

American National Standard

**Voluntary Industry Performance Standards
for Pressure and Velocity
of Centerfire Rifle Sporting Ammunition
for the Use of Commercial Manufacturers**



American National Standards Institute

Headquarters

11 West 42nd Street, 13th Floor

New York, NY 10036

Tel: 212 642-4900 Fax: 212 398-0023

CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

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SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES AND CHAMBERS
FULL AND ABBREVIATED NAMES

The following tabulations list recommended full names and abbreviated names of the Centerfire Rifle cartridges and chambers currently supplied for various types of firearms.

In the order of listing, all Metric cartridges, first in ascending numerical order of approximate caliber designation, then alphabetical order followed by; American cartridges, first in ascending numerical order, of approximate caliber designation, then alphabetical order.

All 2 digit numbers

2 digits and a hyphen followed by more numbers

3 digit numbers

For any cartridge name with several bullet weights, list in ascending numerical order of bullet weights.

Active Cartridges and Chambers

<u>Full Name</u>	<u>Abbreviated Name</u>
6mm Remington	6mm Rem
6.5mm Remington Magnum	6.5mm Rem Mag
6.5x55 Swedish Mauser	6.5x55 Swed Mauser
7mm Mauser (7x57)	7mm (7x57)
7mm Remington Magnum	7mm Rem Mag
7mm Weatherby Magnum	7mm Wby Mag
7mm-08 Remington	7mm-08 Rem
7-30 Waters	7-30 Waters
7.62x39	7.62x39
8mm Mauser (8x57)	8mm (8x57)
8mm Remington Magnum	8mm Rem Mag
17 Remington	17 Rem
218 Bee	218 Bee
22 Hornet	22 Hornet
22-250 Remington	22-250 Rem
220 Swift	220 Swift
222 Remington	222 Rem
222 Remington Magnum	222 Rem Mag
223 Remington	223 Rem
225 Winchester	225 Win

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES AND CHAMBERS
FULL AND ABBREVIATED NAMES

Active Cartridges and Chambers
(continued)

<u>Full Name</u>	<u>Abbreviated Name</u>
243 Winchester	243 Win
25-06 Remington	25-06 Rem
25-20 Winchester	25-20 Win
25-35 Winchester	25-35 Win
250 Savage	250 Sav
256 Winchester Magnum	256 Win Mag
257 Roberts	257 Rob
257 Roberts +P	257 Rob +P
264 Winchester Magnum	264 Win Mag
270 Winchester	270 Win
280 Remington (7mm Express Remington)	280 Rem (7mm Exp Rem)
284 Winchester	284 Win
30 Carbine	30 Carb
30 Remington	30 Rem
30-06 Springfield	30-06 Sprg
30-30 Winchester	30-30 Win
30-40 Krag	30-40 Krag
300 Holland & Holland Magnum	300 H&H Mag
300 Savage	300 Sav
300 Weatherby Magnum	300 Wby Mag
300 Winchester Magnum	300 Win Mag
303 British	303 Brit
303 Savage	303 Sav
307 Winchester	307 Win
308 Winchester	308 Win
32 Remington	32 Rem
32 Winchester Special	32 Win Spl
32-20 Winchester	32-20 Win
338 Winchester Magnum	338 Win Mag
348 Winchester	348 Win

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES AND CHAMBERS
FULL AND ABBREVIATED NAMES

Active Cartridges and Chambers
(continued)

<u>Full Name</u>	<u>Abbreviated Name</u>
35 Remington	35 Rem
35 Whelen	35 Whelen
350 Remington Magnum	350 Rem Mag
351 Winchester Self-Loading	351 Win SL
356 Winchester	356 Win
358 Winchester	358 Win
375 Holland & Holland Magnum	375 H&H Mag
375 Winchester	375 Win
38-40 Winchester	38-40 Win
38-55 Winchester	38-55 Win
416 Remington Magnum	416 Rem Mag
416 Rigby	416 Rigby
44 Remington Magnum	44 Rem Mag
44-40 Winchester	44-40 Win
444 Marlin	444 Mar
45-70 Government	45-70 Govt
458 Winchester Magnum	458 Win Mag
470 Nitro Express	470 NE

Velocity specifications are stated on the basis of a nominal mean velocity ± 90 feet per second, as listed in Section I.

In the testing of ammunition, subsequent to its manufacture, allowances must be made for factors which can influence both the average and the variability of velocity observed. Factors such as components, sampling error, differences in test methods and equipment and in the actual test conditions may influence the observed results.

The specifications include allowances for these sources of variation which are standardized and controlled during the manufacturing cycle, but may vary considerably in subsequent tests.

Manufacturers of ammunition should control velocity during loading at a level which gives reasonable assurance that the product will, in tests subsequent to loading, meet the established specifications.

The following procedures are intended to serve as a guide in establishing loading control limits for velocity which are compatible with the established values. These procedures, based on a modification of the concept of Reject Limits for Averages, permit maximum latitude in loading control while providing adequate assurance that velocity specifications are met.

This procedure requires that a valid estimate of σ' (sigma prime) be developed through analysis of the within-sample variation of velocity. Sigma prime is most easily determined by finding the average range (or extreme variation) within samples of size 10 rounds or less and dividing by the factor d_2 to convert the average range to σ' . For sample sizes greater than 10, calculate the standard deviation of each sample and determine the average standard deviation $\bar{\sigma}$. $\bar{\sigma}$ Divide by the factor c_2 to obtain an estimate of σ' .

(Note: Most texts on Quality Control contain tables of c_2 and d_2 .)

The test results from at least 50 samples of n rounds each, which include data from the loading of several different lots of powder should be used in developing the value of sigma prime (σ').

Table A contains the factors (M_1) which are used as multipliers of \bar{x} in determining the Upper and Lower Reject Limits for sample averages. The specific values for M_1 are given for several levels of assurance and a range of sample sizes. The values of t_2 are taken from a table of critical values for the two-tailed normal distribution. Values of M_1 are calculated as follows:

$M_1 = t_2 / \sqrt{n}$ where t_2 is as defined above and
 n = sample size. For example, the first value
of M_1 in TABLE A is computed as follows:

$$1.65 / \sqrt{2} = 1.17$$

TABLE A
 FOR TWO SIDED SPECIFICATIONS FOR AVERAGES
 MULTIPLIER (M) OF SHOWN
 IN THE BODY OF THE TABLE

Selected Level of Assurance	SAMPLE SIZE								
	%	t_2	2	3	4	5	10	15	20
90.0	1.65	1.17	.95	.83	.74	.52	.43	.37	.33
95.0	1.96	1.39	1.13	.98	.88	.62	.51	.44	.39
97.5	2.24	1.65	1.35	1.17	1.04	.74	.60	.52	.47
99.0	2.58	1.82	1.49	1.29	1.15	.82	.67	.58	.52
99.5	2.81	2.00	1.62	1.41	1.26	.89	.73	.63	.56
99.73	3.00	2.12	1.73	1.50	1.34	.95	.77	.67	.60

EXAMPLE OF THE USE OF TABLE A

Assume that -

1. The product velocity specification is 3455 ± 90 feet per second. Then, the specified limits are 3545 and 3365 feet per second.
2. The value of σ' has been determined to be 30 ft/s.
3. The selected level of assurance = 99%.
4. The sample size = 5 rounds.

Calculated the sample average Reject Limits -

$$\text{Upper Reject Limit} = 3545 - (30 \times 1.15) = 3545 - 34.50 = 3510 \text{ ft/s}$$

$$\text{Lower Reject Limit} = 3365 + (30 \times 1.15) = 3365 + 34.50 = 3400 \text{ ft/s}$$

Note: Because of the importance of σ' in this procedure, it is recommended that control charts for the range (or extreme variation) be used to monitor and control the variability of velocity. Procedures for the construction and use of these charts can be found in Quality Control text books.

Two methods of measuring centerfire rifle pressures are recognized by SAAMI: the copper crusher and the piezoelectric transducer method. One or the other may be used or they may be used simultaneously.

A brief explanation of these two systems follows:

COPPER CRUSHER SYSTEM

This system employs a copper crusher cylinder which is compressed by a piston fitted to a piston hole into the chamber of the test barrel. The pressure developed by the gases from the burning propellant blanks the cartridge case into the piston hole, allowing the gases to force the piston upward, thereby permanently compressing the copper crusher cylinder.

The Sporting Arms and Ammunition Manufacturers' Institute has adopted the pressure units designation of "Copper Units of Pressure" (abbreviated CUP) for this system. This designation applies only to values obtained using the particular crusher, target tables and methods outlined in this Standard.

PIEZOELECTRIC TRANSDUCER SYSTEM

This system employs a piezoelectric transducer flush mounted in the chamber of the test barrel. Pressure developed by the gases from the burning propellant exerts force on the transducer through the cartridge case wall causing the transducer to deflect, creating a measurable electric charge. This electrical charge is converted into a reading of pressure.

The Sporting Arms and Ammunition Manufacturer's Institute has adopted the pressure units designation of "pounds per square inch" (abbreviated psi) for this system. This designation applies to values obtained with transducers and methods as outlined in this Standard.

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

FACTORS AFFECTING
PRESSURE MEASUREMENTS
CRUSHER

There are three principal factors affecting pressure measurements. These are instrumentation, ammunition and procedure. The following lists the items in each category that may cause difficulties in measuring pressure by the crusher method.

INSTRUMENTATION

1. Condition of test barrel (whether minimum or maximum bore, chamber size and headspace, amount of erosion at throat and bore).
2. Diameter of piston and piston hole.
3. Fit of piston in piston hole.
4. Location of piston hole.
5. Tightness of barrel mounting in Universal Receiver, if used.
6. Shape, size and protrusion of firing pin beyond breech face.
7. Force of firing pin blow.
8. Size, material and characteristics of the pressure-sensitive element of the gage (copper crusher cylinders).
9. Type, size and condition of gas check.
10. Type of piston and gas check lubricant.
11. Quality and tolerance of piston hole gages and headspace gages.
12. Quality of crusher measuring instrument.

AMMUNITION

1. Condition of cartridge.
2. Position of powder in cartridge case.
3. Temperature of ammunition.

PROCEDURE

1. Failure to mount pressure barrel properly in Universal Receiver or other test action to assure minimum headspace.
2. Failure to rotate cartridge and close breech carefully to assure proper powder positioning.
3. Failure to wipe piston ends, crusher and set-screw face to remove surplus oil.
4. Failure to center crusher cylinder on piston and properly adjust set-screw.
5. Failure to fire warming shots.
6. Overheating barrel by excessive rate of fire.
7. Failure to clean bore and control metal fouling.
8. Failure to clear barrel of empty case and gas check from previous shot.

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

FACTORS AFFECTING
PRESSURE MEASUREMENTS
TRANSDUCER

There are three principal sources of factors affecting pressure measurements. These are instrumentation, ammunition and procedure. The following lists the principal items in each category that may cause difficulties in measuring pressure by the transducer method.

INSTRUMENTATION

1. Condition of test barrel (whether minimum or maximum bore, chamber size and headspace, amount of erosion at throat and bore).
2. Fit of transducer in barrel.
3. Location of transducer.
4. Tightness of barrel mounting.
5. Shape, size and protrusion of firing pin beyond breech face.
6. Force of firing pin blow.
7. Characteristics of transducer.
8. Quality of transducer.
9. Quality of Read-Out System.

AMMUNITION

1. Condition of cartridge.
2. Position of powder in cartridge case.
3. Temperature of ammunition.

PROCEDURE

1. Failure to mount pressure barrel properly in Universal Receiver or other test action to assure minimum headspace.
2. Failure to rotate cartridge and close breech carefully to assure proper powder positioning.
3. Failure to fire warning shots.
4. Overheating barrel by excessive rate of fire.
5. Failure to clean bore and control metal fouling.
6. Failure to protect transducer against contamination, such as oil or water.
7. Transducer calibration.
8. Read-Out System calibration.

CENTERFIRE RIFLE PRESSURE DATA INTERPRETATION

The procedures outlined in this Standard must be followed precisely in order to obtain accurate, meaningful results. For instance, locating the pressure sensing device at a location other than specified may produce an accurate reading, but will not relate to data on which this interpretation is based.

The Maximum Probable Lot Mean has been established as the maximum pressure for a particular caliber. The only way to determine the true pressure of any lot of ammunition is to fire every round in the lot. This, of course, is impractical; experience and statistical evaluation of test results has resulted in the establishment of a value known as the Maximum Average Pressure. If testing is conducted according to the methods and procedures established in this Standard, adhering to the Maximum Average Pressure as a loading limit will assure that the Maximum Probable Lot Mean will conform to the value established for that caliber.

Cartridge pressure measurements are subject to statistical variation. The average of several successive tests, e.g., 10 rounds drawn from an essentially homogeneous quantity of ammunition will usually differ, but will in general lie within certain limiting values both above and below the lot mean value that would be observed if all rounds in the lot from which the samples were drawn were to be tested. These limits can be estimated from a knowledge of the Standard Deviation of the individual pressure values characteristic of the ammunition in question. It is an experimental fact that the pressures are normally distributed.

EXPLANATION OF PRESSURE TERMINOLOGY

SAAMI recognizes two pressure measuring systems. The preferred system is the piezoelectric transducer system with the transducer flush mounted in the chamber of the test barrel. Pressure developed by the burning propellant exerts force on the transducer through the cartridge case wall causing the transducer to deflect, creating a measurable electric charge. Pressures measured with this system are expressed in units of "pounds per square inch" (abbreviated psi).

The second, older system, employs a copper crusher cylinder which is compressed by a piston fitted to a piston hole into the chamber of the test barrel. Pressure generated by the burning propellant acts on the base of the piston forcing the piston to move, thereby permanently compressing the copper cylinder. Pressures measured by this system are expressed in "Copper Units of Pressure" (abbreviated as CUP).

Throughout the following text the pressure is expressed in terms of "pounds per square inch" (psi) however, it should be understood that the same procedures apply to pressures expressed in "Copper Units of Pressure" (CUP).

Maximum Average Pressure - is the recommended maximum pressure level for loading commercial sporting ammunition. This pressure level is positioned two standard errors below the Maximum Probable Lot Mean (MPLM) pressure in order to assure there is a 97.5% probability that the Maximum Probable Lot Mean pressure is not exceeded. See Figure 1.

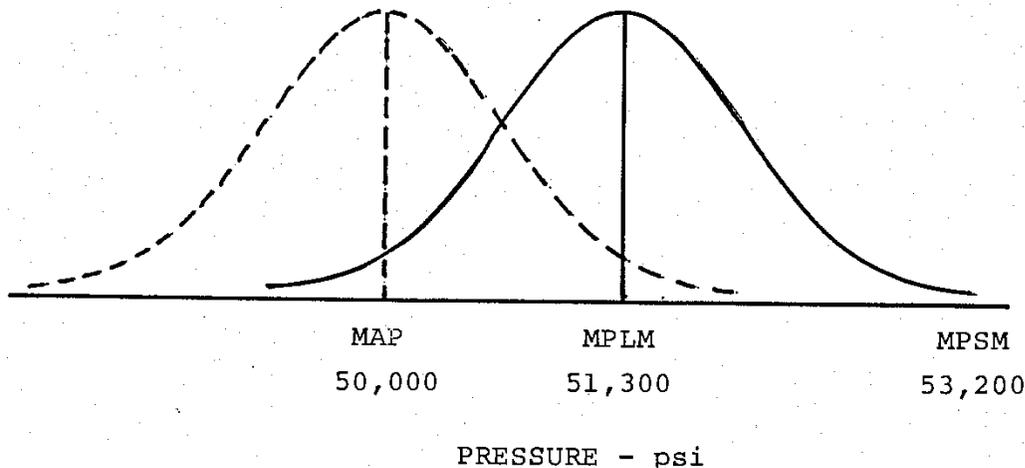


Figure 1

Standard Deviation (S.D.) - The Standard Deviation for each Maximum Average Pressure Level is based on a Coefficient of Variation of 4%. This 4% Coefficient of Variation is maintained throughout the SAAMI pressure spectrum providing a realistic Standard Deviation for each pressure level. To obtain the S. D. for a particular MAP multiply the MAP by 0.04 i.e., $50,000 \times 0.04 = 2,000$ psi.

Standard Error ($\sigma_{\bar{x}}$) - The standard error is calculated by dividing the Standard Deviation (population S. D. = σ) by the square root of the sample size $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$.

Maximum Probable Lot Mean (MPLM) - The MPLM is calculated by adding two standard errors to the Maximum Average Pressure.

The SAAMI pressures are calculated based on a sample size of 10. The Maximum Probable Lot Mean represents the midpoint of the upper service pressure distribution. See figure 1. For example, if the Maximum Average Pressure is 50,000 psi, the Maximum Probable Lot Mean (MPLM) is calculated as follows:

$$\begin{aligned} \text{MPLM} &= \text{Maximum Average Pressure} + 2 \text{ standard errors} \\ \text{MPLM} &= 50,000 + (633 \times 2) = 50,000 + 1300 = 51300 \text{ psi} \end{aligned}$$

Maximum Probable Sample Mean (MPSM) - is the maximum expected average pressure that may be observed in the testing of product subsequent to its manufacture and is not intended for use as a loading control point. The Maximum Probable Sample Mean is positioned 3 standard errors above the Maximum Probable Lot Mean i.e., $\text{MPLM} + 3\sigma_{\bar{x}}$. The Maximum Probable Sample Mean defined here is the value previously referred to in the ANSI/SAAMI Standards as the Maximum Product Average Pressure. See Figure 1.

Maximum Extreme Variation - The maximum allowable sample E.V. (Extreme Variation or Range) is a statistic derived from the knowledge of the population Standard Deviation. Applying table figures from the Relative Range Tables (Biometrika Tables for Statisticians) we calculate the Maximum E.V. or Range---
(population S.D.) $\times 5.16$ (table constant for sample of 10 at 99.0% confidence level) i.e., $2,000 \times 5.16 = 10,300$ psi.

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
CRUSHER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt. Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Copper Units of Pressure (CUP/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
6mm Rem	80	3400	520	533	553
6mm Rem	90	3175	520	533	553
6mm Rem	100	3090	520	533	553
6.5 Rem Mag	120	3195	530	543	563
6.5x55 Swed Mauser	160	2380	460	471	488
7mm Mauser (7x57)	139	2650	460	471	488
7mm Mauser (7x57)	145	2680	460	471	488
7mm Mauser (7x57)	154	2600	460	471	488
7mm Mauser (7x57)	160	2500	460	471	488
7mm Mauser (7x57)	175	2420	460	471	488
7mm Rem Mag	125	3290	520	533	553
7mm Rem Mag	139	3150	520	533	553
7mm Rem Mag	150	3100	520	533	553
7mm Rem Mag	154	3035	520	533	553
7mm Rem Mag	160-162	2940	520	533	553
7mm Rem Mag	175	2850	520	533	553
7mm-08 Rem	120	2990	520	533	553
7mm-08 Rem	140	2845	520	533	553
7-30 Waters	120	2700	400	410	425
7.62x39	123	2350	500	513	532
8mm Mauser (8x57)	170	2340	370	379	393
8mm Rem Mag	185	3065	540	554	575
8mm Rem Mag	220	2815	540	554	575
17 Rem	25	4000	520	533	553
218 Bee	46	2725	400	410	425
22 Hornet	45	2655	430	441	457
22 Hornet	46	2655	430	441	457
22-250 Rem	40	3975	530	543	563
22-250 Rem	52	3740	530	543	563
22-250 Rem	53-55	3650	530	543	563

With regard to match ammunition corresponding to any of the above listings, the velocity figure is a nominal value; optimum accuracy may require a velocity different from the nominal figure.

* Based on sample size n = 10

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
CRUSHER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Copper Units of Pressure (CUP/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
22-250 Rem	60	3600	530	543	563
220 Swift	55	3650	540	554	575
220 Swift	60	3600	540	554	575
222 Rem	50-52	3110	460	471	488
222 Rem	55	3000	460	471	488
222 Rem Mag	55	3215	500	513	532
223 Rem	53	3305	520	533	553
223 Rem	55	3215	520	533	553
223 Rem	60	3200	520	533	553
223 Rem	64	3000	520	533	553
225 Win	55	3540	500	513	532
243 Win	75	3325	520	533	553
243 Win	80	3325	520	533	553
243 Win	85-87	3300	520	533	553
243 Win	100	2950	520	533	553
25-06 Rem	87	3420	530	543	563
25-06 Rem	90	3420	530	543	563
25-06 Rem	100	3210	530	543	563
25-06 Rem	117	2975	530	543	563
25-06 Rem	120	2975	530	543	563
25-20 Win	86	1445	280	287	297
25-35 Win	117	2210	370	371	393
250 Sav	87	3010	450	461	478
250 Sav	100	2800	450	461	478
256 Win Mag	60	2720	430	441	457
257 Rob	87	3150	450	461	478
257 Rob	100	2880	450	461	478
257 Rob	117	2630	450	461	478
257 Rob + P	100	2980	500	513	532
257 Rob + P	117	2760	500	513	532

With regard to match ammunition corresponding to any of the above listings, the velocity figure is a nominal value; optimum accuracy may require a velocity different from the nominal figure.

* Based on sample size, n = 10

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
CRUSHER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Copper Units of Pressure (CUP/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
264 Win Mag	100	3300	540	554	575
264 Win Mag	140	3015	540	554	575
270 Win	100	3300	520	533	553
270 Win	130	3050	520	533	553
270 Win	140	2950	520	533	553
270 Win	150	2830	520	533	553
270 Win	160	2650	520	533	553
280 Rem	120	3135	500	513	532
280 Rem	140	2985	500	513	532
280 Rem	150	2875	500	513	532
280 Rem	165	2800	500	513	532
284 Win	125	3125	540	554	575
284 Win	150	2845	540	554	575
30 Carbine**	110	1965	400	410	425
30 Rem	170	2100	350	359	372
30-06 Sprg	110	3300	500	513	532
30-06 Sprg	125	3125	500	513	532
30-06 Sprg	150	2900	500	513	532
30-06 Sprg	165-168	2790	500	513	532
30-06 Sprg	180	2690	500	513	532
30-06 Sprg	200	2540	500	513	532
30-06 Sprg	200	2400	500	513	532
30-30 Win	125	2550	380	389	403
30-30 Win	150	2370	380	389	403
30-30 Win	170	2180	380	389	403
30-40 Krag	180	2420	400	410	425
30-40 Krag	220	2150	400	410	425
300 H&H Mag	150	3110	540	554	575
300 H&H Mag	180	2870	540	554	575
300 H&H Mag	220	2565	540	554	575

With regard to match ammunition corresponding to any of the above listings, the velocity figure is a nominal value; optimum accuracy may require a velocity different from the nominal figure.

* Based on sample size, n=10

** 20" Barrel

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
CRUSHER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Copper Units of Pressure (CUP/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
300 Sav	150	2615	460	471	488
300 Sav	180	2340	460	471	488
300 Win Mag	150	3275	540	554	575
300 Win Mag	180	2950	540	554	575
300 Win Mag	190	2875	540	554	575
300 Win Mag	200	2800	540	554	575
300 Win Mag	220	2665	540	554	575
303 Brit	150	2685	450	461	478
303 Brit	180	2450	450	461	478
303 Brit	215	2155	450	461	478
303 Sav	190	1875	340	349	362
307 Win	150	2705	520	533	553
307 Win	180	2450	520	533	553
308 Win	110	3150	520	533	553
308 Win	125	3030	520	533	553
308 Win	150	2800	520	533	553
308 Win	165-168	2670	520	533	553
308 Win	180	2600	520	533	553
308 Win	200	2440	520	533	553
32 Rem	170	2120	370	379	393
32 Win Spl	170	2235	380	389	403
32-20 Win	100	1200	160	164	170
32-40 Win	165	1520	300	308	319
338 Win Mag	200	2940	540	554	575
338 Win Mag	210	2855	540	554	575
338 Win Mag	225	2770	540	554	575
338 Win Mag	250	2645	540	554	575

With regard to match ammunition corresponding to any of the above listings, the velocity figure is a nominal value; optimum accuracy may require a velocity different from the nominal figure.

* Based on sample size, n=10

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
 CRUSHER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt. Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Copper Units of Pressure (CUP/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
338 Win Mag	300	2415	540	554	575
348 Win	200	2505	400	410	425
35 Rem	150	2275	350	359	372
35 Rem	200	2055	350	359	372
35 Whelen	200	2660	520	533	553
350 Rem Mag**	200	2690	530	543	563
351 Win SL**	180	1835	450	461	478
356 Win	200	2370	520	533	553
356 Win	250	2075	520	533	553
358 Win	200	2475	520	533	553
358 Win	250	2215	520	533	553
375 H&H Mag	270	2680	530	543	563
375 H&H Mag	300	2515	530	543	563
375 Win	200	2180	520	533	553
375 Win	250	1885	520	533	553
38-40 Win	180	1150	140	144	150
38-55 Win	255	1300	300	308	319
416 Rem Mag	350	2525	540	554	575
416 Rem Mag	400	2400	540	554	575
44 Rem Mag**	210	1900	400	410	425
44 Rem Mag**	240	1740	400	410	425
44-40 Win	200	1175	130	133	138
444 Marlin	240	2320	440	451	468
444 Marlin	265	2100	440	451	468
45-70 Govt	300	1830	280	287	297
45-70 Govt	405	1320	280	287	297
458 Win Mag	500	2025	530	543	563
458 Win Mag	510	2025	530	543	563
470 NE	500	2150	350	359	372

With regard to match ammunition corresponding to any of the above listings, the velocity figure is a nominal value; optimum accuracy may require a velocity different from the nominal figure.

* Based on sample size, n=10

** 20" Barrel

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
 TRANSDUCER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt. Grs.	Velocity in ft/s Mean Instr. @15' (±90)	Pressure Limits (psi/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
6mm Rem	80	3400	650	666	691
6mm Rem	90	3175	650	666	691
6mm Rem	100	3090	650	666	691
7mm Mauser (7x57)	139	2650	510	523	542
7mm Mauser (7x57)	145	2680	510	523	542
7mm Mauser (7x57)	154	2600	510	523	542
7mm Mauser (7x57)	160	2500	510	523	542
7mm Mauser (7x57)	175	2420	510	523	542
7mm Rem Mag	125	3290	610	625	648
7mm Rem Mag	139	3150	610	625	648
7mm Rem Mag	150	3100	610	625	648
7mm Rem Mag	154	3035	610	625	648
7mm Rem Mag	160-162	2940	610	625	648
7mm Rem Mag	175	2850	610	625	648
7mm Wby Mag	140	3225	650	666	691
7mm Wby Mag	175	2900	650	666	691
7mm-08 Rem	120	2990	610	625	648
7mm-08 Rem	140	2845	610	625	648
7-30 Waters	120	2700	450	461	478
7.62x39	123	2350	450	461	478
8mm Mauser (8x57)	170	2340	350	359	372
8mm Rem Mag	185	3065	650	666	691
8mm Rem Mag	220	2815	650	666	691
22-250 Rem	40	3975	650	666	691
22-250 Rem	52	3740	650	666	691
22-250 Rem	53-55	3650	650	666	691
22-250 Rem	60	3600	650	666	691

* Based on sample size n = 10

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
 TRANSDUCER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Pressure Limits (psi/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
222 Rem	50-52	3110	500	513	532
222 Rem	55	3000	500	513	532
223 Rem	53	3305	550	564	585
223 Rem	55	3215	550	564	585
223 Rem	60	3200	550	564	585
223 Rem	64	3000	550	564	585
243 Win	75	3325	600	615	638
243 Win	80	3325	600	615	638
243 Win	85-87	3300	600	615	638
243 Win	100	2950	600	615	638
25-06 Rem	87	3420	630	646	670
25-06 Rem	90	3420	630	646	670
25-06 Rem	100	3210	630	646	670
25-06 Rem	117	2975	630	646	670
25-06 Rem	120	2975	630	646	670
257 Rcb	87	3150	540	554	575
257 Rcb	100	2880	540	554	575
257 Rcb	117	2630	540	554	575
257 Rcb + P	100	2980	580	595	617
257 Rcb + P	117	2760	580	595	617
264 Win Mag	100	3300	640	656	681
264 Win Mag	140	3015	640	656	681
270 Win	100	3300	650	666	691
270 Win	130	3050	650	666	691
270 Win	140	2950	650	666	691
270 Win	150	2830	650	666	691
270 Win	160	2650	650	666	691

* Based on sample size, n = 10

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
TRANSDUCER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (± 90)	Pressure Limits (psi/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
280 Rem	120	3135	600	615	638
280 Rem	140	2985	600	615	638
280 Rem	150	2975	600	615	638
280 Rem	165	2800	600	615	638
284 Win	125	3125	560	574	595
284 Win	150	2845	560	574	595
30 Carbine**	110	1965	400	410	425
30-06 Sprg	55 (Saboted)	4050	500	513	532
30-06 Sprg	110	3300	600	615	638
30-06 Sprg	125	3125	600	615	638
30-06 Sprg	150	2900	600	615	638
30-06 Sprg	165-168	2790	600	615	638
30-06 Sprg	180	2690	600	615	638
30-06 Sprg	200	2540	600	615	638
30-06 Sprg	220	2400	600	615	638
30-30 Win	55 (Saboted)	3365	380	389	403
30-30 Win	125	2550	420	431	447
30-30 Win	150	2370	420	431	447
30-30 Win	170	2180	420	431	447
300 Sav	150	2615	470	482	500
300 Sav	180	1740	470	482	500
300 Wby Mag	180	3185	650	682	691
300 Wby Mag	190	3015	650	682	691
300 Wby Mag	220	2835	650	682	691
300 Win Mag	150	3275	640	656	681
300 Win Mag	180	2950	640	656	681
300 Win Mag	190	2875	640	656	681
300 Win Mag	200	2800	640	656	681
300 Win Mag	220	2665	640	656	681
303 Brit	150	2685	490	503	522
303 Brit	180	2450	490	503	522
303 Brit	215	2155	490	503	522

* Based on sample size, n = 10

** 20" Barrel

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY & PRESSURE DATA
TRANSDUCER

VELOCITY AND PRESSURE DATA
CENTERFIRE RIFLE CARTRIDGES

Cartridge	Bullet Wt.Grs.	Velocity in ft/s Mean Instr. @15' (±90)	Pressure Limits (psi/100) *		
			Maximum Average Pressure (MAP)	Maximum Probable Lot Mean (MPLM)	Maximum Probable Sample Mean (MPSM)
308 Win	55 (Saboted)	3750	520	533	553
308 Win	110	3150	620	636	660
308 Win	125	3030	620	636	660
308 Win	150	2800	620	636	660
308 Win	165-168	2670	620	636	660
308 Win	180	2600	620	636	660
308 Win	200	2440	620	636	660
32 Win Spl	170	2235	420	431	447
338 Win Mag	200	2940	640	656	681
338 Win Mag	210	2855	640	656	681
338 Win Mag	225	2770	640	656	681
338 Win Mag	250	2645	640	656	681
338 Win Mag	300	2415	640	656	681
35 Rem	150	2775	335	343	355
35 Rem	200	2055	335	343	355
375 H&H Mag	270	2680	620	636	660
375 H&H Mag	300	2515	620	636	660
416 Rem Mag	350	2525	650	666	691
416 Rem Mag	400	2400	650	666	691
44 Rem Mag**	210	1900	360	369	382
44 Rem Mag**	240	1740	360	369	382
444 Marlin	240	2320	420	431	447
444 Marlin	265	2100	420	431	447
45-70 Govt	300	1830	280	287	297
45-70 Govt	405	1320	280	287	297

* Based on sample size, n = 10

** 20" Barrel

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

VELOCITY VS. BARREL LENGTH

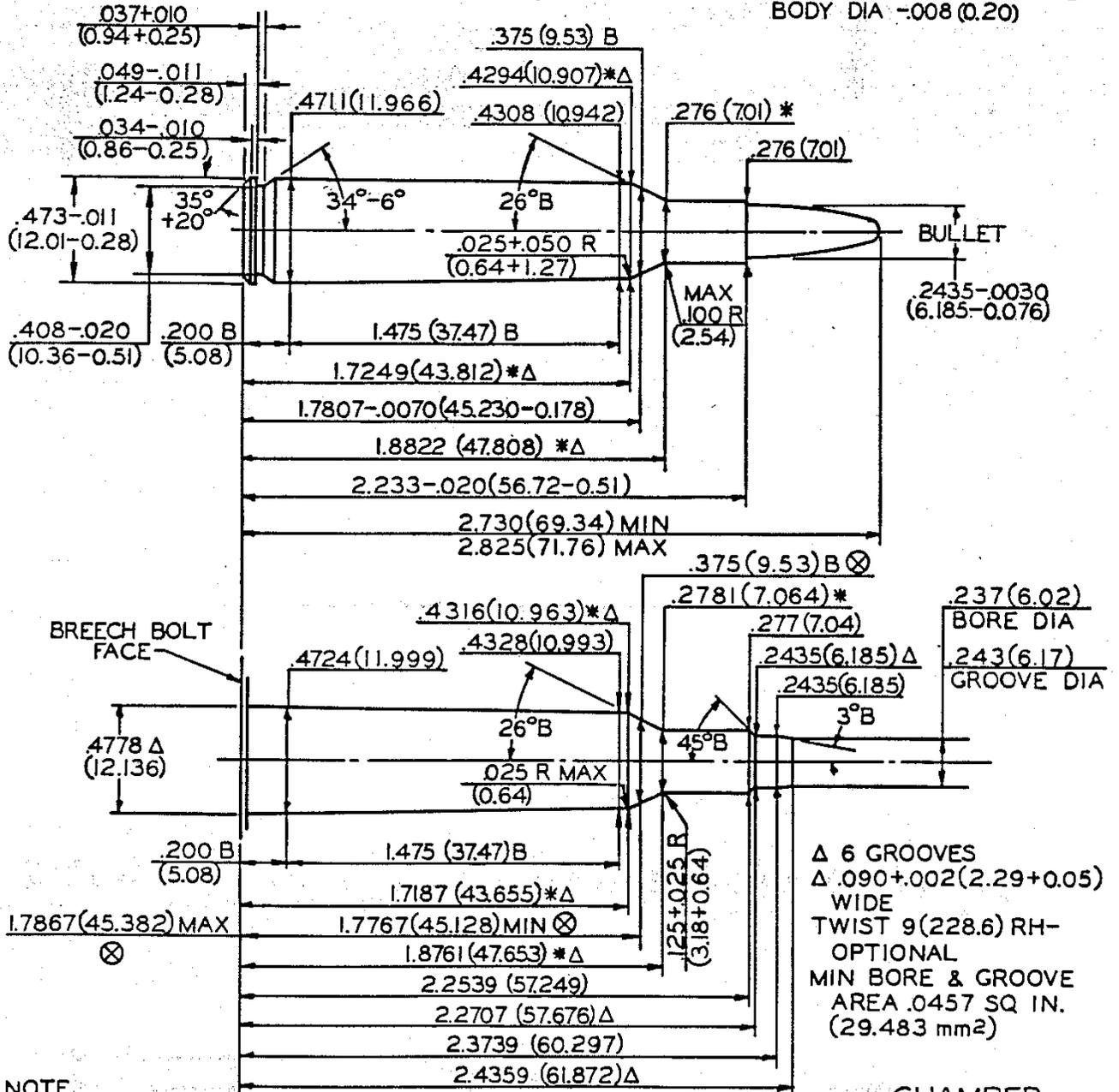
CENTERFIRE RIFLE VELOCITY VS. BARREL LENGTH

<u>Muzzle Velocity Range ft/s</u>	<u>Range of Barrel Length to Which Data Applies (Inches)</u>	<u>Approximate Change in Velocity for Each 1 Inch Change in Barrel Length ft/s</u>
Up to 2000	20-26	5
2001-2500	20-26	10
2501-3000	20-26	20
3001-3500	20-26	30
3501-4000	20-26	40

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 6mm Remington

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)

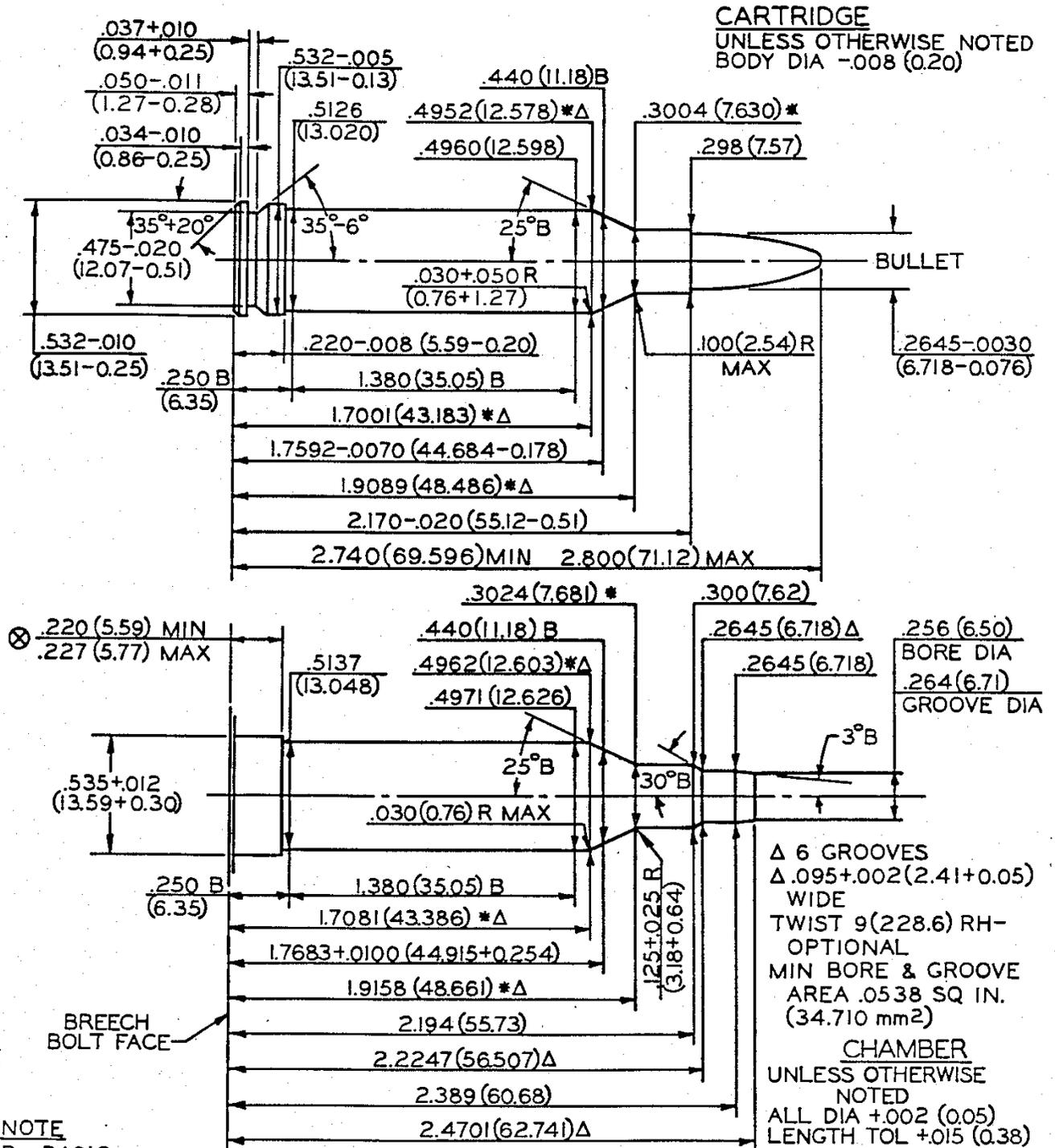


NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS
 ⊗ = HEADSPACE DIMENSION
 Δ = REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

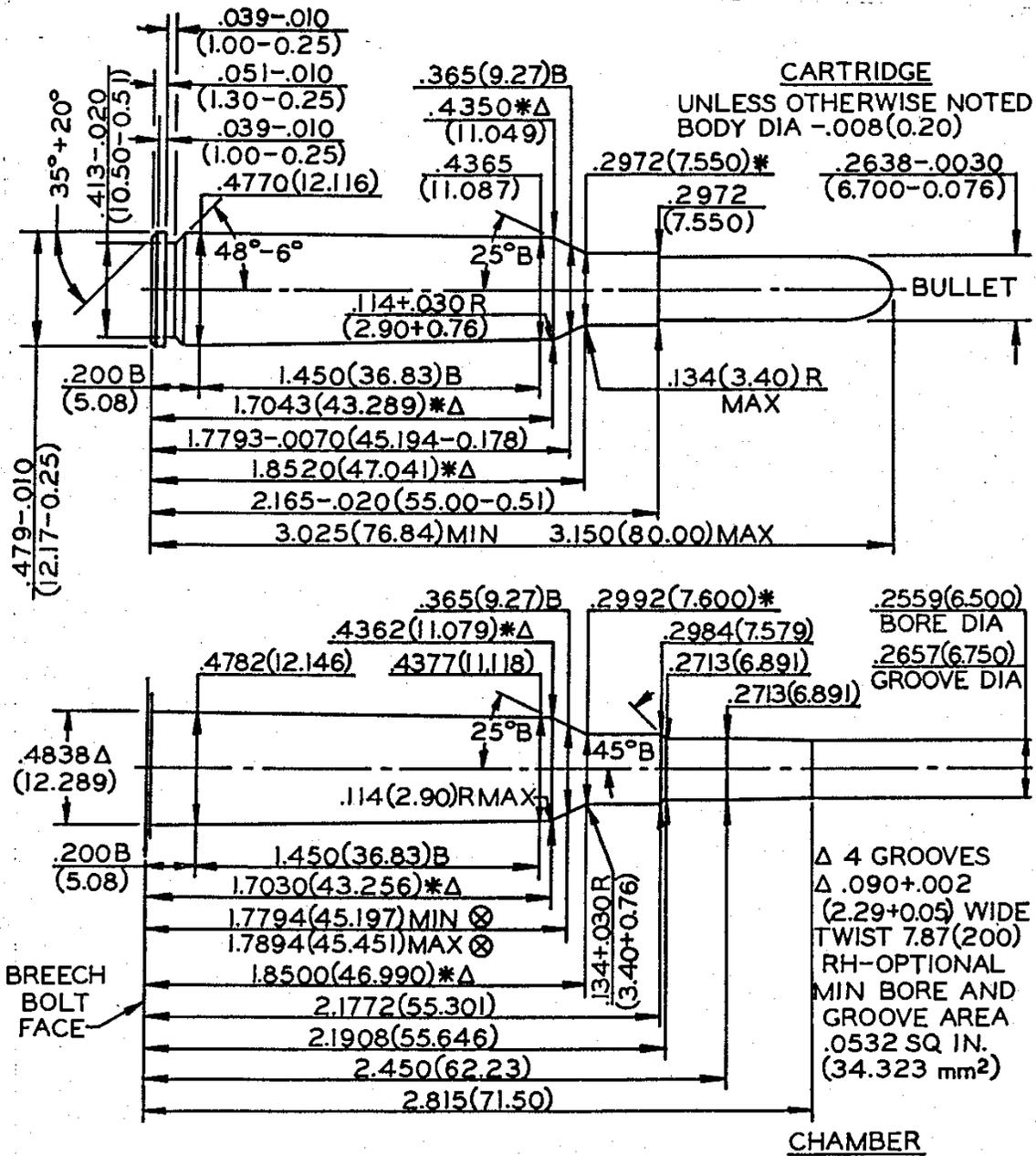
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 6.5mm Remington Magnum



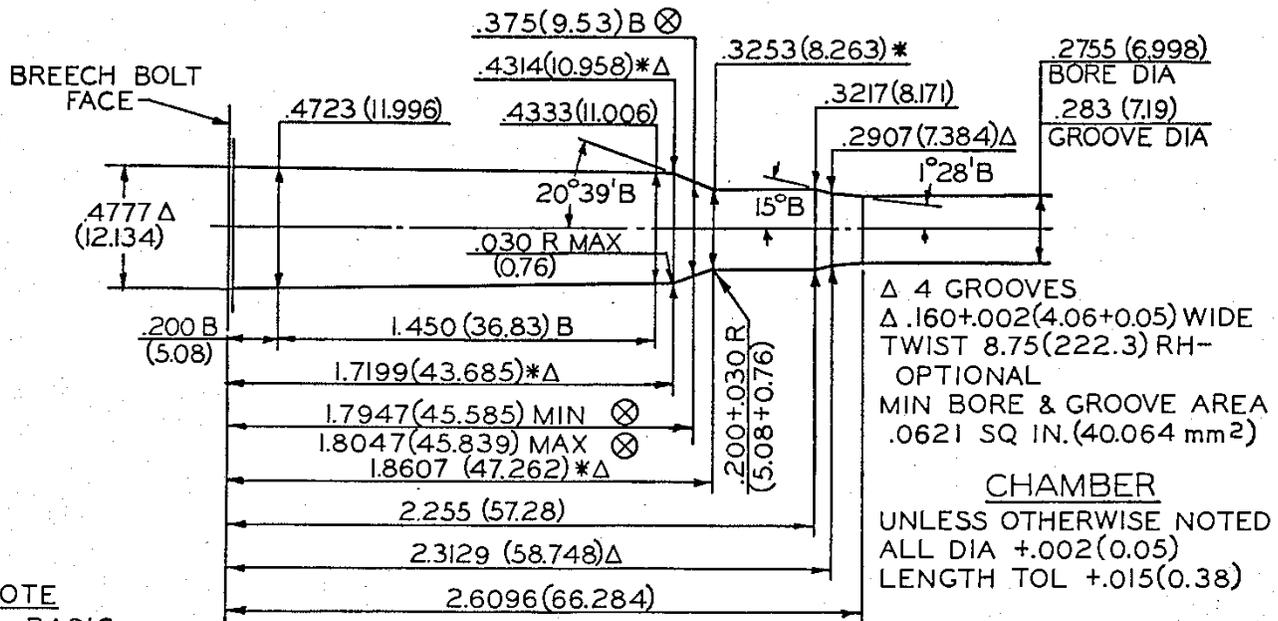
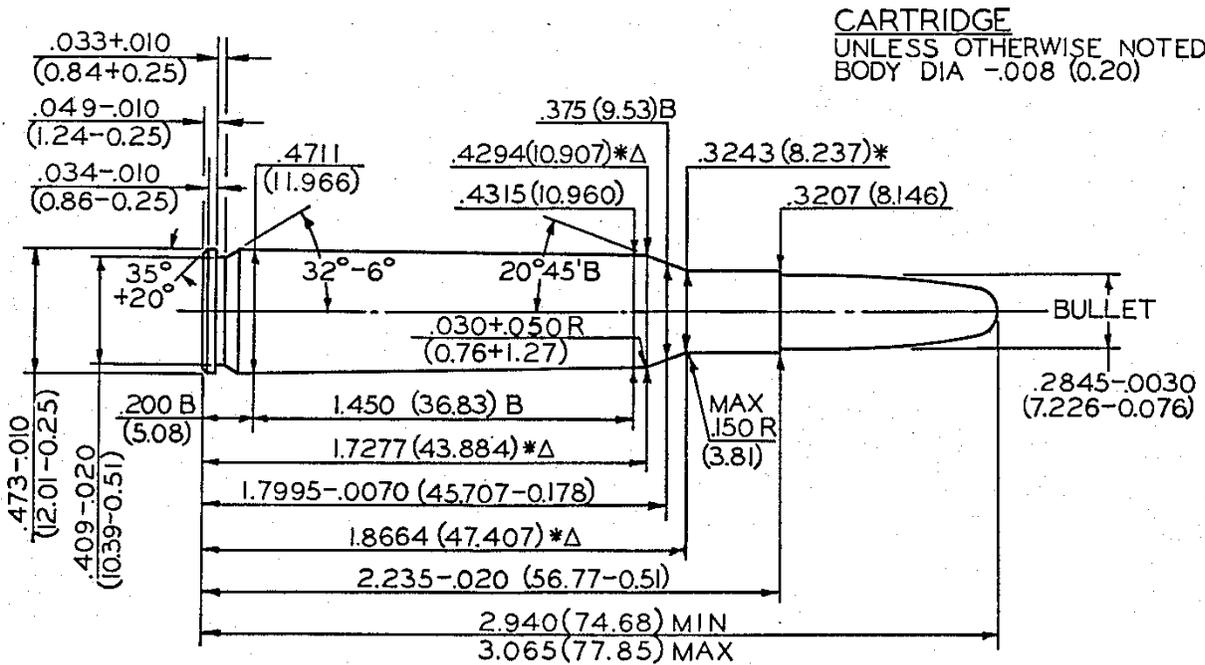
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 6.5 x 55 Swedish Mauser



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 7mm Mauser (7x57)



NOTE

B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES

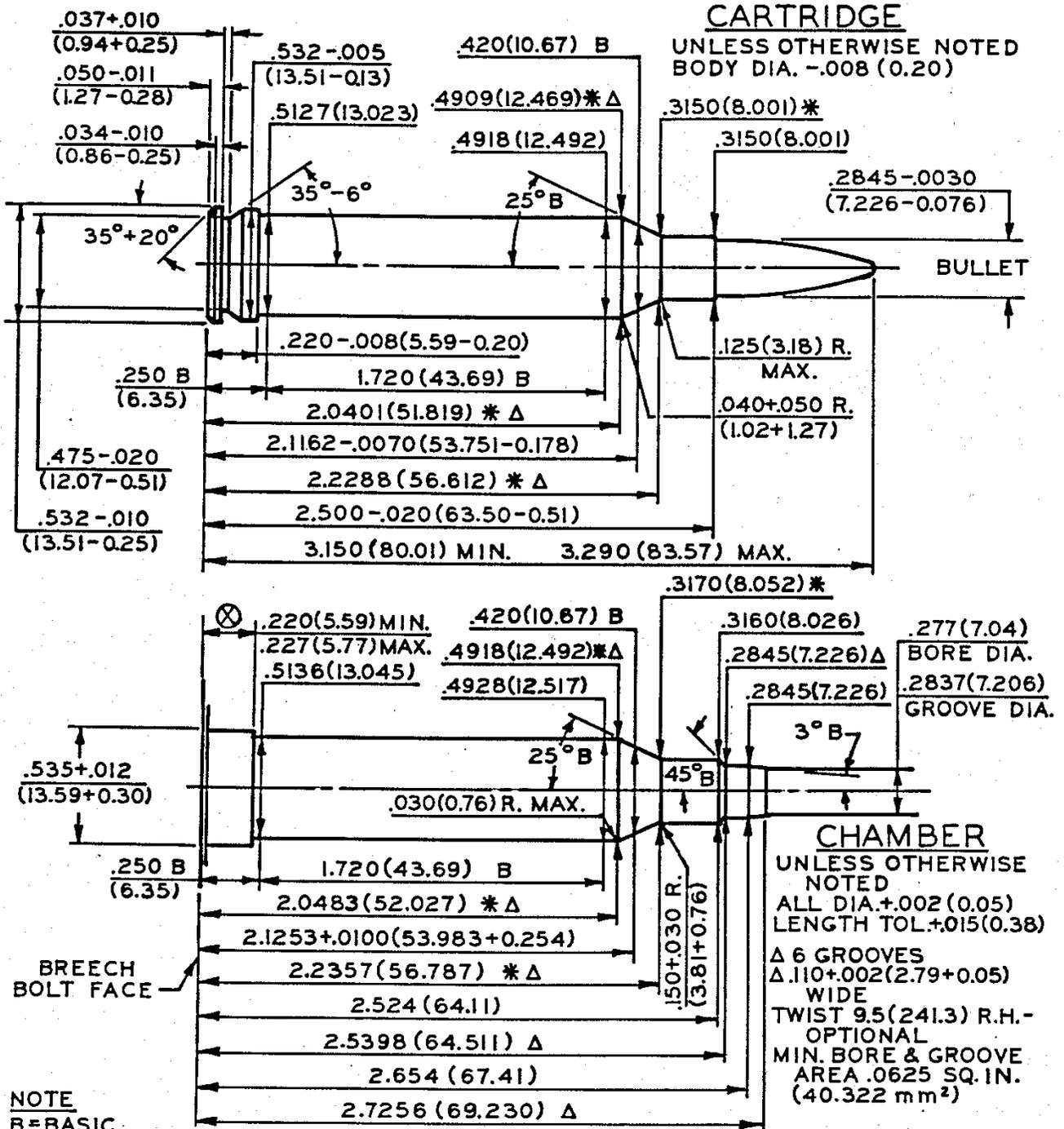
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

⊗ = HEADSPACE DIMENSION

Δ = REFERENCE DIMENSION

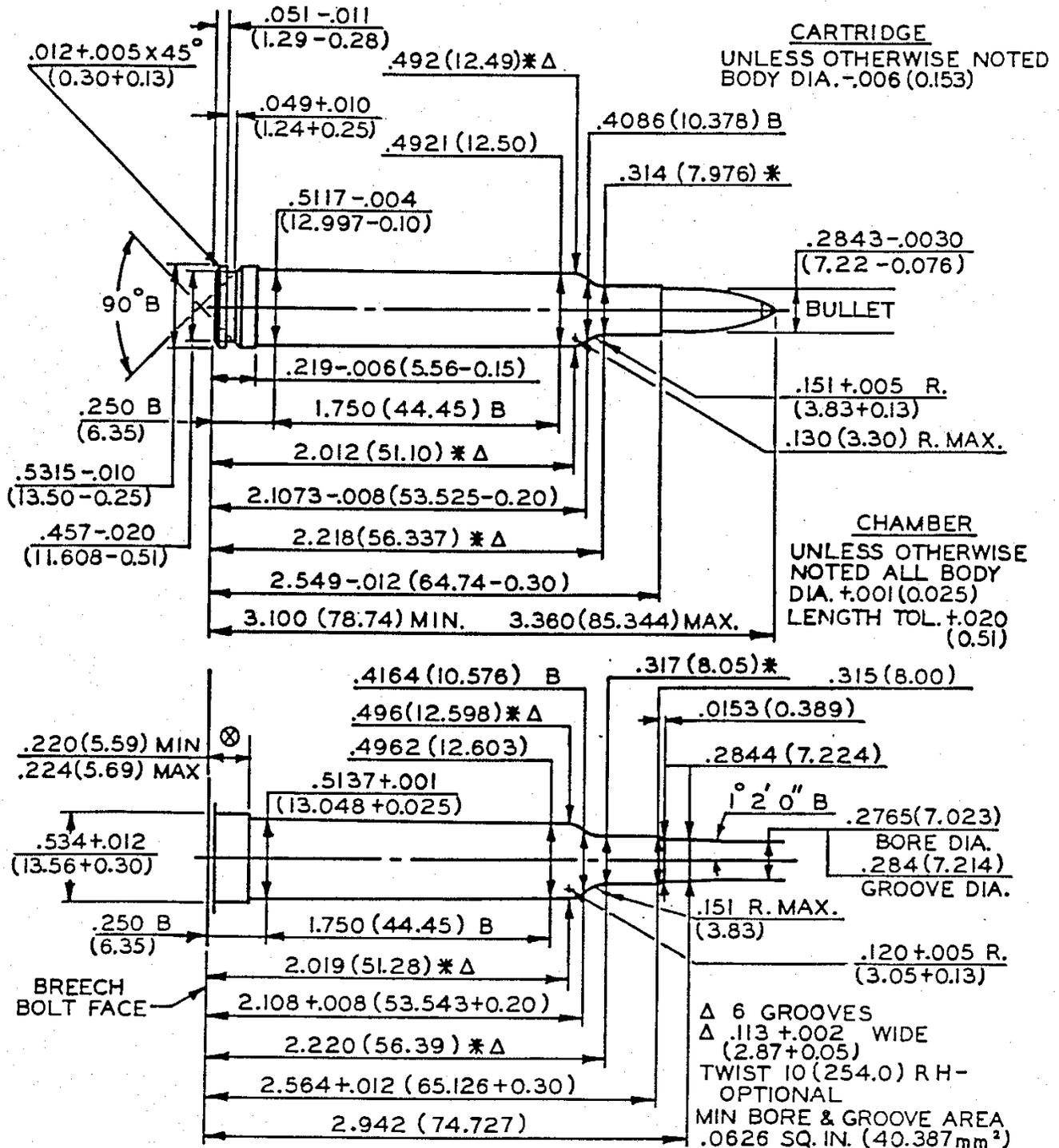
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 7mm Remington Magnum



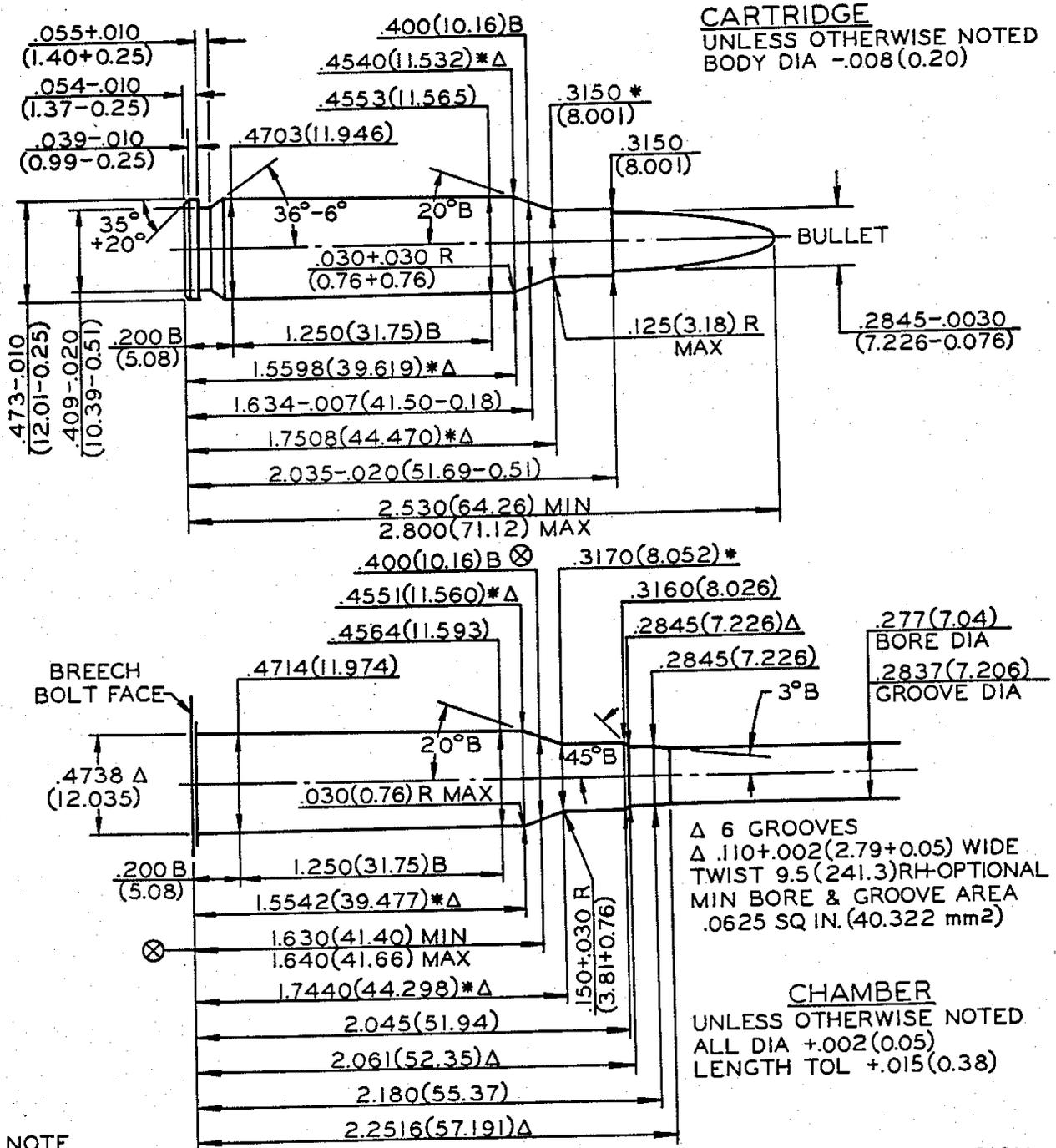
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 7mm WEATHERBY MAGNUM



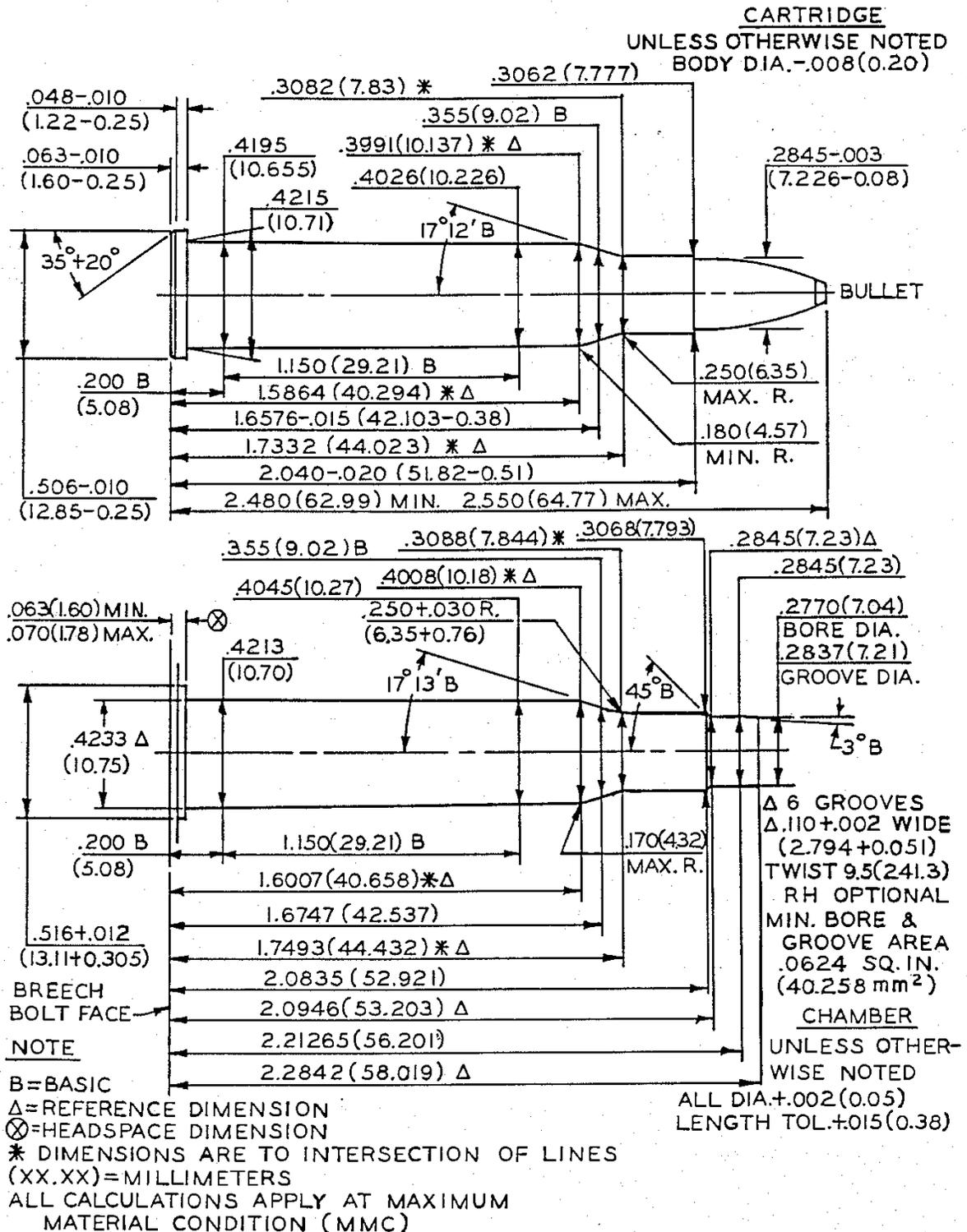
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 7mm-08 Remington



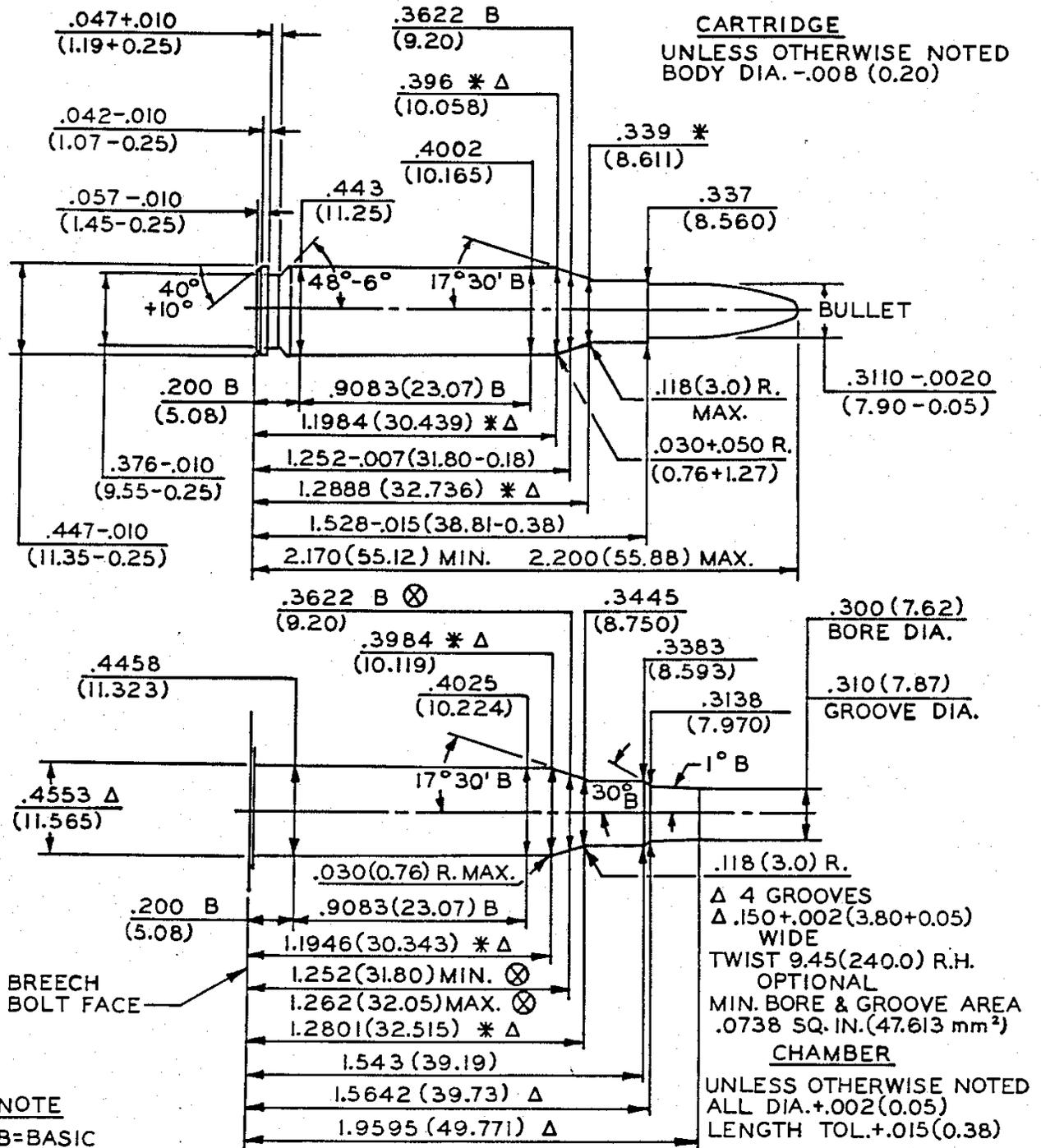
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 7-30 Waters



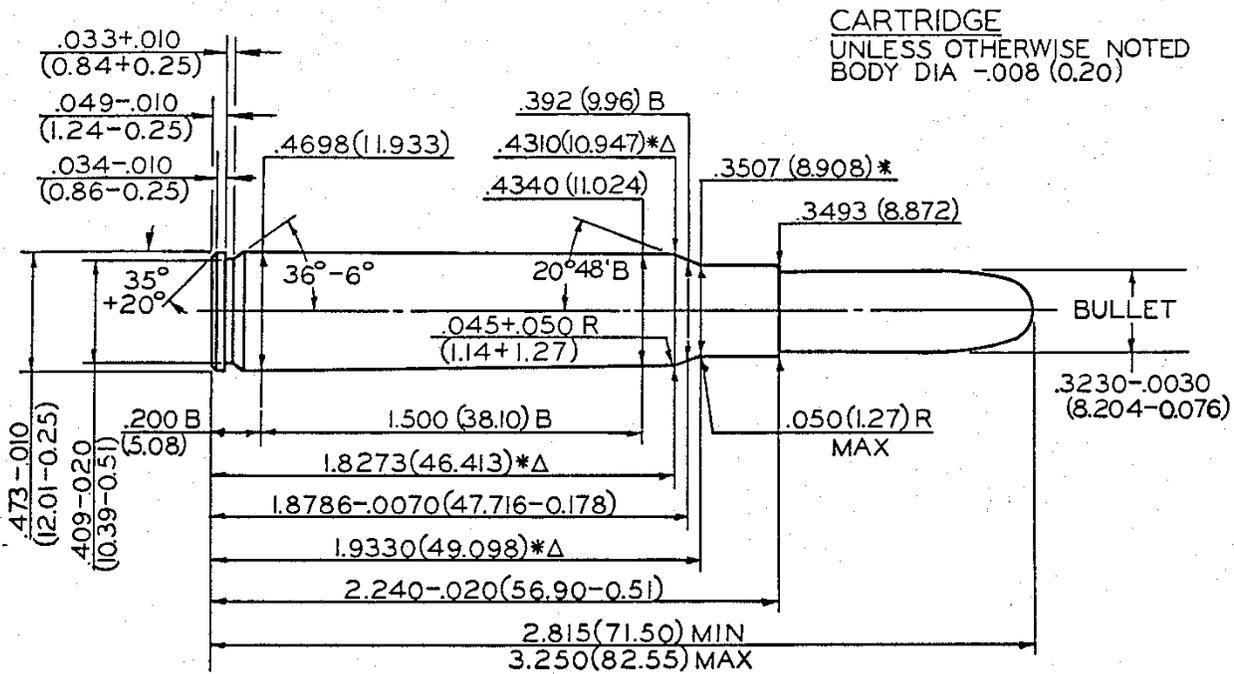
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES & CHAMBERS
 7.62 x 39

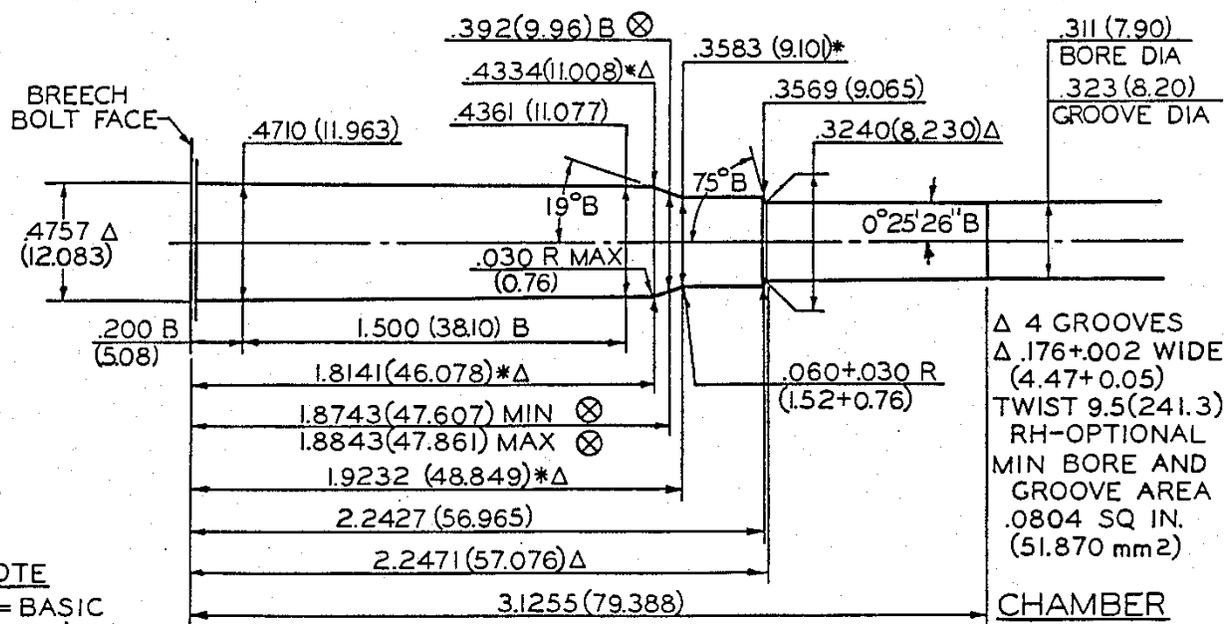


SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 8mm Mauser (8x57)



CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008 (0.20)$



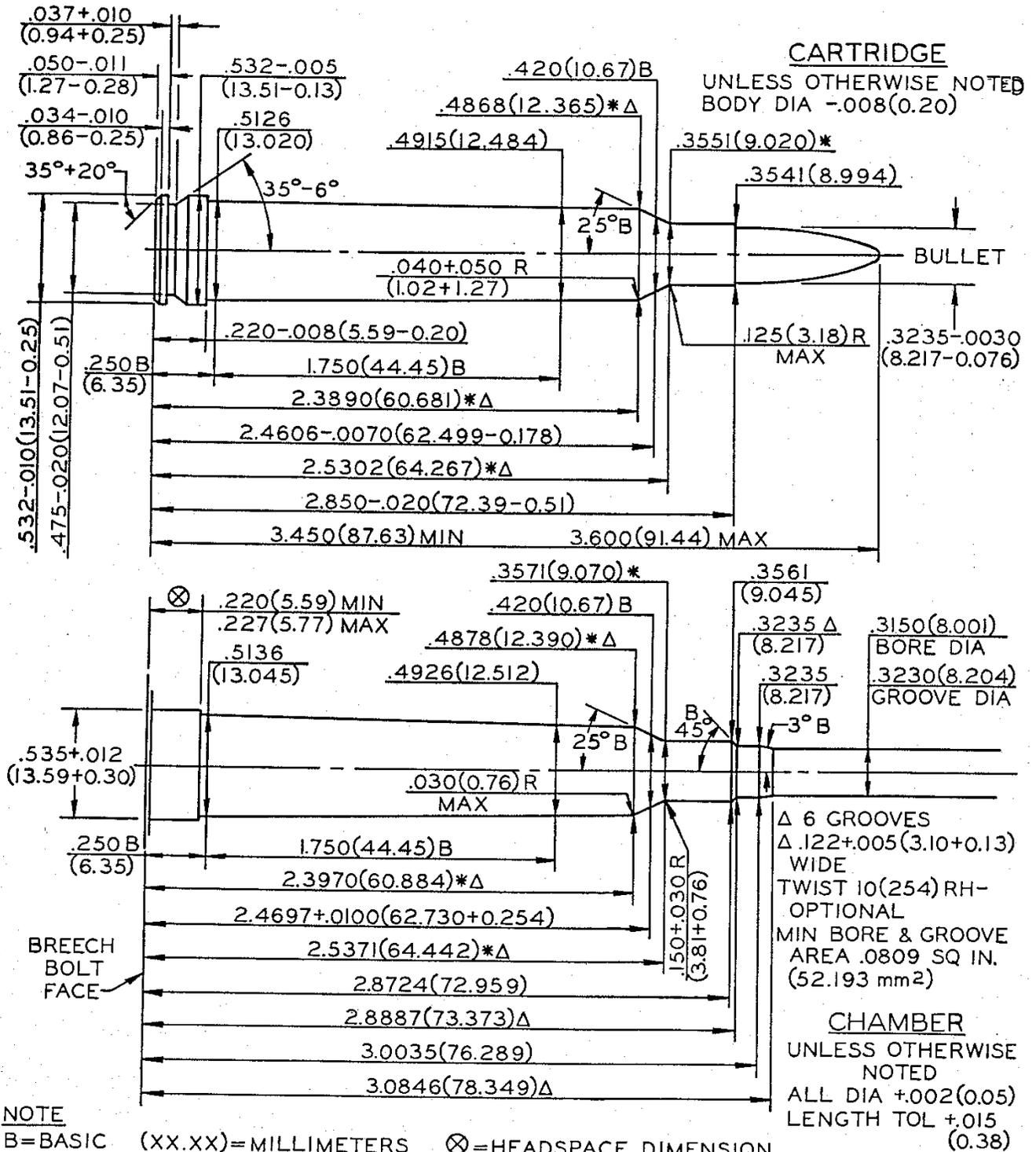
Δ 4 GROOVES
 Δ .176+0.002 WIDE
 (4.47+0.05)
 TWIST 9.5(241.3)
 RH-OPTIONAL
 MIN BORE AND
 GROOVE AREA
 .0804 SQ IN.
 (51.870 mm²)

NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 Δ = REFERENCE DIMENSION ⊗ = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002 (0.05)$
 LENGTH TOL $+.015 (0.38)$

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

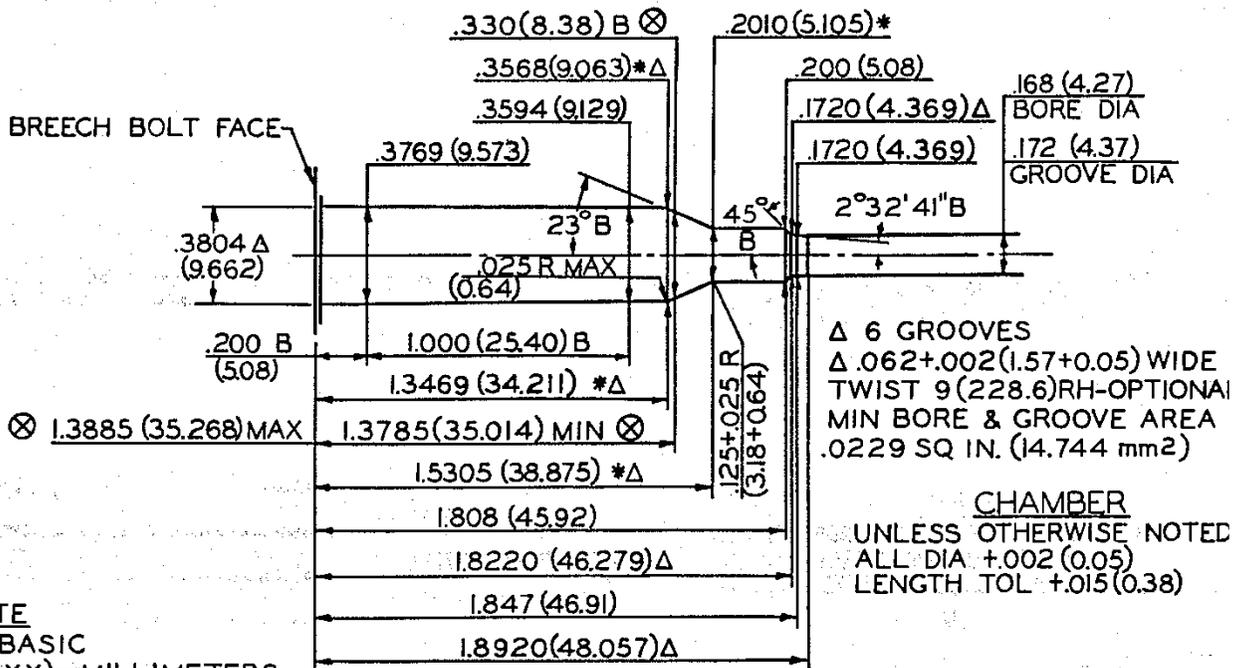
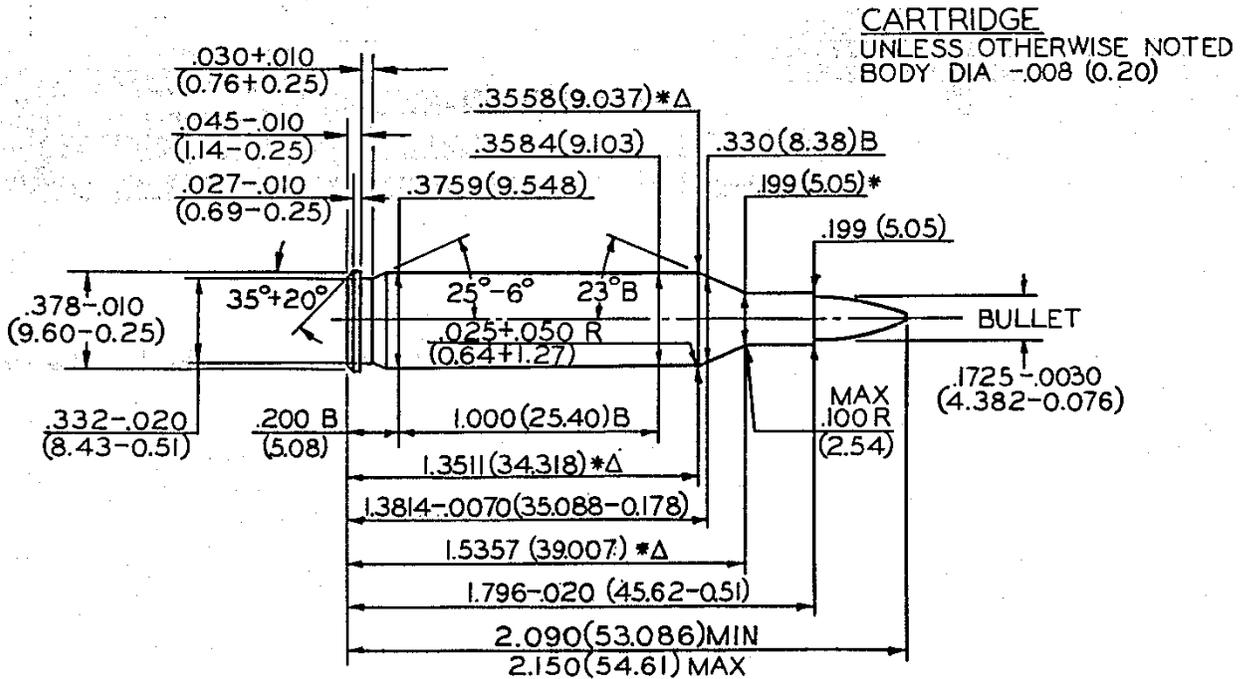
CARTRIDGE & CHAMBER
 8mm Remington Magnum



