INCH-POUND

MIL-PRF-70600B(AR)
26 November 2012
SUPERSEDING
MIL-PRF-70600A(AR)
19 October 1998

PERFORMANCE SPECIFICATION

CARTRIDGE, RIMFIRE, .22 CALIBER

Reactivated after 26 November 2012 and may be used for new and existing designs and acquisitions.

This specification is approved for use by the U.S. Army Armament Research, Development and Engineering Center, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers .22 caliber cartridges for use in .22 caliber weapons (see 6.1).

1.2 Classification. The following items are covered by this specification:

Type I - Cartridge, Caliber .22, Standard Velocity for Rifle
Type II - Cartridge, Caliber .22, High Velocity for Rifle
Type III - Cartridge, Caliber .22, Match Grade for Rifle
Type IV - Cartridge, Caliber .22, Match Grade for Pistol

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to: Commander, U.S. Army ARDEC, ATTN: RDAR-QES-E, Picatinny Arsenal, New Jersey 07806-5000 or e-mailed to ardecstdzn@conus.army.mil. Since contact information can change, you may want to verify the currency of this information using ASSIST Online database at https://assist.dla.mil/.

AMSC N/A FSC 1305

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues 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).

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-286	-	Propellants, Solid: Sampling, Examination & Testing
MIL-STD-636	-	Visual Standards for Small Arms Ammunition through Caliber .50
MIL-STD-1168	-	Ammunition Lot Numbering
MIL-STD-1916	-	DoD Preferred Methods for Acceptance of Products

(These documents are available online at https://assist.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

SPORTING ARMS & AMMUNITION MANUFACTURER'S INSTITUTE

SAAMI	-	Technical Committee Manual Vol. I Rimfire

(Copies of SAAMI manuals are available from Secretary, Sporting Arms & Ammunition Manufacturer's Institute, PO Box 838, Branford, CT 06405 or at www.saami.org)

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI/SAAMI Z299.2-1992	-	Voluntary Industry Performance Standards for Pressure and Velocity of Rimfire Sporting Ammunition for the Use of Commercial Manufacturers

(Copies of SAAMI manuals are available from Secretary, Sporting Arms & Ammunition Manufacturer's Institute, PO Box 838, Branford, CT 06405 or at www.saami.org)

UN ST/SG/AC.10/11 - Recommendations on the Transport of Dangerous Goods, Tests and Criteria

(Copies of UN ST/SG/AC.10/11 are available from United Nations Publications, New York, NY 10017 or at https://unp.un.org/)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Operating requirements.

3.2.1 Primed case sensitivity. The energy imparted by a steel ball weighing 1.94 + 0.02 ounces (oz.) falling 14 inches (in.) onto a test fixture firing pin shall cause initiation of the primed cartridge case. The energy imparted by a steel ball weighing 1.94 + 0.02 oz. falling 1.5 in. onto a test fixture firing pin shall not cause initiation of the primed cartridge case.

3.2.2 Velocity. At a point 15.0 + 0.5 feet (ft.) from the muzzle of a 24.000 +/- 0.010 in. test barrel, the average velocity of bullets fired from cartridges that have been conditioned at 70 + 10°F for at least one hour shall meet the requirements shown in Table I.

3.2.3 Accuracy. The accuracy shall be defined as the extreme spread average that is the mean of the number of 10-shot targets used for the test. The extreme spread is defined as the distance between the centers of the two shot holes that are furthest apart for any given 10-shot target. The target ranges, barrel lengths to be used, and extreme spread average values for shot holes shall be in accordance with Table I.

