EVALUATION OF NORMA 5.56 AMMUNITION WITH BOAT-TAIL BULLETS

COLT'S INC

DATE:

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250 rounds were available for testing for functioning in the AR-15 as well as for comparison with the regular Remington M193 Ball ammunition containing WC846 propellant, currently used for routine testing. This sample was submitted by Cooper-McDonald of Baltimore.

EXTERNAL DIMENSIONS:

The averages of measurements of a random sample of 10 rounds were obtained and found to compare as follows:

	Norma	Remington	Normal Maximum
Rim diameter	0.374"	0.375"	0.378"
Head diameter	0.374	0.373	0.376
Shoulder diameter	0.351	0.349	0.354
Neck diameter (loaded)	0.249	0.248	0.253
Case length	1.755	1.754	1.760
Overall cartridge length	2.243	2.254	2.260

The Norma cartridges use a sealant, made visible with a green dye around the primer rim. The cases are headstamped "NORMA .223".

HEAD TO SHOULDER LENGTHS:

This is the dimension from the head of the case to a datum line midway of the shoulder, this line being 0.330-in. for a maximum cartridge. A barrel section including the chamber of a barrel was placed vertically on a surface plate under a dial indicator. The chamber was selected as being correct in dimensions. Using a master headspace gage, the dial indicator was zeroed at 1.4666-in. to correspond to a maximum cartridge. Data were taken on a 100-round random sample of both Norma and Remington cartridges measured with the dial indicator and cartridges in the chamber, as follows:

Head to Shoulder, Zero at 1.4666" from 0.330" Datum	Number found in each interval	
	Norma	Remington
-0.000 to -0.001	0	1
-0.001 to -0.002	6	32
-0.002 to -0.003	30	67
-0.003 to -0.004	18	0
-0.004 to -0.005	36	0
-0.005 to -0.006	9	0
-0.006 to -0.007	1	0
Total Number	100	100

VELOCITY ASSESSMENT:

A 20 round sample was fired in the Universal Receiver with long piston for velocity in comparison with the Remington ammunition. Correction was made from a long piston firing with the Reference Lot of ammunition so the following figures result:

	Corrected 15' Instrumental Velocities, f/s
Norma (20)	3213
Remington Control (20)	3268
Reference Lot	3244

ACCURACY FROM FIXED REST:

Using the long piston in the Universal Receiver, five groups of ten random rounds each were fired for accuracy at 50 yards with the following comparative results:

	Diagonal, inches
Norma	1.20
Remington	1.32

CYCLIC RATE OF FIRE:

Two 20-round bursts in each of 3 AR-15s were used for determination of cyclic rate (rounds per minute). 2 bursts were fired with both the Norma and Remington ammunition in these guns which contained the GX buffer. Following are the average figures for the 2-burst firings:

	Norma Ammunition	Remington Ammunition
Average Cyclic Rate	688	782

VELOCITY IN THE AR-15 RIFLES:

One AR-15 rifle was taken at random from recent production and fired for 15' instrumental velocity with both the Norma and Remington ammunition. The velocities below are averages of ten shots from the rifle with each ammunition:

AR-15 Rifle Number	15' Instrumental Velocities, f/s	
	Norma	Remington
015492	3101	3129

A histogram of these data is appended.

BULLETS:

A random sample of 10 bullets averaged 0.738" in length and 54.9 grains in weight. They are boat-tailed with tangent ogival heads estimated to have been struck to a 6.5 diameters radius. The jackets are non-magnetic and have the appearance of gilding metal.

POWDER:

The average of 10 weighings of powder charges from the random sample was 26.1 grains. This powder is of the chopped tube variety with a shiny glaze, as from graphite, and is quite similar in appearance and size to the commercial powders sold by Norma like 201. The charge was noted to be very slightly compressed in the cases.

PRIMERS:

The primers are crimped in the cases and are of Boxer (American) type and are nickeled. Five specimens of the Norma and Remington cases were subjected to a Primer Sensitivity Test at each increment of height throughout the range of mixed results according to the procedure contained in AMSMU-P 715-501FA1 of 23 Oct., 1964, with the following results:

	Mean Critical Height with 4 oz. Ball	Equivalent Energy, Inch-Ounces	Standard Deviation Inch-Ounces	Range of Sensitivity, Inch-Ounces
Norma	3.90	15.60	1.96	9.2 to 21.5
Remington	6.50	26.00	6.20	7.4 to 44.6

The desirable range of sensitivity is from 12 to 48 inch-ounces, bringing the Mean Critical Energy to about 30 inch-ounces; this is where 50% of the primers can be expected to fire and/or 50% are expected to mis-fire.

PRESSURE AND VELOCITY:

The Universal Receiver was used for firing Reference Ammunition with short piston for muzzle velocity and port and chamber pressures. The values were compared with the Assessment for this lot (RA 5050) to produce corrections in these values to be applied to a 20-round Norma random sample and a 10-round Remington sample for comparison:

	Short Piston Velocity at 15 feet, f/s.	Chamber Pressure, psi (Copper)	Port Pressure, psi (Copper)
Norma (20)	3149	54400	14900
Standard Deviation	19	1490	300
Remington (10)	3206	51960	15380
Standard Deviation	18	1716	330

OBSERVATIONS:

The chamber pressure produced by the Norma loading was significantly higher than U. S. Military Specifications allow, and might be expected to result in cartridge-case casualties under certain adverse conditions of service use.

The primers of the Norma ammunition were typically too sensitive, thus increasing the risk of accidental firing in the AR-15 rifle, or similar weapons, upon closure of the bolt.

No malfunctions were observed during the testing.

Homer S. Powley

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HEAD TO SHOULDER MEASUREMENTS

SAMPLE SIZE = 100