NOTE
 B=BASIC (XX.XX)=MILLIMETERS ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 17 Remington

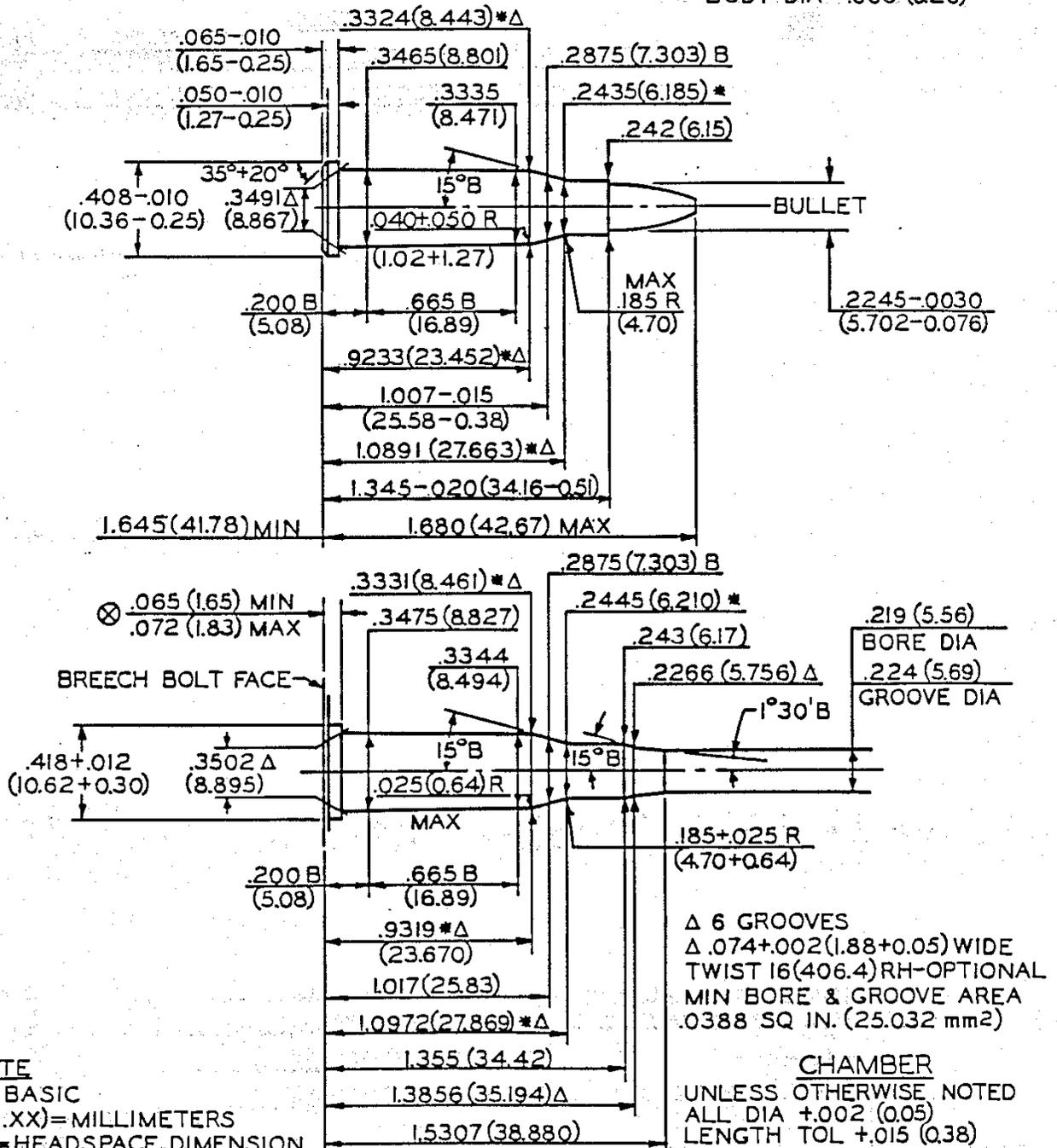


NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 \otimes = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 218 Bee

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)

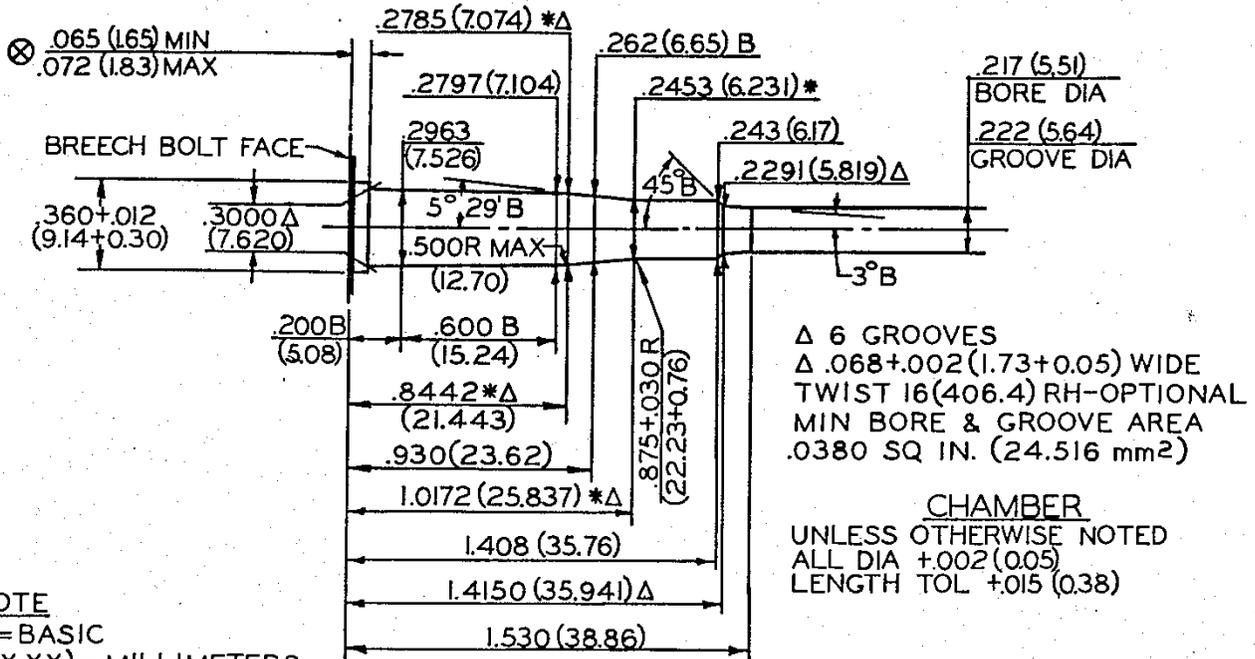
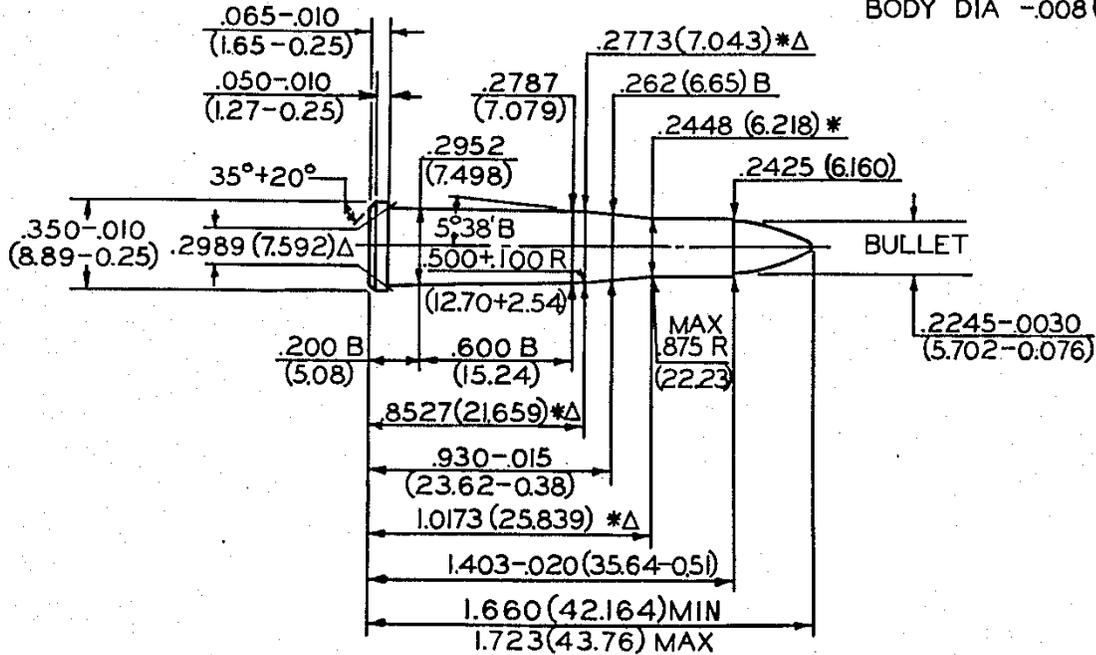


NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 \otimes = HEADSPACE DIMENSION
 Δ = REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 22 Hornet

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



Δ 6 GROOVES
 Δ .068±.002 (1.73±0.05) WIDE
 TWIST 16 (406.4) RH-OPTIONAL
 MIN BORE & GROOVE AREA
 .0380 SQ IN. (24.516 mm²)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE

B=BASIC

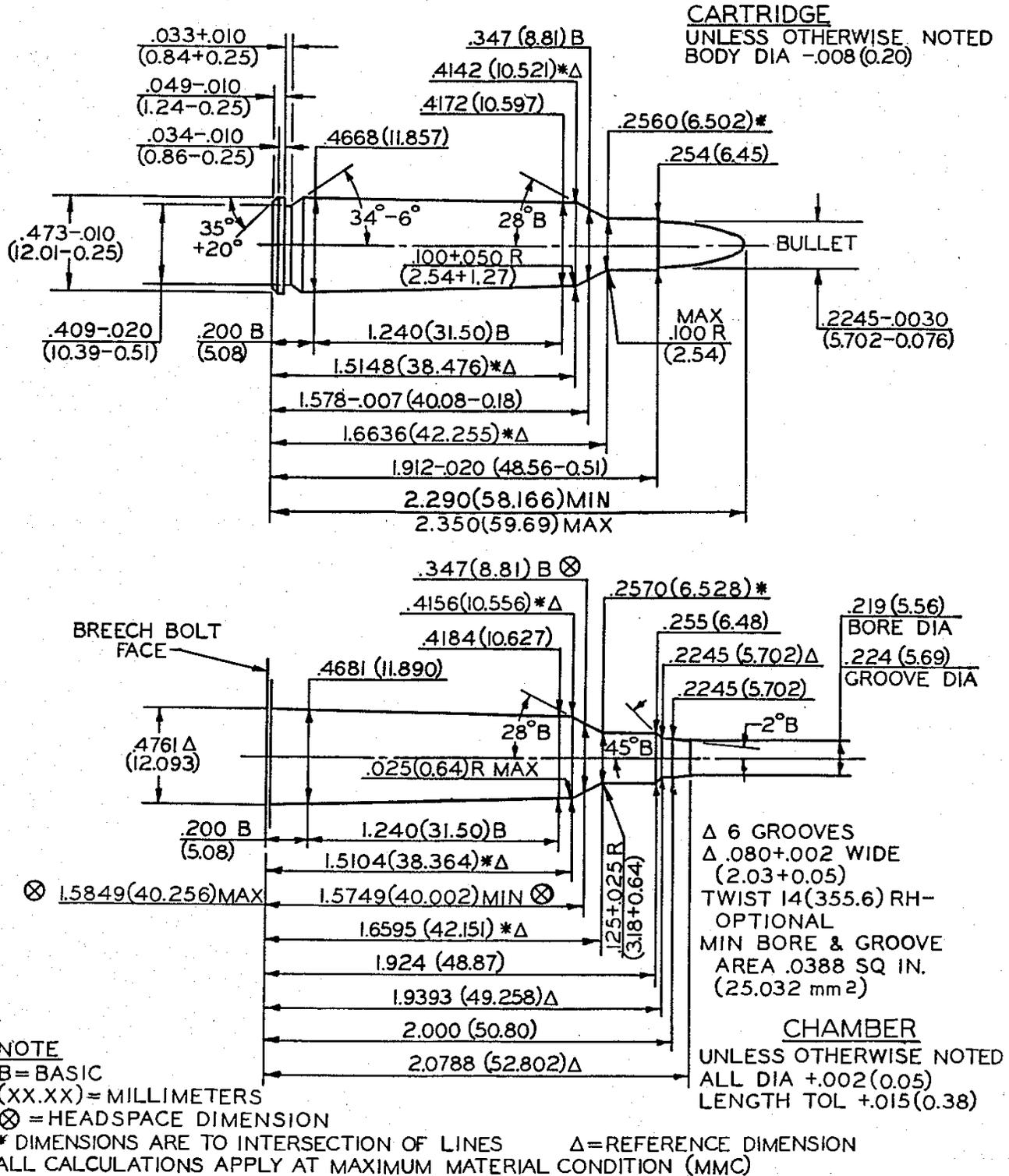
(XX.XX)=MILLIMETERS

⊗=HEADSPACE DIMENSION

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

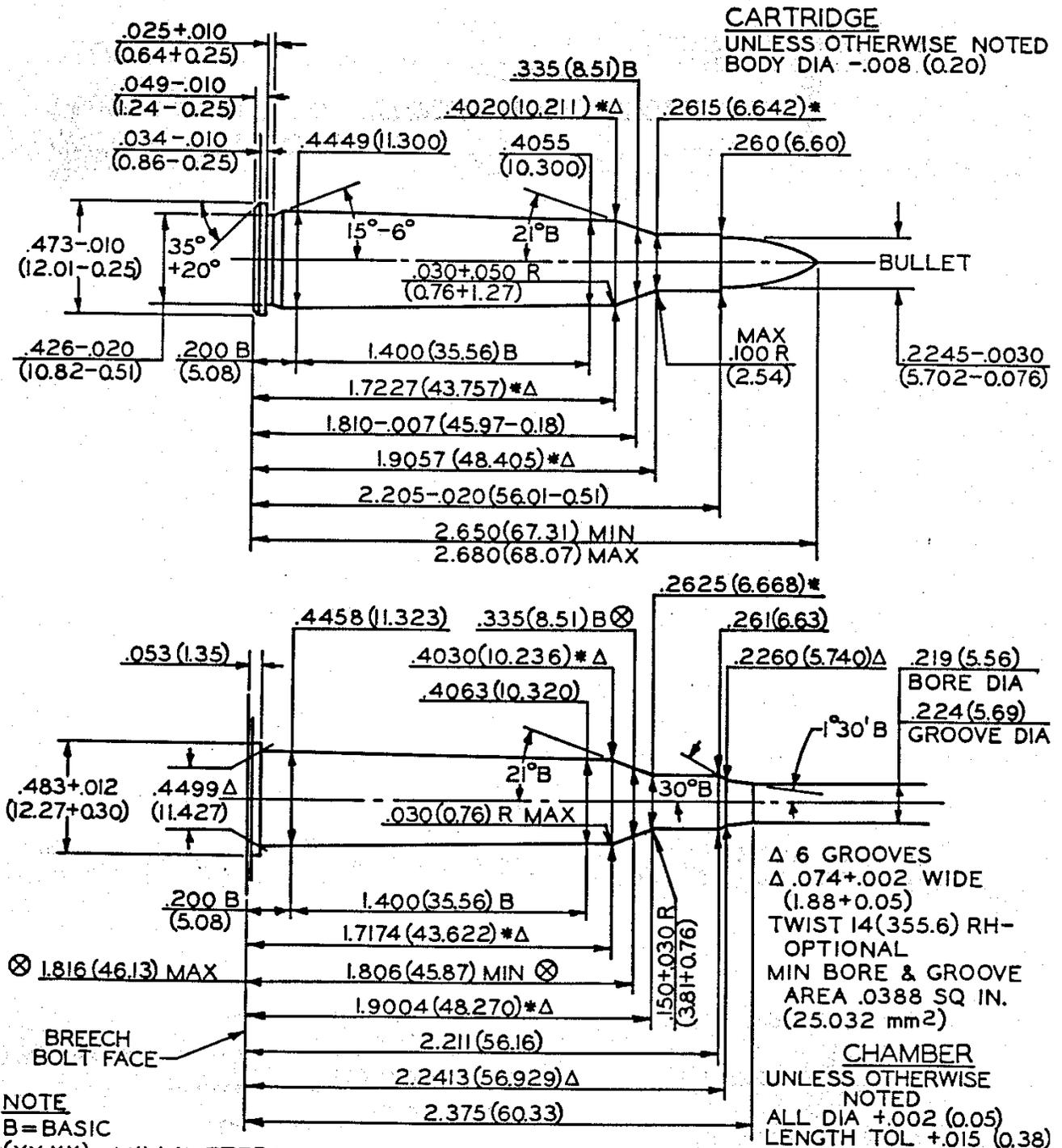
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 22-250 Remington



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

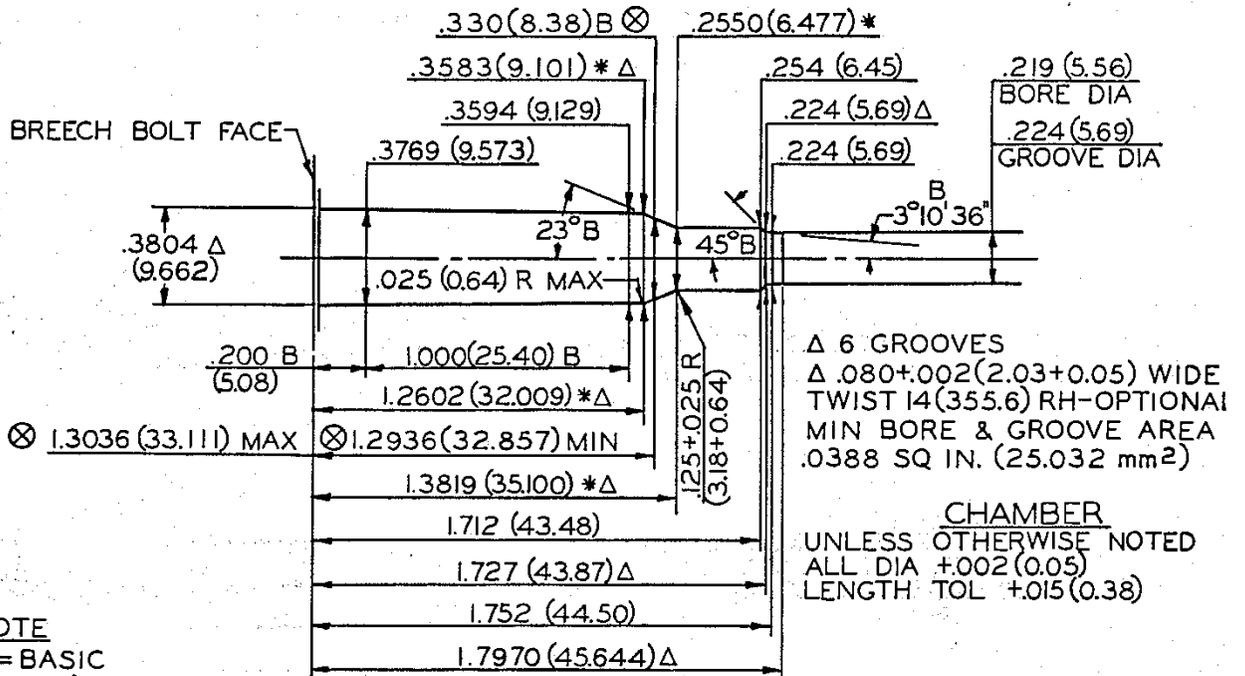
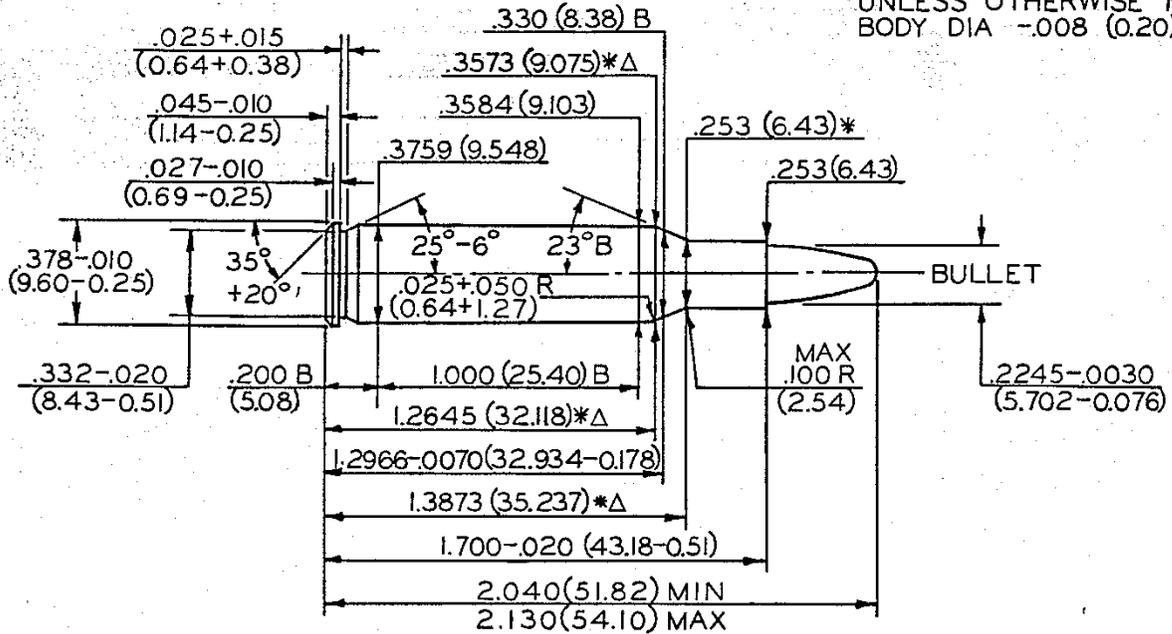
CARTRIDGES & CHAMBERS
 220 Swift



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 222 Remington

CARTRIDGE
 UNLESS OTHERWISE NOTE
 BODY DIA $-.008$ (0.20)



NOTE

B = BASIC

(XX.XX) = MILLIMETERS

⊗ = HEADSPACE DIMENSION

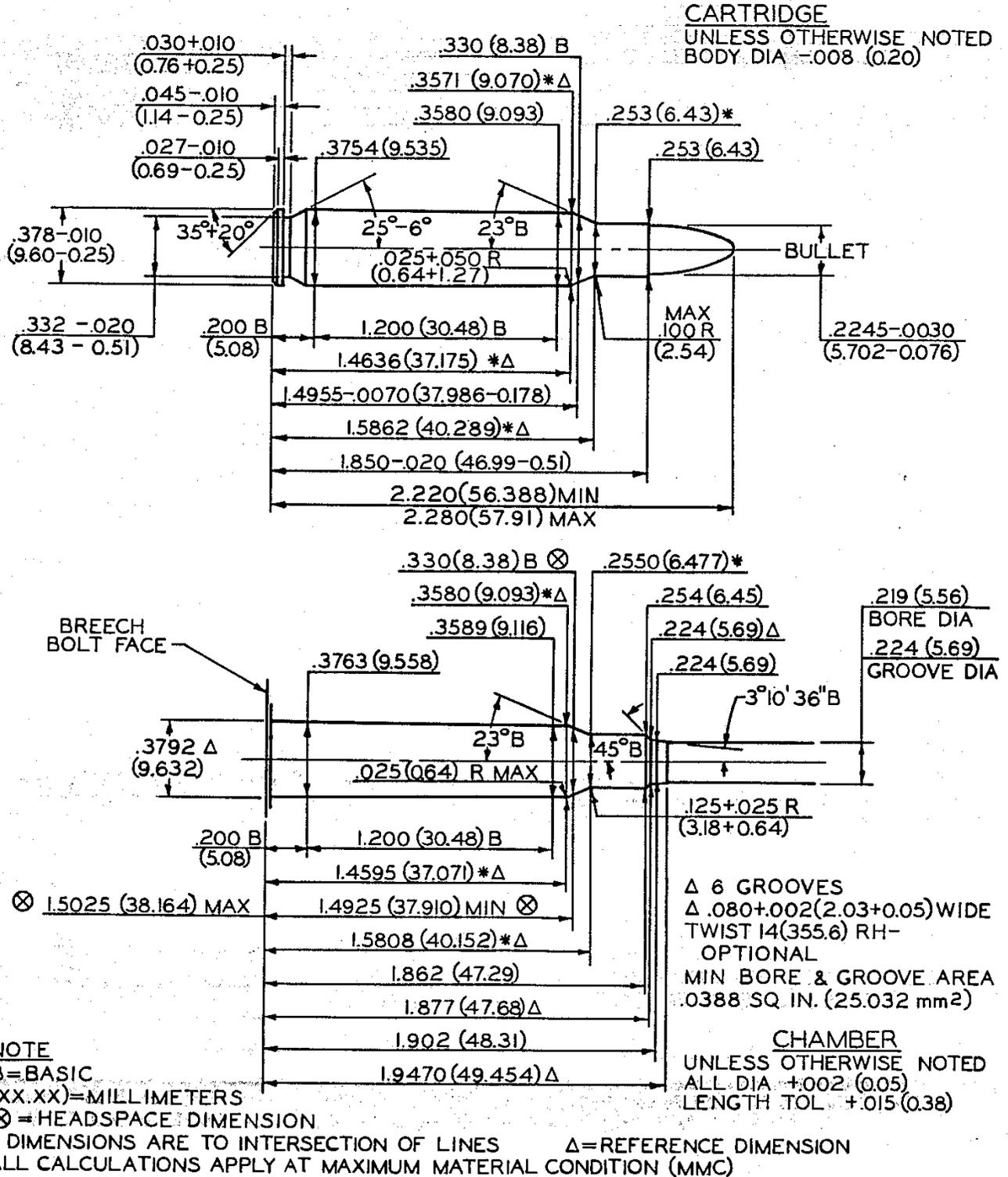
* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

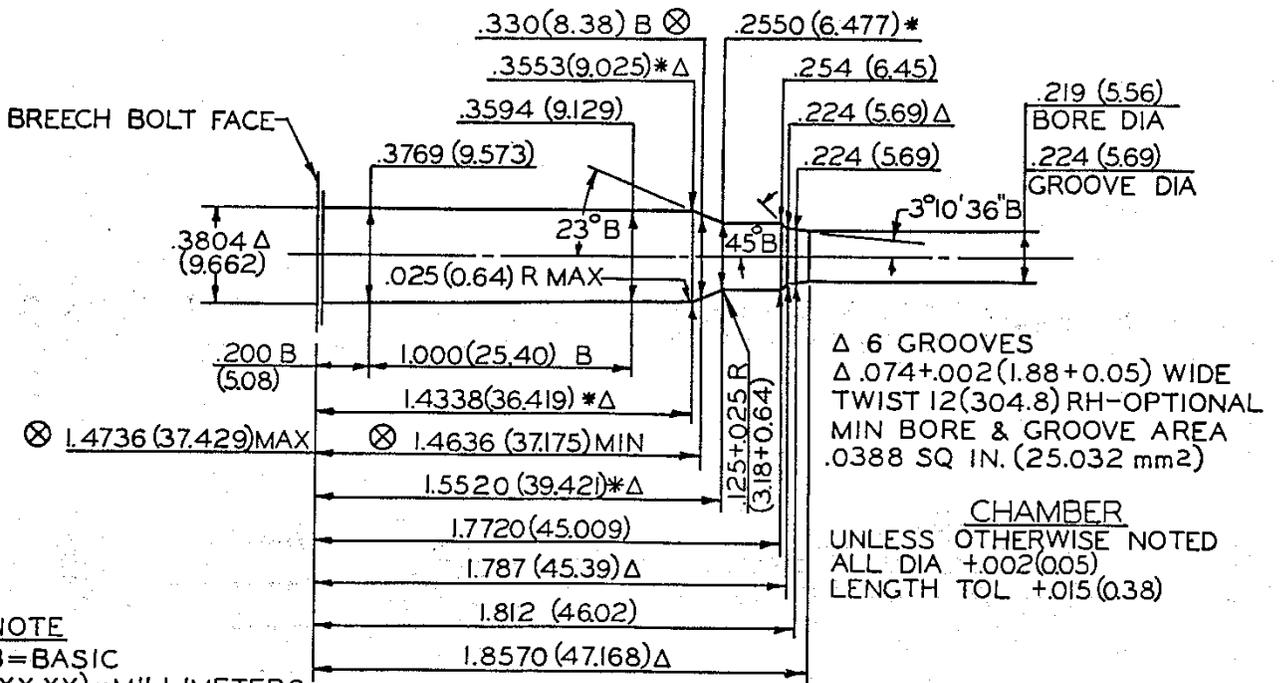
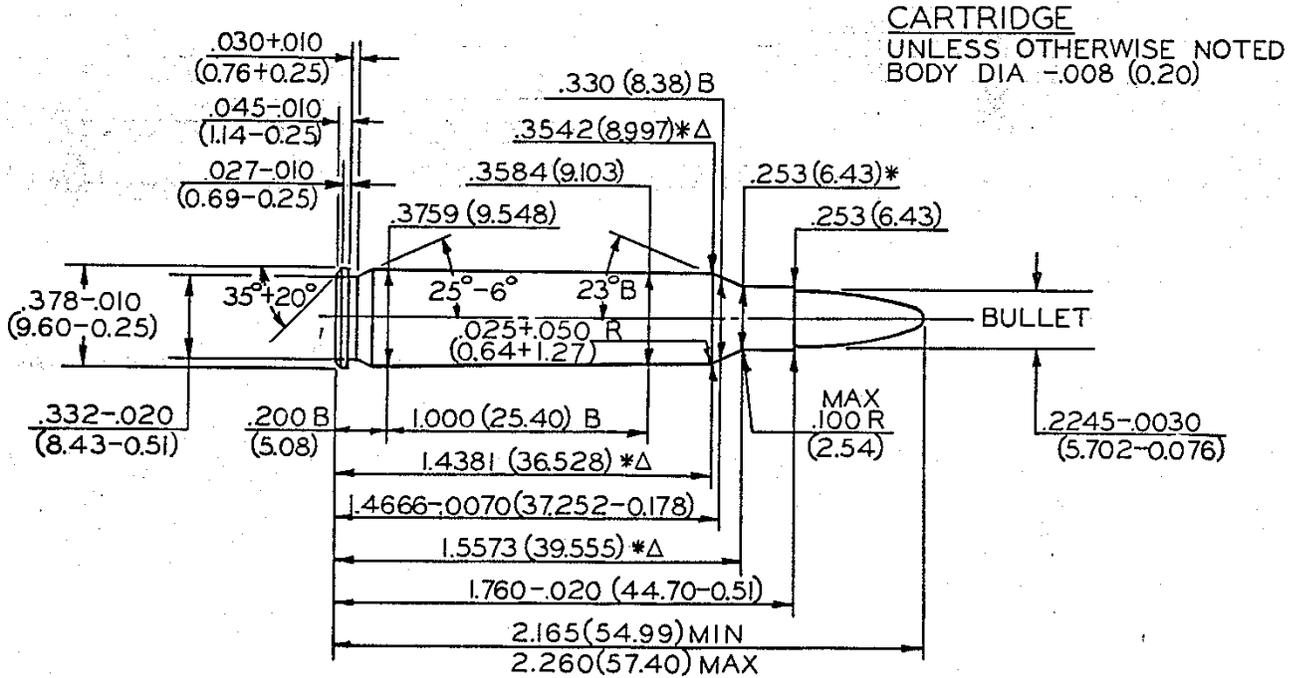
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 222 Remington Magnum



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 223 Remington



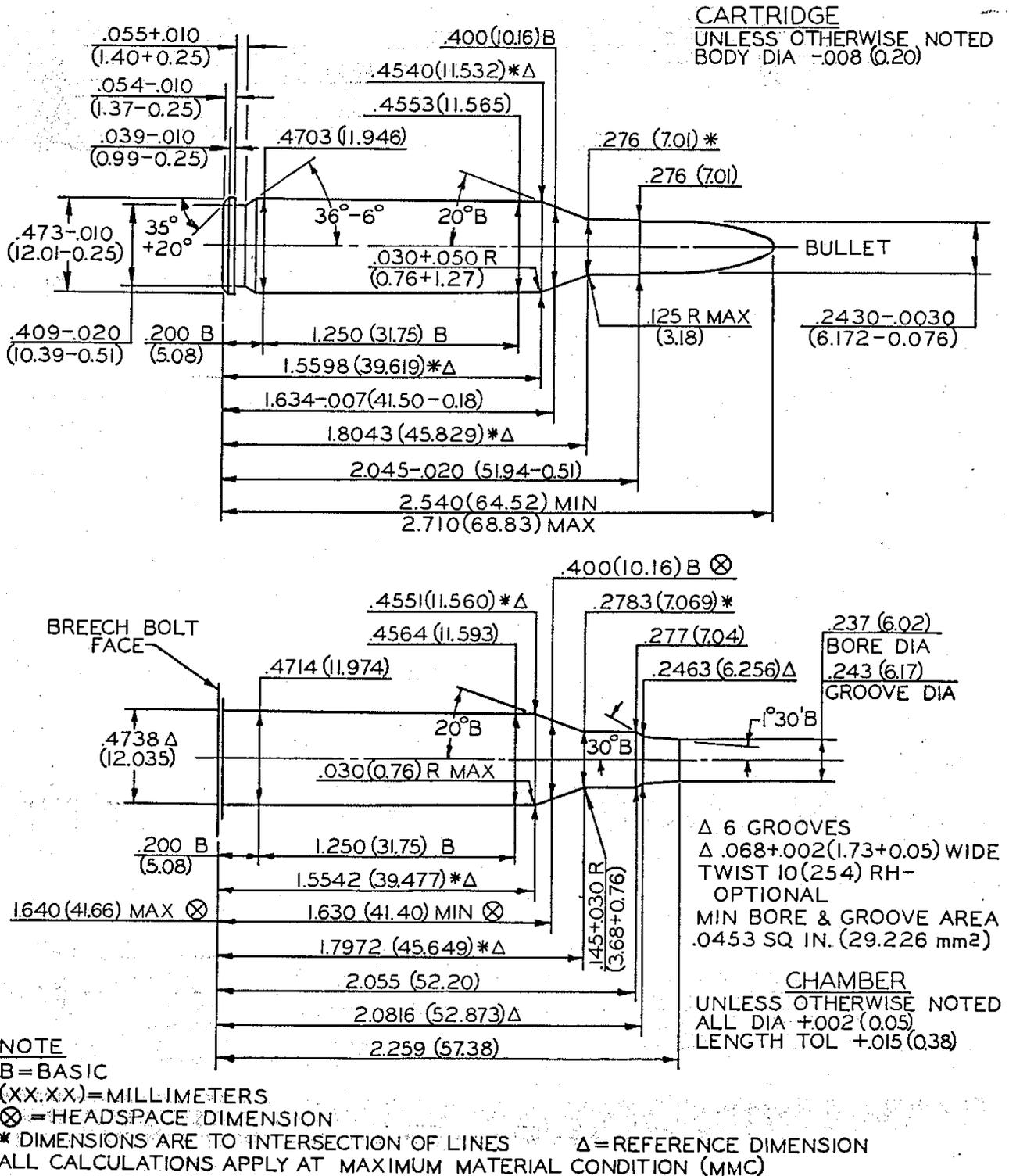
NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS

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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

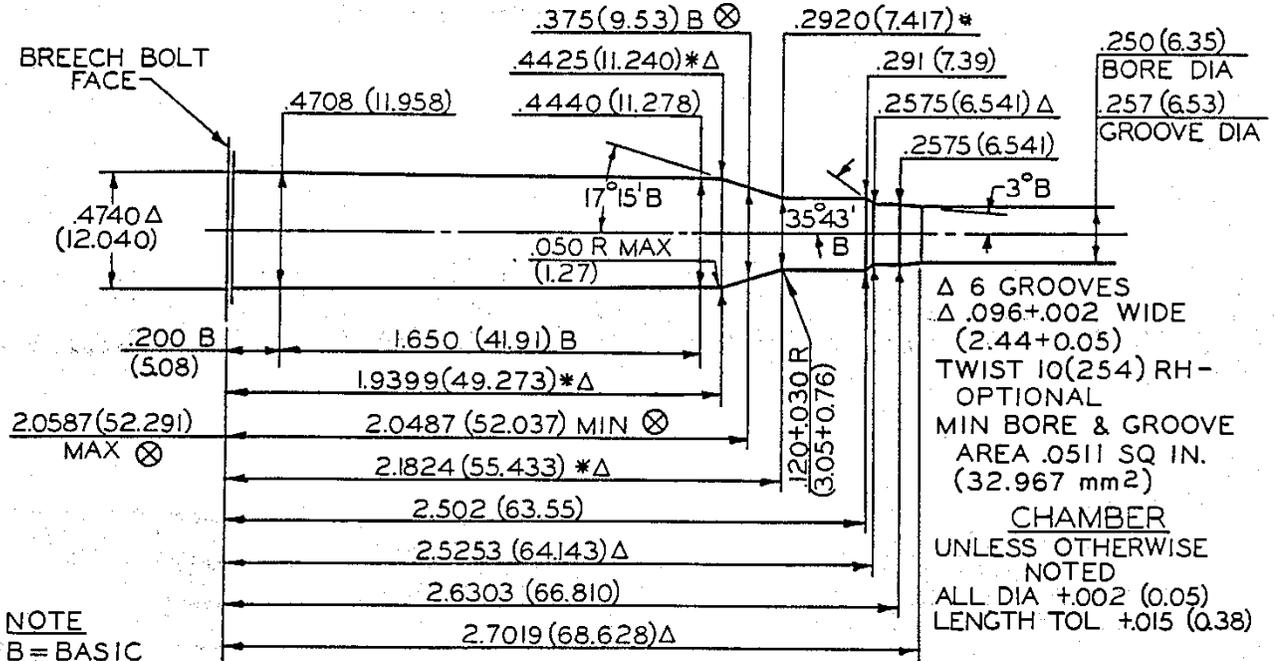
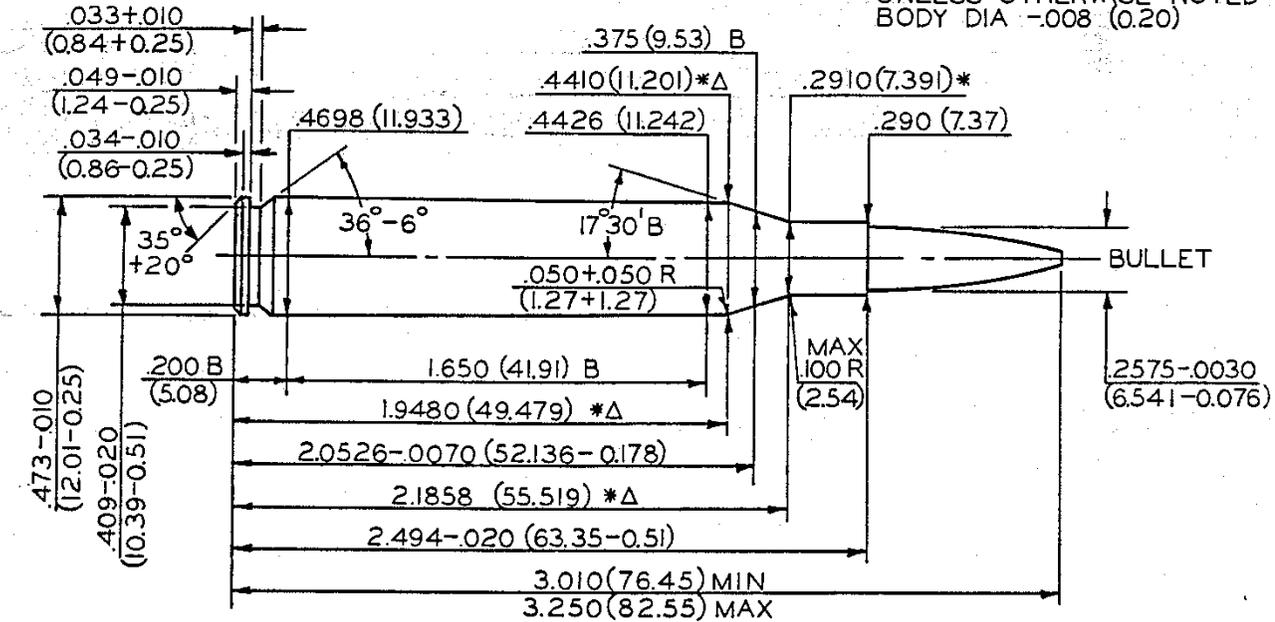
CARTRIDGE & CHAMBER
 243 Winchester



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 25-06 Remington

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



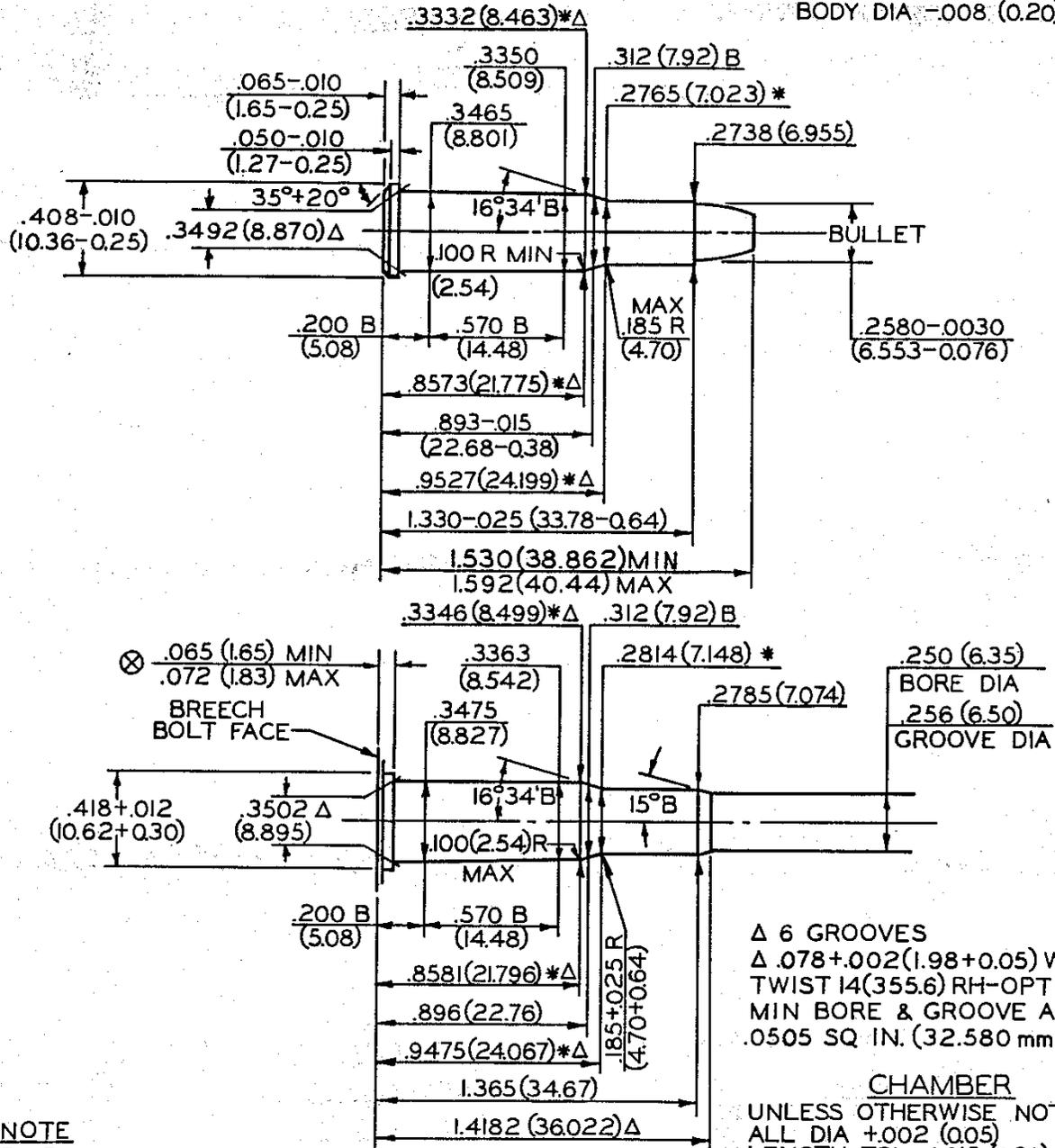
NOTE

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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 25-20 Winchester

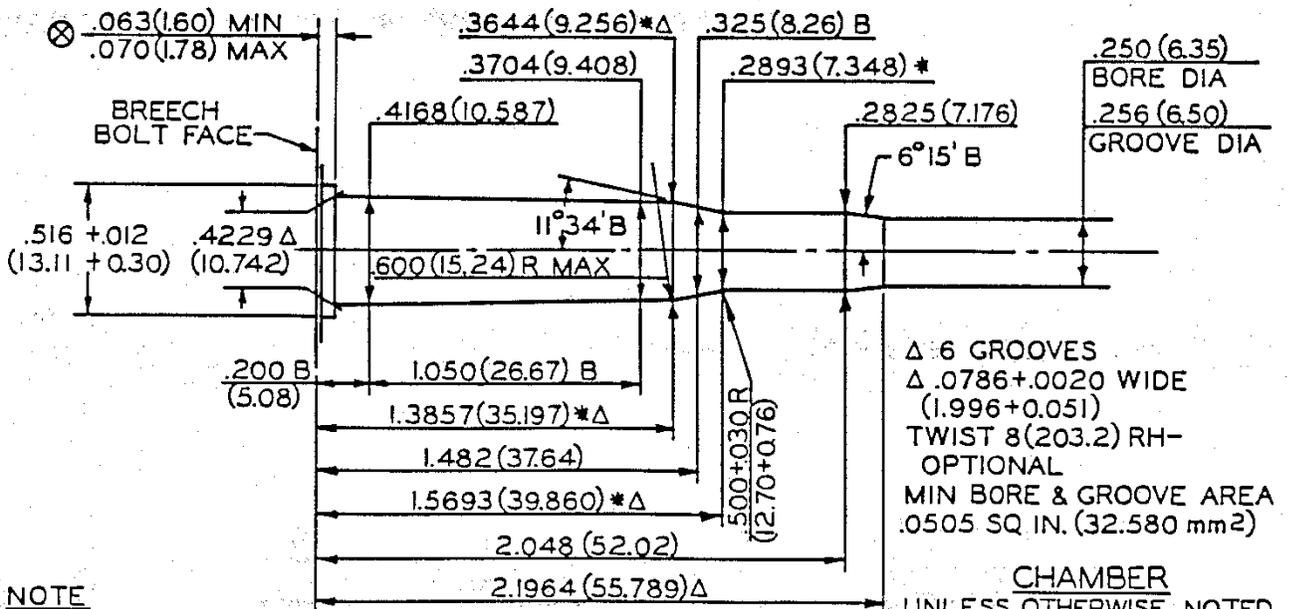
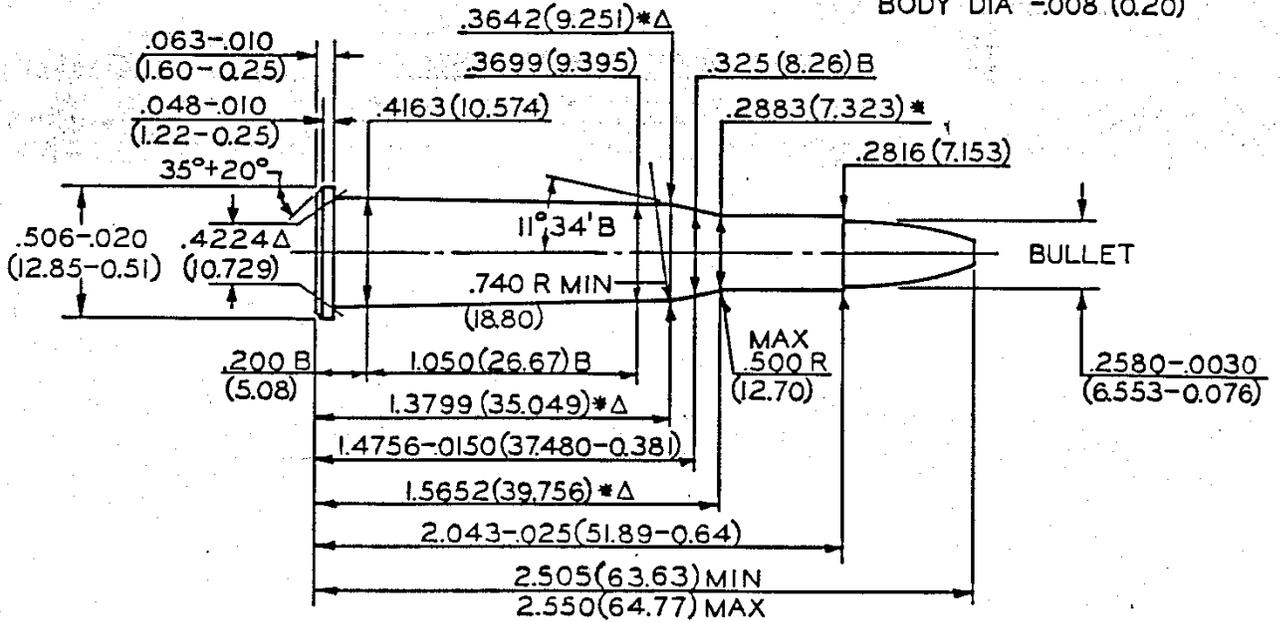
CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 25-35 Winchester

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



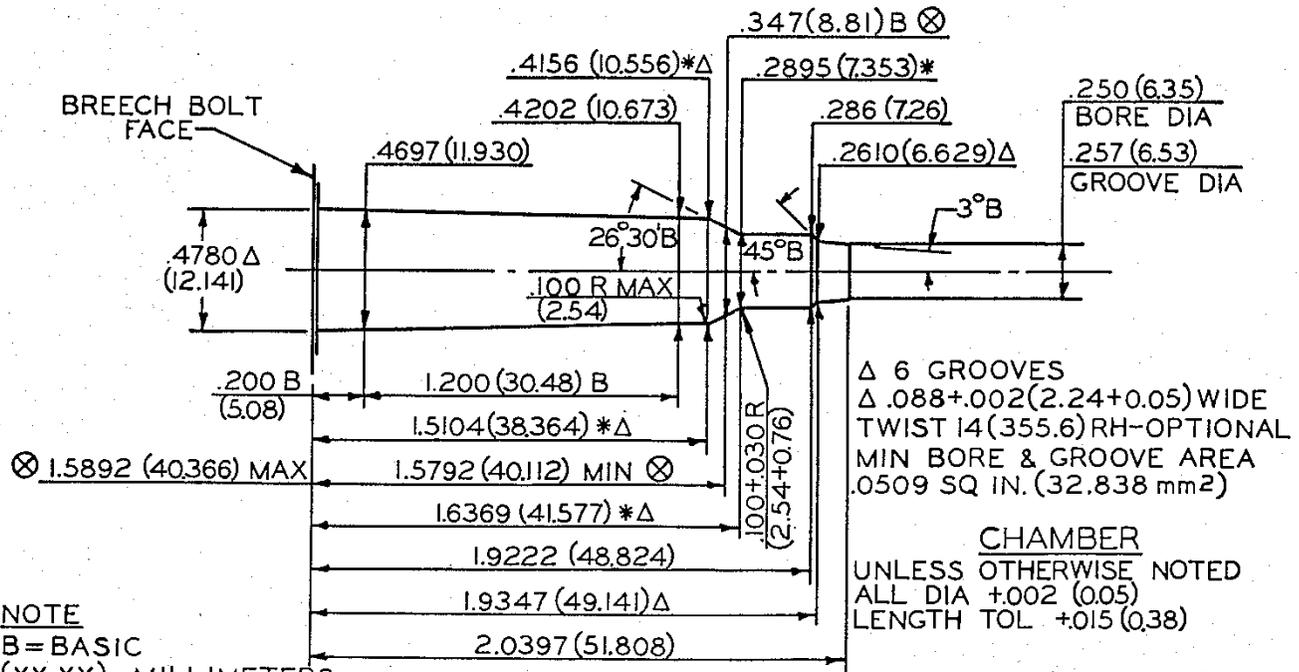
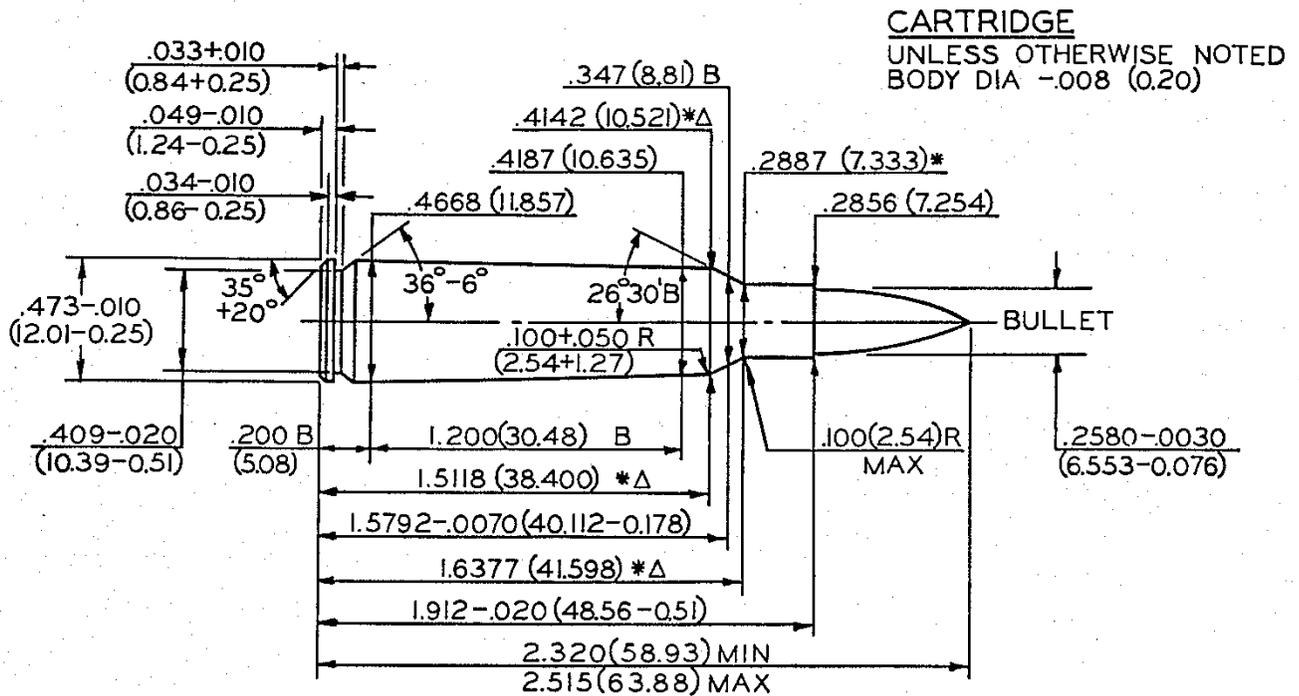
NOTE

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- Δ = REFERENCE DIMENSION
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CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 250 Savage

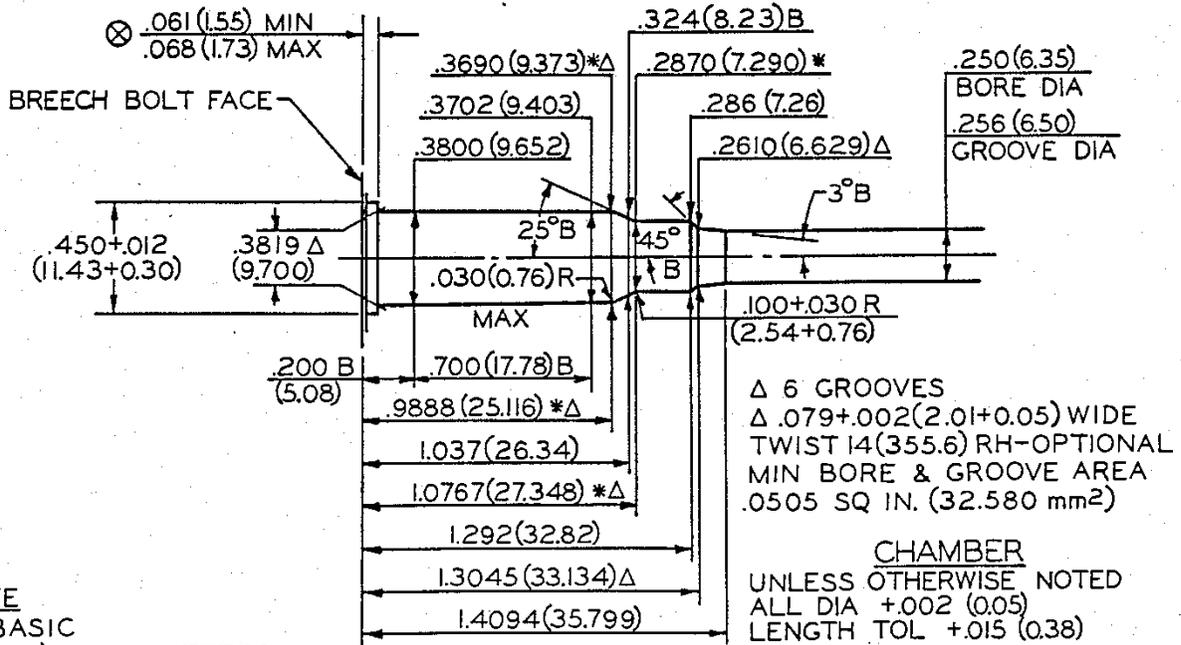
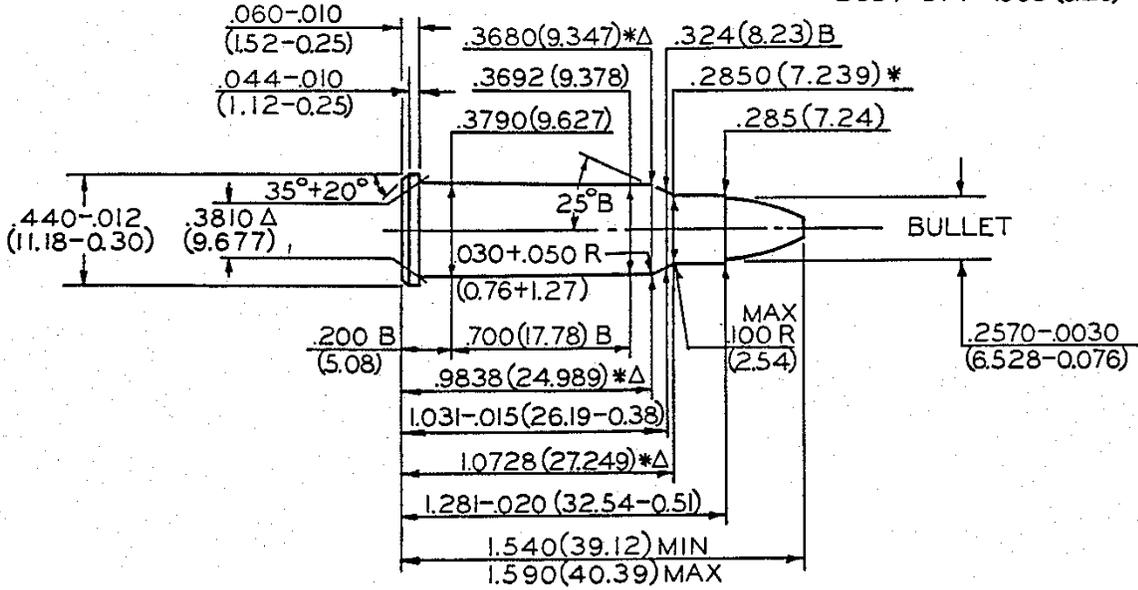


NOTE
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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 256 Winchester Magnum

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



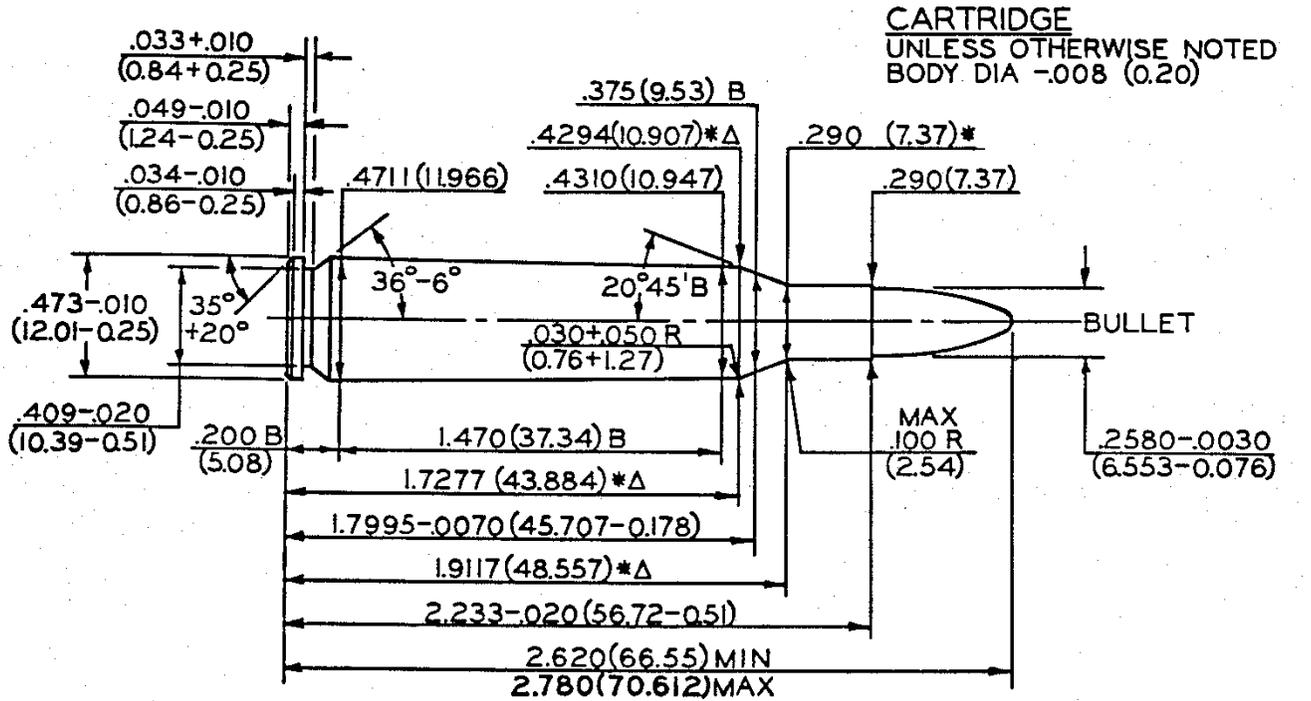
NOTE

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- Δ=REFERENCE DIMENSION
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- ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

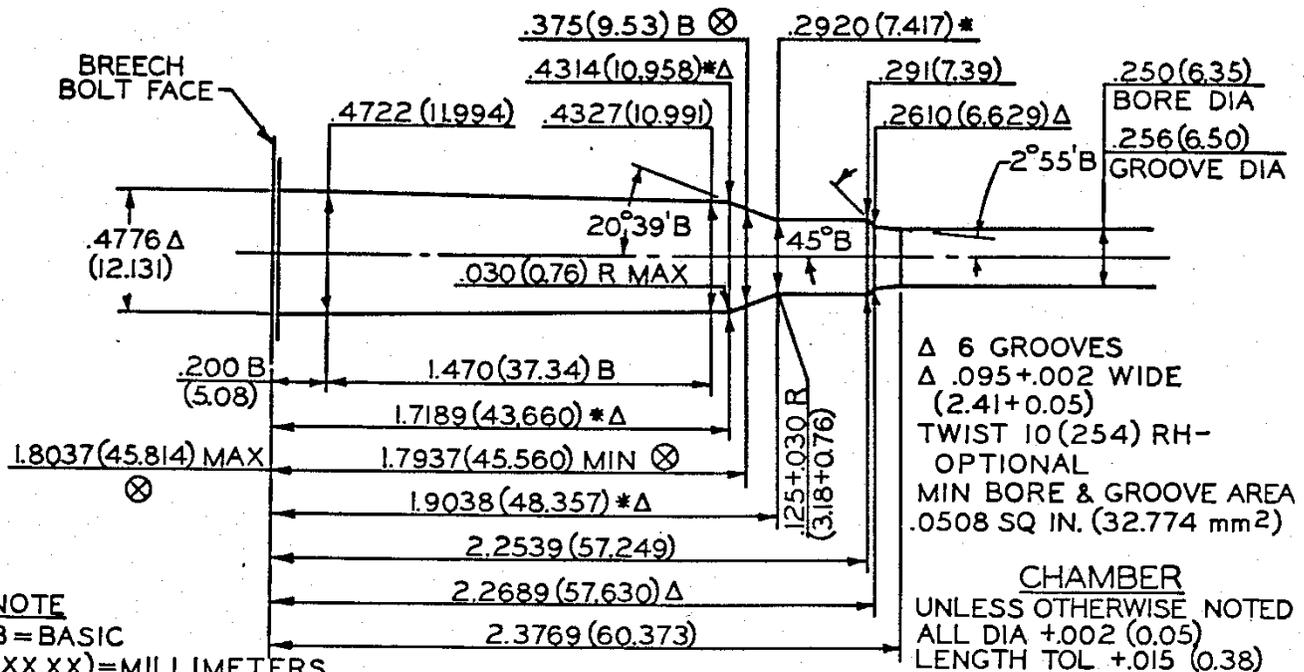
CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 257 Roberts



CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



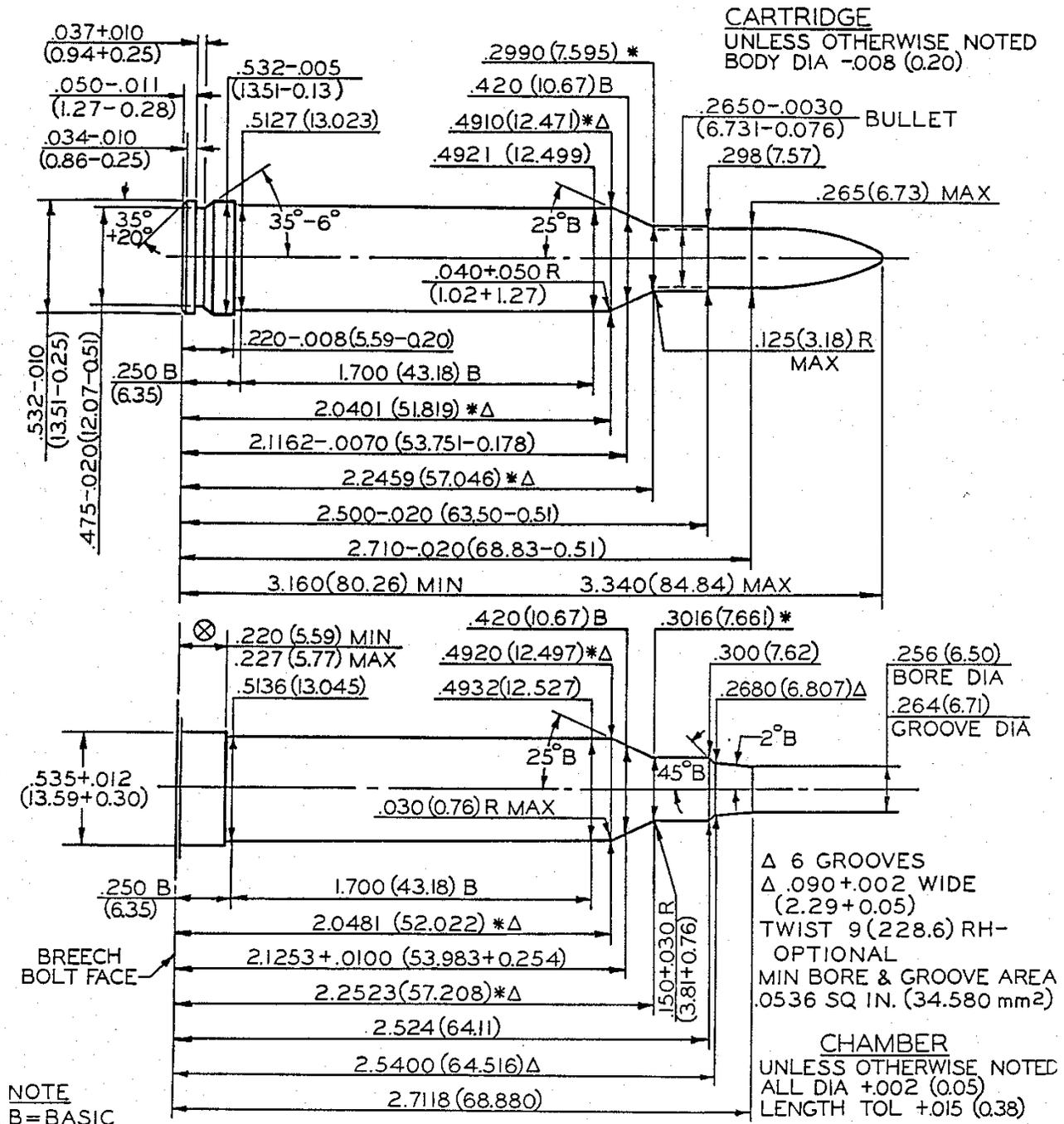
Δ 6 GROOVES
 Δ .095+0.002 WIDE
 (2.41+0.05)
 TWIST 10 (254) RH-
 OPTIONAL
 MIN BORE & GROOVE AREA
 .0508 SQ IN. (32.774 mm²)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS
 ⊗=HEADSPACE DIMENSION
 Δ=REFERENCE DIMENSION
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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

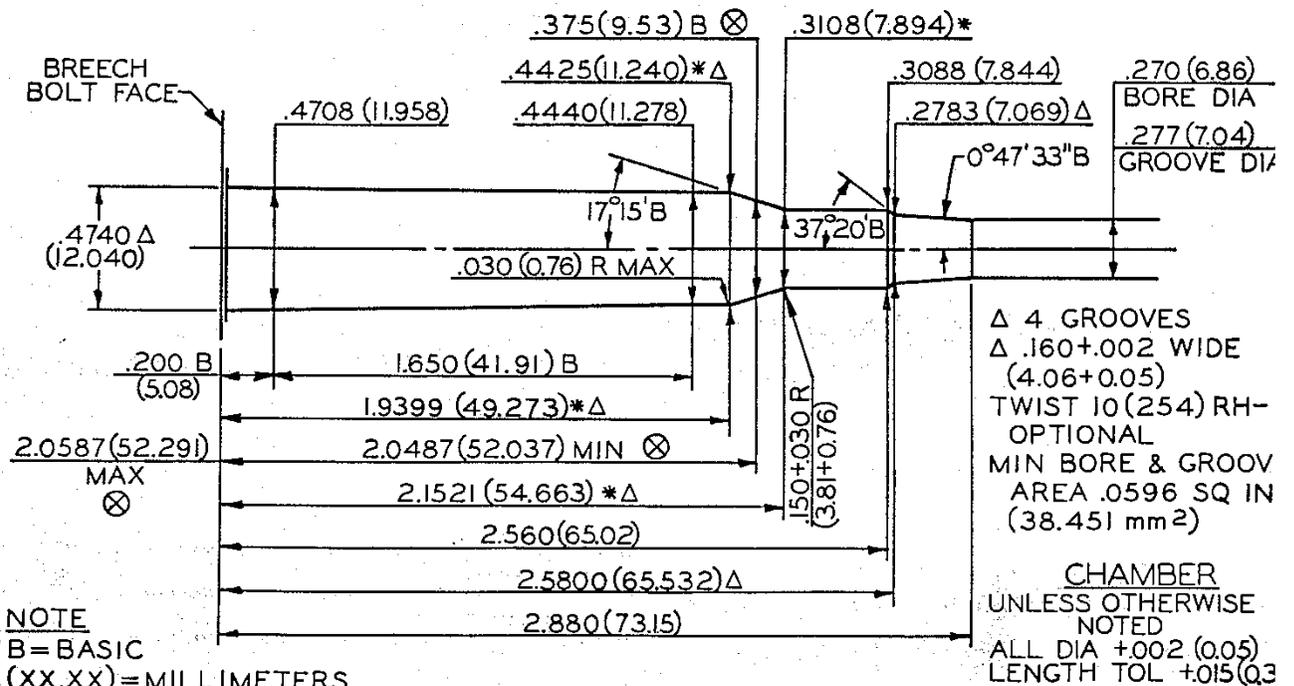
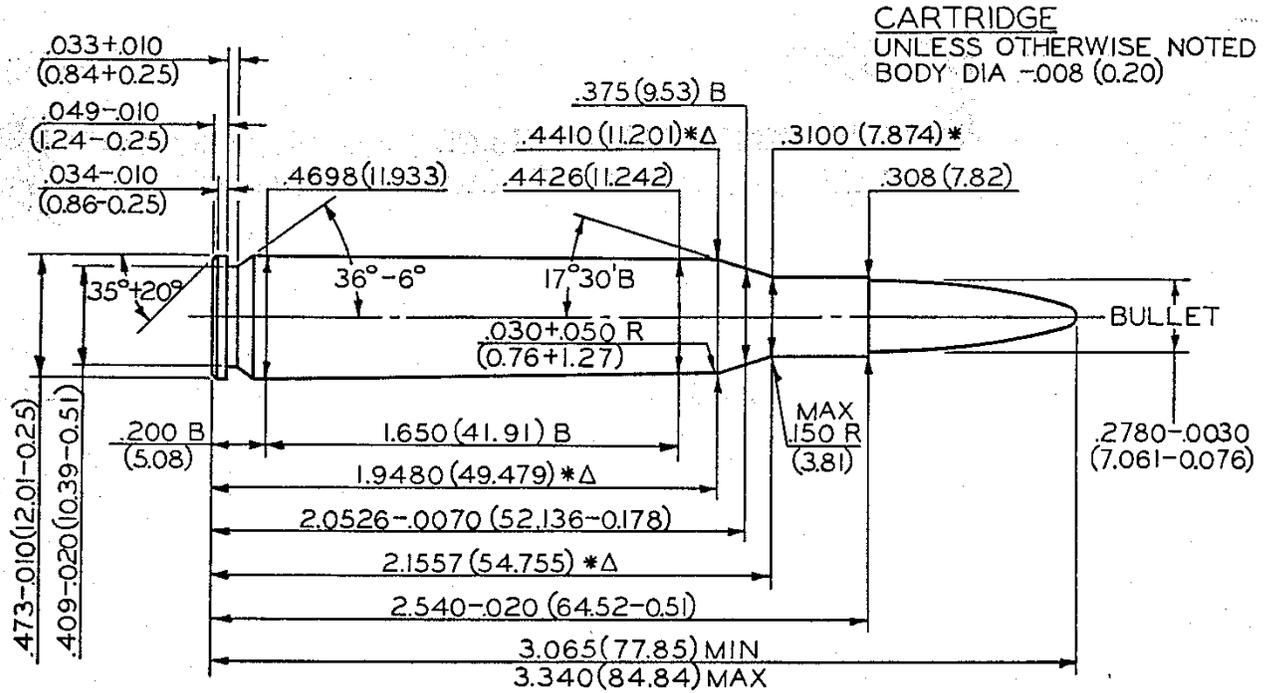
CARTRIDGE & CHAMBER
 264 Winchester Magnum



NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS
 ⊗ =HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 270 Winchester