Table I. Bullet velocity and accuracy requirements

Type	Nomenclature	Velocity (ft/sec)	Accuracy Extreme Spread Average	Accuracy Range / Test Barrel Length
I	Standard Velocity for Rifle	1,135 ± 90	2.0 in. MAX	100 ± 0.33 yards / 20 in. MIN
II	High Velocity for Rifle	1,235 ± 90	3.0 in. MAX	100 ± 0.33 yards / 20 in. MIN
III	Match Grade for Rifle	1,100 ± 90	1.25 in. MAX	100 ± 0.33 yards / 20 in. MIN
IV	Match Grade for Pistol	1,135 ± 90	2.5 in. MAX	50 ± 0.33 yards / 8 in. MAX

3.2.4 Chamber pressure. The maximum average chamber pressure shall not exceed 26,000 PSI when fired from a 24.000 +/- 0.010 inch test barrel. The maximum individual chamber pressure shall not exceed 30,100 PSI. These pressures shall not be exceeded when firing cartridges that have been conditioned (as unpacked cartridges) for at least one hour at the following temperatures prior to firing:

a. Ambient: 70 + 10 degrees Fahrenheit.
b. Hot: 125 + 5 degrees Fahrenheit.
c. Cold: -20 + 5 degrees Fahrenheit.

3.2.5 Function and casualty. The cartridge shall function without casualty when conditioned at ambient temperature of 70 + 10 degrees Fahrenheit for at least one hour.

3.2.6 Projectile integrity. The cartridge projectile or bullet shall not burst or fragment in the barrel or during its entire flight when fired.

3.3 Interface and interoperability requirements.

3.3.1 Cartridge physical parameters. The cartridge dimensions shall be as cited in ANSI/SAAMI Z299.1 for a .22 caliber Long Rifle cartridge. In addition, cartridges shall be free of dents, scratches and other imperfections.

3.3.2 Projectile weight. The projectile or bullet section of the cartridge shall weigh 40 grains ± 2 percent**.**

3.3.3 Projectile lubrication. The projectile shall be lubricated to prevent material buildup in the barrels that would adversely affect performance or the cartridge's storage life.

3.4 Support and ownership.

3.4.1 Ammunition lot configuration. Each lot of ammunition shall be identified by type and lot number. Lot numbering/identification shall be in accordance with MIL-STD-1168.

3.4.2 Final hazard classification. The cartridge shall comply with the following Hazard Classification when packaged in commercial packaging or in accordance with packaging requirements in the contract.

DoD Hazard Class/Div: 1.4
DoD Hazard Compatibility Group: S
DT Hazard Class: 1.4S
Net Explosive Weight: .00057 lbs.

3.4.3 Propellant stability. All propellants shall be stable over a minimum time period of 5 years.

Table II. Requirements / Verification Cross Reference Matrix

Method of Verification 1 -- Analysis 2 -- Demonstration 3 -- Examination 4 -- Test		Classes of Verification A -- First Article B -- Conformance						
Section 3 Requirement	Description	Verification Methods				Verification Class		Section 4 Verification Method
		1	2	3	4	A	B	
3.1	First article	X	X	X	X	X		4.2
3.2.1	Primed case sensitivity				X	X	X	4.4.1
3.2.2	Velocity				X	X	X	4.4.2
3.2.3	Accuracy	X			X	X	X	4.4.3
3.2.4	Chamber pressure				X	X	X	4.4.4
3.2.5	Function and casualty		X			X	X	4.4.5
3.2.6	Projectile integrity		X			X		4.4.6
3.3.1	Cartridge physical parameters			X		X	X	4.4.7
3.3.2	Projectile weight			X		X	X	4.4.8
3.3.3	Projectile lubrication			X		X		4.4.9
3.4.1	Ammunition lot configuration			X		X	X	4.4.10
3.4.2	Propellant stability		X		X	X		4.4.11
3.4.3	Final hazard classification		X		X			4.4.12

4. VERIFICATION

4.1 Classification of verifications. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.2)
b. Conformance verification (see 4.3)

4.1.1 Verification conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in section 4.4.

4.2 First article inspection. When specified in the contract, a sample of the cartridge and components shall be subjected to first article verification in accordance with the Requirements/verification Cross Reference Matrix, Table II.

4.2.1 First article quantity. First article verification shall be performed on 4,000 cartridges, 1,000 primed cases, and 100 grams of propellant.

4.2.2 Inspections to be performed. As determined by the Government, the first article assemblies, components and test specimens may be submitted to any of all of the examinations and tests specified in Table III, and be inspected for any or all requirements of the specification and the applicable drawings.

4.2.3 First article rejection. If any assembly, component or test specimen fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure of an assembly, component or test specimen to comply with any of the requirements.

