9mm Luger +P
101-gr Plated Powdered Metal Frangible

Index - LF9MMB RAMAC - 23858

Design History:

Remington ammunition product Index Codes LF9MMB (RAMAC 23858) was first developed in 1998 to serve training needs engaging hard (AR500) steel targets at close range. The projectiles are designed to break up into very small (<5 grains) fragments upon impact, resulting in greatly reduced splash-back and ricochet potential for increased shooter and bystander safety.

While the original product featured a primer free of lead and lead compounds, in 2002 the round was redesigned using a priming compound free of all heavy metals. This newer primer eliminates the antimony and barium compounds that had been in the original lead-free mixture.

This product has been used extensively by United States Federal and State agencies for training purposes in a multitude of firearm types with great success.

This product is made and tested in accordance with applicable ANSI/SAAMI standards at Remington's manufacturing plant in Lonoke, Arkansas, USA. This facility, owned and operated by Remington Arms Co., Inc., maintains internal manufacturing specifications, procedures, and test equipment compliant with ANSI/SAAMI standards and is certified to the standards of ISO9001:2000.

Remington certifies that the following products were produced in accordance with the ANSI/SAAMI standard, *ANSI/SAAMI Z299.3 Voluntary Industry Performance Standards for Centerfire Pistol & Revolver Ammunition*. This includes all physical, dimensional, visual, and performance inspections.

Remington Arms Company, Inc.
PO Box 700, 870 Remington Drive
Madison, NC 27025
800.243.9700

PRODUCT DATA SHEET

9mm Luger +P/101-gr Plated Powdered Metal Frangible

Index LF9MMB
RAMAC 23858
Date prepared 7-Aug-09

COMPONENT & MANUFACTURING INFORMATION

CALIBER ..... 9mm Luger +P

SHELL ..... Brass (Copper alloy 260; cartridge brass)

BULLET WEIGHT 101-grain

BULLET CONSTRUCTION ..... Electroplated copper cladding, compressed powdered iron core, frangible

PRIMER ..... Remington #149-HMF (1½-HMF); Diazodinitrophenol (Dinol)-based heavy-metal-free priming mix. Operating range -20°F to +150°F (-29°C to +66°C)

PRIMER SEALANT ..... Lacquer-type sealant

CASEMOUTH SEALANT ..... None

CASE KNURL ..... None

HEADSTAMP ..... Loaded cartridges are headstamped with the following information: "R-P" and "9mm LUGER +P"

PRIMER MARKING ..... Primer cups are marked "HF" to enable visual identification

PROPELLANT ..... WPR289 propellant with 100% mechanical, electrical, or electro-mechanical detection of propellant level within the cartridge.

LOT IDENTIFICATION ..... Each box of ammunition is identified with a unique code which allows traceability to shift/day/month/year of packaging and/or loading and all in-process assembly and test results.

FINAL INSPECTION ..... 100% visual and/or vision system inspection of finished cartridges prior to final packaging.

PACKAGING ..... Box quantity ..... 50 cartridges
Case quantity ..... 500 cartridges

BALLISTIC & PERFORMANCE INFORMATION

AVERAGE INSTRUMENTAL VELOCITY ..... 1,220 ± 35 fps (measured at 15', over 20') for a 10-round test when fired from a SAAMI-compliant test barrel.

AVERAGE PRESSURE ..... 38,500 psi maximum for a 10-round test measured at the time of manufacture with a conformal piezoelectric transducer in a SAAMI-compliant test barrel.

AVERAGE MUZZLE ENERGY ..... 342 ft-lb_f (1,235 fps muzzle)

ACCURACY ..... Maximum extreme spread of three 5-round groups of 3.1" at 25 yards fired from a SAAMI-compliant accuracy test barrel mounted in a Universal Receiver.

FRANGIBILITY ..... No fragments greater than 5 grains after impact with a hard steel (AR500) target at 45°.