NOTE

B = BASIC

(XX.XX) = MILLIMETERS

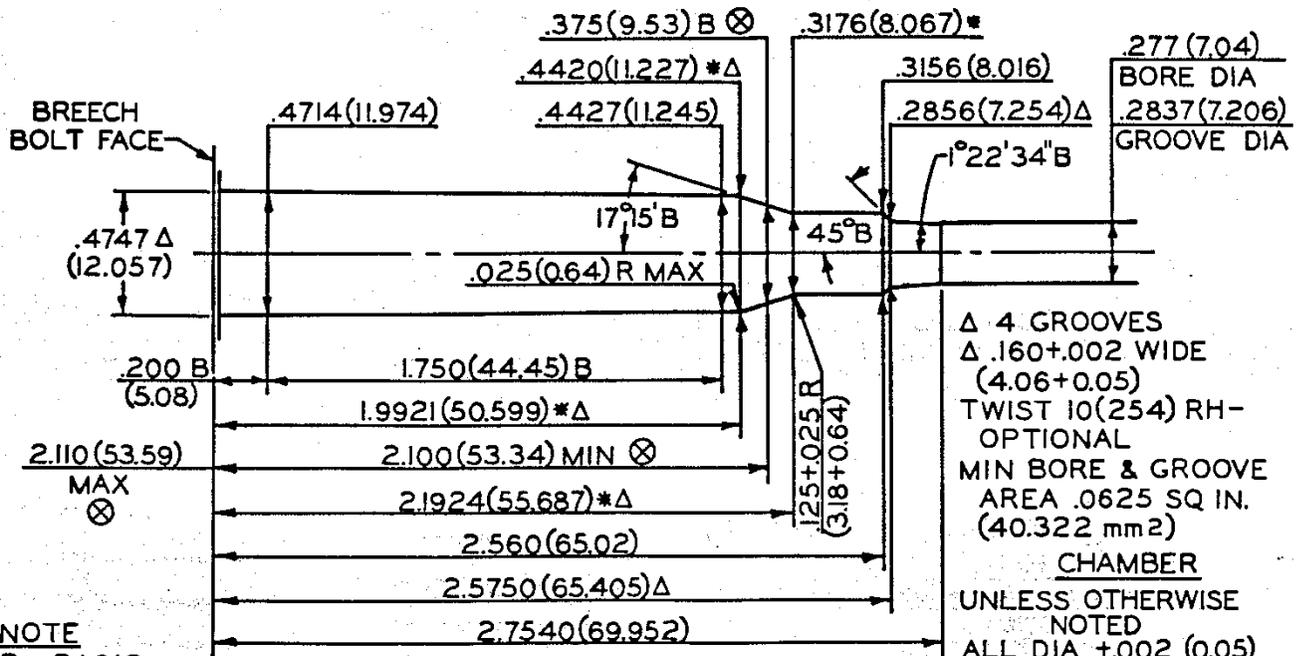
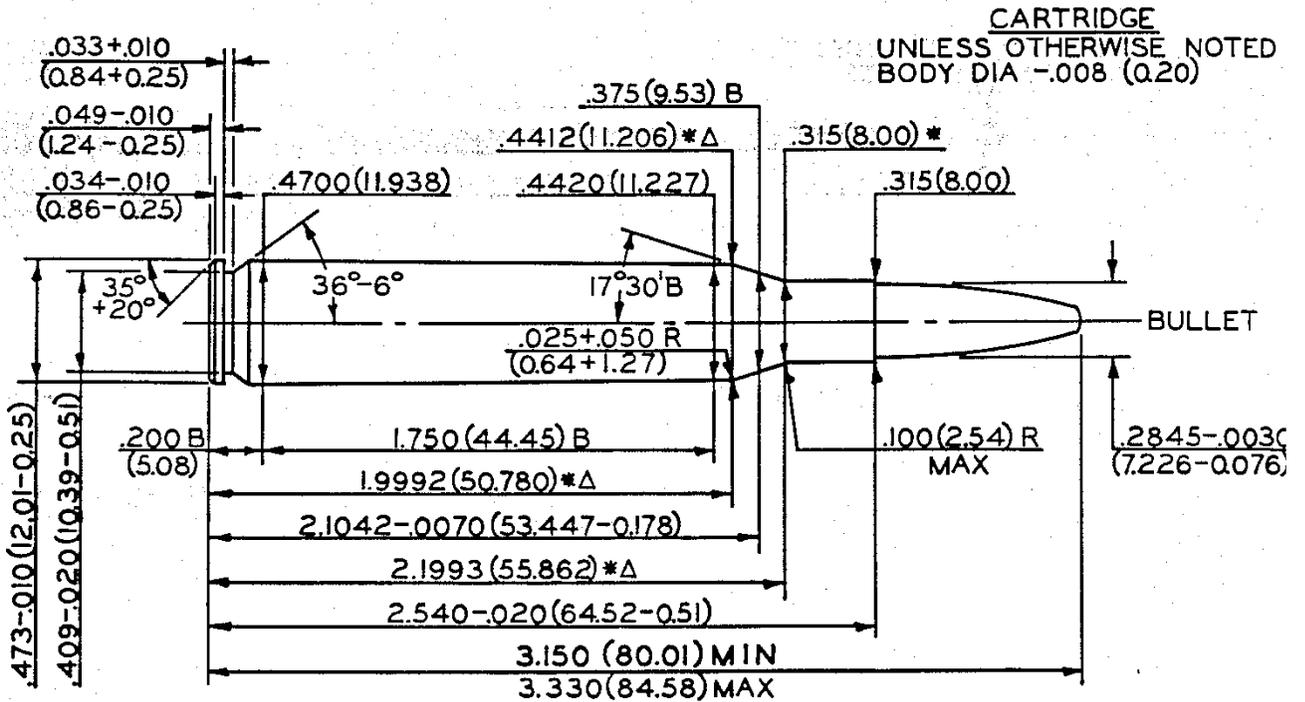
\otimes = HEADSPACE DIMENSION

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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.3)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 280 Remington

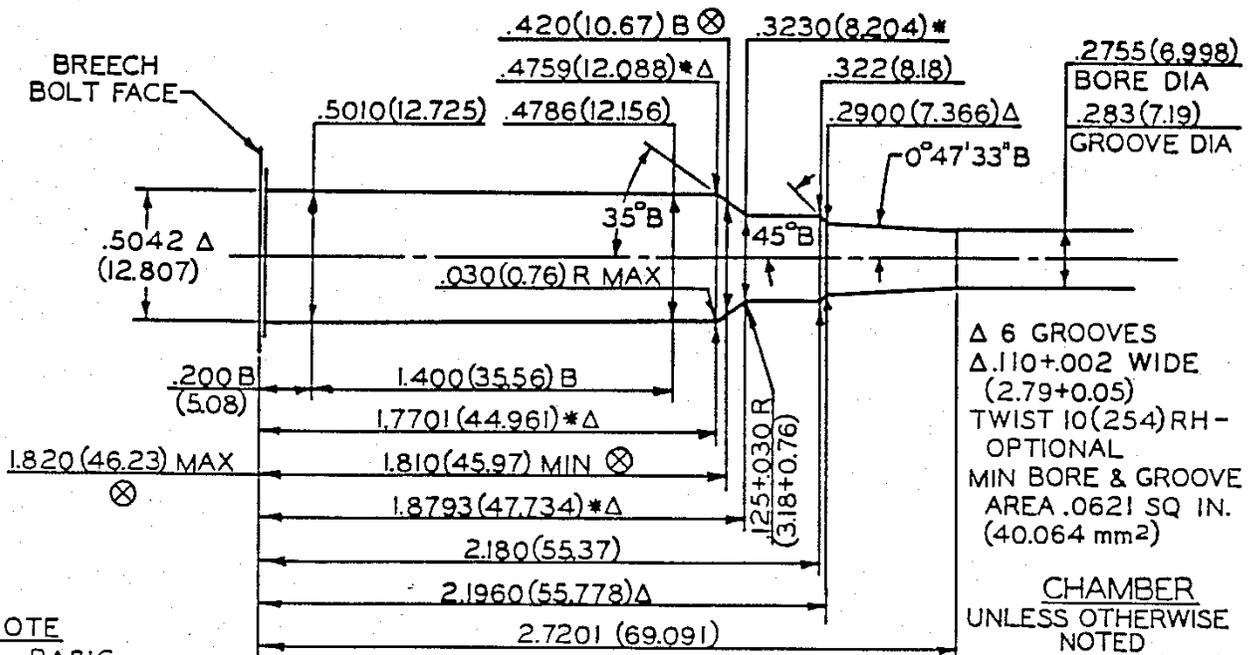
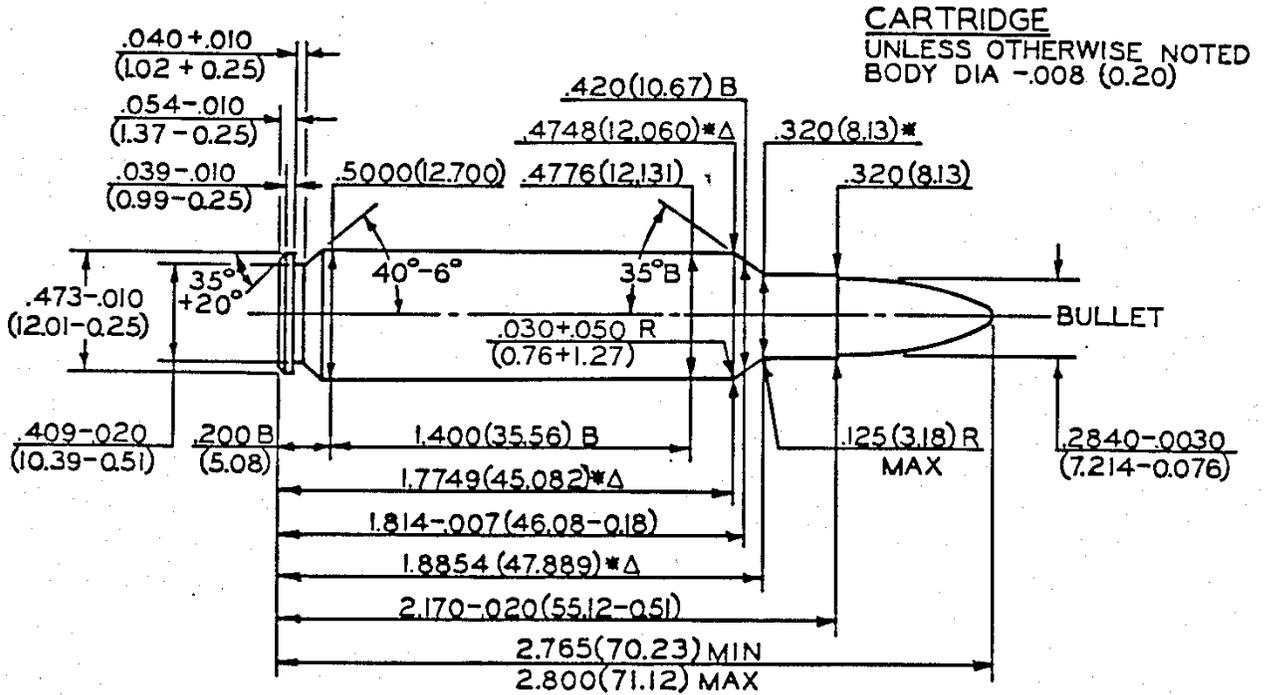


NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 ⊗ = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

Δ 4 GROOVES
 Δ .160+0.002 WIDE
 (4.06+0.05)
 TWIST 10(254) RH-
 OPTIONAL
 MIN BORE & GROOVE
 AREA .0625 SQ IN.
 (40.322 mm²)
 CHAMBER
 UNLESS OTHERWISE
 NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 284 Winchester



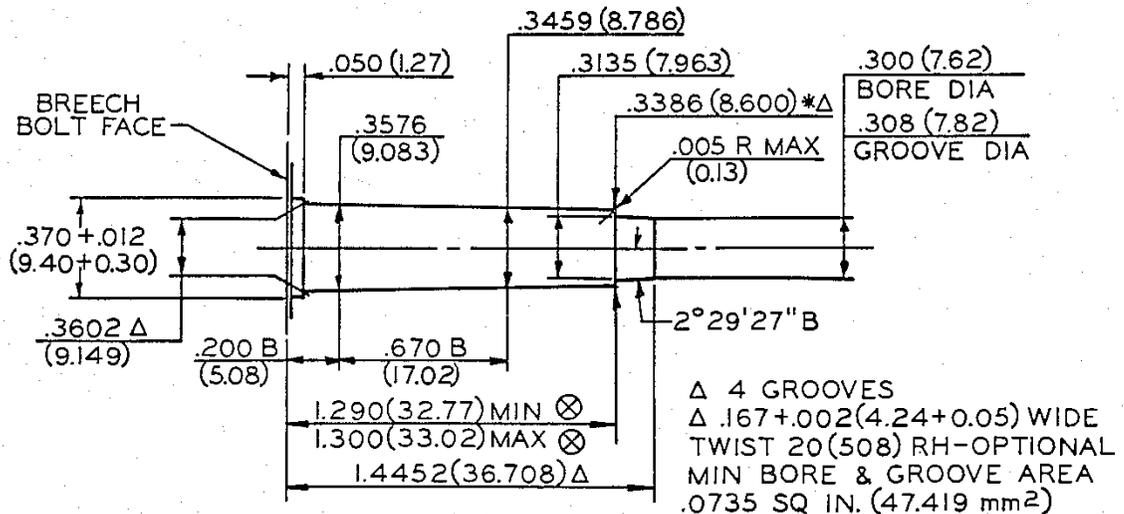
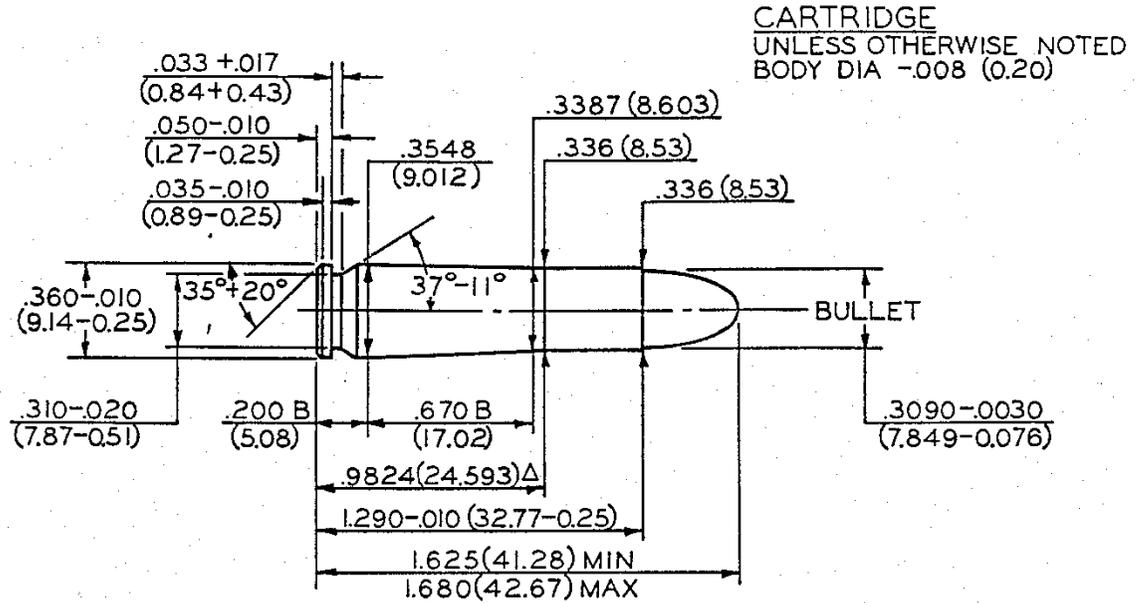
Δ 6 GROOVES
 Δ.110+.002 WIDE
 (2.79+0.05)
 TWIST 10(254) RH-
 OPTIONAL
 MIN BORE & GROOVE
 AREA .0621 SQ IN.
 (40.064 mm²)

CHAMBER
 UNLESS OTHERWISE
 NOTED
 ALL DIA +.002 (0.05)
 LENGTH TOL +.015
 (0.38)

NOTE
 B=BASIC
 (XX.XX) = MILLIMETERS
 ⊗ = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 30 Carbine



NOTE

B=BASIC

(XX.XX)=MILLIMETERS

⊗ = HEADSPACE DIMENSION

Δ = REFERENCE DIMENSION

* DIMENSIONS ARE TO INTERSECTION OF LINES

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER

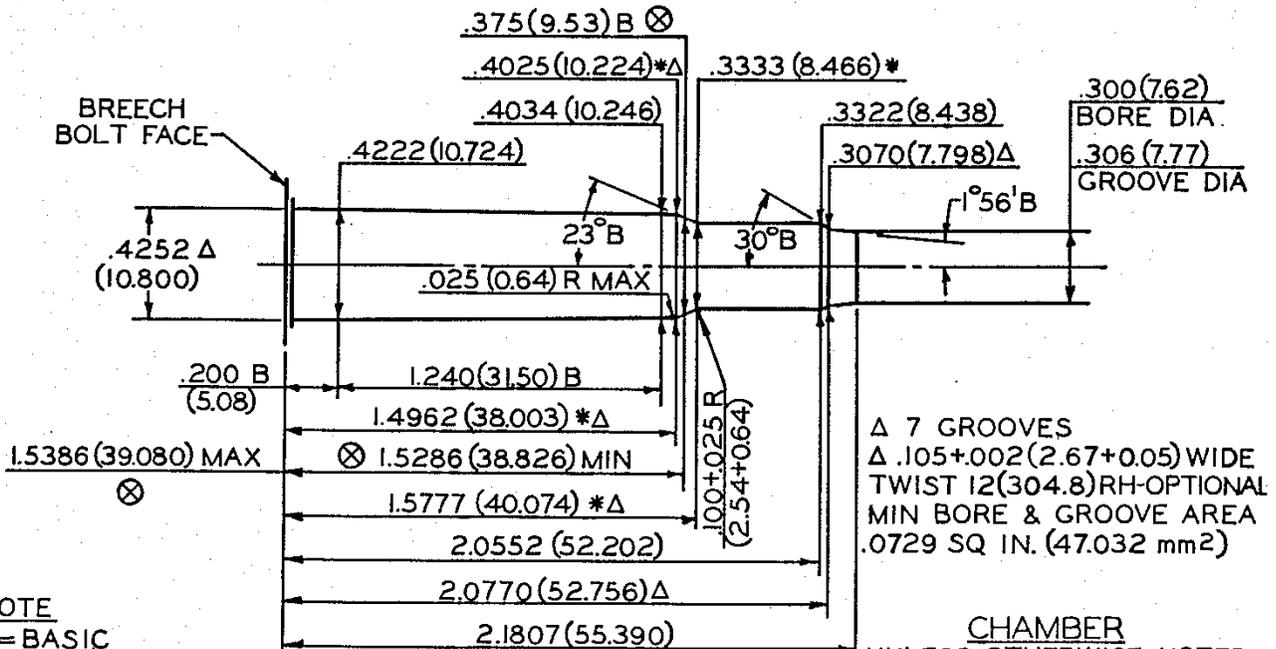
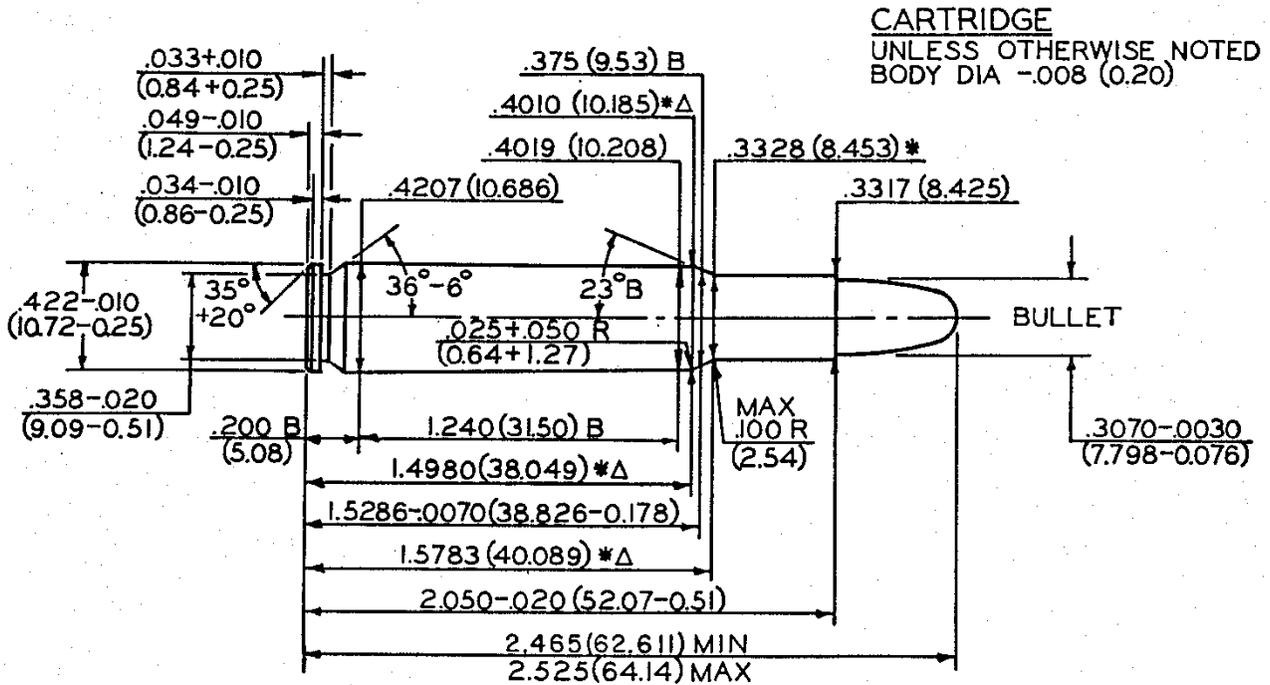
UNLESS OTHERWISE NOTED

ALL DIA $+.002$ (0.05)

LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 30 Remington



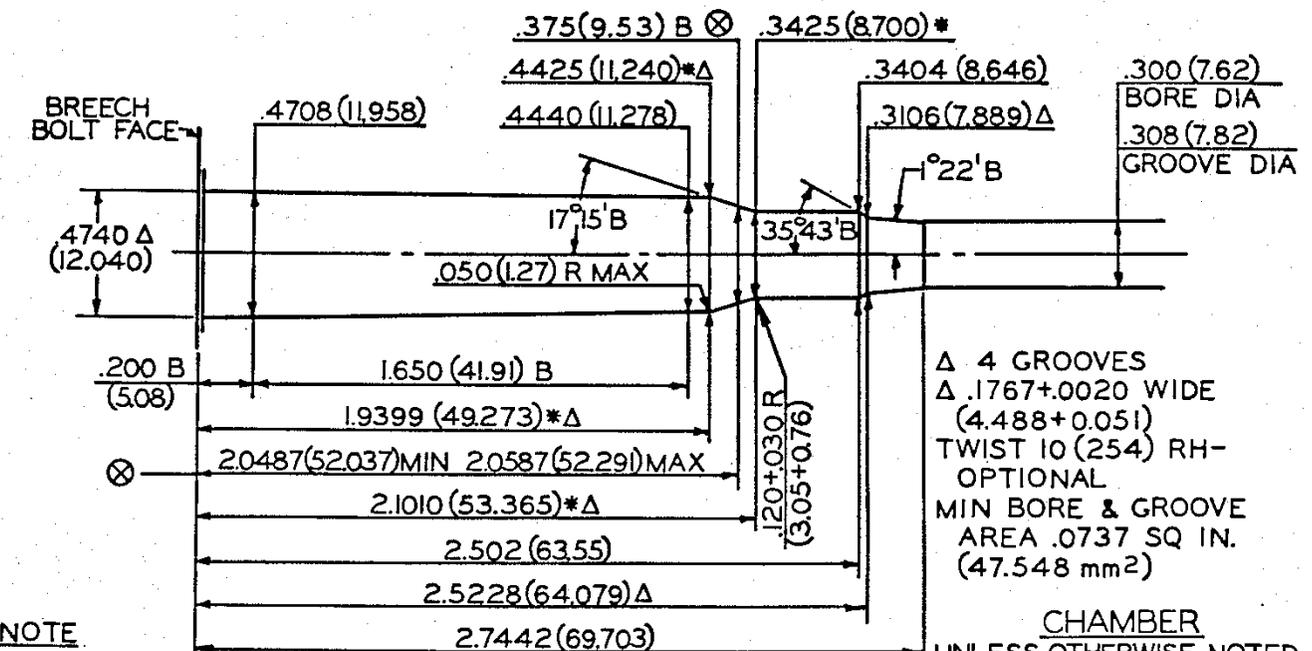
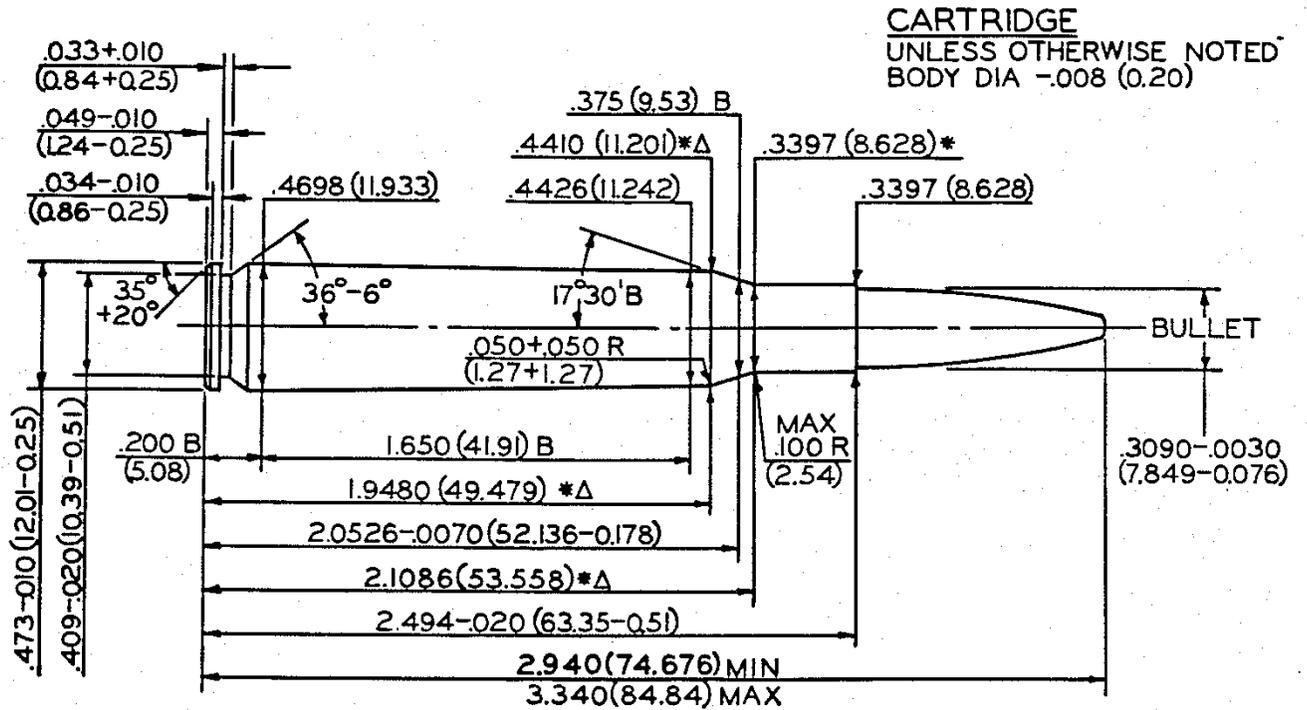
Δ 7 GROOVES
 Δ .105+0.002 (2.67+0.05) WIDE
 TWIST 12 (304.8) RH-OPTIONAL
 MIN BORE & GROOVE AREA
 .0729 SQ IN. (47.032 mm²)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+0.02$ (0.05)
 LENGTH TOL $+0.15$ (0.38)

NOTE
 B = BASIC
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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE

CARTRIDGE & CHAMBER
30-06 Springfield



NOTE

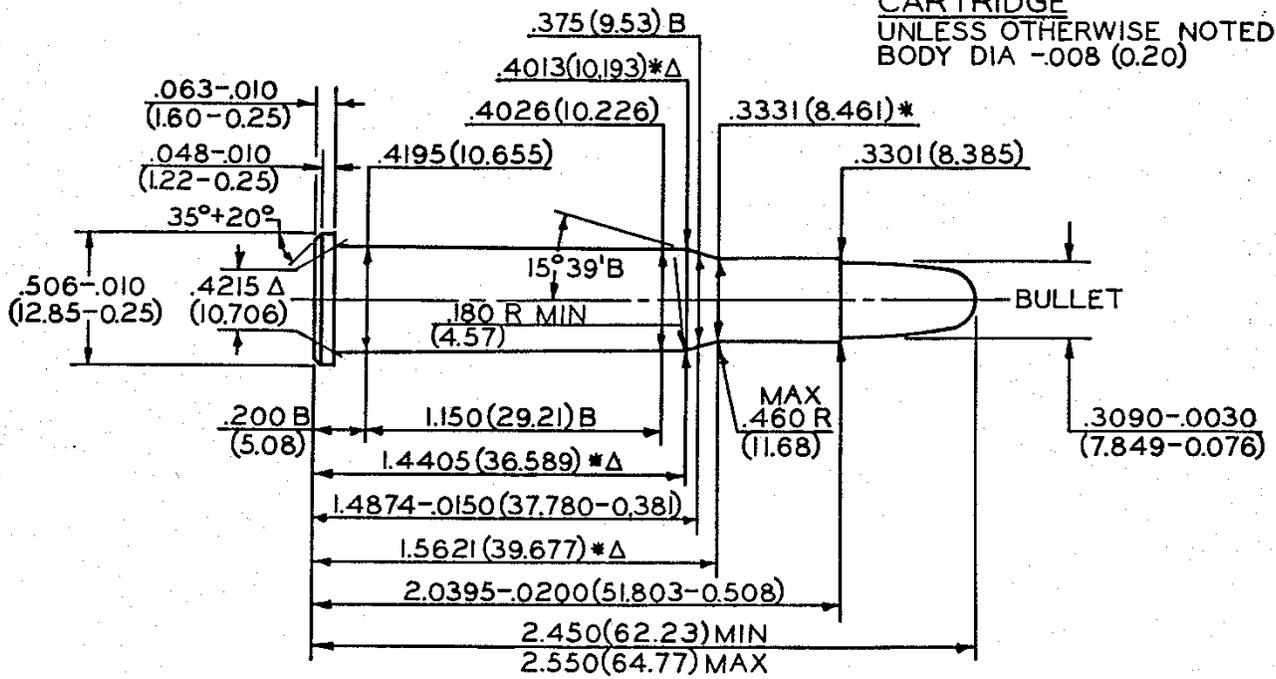
B = BASIC
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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

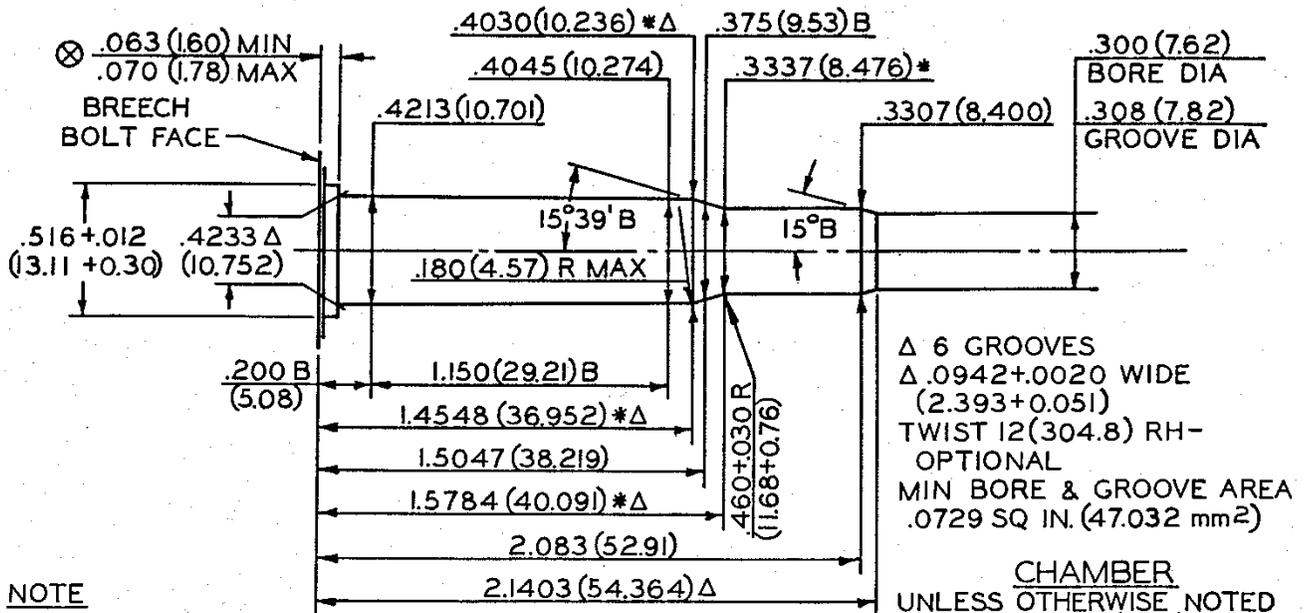
CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 30-30 Winchester



CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



Δ 6 GROOVES
 Δ .0942+.0020 WIDE
 (2.393+0.051)
 TWIST 12 (304.8) RH-
 OPTIONAL
 MIN BORE & GROOVE AREA
 .0729 SQ IN. (47.032 mm²)

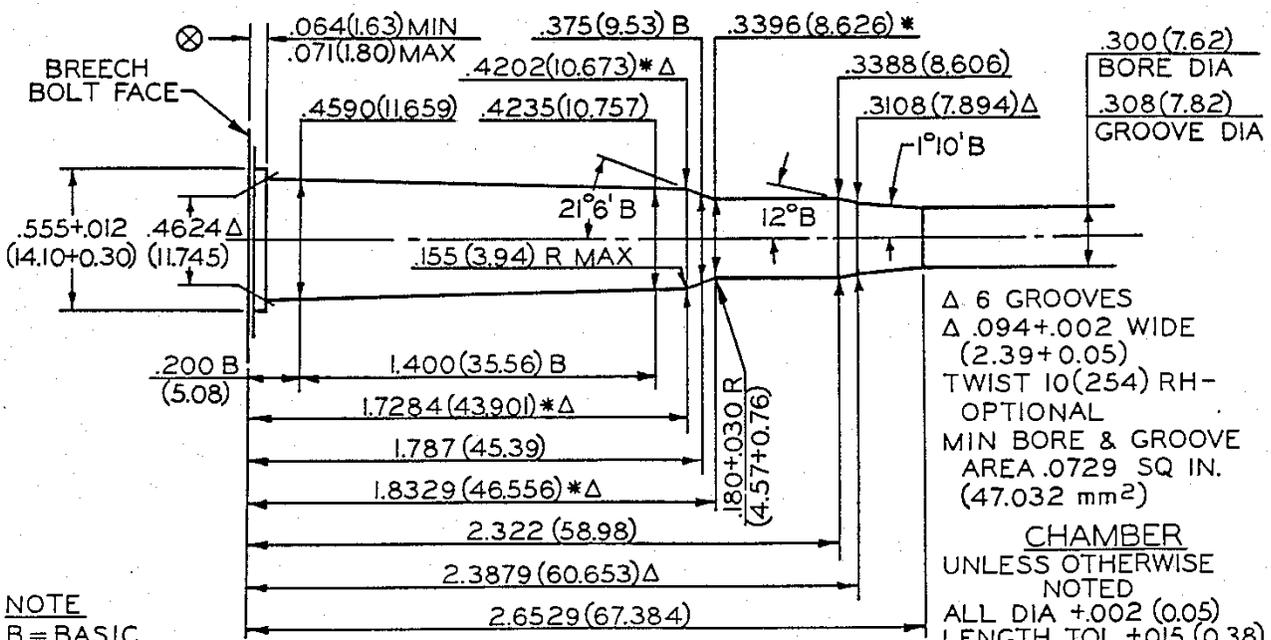
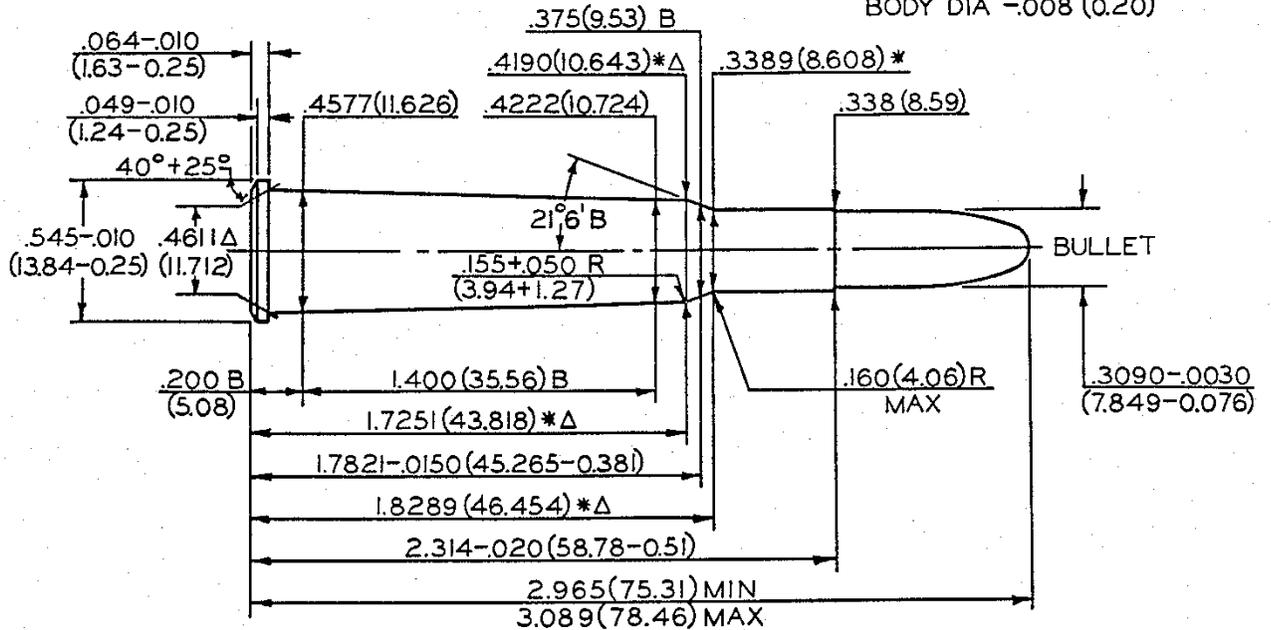
CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE
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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 30-40 Krag

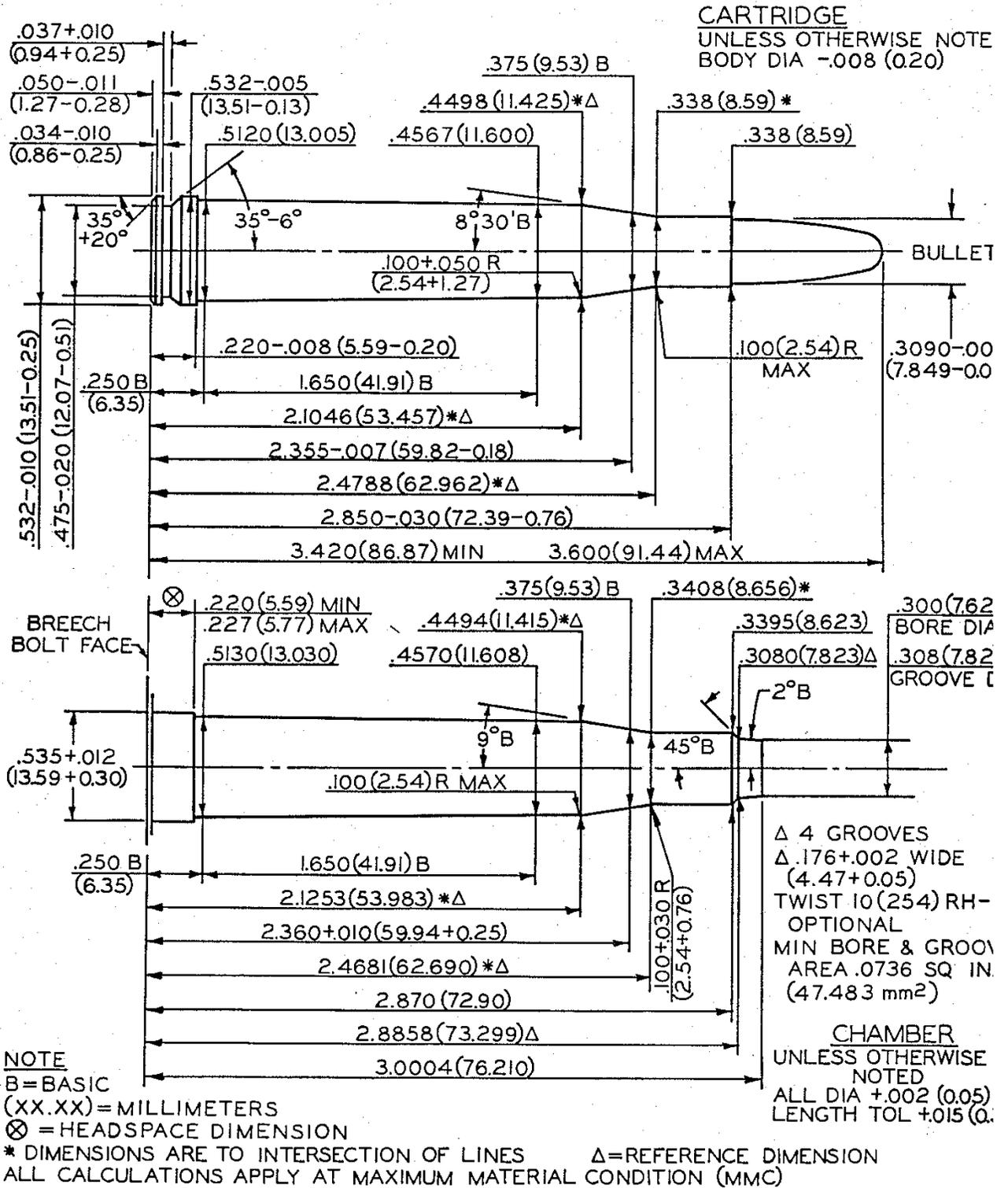
CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



NOTE
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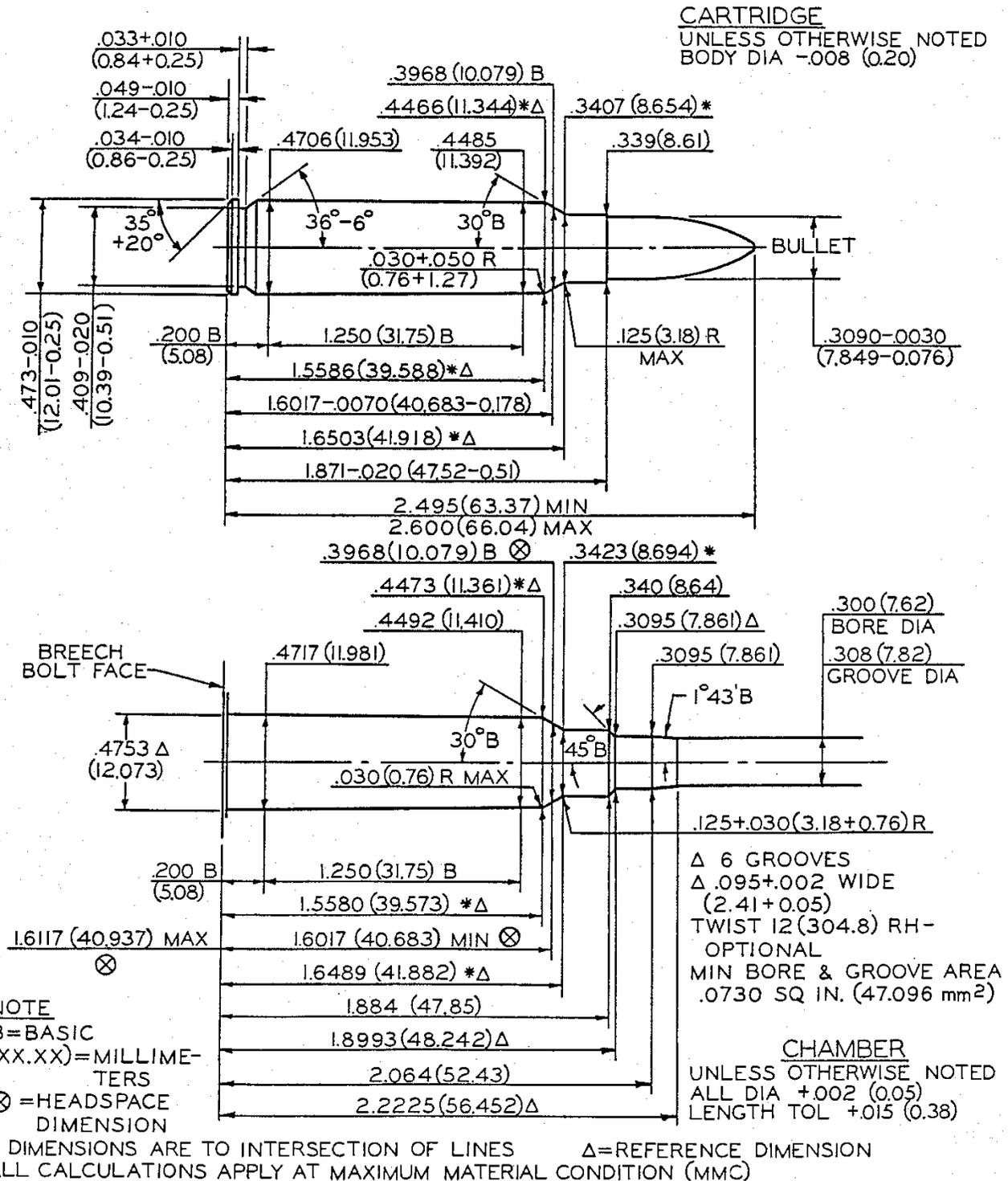
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 300 H&H Magnum



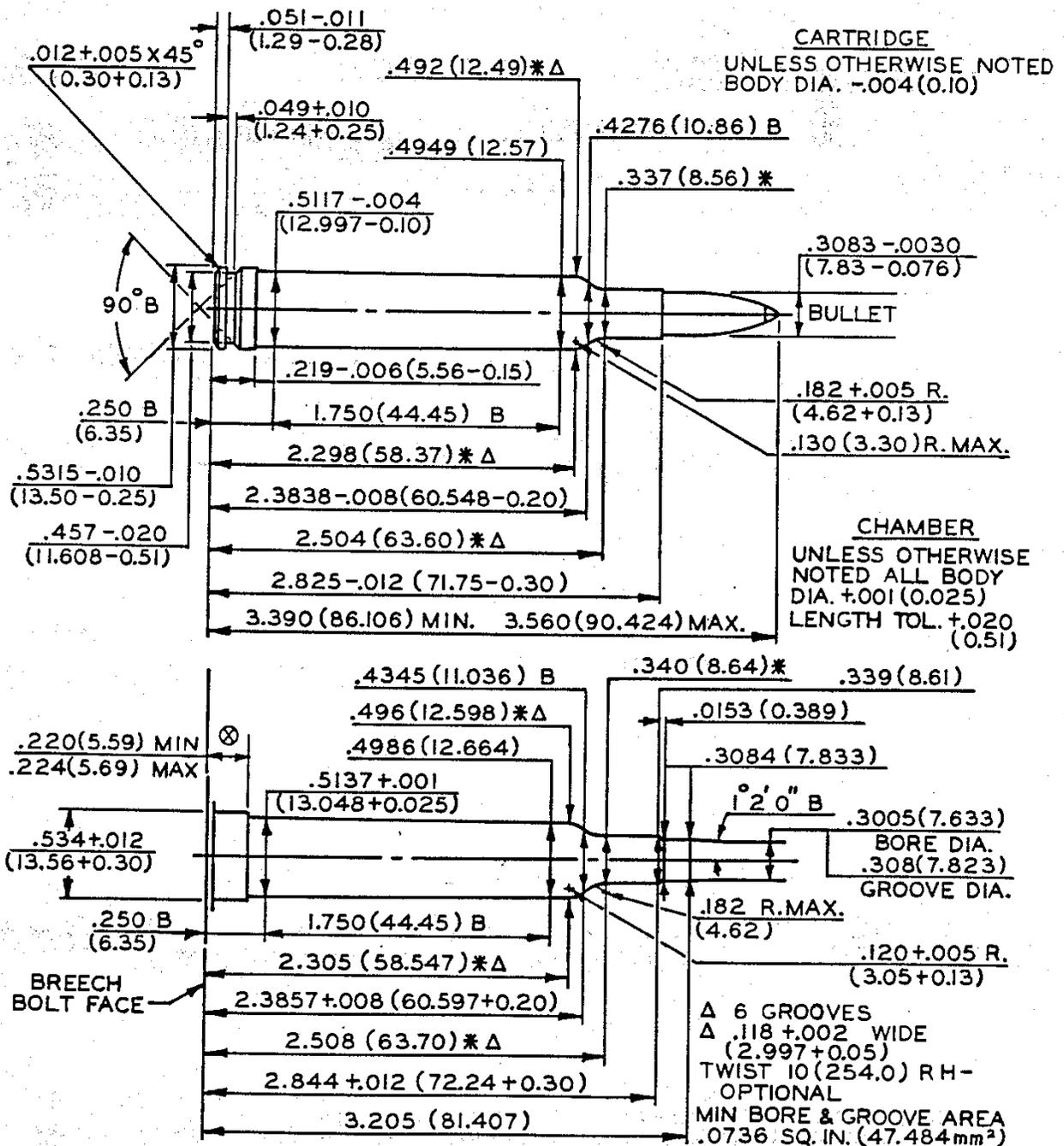
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 300 Savage



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

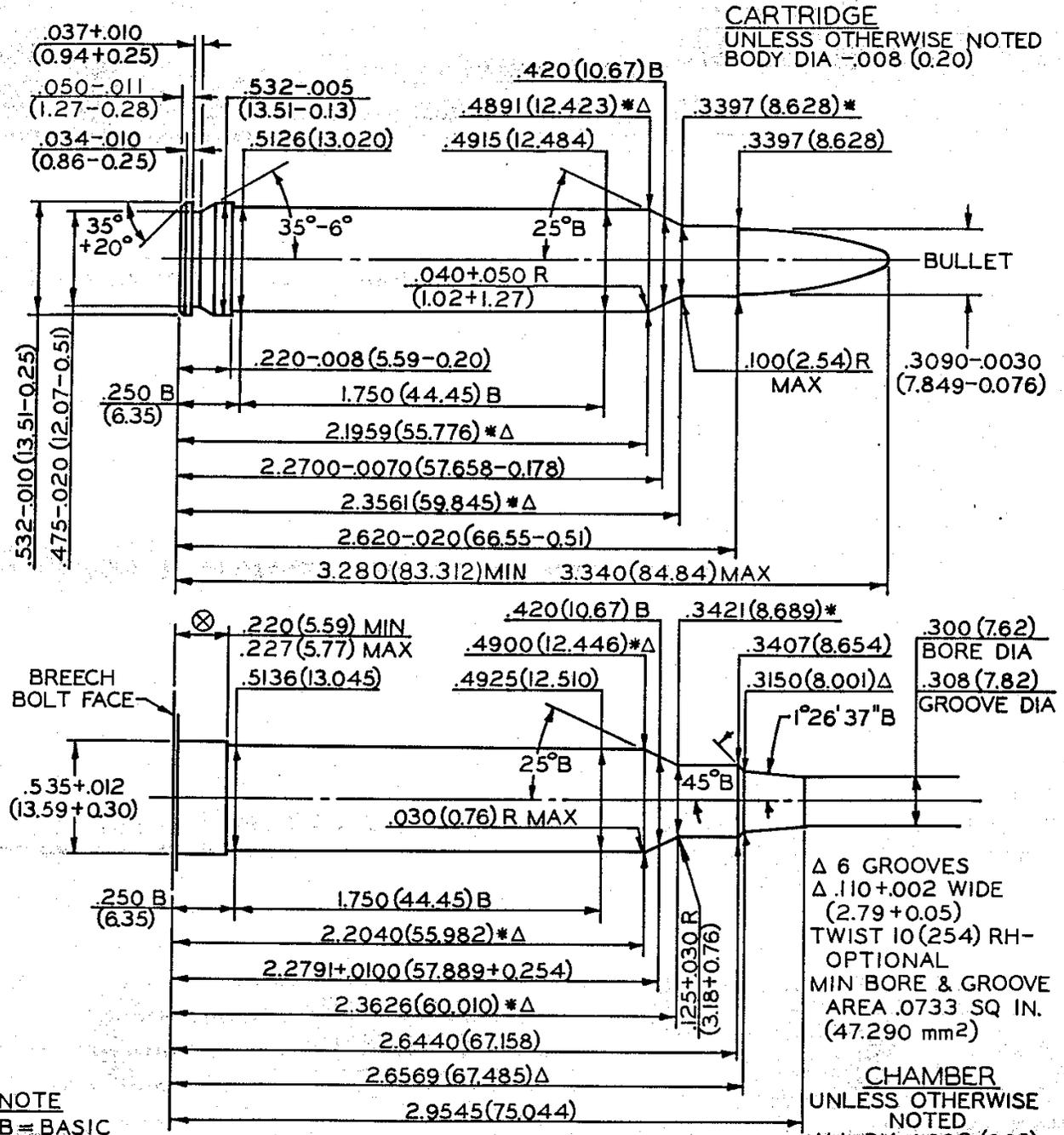
CARTRIDGES & CHAMBERS
 300 Weatherby Magnum



NOTE
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 CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 300 Winchester Magnum



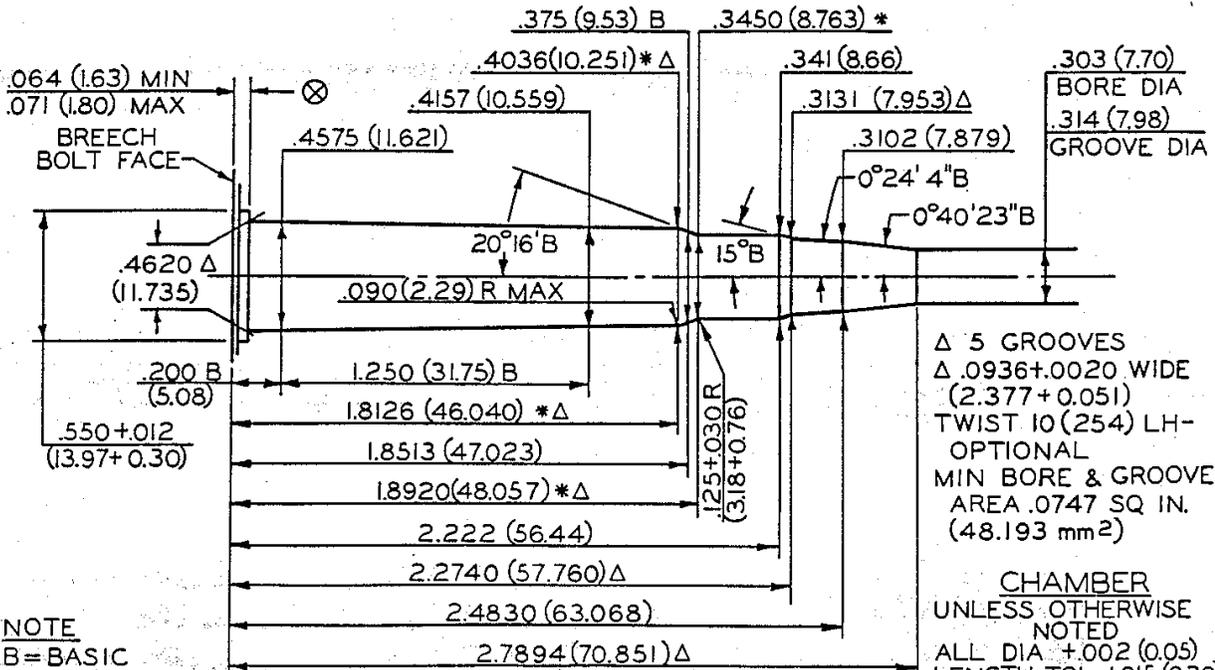
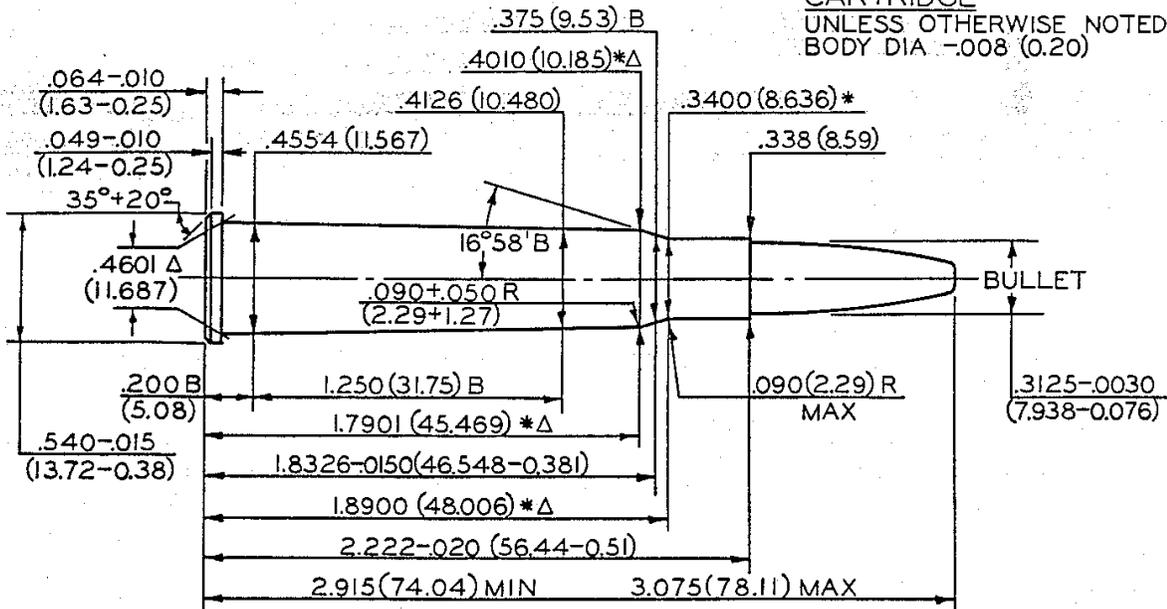
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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 303 British

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



Δ 5 GROOVES
 Δ .0936+.0020 WIDE
 (2.377+0.051)
 TWIST 10 (254) LH-
 OPTIONAL
 MIN BORE & GROOVE
 AREA .0747 SQ IN.
 (48.193 mm²)

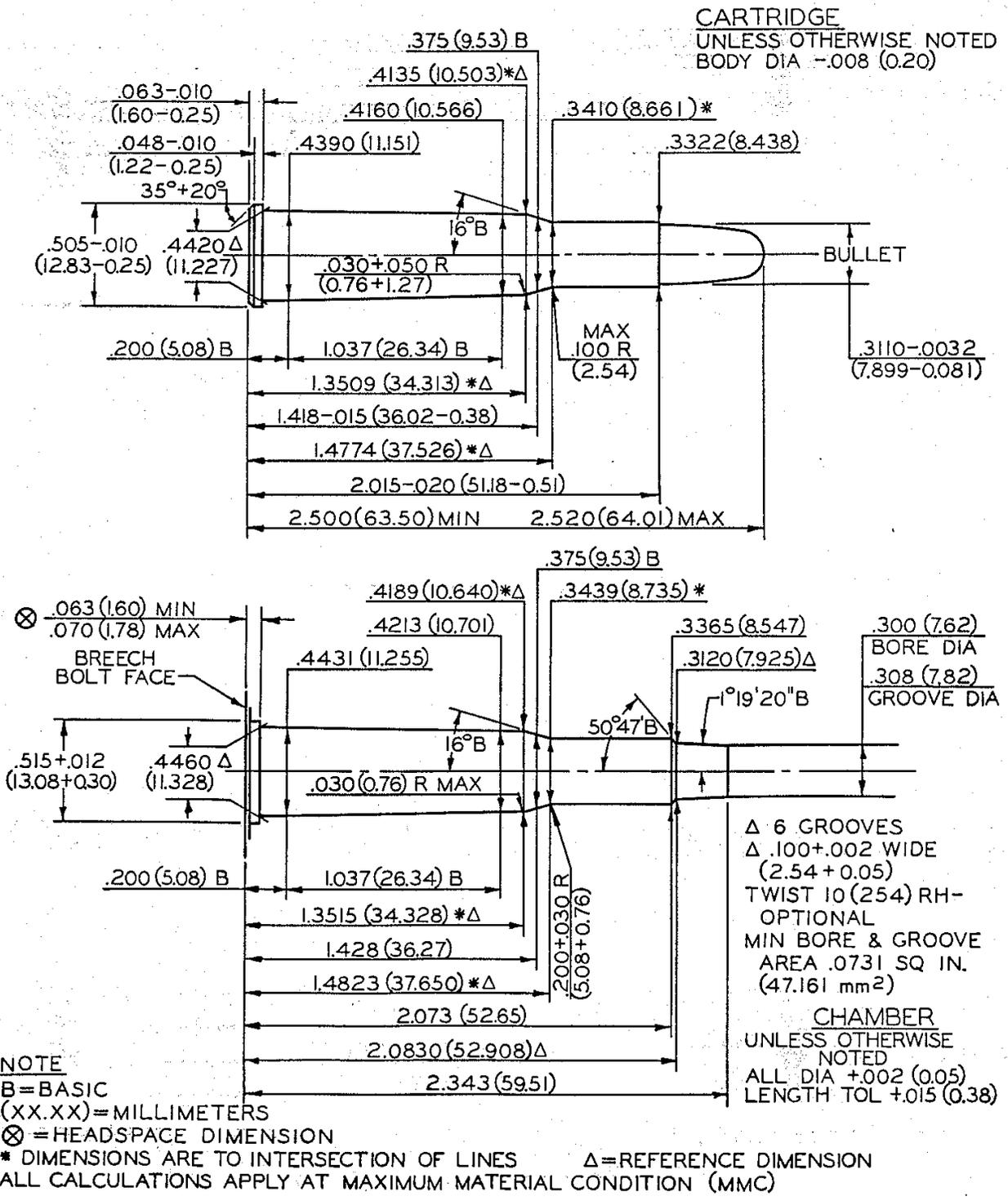
CHAMBER
 UNLESS OTHERWISE
 NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE

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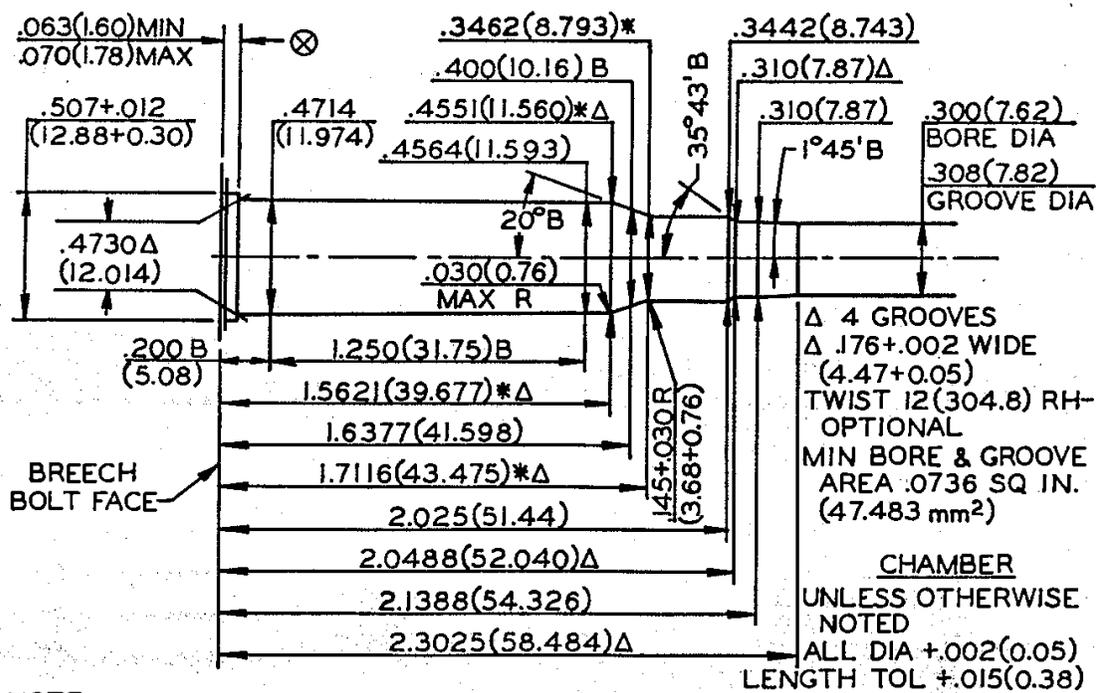
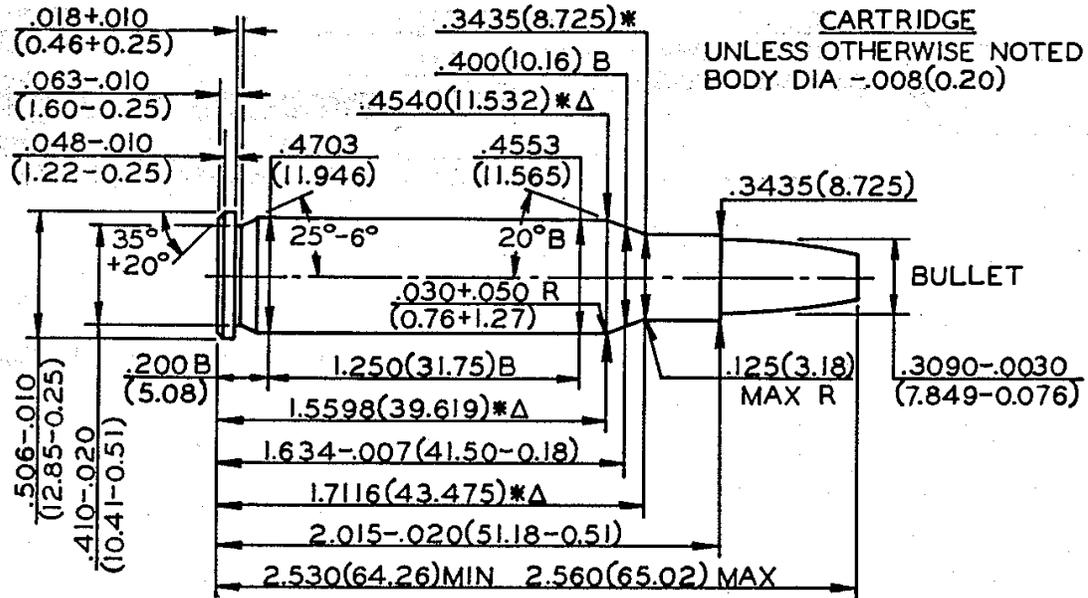
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 303 Savage



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 307 Winchester

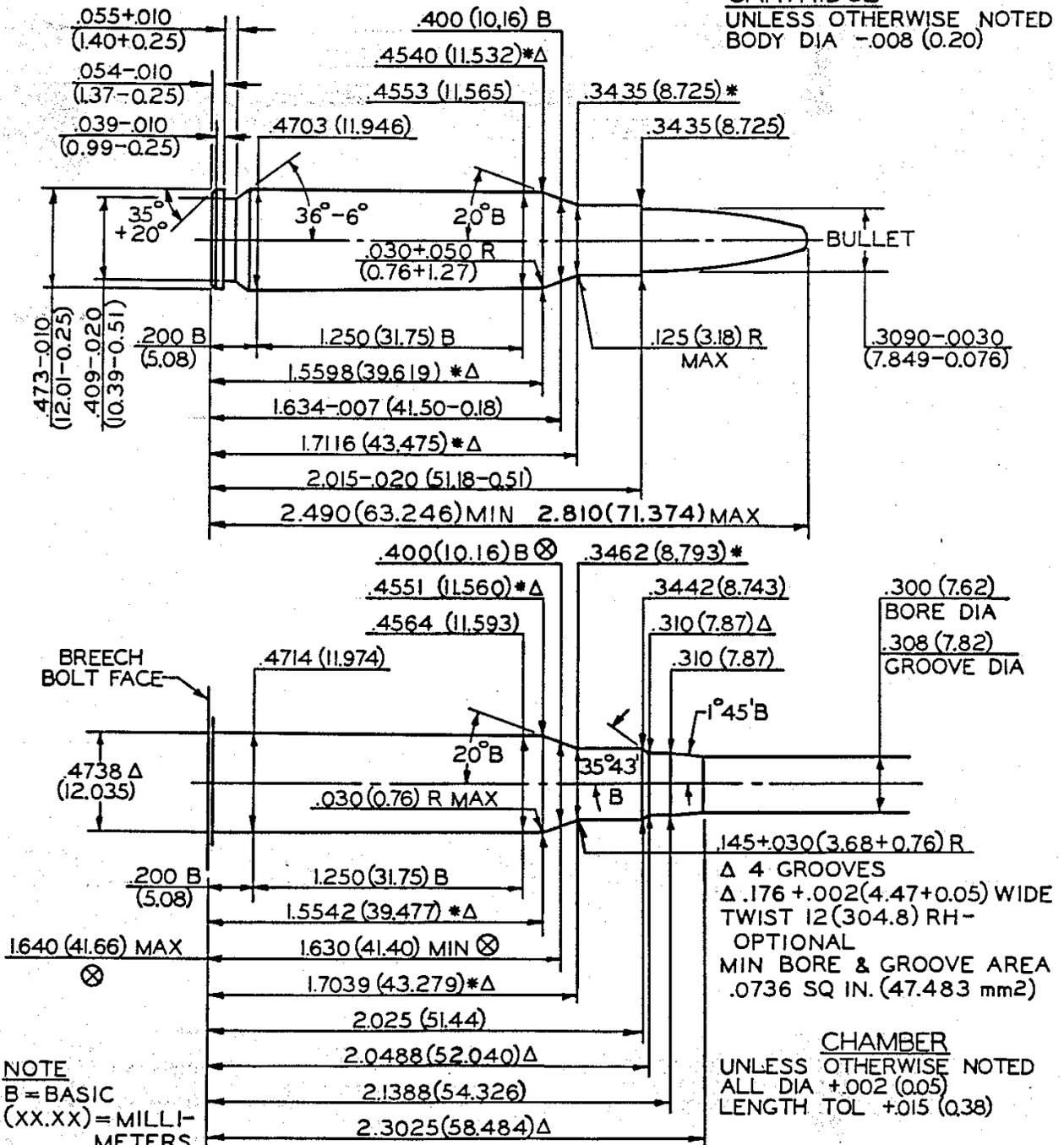


NOTE
 B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 308 Winchester

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



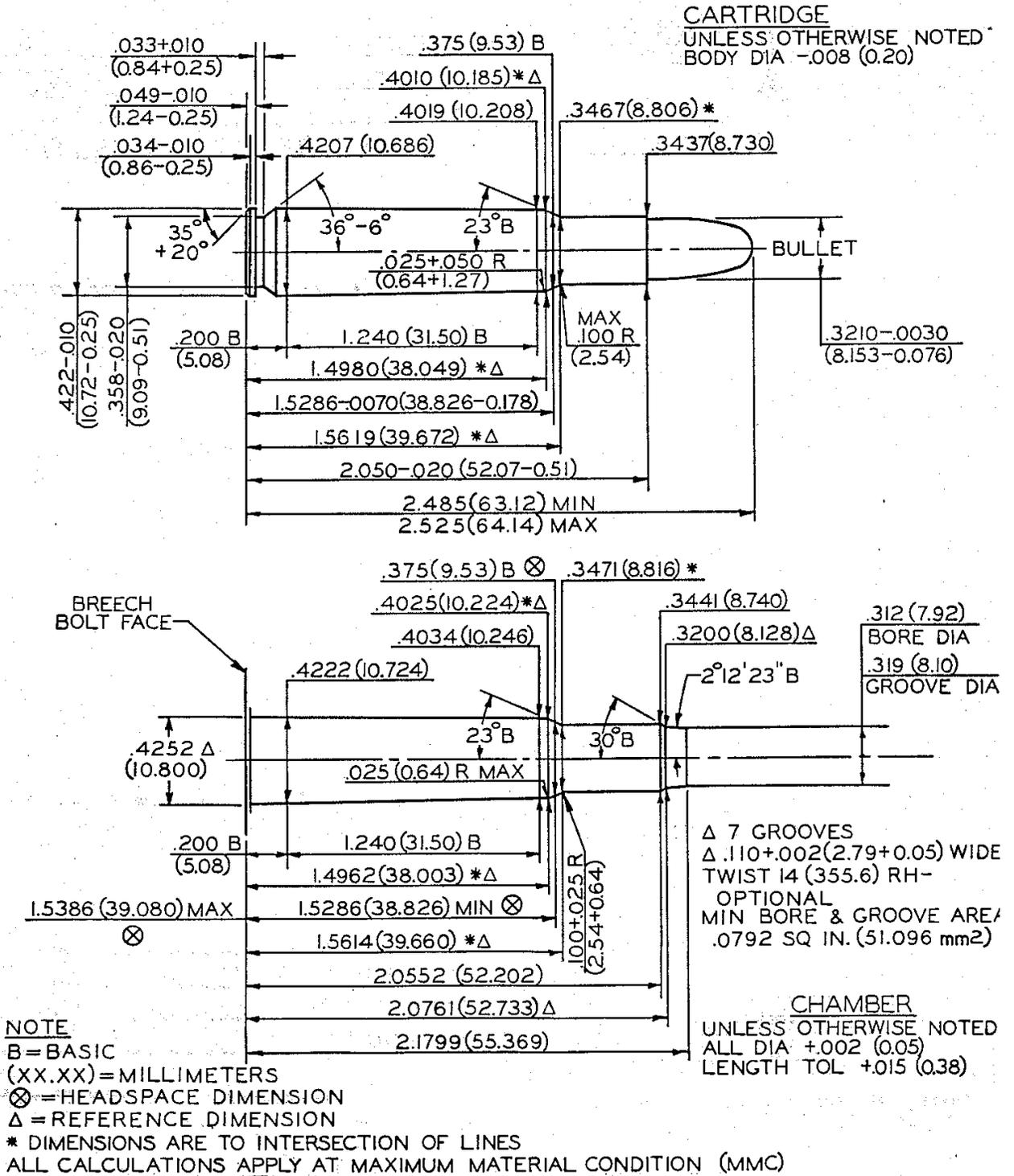
NOTE
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 (XX.XX) = MILLI-
 METERS

⊗ = HEADSPACE DIMENSION

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

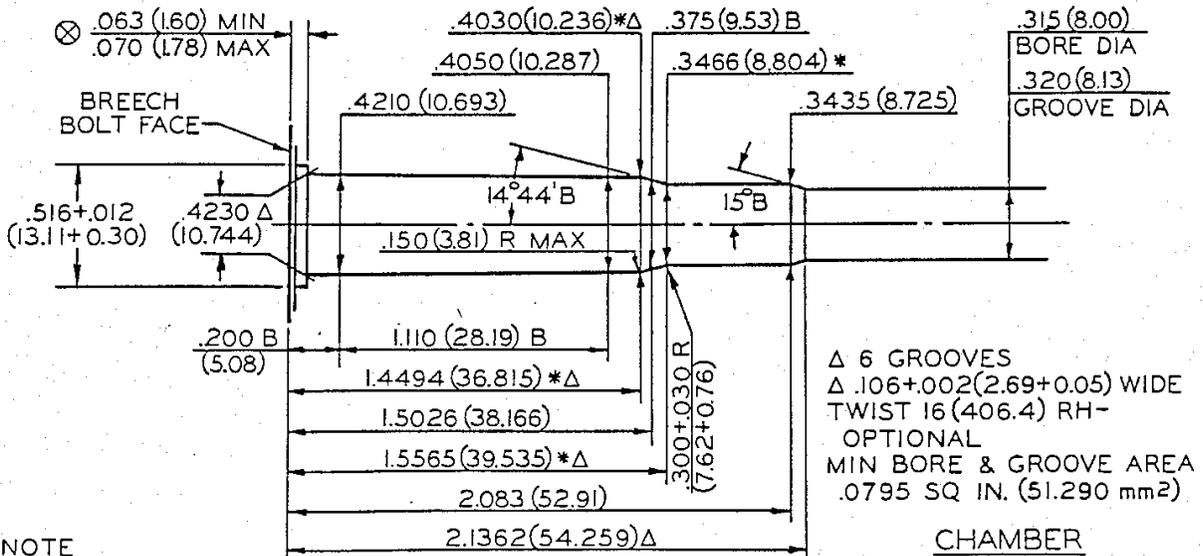
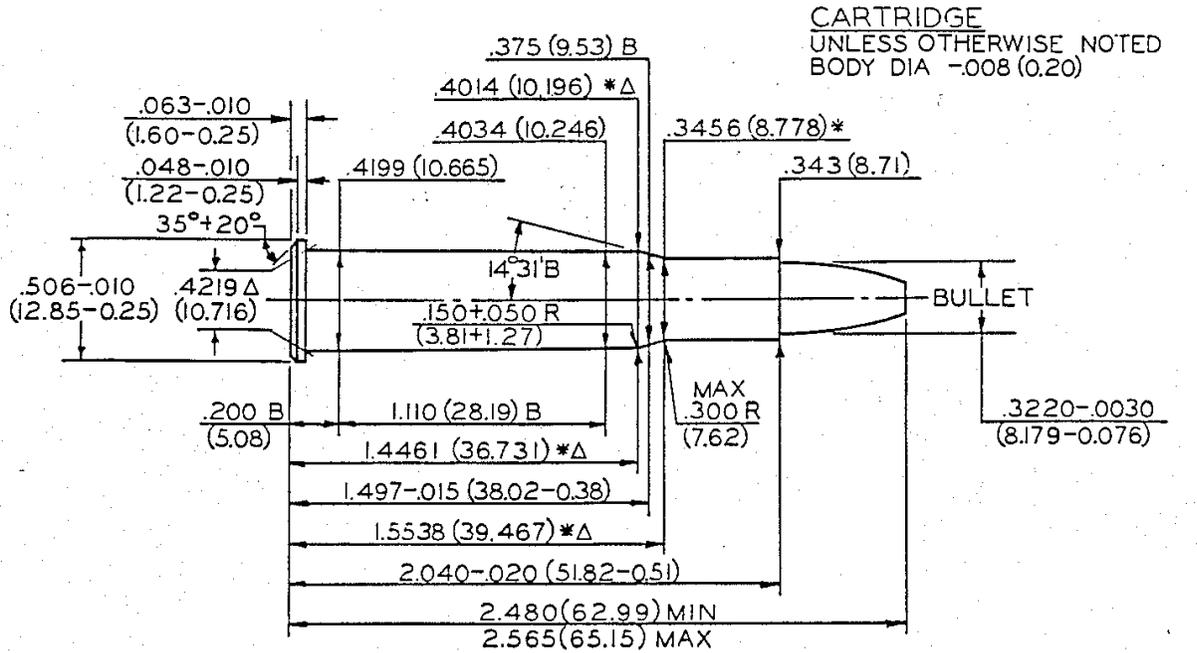
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 32 Remington



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 32 Winchester Special



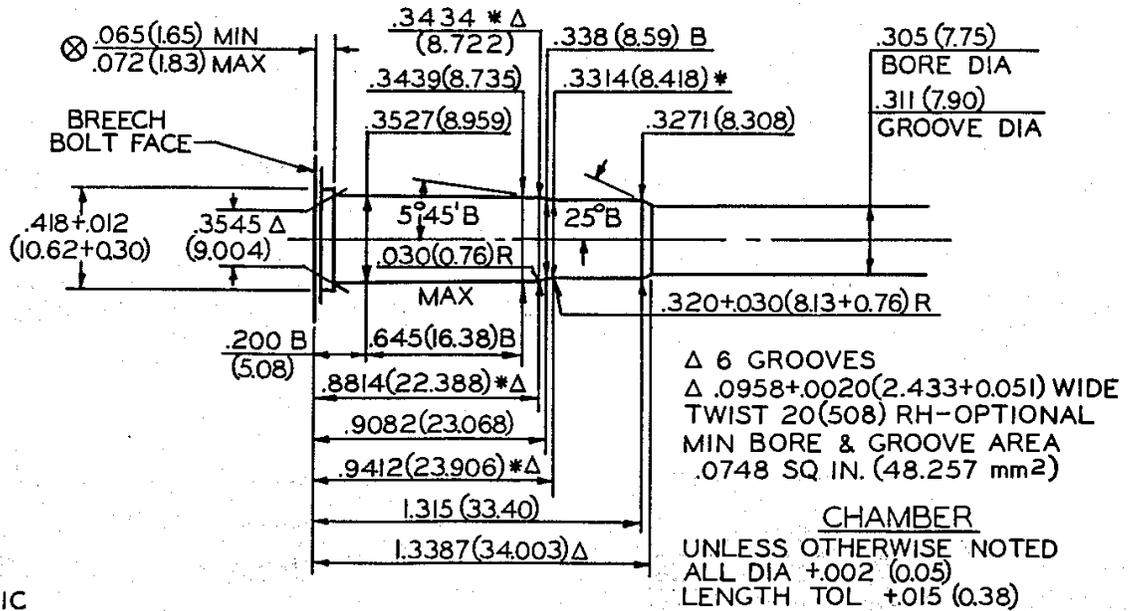
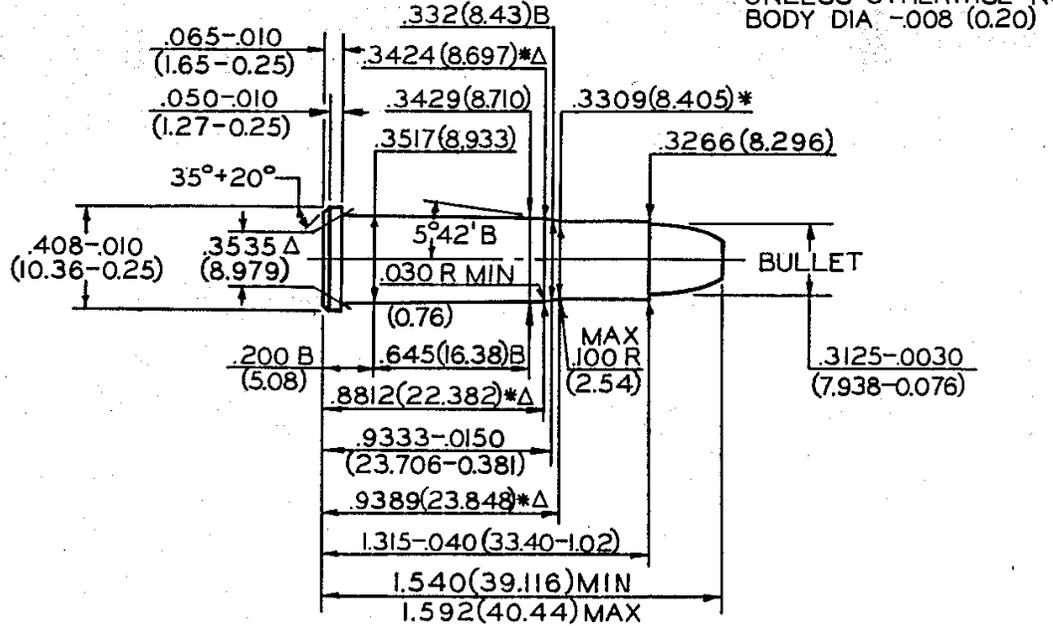
NOTE
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 ⊗ = HEADSPACE DIMENSION
 Δ = REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 32-20 Winchester