Table III. First article inspection

Examination or Test	Conformance Criteria				Requirement Paragraph	Inspection Method
	Sample			Acc-Rej 1/		
	Ambient	Hot	Cold			
Primed case sensitivity	300			1/	3.2.1	4.4.1
Velocity	50			2/	3.2.2	4.4.2
Accuracy	100			3/	3.2.3	4.4.3
Chamber pressure	50	50	50	4/	3.2.4	4.4.4
Function and casualty	1000			5/	3.2.5	4.4.5
Projectile integrity	50			6/	3.2.6	4.4.6
Examination for defects	As specified				3.3.1	4.4.7
Projectile weight	20			7/	3.3.2	4.4.8
Projectile lubricant	20			8/	3.3.3	4.4.9
Thermal stability	45 gm			0 / 1	3.4.2	4.4.11
Propellant stability	2.5 gm			0 / 1	3.4.3	4.4.12
Notes: 1/ See notes after Table IV.						

4.3 Conformance verification.

4.3.1 Inspection lot formation. Lot formation shall be in accordance with the lot formation requirement of MIL-STD-1916, paragraph 4.2.2. Unless otherwise specified in the contract, the size of the ammunition lot shall be no more than 3,000,000 cartridges.

4.3.2 Conformance inspection. The sample cartridges shall be subjected to conformance verification in accordance with Table IV.

4.3.3 Examinations and tests. Reference shall be made to MIL-STD-1916 for the definition of Critical, Major, and Minor defects. The attribute sampling plan required for the examination of defects inn Table IV shall be in accordance with the attribute sampling plan of MIL-STD-1916, using verification level IV for Major characteristics and level III for Minor characteristics. One hundred percent inspection shall be used on all Critical characteristics.

4.3.4 Alternative conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative conformance procedures, methods or equipment, such as statistical process control, tool control, or other types of sampling plans, may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions herein. At the discretion of the contracting officer, a COC (Certificate of Conformance) may be accepted by the government as evidence of compliance with this specification.

Table IV. Conformance inspection

Examination or Test	Conformance Criteria				Requirement Paragraph	Inspection Method
	Sample			Acc-Rej		
	Ambient	Hot	Cold			
Primed case sensitivity	300			1/	3.2.1	4.4.1
Velocity	50			2/	3.2.2	4.4.2
Accuracy	100			3/	3.2.3	4.4.3
Chamber pressure	50	50	50	4/	3.2.4	4.4.4
Function and casualty	300			5/	3.2.5	4.4.5
Examination for defects	See MIL-STD-1916				3.3.1	4.4.7
Projectile weight	20			7/	3.3.2	4.4.8
Projectile lubricant	20			8/	3.3.3	4.4.9

Notes:
1/ The criteria for primed case sensitivity acceptance are contained in 4.4.1.

2/ The average velocity of the sample cartridges shall comply with the requirement of Table I. If the requirement is not met, the lot is rejected.

3/ The average extreme spread of the sample cartridges shall comply with the requirement of Table I. If the requirement is not met, the lot is rejected.

4/ The average pressure of the sample cartridges, tested at hot, cold and ambient temperatures, shall comply with the requirement of 3.2.4. If the requirement is not met, the lot is rejected.

5/ The criteria for function and casualty of the sample cartridges, tested at hot, cold and ambient temperatures, are contained in Table VI, Firing defects.

6/ If any cartridge bursts or fragments, the lot is rejected.

7/ The projectile weight of the sample shall comply with the requirement of 3.3.2. If the requirement is not met, the lot is rejected.

8/ If any cartridge shall fail to have evidence of bullet lubrication, the lot is rejected.

Table V. Examination for defects

Classification	Examination	Conformance Criteria		Requirement Paragraph	Inspection Method Reference
		Sample	Acc-Rej 3/		
Critical					
1	Head or rim split	100%		3.3.1	Visual
Major					
101	Perforated or split case	Level IV 2/		3.3.1	Visual
102	Crooked projectile	Level IV		3.3.1	Visual
103	Cartridge length, max	Level IV		3.3.1	SME
104	Rim thickness, max	Level IV		3.3.1	SME
105	Head diameter, max	Level IV		3.3.1	SME
106	Case diameter, max	Level IV		3.3.1	SME
107	Projectile diameter, max	Level IV		3.3.1	SME
108	Cartridge case length, max	Level IV		3.3.1	SME
Minor					
201	Visual defects 1/	Level III		3.3.1	Visual
202	Improper lot number	Level III		3.4.1	Visual

Notes:
1/ Refer to cartridge section of MIL-STD-636 for Visual Standards of defects.