BULLET PULL ..... Minimum average (10-round test) ..... 120 lb_f
Minimum individual ..... 78 lb_f

Propellant Decomposition:

Double-base smokeless propellants, as are used in this round, degrade as a function of both time and temperature. Therefore, no one temperature accurately represents a point of degradation without a corresponding survival time with which it should be associated. The following table presents the predicted performance generated from a mathematical equation fit to experimental data for projecting the degradation of double-base smokeless propellants.

Temp., °F	"Cook-off" Time		Temp., °F	"Cook-off" Time	
70	1708	years	270	148.4	minutes
80	594	years	280	84.9	minutes
90	215	years	**286.4**	**60**	**minutes**
100	81	years	290	49.2	minutes
110	31.3	years	300	29.0	minutes
120	12.5	years	310	17.3	minutes
130	5.2	years	320	10.5	minutes
140	2.2	years	330	6.4	minutes
149.6	**1**	**years**	340	4.0	minutes
150	353	days	350	2.5	minutes
160	159	days	360	1.6	minutes
170	73	days	**370.3**	**1**	**minutes**
180	35	days	380	39.5	seconds
182.0	**30**	**days**	390	25.9	seconds
190	16.8	days	400	17.1	seconds
200	8.3	days	410	11.4	seconds
210	100.6	hours	420	7.7	seconds
220	51.8	hours	430	5.2	seconds
230	27.2	hours	440	3.6	seconds
232.0	**24**	**hours**	450	2.5	seconds
240	14.6	hours	460	1.7	seconds
250	7.9	hours	470	1.2	seconds
260	4.4	hours	**475.7**	**1**	**seconds**

PROPELLANT SPECIFICATION

PROPELLANT: WPR® 289	**MANUFACTURER**: General Dynamics, St. Marks, Florida
CHEMICAL AND PYSICAL SPECIFICATIONS:	
Stabilizer (%):	0.75 – 1.65
Graphite (%):	0.40 Max
Bulk Density (gm/cc):	0.800 ± 0.050
Bulk Density Uniformity (gm/cc):	0.025 Max
Potassium Salt (%):	1.00 Max
Nitroglycerine (%):	15.00 ± 3.00
Deterrent (%):	5.00 Max
Water (Moisture %):	0.45 – 0.80
Nitrocellulose (%):	Remainder
120°C SP (Minutes):	40 Min.

Heavy-Metal-Free Primer Mix Specification

Component	Nominal Composition (%)
Tetrazene	7.5
Dinol (diazodinitrophenol)	28
Smokeless propellant fines	6
Aluminum	10
Gum Arabic	0.5
Ground Glass	5
Potassium Nitrate	43

Products of Combustion:

The following list presents the ***predicted*** products of combustion as calculated by a computer simulation ("Cheetah") of the internal ballistic cycle taking into account the composition of the primer mix and smokeless propellant and the operating pressure of the cartridge.

NOTES:

1. Due to program limitations for the number of input compounds, the calculations have been run for the primer mix and propellant separately, with those results combined to the list shown below.
2. The list only includes chemical species present at a compositional level of 0.001% yet accounts for 99.998% of the combustion products. The remaining 0.002% (or .0000096 gm) is comprised of more than 100 different chemical species.

Specie	State	Grams per round	% of Total	Cumulative %
CO_2	Gas	1.8587E-01	54.263%	54.263%
N_2	Gas	4.4175E-02	12.897%	67.159%
CH_2O_2	Gas	4.2760E-02	12.484%	79.643%
H_2O	Gas	2.9400E-02	8.583%	88.226%
C	solid	1.1002E-02	3.212%	91.438%
C_2H_6	Gas	7.1155E-03	2.077%	93.515%
CK_2O_3	solid	5.3159E-03	1.552%	95.067%
CH_4	Gas	4.2693E-03	1.246%	96.314%
H_3N	Gas	4.1464E-03	1.211%	97.524%
CH_3OH	Gas	2.3689E-03	0.692%	98.216%
CO	Gas	2.0152E-03	0.588%	98.804%
Al_2O_5Si	solid	1.8204E-03	0.531%	99.336%
Al_2O_3	solid	1.4054E-03	0.410%	99.746%
C_2H_4	Gas	1.9764E-04	0.058%	99.804%
H_2	Gas	1.7678E-04	0.052%	99.855%
NO	Gas	1.2547E-04	0.037%	99.892%
CH_3	Gas	6.4868E-05	0.019%	99.911%
H_4N_2	Gas	6.1141E-05	0.018%	99.929%
H_2O_2	Gas	5.5583E-05	0.016%	99.945%
CH_2O	Gas	4.7034E-05	0.014%	99.959%
CHNO	Gas	4.4264E-05	0.013%	99.972%
O_2	Gas	2.5866E-05	0.008%	99.979%
CNO	Gas	1.8369E-05	0.005%	99.984%
H_2N	Gas	1.6189E-05	0.005%	99.989%
HO	Gas	1.6121E-05	0.005%	99.994%
H_2N_2	Gas	6.5713E-06	0.002%	99.996%
C_3H_8	Gas	3.9830E-06	0.001%	99.997%
CHO	Gas	3.7469E-06	0.001%	99.998%
>100 species	Individually	<2.0E-06	<0.0005%	Remainder