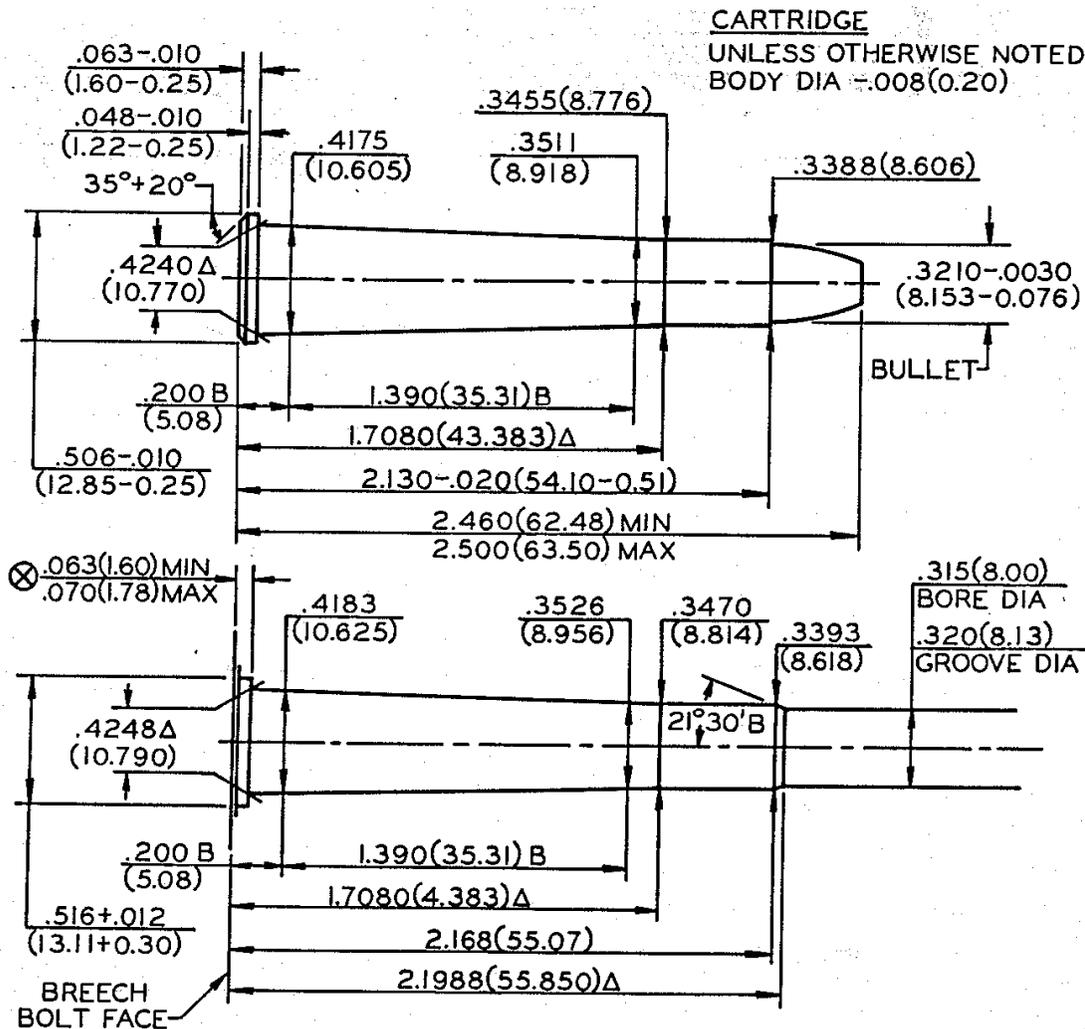
CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA. $-.008$ (0.20)



NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 \otimes = HEADSPACE DIMENSION
 Δ = REFERENCE DIMENSION
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 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 32-40 Winchester



Δ 6 GROOVES
 Δ $.099+.002(2.51+0.05)$ WIDE
 TWIST 16(406.4) RH-OPTIONAL
 MIN BORE & GROOVE AREA
 $.0794$ SQ IN. (51.225 mm²)

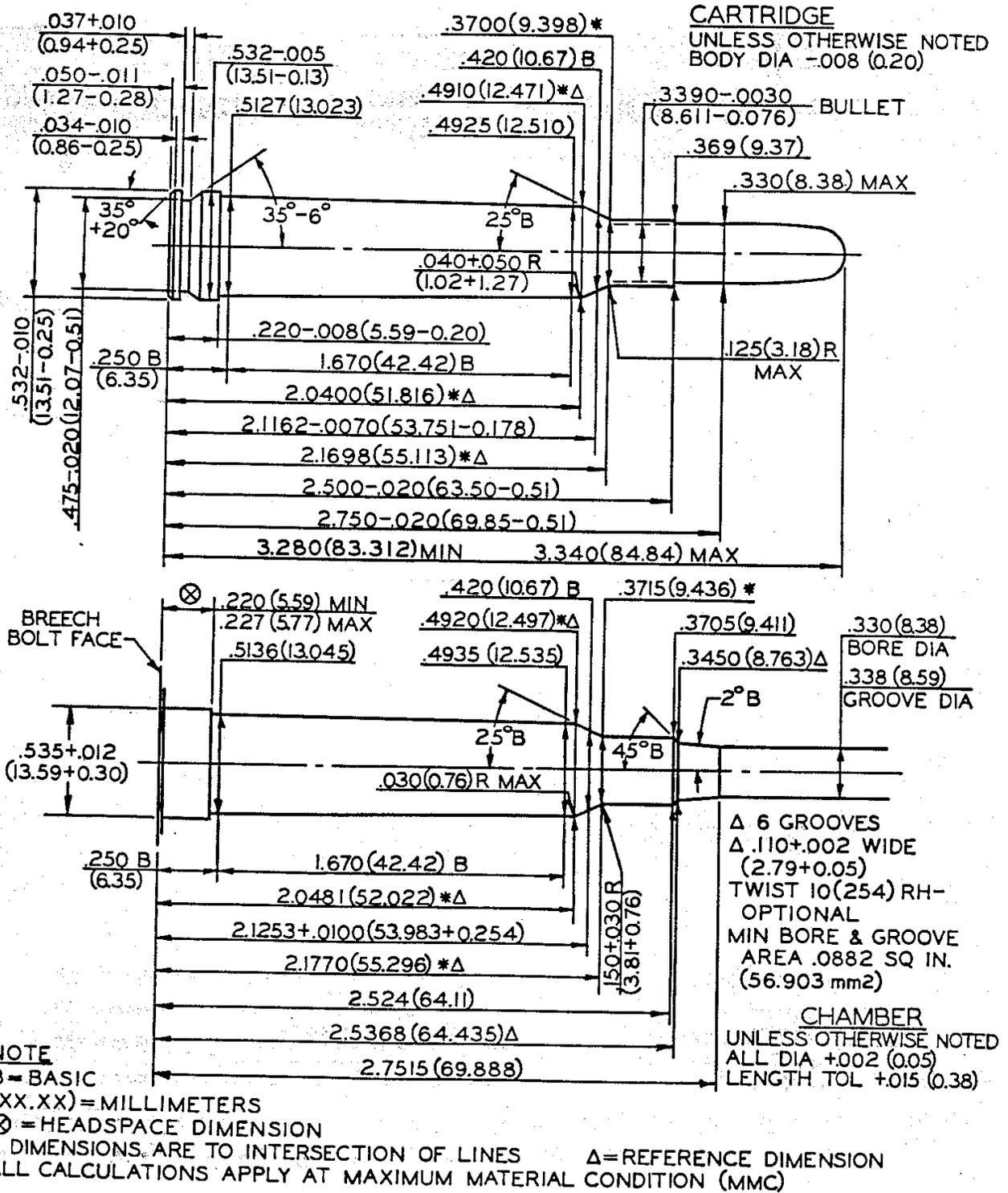
UNLESS OTHERWISE NOTED
 ALL DIA $+.002(0.05)$
 LENGTH TOL $+.015(0.38)$

NOTE

B=BASIC (xx.xx)=MILLIMETERS
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

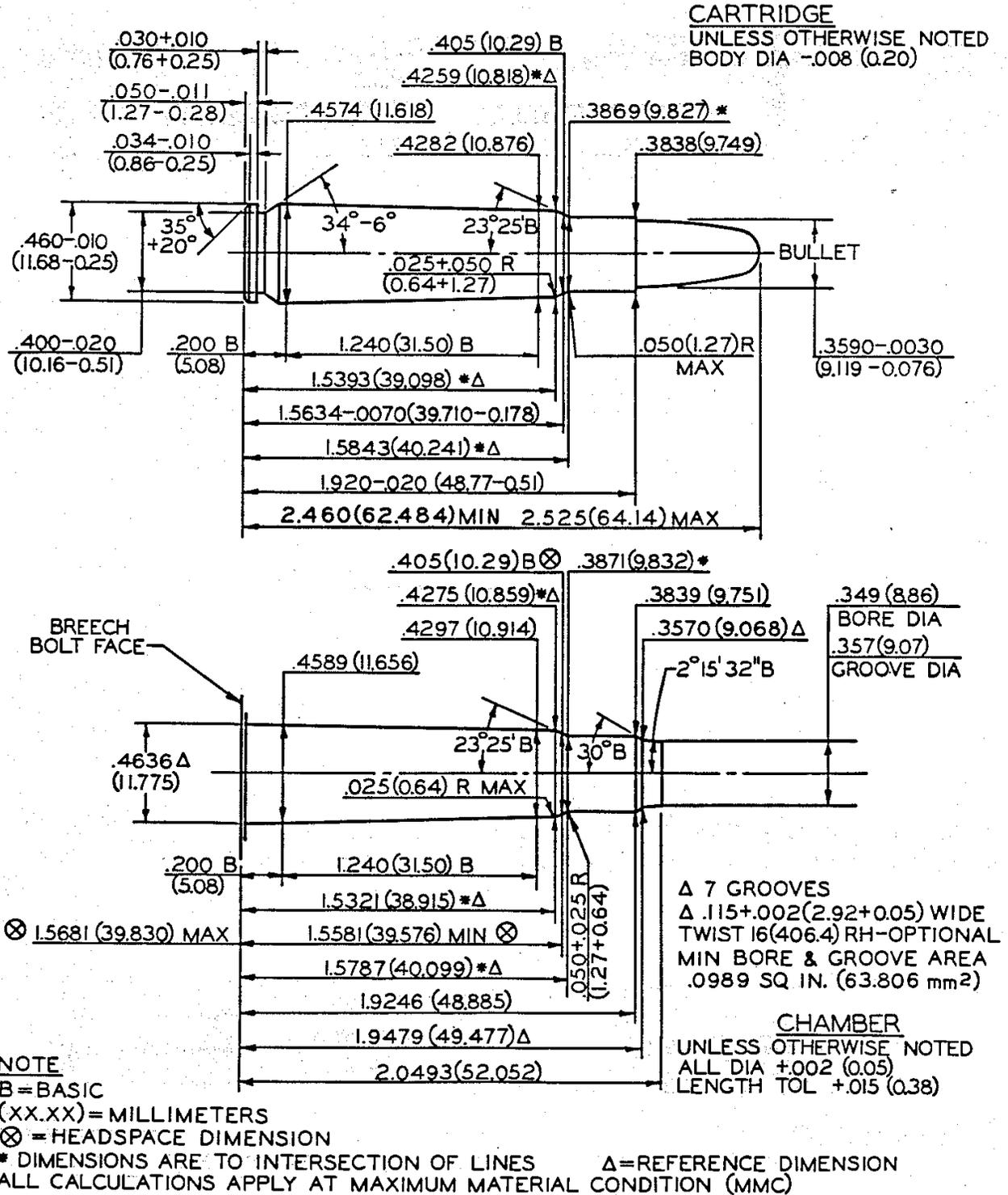
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 338 Winchester Magnum



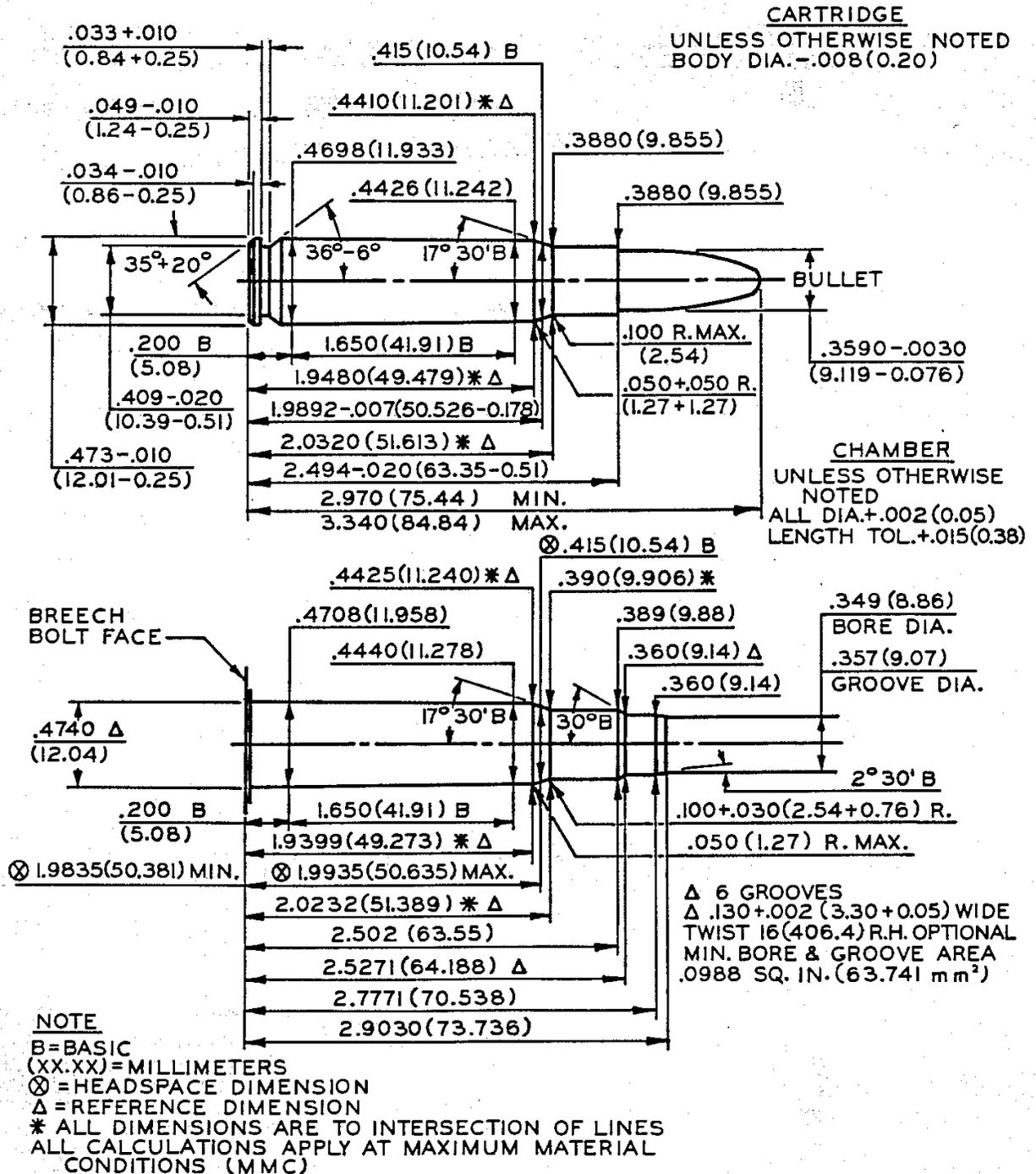
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 35 Remington



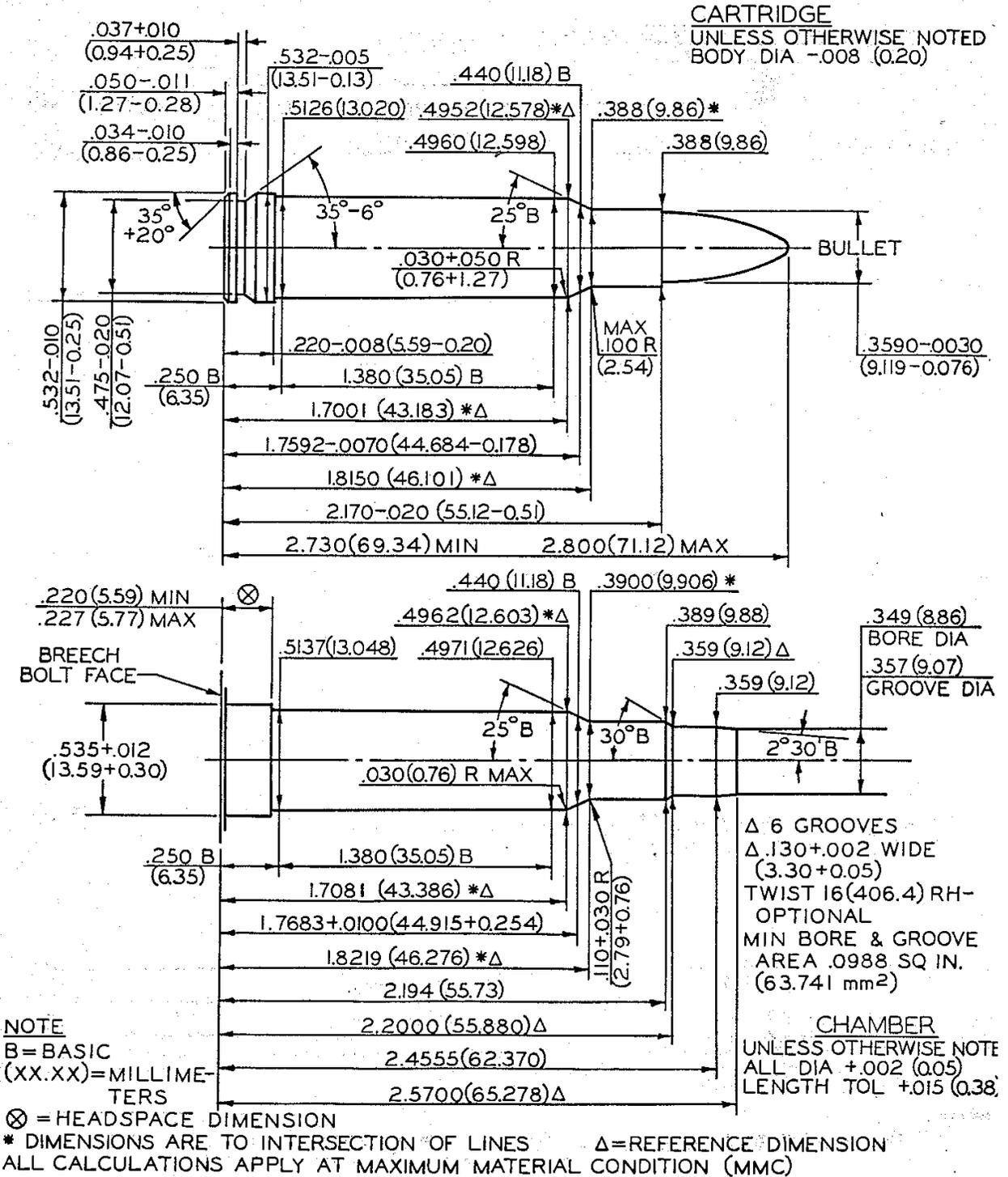
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES & CHAMBERS
 35 Whelen



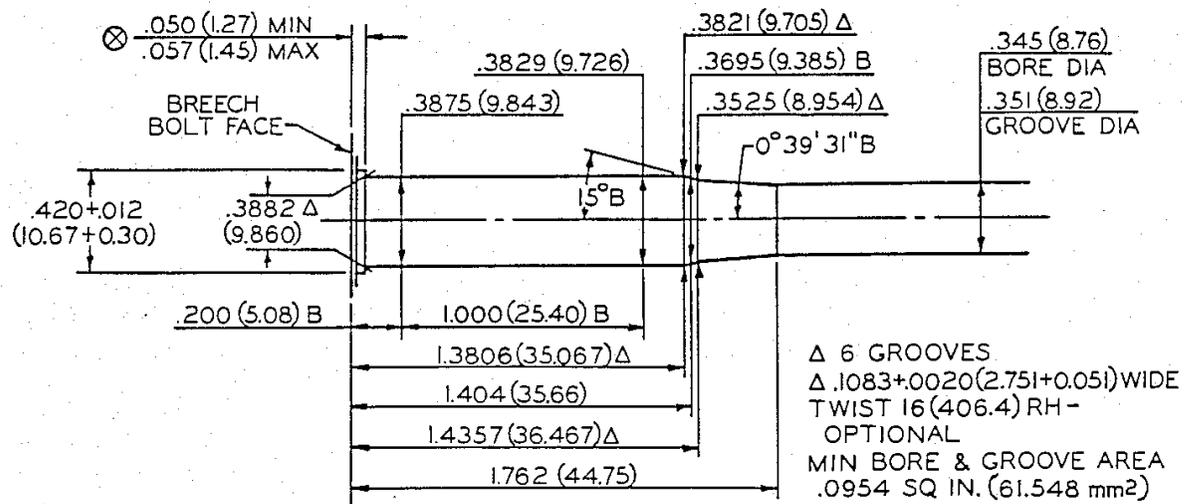
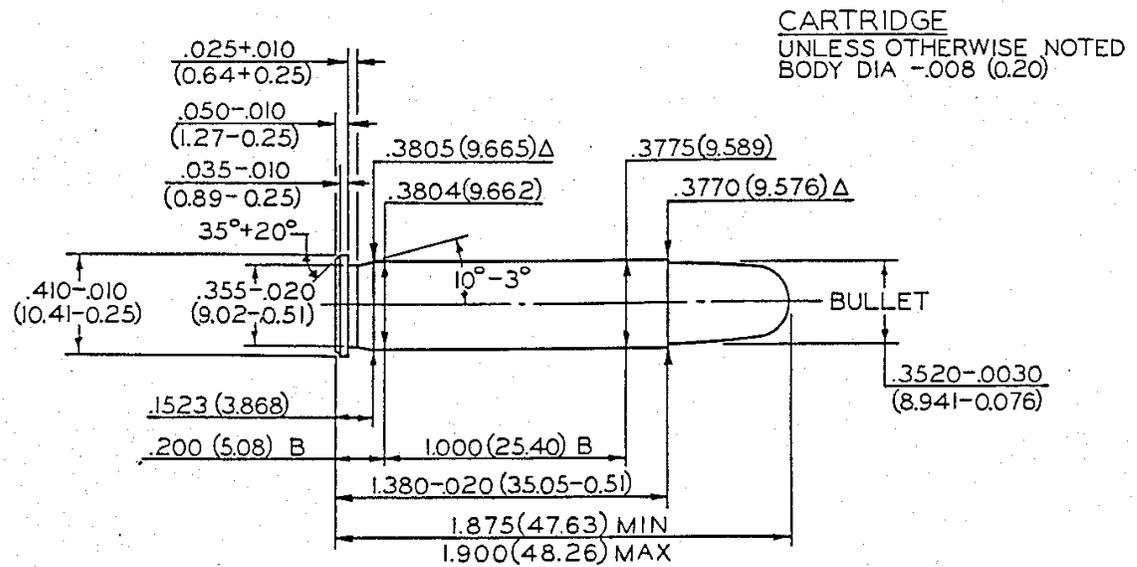
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 350 Remington



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 351 Winchester Self Loading

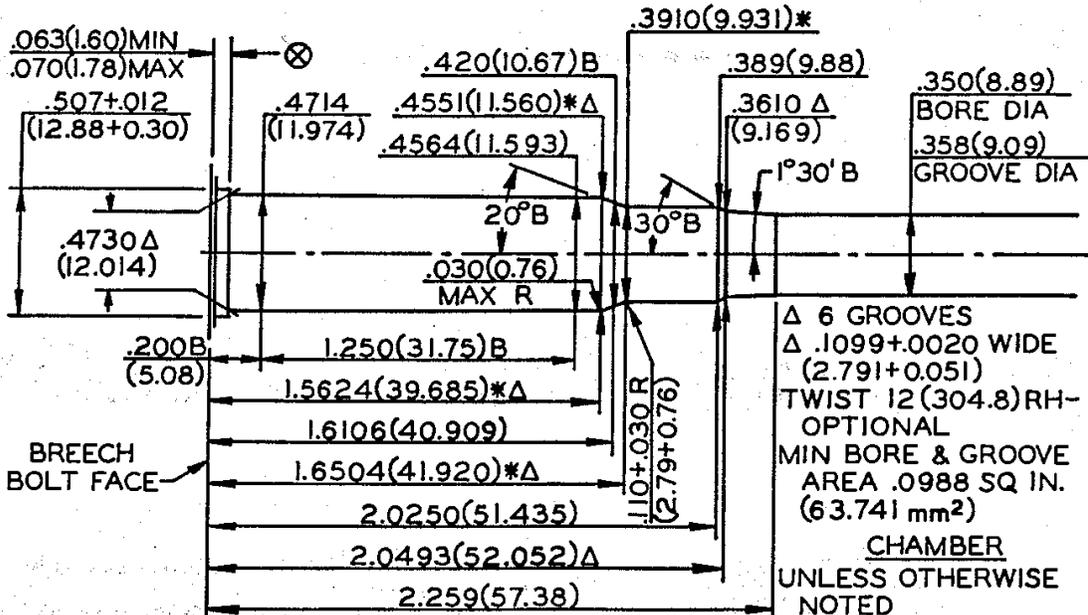
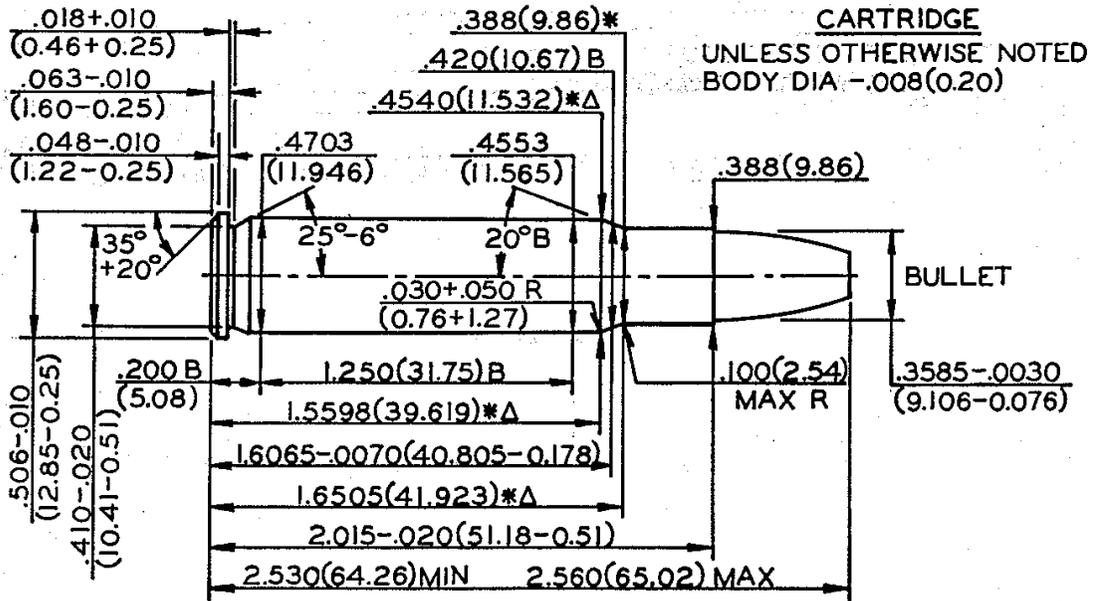


NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS
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 Δ=REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

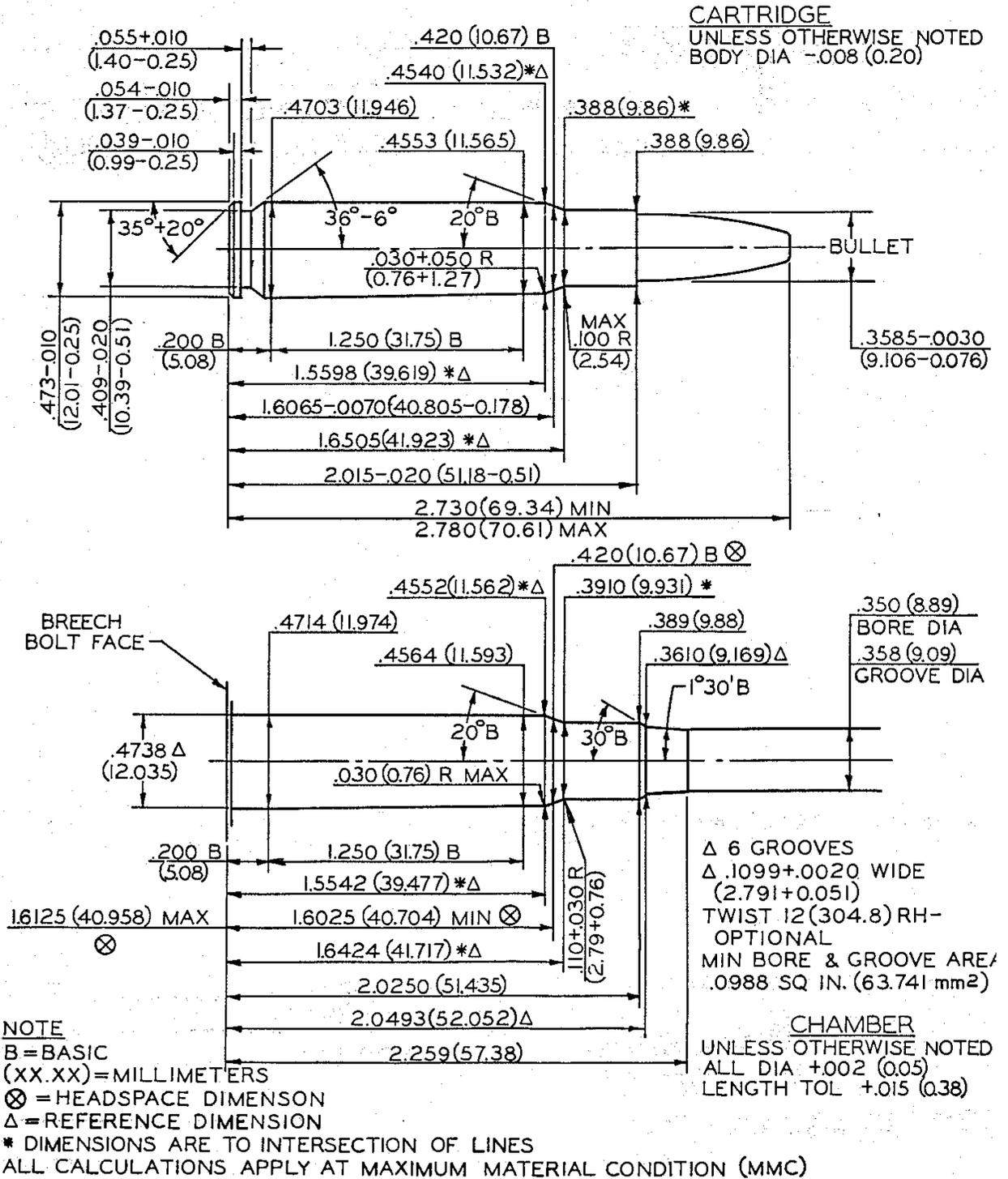
CARTRIDGE & CHAMBER
 356 Winchester



NOTE
 B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

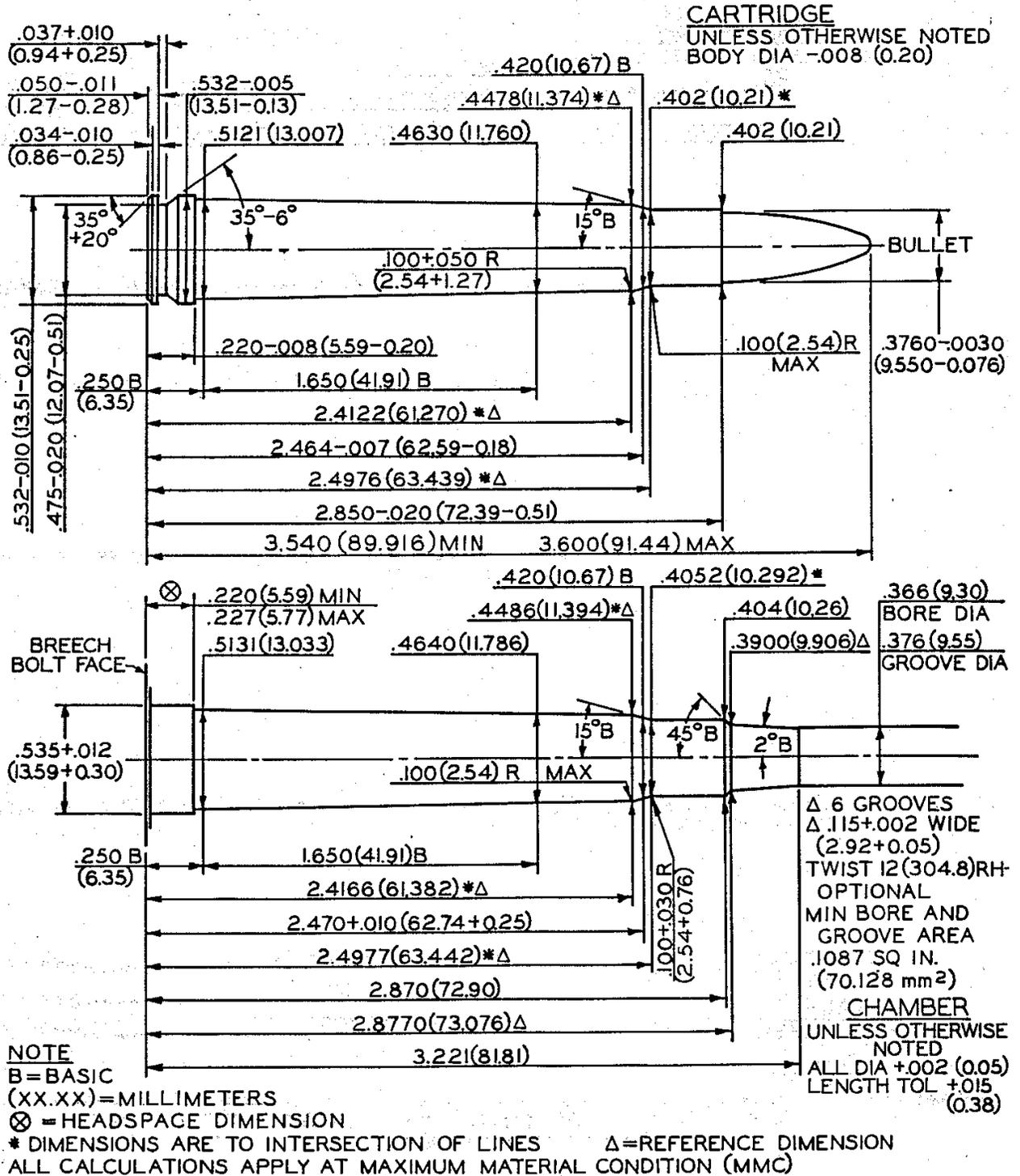
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 358 Winchester



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 375 H&H Magnum

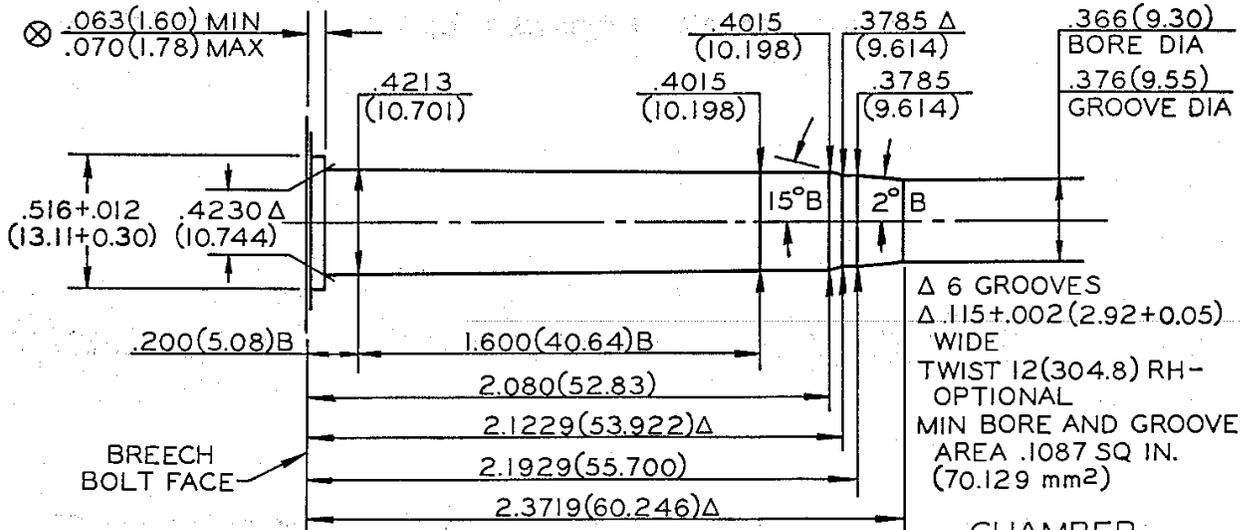
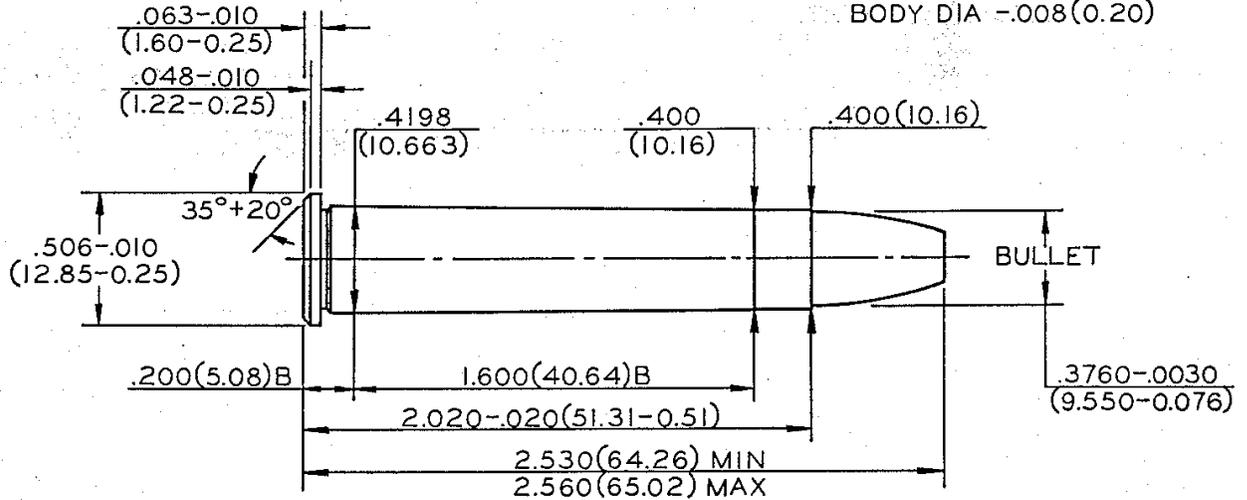


SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 375 Winchester

CARTRIDGE

UNLESS OTHERWISE NOTED
 BODY DIA $-.008(0.20)$



CHAMBER

UNLESS OTHERWISE NOTED
 ALL DIA $+.002(0.05)$
 LENGTH TOL $+.015(0.38)$

NOTE

BREECH ON RIM

B=BASIC

* DIMENSIONS ARE TO INTERSECTION OF LINES

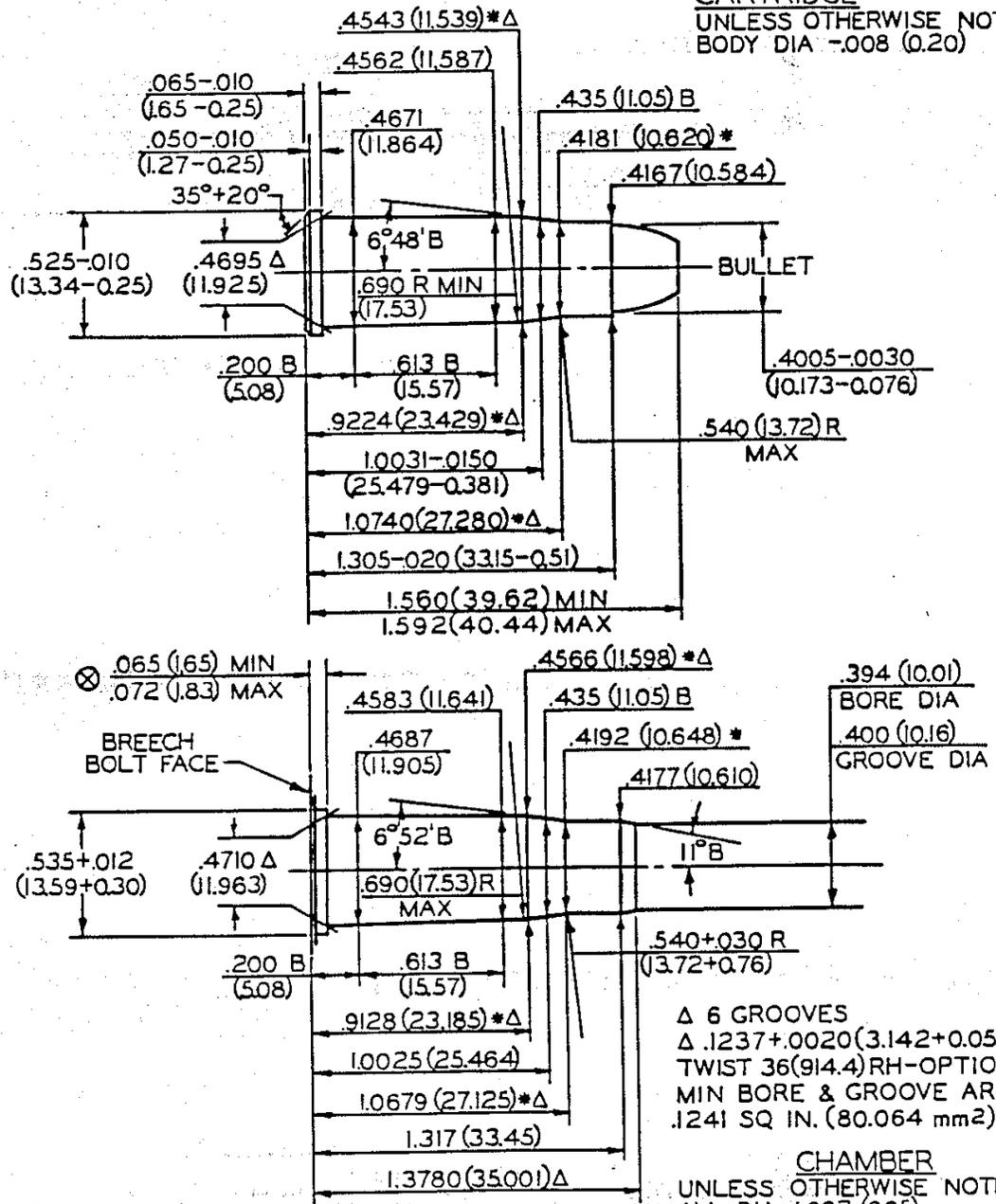
Δ=REFERENCE DIMENSION (XX.XX)=MILLIMETERS ⊗=HEADSPACE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 38-40 Winchester

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)



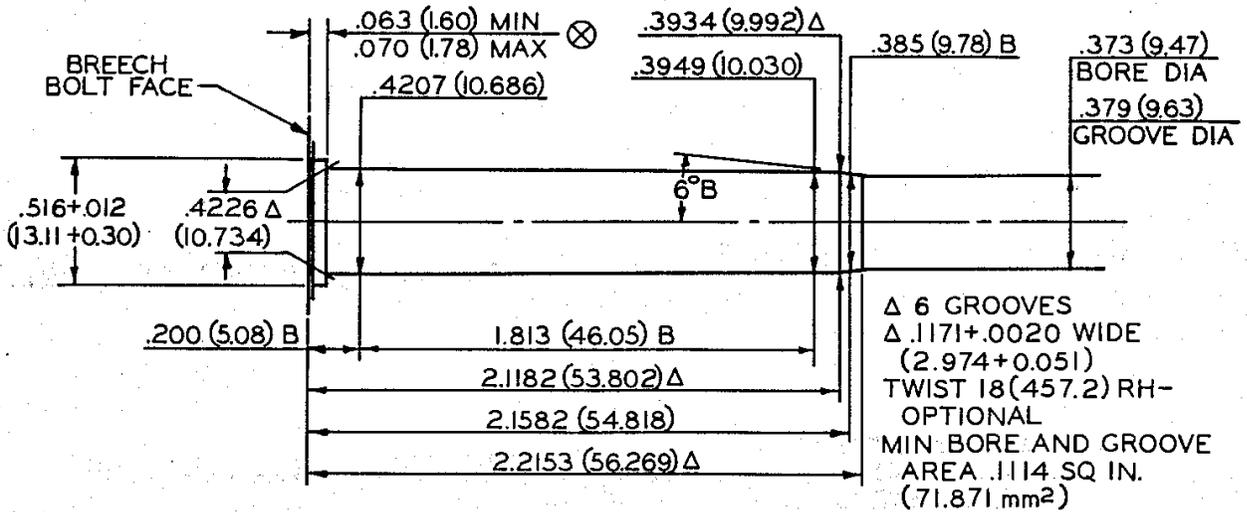
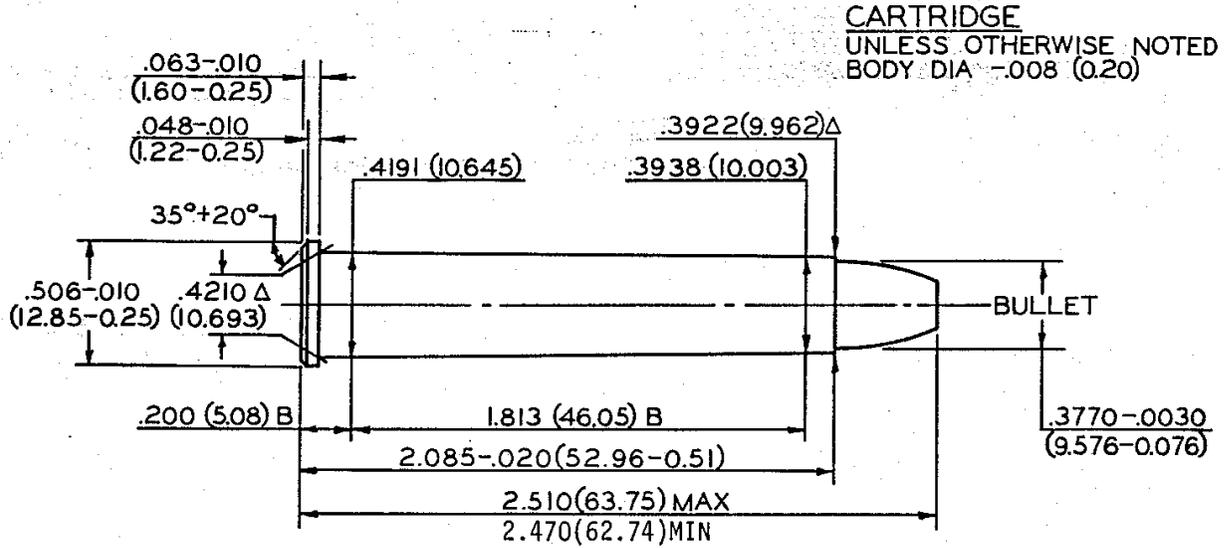
Δ 6 GROOVES
 Δ .1237+.0020(3.142+0.051)WID
 TWIST 36(914.4)RH-OPTIONAL
 MIN BORE & GROOVE AREA
 .1241 SQ IN. (80.064 mm²)

CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE
 B = BASIC
 (XX.XX) = MILLIMETERS
 ⊗ = HEADSPACE DIMENSION
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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 38-55 Winchester



NOTE

B=BASIC

(XX.XX)=MILLIMETERS

⊗=HEADSPACE DIMENSION

* DIMENSIONS ARE TO INTERSECTION OF LINES

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

Δ =REFERENCE DIMENSION

CHAMBER

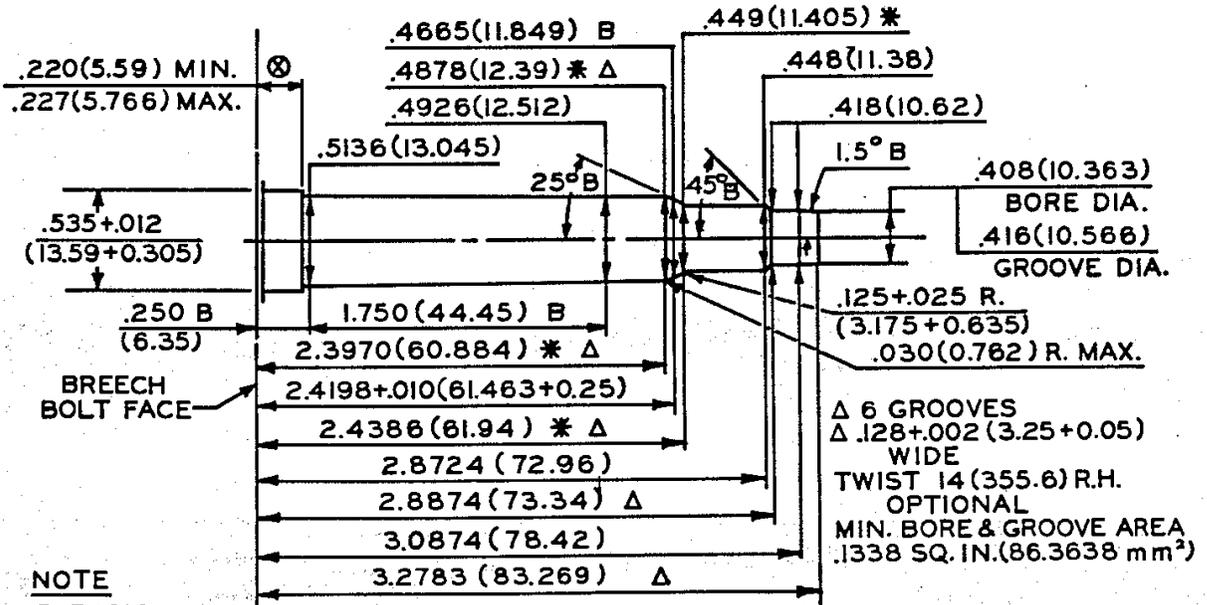
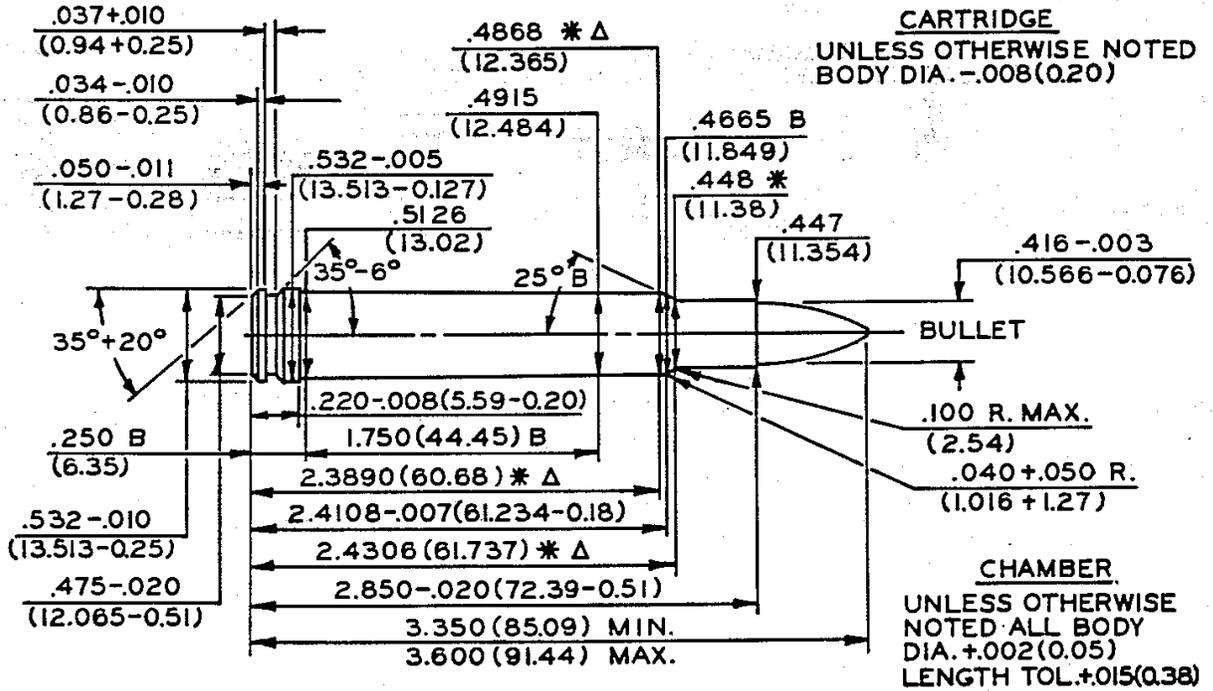
UNLESS OTHERWISE NOTED

ALL DIA $+.002$ (0.05)

LENGTH TOL $+.015$ (0.38)

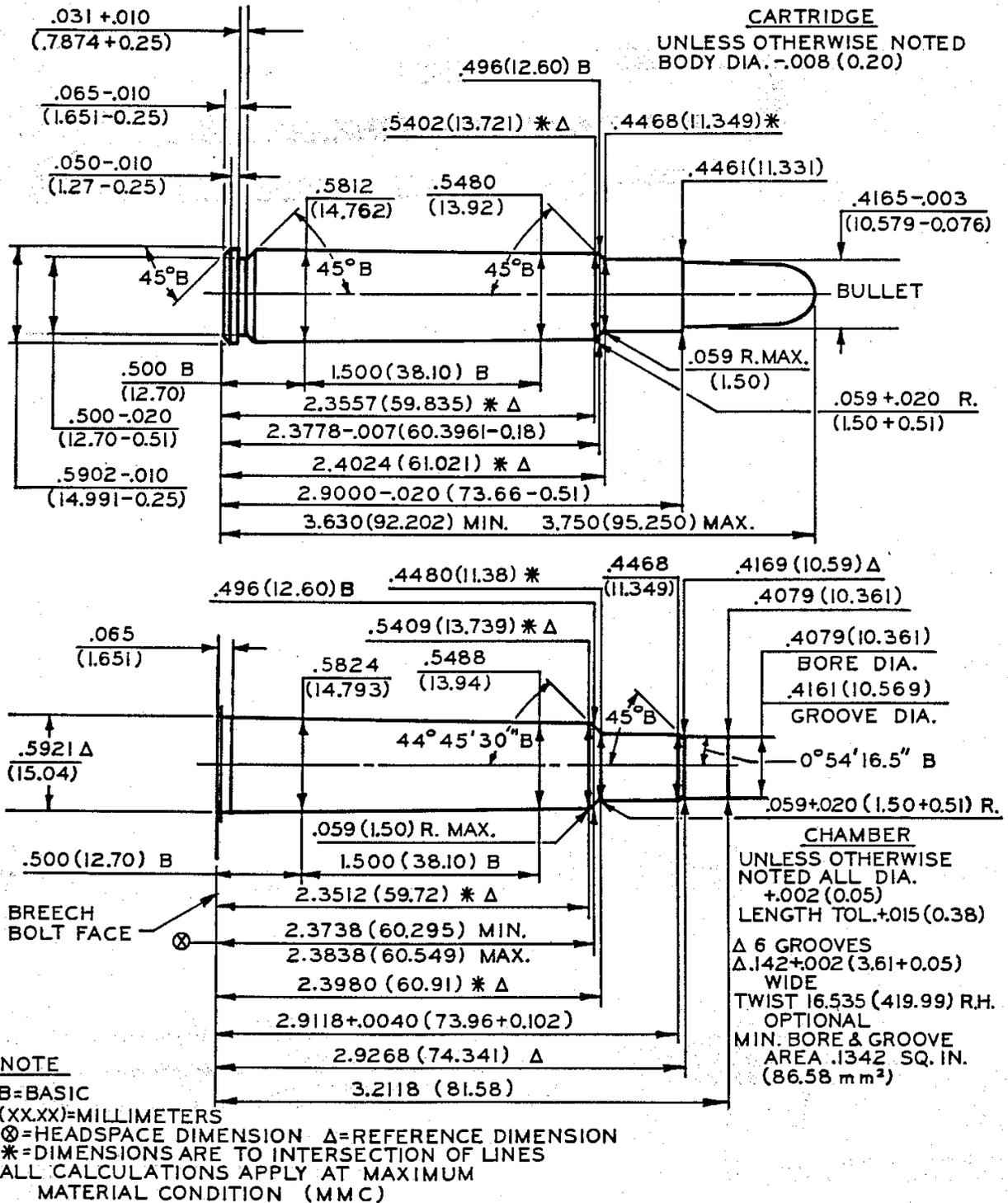
SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES & CHAMBERS
 416 Remington Magnum



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

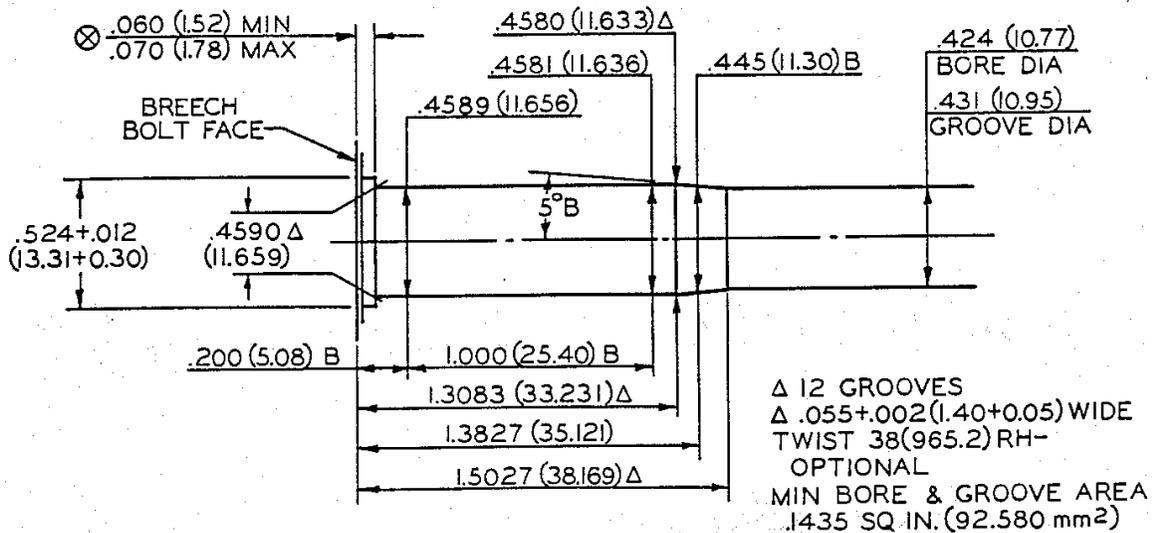
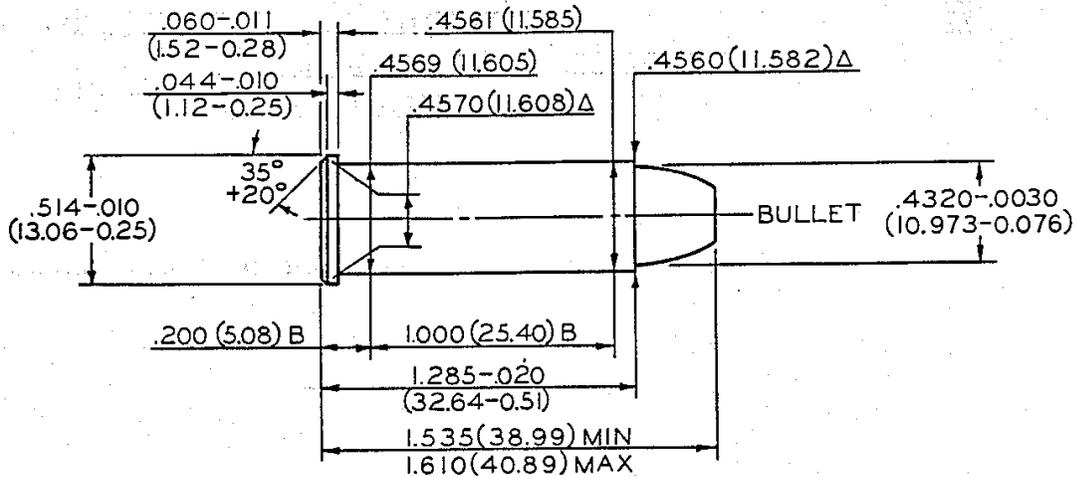
CARTRIDGES & CHAMBERS
 416 Rigby



SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 44 Remington Magnum

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.005$ (0.13)



NOTE

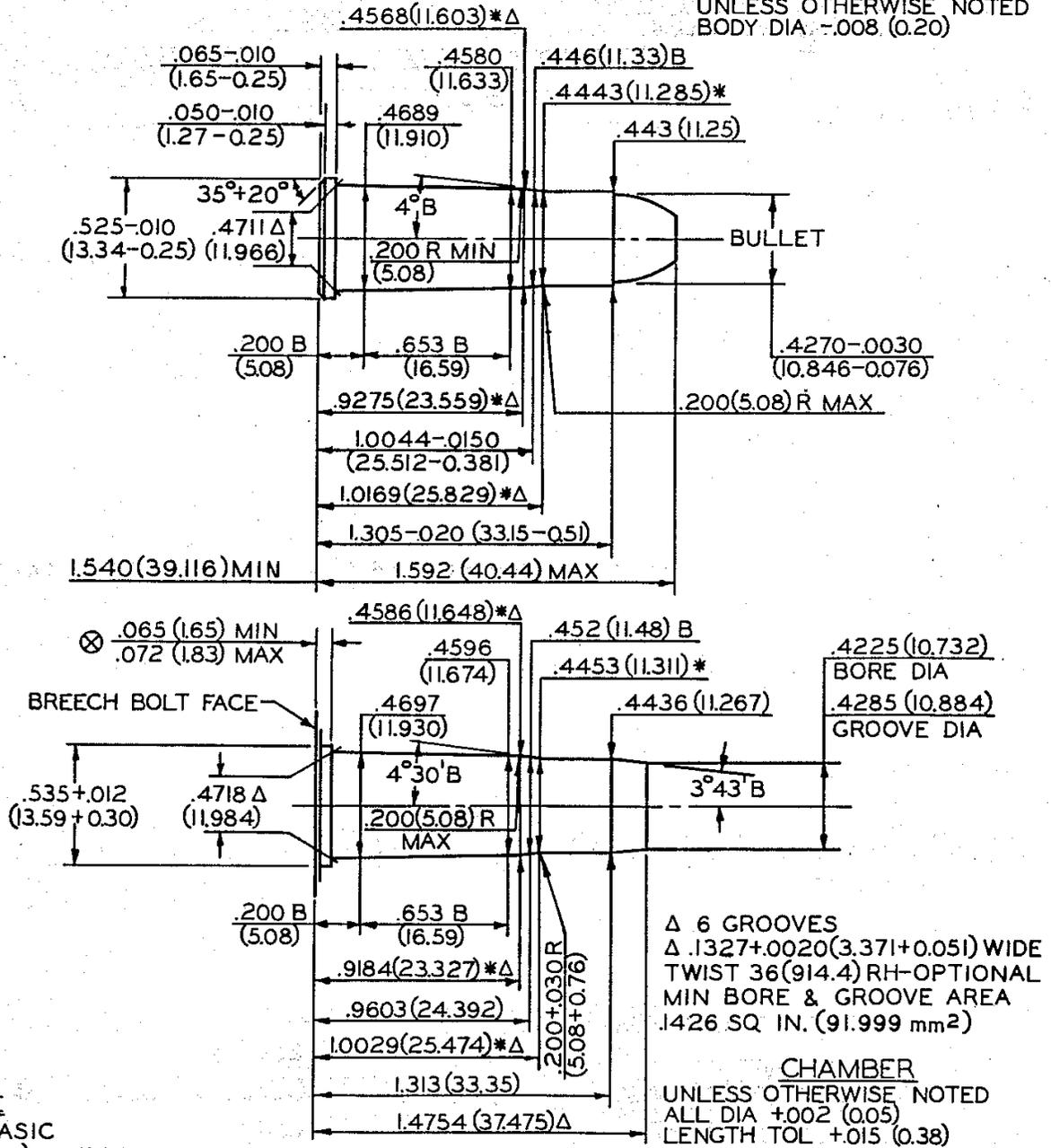
- B = BASIC
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- * DIMENSIONS ARE TO INTERSECTION OF LINES
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CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.004$ (0.10)
 LENGTH TOL $+.015$ (0.38)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

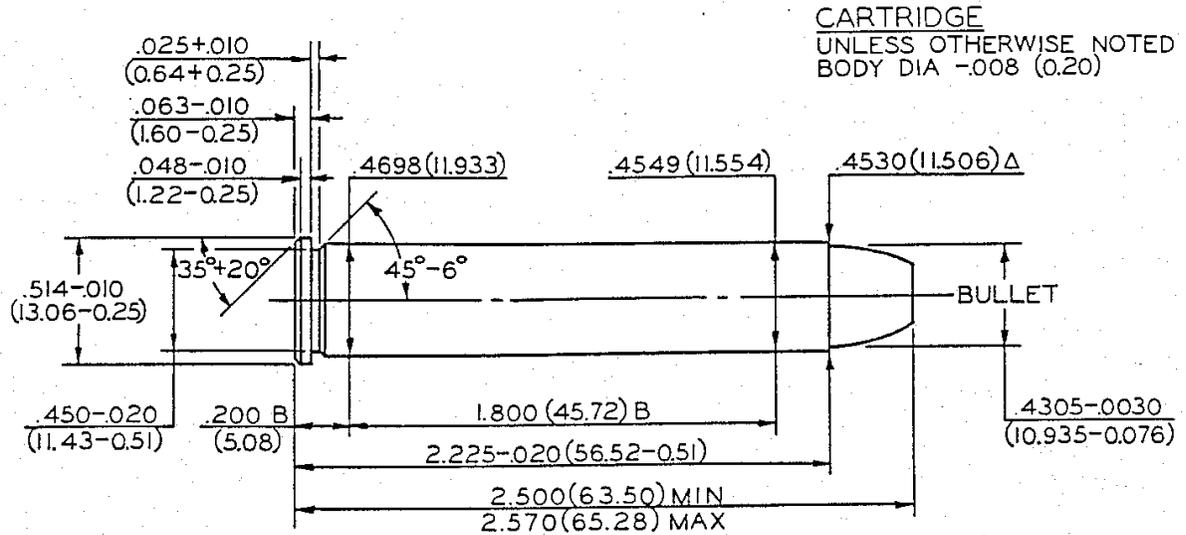
CARTRIDGE & CHAMBER
 44-40 Winchester

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA. $-.008$ (0.20)

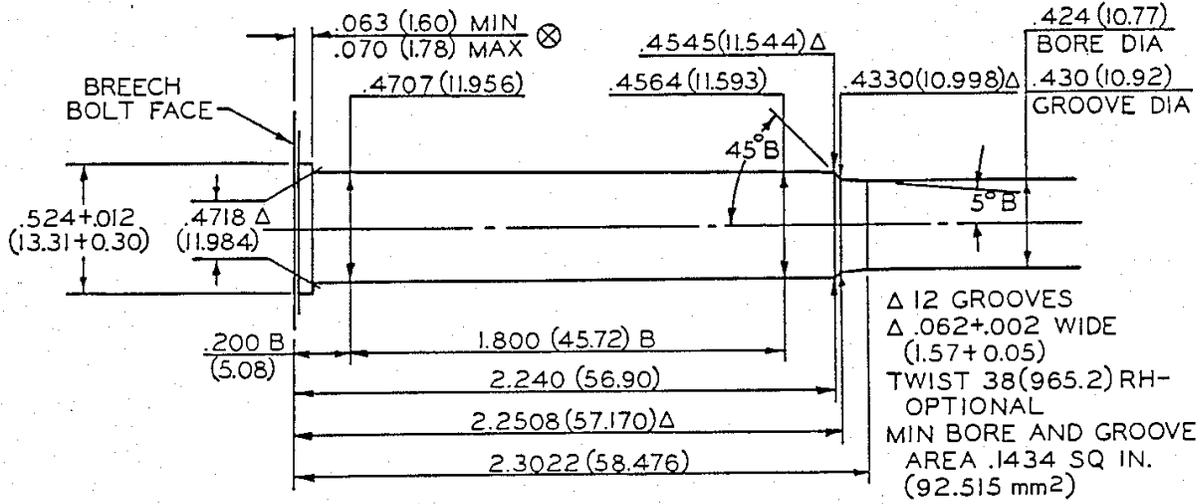


SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 444 Marlin



CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA $-.008$ (0.20)

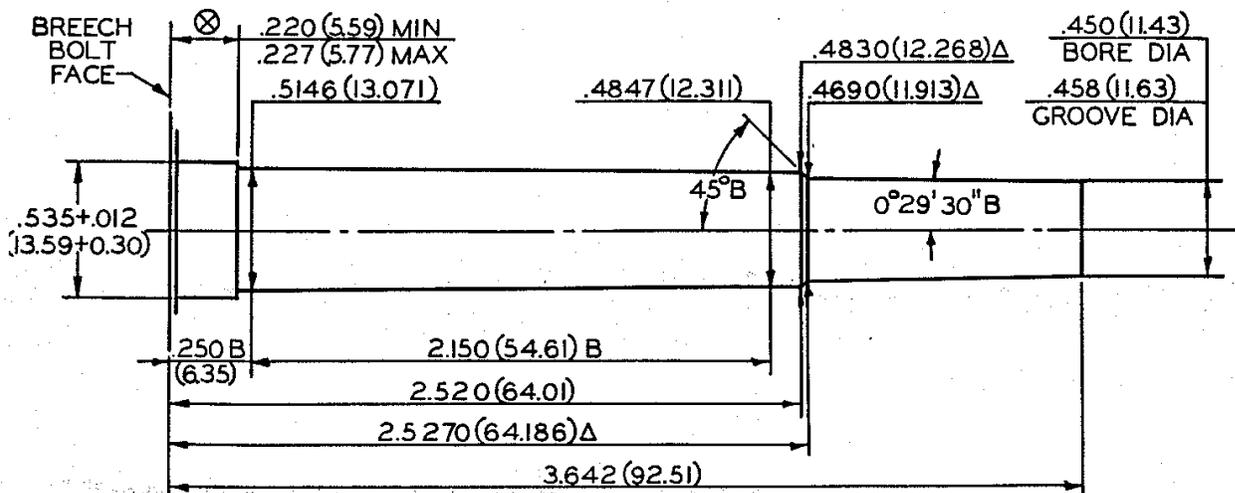
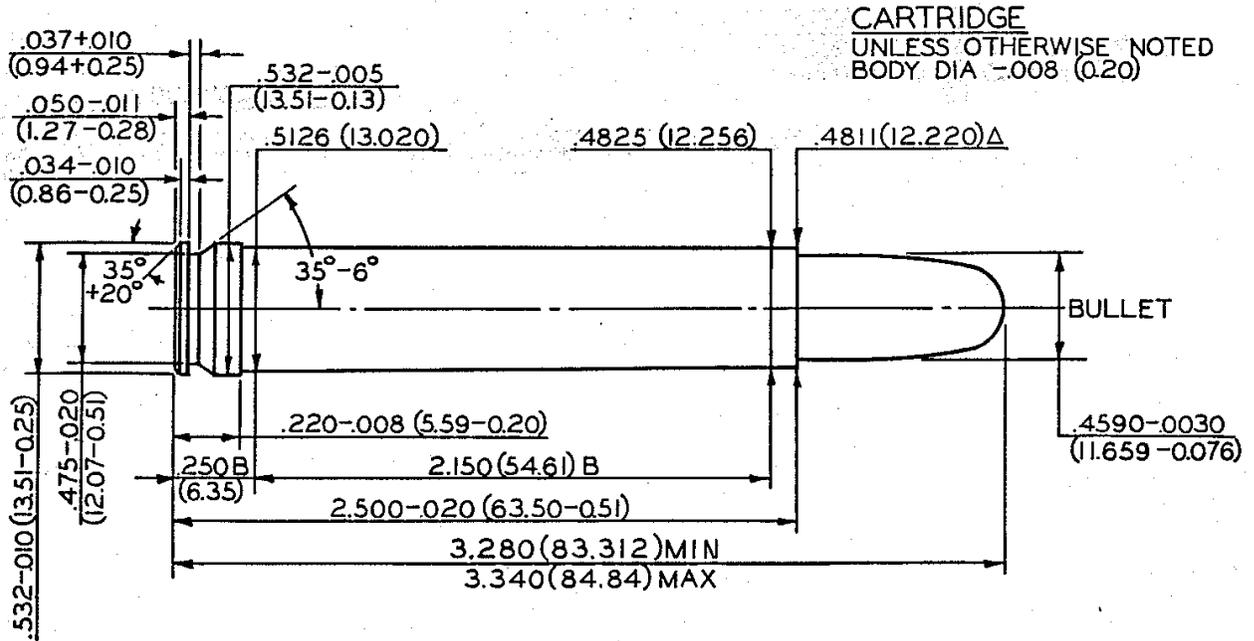


CHAMBER
 UNLESS OTHERWISE NOTED
 ALL DIA $+.002$ (0.05)
 LENGTH TOL $+.015$ (0.38)

NOTE
 B= BASIC
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SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE & CHAMBER
 458 Winchester Magnum



NOTE

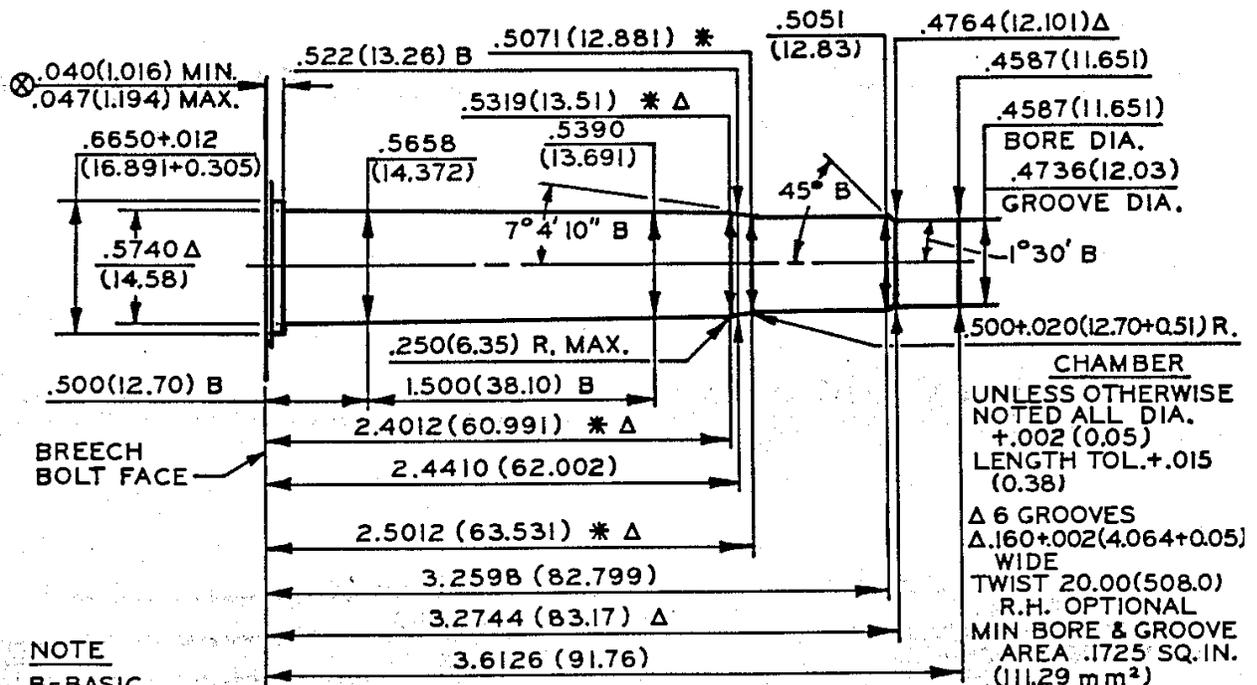
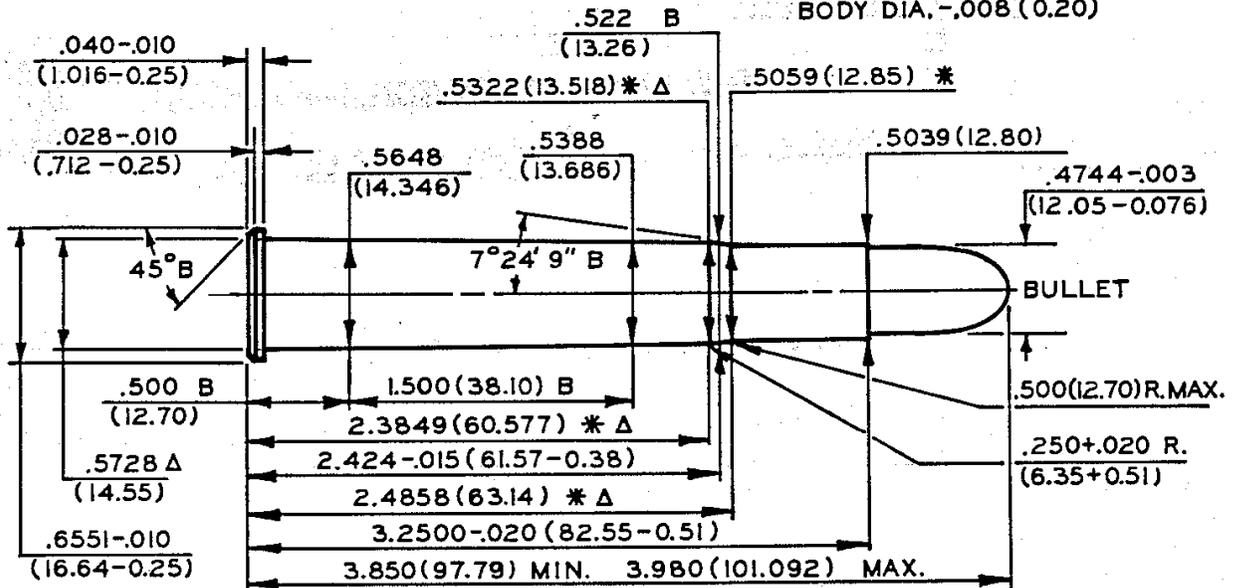
- B = BASIC
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- Δ = REFERENCE DIMENSION
- * DIMENSIONS ARE TO INTERSECTION OF LINES
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Δ 6 GROOVES Δ $.150+0.002$ (3.81+0.05) WIDE
 TWIST 1:4 (355.6) RH - OPTIONAL
 MIN BORE & GROOVE AREA $.1627$ SQ IN. (104.967 mm²)

SECTION I - CHARACTERISTICS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGES & CHAMBERS
 470 Nitro Express

CARTRIDGE
 UNLESS OTHERWISE NOTED
 BODY DIA. -.008 (0.20)

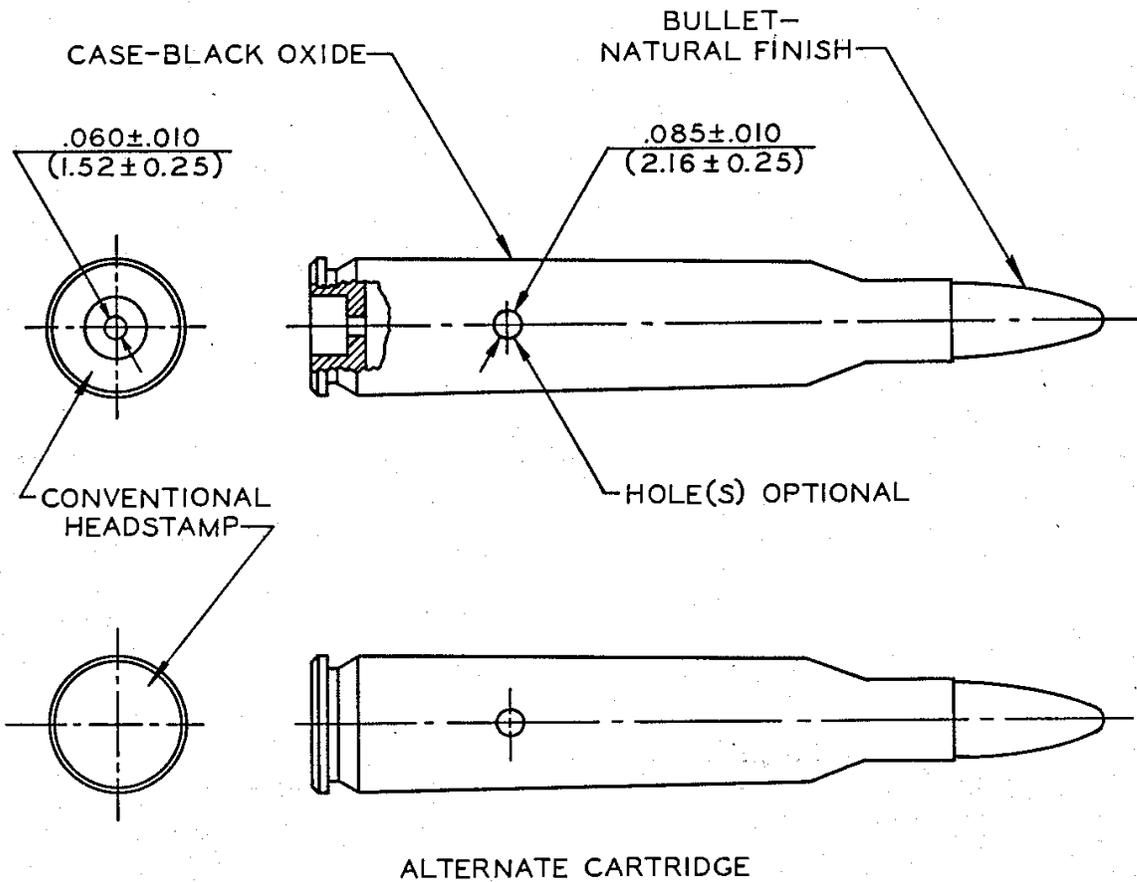


NOTE
 B=BASIC
 (XX.XX)=MILLIMETERS
 ⊗=HEADSPACE DIMENSION Δ=REFERENCE DIMENSION
 * = DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

CHAMBER
 UNLESS OTHERWISE NOTED ALL DIA. +.002 (0.05)
 LENGTH TOL.+.015 (0.38)
 Δ 6 GROOVES
 Δ.160+.002(4.064+0.05) WIDE
 TWIST 20.00(508.0) R.H. OPTIONAL
 MIN BORE & GROOVE AREA .1725 SQ. IN. (111.29 mm²)

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

DUMMY CARTRIDGE - GUN FUNCTIONING
ALL CALIBERS



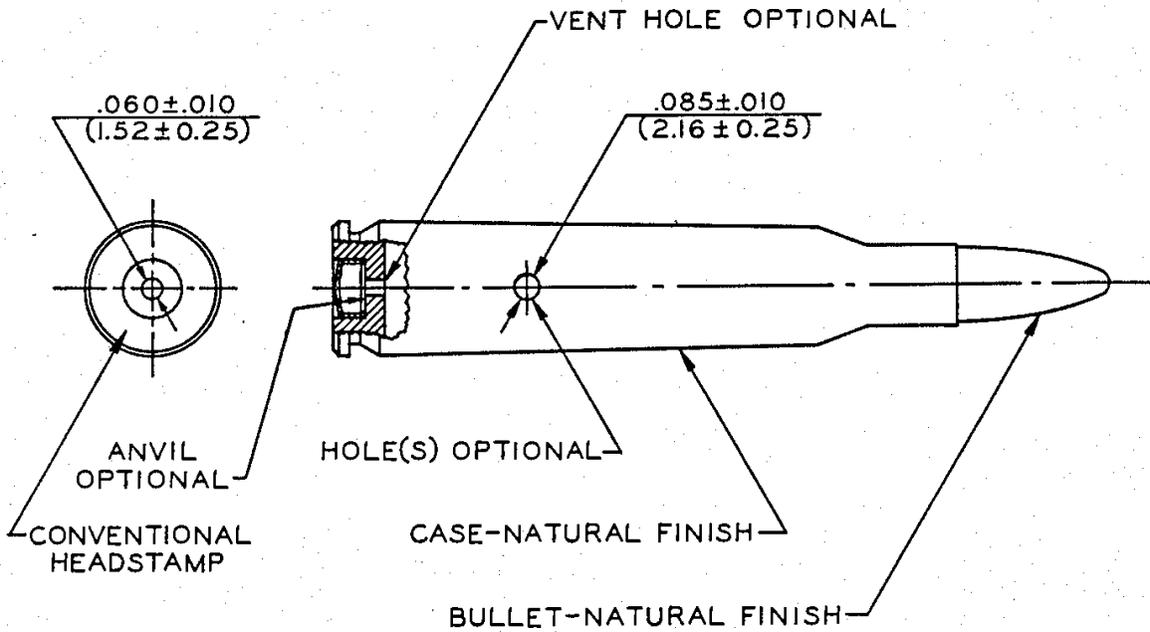
NOTE

ILLUSTRATES FORM ONLY-
PERTINENT DIMENSIONS SHOWN ON
APPROPRIATE CARTRIDGE DRAWING

(XX.XX) = MILLIMETERS

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

DUMMY CARTRIDGE - DISPLAY
ALL CALIBERS



NOTE
ILLUSTRATES FORM ONLY-
PERTINENT DIMENSIONS SHOWN ON
APPROPRIATE CARTRIDGE DRAWING

(XX.XX) = MILLIMETERS

SECTION I - CHARACTERISTICS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

TOLERANCE - BULLET WEIGHT

BULLET WEIGHT TOLERANCE

To 100 grains - Nominal Weight $\pm 2\%$

100 grains and over - Nominal Weight $\pm 1.5\%$

1. Velocities and pressures should be measured separately.
 - a. Velocities should be fired in horizontally mounted test barrels of the appropriate caliber and length for the cartridges to be tested. Either pressure barrels fitted with long pistons or velocity barrels without pistons and piston holes may be used.
 - b. Pressures should be fired in pressure test barrels fitted with short pistons for use with gas checks. Velocities should be recorded for information on rounds fired for pressure.
2. Recommended values for velocity and pressure of all centerfire rifle cartridges are tabulated in Section I, page 13. When required a minimal retest of double the original quantity may be fired with statistically equivalent tolerances.
3. Drawings and descriptions of the required equipment are listed in Section III of these Standards.
4. Handling of Ammunition
 - a. Cartridges to be tested should be placed in a vertical position with primer end down in a recessed holding block.
 - b. When the appropriate test barrel has been properly serviced and the chronograph reset, a cartridge should be lifted vertically from the block. It should be rotated slowly, end over end, in a vertical plane through 360° pausing momentarily when the powder is at the bullet end and again when the powder is at the primer end.
 - c. The cartridge is then rotated slowly, a minimum amount to enter chamber, keeping primer end in lowest possible position until inserted gently and carefully into the chamber.
 - d. The cartridge should be seated in the chamber as far as practicable with the fingers. The bolt or breech mechanism should be closed gently in order not to disturb the position of the powder in the cartridge case. The object of this method of handling cartridges is to position the propellant powder at the primer end of the cartridge case by permitting it to fall gently against the primer while rotating the case.

