

**UNITED NATIONS / DOT
PERFORMANCE CERTIFICATION**

MARINE LUMBER COMPANY

4A DESIGN QUALIFICATION

**M2A1 Steel Ammunition Can Packaging
for (100) Ammunition Rounds**

TEST REPORT #: 18-MN20230



4A / Y35.3 / S / **
USA / +AA9669

**Insert the year packaging is manufactured

TESTING PERFORMED FOR:

MARINE LUMBER COMPANY

11800 SW Myslony Road
Tualatin, OR 97062

ATTN: Eddie McGrath

TESTING PERFORMED BY:

TEN-E PACKAGING SERVICES, INC.

1666 County Road 74
Newport, MN 55055
Phone: 651-459-0671
Fax: 651-459-1430

May 22, 2018

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SECTION I: CERTIFICATION

Design Qualification of the Marine Lumber Company M2A1 Steel Ammunition Can Packaging for (100) Ammunition Rounds

TEN-E Packaging Services, Inc. is a current DOT UN Third-Party Certification Agency under §107.403 and certifies that the **Marine Lumber Company** packaging referenced above has passed the standards of the DEPARTMENT OF TRANSPORTATION'S TITLE 49 CFR; Performance Oriented Packaging Standards, Section 178. This package is also certified under IMDG, ICAO/IATA Regulations and the UN Recommendations on the Transport of Dangerous Goods. It is the responsibility of the end user to determine authorization for use under these regulations. The use of other packaging methods or components other than those documented in this report may render this certification invalid.

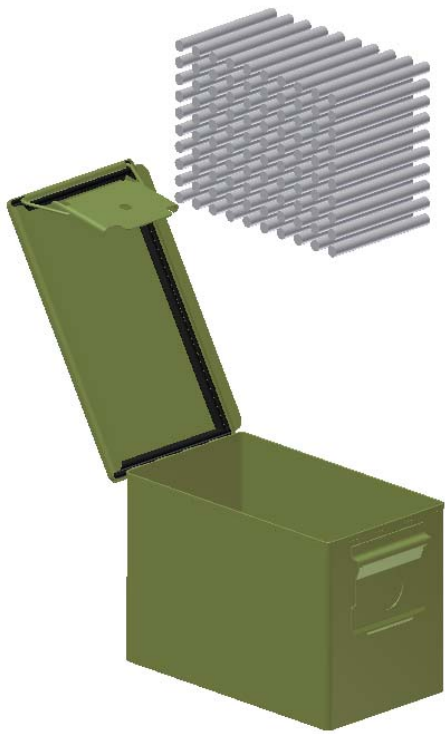
SUMMARY OF PERFORMANCE TESTS					
UN / DOT TEST	CFR REFERENCE	TEST LEVEL	TEST CONTENTS	TEST COMPLETED	TEST RESULTS
Drop	178.603	1.2 m	Simulated Articles / Lead Shot	May 22, 2018	PASS
Stacking	178.606	2,268.0 Kg – 24 Hours	Empty	May 22, 2018	PASS
Vibration	178.608	4.0 Hz – 1 Hour	Simulated Articles / Lead Shot	May 21, 2018	PASS
TEST REPORT NUMBER:			18-MN20230		
UN MARKING: (CFR 49 – 178.503)			 4A / Y35.3 / S / ** USA / +AA9669		
PACKAGING IDENTIFICATION CODE:			4A - Steel Box (178.512)		
PERFORMANCE STANDARD:			Y (Packaging meets Packing Group II and III tests)		
AUTHORIZED GROSS MASS:			35.3 Kg (77.8 Lbs.)		
"S" DESIGNATION:			Denotes Inner Packagings		
YEAR OF MANUFACTURE:			** Insert year the packaging is manufactured		
STATE AUTHORIZING THE MARK:			USA		
PACKAGING CERTIFICATION AGENCY:			(+AA) TEN-E Packaging Services, Inc. (Newport, MN CAA #2006030022)		
THIRD PARTY PACKAGING IDENTIFICATION:			+AA9669		
PERIODIC RETEST DATE:			May 22, 2020		

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY THAT THE PACKAGING TESTED IS MERCHANTABLE OR FIT FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. In no event shall TEN-E Packaging Services, Inc. liability exceed the total amount paid by **Marine Lumber Company** for services rendered. In the event of future changes to the above referenced test standards, it is the responsibility of **Marine Lumber Company** to determine whether additional testing or updating of past testing is necessary to verify that the packaging we have tested remains in compliance with those standards.