Exterior Ballistics Calculator

Version 4.02 BETA VERSION

Centerfire Pistol Flat Trajectory

I. CARTRIDGE DATA

Cartridge Name: 9mm Luger +P
Bullet Type: PPMF
Bullet Weight: 101 grains
Ballistic Coefficient: 0.141569 (Calculated)
First Given Velocity @ Range: 1,250 fps @ 0 yards
Second Given Velocity @ Range: 1,112 fps @ 50 yards
Drag Factor: G1

II. ENVIRONMENTAL DATA

Temperature: 59° F
Atmospheric pressure: 29.53 inches of Hg

III. FIREARM DATA

Sight height: 0.9 inches above centerline of bore.
Sighting-in range: 25 yards

IV. PREDICTED PERFORMANCE

Range (yards)	Remaining Velocity (feet/sec)	Remaining Energy (lb-feet)	Time of Flight (seconds)	Drop (inches)	Mid-Range Trajectory (inches)	Trajectory (inches)	Deflection 10-mph Wind (inches)
Muzzle	1,250	350	0.0000	0.00	0.0	-0.9	0.0
25	1,175	309	0.0619	0.73	0.2	0.0	0.3
50	1,112	277	0.1276	3.02	0.8	-0.7	1.3
75	1,061	252	0.1967	7.07	1.9	-3.1	2.9
100	1,018	232	0.2689	13.06	3.5	-7.5	5.1

Remington Arms *Material Safety Data Sheet*

This Material Safety Data Sheet has been prepared in compliance with Federal OSHA Hazard Communication Standard 29 CFR 1910.1200, ANSI Z400.1-1993 and the ISO Safety Data Sheet Standard. This product may be considered to be a hazardous chemical under 29 CFR 1910.1200. This information is required to be disclosed for safety in the workplace. ***This MSDS is applicable only to the product identified herein and only when used properly.***

NOTE: Refer to Section XVII for *List of Acronyms.*

I. PRODUCT IDENTIFICATION

Product: **CENTERFIRE PISTOL AMMUNITION (HEAVY METAL FREE FRANGIBLE)**

HMIS Rating
Health: 1
Flammability: 0
Reactivity: 1

IN EVENT OF EMERGENCY
(Spill, Leak, Fire, Exposure, Accident)
CALL CHEMTREC DAY OR NIGHT
(800) 424-9300
In Arlington, VA 741-5000
Outside Continental U.S.A. (703) 741-5000

II. HAZARDOUS COMPONENT INFORMATION

Centerfire Pistol & Revolver Ammunition is comprised of the following four (4) components. The hazardous chemicals contained in each are listed. The percent by weight of the hazardous ingredients in Centerfire Pistol & Revolver Ammunition are listed in the table below.