4. Handling of Ammunition (continued)

- e. The rate of fire should not be rapid enough to cause excessive heating of the barrel. The time between rounds depends on auxiliary equipment, which may be used to cool the barrel.
 - f. Conditioning should be between 60° - 80° F (15.6°C - 26.7°C).
5. It is recommended that three warming shots be fired before firing the sample to be tested. The velocity and/or pressure of these shots may be recorded, but should not be included in the record of the sample.

6. Pressure Determination

- a. Oiling of the gas check and piston is extremely important as a poor gas seal will cause erosion of the piston hole and piston causing erroneous readings before the barrel bore and chamber are worn. Use SAE 30. (see page 201.) Gas checks should be placed in a shallow container of oil. Each gas check is then blotted on absorbent material before insertion in piston hole.
- b. Insert in piston hole, an oiled gas check with open end toward chamber and seat to approximately one-half of the depth of the hole with seating tool.
- c. Dip piston shank in oil and drain until but one drop remains. Scrape remaining drop from bottom of piston or blot remaining drop on a flannel patch.
- d. Insert piston in piston hole and seat on gas check manually. Do not force by striking or hammering.

Caution: The piston must be checked to make sure it slides freely, but not loosely, in the piston hole at all times. If the piston does not slide freely, it should be withdrawn from the piston hole and examined. Any black deposit should be removed with worn crocus cloth. If the piston is still not free in the piston hole, the hole should be cleaned with worn crocus cloth.

- e. Insert cartridge to be fired in chamber in the manner described in Paragraph 4d. above.

6. Pressure Determination (continued)

- f. Center crusher cylinder appropriate for the cartridge to be tested upon the head of the piston. The piston may now be seated fully by the action of the set screw against the cylinder. Care should be taken to avoid precompression of the cylinder before firing. Both ends of the piston, face of set screw and faces of cylinder must be free of oil.
- g. After firing the cartridge, the compressed crusher cylinder should be removed and measured for remaining length. Pressure is determined from this length by the use of a Tarage Table, appropriate to the piston diameter, which is furnished with the cylinders.
- h. The piston is removed and the gas check driven into the fired case with knockout tool.
- i. The fired case containing the gas check and the disk blanked from the case by the internal gas pressure is removed from the chamber.

Caution: The chamber and bore should be checked to make certain that the bore is unobstructed before proceeding further.

- j. For subsequent shots in a series, the procedure shown in Paragraphs 6a through 6i are repeated.
- k. Test barrels should be cleaned regularly after each 10-round test with Hoppe's #9 or equivalent and a brass or bronze wire brush. If cleaning is not done with this frequency, fouling buildup may cause erroneous readings. Three to five complete cycles with the brush are required. Pass the brush completely through the bore on each stroke. If testing is completed for a period of time, leave Hoppe's #9 or equivalent in the bore. Before re-use, two or three tight cloth patches should be used to wipe the solvent from the bore. After standing several days, the solvent evaporates to a wax coating and wetting the bore with solvent with the first cloth helps remove the residue.

7. Velocity Determination

Handling of the ammunition should be in accordance with the instructions in Paragraph 4. The time of flight of the bullet should be measured with a 100 kilohertz (minimum) electronic counter chronograph using photoelectric screens spaced 20 feet (6.096 m) apart with the first screen 5 feet (1.524 m) and the second screen 25 feet (7.62 m) from the muzzle of the test barrel.

8. Recording of Test Results

The following data should be recorded for each series of shots fired for velocity and/or pressure.

a. Ammunition Data

- 1) Date of test
- 2) Nominal cartridge identification
- 3) Cartridge - caliber
- 4) Bullet weight and type
- 5) Powder charge, type, lot number
- 6) Priming
- 7) Type of lubricant (if any)
- 8) Code or date of loading

b. Average velocity uncorrected

c. Average pressure uncorrected

d. Maximum and minimum individual velocity

e. Maximum and minimum individual pressure

f. Extreme variation (range) of velocity

g. Extreme variation (range) of pressure

h. Other statistical indication of variation (optional)

i. Correction to results from firing Reference Ammunition (optional)

j. Corrected average velocity (optional)

k. Corrected average pressure (optional)

l. Recommended values

- 1) Average velocity
- 2) Average pressure
- 3) Velocity and pressure variation

- m. Test firearm and range data
 - 1) Barrel length and serial number
 - 2) Barrel history
 - 3) Type of chronograph and screens
 - n. Test personnel
9. Use of Reference Ammunition
- a. Purpose

Reference Ammunition assessed by firings at the ranges of member companies is available for calibrating ranges, firearms and other equipment for velocity and pressure only.
 - b. Supply

On request, the SAAMI Office, P.O. Box 838, Branford, Connecticut 06405, will supply information on the manufacturer of specific Reference Ammunition. The method of identifying Reference Ammunition is shown on page 115.

Requests for Reference Ammunition should be addressed to the manufacturer of the specific cartridge.
 - c. Assessment

Details of the assessment tests are shown in Section II.
 - d. Clearing House

Results of assessment tests of Reference Ammunition are tabulated, analyzed and distributed by the SAAMI Office.
 - e. Corrections

For method of applying corrections to test of service loads, see Section II, page 121.
 - f. Calibration

For method of calibrating ranges and equipment, see Section II, page 116.

I. EQUIPMENT PREPARATION

- A. All instruments should be operational and calibrated per manufacturer specification. Establish the transfer function of the charge amplifier (on a selected range) to be used in the transducer calibration.
- B. The transducer calibrator and instruments used to calibrate the charge amplifier, peak detector and digital voltmeter should have a certified calibration traceable to the National Bureau of Standards.
- C. Transducers should be properly maintained per manufacturer recommendations and stored in a desiccator when not in use.
- D. Caution: Cable, transducers and instrument connectors should be covered with plastic caps when not in use to prevent contamination.
- E. Measure the internal resistance of the transducer and low noise cable. If the resistance is less than 10^{12} ohms, bake out transducer and low noise cable as described in IIB, Transducer Initialization. If the resistance is in the 10^{12} to 10^{14} ohm range, proceed to Section III, Transducer Calibration.

II. TRANSDUCER INITIALIZATION

- A. Clean transducer and low noise cable connectors using Freon TF or equivalent.
- B. Bake out transducer and low noise cable in a temperature-controlled oven for 24 to 48 hours at 250°F (121°C).
- C. Allow oven to return to ambient temperature at a slow rate.
- D. After removing the transducer and cable from the oven, check the internal resistance of the transducer. The resistance should be in the 10^{12} to 10^{14} ohm range.
- E. Place protective caps on transducer and cable connectors to prevent contamination.

III. TRANSDUCER CALIBRATION

A. INITIAL SET-UP

1. Allow instrumentation to stabilize as recommended by the manufacturer.
2. Mount transducer with steel spacer rings into a calibration fixture or test barrel as described in PCB Operating Instruction Manuals.
3. Mount dummy primer primed cartridge case into calibration fixture and complete fixture assembly as per PCB Instruction Manual. If the sample cartridge is a loaded round, it may be pulled down and the primer in the empty case then fired.
4. Mount calibration fixture with transducer to transducer calibrator.
5. Connect transducer and instrumentation as indicated in Fig. 1.
6. Set charge amplifier range switch to a suitable range and set time constant switch to LONG.
7. Set DVM to 1 volt or 10 volt range.
8. Adjust Heise readout indicator to 0 psi with no pressure on hydraulic lines.
9. Reset charge amplifier and DVM to obtain zero volts output. If zero volts is not constant, refer to step III, A 1.
10. Apply pressure in increments indicated on page 104. Calibration pressure range should cover the pressure ranges shown on Page 104. DO NOT exceed recommended manufacturer's maximum pressure limit on fixture or barrel calibrator.
11. Record DVM reading after the Heise readout indicator is exactly at desired pressure level.
12. Release pressure slowly and verify that the instrumentation returns to zero.

III. TRANSDUCER CALIBRATION (Continued)

13. Replace dummy primer primed cartridge case in calibration adaptor with new (unused) cartridge case.
14. Repeat steps 8 through 13 a minimum of ten times.
15. CAUTION: Always increase pressure to desired level, never decrease pressure to desired level.

B. DATA REDUCTION

1. Calculate the average value for the output voltages recorded at each pressure increment. Multiply these average values by the charge amplifier range transfer function (pC/V) to obtain the transducer charge output (Q) at each pressure increment (P).
2. Obtain a least square line equation using the transducer charge output (Q) as the dependent variable and pressure (P) as the independent variable. $Q = mP + q$.
3. A manual method of calculating the least square line equation is given in tabular form in figure 3. It is recommended that when using this technique, all numbers be carried to the third place.
4. Obtain the pressure (P) offset value when Q in the line equation is zero. Refer to Figure 4.

C. CALIBRATION CHECK

When the calibration calculations are complete the sensitivity should be set on the charge amplifier. The digital voltmeter is set at zero. A new sample cartridge is put in the calibration fixture and the hydraulic pressure is increased to 60K psi. The digital voltmeter reading plus the offset should equal 60K psi on most cartridges ($\pm 1.5\%$ of gauge reading).

D. TRANSDUCER RECORDS

1. Date of calibration.
2. History of rounds exposed to test firing.

III. TRANSDUCER CALIBRATION (continued)

3. Calibration pressure (P), charge amplifier voltage output (V) and transducer charge output (Q).
4. Charge amplifier range and transfer function.
5. Least square line equation.
6. Pressure offset.
7. Transducer identification.
8. Date of next calibration.

IV. FIRING TEST

A. PRESSURE BARREL PREPARATION

1. Refer to the recommended piezoelectric pressure transducer installation in a pressure barrel illustrated on page 132.

B. INITIAL SET-UP

1. Connect equipment as shown in Figure 2.
2. Allow instrumentation to stabilize as recommended by the manufacturer.
3. Inspect the transducer mounting cavity in the pressure barrel to assure that the seal seat is free of dirt and other foreign matter.
4. It is essential that the sensing surface of the transducer be flush with the chamber inside diameter. Care must be exercised to obtain correct depth as well as exact rotational alignment. Depth adjustment is accomplished by the use of various thickness spacers. With the proper spacer installed in the barrel, install the transducer.
5. Loosen the slotted clamp but do not remove clamp.
6. Thread the transducer into the mounting port. Adjust the slotted clamp to allow guide pin to enter guide hole. Continue to turn transducer nut into the mounting port, but do not tighten when transducer bottoms.

B. INITIAL SET-UP (continued)

7. Now, tighten the screw closing slotted clamp.
8. Using an open end wrench, tighten the transducer nut. Approximately five to ten ft. lbs. of torque is sufficient.
9. Inspect chamber to assure that the transducer sensing surface is flush with the surface of the test chamber.
10. Set the charge amplifier controls as follows:
 - Range switch to a position that will allow for maximum test pressures and direct pressure readout on the digital voltmeter; time constant as required, and, sensitivity dial to the value of slope m obtained from the transducer least square line equation.
11. Select peak meter for AC coupling and positive input.
12. Take note of the transducer offset (P) value obtained from the least square line equation. This value is to be used later in making final peak pressure determination.
 - 12.1 The offset value may also be directly dialed into an instrumentation system capable of providing direct peak pressures without data manipulation.

C. PROCEDURE

1. Reset all pressure instrumentation and assure that the digital voltmeter (DVM) displays all zeros. Test rounds may now be fired.
2. For each round fired, the pressure reading on the DVM should be recorded and pressure instrumentation reset.

D. PEAK PRESSURE DETERMINATION

1. To determine peak pressures, add or subtract as required, the pressure offset value to the pressure readings obtained in the firing test.

Transducer Calibration

The following increments and ranges are to be used for the calibration of transducers.

<u>Caliber</u>	<u>Pressure Increments (K psi)</u>	<u>Pressure Range (K psi)</u>
6mm Rem	5	35-60
7mm Mauser	5	35-60
7mm Rem Mag	5	35-60
7 x 30 Waters	5	30-50
7.62 x 39	5	35-60
8mm Mauser	5	20-40
8mm Rem Mag	5	35-60
22-250 Rem	5	35-60
222 Rem	5	35-60
223 Rem	5	35-60
243 Win	5	35-60
25-06 Rem	5	35-60
257 Roberts	5	35-60
264 Win	5	35-60
270 Win	5	35-60
280 Rem	5	35-60
284 Win	5	35-60
30 Carb	5	20-45
30-06	5	35-60
30-30 Win	5	30-50
300 Sav	5	35-60
300 Win Mag	5	35-60
303 Brit	5	35-60
308 Win	5	35-60
32 Win	5	30-50
338 Win Mag	5	35-60
35 Rem	5	20-40
35 Whelen	5	35-60
375 H&H Mag	5	35-60
44 Rem Mag	5	20-45
45-70 Govt	5	15-40
444 Marlin	5	30-50
458 Win Mag	5	30-50

TRANSDUCER CALIBRATION EQUIPMENT INTERCONNECT
USING 090B CALIBRATION FIXTURE
OR
090F IN-BARREL CALIBRATION FIXTURE

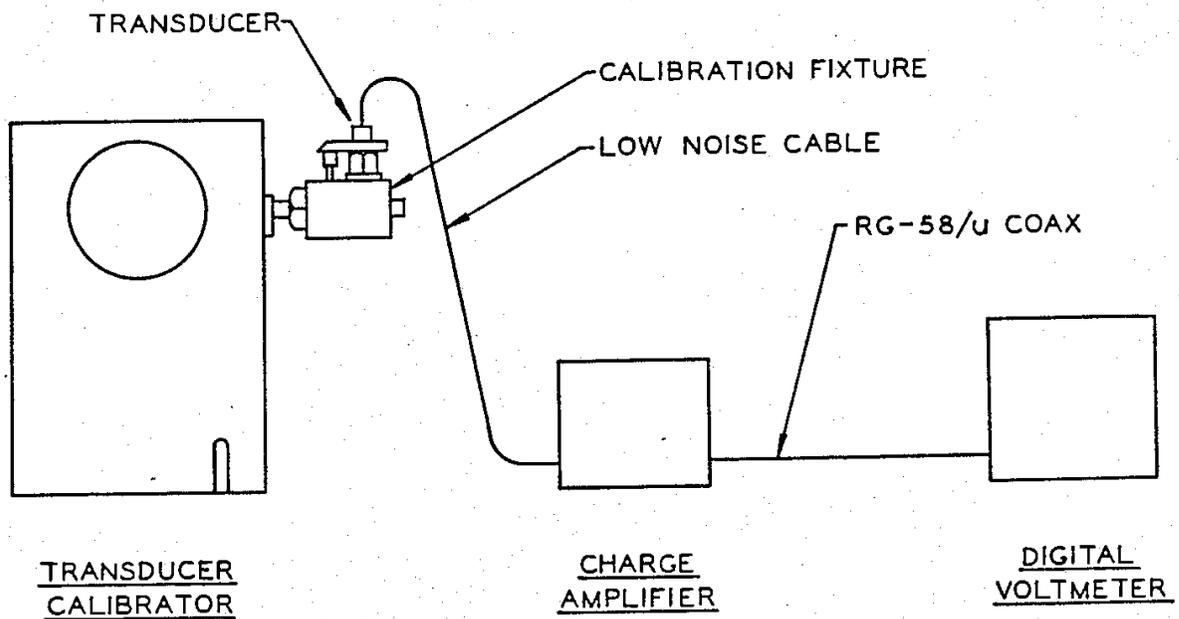


FIGURE 1

LEAST SQUARE LINE COMPUTATION

$$Q = mP + q$$

where:

Q - Charge in picocoulombs

m - Slope $\Delta Q/\Delta P$

P - Pressure in pounds per square inch

q - Charge intercept in picocoulombs

$$m = \frac{\sum PQ - \frac{\sum P \sum Q}{n}}{\sum P^2 - \frac{[\sum P]^2}{n}}$$

$$q = \frac{\sum P \sum PQ - \sum P^2 \sum Q}{[\sum P]^2 - n \sum P^2}$$

	P	Q	PQ	P ²
TOTAL				

FIGURE 3

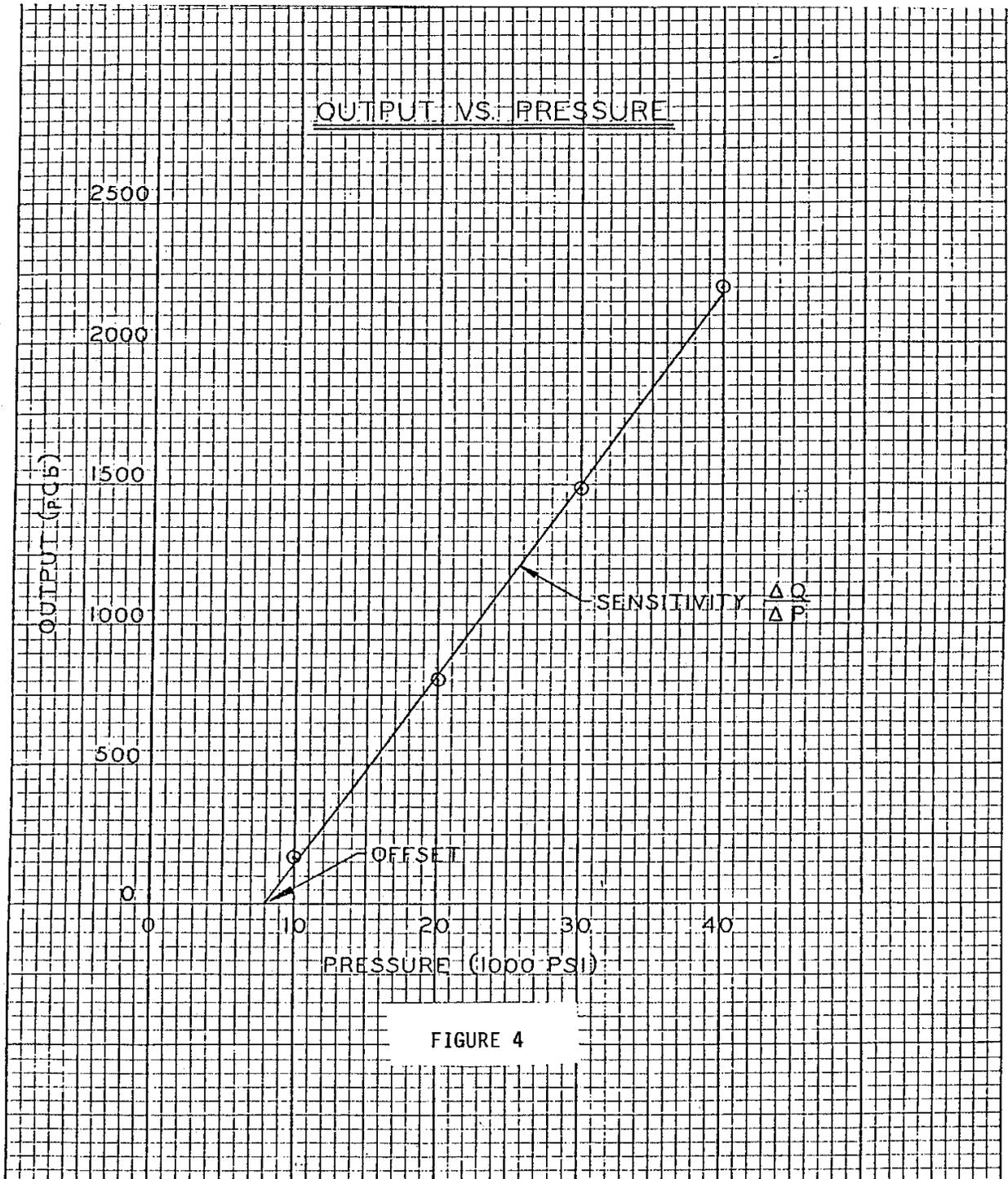


FIGURE 4

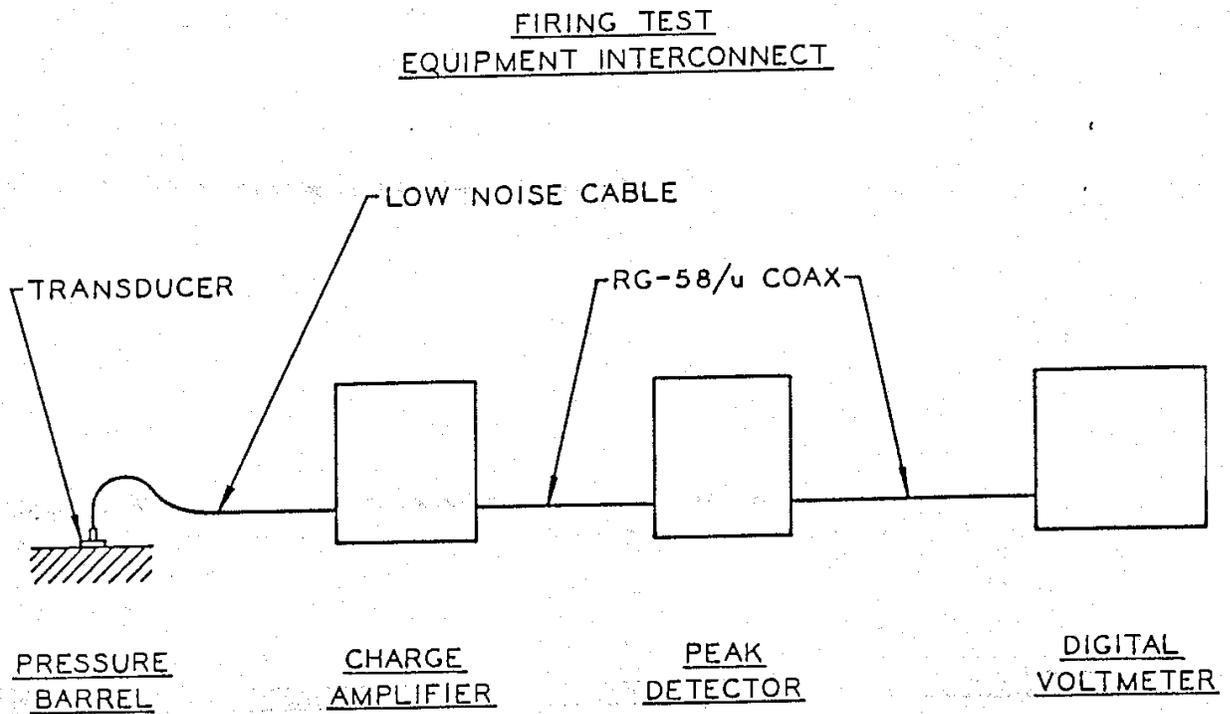


FIGURE 2

All barrels are not necessarily suitable for use in determining pressure or velocity levels, even though they may conform to the dimensions given on the appropriate Standard Velocity and Pressure Barrel drawing in this Standard. New barrels may require a number of rounds to be fired to remove sharp corners or burrs resulting from the manufacturing process. Barrels in service do not have an unlimited life and may become unserviceable from wear and erosion. There is no predictable number of rounds to which a barrel should be exposed before use for pressure and velocity determinations, nor is there a predictable round life for such equipment.

The following procedure is suggested for determining the suitability of any barrel for pressure or velocity test use:

Fire ten rounds of SAAMI Reference Ammunition following the procedures given on page 94 and 99. The average test results should not vary from the assessed value of the Reference Ammunition by more than the Inclusion Limits as reported for that lot. The use of Reference Ammunition is detailed on page 120.

In the case of a new barrel, the firing of more breaking-in shots may be indicated after which the Reference Ammunition test should be repeated.

In the case of barrels which have been in service, removal of fouling or other corrective procedures may be implemented followed by a retest.

VELOCITY & PRESSURE BARRELS
MOUNTING IN RECEIVERS

It is essential that close headspace be maintained in velocity-pressure testing equipment if reliable test results are to be achieved.

In mounting test barrels to Universal Receivers or test actions, a headspace not exceeding 0.003" (0.07mm) over minimum should be maintained. This may be measured by headspace gages, shim stock or feeler gages, or a combination thereof, whichever is most appropriate for the type of equipment being used.

Headspace adjustments with the Universal Receiver may be accomplished by several methods:

1. Formed shim stock behind the Firing Pin Plate.
2. Formed shim stock on the rear bearing shoulder of the Barrel Collar.
3. Adjustment of the Breech Locking Screws.

PROCEDURE

USE OF PRESSURE-VELOCITY BARREL PISTON HOLE GAGES

Pressure barrel piston hole size should be checked periodically with piston hole gages to determine whether or not erosion is present. Piston hole erosion can cause high or erratic pressure readings and low velocity readings.

Three piston hole gages constitute a set: 1) plug gage, 2) longitudinal gage, and 3) transverse gage. Each gage is double-ended, "go" and "no go." The gages are used as described below:

- 1) Attempt to insert the appropriate "no go" plug gage into the top of the piston hole.
- 2) Insert the appropriate "no go" longitudinal gage through the chamber, align it with the bottom of the piston hole, and attempt to insert the gage upward into the hole.
- 3) Attempt to insert the appropriate "no go" transverse gage into the bottom of the piston hole in the same manner as described above for the longitudinal gage.
- 4) If the piston hole accepts any of the "no go" gages, the hole diameter is larger than the maximum acceptable.

The probable cause of extreme piston hole erosion is poor gas sealing (improper use of gas checks and/or insufficient oiling).

In some cases minor erosion does not seem to affect pressure and velocity readings. An analysis of test results will indicate whether or not repair is necessary.

NEW REFERENCE LOTS

I. GENERAL

Reference Ammunition Lots have been established for those lots or loads designated by the Technical Committee. Responsibility for production of each of the selected lots is assigned to a member company which is responsible for maintaining a supply. A five-year supply is recommended. It is desirable that Reference Ammunition be consistent with standards values for that particular round.

When a new lot has been prepared by a producer, it shall be the producer's responsibility to announce the lot to the SAAMI Office, giving a tentative assessment and other data. (See pg. 114.)

II. METHOD OF ASSESSMENT - NEW LOTS

- A. Before announcing a new lot of Reference Ammunition to the Technical Services Office, the manufacturer should make sufficient tests to determine Tentative Values of pressure and velocity for the lot.
1. The test barrels shall conform to SAAMI specifications for internal dimensions, length and location of Piston or Transducer.
 2. Counter-chronographs and photoelectric screens shall be used in velocity measurements. (See pg. 124)
 3. Ammunition shall be conditioned for 24 hours at $70^{\circ} \pm 2^{\circ}\text{F}$ ($21.1^{\circ} \pm 1.1^{\circ}\text{C}$) with relative humidity of $60\% \pm 5\%$ before firing.
 4. Only an approved crusher lot or transducer shall be used in pressure measurements. (See page 203 for proper crusher sizes.)

NEW REFERENCE LOT REPORTING
FORM AND INSTRUCTIONS

These instructions pertain to the form shown on page 101, which is used for a Reference Ammunition producer to announce new lots to the SAAMI Office, as well as for the SAAMI Office to announce the new lot to participating ranges.

SUBJECT: T-4010 Reference Ammunition, Centerfire Rifle
New Reference Lot

TO: (When used by a producer):

SAAMI OFFICE

(When used by SAAMI Office to notify test stations):

Current address of all stations and personnel.

(!) Name and address of source
for procurement.

SIGNED: Authorized Person
Producer Company
Name Address
(Include Zip
Code.)

DATE:

SECTION II - PROCEDURES
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION - NEW LOTS

ANNOUNCEMENT OF NEW REFERENCE AMMUNITION LOT

SUBJECT: Reference Ammunition - Centerfire Rifle T-4010
New Reference Lot

TO:

CARTRIDGE _____ LOT NO. _____
ORDER SYMBOL _____

-TENTATIVE ASSESSMENT-

<u>VELOCITY (ft/s)</u>		<u>PRESSURE (CUP or psi in units of 100)</u>	
Average	S.D.:	Average:	S.D.:

LOT NUMBER THIS REPLACES _____

Please order the ammunition, test and report the results to the SAAMI Office on the proper form as soon as possible. Address your order to the address given in the left-bottom corner of this notice.

ADDRESS ORDER TO:

SIGNED:

DATE:

SAAMI REFERENCE AMMUNITION

THIS AMMUNITION IS TO BE USED ONLY FOR CALIBRATION
OF TEST GAGES FOR VELOCITY AND PRESSURE

LOT NUMBERING SYSTEM (TYPICAL NUMBERS)

C.F. LOT 270-100-3 WW

CALIBER ———
BULLET WEIGHT ———
LOT NUMBER ———
LOADING COMPANY ———

LOT SYMBOL-MANUFACTURER

WW = OLIN
F = FEDERAL
R = REMINGTON
H = HORNADY

NOTE
BLACK LETTERING

ASSESSMENT - PERIODIC

I. PROCUREMENT

Reference Ammunition is procured as noted on page 223.

II. PERIODIC TESTS

A. Stations

1. All test conditions should conform as closely as possible to those prescribed in this Standard, and the following conditions should be met:
 - (a) Test should consist of ten (10) rounds for velocity and pressure fired during a single day.
 - (b) Test barrels shall conform to SAAMI specifications for internal dimensions, length and location of piston or transducer.
 - (c) Counter chronographs and photoelectric screens shall be used in velocity measurements.
 - (d) Ammunition shall be conditioned for 24 hours at $70^{\circ} \pm 2^{\circ}\text{F}$ ($21.1^{\circ} \pm 1.1^{\circ}\text{C}$) with relative humidity of $60\% \pm 5\%$ before firing.
 - (e) Only an approved crusher lot or transducer shall be used in pressure measurements. (See page 203 for proper crusher sizes.)
2. Each station should report results of its firing in the test on approved forms to the SAAMI Office. A sample of the report form is shown on page 118.

II. PERIODIC TESTS (continued)

B. Clearing House

1. The SAAMI Office serves as a clearing house for all Reference Ammunition ballistics and related information. It shall be the responsibility of the SAAMI Office to schedule testing and to assemble and distribute results of periodic tests. This should be done on the proper Reference Ammunition report form. (Sample, Section II.)
2. The Reference Ammunition Report shall contain the average pressure, velocity and related standard deviations as reported by each station for that lot. From this data, the SAAMI Office will calculate and report the Raw Average, Corrected Average, Standard Deviation Averages and Inclusion Limits.
3. To obtain the Raw Averages, the SAAMI Office shall include the 10 round averages for both mean and sigma (S.D.) of pressure and velocity of all reporting stations and the first and second previous assessment value. If the 10 round average from any station varies from the Raw Average by more than plus or minus 50 FPS in velocity OR plus or minus 3500 CUP (psi) in pressure, the pressure or velocity data from that station(s) should be discarded. The mean pressure and velocity should be recalculated omitting the discarded data. The new mean is the "Corrected Average." If the mean pressure value of a station is outside of the limits as defined above, but the velocity is in, the pressure data should be dropped and the velocity data retained. The converse is true, as well. Using the Corrected Averages, the Inclusion Limits are determined as follows:

VELOCITY: MEAN = Same as Corrected Average
HIGH = MEAN + 50 FPS
LOW = MEAN - 50 FPS

PRESSURE: MEAN = Same as Corrected Average
HIGH = MEAN + 3500 CUP (psi)
LOW = MEAN - 3500 CUP (psi)

SECTION II - PROCEDURES
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION - ASSESSMENT

T-4010 STATION REPORT
 REFERENCE AMMUNITION - PERIODIC ASSESSMENT
 CENTERFIRE RIFLE

STATION _____	SAAMI REFERENCE LOT _____
DATE _____	PREVIOUS ASSESSMENT: Velocity _____ Pressure _____
Pressure Bbl. No. _____	Type of Gage _____
Pressure Bbl. History _____	No. _____
Velocity Bbl. No. _____	
Velocity Bbl. History _____	

	VELOCITY	PRESSURE
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

AVG.	_____	_____
OFFSET	_____	_____
CORR. AVG.	_____	_____
S. D.	_____	_____

SECTION II - PROCEDURES
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION - ASSESSMENT

TECHNICAL SERVICES REPORT - REFERENCE AMMUNITION

PERIODIC ASSESSMENT - CF RIFLE

MAY - 1990

LOT NO: 30 CARB-110-4WW

GAGE: CRUSHER

	VELOCITY	S.D.	PRESSURE	S.D.
BLOUNT	2036	15.0	372	11.8
FEDERAL	1983	21.0	334	9.4
HERCULES	2015	5.0	412	17.2
HORNADY	2044	11.0	365	13.5
OLIN - MFG.	2004	14.0	328	10.0
OLIN - R&D	2020	12.5	378	11.7
OLIN - ST.M.	2014	22.0	371	10.1
REM - ILION	2046	10.0	370	28.0
REM - LONOKE	1975	8.6	337	17.9

1ST PREV. AVG.	2016		356	
2ND PREV. AVG.	2013		350	

	VELOCITY	S.D.	PRESSURE	S.D.
RAW AVG.	2015		361	
CORRECTED AVG.	2015		356	

INCLUSION LIMITS @ 99.95%

UPPER LIMIT	2065		391	
LOWER LIMIT	1965		321	

ASSESSMENT:..... 2015 356

SECTION II - PROCEDURES
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION - USE

The use and usefulness of Reference Ammunition in connection with the testing of ammunition for velocity and pressure is predicated upon two basic assumptions as follows:

1. Associated with a given batch of Reference Ammunition at a given time is an assessed average velocity, an assessed average pressure, as well as Upper and Lower limits for each, which the averages of any ten round test may be expected to fall within when:
 - a. The user has blended the Reference Lot before use.
 - b. The ammunition is tested only after being conditioned under controlled temperature and humidity.
 - c. The ammunition is tested in standard test equipment.
 - d. The ammunition is handled strictly in accordance with the specified method.
 - e. All auxiliary measuring equipment is in proper working condition.
2. Although there will be changes with time in the velocity and pressure assessments, the changes occur sufficiently slowly to be detected by periodic reassessments before they have achieved a magnitude sufficient to impair the usefulness of the reference rounds. In other words, the velocity and pressure assessments are reasonably stable with time.

The average velocity and average pressure that may be developed by a sample of Reference Ammunition in any given gun under given conditions may be different from the results obtained under the test conditions referred to above in assumption 1. Such values may be perfectly real, providing no errors are introduced by the auxiliary equipment. However, the average of any ten round test with a lot of Reference Ammunition, fired under the conditions listed above should fall within the limits given with the assessment of that lot under the heading, "Inclusion Limits."

In order to realize the benefits of Reference Ammunition, some rules must be adhered to. Nevertheless, the final judgments concerning how often it is used and the use of the data must be made by each individual user. It is important, therefore, that there be a clear realization of what it can and what it cannot tell the ammunition tester.

Reference Ammunition cannot guarantee the absolute accuracy of any test system. It does, however, provide simple and direct data from any given ammunition test equipment to determine how closely it duplicates the acceptable, average system as used by other SAAMI members.

In line with the preceding discussion, the following recommendations are made for the use of Reference Ammunition.

- A. Each Reference Lot should be blended at each station or range and conditioned before use.
- B. How often Reference Ammunition is used shall be determined by the accuracy required.
- C. The minimum sample size shall be ten rounds.
- D. The Upper and Lower "Inclusion Limits" for both velocity and pressure are the limits within which the averages of a ten round test may be expected to fall 99.95% of the time.
- E. A correction need not be applied to the test equipment as long as the velocity and pressure averages are within the Inclusion Limits.

SECTION II - PROCEDURES
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION - USE

- F. If one average is outside of the Inclusion Limits and the other within, the average that exceeds the limits shall be corrected according to the procedure given in Step H.
- G. If both averages are outside of the Inclusion Limits, a second ten round test should be fired to verify the data.
- H. If the correction is to be applied, the correction shall be the difference between the assessed value and the observed average of the twenty round test.

SECONDARY REFERENCE AMMUNITION

Occasionally, a test station will have need for an inordinately large supply of Reference Ammunition in considerable excess of the usual volume. In order to minimize the premature exhaustion of any particular lot, it is suggested that the station create its own secondary reference lot to fill the special need.

A secondary reference lot should consist of a supply of off-the-shelf ammunition, each box bearing the same manufacturer's code number. The secondary reference lot should be approximately equivalent to the Reference Ammunition which it replaces.

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

LIST OF EQUIPMENT
CRUSHER

LIST OF EQUIPMENT

1. Electronic Counter chronograph - 100 kilohertz (minimum)
Oehler Research, Electronic Counters, Inc. or equivalent
2. Table of velocity vs. time of flight
3. Photoelectric screens
Oehler Research, Electronic Counters, Inc. or equivalent
4. Gun rest
 - a. Machine rest Frankford Arsenal Type - Cannatech, Inc.
 - b. Other equivalent
5. Receiver
 - a. Universal Receivers, Cannatech, Inc.
 - b. Winchester Bolt Action Model 70
 - c. Other equivalent
6. Barrels
 - a. Drawings of test barrels are shown in Section III.
7. Piston and piston hole. (pg. 212,213)
8. Piston and piston hole gages. (pg. 214)
9. Oil - Piston and gas check (pg. 215)
10. Gas Check (pg. 210)
11. Gas Check tools - seating and knockout. (pg 211)
12. Crusher cylinders - .146" x .400" - copper (pg. 207)
.225" x .500" - copper (pg. 208)
.225" x .400" - copper (pg. 209)
13. Tarage Table - supplied with each lot of crusher cylinders.

Sample tables: .146" x .400" - copper/.206 piston (pg. 204)
.225" x .500" - copper/.206 piston (pg. 205)
.225" x .400" - copper/.206 piston (pg. 206)

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

LIST OF EQUIPMENT
CRUSHER

LIST OF EQUIPMENT (continued)

14. Measuring device - crusher cylinder
 - a. Micrometer 1" calibrated in .001"
 - b. Platform dial indicator - calibrated in .001"
 - c. Platform dial indicator - calibrated in Copper Units of Pressure (CUP).

15. Reference Ammunition
 - A. Supply (pg. 221)

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

LIST OF EQUIPMENT
TRANSDUCER

LIST OF EQUIPMENT

1. Electronic Counter Chronograph - 100 Kilohertz (minimum)
Oehler Research or equivalent
2. Photoelectric screens
Oehler Research or equivalent
3. Machine rest - Frankford Arsenal type
Cammatech, Inc. or equivalent
4. Receiver
Universal Receiver, Cammatech, Inc. or equivalent
5. Barrels
 - a. Remington Arms Co., Inc.
 - b. H-S Precision, Inc.
 - c. Wilson Arms Co.
 - e. Equivalent
6. Digital Voltmeter
Fluke Model 8110A or equivalent
7. Charge Amplifier
PCB Model 462B52 or equivalent
8. Peak Detector
PCB Model 451A07 or equivalent
9. Transducer
PCB Model 117BXX or equivalent
10. Low Noise Cable
PCB Model 003A05 or equivalent
11. Transducer Calibrator
PCB Model 090B Series or equivalent
12. Calibration Fixture
PCB 090H Series or equivalent

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

SUGGESTED EQUIPMENT SOURCES

- | | |
|--------------------------|---|
| 1. Electronic Counter | Oehler Research
P.O. Box 9135
Austin, TX 78766 |
| 2. Photoelectric Screens | Oehler Research
P.O. Box 9135
Austin, TX 78766 |
| 3. Gun Rest | Cannatech, Inc.
15 Spring Hollow Drive
Erial, NJ 08081 |
| 4. Receivers | Cannatech, Inc.
15 Spring Hollow Drive
Erial, NJ 08081

B & J Machine Inc.
P. O. Box 21146
Philadelphia, PA 19114 |
| 5. Barrels | Remington Arms Co., Inc.
Attn: Custom Shop
14 Hoefler Ave.
Ilion, New York 13357

H - S Precision, Inc.
1301 Turbine Drive
Rapid City, SD 57701

Wilson Arms Co.
63 Leetes Island Rd.
Branford, CT 06405 |
| 6. Digital Voltmeter | John Fluke Mfg., Co., Inc.
6920 Seaway Blvd.
Everett, WA 98206 |
| 7. Charge Amplifier | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |
| 8. Peak Detector | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |

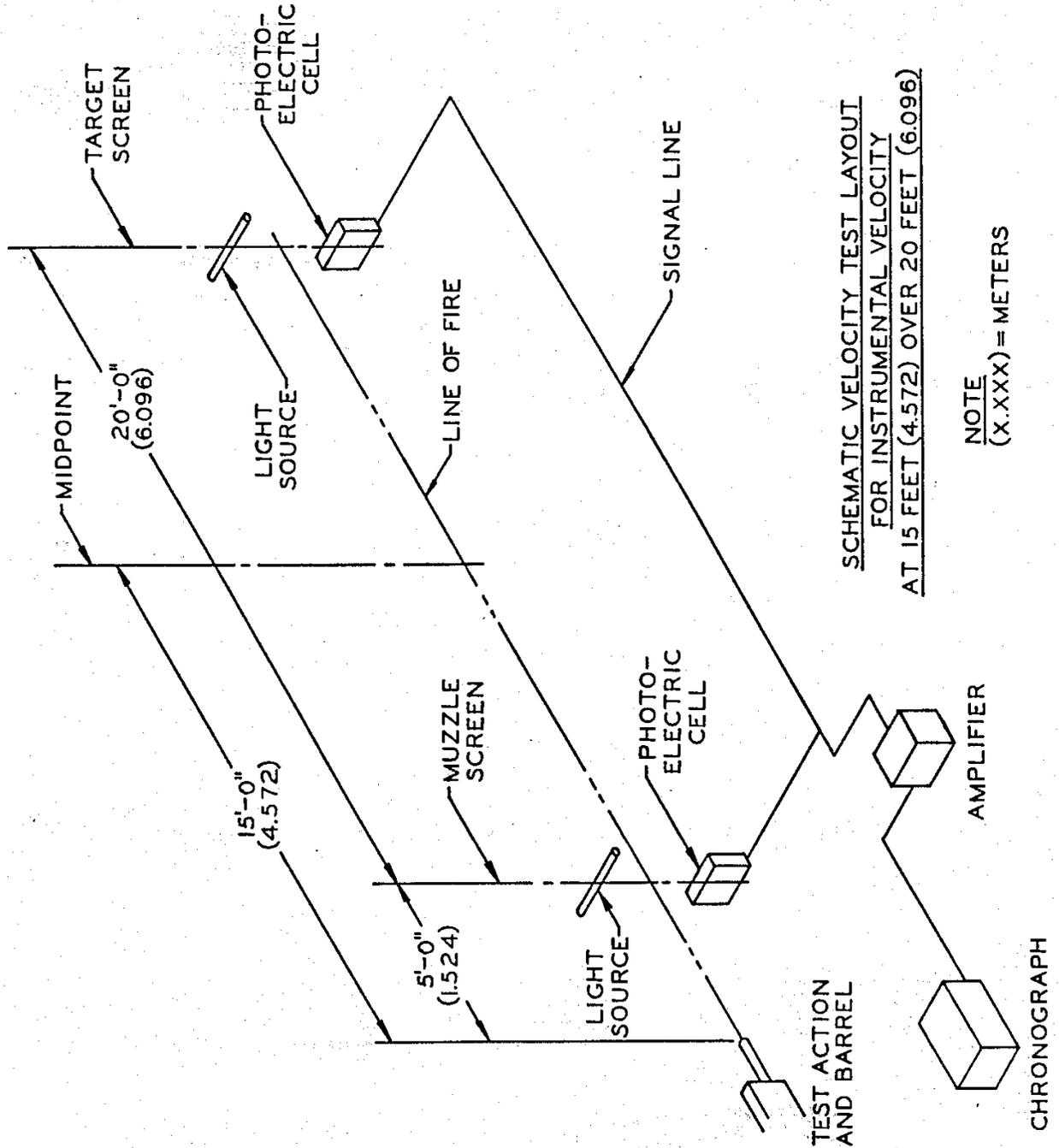
SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

SUGGESTED EQUIPMENT SOURCES

- | | |
|---------------------------|--|
| 9. Transducer | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |
| 10. Low Noise Cable | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |
| 11. Transducer Calibrator | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |
| 12. Calibration Fixture | PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY 14043-2495 |

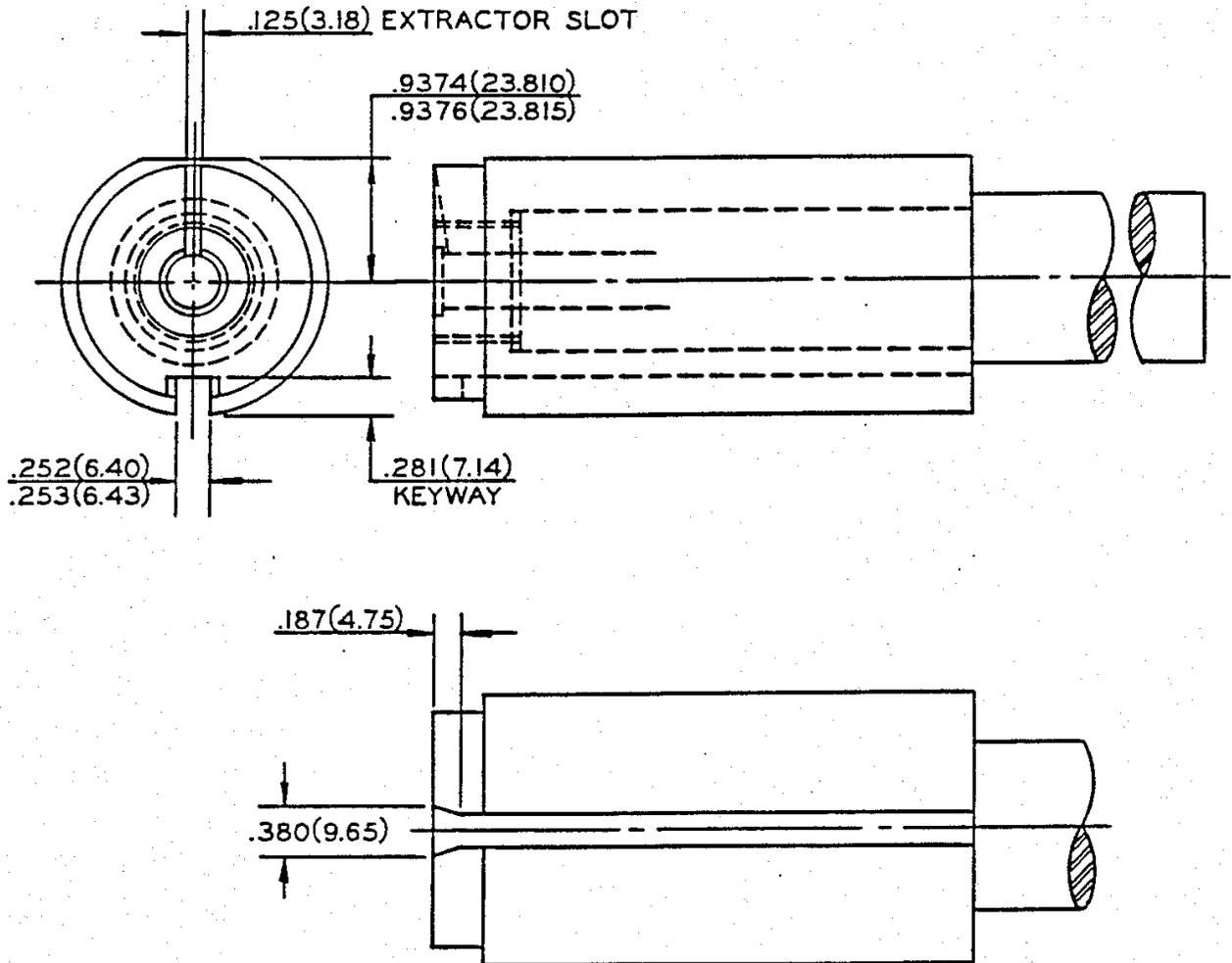
SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

SCHEMATIC VELOCITY LAYOUT-SCREENS



SCHEMATIC VELOCITY TEST LAYOUT
FOR INSTRUMENTAL VELOCITY
AT 15 FEET (4.572) OVER 20 FEET (6.096)

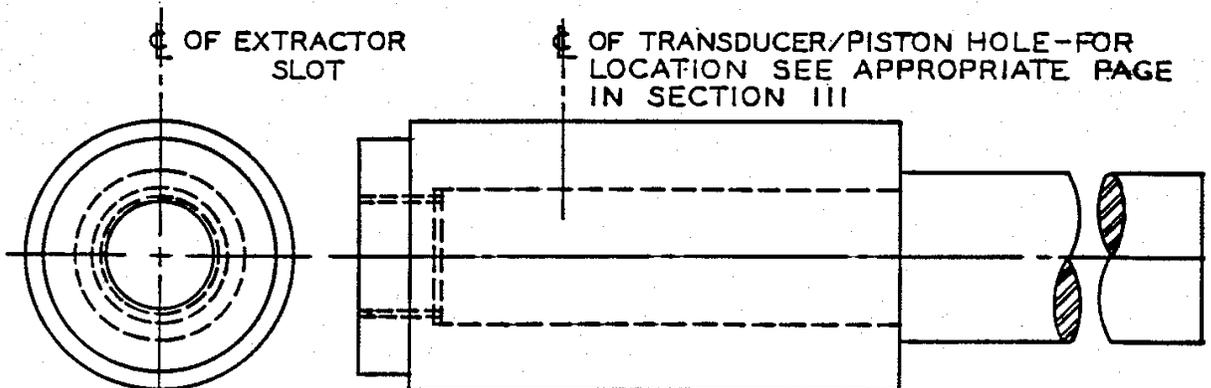
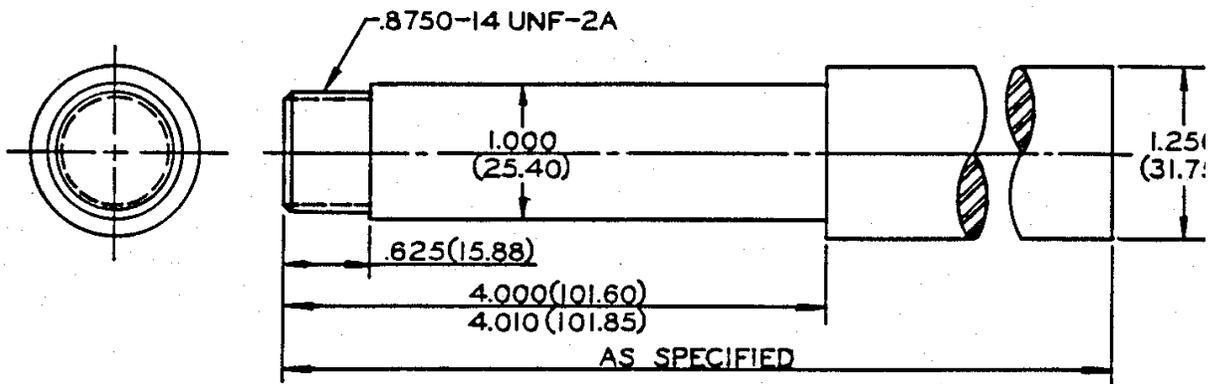
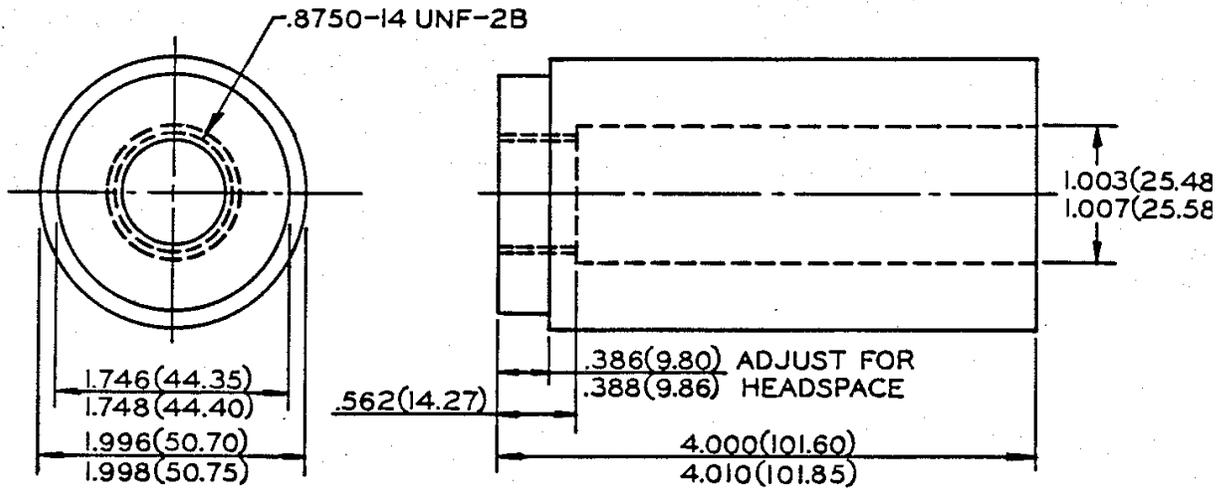
NOTE
 (X.XXX) = METERS



FOR DETAIL INFORMATION SEE PAGE 131

NOTE
(XX.XX) = MILLIMETERS

UNIVERSAL RECEIVER COLLAR &
 TEST BARREL



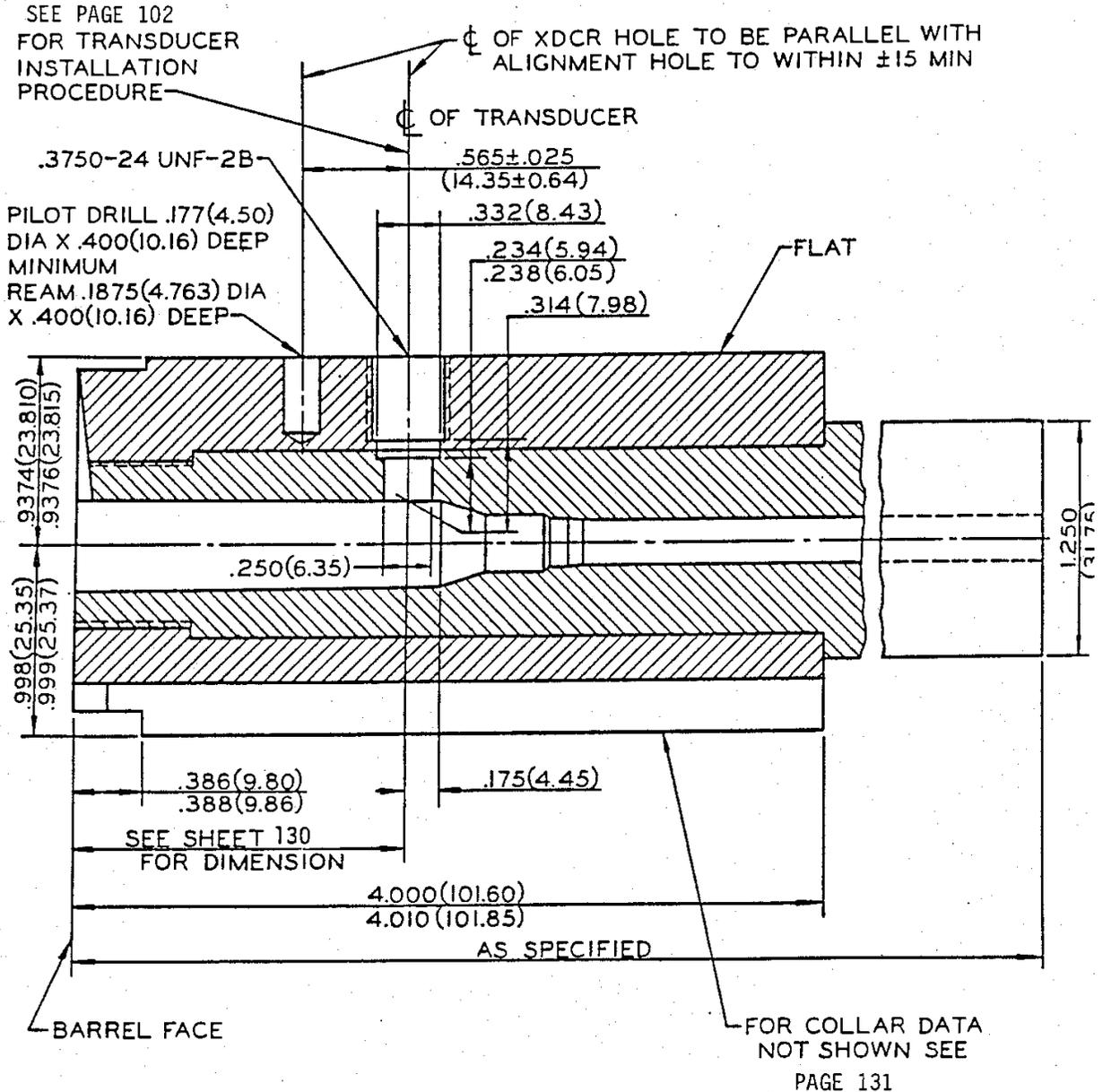
ONE PIECE BARRELS ARE ACCEPTABLE
 DRAW BARREL AND COLLAR TIGHT.
 TRANSDUCER HOLE AND HEAD CUTS
 MADE AFTER ASSEMBLY - SEE
 PAGE 130

MATERIAL: RESULPHURIZED 4140 STEEL
 HEAT TREAT PRIOR TO MACHINING TO
 BRINELL HARDNESS 277 TO 321 (R_c 29 TO :

NOTE (XX.XX) = MILLIMETERS

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

UNIVERSAL RECEIVER TEST BARREL



NOTE
 (XX.XX) = MILLIMETERS

TRANSDUCER LOCATION CRITERIA

I Transducer Location

The following criteria for transducer positioning should be followed when designing new cartridges. In those cases where following the criteria will cause the transducer to be located over current or projected bullet heel locations, case cannellures or other undesirable areas, the best alternate location should be chosen. In general the location should be as close to the bullet heel as practical.

A. Straight Cartridge Cases

Center line of transducer shall be located behind the heel of the bullet by an amount that is equal to one-half the transducer diameter plus 0.005" (0.13) - 0.010" (0.25). This criterion applies to both large diameter 0.250" (6.35) and small diameter 0.194" (4.93) transducers.

B. Bottleneck Cartridge Cases

Center line of transducer shall be located behind shell case shoulder intersection by an amount of 0.175" (4.44) for large diameter transducers 0.250" (6.35) and 0.150" (3.8) for small diameter transducers 0.194" (4.93).

II Transducer Diameter

Transducer diameter, 0.250" (6.35), is selected when the chamber diameter at transducer center line location is equal or greater than 0.350" (8.89).

Transducer diameter, 0.194" (4.93), is selected when the chamber diameter at transducer center line location is less than 0.350" (8.89).

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

UNIVERSAL RECEIVER TEST BARREL
 TRANSDUCER LOCATION

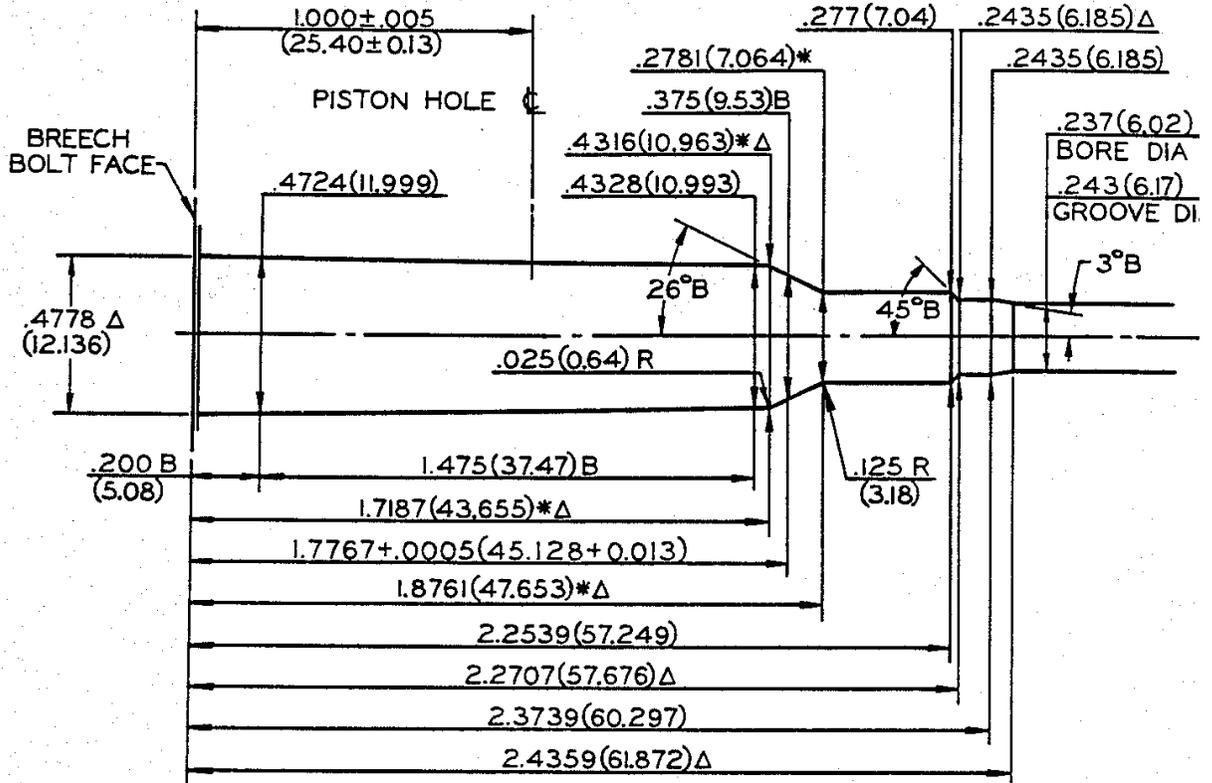
<u>Cartridge</u>	<u>CENTER LINE OF TRANSDUCER FROM BOLT FACE*</u>		<u>Cartridge</u>	<u>CENTER LINE OF TRANSDUCER FROM BOLT FACE*</u>	
	<u>Inches</u>	<u>mm</u>		<u>Inches</u>	<u>mm</u>
6mm Rem	1.544	39.2	30-06 Sprg	1.765	44.8
6.5mm Rem	1.533	38.9	30-30 Win	1.280	32.5
7mm (7x57)	1.545	39.2	30-40 Krag	1.543	39.2
7mm Rem Mag	1.873	47.6	300 H&H Mag	1.950	49.5
7mm-08 Rem	1.379	35.0	300 Sav	1.383	35.1
7-30 Waters	1.426	36.2	300 Wby Mag	2.130	54.1
7.62x39	1.020	25.91	300 Win Mag	2.029	51.5
8mm (8x57)	1.639	41.6	303 Brit	1.653	42.0
8mm Rem Mag	2.222	56.4	303 Sav	1.176	30.0
17 Rem	1.172	29.8	308 Win	1.379	35.0
218 Bee	0.782	19.9	32 Rem	1.321	33.6
22 Hornet	0.694	17.6	32 Win Spl	1.274	32.4
22-250 Rem	1.335	33.9	32-20 Win	0.731	18.6
222 Rem	1.085	27.6	338 Win Mag	1.873	47.6
222 Rem Mag	1.285	23.6	348 Win	1.485	37.7
223 Rem	1.259	32.0	35 Rem	1.357	34.4
225 Win	1.350	34.3	350 Rem Mag	1.533	38.9
243 Win	1.380	35.0	351 Win SL	0.990	25.1
25-06 Rem	1.765	44.8	358 Win	1.380	35.0
25-20 Win	0.708	18.0	375 H&H Mag	2.242	56.9
25-35 Win	1.210	30.7	375 Win	1.410	35.8
250 Sav	1.335	33.9	38-40 Win	0.738	18.7
256 Win Mag	0.814	20.7	38-55 Win	1.375	34.9
257 Rob	1.544	39.2	44 Rem Mag	0.730	18.5
264 Win Mag	1.873	47.6	44-40 Win	0.743	18.9
270 Win	1.767	44.9	44 Mar	1.725	43.8
280 Rem(7mm Exp Rem)	1.817	46.2	45.70 Govt	1.200	30.5
284 Win	1.595	40.5	458 Win Mag	1.863	47.3
30 Carb	0.875	22.2			
30 Rem	1.321	33.6			

*Tolerance Minus 0.010" (0.25)

All transducers are 0.250" (6.35) diameter except 218 Bee, 22 Hornet, 25-20 Win, 30 Carb, 32-20 Win, which are 0.194" (4.93).