2/ Levels III and IV refer to those verification levels of Table II attributes sampling plan in MIL-STD-1916.

3/ Accept on 0 and reject on 1.

Table VI. Firing defects

Class	Firing Defects	Criteria 1/	
		Acceptance	Rejection
Critical			
1	Bullet in bore	0	1
2	Complete of parial rupture	0	1
3	Detached material (upon firing)	0	1
4	Burn through	0	1
5	Slamfire 2/	0	1
6	Uncontrolled fire 3/	0	1
7	Other critical 4/	0	1
Major			
101	Split body or head	1	2
102	Gas leak at body/head interface	1	2
103	Misfire	1	2
104	Detached material (upon extraction)	1	2

Note:
For defects 101, 102, 103, and 104 the cumulative acceptance number shall not exceed two. If the cumulative firing defects or individual firings defects exceed the acceptance number, the Function and Casualty test in Table V shall be performed again with double sample. If the firing defects for the double sample meets the acceptance numbers for defects 1, 2, 3, 4, 5, 6, 7, 101, 102, 103, and 104, the lot is accepted.

1/ This table shall be applied separately to the results of each weapon type at each temperature condition.

2/ A slamfire occurs when a round is unintentionally fired by manually closing the weapon bolt without depressing the trigger of the weapon.

3/ Uncontrolled fire for semi-automatic weapons refers to the firing of two or more rounds for a single trigger depression when the fault is due to the ammunition.

4/ Any other defect that is likely to result in hazardous or unsafe conditions.

4 .4 Methods of inspection.

4.4.1 Primed case sensitivity verification. The sample of empty primed cartridge cases shall be tested in accordance with SAAMI Technical Committee Manual Vol. 1 Rimfire.

4.4.2 Velocity verification. The velocity test shall be tested in accordance with SAAMI Technical Committee Manual Vol. 1 Rimfire and ANSI/SAAMI Z299.1-1992 . Test barrel length shall be 24.000 ± 0.010 inches.

4.4.3 Accuracy verification. The accuracy test shall be tested in accordance with SAAMI Technical Committee Manual Vol. 1 Rimfire. Test barrel length and range shall be as specified in Table I.

4.4.4 Chamber pressure verification. The chamber pressure test shall be tested in accordance with SAAMI Technical Committee Manual Vol. 1 Rimfire and ANSI/SAAMI Z299.1-1992.

4.4.5 Function and casualty verification. All cartridges shall be fired in a ratio of 50 percent – 50 percent through two unaltered commercial weapons. For all cartridges except Match Grade cartridges, one weapon shall have a semiautomatic auto-loading action and one shall have a manually operated bolt action. Each weapon shall have a total chamber and magazine capacity of five cartridges minimum. Cartridges for Match Grade Rifle shall be fired from match grade rifles with manually operated bolt actions. Cartridges for Match Grade Pistol shall be fired from match grade pistol pistols, which have a semiautomatic auto loading action and a chamber and magazine capacity of five cartridges minimum. All weapons shall be loaded to capacity and the test performed.

4.4.6 Projectile integrity verification. Projectile integrity shall be tested concurrently with function and casualty. A witness screen of at least 4 feet by 4 feet shall be placed at 5 yards from the muzzle of the weapon, and examined for any evidence of bursting or fragmenting of projectiles.

4.4.7 Physical parameters verification. All test cartridges shall be inspected for the defects in Table V. The criteria for grading visual defects shall be in accordance with MIL-STD-636.

4.4.8 Projectile weight verification. Projectiles shall be de-lubed and then individually weighed.

4.4.9 Projectile lubrication verification. The sample cartridges shall be visually examined for evidence of bullet lubrication.

4.4.10 Ammunition lot configuration verification. Visually verify that an ammunition lot number has been assigned to each lot of .22 caliber rimfire cartridges in accordance with MIL-STD-1168.