1. **Projectile** Iron, Copper
2. **Brass Shellcase** Copper, Zinc
3. **Propellant** Nitrocellulose, Nitroglycerin, Dinitrotoluene, Graphite
4. **Primer** Copper, Zinc, Bismuth Trioxide, Aluminum, Diazodinitrophenol, Tetrazene, Nitrocellulose, Nitroglycerin

Hazardous Ingredients	Percent by Weight	CAS Number	Exposure Limits (PEL)
Copper	21-26%	7440-50-8	TWA (dust) 1.0 mg/m³
Zinc	9-11%	7440-66-6	TWA (fume) 0.1 mg/m³ TWA (dust, mist) 1.0 mg/m³
Iron	56-62%	1309-37-1	TWA 10 mg/m³
Nitroglycerin	0-1.6%	55-63-0	TWA CL 0.2 ppm (skin) STEL 0.1 mg/m³ (skin)
Graphite	Less than 1%	7440-44-0	(Natural) TWA 2.5 mg/m³ (Synthetic) Respirable Fraction: 5 mg/m³

Nitrocellulose Cellulose Tetranitrate	Less than 1%	9004-70-0	None established
Tetrazene	Less than 0.1%	109-27-3	None Established
Diazodinitrophenol	Less than 0.1%	87-31-0	None Established
Bismuth Trioxide	Less than 0.1%	1304-76-3	TWA (dust) 15mg/m³ TWA (Respirable Fraction – nuifancy dust) 5mg/m³
Aluminum	0.0-0.02%	7429-90-5	TWA (dust) 15mg/m³ TWA (Respirable Fraction) 5mg/m³

III. HAZARDS IDENTIFICATION

Emergency Overview: Accidental fire may cause low-energy fragments to be emitted thus causing potential eye injury.

Potential Human Health Effects:

Skin Contact: May cause allergic reaction (sensitization) in susceptible individuals.

Eye Contact: Dust and fumes can irritate the eyes causing redness and discharge.

Inhalation: Inhalation of dust or fumes may cause irritation to nose, throat, upper respiratory tract and lungs. Irritation may lead to bronchitis, headache, lowering of blood pressure and weakness.

Ingestion/Absorption: Ingestion may cause severe headache, nausea, vomiting, abdominal pain, fatigue, diarrhea, trembling, ringing in ear and salivation.

Carcinogenicity Information: This product is not classified a carcinogen by IARC, OSHA, NTP or EPA.

IV. FIRST AID MEASURES

Skin Contact: Wash affected area thoroughly with soap and water. Remove contaminated clothing. Wash clothing thoroughly prior to reuse. Discard any contaminated leather items (i.e. shoes, etc.).

Eye Contact: If wearing contacts, immediately remove contact lenses. Hold eyelids apart and flush eyes thoroughly with water for at least 15 minutes. Obtain medical attention immediately.

Inhalation: Immediately remove to fresh air. Administer artificial respiration, if necessary. If breathing is difficult, administer oxygen. Obtain medical attention immediately.

Ingestion/Absorption: If conscious, drink large amounts of water. Induce vomiting. Immediately contact a physician or Poison Control Center. ***Never*** induce vomiting or give anything by mouth to an unconscious person.

V. FIRE HAZARDS

Flammable Properties: May ignite if heated above 130ºC. Will ignite when exposed to flame and high temperatures. Be cautious of low-energy fragments.

Extinguishing Media: Flood fire with water to fight fire and cool shells. If no water is available, use carbon dioxide, dry chemical or earth.

Fire-Fighting Instructions: Evacuate area immediately. Deluge area with water. Wear full fire-fighting protective gear including face shield or SCBA to protect from fragments.

VI. ACCIDENTAL RELEASE MEASURES

Safeguards: Remove from all sources of ignition.

Spill Cleanup: Use non-sparking equipment to clean up spill. If disposal is necessary, refer to *XIII. DISPOSAL CONSIDERATIONS* .

VII. HANDLING AND STORAGE

Personnel Handling: Handle with care. Do not strike or crush the rounds.

Storage: Store in original containers in a cool, dry, well-ventilated area away from all sources of ignition. Do not subject to mechanical shock. Keep out of reach of children. This product ***must not be stored*** with acids, strong oxidizers or caustics.

VIII. PERSONAL PROTECTION/EXPOSURE CONTROLS

Engineering Controls: Local exhaust ventilation is recommended if significant dusting occurs. Otherwise, use general exhaust ventilation.