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 6 mm REMINGTON



NO. OF GROOVES	6
WIDTH OF GROOVES	.090±.002 (2.29±0.05)
TWIST	9 (228.6) RH
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

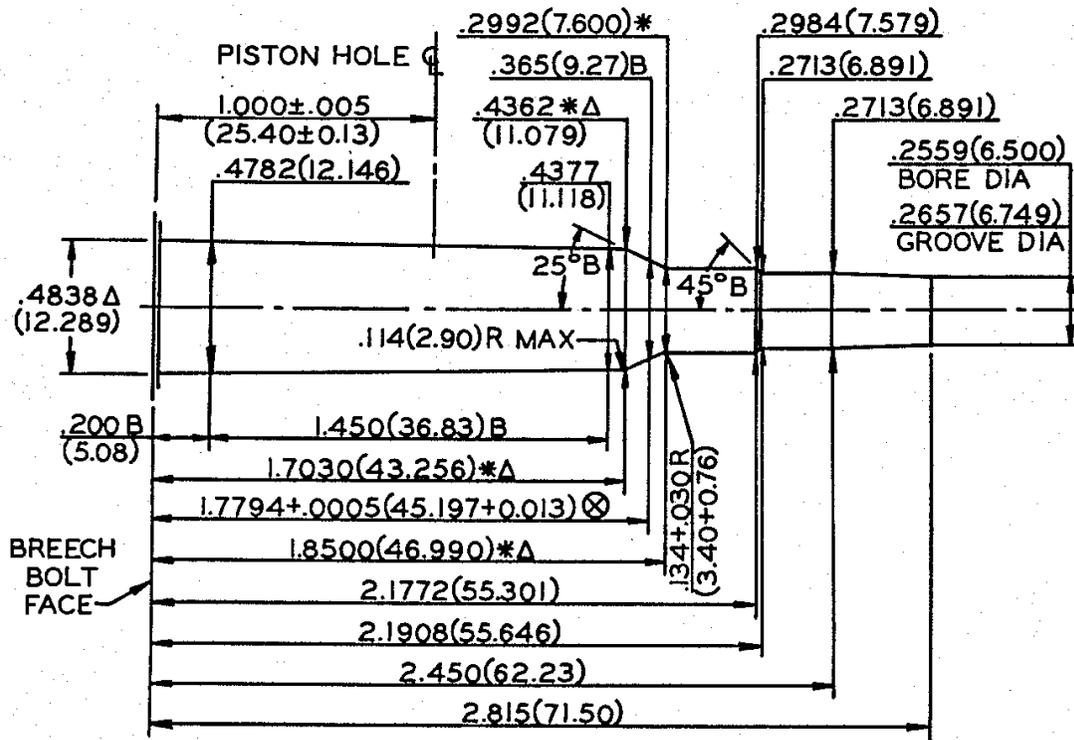
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	4
WIDTH OF GROOVES	$.090 \pm .002 (2.29 \pm 0.05)$
TWIST	7.87(200) RH
LENGTH OF BARREL	$24.000 \pm .010 (609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206(5.23)$

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

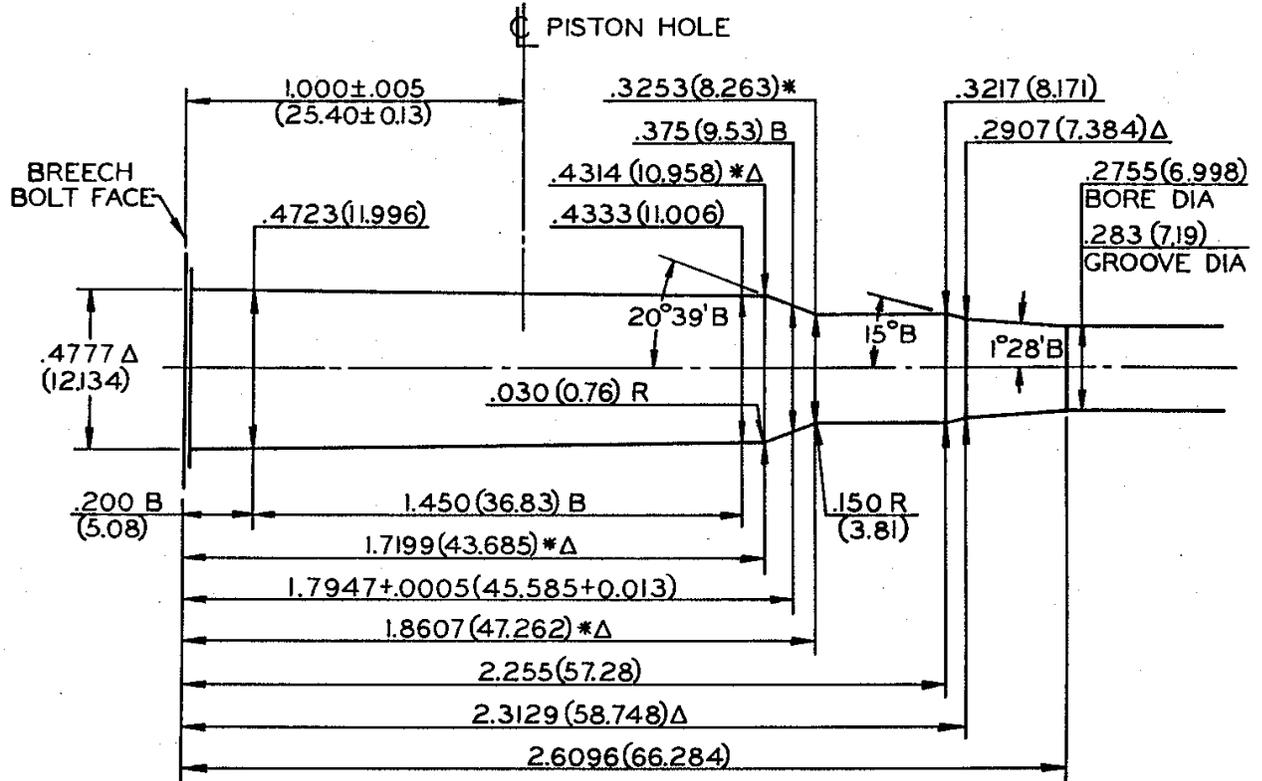
UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B = BASIC Δ = REFERENCE DIMENSION \otimes = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX) = MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 7mm Mauser (7x57)



NO. OF GROOVES	4
WIDTH OF GROOVES	.160±.002 (4.06±0.05)
TWIST	8.75 (222.3)
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

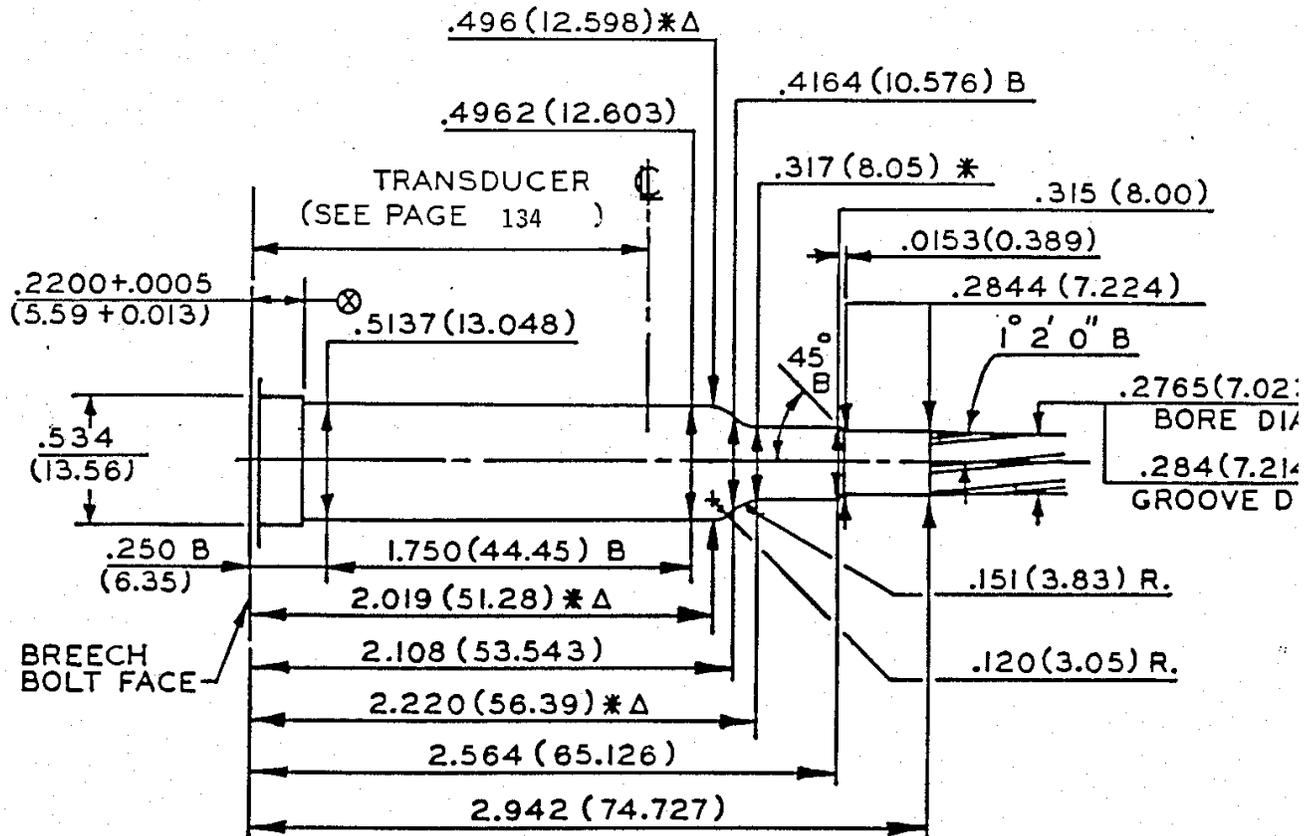
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY &
 PRESSURE BARREL
 7mm WEATHERBY MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.113 ± .002 (2.87 ± 0.05)
TWIST	10 (254.0) R.H.
LENGTH OF BARREL	24.000 ± .010 (609.60 ± 0.25)
DIA. OF PISTON HOLE	.208 (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

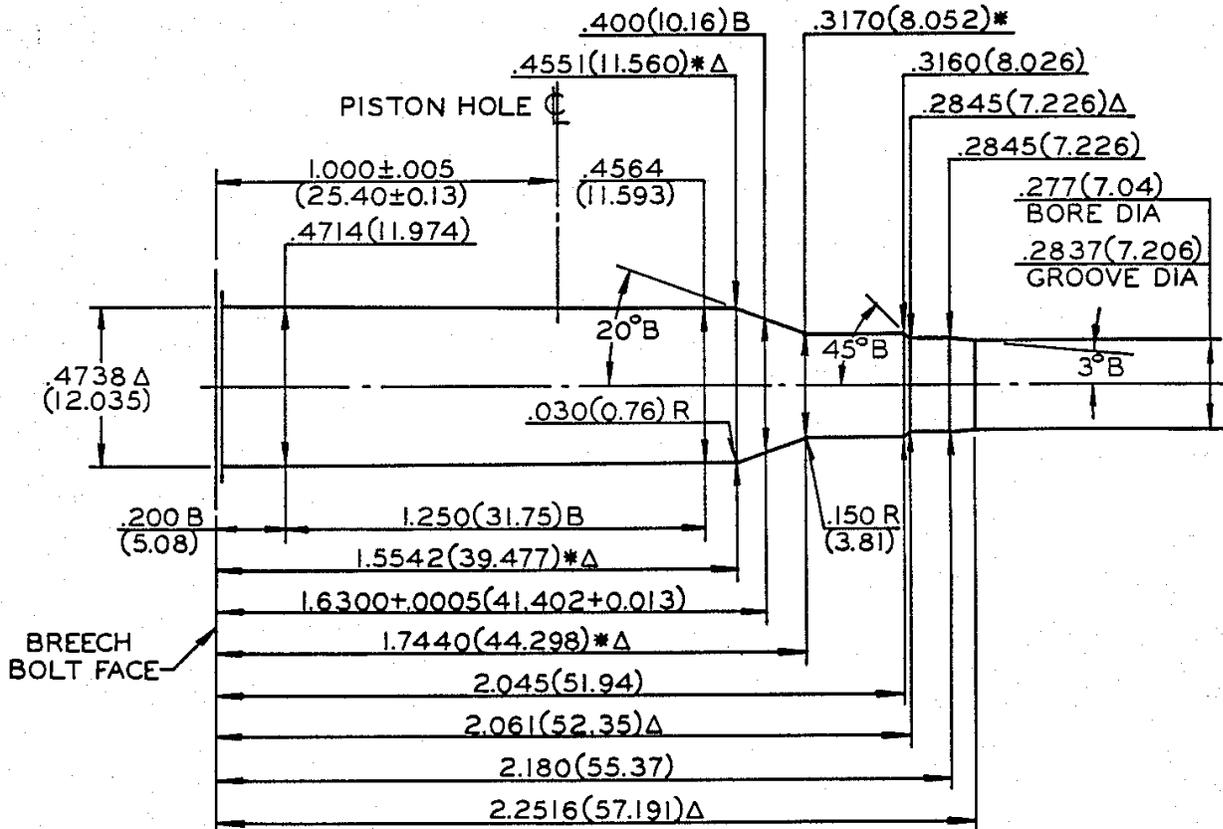
UNLESS OTHERWISE NOTED
 ALL DIA. +.0005 (0.013)
 LENGTH TOL. +.005 (0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY &
 PRESSURE BARREL
 7mm-08 Remington



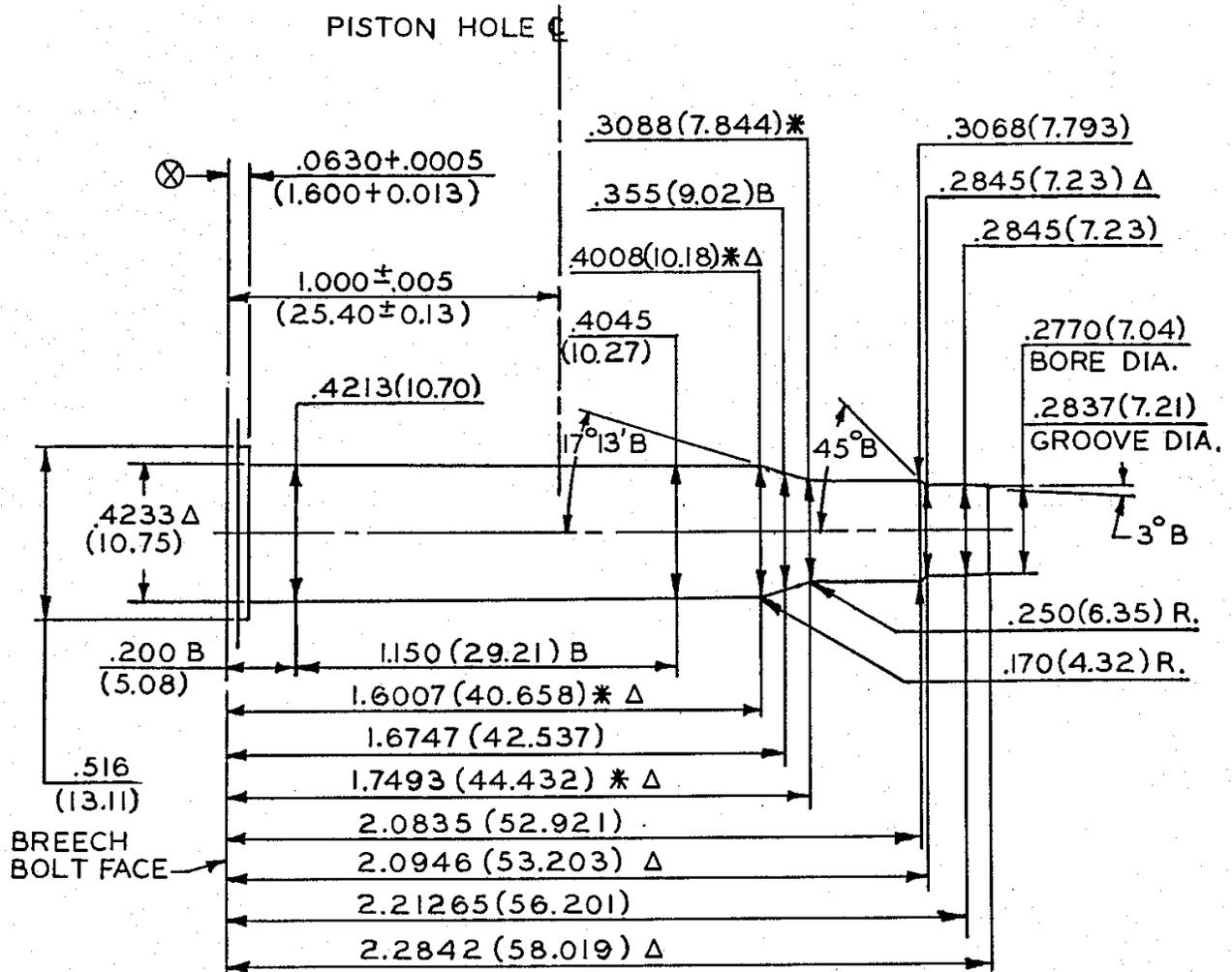
NO. OF GROOVES 6
 WIDTH OF GROOVES $.110 \pm .002(2.79 \pm 0.05)$
 TWIST 9.5(241.3) RH
 LENGTH OF BARREL $24.000 \pm .010(609.60 \pm 0.25)$
 DIA OF PISTON HOLE $.206(5.23)$

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B = BASIC (XX.XX) = MILLIMETERS Δ = REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



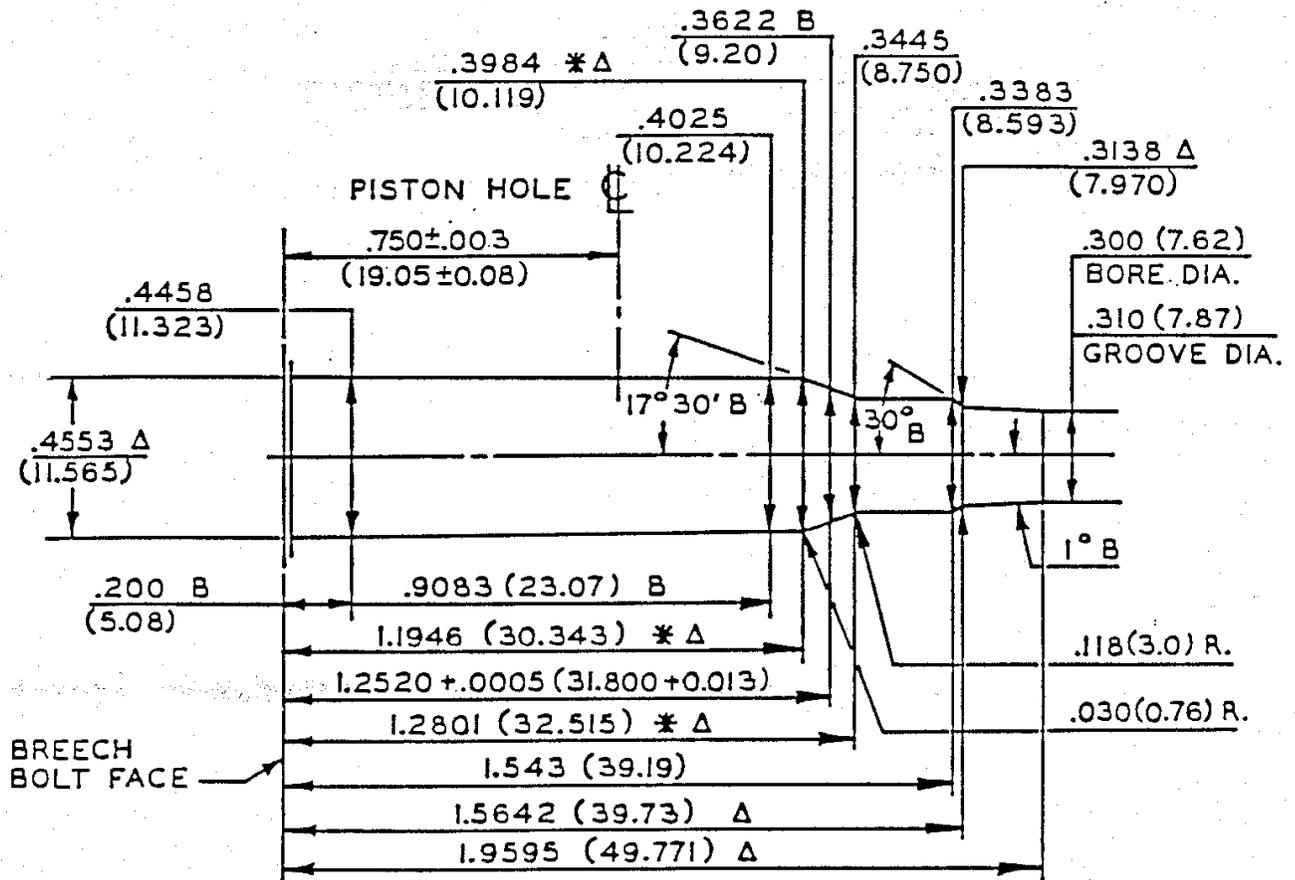
NO. OF GROOVES 6
 WIDTH OF GROOVES .110±.002 (2.794±0.051)
 TWIST 9.5 (241.3) R.H.
 LENGTH OF BARREL 24.000±.010 (609.60±0.25)
 DIA. OF PISTON HOLE .206 (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA. ±.0005 (0.013)
 LENGTH TOL. ±.005 (0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	4
WIDTH OF GROOVES	.150 +.002 (3.81+0.05)
TWIST	9.45 (240) R.H.
LENGTH OF BARREL	20.0 ± .010 (508.0 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

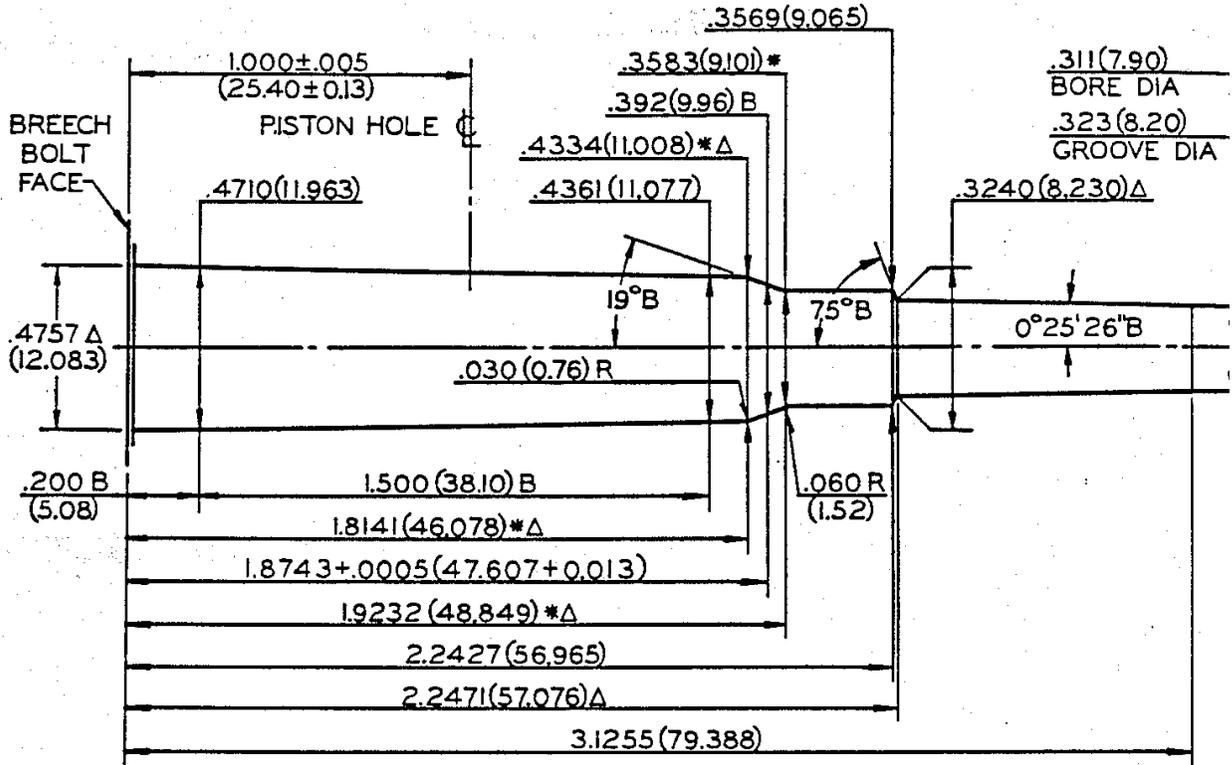
UNLESS OTHERWISE NOTED
 ALL DIA. +.0005 (0.013)
 LENGTH TOL. +.005 (0.13)

NOTE

B = BASIC Δ = REFERENCE DIMENSION ⊗ = HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX) = MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 8 mm MAUSER (8x57)



NO. OF GROOVES	4
WIDTH OF GROOVES	.176 + 0.002 (4.47 + 0.05)
TWIST	9.5 (241.3) RH
LENGTH OF BARREL	24.000 ± 0.010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

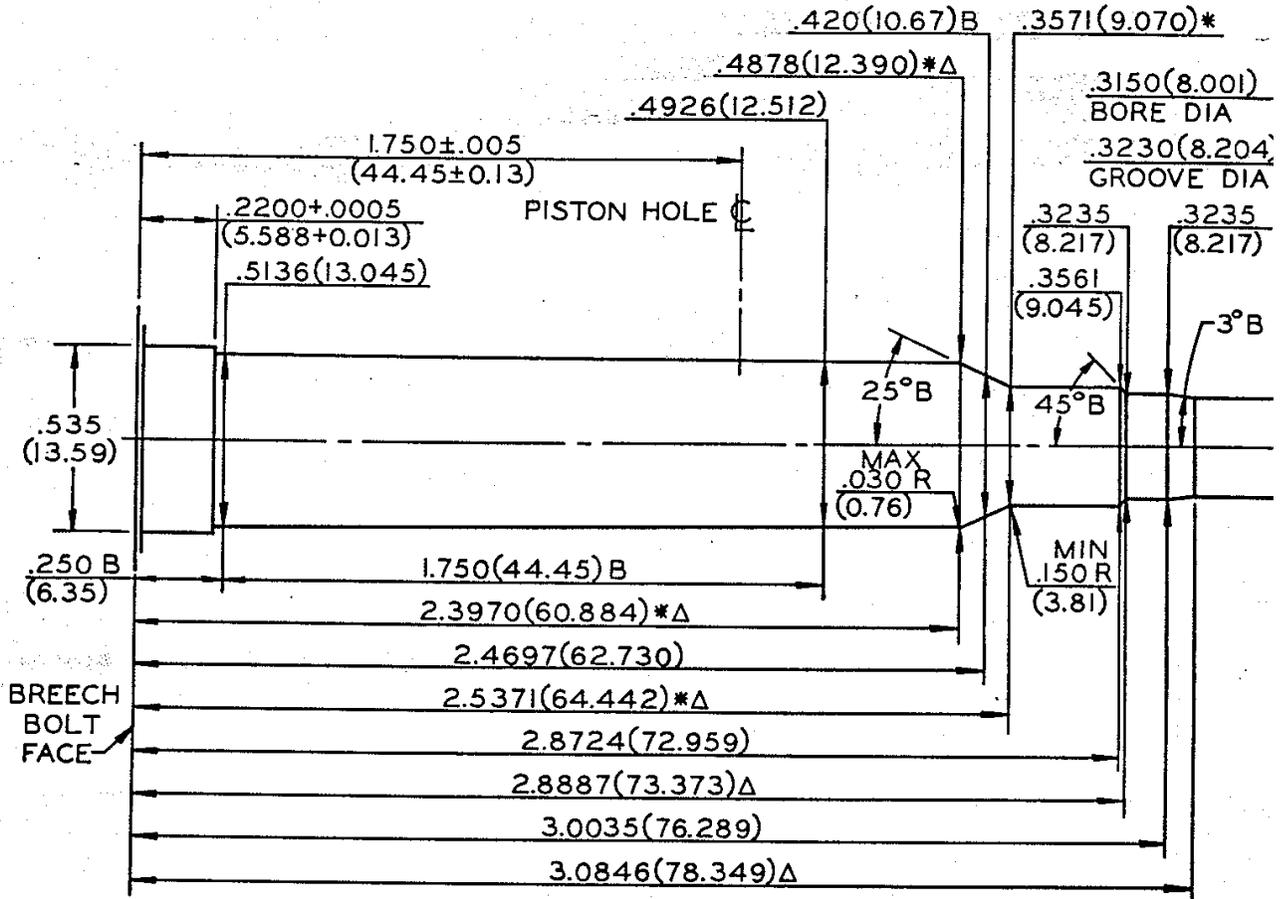
UNLESS OTHERWISE NOTED
 ALL DIA +.0005 (0.013)
 LENGTH TOL +.005 (0.13)

NOTE

B = BASIC
 (XX.XX) = MILLIMETERS
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 8 mm REMINGTON MAGNUM



NO. OF GROOVES 6
 WIDTH OF GROOVES .122+0.005(3.10+0.13)
 TWIST 10 (254) RH
 LENGTH OF BARREL 24.000±.010(609.60±0.25)
 DIA OF PISTON HOLE .206(5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

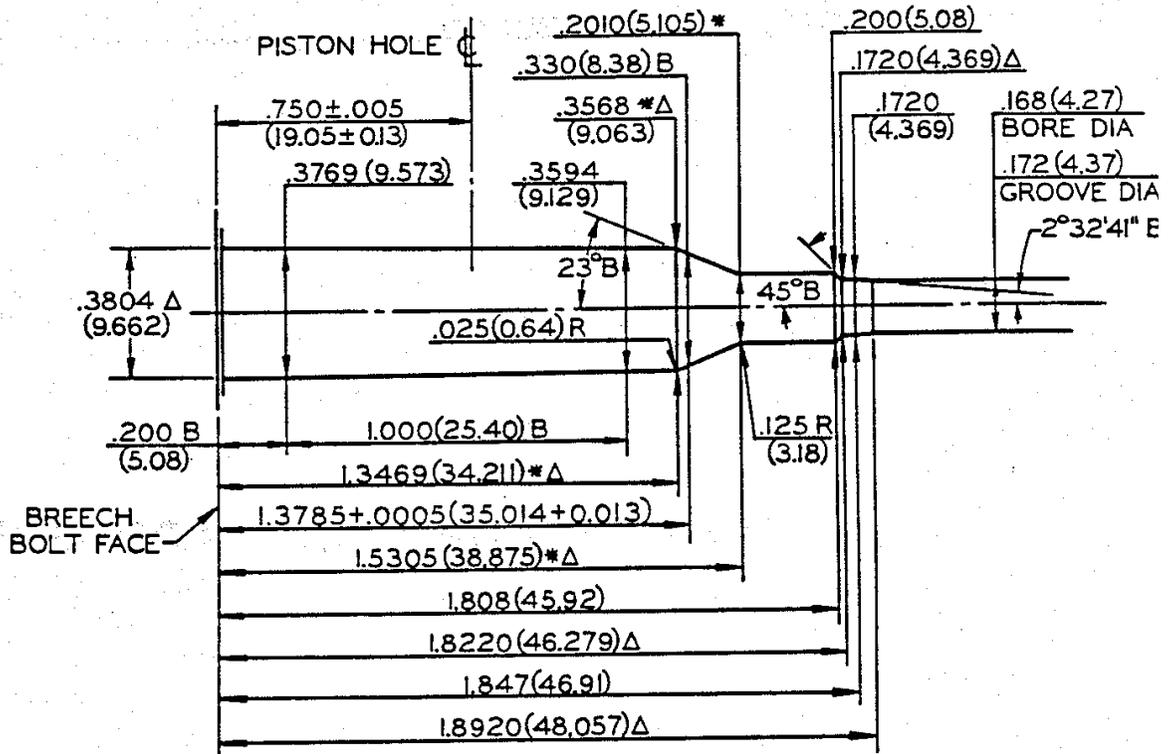
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC (XX.XX)=MILLIMETERS Δ=REFERENCE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 17 REMINGTON



NO. OF GROOVES	6
WIDTH OF GROOVES	.062±.002 (1.57±0.05)
TWIST	9 (228.6) RH
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

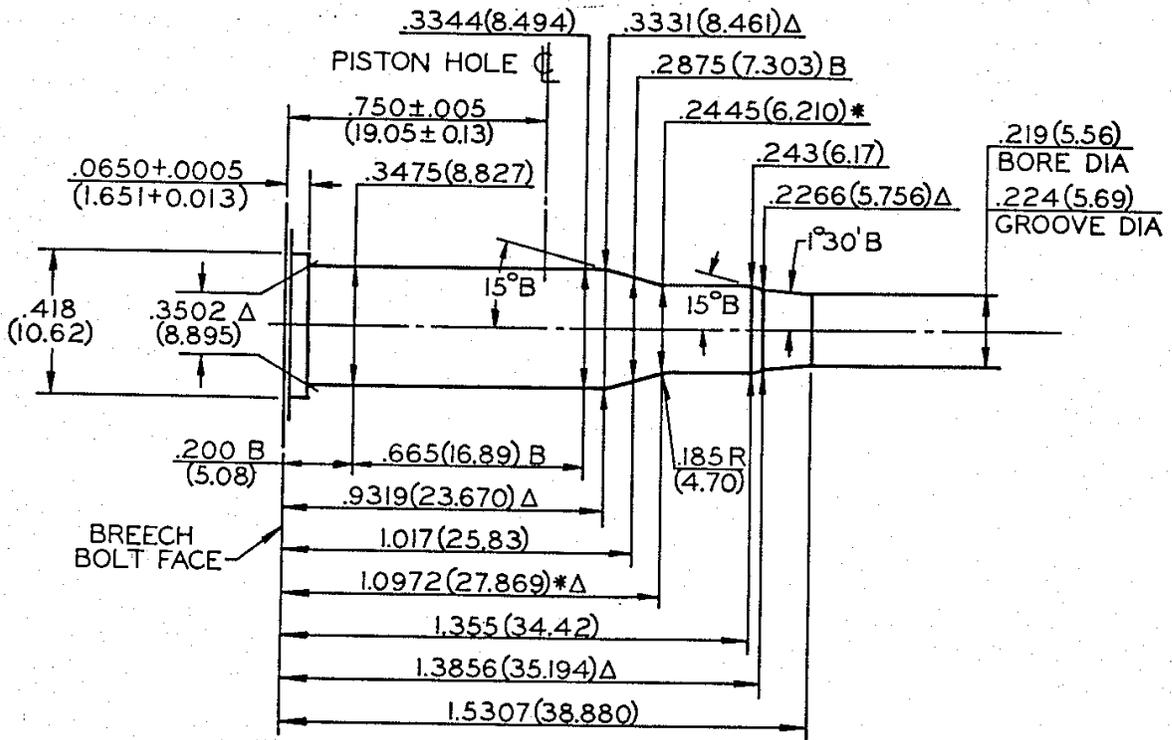
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 218 BEE



NO. OF GROOVES	6
WIDTH OF GROOVES	$.074 \pm .002 (1.88 \pm 0.05)$
TWIST	16 (406.4) RH
LENGTH OF BARREL	$24.000 \pm .010 (609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+0.0005(0.013)$
 LENGTH TOL $+0.005(0.13)$

NOTE

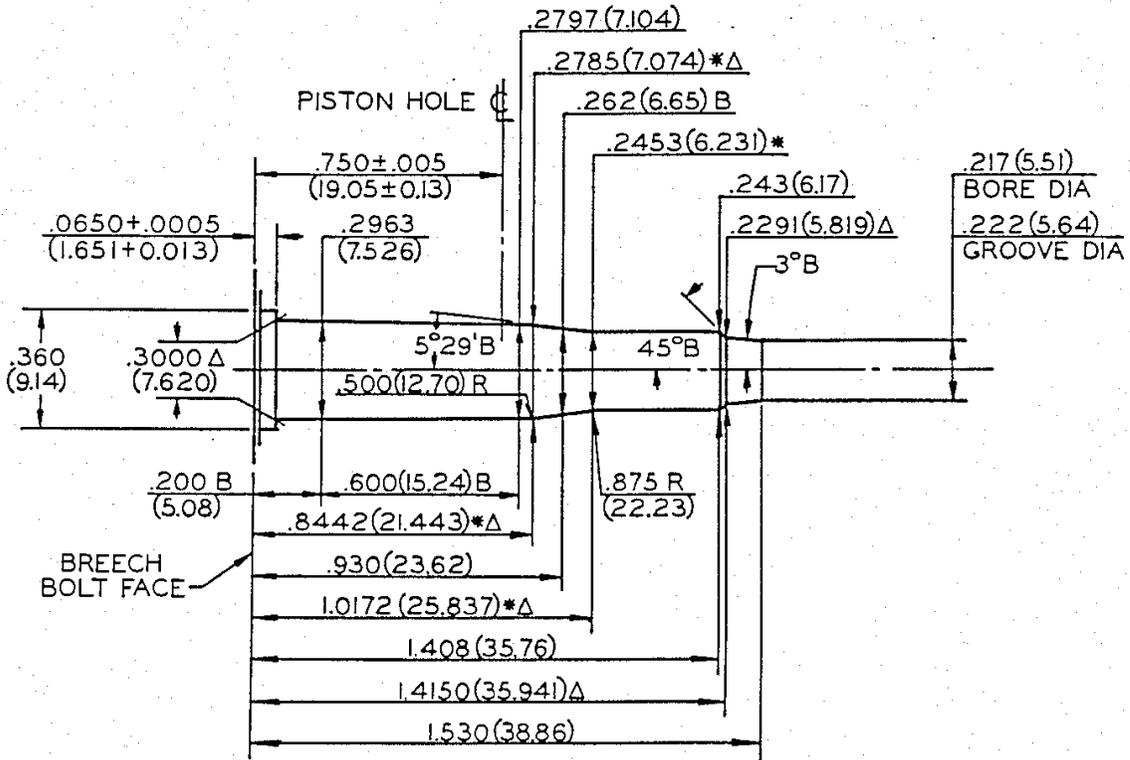
B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 22 HORNET



NO. OF GROOVES	6
WIDTH OF GROOVES	.068 + .002 (1.73 + 0.05)
TWIST	16 (406.4) RH
LENGTH OF BARREL	24.000 ± 0.010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005 (0.013)
 LENGTH TOL +.005 (0.13)

NOTE

B = BASIC

(XX.XX) = MILLIMETERS

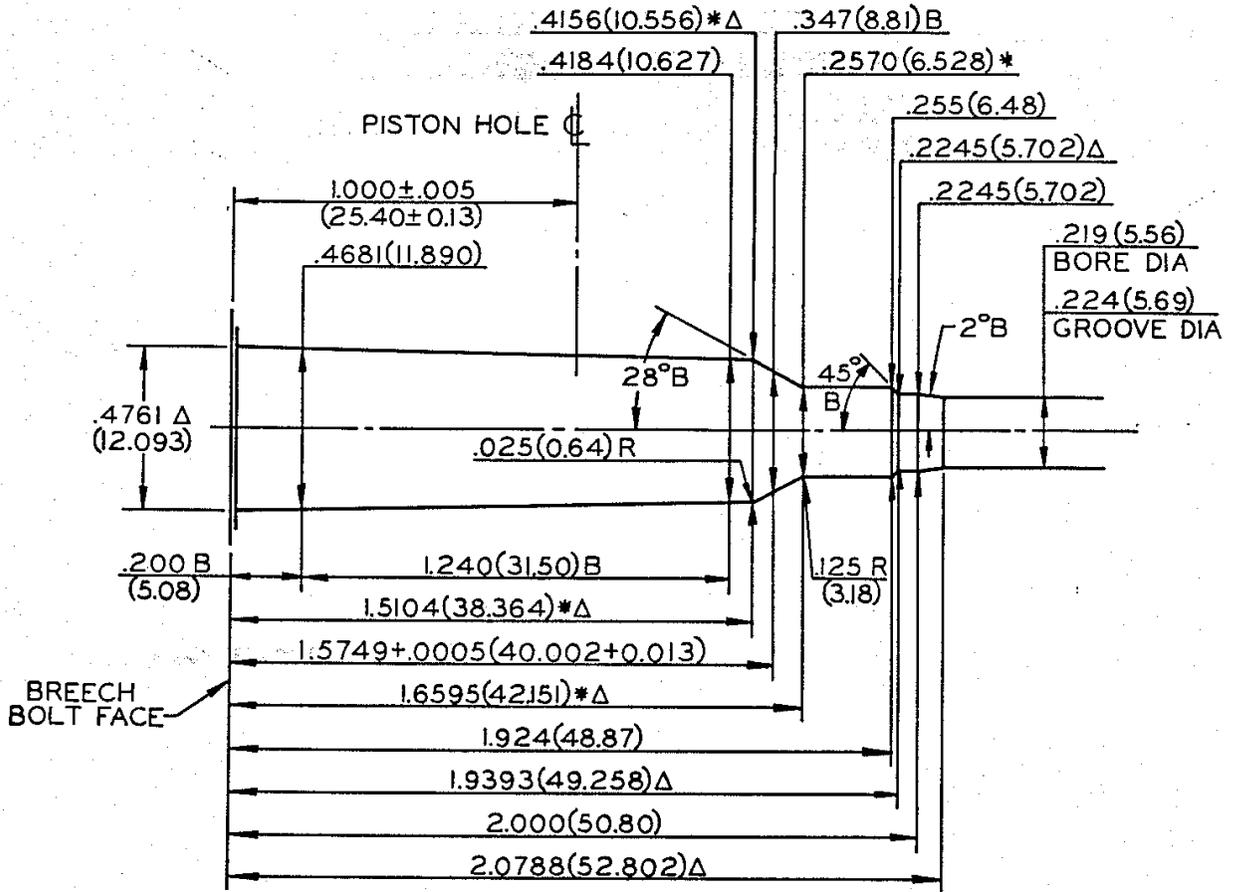
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ = REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 22-250 REMINGTON



NO. OF GROOVES	6
WIDTH OF GROOVES	$.080 \pm .002$ (2.03 ± 0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	$24.000 \pm .010$ (609.60 ± 0.25)
DIA OF PISTON HOLE	$.206$ (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED

ALL DIA $+.0005$ (0.013)
 LENGTH TOL $+.005$ (0.13)

NOTE

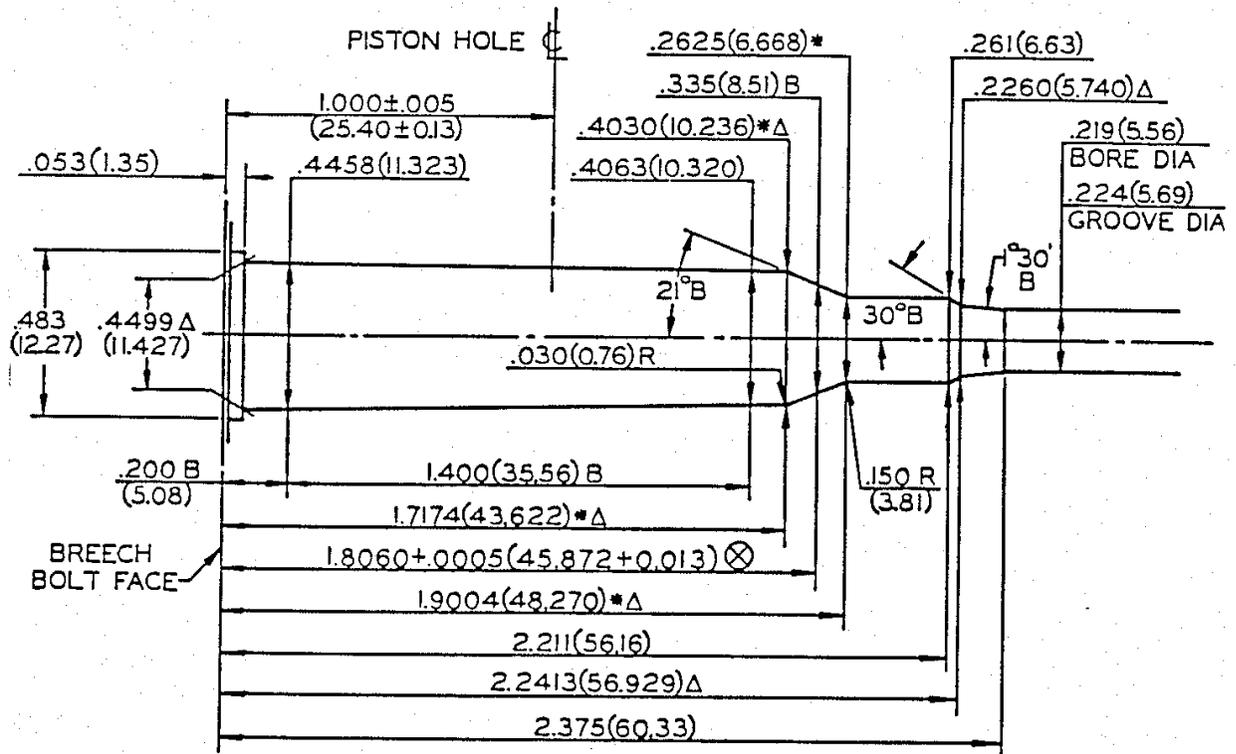
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ =REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 220 SWIFT



NO. OF GROOVES	6
WIDTH OF GROOVES	.074±.002 (1.88±0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES

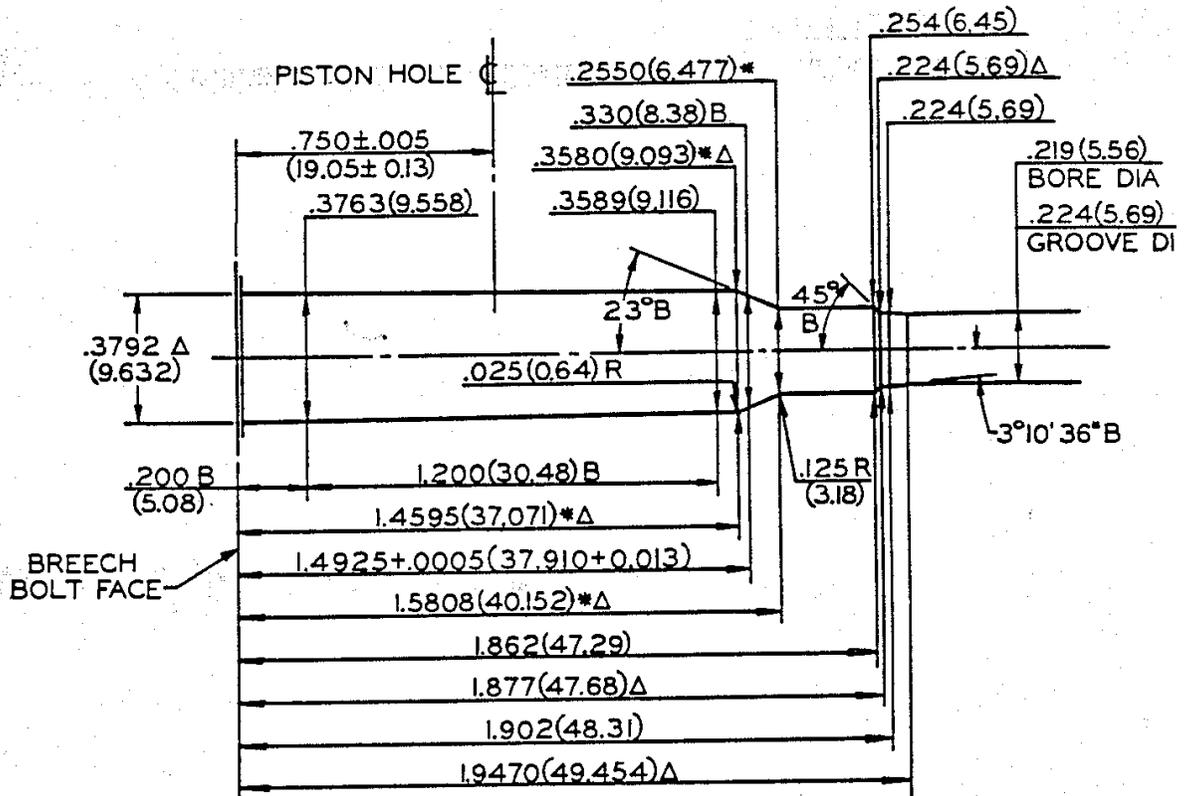
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

⊗=HEADSPACE DIMENSION

Δ=REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 222 REMINGTON MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.080+0.002 (2.03+0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B = BASIC

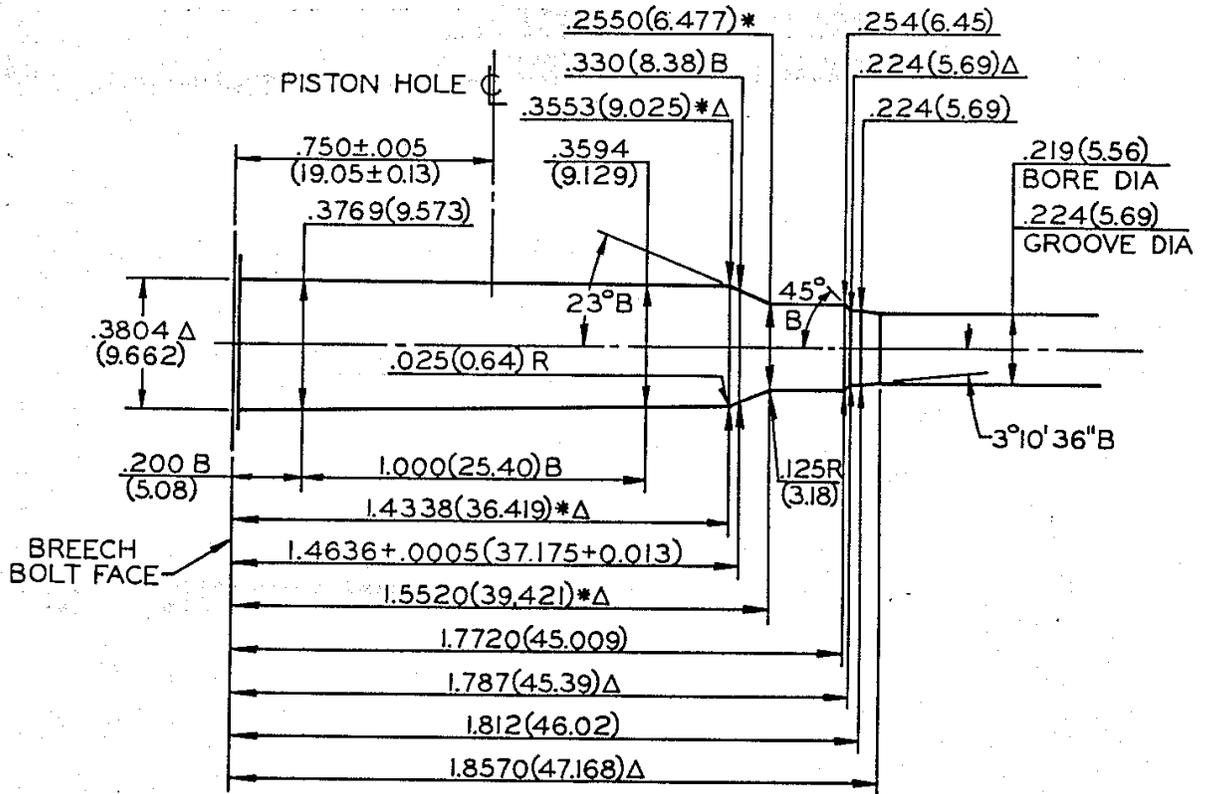
(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 223 REMINGTON



NO. OF GROOVES	6
WIDTH OF GROOVES	$.074 \pm .002 (1.88 \pm 0.05)$
TWIST	12 (304.8) RH
LENGTH OF BARREL	$24.000 \pm .010 (609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

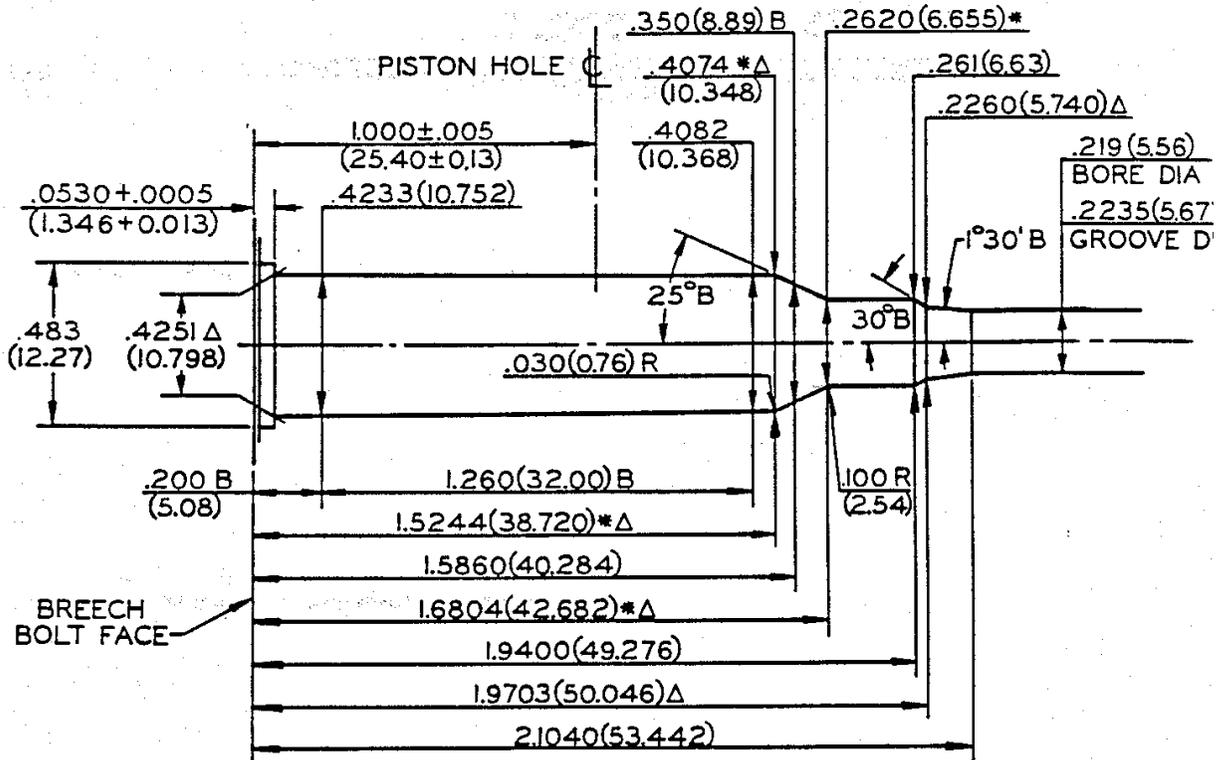
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ =REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 225 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.074 + .002 (1.88 + 0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000 ± .010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

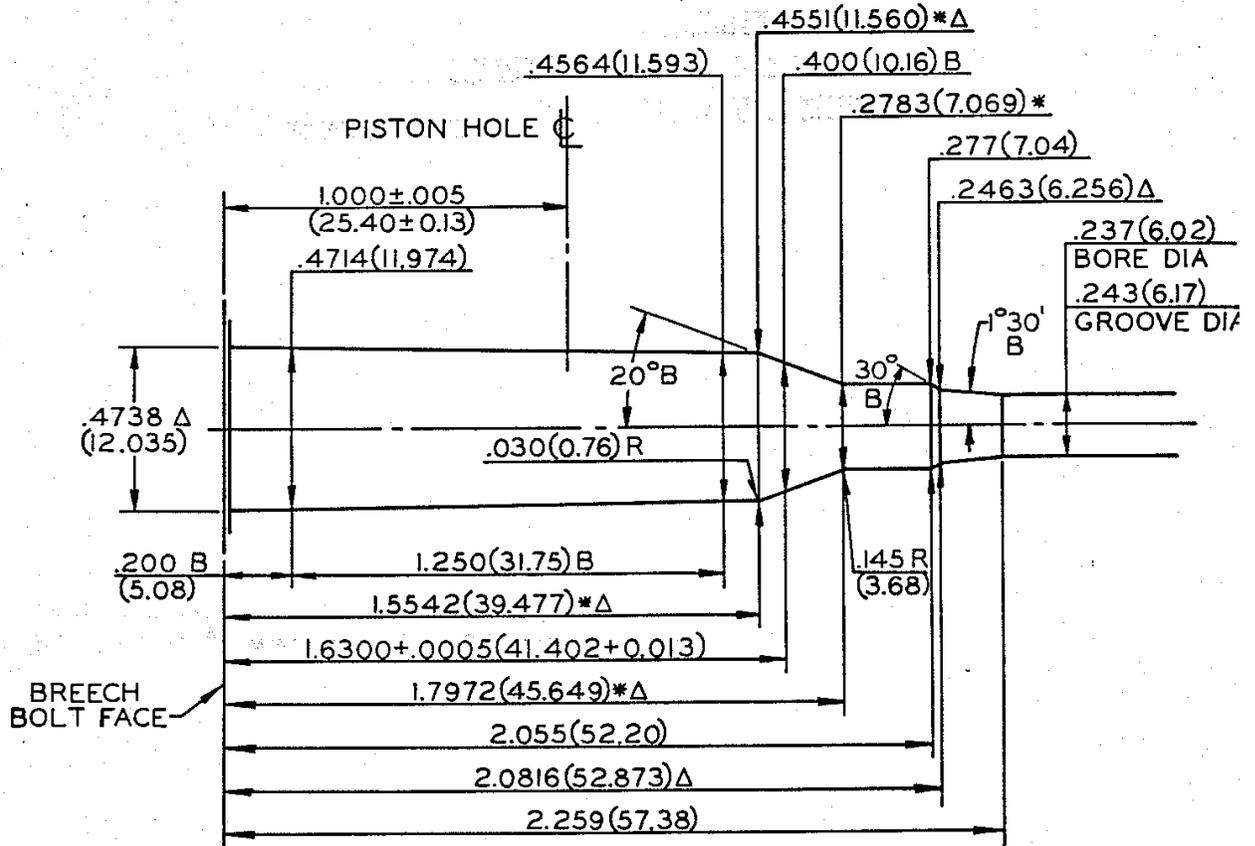
B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 243 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.068±.002 (1.73±0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

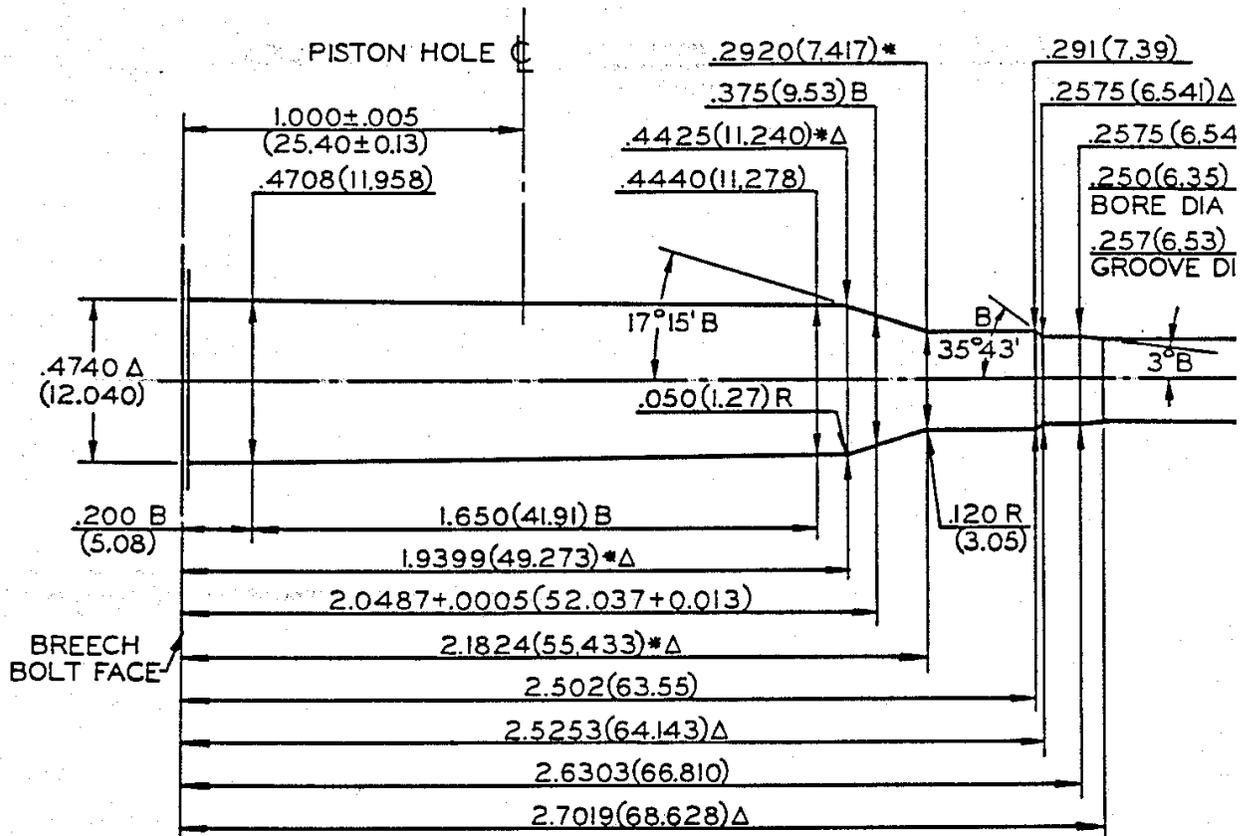
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 25-06 REMINGTON



NO. OF GROOVES	6
WIDTH OF GROOVES	.096±.002(2.44±0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B = BASIC

* DIMENSIONS ARE TO INTERSECTION OF LINES

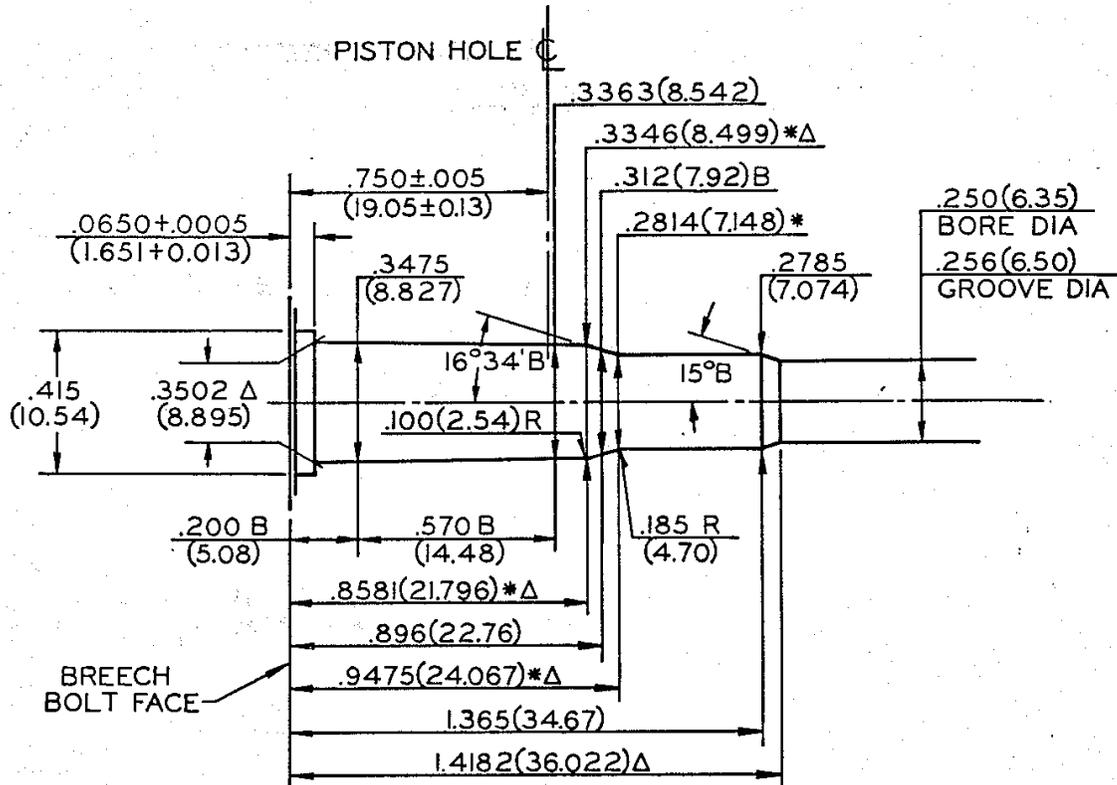
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

(XX.XX) = MILLIMETERS

Δ = REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 25-20 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.078+0.002 (1.98+0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000 \pm .010 (609.60 \pm 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

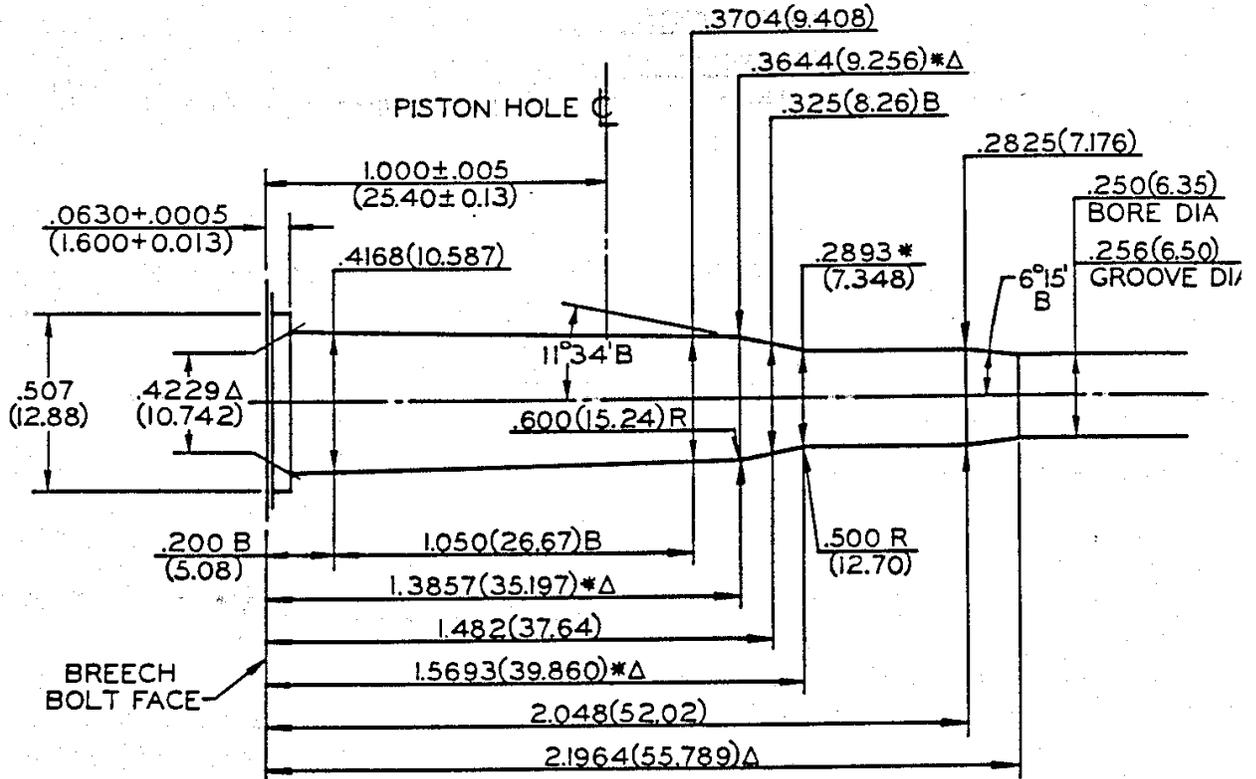
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ =REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 25-35 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.0786+0.0020 (1.996+0.051)
TWIST	8 (203.2) RH
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

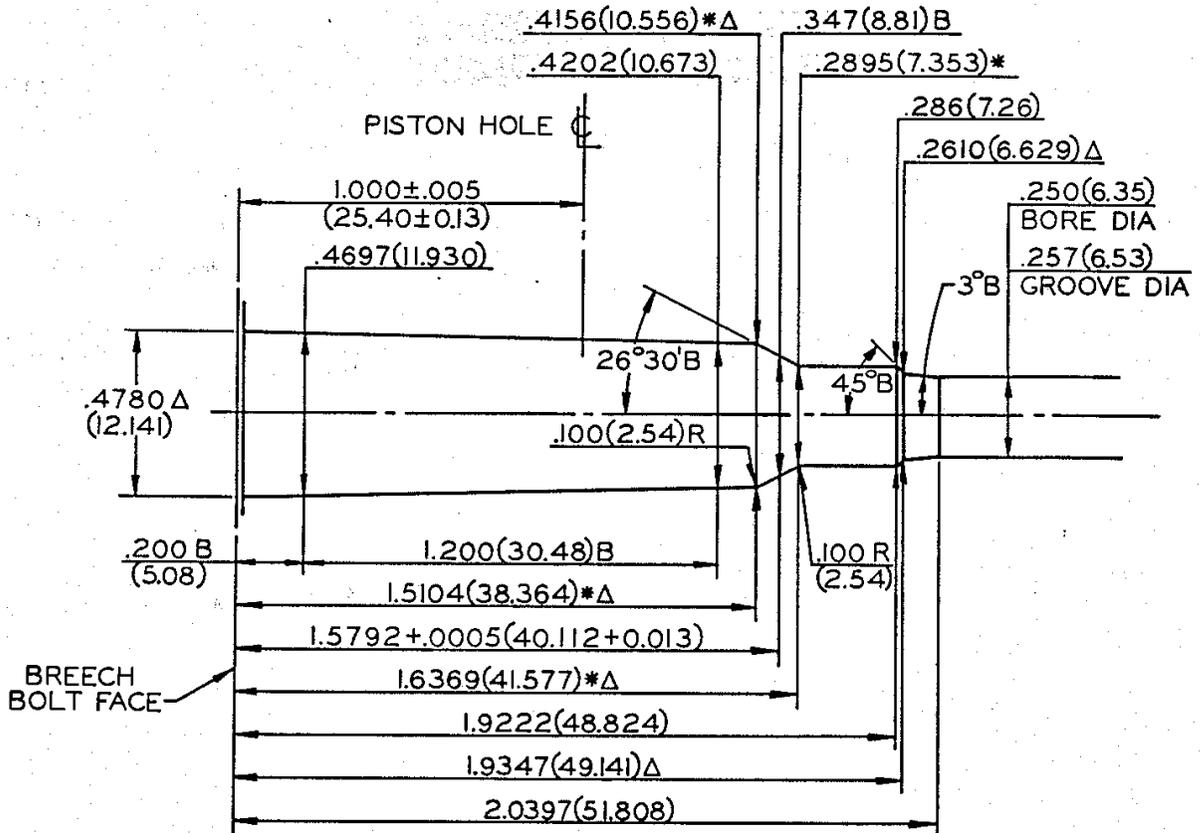
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 250 SAVAGE



NO. OF GROOVES	6
WIDTH OF GROOVES	$.088 \pm .002 (2.24 \pm 0.05)$
TWIST	14 (355.6) RH
LENGTH OF BARREL	$24.000 \pm .010 (609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+0.0005(0.013)$
 LENGTH TOL $+0.005(0.13)$

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

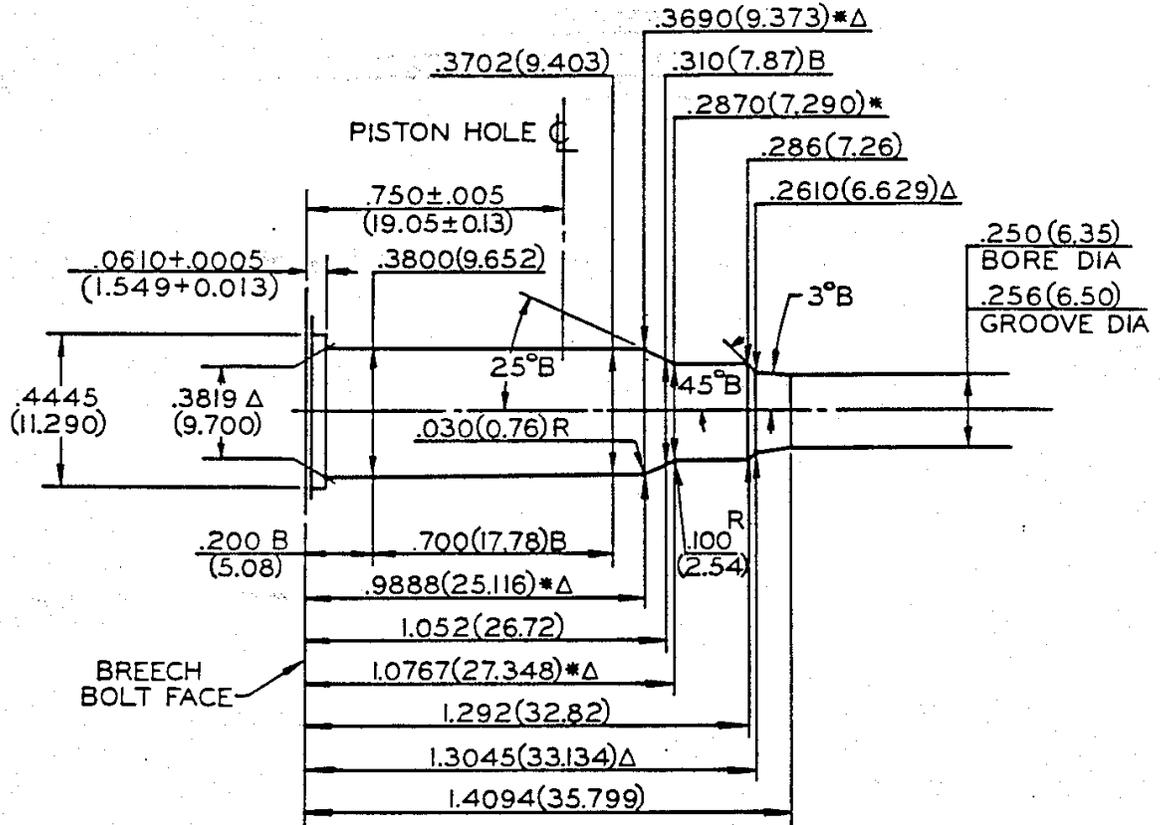
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ =REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 256 WINCHESTER MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.079+0.002 (2.01+0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

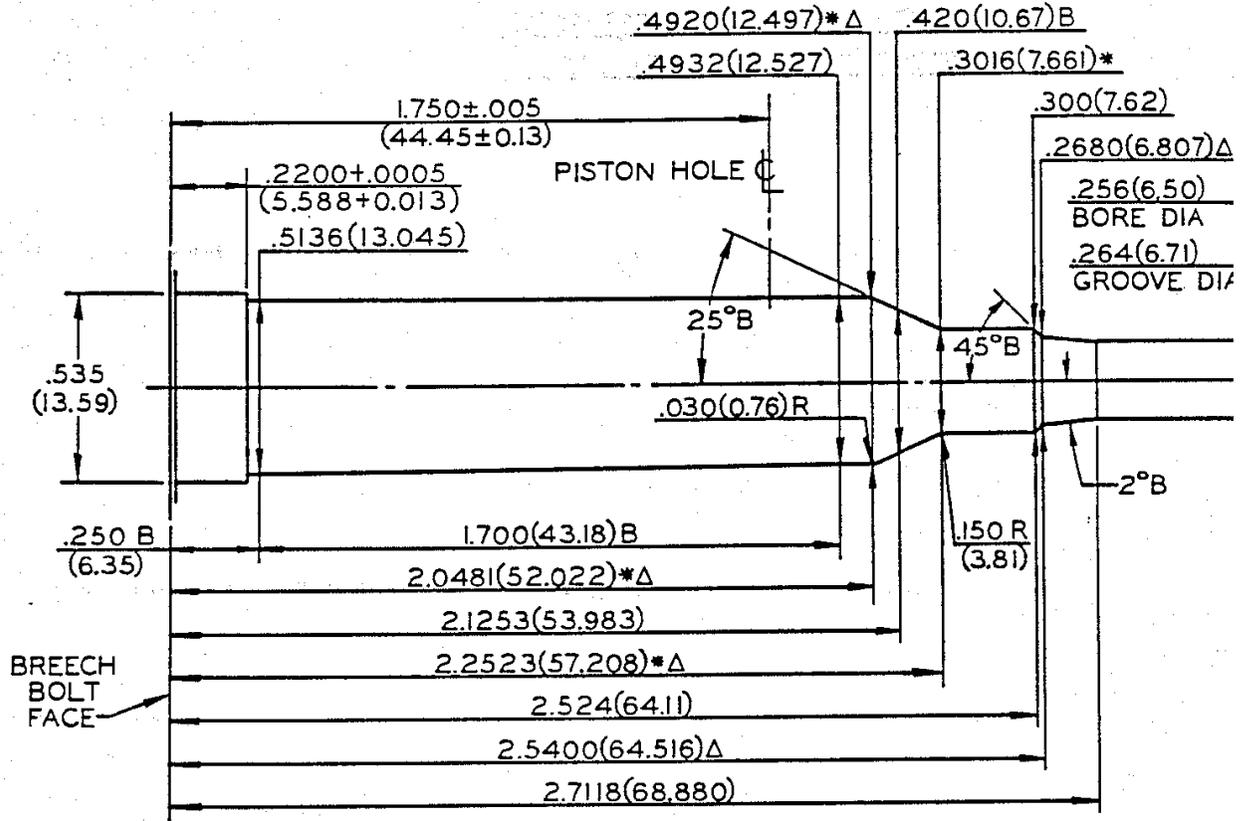
(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 264 WINCHESTER MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.090+0.002 (2.29+0.05)
TWIST	9 (228.6) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

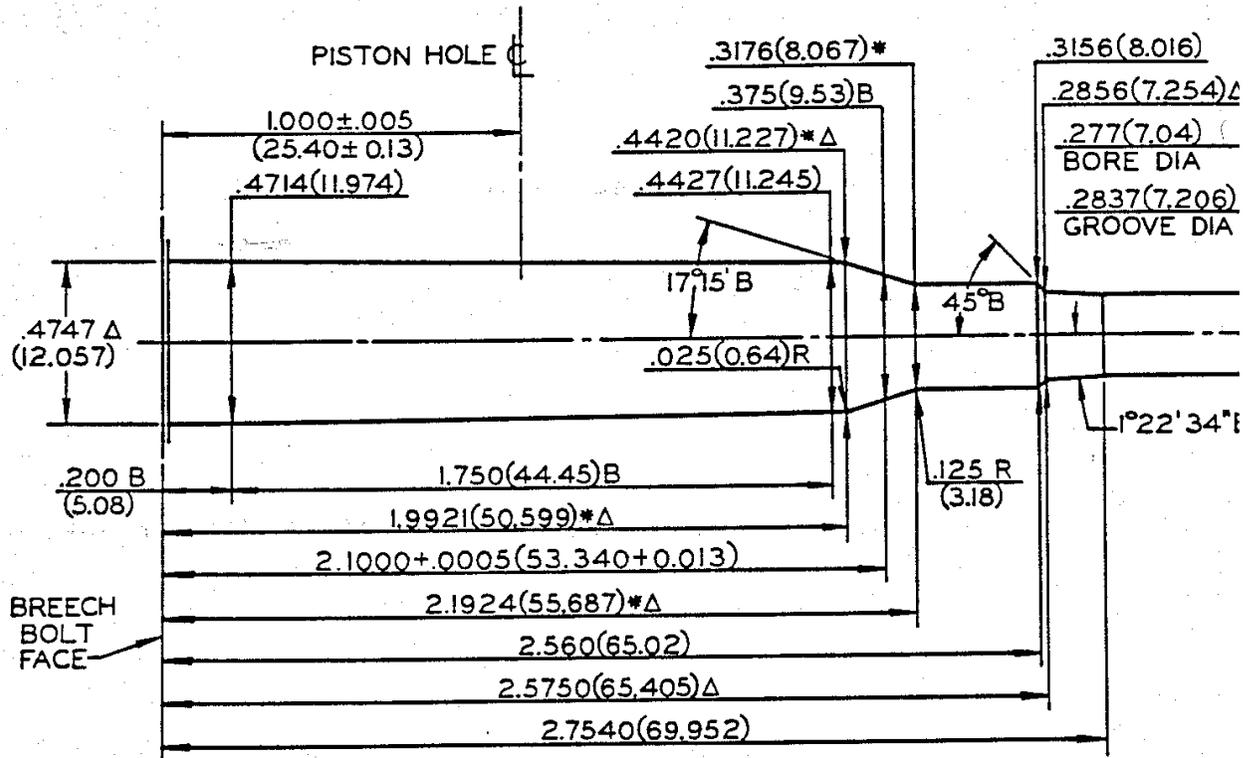
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 280 REMINGTON



NO. OF GROOVES 4
 WIDTH OF GROOVES $.160 \pm .002$ (4.06 \pm 0.05)
 TWIST 10 (254) RH
 LENGTH OF BARREL $24.000 \pm .010$ (609.60 \pm 0.25)
 DIA OF PISTON HOLE .206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005$ (0.013)
 LENGTH TOL $+.005$ (0.13)

NOTE

B = BASIC

(XX.XX) = MILLIMETERS

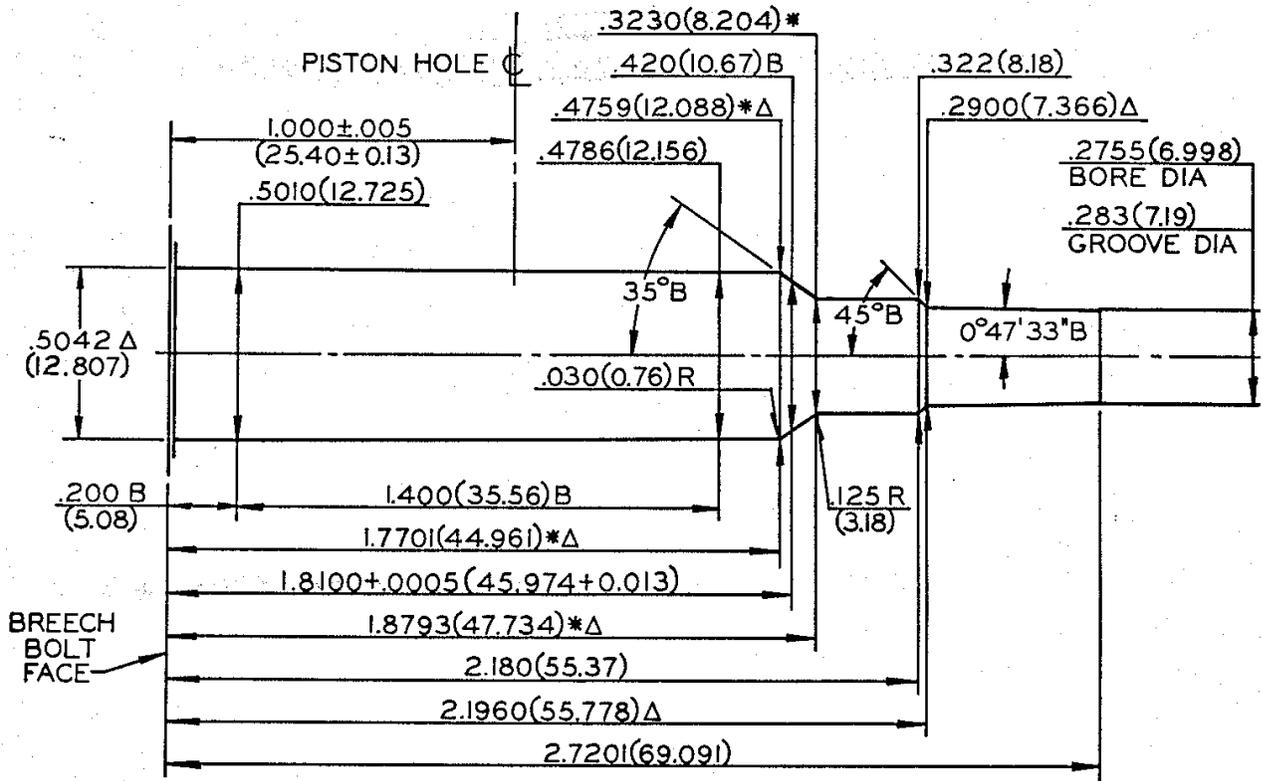
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ = REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 284 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.110 ± .002 (2.79 ± 0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000 ± .010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005 (0.013)
 LENGTH TOL +.005 (0.13)

NOTE

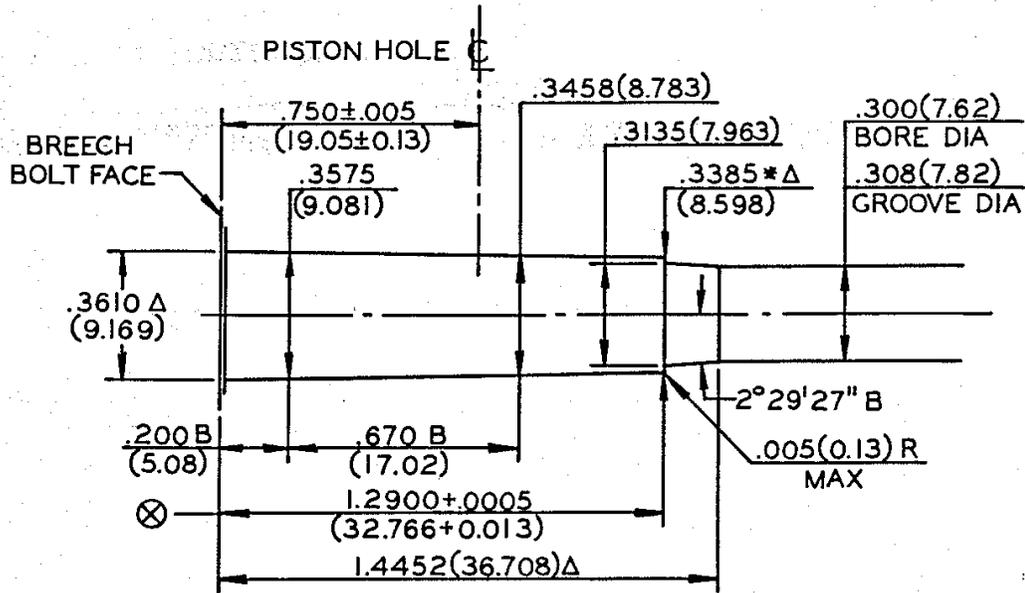
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 30 CARBINE



NO. OF GROOVES	4
WIDTH OF GROOVES	.167+.002 (4.24+0.05)
TWIST	20(508) RH
LENGTH OF BARREL	20.000±.010(508.00±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES

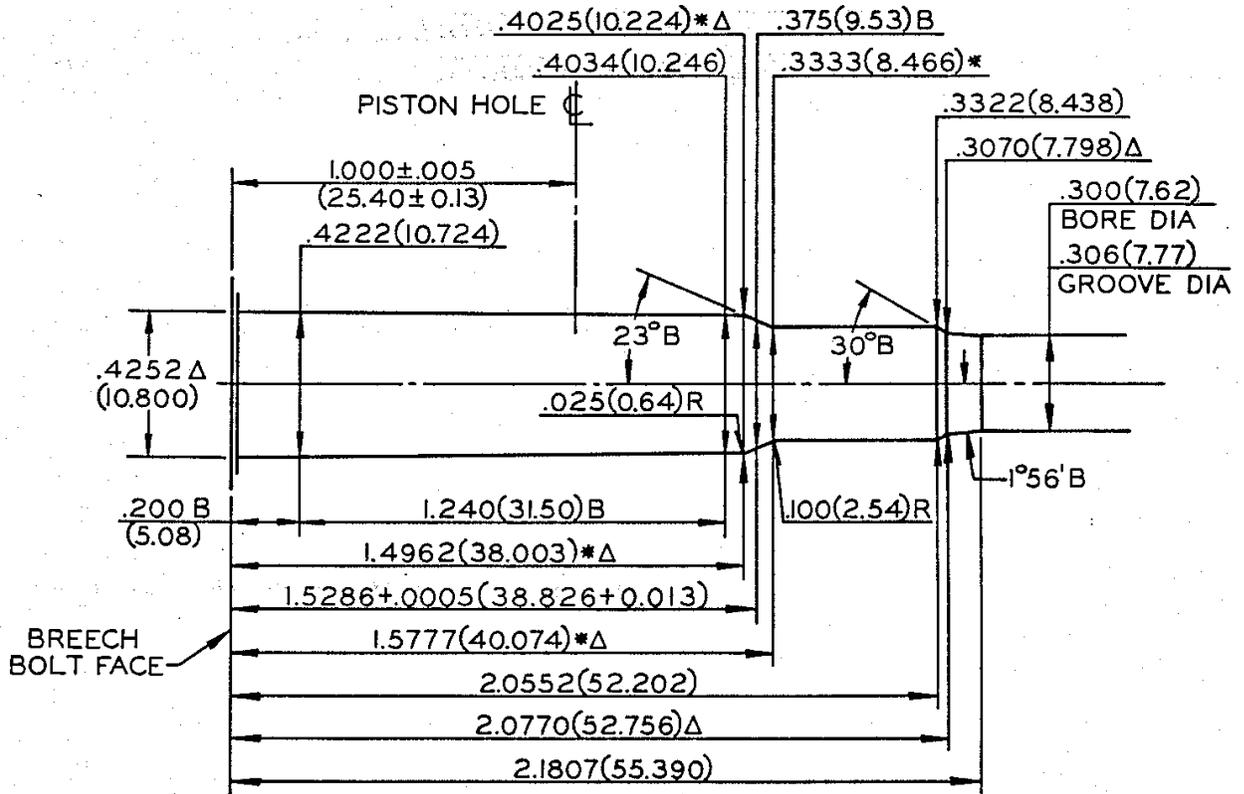
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

⊗=HEADSPACE DIMENSION

Δ=REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 30 REMINGTON



NO. OF GROOVES	7
WIDTH OF GROOVES	$.105 \pm .002 (2.67 \pm 0.05)$
TWIST	12 (304.8) RH
LENGTH OF BARREL	$24.000 \pm .010 (609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

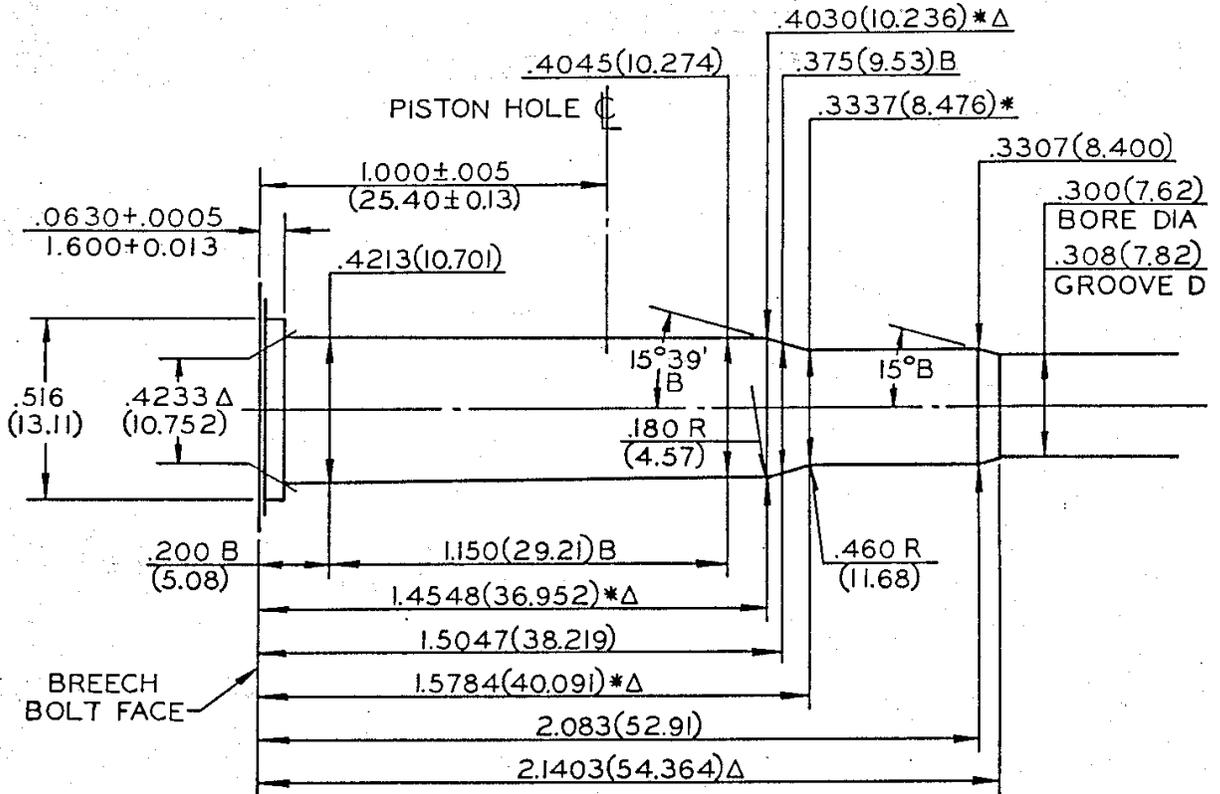
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ =REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 30-30 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.0942+0.0020(2.393+0.051)
TWIST	12 (304.8) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

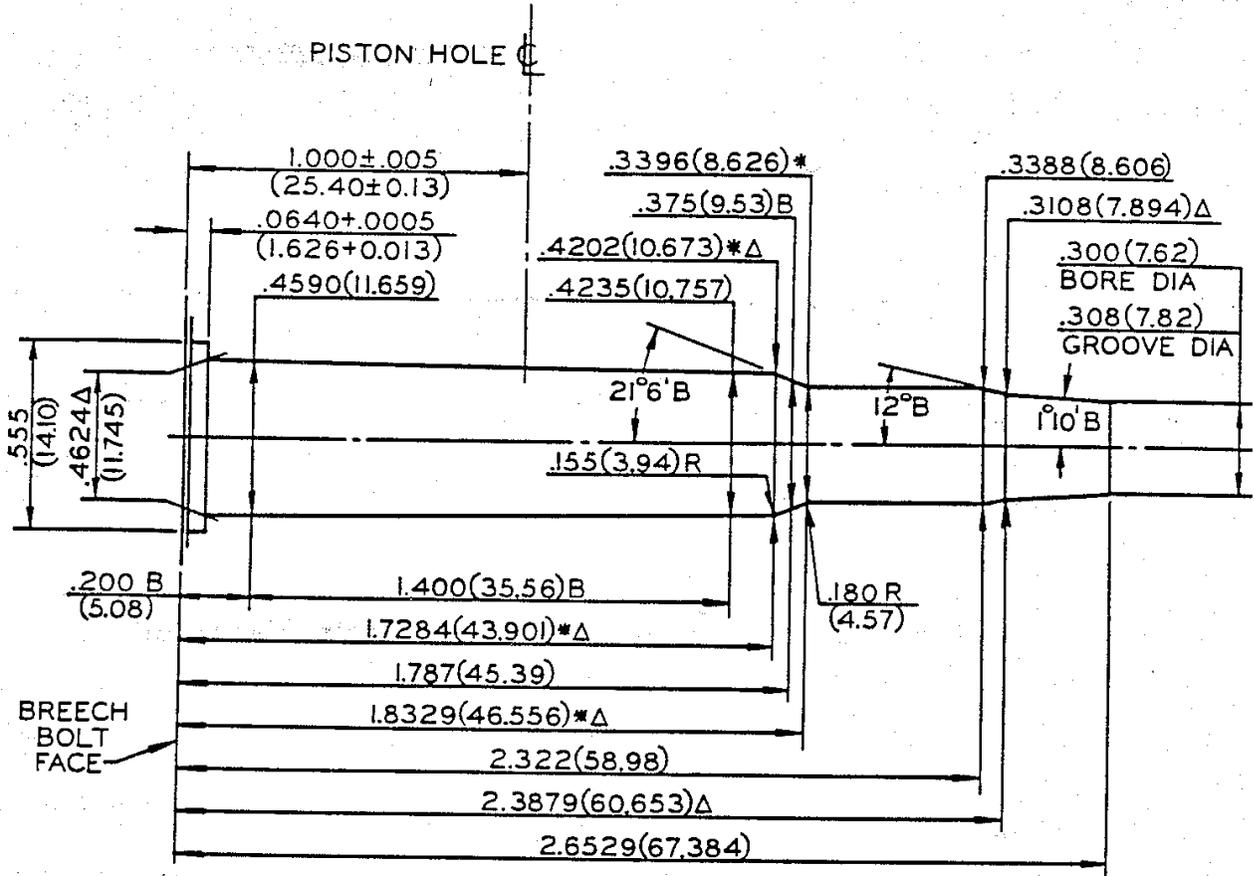
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 30-40 Krag



NO. OF GROOVES	6
WIDTH OF GROOVES	.094+0.002(2.39+0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

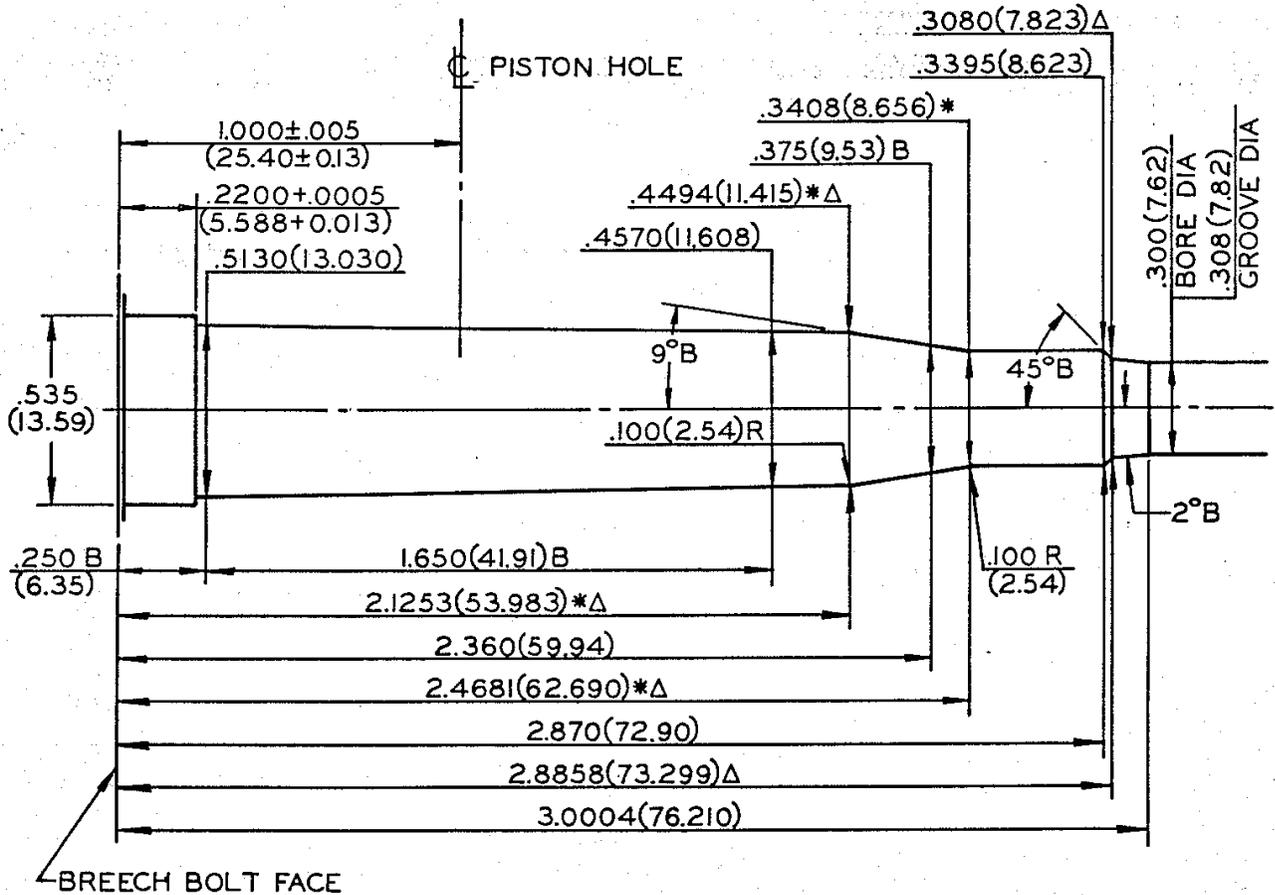
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 300 HOLLAND & HOLLAND MAGNUM



NO. OF GROOVES	4
WIDTH OF GROOVES	.176 + 0.002 (4.47 + 0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000 ± 0.010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

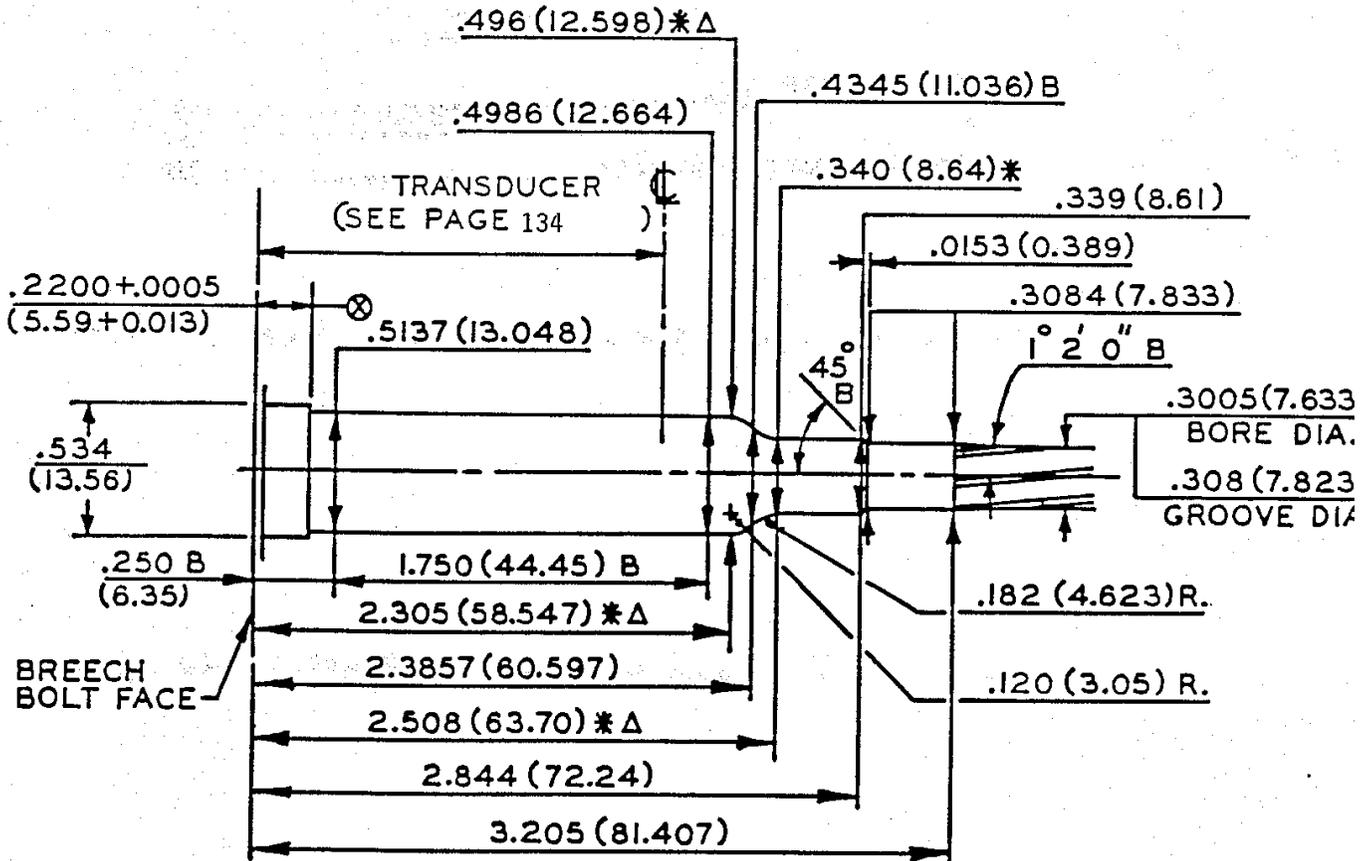
UNLESS OTHERWISE NOTED
 ALL DIA +.0005 (0.013)
 LENGTH TOL +.005 (0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	6
WIDTH OF GROOVES	.118+0.002 (2.997+0.05)
TWIST	10 (254.0) R.H.
LENGTH OF BARREL	24.000±.010 (609.60±0.25)
DIA. OF PISTON HOLE	.206 (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

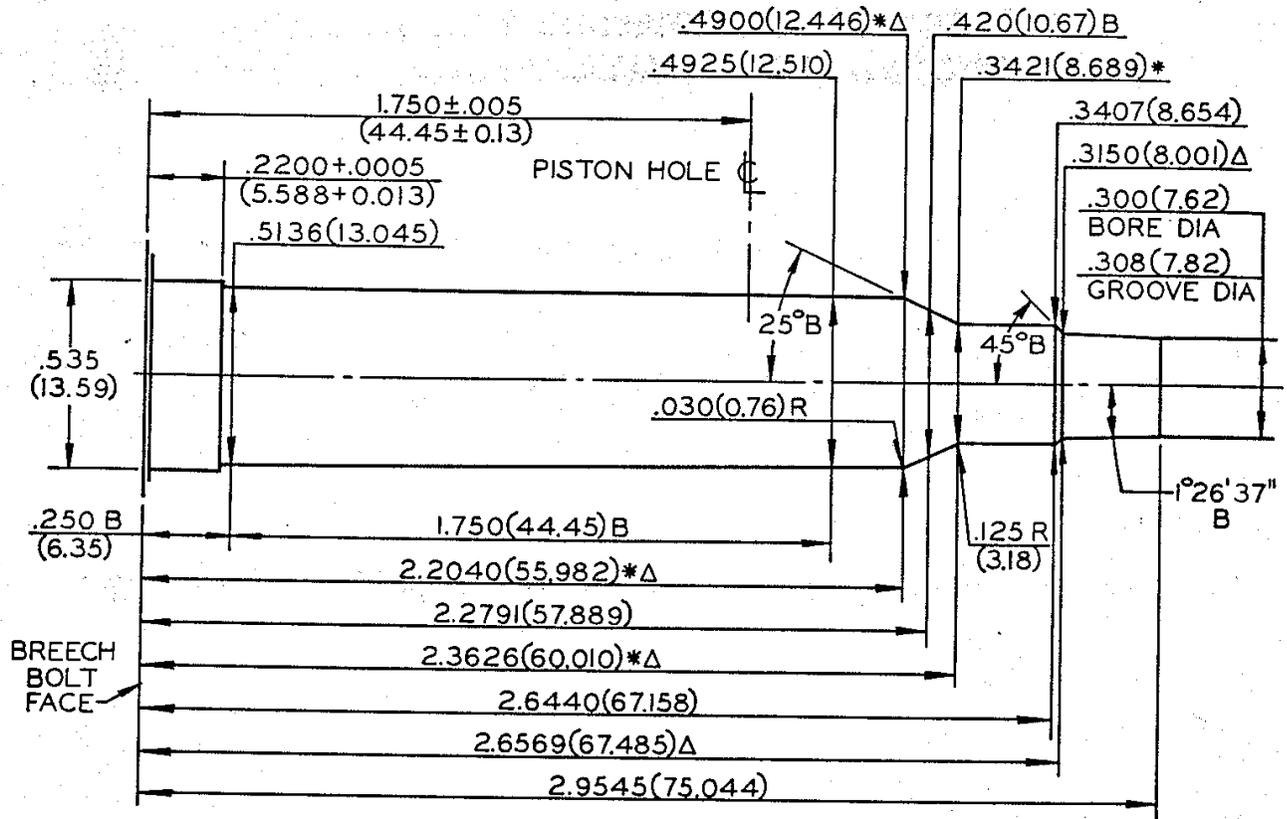
UNLESS OTHERWISE NOTED
 ALL DIA. +.0005 (0.013)
 LENGTH TOL. +.005 (0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 300 WINCHESTER MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.110+0.002(2.79+0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

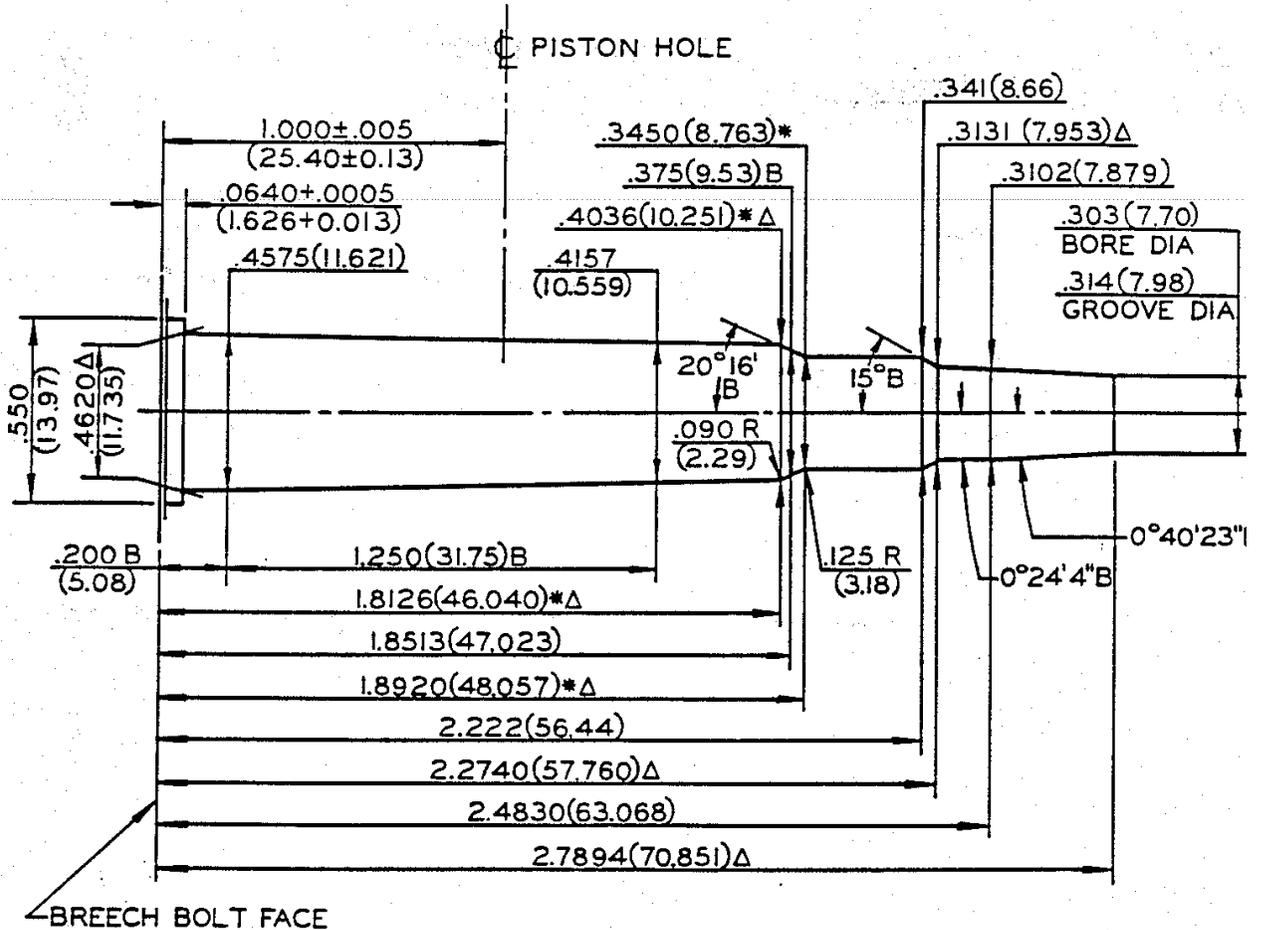
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 303 BRITISH



NO. OF GROOVES	5
WIDTH OF GROOVES	.0936+0.0020(2.377+0.051)
TWIST	10 (254) LH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

* DIMENSIONS ARE TO INTERSECTION OF LINES

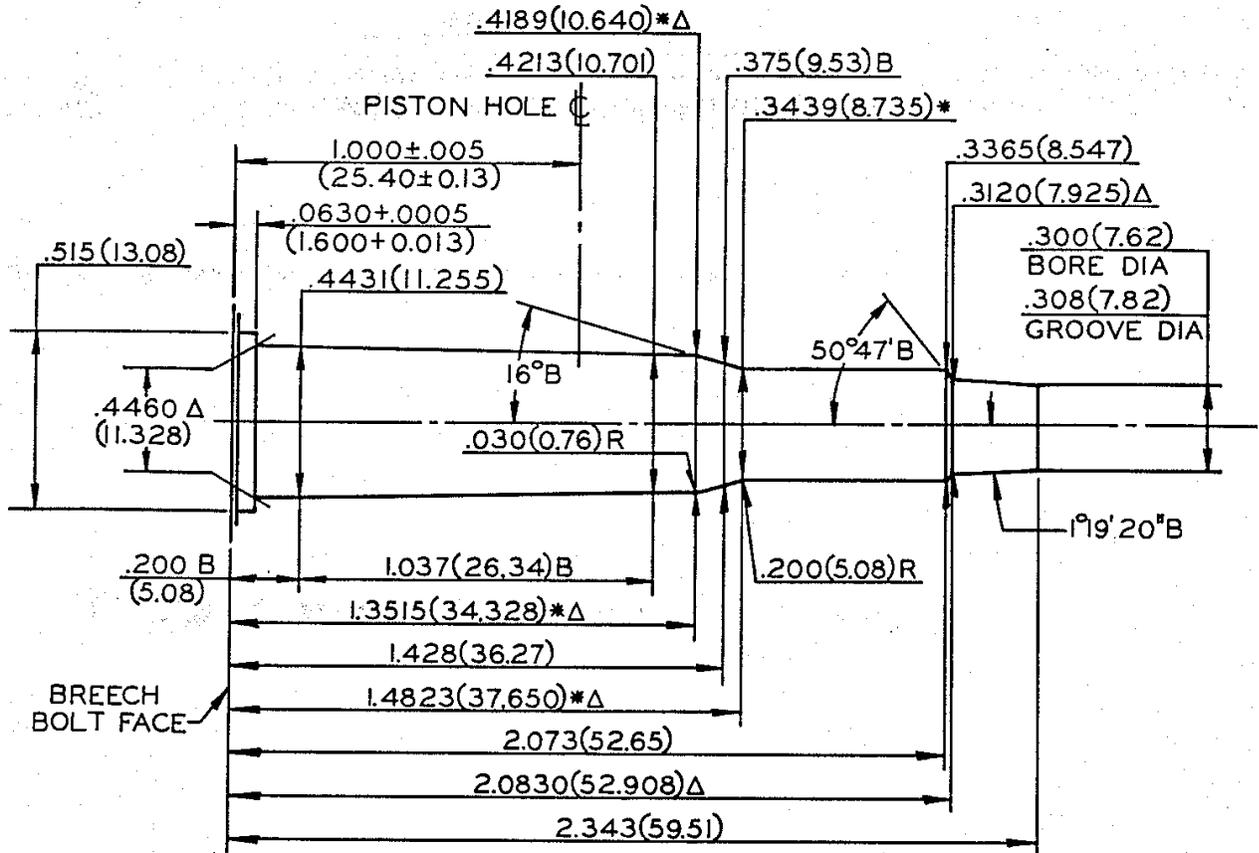
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

(XX.XX)=MILLIMETERS

Δ=REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 303 SAVAGE



NO. OF GROOVES	6
WIDTH OF GROOVES	$.100 + .002(2.54 + 0.05)$
TWIST	10 (254) RH
LENGTH OF BARREL	$24.000 \pm .010(609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206(5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+0.0005(0.013)$
 LENGTH TOL $+0.005(0.13)$

NOTE

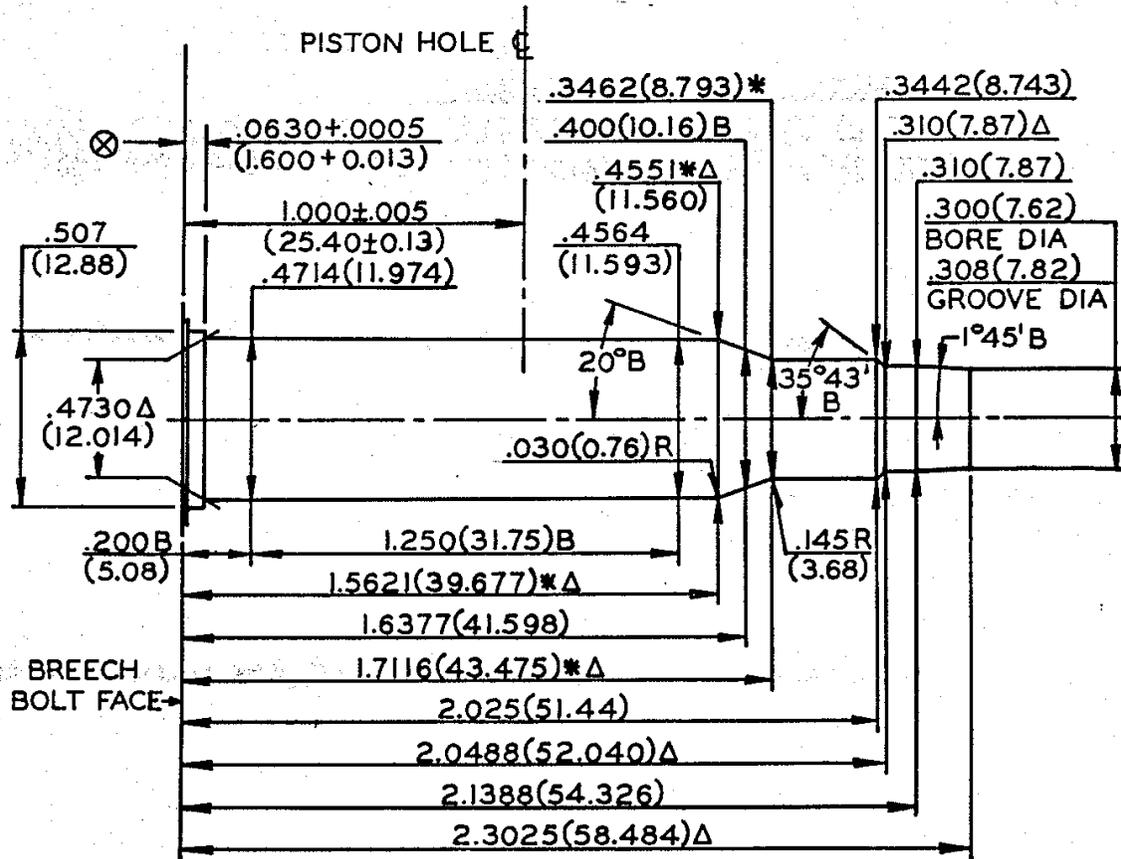
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ =REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	4
WIDTH OF GROOVES	.176+.002(4.47+0.05)
TWIST	12(304.8) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206(5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

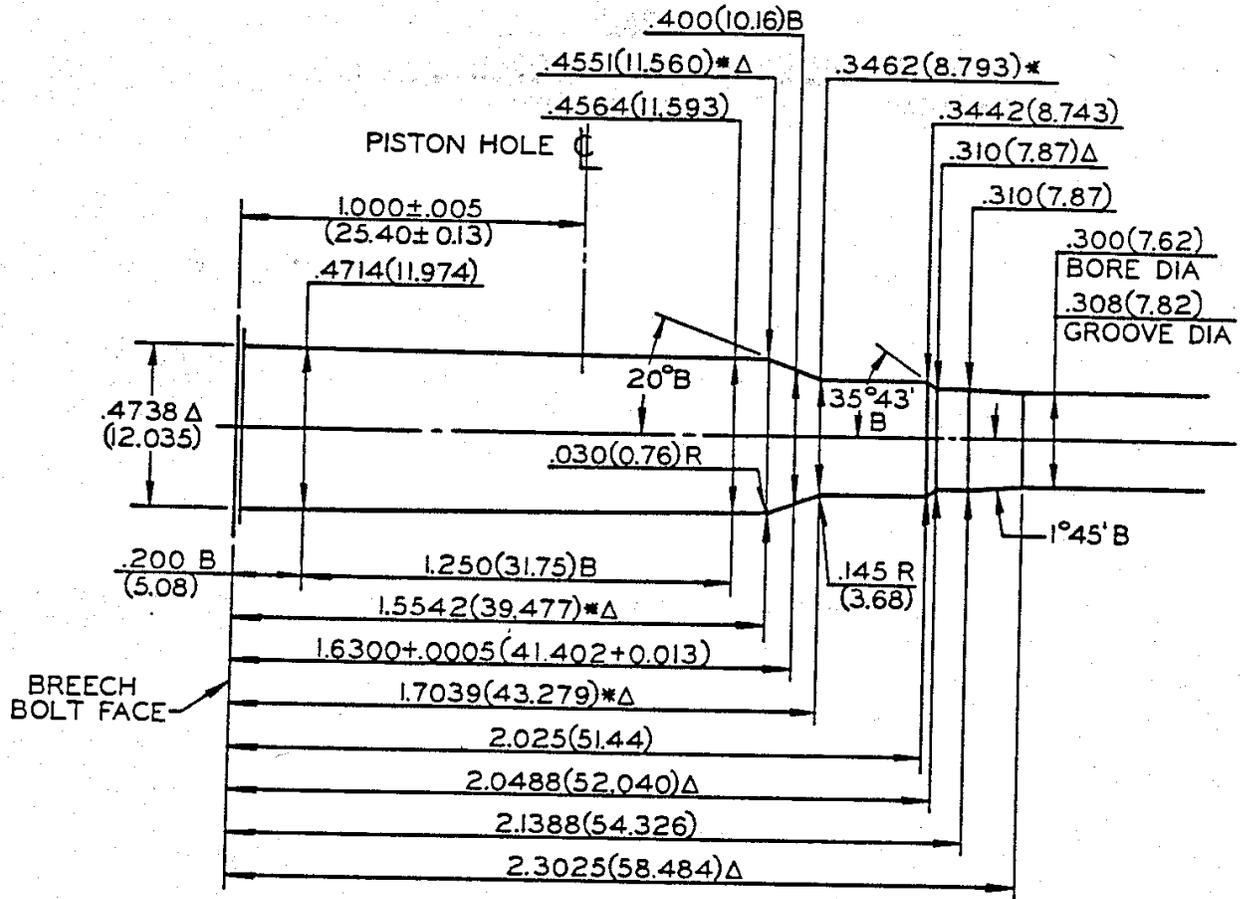
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 308 WINCHESTER



NO. OF GROOVES	4
WIDTH OF GROOVES	.176 ± 0.002 (4.47 ± 0.05)
TWIST	12 (304.8) RH
LENGTH OF BARREL	24.000 ± 0.010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED

ALL DIA: +.0005 (0.013)
 LENGTH TOL: +.005 (0.13)

NOTE

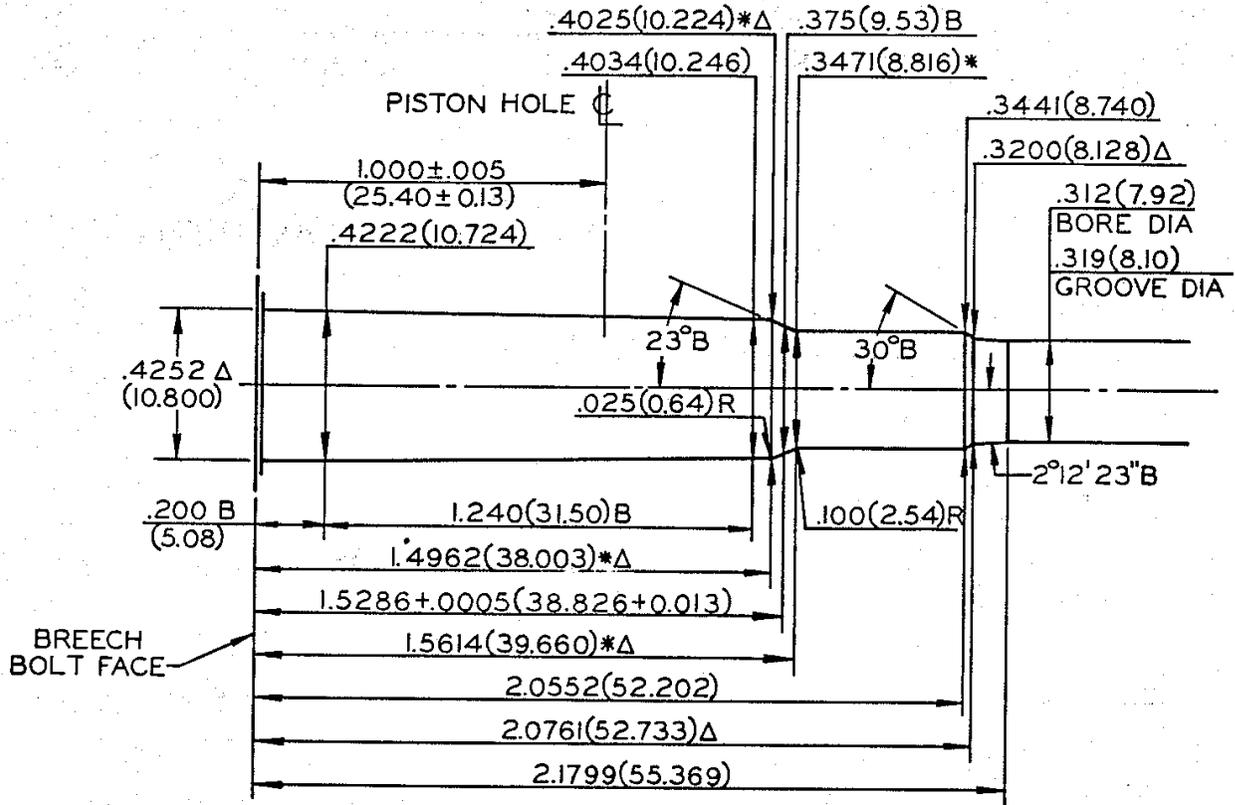
B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 32 REMINGTON



NO. OF GROOVES	7
WIDTH OF GROOVES	$.110 \pm .002(2.79 \pm 0.05)$
TWIST	14 (355.6) RH
LENGTH OF BARREL	$24.000 \pm .010(609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+ .0005(0.013)$
 LENGTH TOL $+ .005(0.13)$

NOTE

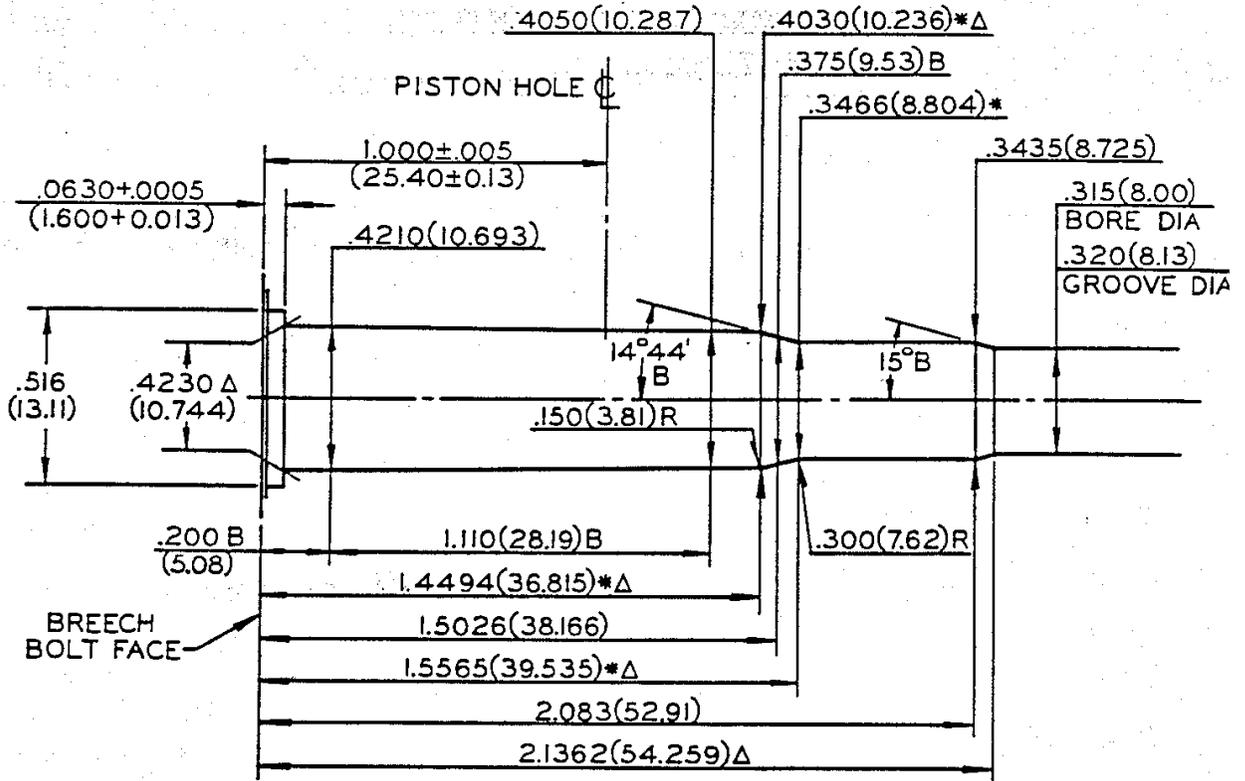
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ =REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 32 WINCHESTER SPECIAL



NO. OF GROOVES	6
WIDTH OF GROOVES	$.106+0.002(2.69+0.05)$
TWIST	16 (406.4) RH
LENGTH OF BARREL	$24.000 \pm 0.010(609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206(5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+0.0005(0.013)$
 LENGTH TOL $+0.005(0.13)$

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

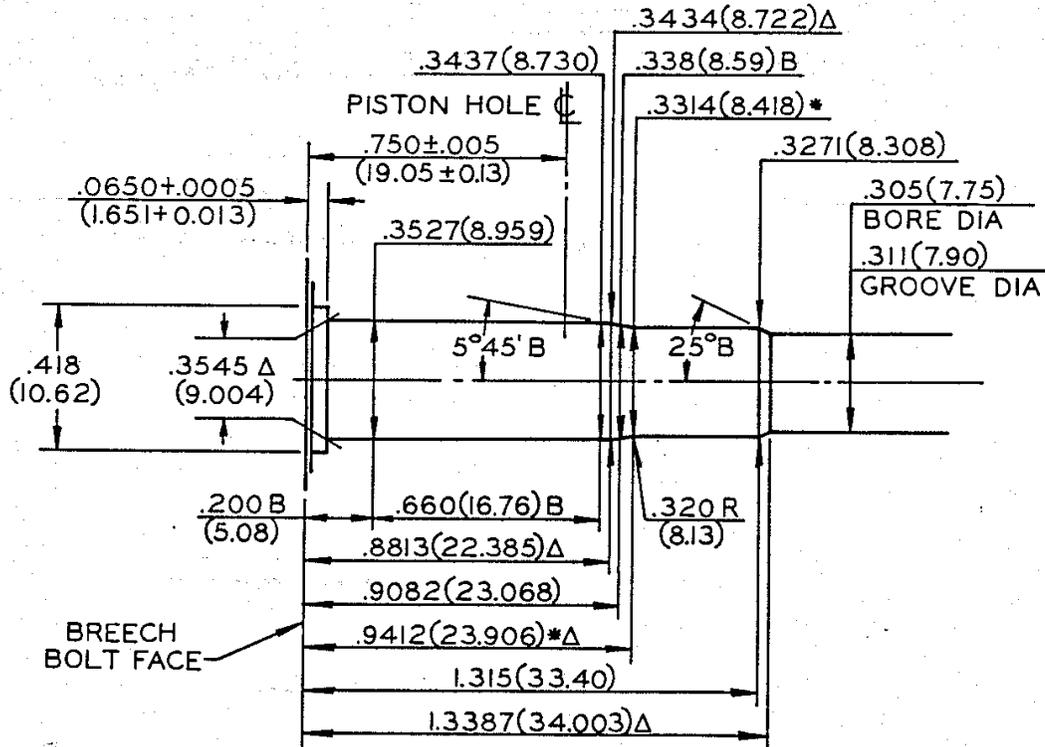
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ =REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 32-20 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	$.0958 + .0020(2.433 + 0.051)$
TWIST	20 (508) RH
LENGTH OF BARREL	$24.000 \pm .010(609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206(5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

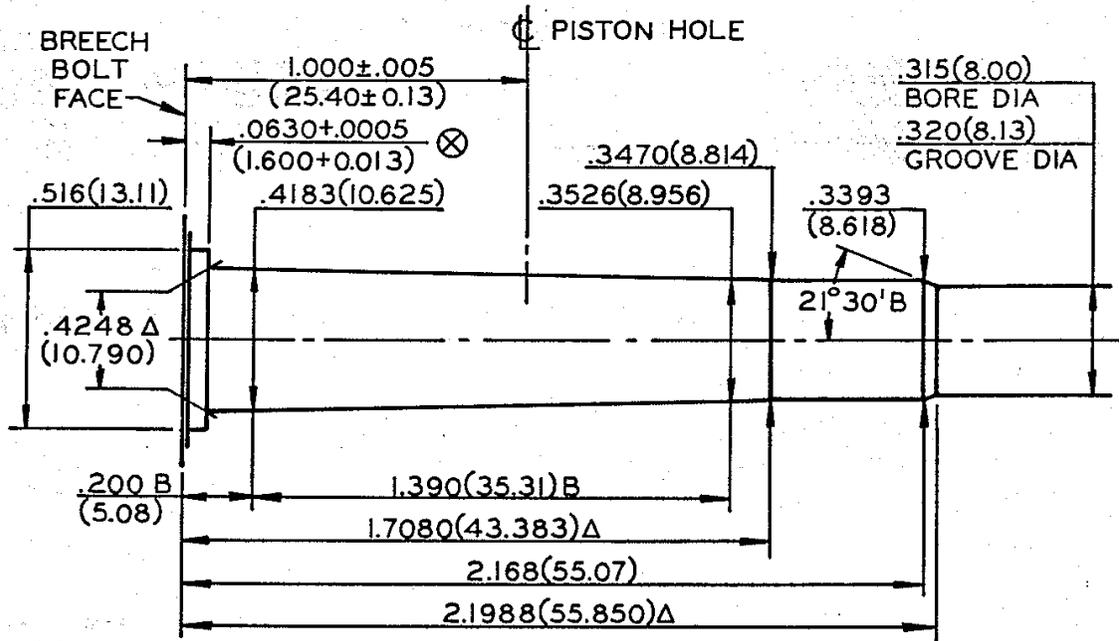
UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ =REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	6
WIDTH OF GROOVES	.099+0.002(2.51+0.05)
TWIST	16 (406.4) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206(5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

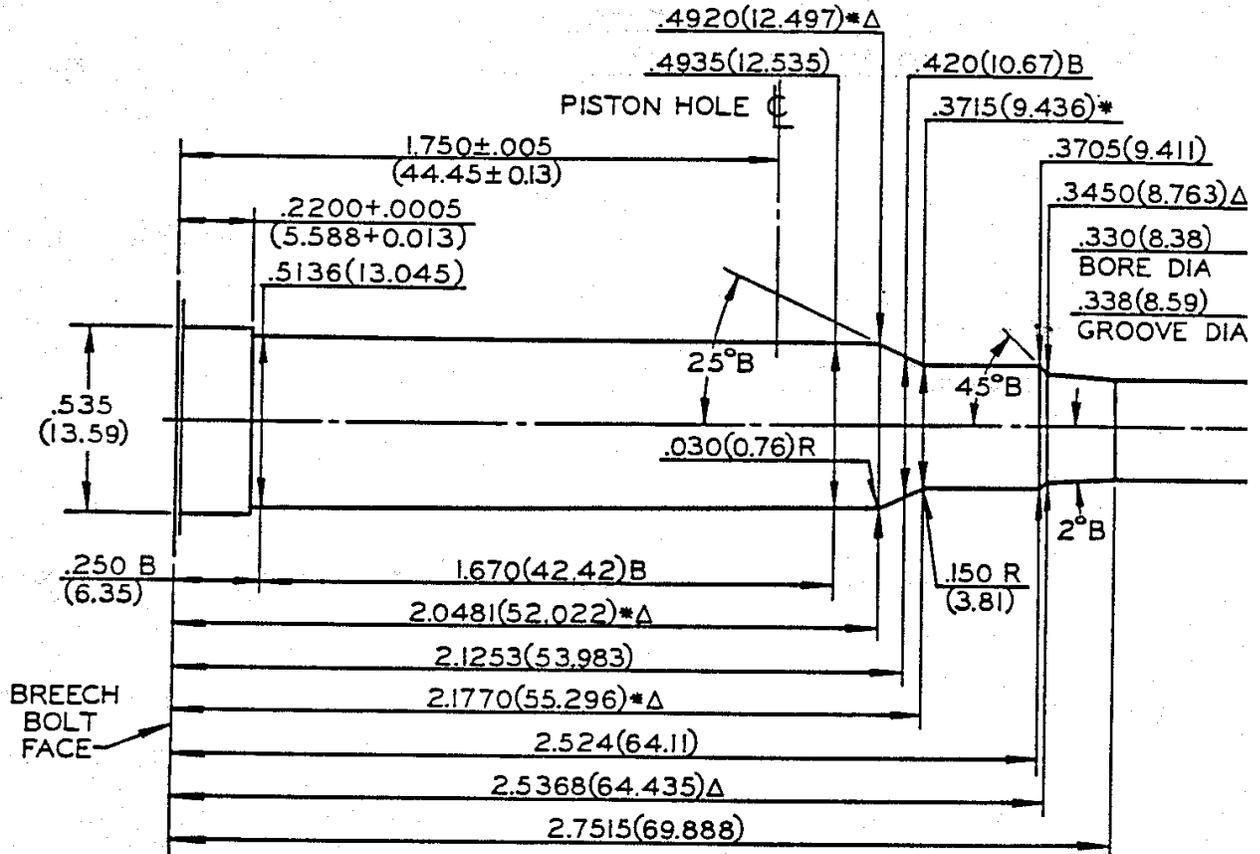
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC (XX.XX)=MILLIMETERS ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 338 WINCHESTER MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.110+0.002(2.79+0.05)
TWIST	10 (254) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

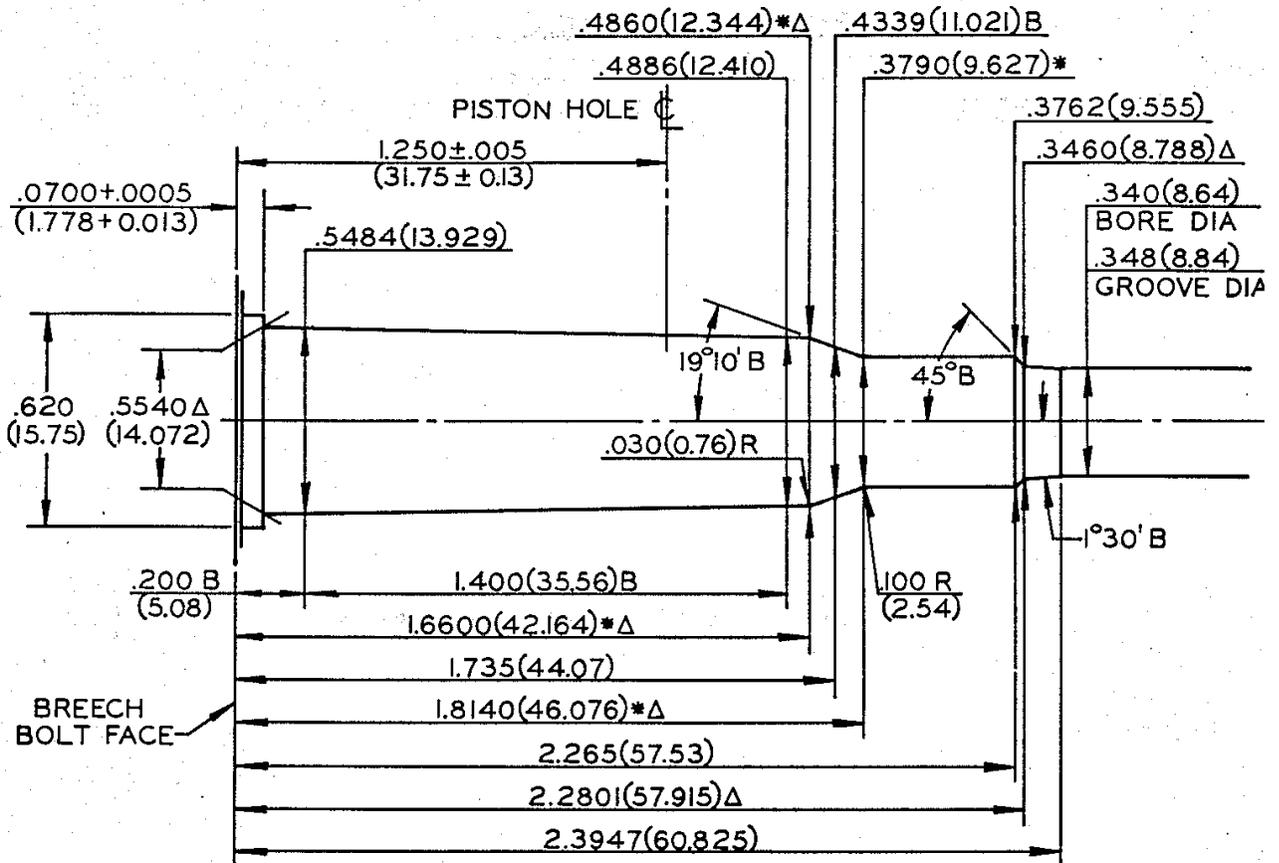
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 348 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	$.120 \pm .002$ (3.05 ± 0.05)
TWIST	12 (304.8) RH
LENGTH OF BARREL	$24.000 \pm .010$ (609.60 ± 0.25)
DIA OF PISTON HOLE	$.206$ (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $\pm .0005$ (0.013)
 LENGTH TOL $\pm .005$ (0.13)

NOTE

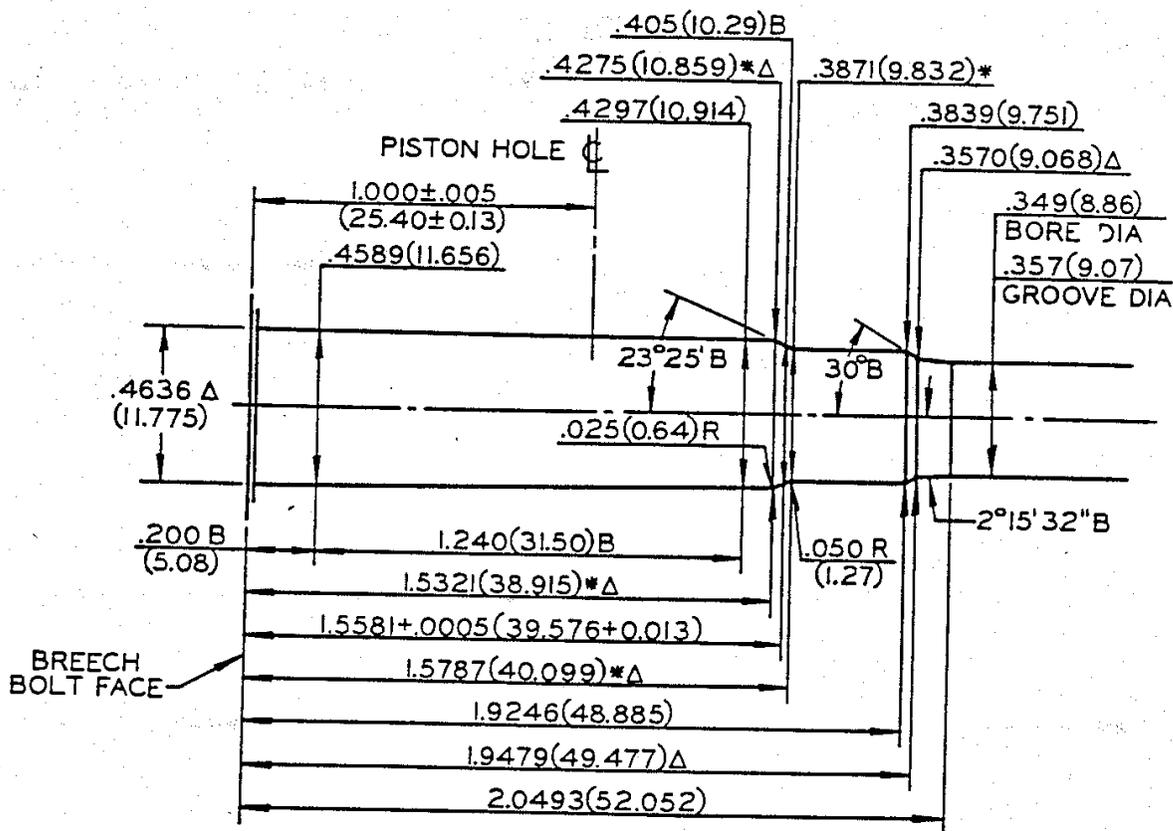
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 35 REMINGTON



NO. OF GROOVES	7
WIDTH OF GROOVES	.115 +.002 (2.92 + 0.05)
TWIST	16 (406.4) RH
LENGTH OF BARREL	24.000 ± .010 (609.60 ± 0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

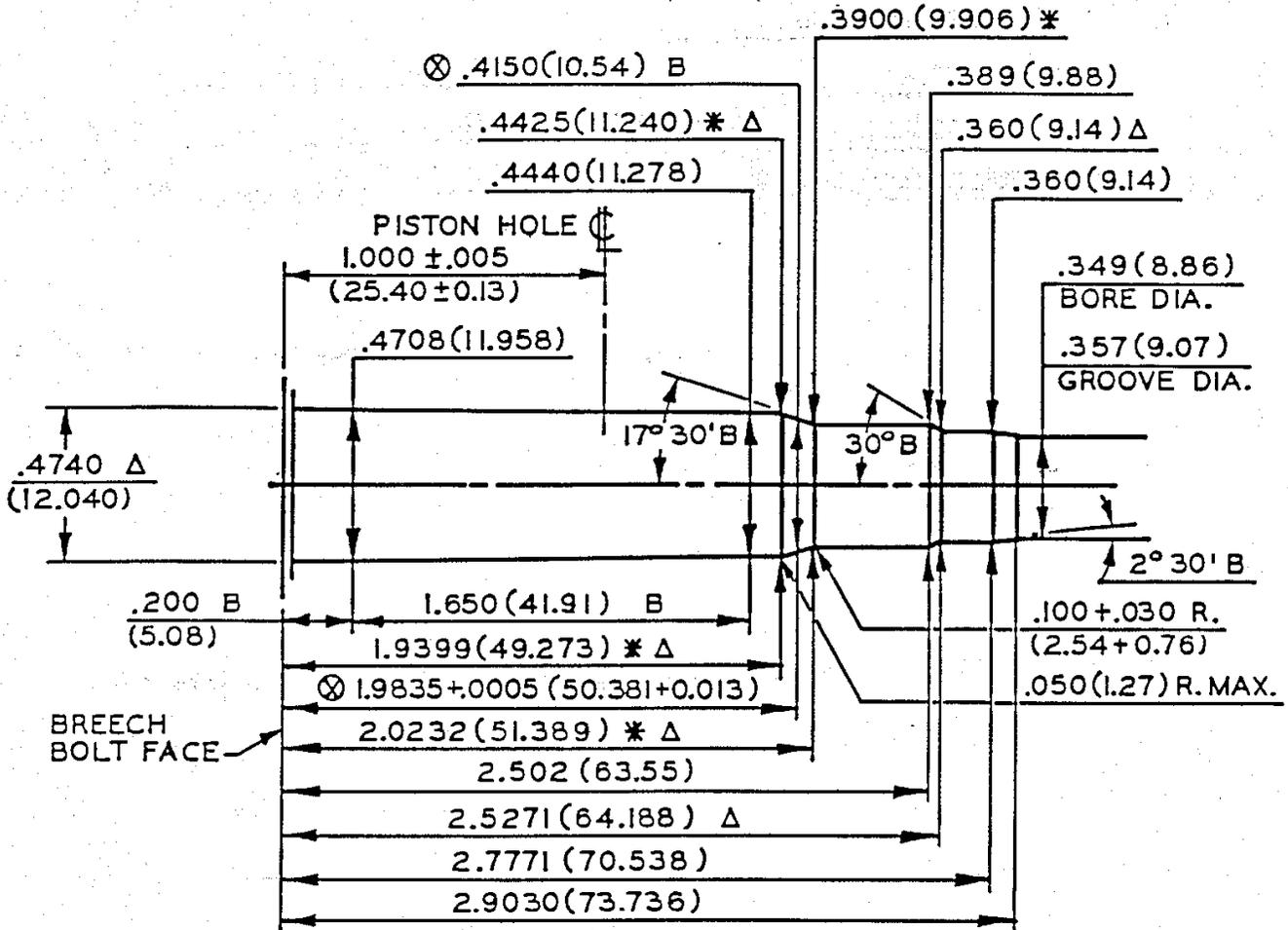
UNLESS OTHERWISE NOTED
 ALL DIA +.0005 (0.013)
 LENGTH TOL +.005 (0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	6
WIDTH OF GROOVES	.130 + .002 (3.30 + 0.05)
TWIST	16 (406.4) R.H.
LENGTH OF BARREL	24.000 \pm .010 (609.60 \pm 0.25)
DIA. OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

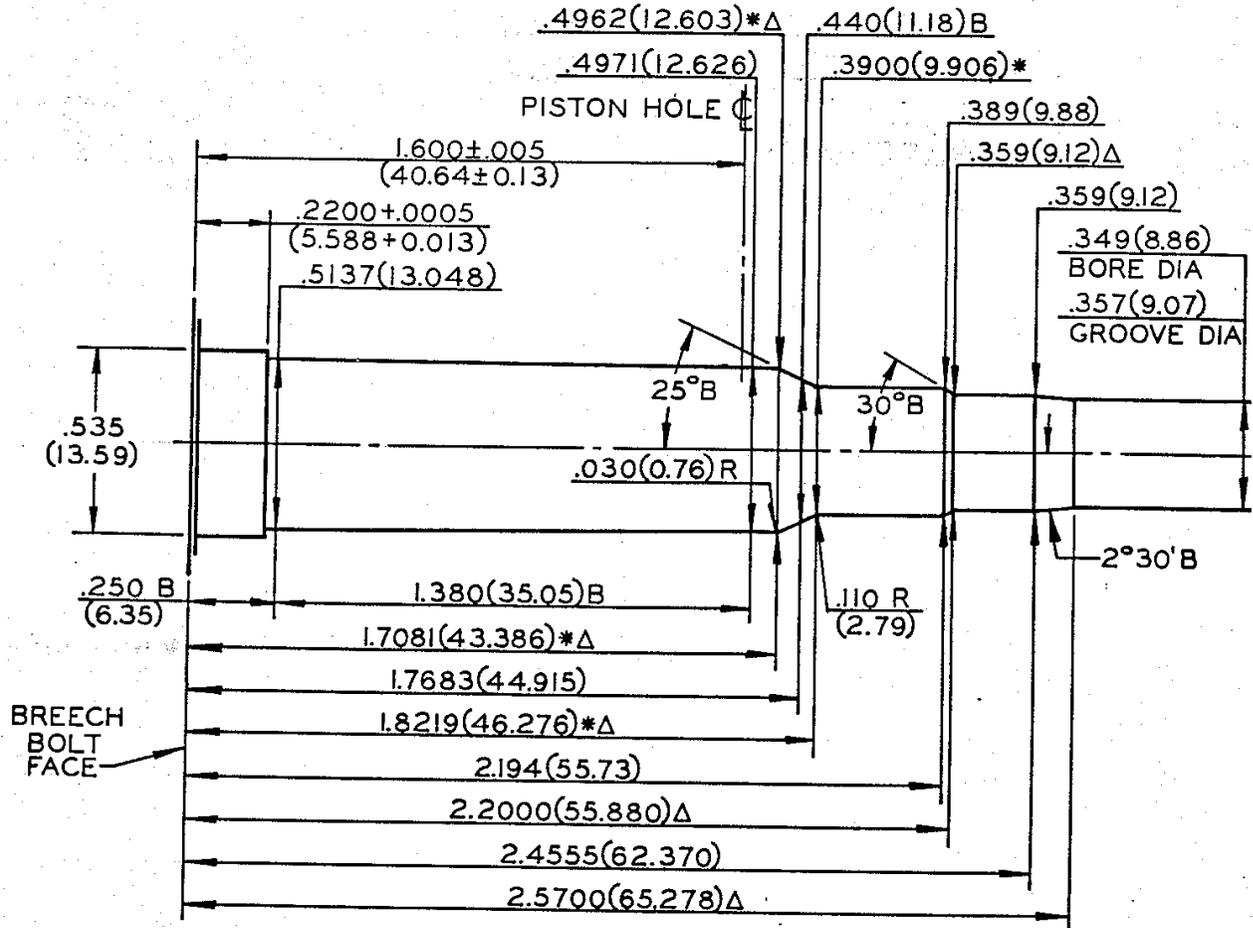
UNLESS OTHERWISE NOTED
 ALL DIA. + .0005 (0.013)
 LENGTH TOL. + .005 (0.13)

NOTE

- B = BASIC
- (XX.XX) = MILLIMETERS
- \textcircled{X} = HEADSPACE DIMENSION
- Δ = REFERENCE DIMENSION
- * DIMENSIONS ARE TO INTERSECTION OF LINES
- ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 350 REMINGTON MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	$.130 \pm .002 (3.30 \pm 0.05)$
TWIST	16 (406.4) RH
LENGTH OF BARREL	$20.000 \pm .010 (508.00 \pm 0.25)$
DIA OF PISTON HOLE	$.206 (5.23)$

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B=BASIC

* DIMENSIONS ARE TO INTERSECTION OF LINES

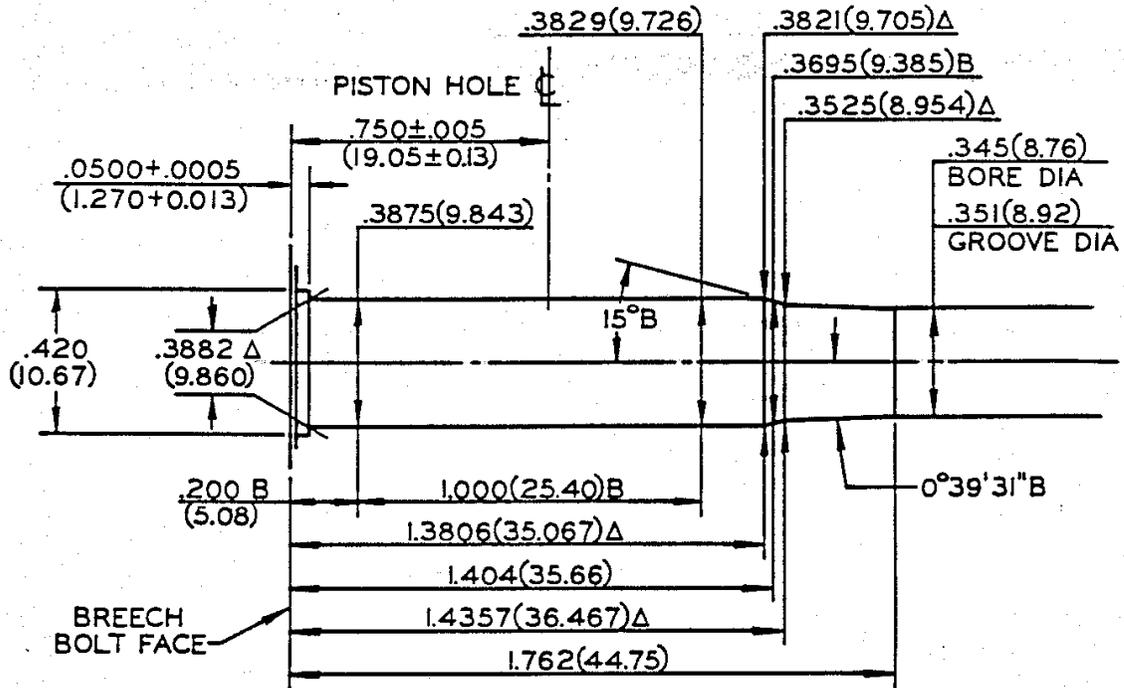
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

(XX.XX)=MILLIMETERS

Δ =REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 351 WINCHESTER SELF LOADING



NO. OF GROOVES	6
WIDTH OF GROOVES	$.1083 + 0.0020$ (2.751 + 0.051)
TWIST	16 (406.4) RH
LENGTH OF BARREL	20.000 ± 0.010 (508.00 ± 0.25)
DIA OF PISTON HOLE	$.206$ (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

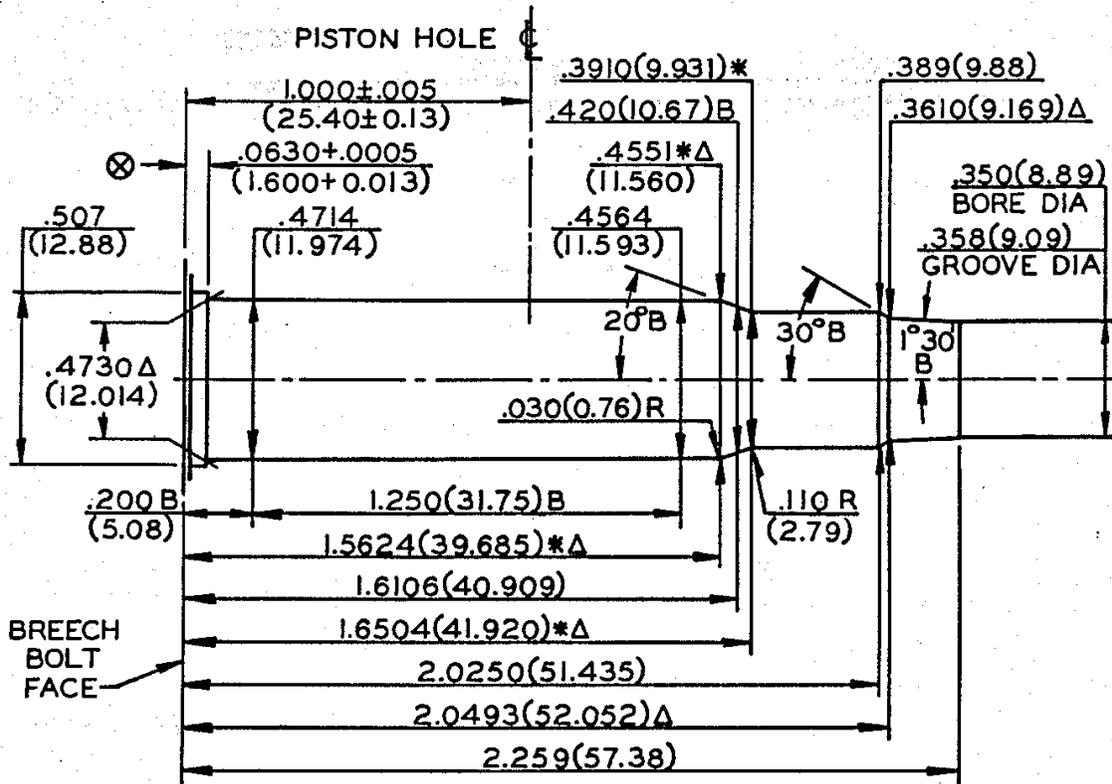
UNLESS OTHERWISE NOTED
 ALL DIA $+0.0005$ (0.013)
 LENGTH TOL $+0.005$ (0.13)

NOTE

B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	6
WIDTH OF GROOVES	.1099+.0020(2.791+0.051)
TWIST	12(304.8) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206(5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

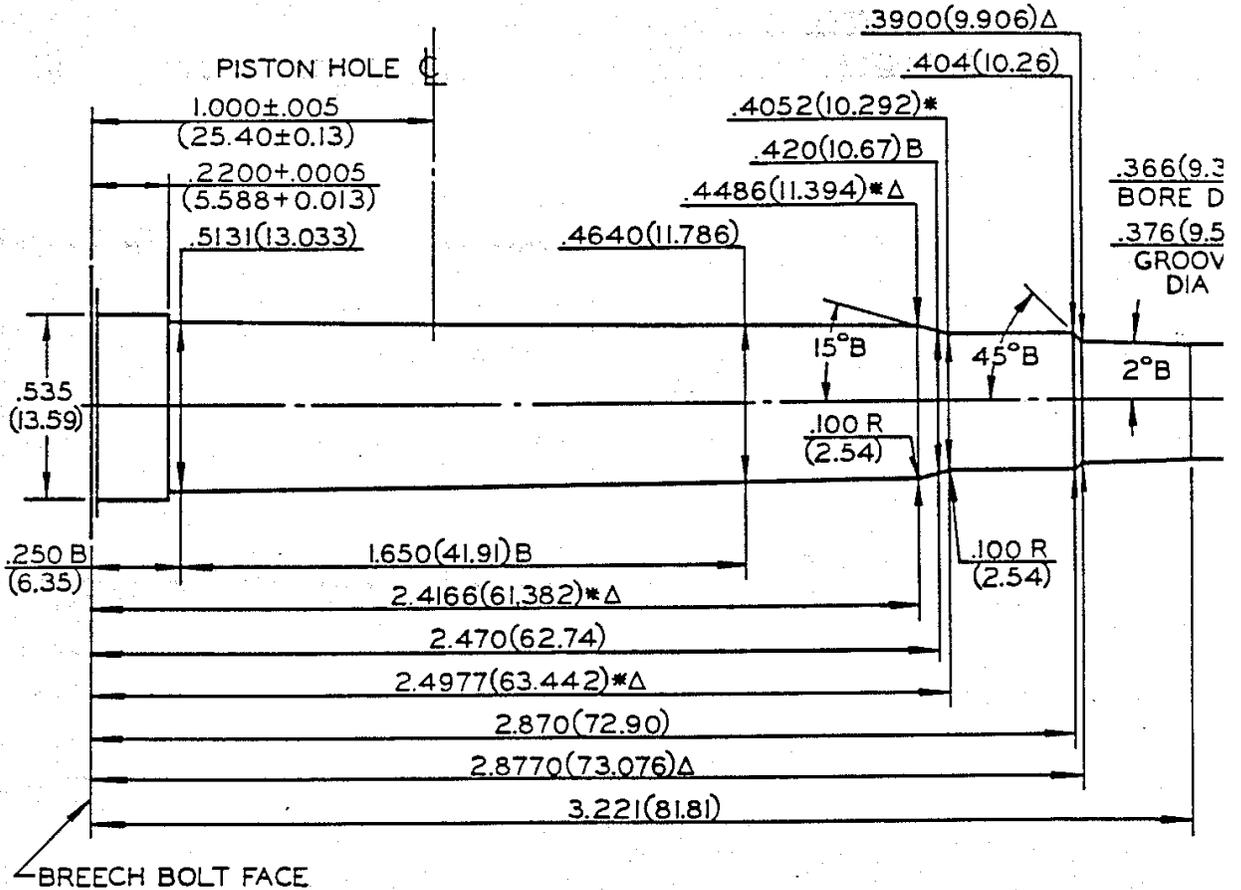
UNLESS OTHERWISE NOTED
ALL DIA +.0005(0.013)
LENGTH TOL +.005(0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
* DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETERS
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 375 HOLLAND & HOLLAND MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.115+.002(2.92+0.05)
TWIST	12 (304.8) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA. +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

* DIMENSIONS ARE TO INTERSECTION OF LINES

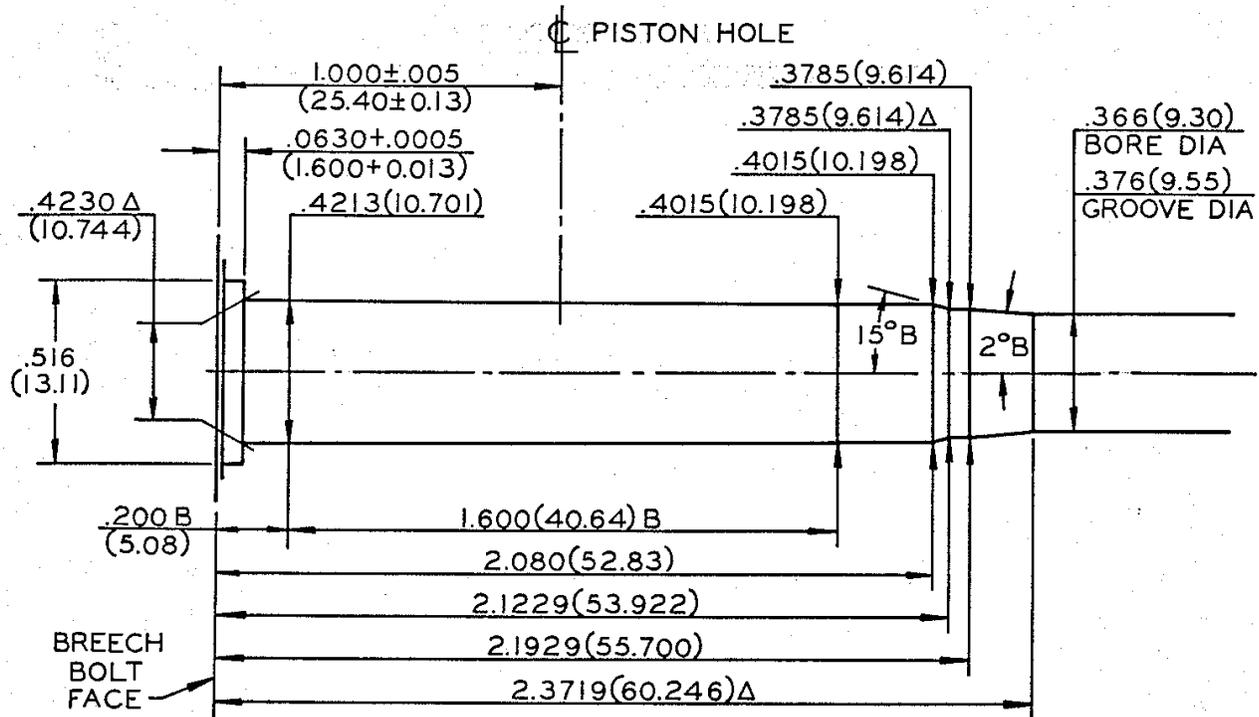
ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

(XX.XX)=MILLIMETERS

Δ=REFERENCE DIMENSION

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 375 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	$.115 \pm .002(2.92 \pm 0.05)$
TWIST	12 (304.8) RH
LENGTH OF BARREL	$24.000 \pm .010(609.60 \pm 0.25)$
DIA OF PISTON HOLE	$.206(5.23)$

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005(0.013)$
 LENGTH TOL $+.005(0.13)$

