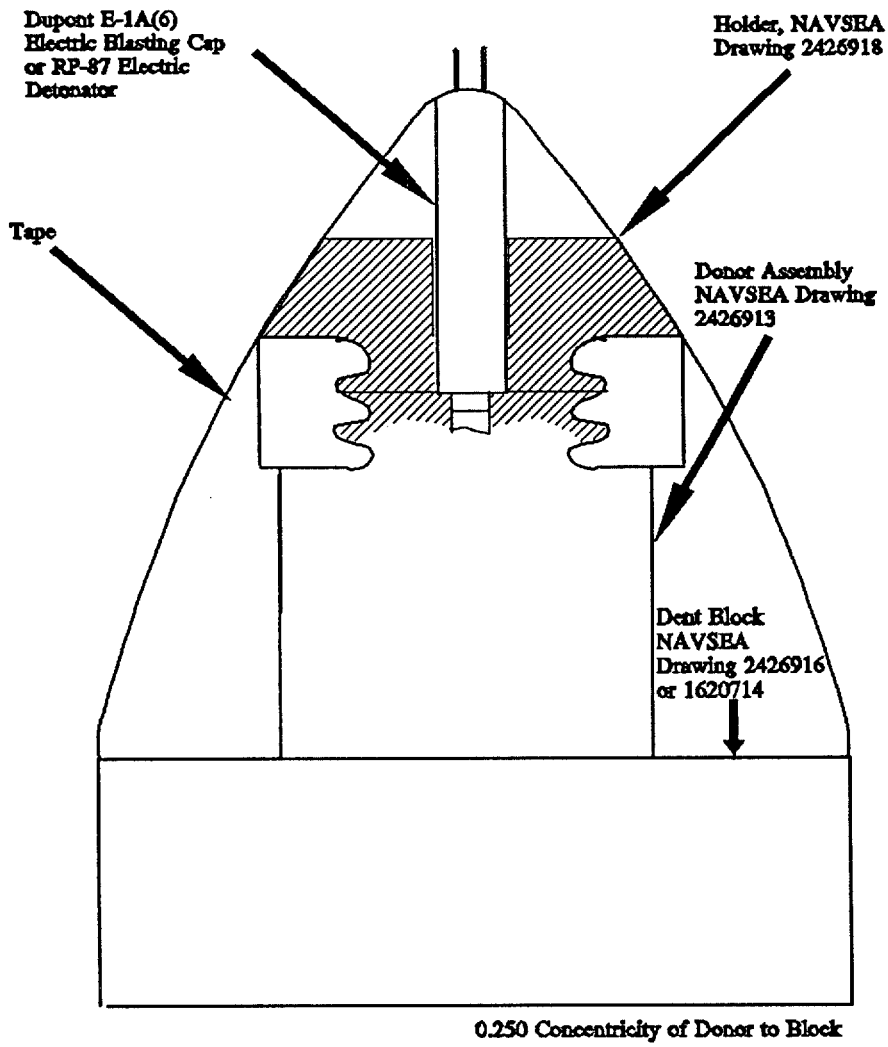


FIGURE 4. Small scale gap test arrangement for testing donors.