Personal Protective Equipment: Safety glasses recommended when handling or firing rounds.
Hearing protection recommended when firing rounds.
Use of a NIOSH/MSHA-approved respirator is recommended when concentrations to fumes and/or dust exceed the PEL or TLV.

Exposure Guidelines:

- Keep product away from sources of accidental ignition.

Exposure Limits:

- Exposure limits listed with each hazardous chemical.

IX. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DATA

Form:	Solid	**Evaporation Rate:**	N/A
Color:	Variable	**Melting Point:**	N/A
Odor:	None	**Solubility in Water:**	N/A
Boiling Point:	N/A	**pH:**	N/A
Specific Gravity:	N/A		

Vapor Density: N/A

X. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal use conditions. Will not react with water.

Other Hazards:
Incompatibility: Incompatible with acids, strong oxidizers and caustics.
Polymerization: Will not occur.

Conditions to Avoid: Flames, sparks, percussion, shock, static, high temperatures (266ºF or 130ºC, or above)

XI. TOXICOLOGICAL INFORMATION

Oral LD 50: No available data.
Dermal LD 50: No available data.
Inhalation LC 50: No available data.
Irritation: Not a skin or eye irritant.

XII. ECOLOGICAL INFORMATION

Aquatic Toxicity:
None

Environmental Impact: When used and disposed of properly, there is no known environmental impact.

XIII. DISPOSAL CONSIDERATIONS

This product is considered a characteristic hazardous waste per 40 CFR 261.24 ***for disposal purposes only***. Dispose of as required by local, state and federal laws and regulations.

XIV. TRANSPORTATION INFORMATION

SHIPPING INFORMATION
Proper Shipping Name: Cartridges, Small Arms
Hazard Class: ORM-D
UN/NA No: N/A
Packing Group: N/A
Shipping Label: None required.
Special Information: May be reclassified internationally as:
Hazard Class: 1.4S
UN/NA No.: UN0012
Packing Group: II
Shipping Label: 1.4S label (or marked 1.4S)

XV. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

TSCA Inventory Status: Included on list.

This product contains a toxic chemical or chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

XVI. OTHER INFORMATION

NFPA Rating: Not established.

HAZARD CLASSIFICATION

Chronic Health: Headache, nausea, weakness
Acute Health: None
Fire Hazard: 0 (per *HMIS Rating*)
Pressure Hazard: Sudden release of pressure.
Reactivity Hazard: 1 (per *HMIS Rating*)

NPCA-HMIS Ratings:
Health: 1
Flammability: 0
Reactivity: 1

References:

Code of Federal Regulations, Monthly Summary, CFR 1910.1200(g) and Appendix E (B.), Regulations Management Corporation, Bloomington, Indiana, July 1, 1994.

Hazardous Chemical Desk Reference: Third Edition, Richard J. Lewis, Sr., Van Nostrand Reinhold, Copyright 1993.

American National Standards Institute, Z400.1-1993

International Standards Organization Safety Data Sheet Standard.

XVII. LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA WEEL	American Industrial Hygiene Association-Workplace Environmental Exposure Level
ANSI	American National Standard Institute
BEI	Biological Exposure Indexes
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CL	Ceiling Limits (not to be exceeded)
DSL	Domestic Substances List
EPA	Environmental Protection Agency
HMIS	Hazardous Materials Identification System
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ISO	International Standards Organization
LC	Lethal Concentration
LD	Lethal Dose
MITI	Ministry of International Trade and Industry (Japan)
MSHA	Mine Safety and Health Appliance
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NTA	National Transportation Agency (Canada)
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
ORM	Other Regulated Materials
PEL	Permissible Exposure Limit (OSHA)
SCBA	Self-contained Breathing Apparatus
STEL	Short-Term Exposure Limit
TLV	Threshold Limit Values (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
UN/NA	United Nations/North American (Identification number)
SARA	Superfund Amendments and Reauthorization Act
RCRA	Resource Conservation and Recovery Act

For additional information, please contact:

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Madison, NC 27025-0700
(800) 243-9700