MANUFACTURER:
Marine Lumber Company
 11800 SW Myslony Road
 Tualatin, OR 97062


 Angela M. Clifton
 Packaging Engineer
 TEN-E Packaging Services, Inc.
 1666 County Road 74
 Newport, MN 55055

SECTIONS II & V: PACKAGING DESCRIPTIONS / COMPONENT DRAWINGS

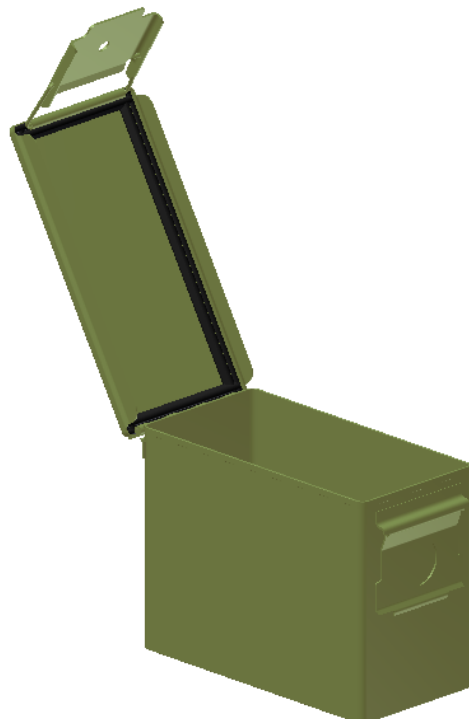
M2A1 Steel Ammunition Can Packaging for (100) Ammunition Rounds		
ASSEMBLY DRAWING	TEST LEVELS	
	Certification Type:	Design Qualification
	Packaging Code Designation:	4A
	Packing Group:	II
	TEST SAMPLE PREPARATION (Refer to Section IV)	
	Overall Packaging Tare Weight: (Less Inner Articles)	2,590 Grams
	Gross Weight of Inner Articles:	280 Grams
	Additional Weight Added: (Bag of Lead Shot)	32,500 Grams
	Package Test Weight:	35.3 Kg 77.8 Lbs.
	Authorized Package Gross Mass:	35.3 Kg 77.8 Lbs.
	CLOSING METHODS	
	(1) Metal Latch with (1) Wire Security Seal	

COMPONENT INFORMATION

SIMULATED ARTICLE		DRAWING
Description:	Simulated 12.5 mm Ammunition Rounds	
Quantity*	100	
Material:	PVC Pipe	
Tare Weight:	28 Grams (each)	
Overall Dimensions:		
• Diameter	3/4"	
• Overall Length	5-1/2"	
Markings (QC Audit):	None	

***Note:** (90) simulated ammunition rounds were removed from the packaging in order to add lead shot to achieve the required authorized package gross mass of 35.3 Kg

AMMUNITION CAN (7553296)				DRAWING
Manufacturer: Marine Defense Packaging, Tualatin, OR				
Description:	M2A1 Metal Ammunition Container with Hinged Cover, Top Metal Handle and Side Latch			
Material:	Steel			
Coating	Olive Green Painted			
Tare Weight:	2,482.0 Grams			
Thickness (Nom.):	Cover	Sidewall	Bottom	
	0.022"	0.035"	0.033"	
	0.021"	0.035"	0.034"	
	0.022"	0.034"	0.033"	
Dimensions (Max):				
• Length	12-1/32"			
• Width	6-3/32"			
• Height	7-1/4"			
• Overall Height	7-1/2" (with Cover)			
Gasket:				
• Description:	Black Rubber Gasket			
• Tare Weight:	70 Grams			
• Length	11-5/8"			
• Width	6"			
• Thickness	0.259"			
Markings (QC Audit):	18	M2A1	MLI	



SECTION III: TEST PROCEDURES AND RESULTS

DROP TESTS

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Simulated Articles and Lead Shot	- There can be no damage to the outer packaging likely to adversely affect safety during transport. Inner receptacles, inner packagings or articles must remain completely within the outer packaging and there must be no leakage of the filling substance from the inner packaging. - No rupture is permitted in packagings for materials in Class 1 which would permit spillage of loose explosive substances or articles from the outer packaging. (§178.603)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	Ambient	
DROP HEIGHT:	1.2 Meters (48.0") (Refer to Section IV)	
TEST EQUIPMENT:	L.A.B. Accu Drop 160	
DROP ORIENTATIONS AND TEST RESULTS		
Sample #1: Flat on Bottom	Sample #2: Flat on Top	Sample #3: Flat on Long Side
		
PASS: No leakage or damage.	PASS: No leakage or damage.	PASS: No leakage or damage.
Sample #4: Flat on Short Side	Sample #5: Bottom Corner	*Sample #1: Top Corner
		
PASS: No leakage or damage.	PASS: No leakage. Slight deformation at impact corner.	PASS: No leakage. Slight deformation at impact corner.

*Flat on bottom drop sample was also used for the top corner drop.

STACKING TEST

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Empty	There can be no deterioration that could adversely affect transport safety or any distortion liable to reduce the package's strength, cause instability in stacks of packages, or cause damage to inner packagings that is likely to reduce safety in transport. (§178.606)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	Ambient	
TEST LOAD APPLIED:	2,268.0 Kg (5,000.0 Lbs.) (Refer to Section IV)	
TEST DURATION:	24 Hours	
TEST EQUIPMENT:	Dead Load Weights	

STACKING TEST SET-UP & RESULTS



Sample #	Maximum Deflection After 24 Hours	Results
1	0"	PASS
2	0"	PASS
3	0"	PASS
4	0"	PASS

Comments/Observations: Following the 24-hour stack test, there was no damage likely to affect the performance of the packaging.