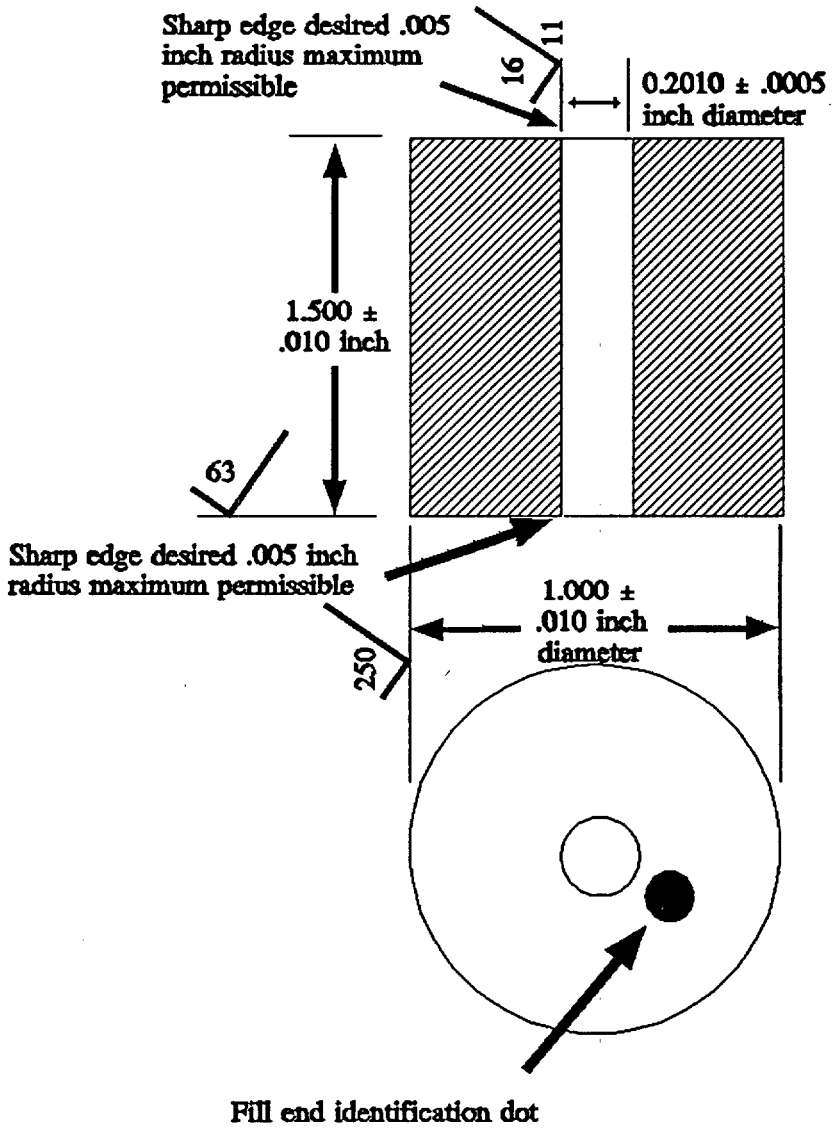


FIGURE 5. Acceptor body (NAVSEA Drawing 2426915).

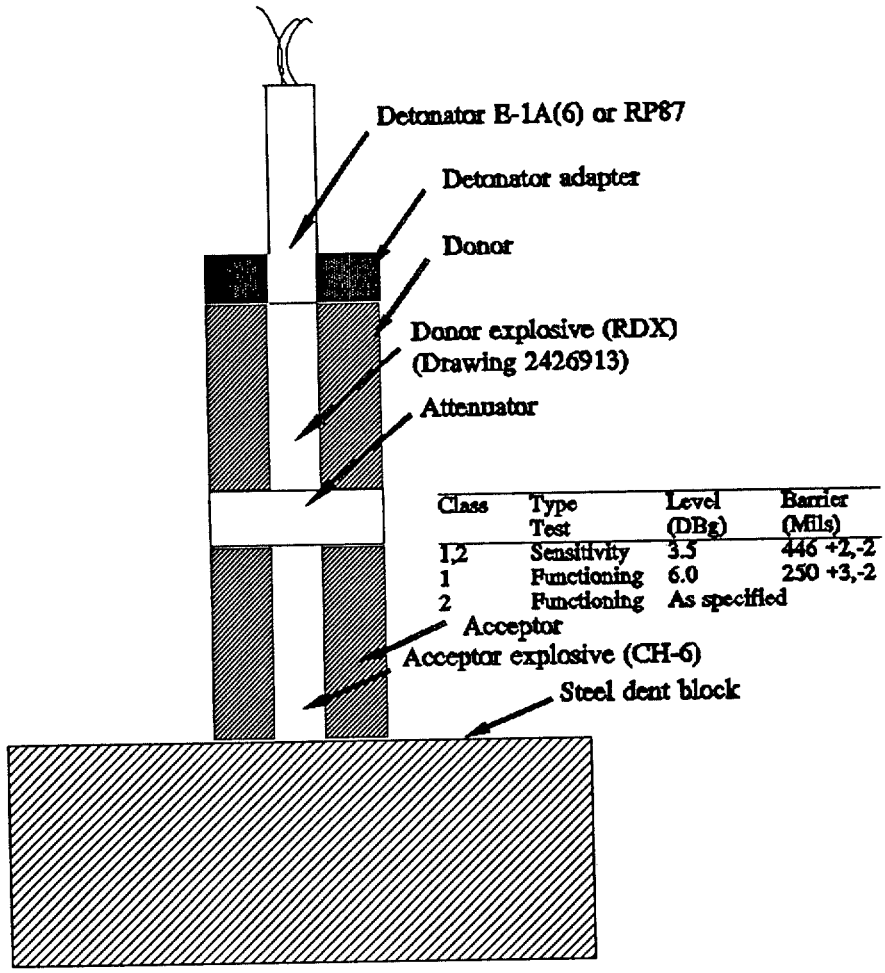


FIGURE 6. Small scale gap test configuration.