4.4.11 Final hazard classification verification. Compliance with the FHC requirements specified at paragraph 3.4.2 shall be validated during the First Article Test (FAT). FAT tests for Final Hazard Classification shall be in accordance with UN ST/SG/AC.10/11, Recommendations on the Transportation of Dangerous Goods, Tests and Criteria. The following test series shall be used: 4.a for thermal stability. Test results from prior in-house verifications of these tests are acceptable.

4.4.12 Propellant stability verification. Propellant stability tests shall be conducted in accordance with the test procedures listed below. Stability is demonstrated when results comply with the requirements listed below.

Test	Reference Document	Test Procedure Description	Requirement
Heat	MIL-STD-286	Method 404.1.2	For single base propellants - Methyl violet paper shall not change to salmon pink in less than 40 minutes, and the sample shall not explode in less than 5 hours at 134.5°C. For double base propellants - Methyl violet paper shall not change to salmon pink in less than 40 minutes, and no fumes given off less than 1 hour at 120°C.
Storage Degradation/Surveillance	MIL-STD-286	Method 407.1	No fumes in less than 30 days of storage at 65.5°C

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. These cartridges are intended for use in US military .22 caliber rimfire weapons. The .22 Caliber Rimfire Long Rifle Cartridges procured to this specification are military unique because:

a. They should contain non-corrosive primers and propellants which will not cause damage/degradation to our military weapons.

b. They should meet the militaries propellant stability and shelf life storage requirements of 5 years, which exceeds commercial industries normal requirements.

c. They are intended for use in military marksmanship training.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number and date of this specification.

b. Issue of DODISS to be sited in the solicitation, and, if required, the specific issue of individual documents referenced (see 2.2.1).

c. Requirements for submission of first article.

d. Requirement and provisions for submission of test data as required.

e. Certificate of conformance for each lot of ammunition.

f. Requirements for Ammunition Lot Numbering.

g. Packaging requirements (see section 5.1): The following is provided as reference information.

Packaging will be Level B for the following round:

Type	DODAC	NSN
I	A106	1305-01-257-2559
II	A107	1305-01-256-0324
III	A091	1305-01-255-9109
IV	A093	1305-01-257-1094

Cartridges shall be unit packed in accordance with the manufacturer's best commercial practice in quantities of fifty (50) per fiberboard box. The packed cartridges will then be over packed into a close fitting fiberboard box in accordance with the manufacturer's best commercial practice and closed such that the total cartridge quantity will be five hundred (500). The boxes containing five hundred cartridges will be over packed by either Alternative 1, or Alternative 2.

Alternative 1. Ten of these boxes will be over packed in accordance with the manufacturer's best commercial practice in a close fitting fiberboard box and closed such that the total cartridge quantity will be five thousand (5000). This box will be sealed in a Type I, Class E bag per MIL-B-117. The sealed bag will be over packed in a close fitting fiberboard box conforming to ASTM D 5118 Type CF, Class WR, Variety SW, Grade W5c and closed per Method 2A2 of ASTM D1974.

Alternative 2. Ten of these boxes will be sealed in a Type I, Class E bag per MIL-B-117 such that the total cartridge quantity will be five thousand (5000). The sealed bag will be over packed in a close fitting fiberboard box conforming to ASTM D 5118, Type CF, Class WR, Variety SW, Grade W5c and closed per Method 2A1 of ASTM D 1974.

Unless otherwise specified, marking shall be in accordance with 12982865.

h. Information needed to satisfy requirements for qualification of the energetic materials (see 3.4.2).

6.3 Materials. Drawing 12551637 may be used as a reference for a design that has been qualified.

6.4 Reference documents. Reference documents are intended for information purposes only. They are not to be construed as requirements for any material, process or method of construction.

6.5 Submission of alternative conformance provisions. All contractor proposed alternative conformance provisions will be submitted to the Government for evaluation/approval as directed by the contracting activity.

6.6 Subject term (keyword) listing.

Pistol
Rifle

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

Custodian:
Army—AR

Preparing activity:
Army—AR

(Project 1305-2013-012)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil/.