Stacking Stability: Not conducted; required only for guided load tests.

VIBRATION TEST

TEST INFORMATION		TEST CRITERIA
TEST CONTENTS:	Simulated Article s and Lead Shot	• Immediately following the period of vibration, each package must be removed from the platform, turned on its side and observed for any evidence of leakage. • A packaging passes the vibration test if there is no rupture or leakage from any of the packages. • No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength. (\$178.608)
SAMPLE PREPARATION:	Refer to Section II	
CONDITIONING:	Ambient	
TABLE DISPLACEMENT:	1"	
TEST FREQUENCY:	4.0 Hz	
TEST DURATION:	1 Hour	
TEST EQUIPMENT:	Vertical motion using L.A.B. 6000 Transportation Simulator	

VIBRATION TEST SET-UP AND RESULTS

	Sample #	Results	Comments/Observations
	1	PASS	No leakage or damage.
	2	PASS	
	3	PASS	

REGULATORY AND INDUSTRY STANDARD REFERENCES

REGULATORY REFERENCES

TEST	49 CFR ^①	UN ^②	IMDG ^③	ICAO ^④	IATA ^⑤
	October 2017 Edition	20 th Edition	2016 Edition	2017-2018 Edition	59 th Edition
Drop:	178.603	6.1.5.3	6.1.5.3	6; 4.3	6.3.3
Stacking:	178.606	6.1.5.6	6.1.5.6	6; 4.6	6.3.6
Vibration:	178.608	---	---	4; 1.1.1	5.0.2.7

① United States Department of Transportation Code of Federal Regulations (CFR) Title 49, Transportation, Parts 100-185

② The United Nations Recommendations on the Transport of Dangerous Goods – Model Regulations (UN – Orange Book)

③ International Maritime Dangerous Goods Code (IMDG)

④ Technical Instructions for the Safe Transport of Dangerous Good by Air (ICAO)

⑤ International Air Transport Association (IATA) Dangerous Goods Regulations

INDUSTRY STANDARD REFERENCES

Drop:	ASTM ^⑥ D5276:	Standard Test Method for Drop Test of Loaded Containers by Free Fall
	ISO ^⑦ 2248:	Packaging – Complete, Filled Transport Packages – Vertical Impact Test by Dropping
Stacking:	ASTM ^⑥ D4577:	Standard Test Method for Compression Resistance of a Container Under Constant Load
	ISO ^⑦ 2234:	Packaging – Complete, Filled Transport Packages – Stacking Test using Static Load
Vibration:	ASTM ^⑥ D999:	Standard Test Method for Vibration Testing of Shipping Containers
	ISO ^⑦ 2247:	Packaging – Complete, Filled Transport Packages – Vibration Test at Fixed Low Frequency

⑥ American Society for Testing and Materials (ASTM)

⑦ International Organization for Standardization (ISO)

EQUIPMENT

All inspection, measuring and test equipment that can affect product quality is calibrated and adjusted at prescribed intervals, or prior to use, and is traceable to NIST, using ANSI Z540 as an overall guide for calibration certification.

SECTION IV: MATHEMATICAL CALCULATIONS

INFORMATION USED FOR CALCULATIONS

Overall Package Tare Weight(less inner articles/pkg) (PTW):	2,590	Grams
Gross Weight of (1) Inner Article/Packaging (GW):	28	Grams
Additional Weight Added (AWA):	32,500	Grams
Number of Inner Article/Packaging (# IP):	10	
Overall Height of one Package (OH):	7.5	Inches
Stack Test-# of Samples Tested Simultaneously:	4	

AUTHORIZED PACKAGE GROSS MASS (GM) AND PACKAGE TEST WEIGHT

Overall Pkg Tare Weight (less Inner Articles)(PTW) + Gross Weight of (1) Inner Article (GW)
+ Additional Weight Added (AWA) x # of Inner Pkg (# IP)

(PTW	+	AWA)	+	(GW	x	# IP)
2,590	+	32,500	+	28	x	10
		35.3	Kg	77.8	Lbs.	

PACKING GROUP DROP HEIGHTS

PG I	1.8 Meter	70.9 Inches	71.0 Inches
PG II	1.2 Meter	47.2 Inches	48.0 Inches
PG III	0.8 Meter	31.5 Inches	32.0 Inches

STACKING TEST MINIMUM LOAD CALCULATIONS

Number of Packages in a 3m High Stack (120 / Overall Pkg Height (OH) -1)

120 / Overall Height of one Pkg (OH) - 1

(120	/	OH)	-1	=	# 3m HS
120	/	7.50	-1	=	15.0

Stacking Test Load Calculation (Individual Package)

Authorized Pkg Gross Mass (APGM) x # of Pkg in a 3m High Stack (# 3m HS)

GM	x	# 3m HS	
35.3	x	15.0	
		529.5 Kg	1,167.3 Lbs.

Stacking Test Load Calculation

Samples x Authorized Pkg Gross Mass (APGM) x # of Pkg in a 3m High Stack (# 3m HS)

Samples	x	(GM	x	# 3m HS)
4	x	35.3	x	15.0
		2,118.0 Kg		4,669.3 Lbs.