NOTE

B=BASIC

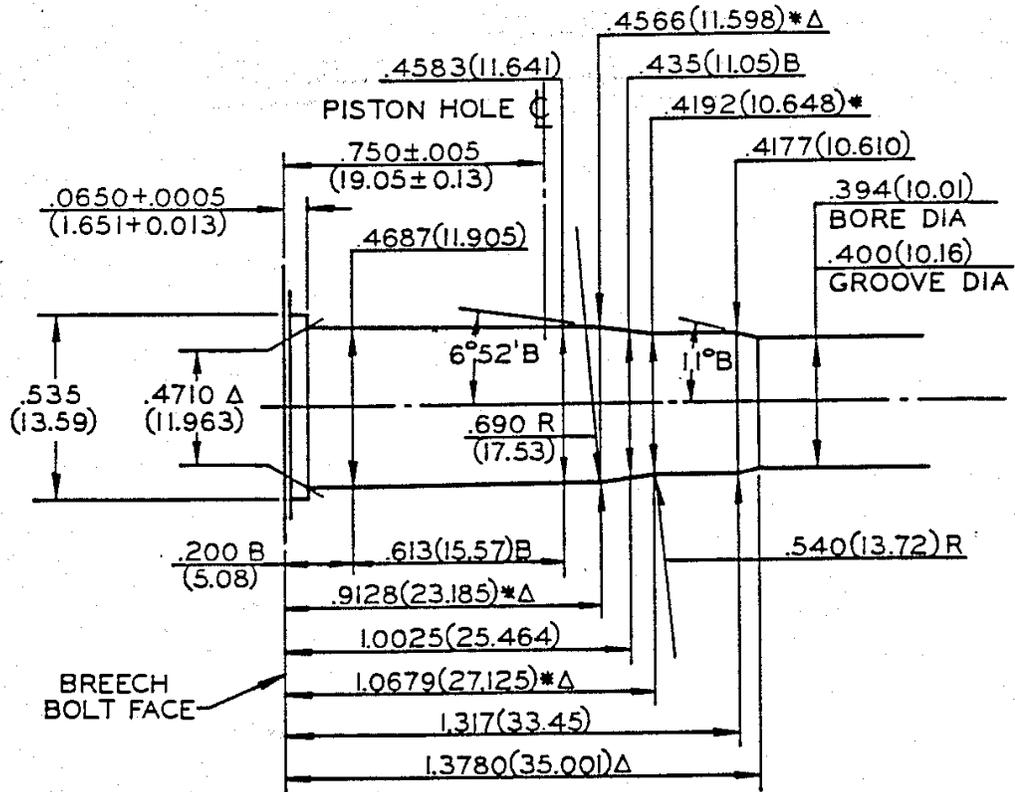
(XX.XX)=MILLIMETERS

Δ =REFERENCE DIMENSION

* DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 38-40 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	.1237+.0020(3.142+0.051)
TWIST	36 (914.4) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

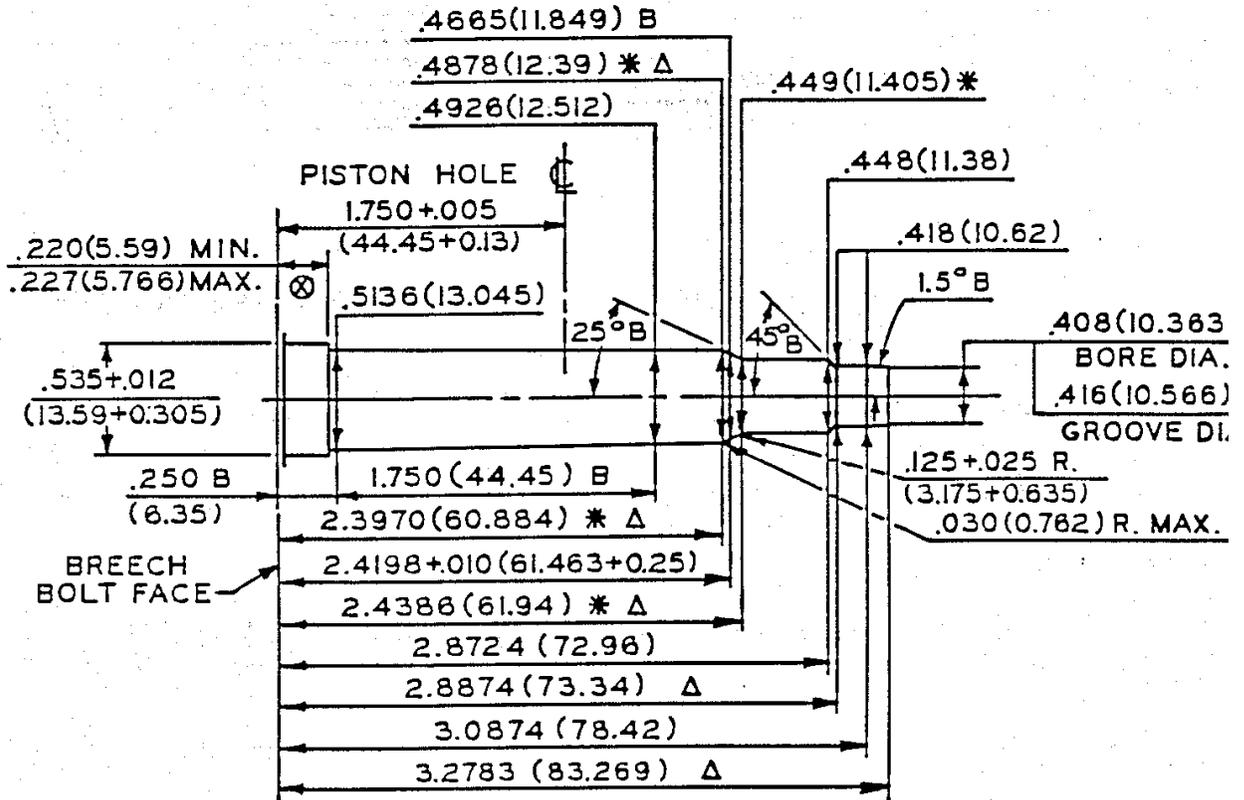
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



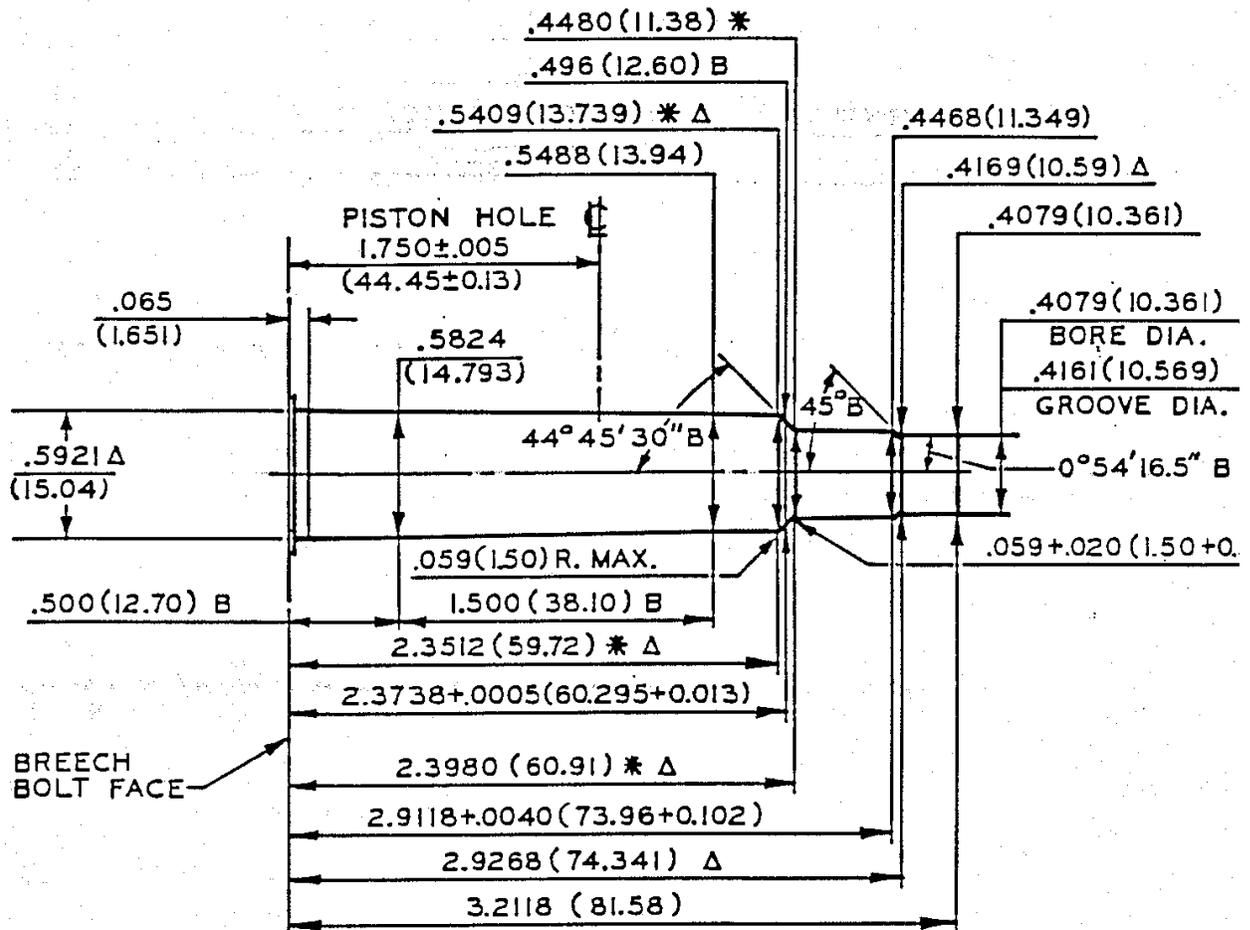
NO. OF GROOVES 6
 WIDTH OF GROOVES .128±.002 (3.25±0.05)
 TWIST 14 (355.6) R.H. OPTIONAL
 LENGTH OF BARREL 24 ±.010 (609.6 ± 0.25)
 DIA. OF PISTON HOLE .206 (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA. +.0005 (0.013)
 LENGTH TOL. +.005 (0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION ⊗=HEADSPACE DIMENSION
 * DIMENSIONS ARE TO INTERSECTION OF LINES (XX.XX)=MILLIMETER
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (M.M.C)



NO. OF GROOVES	6
WIDTH OF GROOVES	$.142 + 0.002$ (3.61 ± 0.05)
TWIST	16.535 (419.99) R.H. OPTIONAL
LENGTH OF BARREL	$24.000 + 0.010$ (609.60 ± 0.25)
DIA. OF PISTON HOLE	$.206$ (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

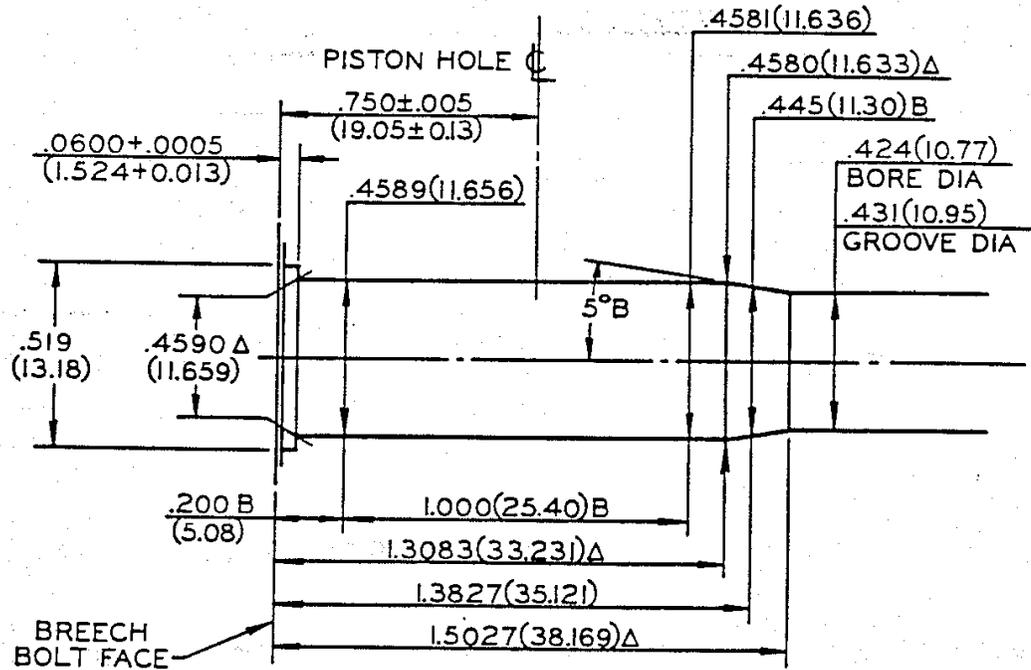
UNLESS OTHERWISE NOTED
 ALL DIA. $+0.0005$ (0.013)
 LENGTH TOL. $+0.005$ (0.13)

NOTE

B=BASIC Δ=REFERENCE DIMENSION
 ⊗=HEADSPACE DIMENSION (XX.XX)=MILLIMETERS
 *DIMENSIONS ARE TO INTERSECTION OF LINES
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (M M C)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 44 REMINGTON MAGNUM



NO. OF GROOVES	12
WIDTH OF GROOVES	.055±.002(1.40±0.05)
TWIST	38 (965.2) RH
LENGTH OF BARREL	20.000±.010(508.00±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

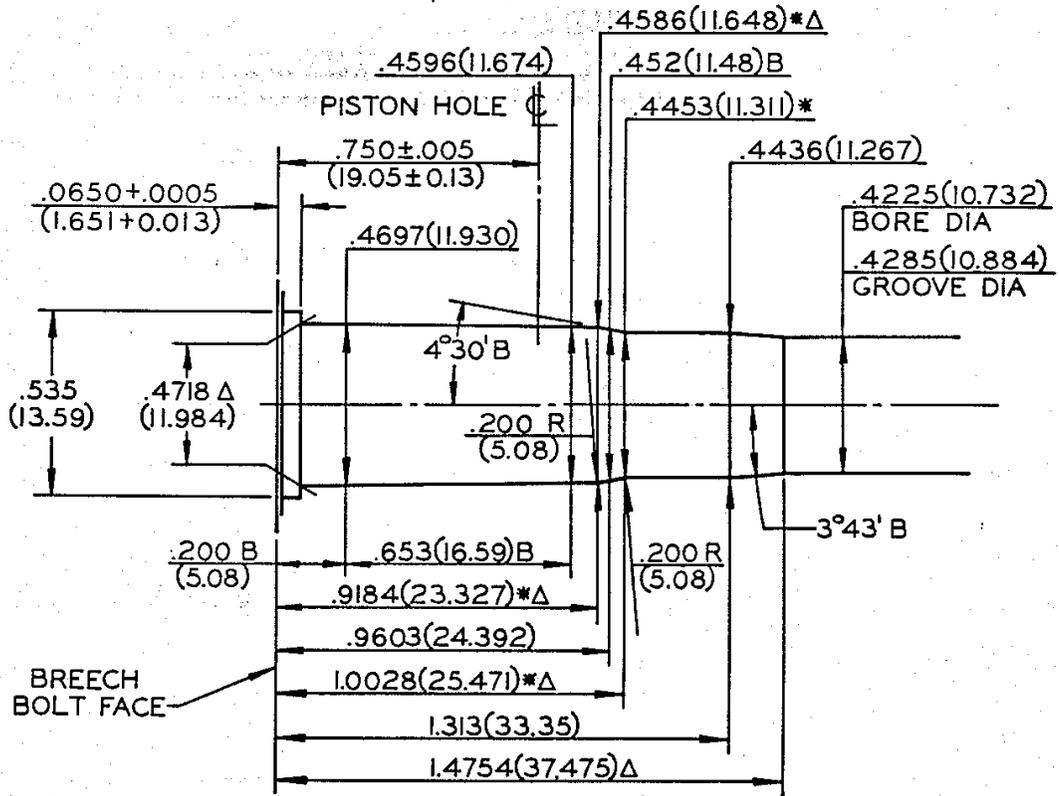
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 44-40 WINCHESTER



NO. OF GROOVES	6
WIDTH OF GROOVES	$.1327 \pm .0020$ (3.371 ± 0.051)
TWIST	36 (914.4) RH
LENGTH OF BARREL	$24.000 \pm .010$ (609.60 ± 0.25)
DIA OF PISTON HOLE	$.206$ (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA $+.0005$ (0.013)
 LENGTH TOL $+.005$ (0.13)

NOTE

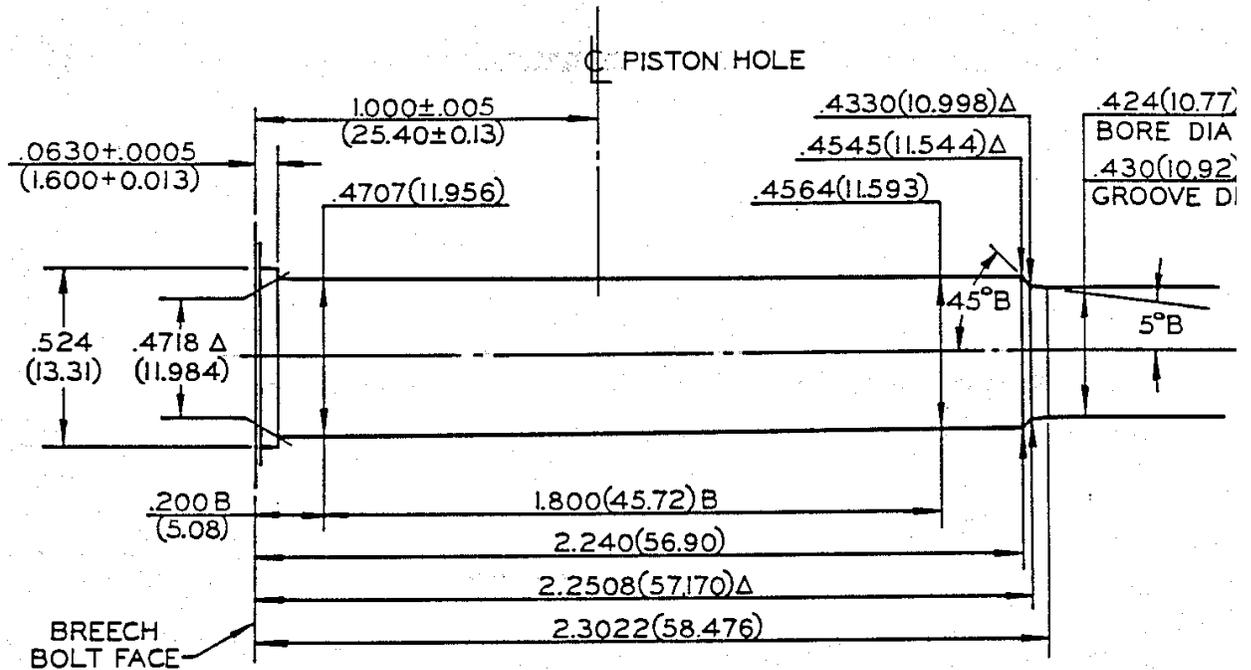
B=BASIC

(XX.XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ =REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 444 MARLIN



NO. OF GROOVES	12
WIDTH OF GROOVES	.062±.002(1.57±0.05)
TWIST	38 (965.2)RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

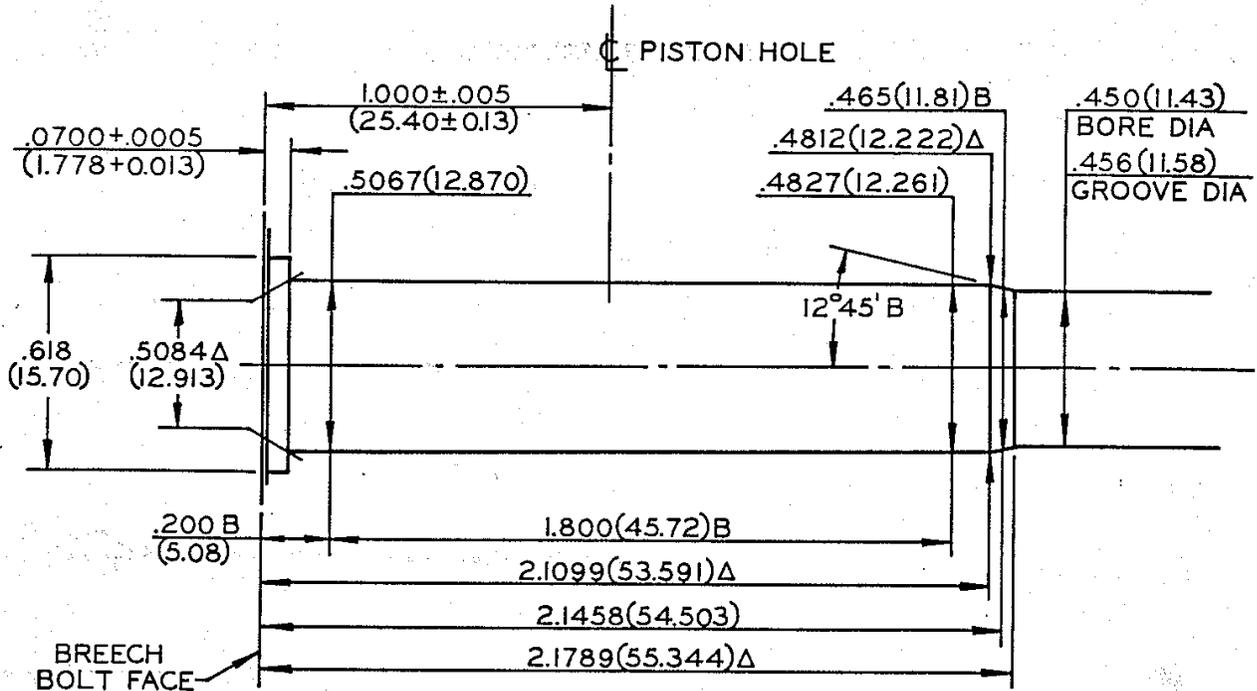
B=BASIC

(XX:XX)=MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ=REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 45-70 GOVERNMENT



NO. OF GROOVES	6
WIDTH OF GROOVES	.141+0.002(3.58+0.05)
TWIST	20 (508)RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B=BASIC

(XX.XX)=MILLIMETERS

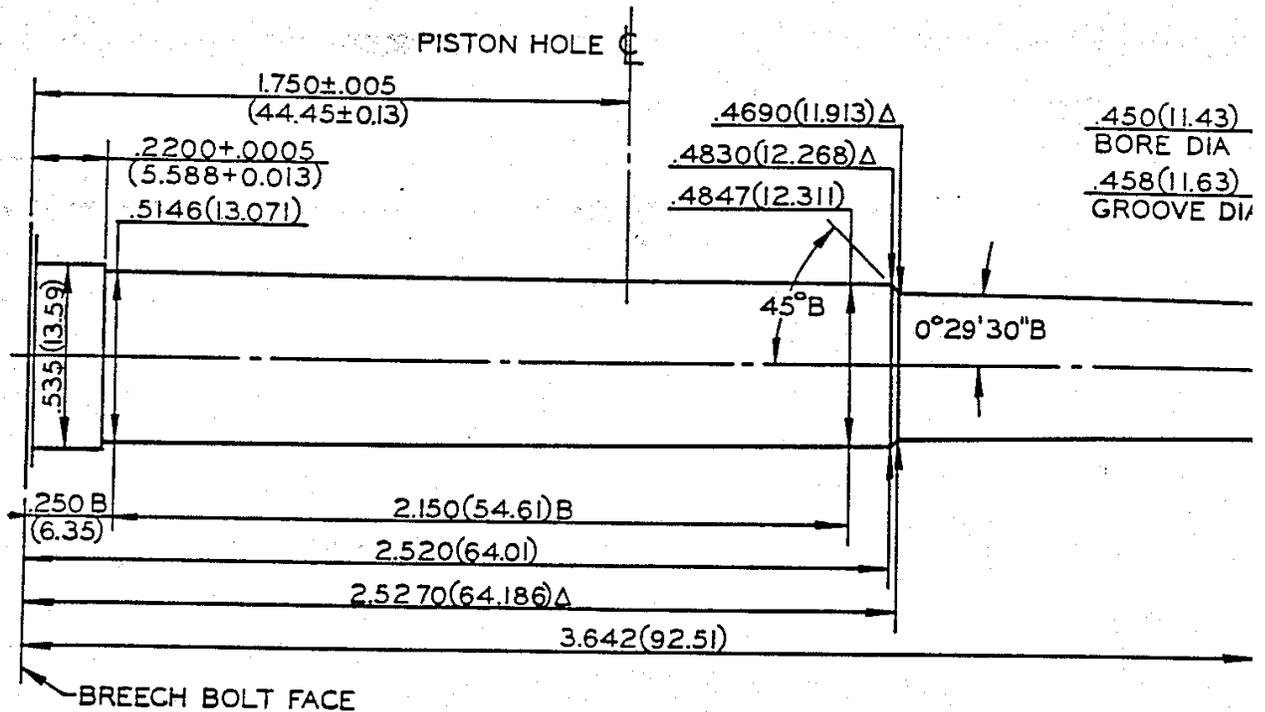
* DIMENSIONS ARE TO INTERSECTION OF LINES

Δ=REFERENCE DIMENSION

ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

STANDARD VELOCITY & PRESSURE BARREL
 458 WINCHESTER MAGNUM



NO. OF GROOVES	6
WIDTH OF GROOVES	.150±.002(3.81±0.05)
TWIST	14 (355.6) RH
LENGTH OF BARREL	24.000±.010(609.60±0.25)
DIA OF PISTON HOLE	.206 (5.23)

LAND & GROOVE DIMENSIONS TO BE WITHIN
 TOLERANCES THROUGHOUT LENGTH OF BARREL

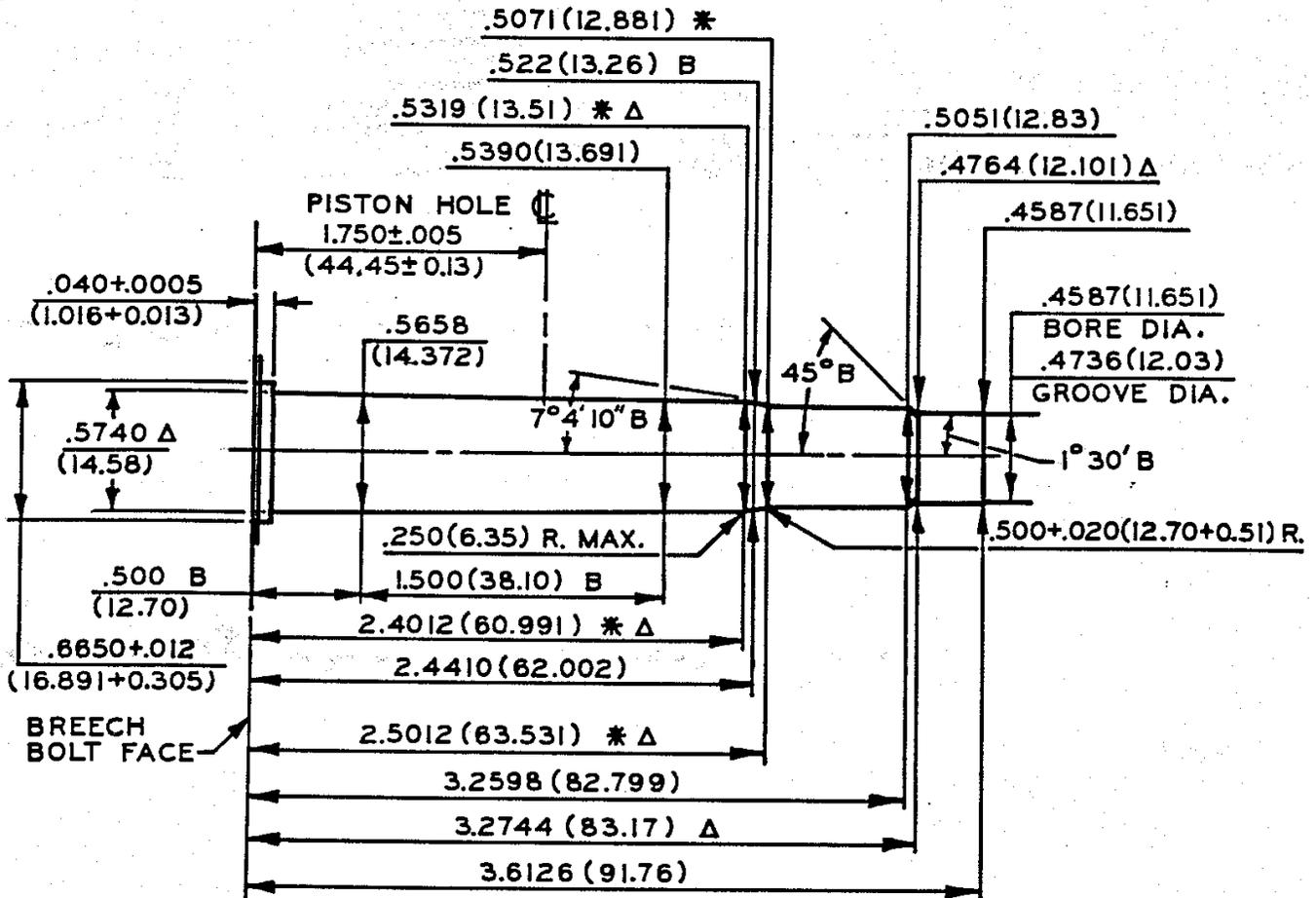
UNLESS OTHERWISE NOTED
 ALL DIA +.0005(0.013)
 LENGTH TOL +.005(0.13)

NOTE

B = BASIC

(XX.XX) = MILLIMETERS

* DIMENSIONS ARE TO INTERSECTION OF LINES Δ = REFERENCE DIMENSION
 ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (MMC)



NO. OF GROOVES	6
WIDTH OF GROOVES	$.160 \pm 0.002$ (4.064 ± 0.05)
TWIST	20.00 (508.0) R.H. OPTIONAL
LENGTH OF BARREL	24.000 ± 0.010 (609.60 ± 0.25)
DIA. OF PISTON HOLE	$.206$ (5.23)

LAND AND GROOVE DIMENSIONS TO BE WITHIN TOLERANCES THROUGHOUT LENGTH OF BARREL

UNLESS OTHERWISE NOTED
 ALL DIA. $+.0005$ (0.013)
 LENGTH TOL. $+.005$ (0.13)

NOTE

- B=BASIC Δ=REFERENCE DIMENSION
- ⊗=HEADSPACE DIMENSION (XX.XX)=MILLIMETERS
- *=DIMENSIONS ARE TO INTERSECTION OF LINES
- ALL CALCULATIONS APPLY AT MAXIMUM MATERIAL CONDITION (M M C)

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

USAGE OF CRUSHER CYLINDER
PRESSURE TESTS

Copper crusher cylinders of the nominal sizes listed below shall be used for pressure tests of centerfire rifle cartridges.

Crusher cylinders shall not be precompressed before using.

Sample tarage tables are shown on pages 204, 205 and 206, but only the tarage table furnished with the particular lot of crushers should be used.

SIZE DESIGNATION	NOMINAL SIZE	PISTON		AVERAGE PRESSURE LIMITS (CUP) IN UNITS OF 100
		DIAMETER	AREA	
A	.146" x .400"	.206"	1/30 sq. inch	Below 240
B	.225" x .500"	.206"	1/30 sq. inch	240 to 550
C	.225" x .400"	.206"	1/30 sq. inch	Over 550

It is recommended that pressures be recorded in Copper Units of Pressure.*

*The designation Copper Units of Pressure (CUP) was adopted by the Technical Committee at their meeting of January 8, 1969, to replace the previous designation of pounds per square inch. Advances in the art of pressure-sensing devices have shown that pressures recorded by deformation of copper crusher cylinders are not necessarily a true measure of pounds per square inch for the transient phenomena encountered in sporting arms ammunition.

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

SAMPLE TARAGE TABLE
 .146 x .400 COPPER
 SIZE A

SAMPLE TARAGE TABLE
 COPPER CRUSHER CYLINDERS
 0.146 INCH DIAMETER, 0.400 INCH LONG
 FOR USE WITH 0.206 INCH DIAMETER PISTON
 AREA = 1/30 SQUARE INCH

*CUP in units of 100

Final Length	Pressure CUP*						
.3995	14	.3795	102	.3595	155	.3290	219
.3990	20	.3790	103	.3590	156	.3280	221
.3985	25	.3785	105	.3585	157	.3270	223
.3980	30	.3780	106	.3580	158	.3260	225
.3975	33	.3775	108	.3575	159	.3250	227
.3970	35	.3770	109	.3570	160	.3240	229
.3965	38	.3765	111	.3565	161	.3230	231
.3960	41	.3760	112	.3560	162	.3220	233
.3955	44	.3755	114	.3555	163	.3210	235
.3950	46	.3750	115	.3550	164	.3200	237
.3945	49	.3745	117	.3545	165	.3190	239
.3940	51	.3740	118	.3540	166	.3180	241
.3935	53	.3735	120	.3535	167	.3170	243
.3930	55	.3730	121	.3530	168	.3160	245
.3925	57	.3725	122	.3525	169	.3150	247
.3920	59	.3720	123	.3520	170	.3140	249
.3915	61	.3715	125	.3515	172	.3130	251
.3910	63	.3710	126	.3510	173	.3120	253
.3905	65	.3705	127	.3505	174	.3110	255
.3900	67	.3700	128	.3500	175	.3100	257
.3895	69	.3695	130	.3490	177	.3090	259
.3890	70	.3690	131	.3480	179	.3080	261
.3885	72	.3685	133	.3470	181	.3070	263
.3880	73	.3680	134	.3460	183	.3060	265
.3875	75	.3675	136	.3450	185	.3050	267
.3870	76	.3670	137	.3440	187	.3040	269
.3865	78	.3665	138	.3430	189	.3030	271
.3860	80	.3660	139	.3420	192	.3020	273
.3855	82	.3655	141	.3410	194	.3010	275
.3850	83	.3650	142	.3400	196	.3000	277
.3845	85	.3645	143	.3390	198	.2990	279
.3840	87	.3640	144	.3380	200	.2980	281
.3835	89	.3635	146	.3370	202	.2970	283
.3830	91	.3630	147	.3360	204	.2960	285
.3825	93	.3625	148	.3350	206	.2950	287
.3820	94	.3620	149	.3340	209	.2940	289
.3815	96	.3615	150	.3330	211	.2930	291
.3810	97	.3610	151	.3320	213	.2920	293
.3805	99	.3605	153	.3310	215	.2910	295
.3800	100	.3600	154	.3300	217	.2900	297

NOTE: TARAGE TABLES ARE ESTABLISHED FOR EACH LOT OF CYLINDERS. ONLY THE TABLE FURNISHED BY THE MANUFACTURER WITH EACH SHIPMENT OF CYLINDERS SHOULD BE USED.

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

SAMPLE TARAGE TABLE
 .225 x .500 COPPER
 SIZE B

SAMPLE TARAGE TABLE
 COPPER CRUSHER CYLINDERS
 0.225 INCH DIAMETER, 0.500 INCH LONG
 FOR USE WITH 0.206 INCH DIAMETER PISTON
 AREA = 1/30 SQUARE INCH

*CUP in units of 100

Final Length	Pressure CUP*						
.499	30	.459	319	.419	491	.379	639
.498	49	.458	324	.418	494	.378	642
.497	72	.457	329	.417	498	.377	646
.496	85	.456	334	.416	502	.376	650
.495	93	.455	339	.415	506	.375	654
.494	102	.454	344	.414	510	.374	657
.493	111	.453	349	.413	514	.373	661
.492	119	.452	354	.412	517	.372	664
.491	128	.451	359	.411	521	.371	668
.490	136	.450	364	.410	525	.370	672
.489	144	.449	369	.409	529	.369	676
.488	151	.448	374	.408	532	.368	679
.487	159	.447	379	.407	536	.367	683
.486	166	.446	384	.406	540	.366	687
.485	172	.445	389	.405	544	.365	691
.484	179	.444	393	.404	548	.364	695
.483	186	.443	397	.403	552	.363	699
.482	192	.442	401	.402	556	.362	702
.481	199	.441	405	.401	560	.361	706
.480	206	.440	409	.400	563	.360	709
.479	212	.439	413	.399	567	.359	713
.478	217	.438	417	.398	571	.358	717
.477	223	.437	421	.397	575	.357	721
.476	228	.436	425	.396	578	.356	724
.475	234	.435	429	.395	582	.355	728
.474	239	.434	433	.394	585	.354	732
.473	245	.433	437	.393	589	.353	736
.472	250	.432	440	.392	592	.352	740
.471	256	.431	444	.391	596	.351	744
.470	262	.430	448	.390	599	.350	748
.469	268	.429	452	.389	603	.349	752
.468	273	.428	456	.388	606	.348	756
.467	278	.427	460	.387	610	.347	760
.466	283	.426	463	.386	613	.346	763
.465	288	.425	467	.385	617	.345	767
.464	293	.424	471	.384	621	.344	771
.463	298	.423	475	.383	625	.343	775
.462	303	.422	479	.382	628	.342	779
.461	308	.421	483	.381	632	.341	783
.460	313	.420	487	.380	635	.340	787

NOTE: TARAGE TABLES ARE ESTABLISHED FOR EACH LOT OF CYLINDERS. ONLY THE TABLE FURNISHED BY THE MANUFACTURER WITH EACH SHIPMENT OF CYLINDERS SHOULD BE USED.

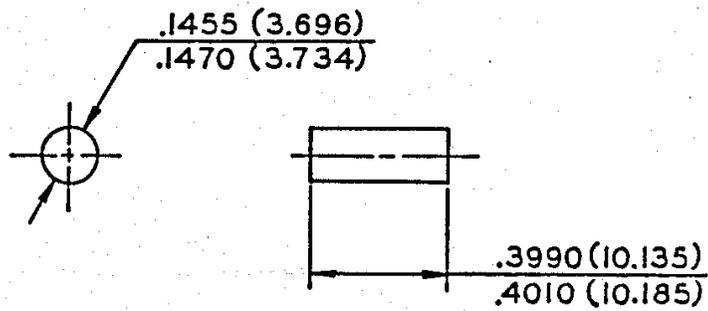
SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

SAMPLE TARAGE TABLE
 .225 x .400 COPPER
 SIZE C

SAMPLE TARAGE TABLE
 COPPER CRUSHER CYLINDERS
 0.225 INCH DIAMETER, 0.400 INCH LONG
 FOR USE WITH 0.206 INCH DIAMETER PISTON
 AREA = 1/30 SQUARE INCH *CUP in Units of 100

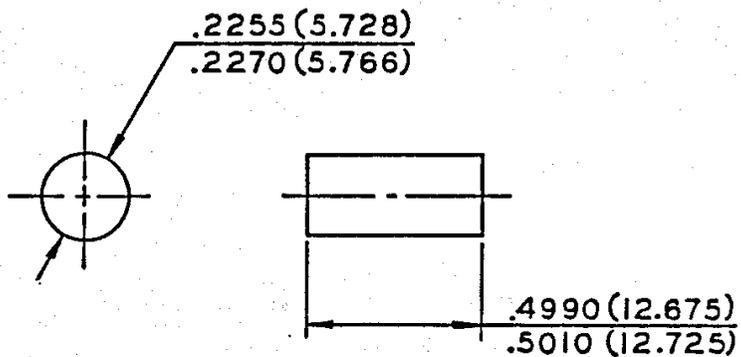
Final Length	Pressure CUP*						
.399	30	.359	383	.319	590	.279	783
.398	60	.358	390	.318	595	.278	787
.397	78	.357	395	.317	600	.277	792
.396	96	.356	400	.316	605	.276	797
.395	106	.355	405	.315	610	.275	802
.394	117	.354	411	.314	614	.274	807
.393	127	.353	416	.313	619	.273	812
.392	138	.352	421	.312	623	.272	816
.391	150	.351	427	.311	628	.271	821
.390	158	.350	433	.310	633	.270	826
.389	167	.349	438	.309	637	.269	831
.388	175	.348	444	.308	642	.268	836
.387	184	.347	450	.307	647	.267	840
.386	193	.346	455	.306	651	.266	845
.385	202	.345	460	.305	656	.265	850
.384	211	.344	466	.304	661	.264	855
.383	219	.343	471	.303	666	.263	860
.382	226	.342	477	.302	670	.262	864
.381	234	.341	483	.301	675	.261	869
.380	241	.340	488	.300	680	.260	874
.379	248	.339	493	.299	685	.259	879
.378	255	.338	497	.298	690	.258	884
.377	263	.337	502	.297	695	.257	888
.376	270	.336	507	.296	700	.256	893
.375	277	.335	511	.295	705	.255	898
.374	284	.334	516	.294	710	.254	903
.373	290	.333	521	.293	715	.253	908
.372	297	.332	526	.292	720	.252	913
.371	304	.331	531	.291	725	.251	917
.370	311	.330	535	.290	729	.250	922
.369	318	.329	540	.289	734		
.368	325	.328	545	.288	739		
.367	332	.327	550	.287	744		
.366	339	.326	555	.286	749		
.365	345	.325	560	.285	754		
.364	351	.324	565	.284	759		
.363	358	.323	570	.283	764		
.362	364	.322	575	.282	768		
.361	370	.321	580	.281	773		
.360	376	.320	585	.280	778		

NOTE - TARAGE TABLES ARE ESTABLISHED FOR EACH LOT OF CYLINDERS. ONLY THE TABLE FURNISHED BY THE MANUFACTURER WITH EACH SHIPMENT OF CYLINDERS SHOULD BE USED



NOTES

1. MATERIAL-COPPER DEVELOPMENT ASSOCIATION ALLOY 102
2. (XX.XX)= MILLIMETERS

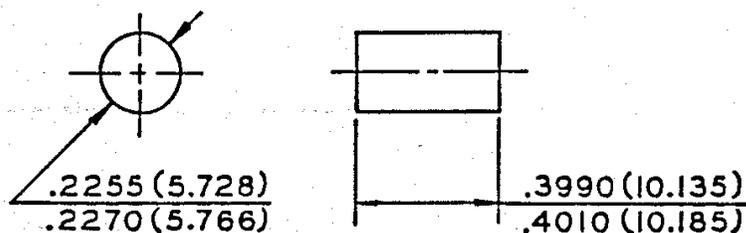


NOTES

1. MATERIAL-COPPER DEVELOPMENT ASSOCIATION ALLOY 102
2. (XX.XX) = MILLIMETERS

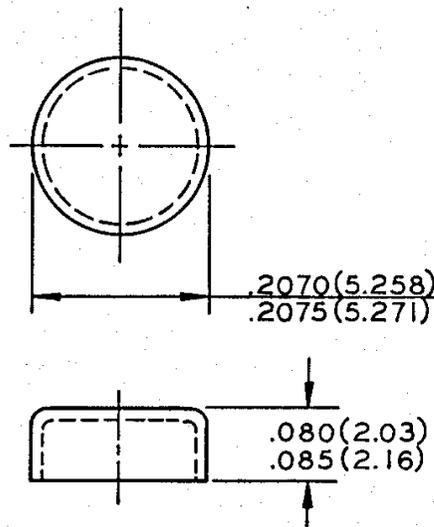
SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

.225 x .400 CRUSHER CYLINDER
SIZE C



NOTES

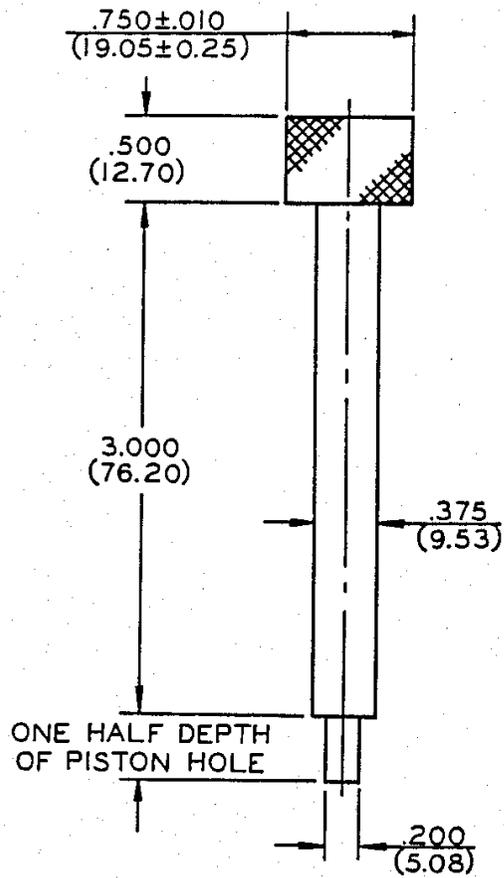
1. MATERIAL-COPPER DEVELOPMENT ASSOCIATION ALLOY 102
2. (XX.XX) = MILLIMETERS



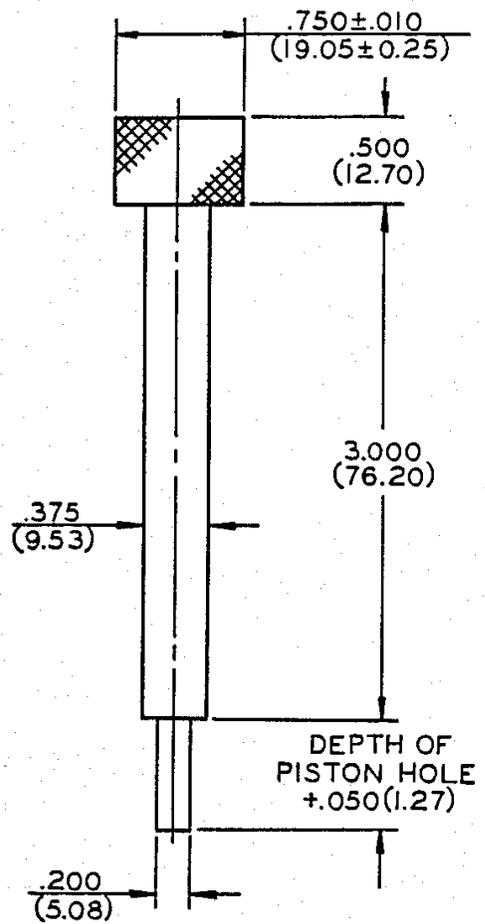
NOTES

1. MATERIAL - COPPER DEVELOPMENT ASSOCIATION ALLOY 210
GRAIN SIZE - .015-.030 mm
MATERIAL THICKNESS .0110-.0115 (0.279-0.292)
2. (XX.XX) = MILLIMETERS

SEATING TOOL

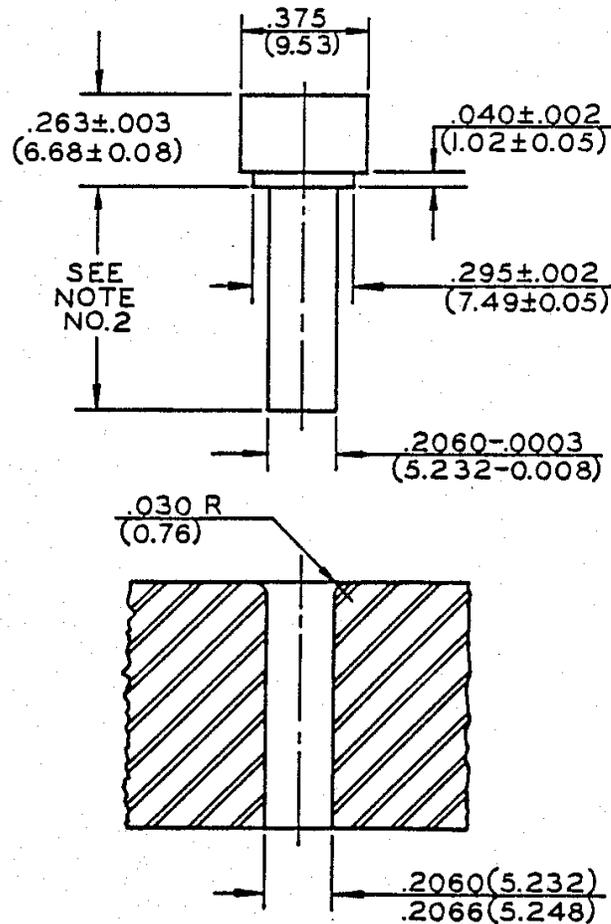


KNOCKOUT TOOL



NOTES

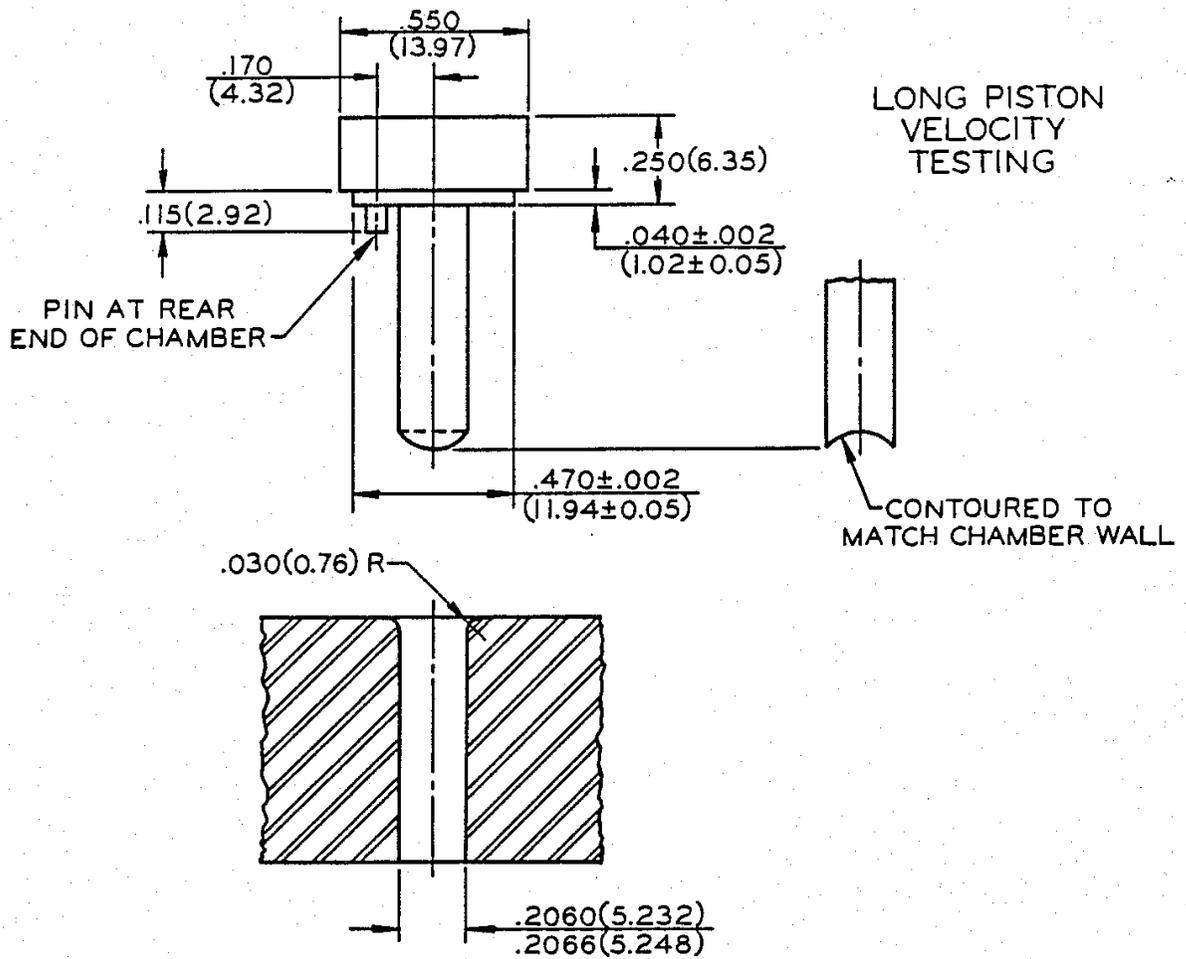
1. MATERIAL-COPPER DEVELOPMENT ASSOCIATION ALLOY 260
2. UNLESS OTHERWISE NOTED ALL TOLERANCES $\pm .002(0.05)$
3. (XX.XX)=MILLIMETERS



SHORT PISTON
 PRESSURE
 TESTING

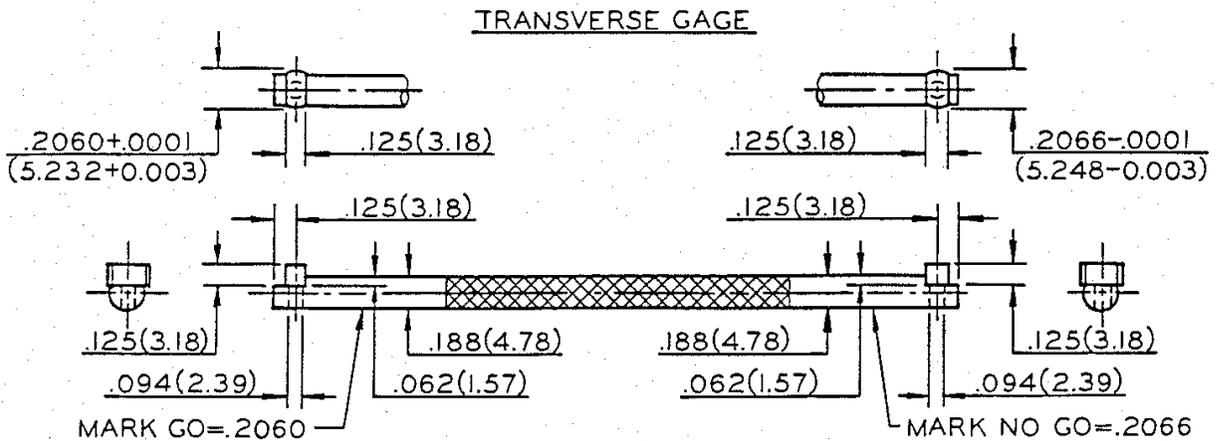
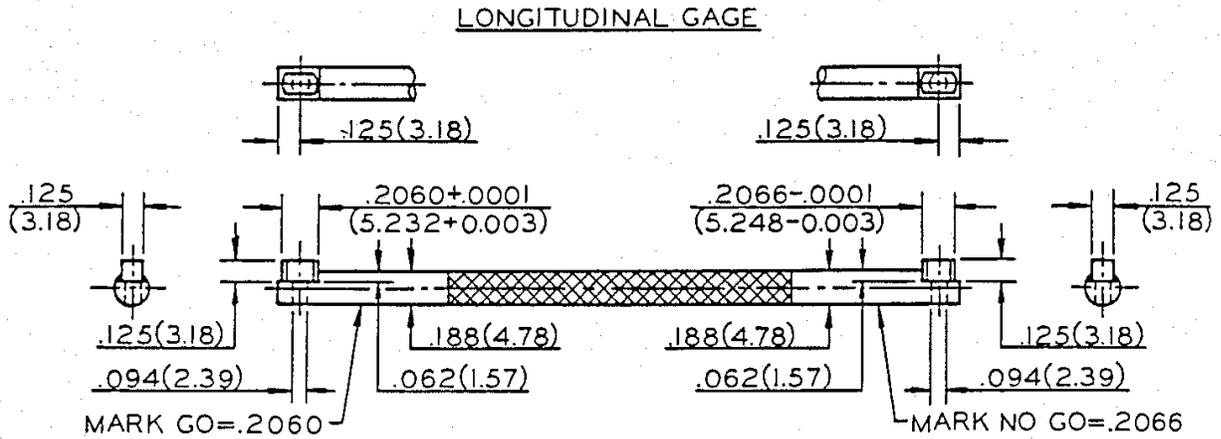
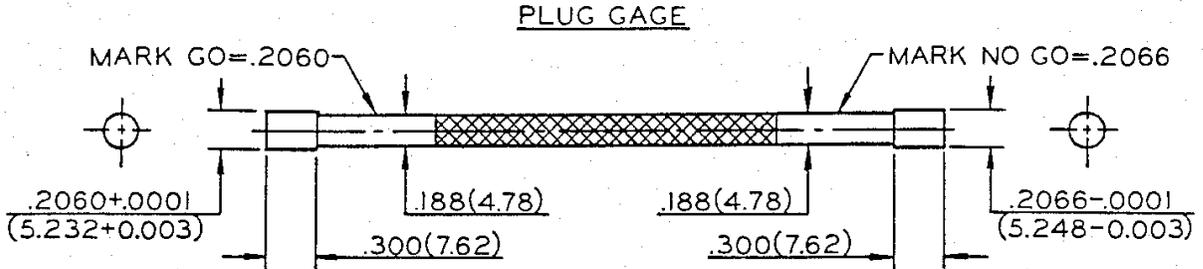
NOTES

1. MATERIAL-HIGH CARBON STEEL-HEAT TREAT R_c 62-63
2. LENGTH OF PISTON SHANK TO BE DEPTH OF PISTON HOLE MINUS HEIGHT OF APPROPRIATE GAS CHECK
3. PISTON TO BE SUCTION FIT IN PISTON HOLES
4. (XX.XX) = MILLIMETERS



NOTES

1. MATERIAL - HIGH CARBON STEEL - HEAT TREAT R_c 62-63
2. PISTONS TO BE SUCTION FIT IN PISTON HOLES
3. (XX.XX) = MILLIMETERS



NOTES

1. GENERAL TOLERANCE ± 0.005 (0.13)
2. MATERIAL - OIL HARD DRILL ROD AISI .01 R_c 61-63
3. (XX.XX) = MILLIMETERS

FIREARM HEADSPACE GAGES

In the interest of safety and interchangeability in the cartridge-firearm relationship, dimensional limits have been established for both the cartridge and firearm. These limits are reflected in the dimensions and tolerances shown on the cartridge-chamber drawings. Gages, commonly referred to as headspace gages, are utilized to measure dimensional characteristics of the firearm chamber.

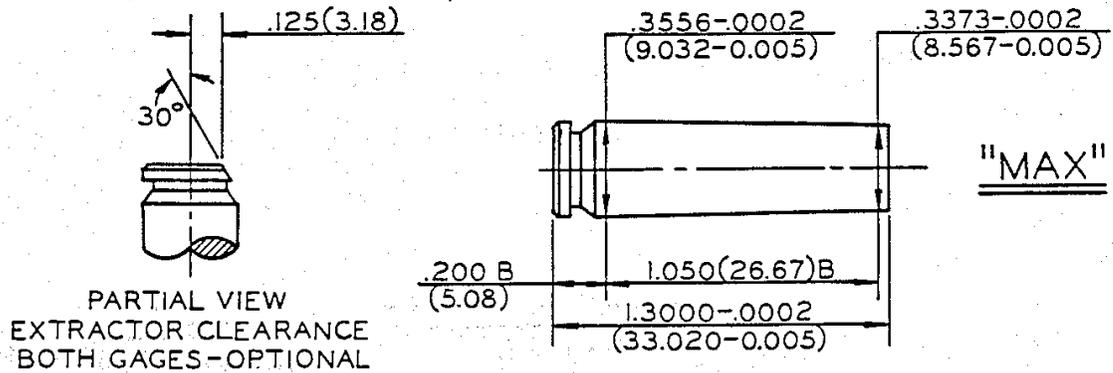
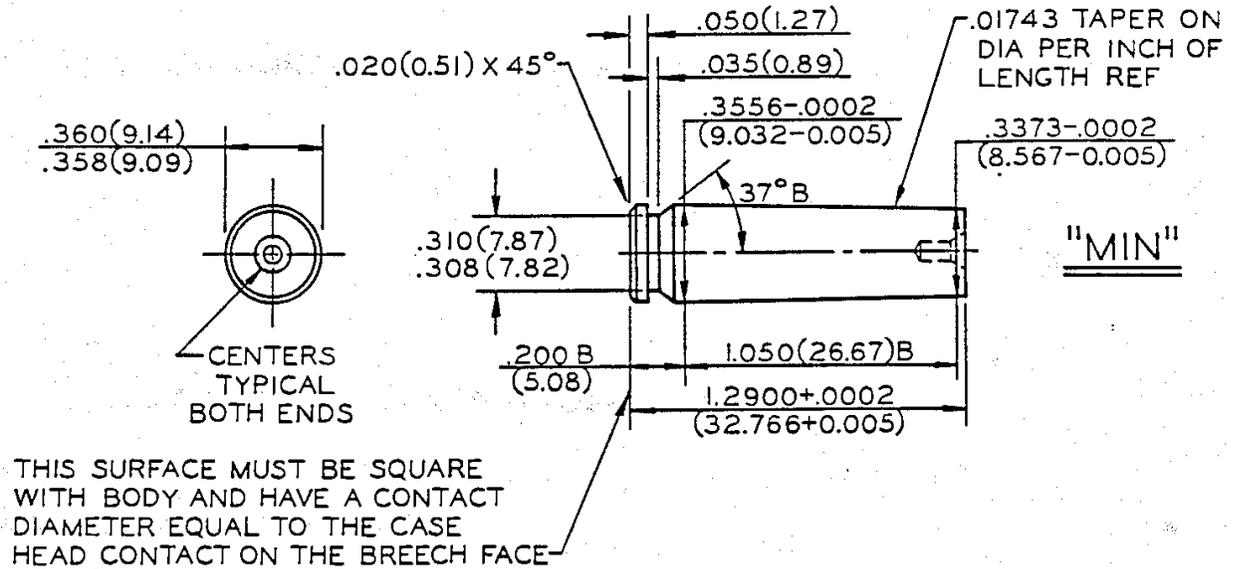
Data sheets 217 through 220 show typical headspace gages. As shown on the drawing, the minimum gage should reflect the full contour of the chamber and bolt face in order to insure that the chamber will always accept the maximum cartridge. The minimum gage should be made as close to the minimum chamber as practical. The maximum headspace gage should be relieved in certain areas to insure that the firearm is within the headspace limits.

The technique of gaging firearms and/or test barrels headspace is critical. Improper use can give erroneous readings. For instance, it is possible to deform the chamber with the use of extra force, particularly in the belted magnum chamber.

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

HEADSPACE GAGES

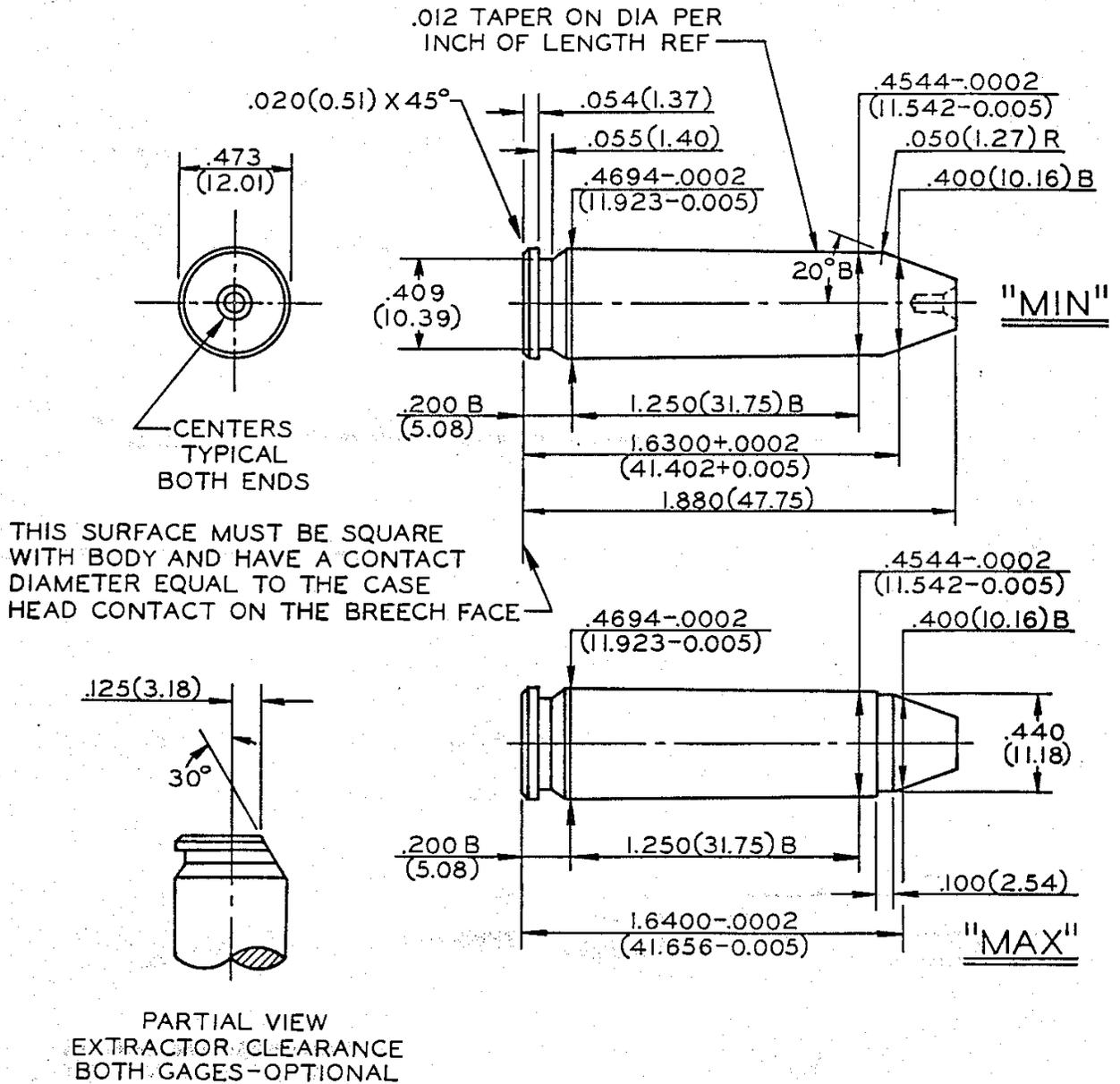
CENTERFIRE RIFLE
 HEADSPACE GAGES (FIREARMS)
 MOUTH BREECH (TYPICAL)
 (CALIBER 30 CARBINE SHOWN)



NOTES
 B = BASIC
 (XX.XX) = MILLIMETERS

HARDEN AND GRIND

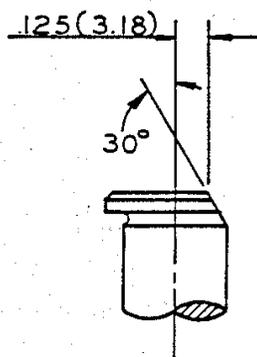
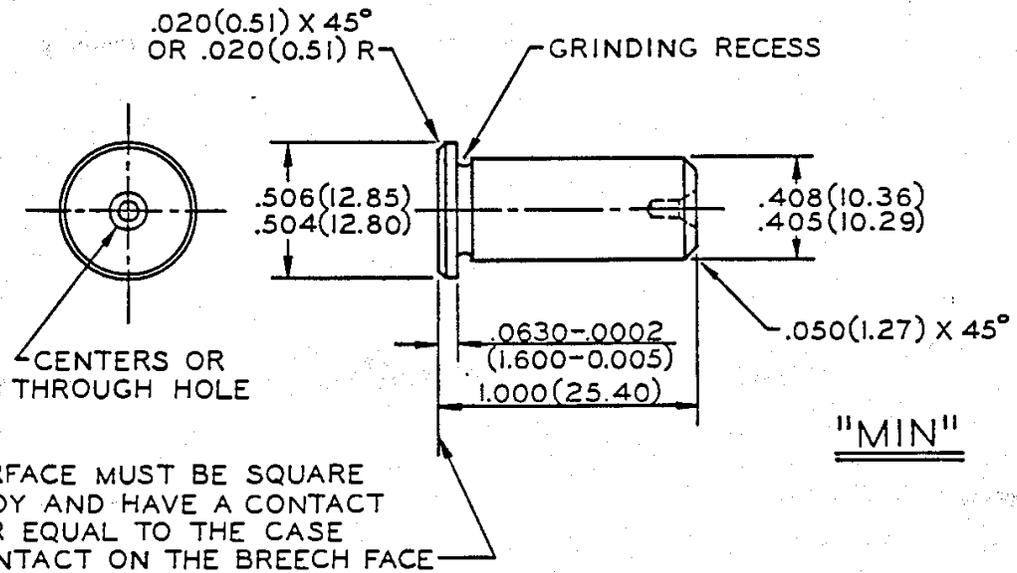
CENTERFIRE RIFLE
 HEADSPACE GAGES (FIREARMS)
 RIMLESS (TYPICAL)
 (308 WINCHESTER SHOWN)



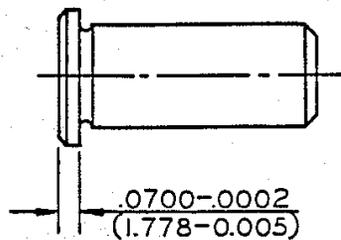
NOTES
 B = BASIC
 (XX.XX) = MILLIMETERS

HARDEN AND GRIND
 210

CENTERFIRE RIFLE
 HEADSPACE GAGES (FIREARMS)
 RIMMED (TYPICAL)
 (CALIBER 30-30 WINCHESTER SHOWN)



PARTIAL VIEW
 EXTRACTOR CLEARANCE
 BOTH GAGES - OPTIONAL



"MAX"

NOTES
 (XX.XX) = MILLIMETERS

HARDEN AND GRIND

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION SUPPLY

The following calibers of Centerfire Rifle Reference Ammunition for the verification of ranges, barrels and other equipment may be obtained from the manufacturer listed below.

Current assessments are maintained at the SAAMI Office, P.O. Box 838, Branford, Connecticut 06405.

Cartridge	Bullet		Supplier & Order Symbol				Recommended Maximum Order
	Weight	Type	Federal	Remington	Winchester Group	Hornady	
6mm Rem	100	SP		21642			60
6.5mm Rem Mag	120	SP		21646			60
6.5x55 Swed Mauser	160	SP					60
7mm Mauser	175	SP	SAM7A				60
7mm Rem Mag	150	SP		29088			100
7mm Wby Mag	175	PSP					
7mm-08 Rem	140	SP		21610			
7-30 Waters	120	SP	SAM7-30A				
7.62 x 39	123	SP			SAXXX		
8mm Mauser	170	SP	SAM8A				200
8mm Rem Mag	220	SP		21612			100
17 Rem	25	HP		28462			60
218 Bee	46	HP			SA218B		60
22 Hornet	46	HP			SA22H2		100
22-250 Rem	55	SP		21644			100
220 Swift	60	SP				8122R	
222 Rem	50	SP		21654			100
222 Rem Mag	55	SP		21652			60
223 Rem	55	SP	SAM223A				60
225 Win	55	SP			SA2251		60
243 Win	100	SP	SAM243B				100
25-06 Rem	100	SP		21624			60
25-20 Win	86	SP		21658			60
25-35 Win	117	SP			SA2535		60
250 Sav	100	SP		21664			100
257 Roberts	117	SP		21662			60
257 Roberts +P	117	SP			SA257P3		60
264 Win Mag	140	SP			SA2642		100
270 Win	130	SP			SA2705		200
280 Rem (7mm Exp Rem)	150	SP		21630			60
284 Win	150	SP			SA2842		60

SECTION III - EQUIPMENT
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION SUPPLY

Cartridge	Bullet		Supplier & Order Symbol				Recommended Maximum Order
	Weight	Type	Federal	Remington	Winchester Group	Hornady	
30 Carb	110	SP			SAW30MI		60
30 Rem	170	SP		21670			60
30-06 Sprg	180	SP			SA30064		200
30-30 Win	170	SP			SA30303		200
30-40 Krag	180	SP			SA30401		60
300 H&H Mag	180	ST			SA300H2		100
300 Sav	180	SP		21672			100
300 Wby Mag	180	SP		21638			
300 Win Mag	180	SP			SA30SM2		100
303 Brit	180	SP		28440			100
303 Sav	190	ST			SA3032		60
307 Win	180	SP			SA3076		60
308 Win	180	SP			SA3086		200
32 Rem	170	SP		21678			60
32 Win Spl	170	SP			SA32WS2		200
32-20 Win	100	SP			SA32202		60
338 Win Mag	200	SP			SA3381		60
348 Win	200	ST			SA3482		60
35 Rem	200	SP		21656			100
35 Whelen	200	SP		21XXX			
350 Rem Mag	250	SP		21648			60
351 Win SL	180	SP			SA351SL2		60
356 Win	250	SP			SA3563		60
358 Win	200	ST			SA3581		60
375 H&H Mag	300	SP		21632			60
375 Win	200	SP			SA375W		60
38-40 Win	180	SP			SA3840		60
38-55 Win	255	SP			SA3855		60
416 Rem Mag	400	SP		21XXX			
44 Rem Mag	240	SP		21680			60
44-40 Win	200	SP			SA4440		60
444 Marlin	240	SP		21634			60
45-70 Govt	405	SP			SA4570		60
458 Win Mag	510	SP			SA4581		60

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE AMMUNITION SUPPLY

ORDER PROCEDURE

Each order should contain the following information in the following order:

1. Number of rounds desired. (See NOTE below.)
2. Appropriate order symbol.
3. Designation "SAAMI Reference Ammunition."
4. Cartridge name.

EXAMPLE:

100 Rounds, Order Symbol SA22H2
SAAMI Reference Ammunition
22 Hornet.

SUPPLIER & ADDRESS

Federal Cartridge Company
900 Bob Ehlen Drive
Anoka, Minnesota 55303
Attention: Order Dept.

Hornady Manufacturing Co.
P.O. Box 1848
Grand Island, NE 68802
Attention: Order Dept.

Remington Arms Company, Inc.
Order Services
Room B-6373, F&FP Dept.
1007 Market Street
Wilmington, DE 19898

Winchester Group
Olin Corporation
East Alton, Illinois 62024
Attention: Marketing Dept.

It is up to the discretion of the producer to provide at least a five year supply.

SAAMI policy permits release of assessment values by the manufacturer with Reference Ammunition to non-SAAMI members.

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE CRUSHER SUPPLY

REFERENCE CRUSHER PROCUREMENT

The following sizes and types of Reference Crushers for the verification of ranges, barrels and other equipment are available. Crusher order information is on page 225.

<u>Designation</u>	<u>Size</u>	<u>Type</u>	<u>Order Symbol No.</u>
A	.146 x .400	Copper	SAK1270
B	.225 x .500	Copper	SAK1272
C	.225 x .400	Copper	SAK1276

SECTION III - EQUIPMENT
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

REFERENCE CRUSHER SUPPLY

ORDER PROCEDURE

Each order should contain the following information in the following order:

1. Number of crushers desired. (See NOTE below.)
2. Appropriate order symbol
3. Designation "SAAMI Reference Crushers"
4. Designation of size and type
5. SAAMI Lot Number.

EXAMPLE: 500 Crushers, Order Symbol SAK1270
SAAMI Reference Crushers, .146 x .400
Copper, SAAMI Lot 416

NOTE: Minimum Order: 500
Maximum Order: 1000

SUPPLIER AND ADDRESS

Winchester Group
Olin Corporation
East Alton, Illinois 62024

Attention: Marketing Department

DEFINITION AND PURPOSE

SAAMI Definitive Proof cartridges are cartridges, commercially loaded by SAAMI member companies, which develop pressures substantially exceeding those developed by normal service loads. The pressure levels are designed to assure firearm safety when using ammunition loaded to service pressures in accordance with accepted American practices.

Proof cartridges are designed to stress firearms components which contain the cartridge in order to assure safety in the recommended use of the firearm during its service life.

It is important from the safety standpoint that Definitive Proof cartridges be used only for the proof of firearms. Adequate precaution must be taken to protect personnel performing firearms proof testing.

Definitive Proof cartridges should be loaded with the heaviest bullet for the particular cartridge. The slowest powder which will meet the pressure values is used in order to maintain effective pressure-distance relationships.

NOTE: The heat treatment of cartridge cases for Definitive Proof Loads may be different from the treatment of service cases, at the option of the manufacturer.

Other case modifications to minimize firing casualties, such as gas leaks around primers are also permissible. The use of such options must not affect the stressing of the firearms components.

The following specifications define proof loads based on tests fired in standard test barrels with the ammunition at a temperature of 60°-80°F (15.6°-26.7°C). Tests shall be in accordance with the procedures and equipment shown in Sections II and III of this Standard.

Pressure values are given on the following pages in terms of minimum and maximum averages and extreme variations for 10-round tests in standard test barrels.

The Standard Deviations for Definitive Proof Cartridges are derived from the service load standard deviations. A multiplication factor of 1.25 is used to obtain Definitive Proof Load Standard Deviations from service load standard deviations.

The minimum and maximum average Definitive Proof Pressures are computed as follows:

The Minimum Average Definitive Proof Pressure is calculated by multiplying the Maximum Probable Lot Mean (MPLM) service pressure by a factor of 1.3 (i.e., 130%) and rounding up to the nearest multiple of 500 psi.

The Maximum Average Definitive Proof Pressure is calculated by multiplying the Maximum Probable Lot Mean (MPLM) service pressure by a factor of 1.4 (i.e., 140%) and rounding downward to the nearest multiple of 500 psi.

Example:

Cartridge 222 Remington MPLM Pressure = 51,300 psi S.D. = 2,000 psi

1. Definitive Proof S.D. = service load S.D. x 1.25
i.e.: 2,000 x 1.25 = 2,500 psi
2. Min. Avg. Proof Pressure = Max Probable Lot Mean Pressure x 1.3
i.e.: 51,300 psi x 1.3 = 66,690 rounded up to 67,000 psi
3. Max. Avg. Proof Pressure = Max Probable Lot Mean Pressure x 1.4
i.e.: 51,300 psi x 1.4 = 71,820 rounded down to 71,500 psi

The Maximum Proof Pressure E.V. is a statistic derived from knowledge of the population Standard Deviation. Applying table figures from Relative Range Tables (Biometrika Tables for Statisticians), we calculate the maximum E.V. or Range equal to the population S.D. times the table constant 5.16 (for sample of 10 at 99.0% confidence level). For example, 222 Remington Proof S.D. = 2,500 psi, 2,500 psi x 5.16 = 13,000 psi which is the maximum allowable E.V. for the 222 Remington Proof Cartridge.

SECTION IV - DEFINITIVE PROOF LOADS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

PROOF PRESSURE DATA
 CRUSHER

PRESSURE DATA

Cartridge	Max. Bullet Wt. (grs.)	Service Maximum Average Pressure	Minimum & Maximum Pressure Values of Proof Cartridges (CUP/100)		Max. E.V.
			Minimum Average	Maximum Average	
6mm Rem	100	520	695	745	135
6.5mm Rem Mag	120	530	705	760	135
6.5x55 Swed Mauser	160	460	615	655	116
7mm Mauser	175	460	615	655	116
7mm Rem Mag	175	520	695	745	135
7mm-08Rem	140	520	695	745	135
7-30 Waters	120	400	535	570	103
7.62x39	123	500	670	715	129
8mm Mauser	170	370	495	530	96
8mm Rem Mag	220	540	720	775	141
17 Rem	25	520	695	745	135
218 Bee	46	400	535	570	103
22 Hornet	46	430	575	615	109
22-250 Rem	55	530	705	760	135
220 Swift	60	540	720	775	141
222 Rem	55	460	615	655	116
222 Rem Mag	55	500	670	715	129
223 Rem	55	520	695	745	135
225 Win	55	500	670	715	129
243 Win	100	520	695	745	135
25-06 Rem	120	530	705	760	135
25-20 Win	86	280	375	400	70
25-35 Win	117	370	495	530	96
250 Sav	100	450	600	645	116
256 Win Mag	60	430	575	615	109
257 Rob +P	117	500	670	715	129
264 Win Mag	140	540	720	775	141
270 Win	150	520	695	745	135
280 Rem (7mm Exp Rem)	165	500	670	715	129
284 Win	150	540	720	775	141
30 Carb	110	400	535	570	103
30 Rem	170	350	470	500	90
30-06 Sprg	220	500	670	715	130
30-30 Win	170	380	505	540	96

SECTION IV - DEFINITIVE PROOF LOADS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

PROOF PRESSURE DATA
 CRUSHER

PRESSURE DATA

Cartridge	Max. Bullet Wt. (grs.)	Service Maximum Average Pressure	Minimum & Maximum Pressure Values of Proof Cartridges (CUP/100)		Max. E.V.
			Minimum Average	Maximum Average	
30-40 Krag	220	400	535	570	103
300 H&H Mag	220	540	720	775	141
300 Sav	180	460	615	655	116
300 Win Mag	220	540	720	775	141
303 Brit	180	450	600	645	116
303 Sav	190	340	455	485	90
307 Win	180	520	695	745	135
308 Win	200	520	695	745	135
32 Rem	170	370	495	530	96
32 Win Spl	170	380	505	540	96
32-20 Win	100	160	213	229	38
32-40 Win	165	300	400	430	77
338 Win Mag	225	540	720	775	141
348 Win	200	400	535	570	103
35 Rem	200	350	470	500	90
35 Whelen	250	520	695	745	135
350 Rem Mag	200	530	705	760	135
351 Win SL	180	450	600	645	116
356 Win	250	520	695	745	135
358 Win	250	520	695	745	135
375 H&H Mag	300	530	705	760	135
375 Win	200	520	695	745	135
38-40 Win	180	140	187	201	38
38-55 Win	255	300	400	430	77
416 Rem Mag	400	540	720	775	141
44 Rem Mag	240	400	535	570	103
44-40 Win	200	130	173	186	32
444 Marlin	240	440	590	630	116
45-70 Govt	405	280	375	400	70
458 Win Mag	510	530	705	760	135

SECTION IV - DEFINITIVE PROOF LOADS
 CENTERFIRE RIFLE
 SAAMI VOLUNTARY PERFORMANCE STANDARDS

PROOF PRESSURE DATA
TRANSDUCER

PRESSURE DATA

<u>Cartridge</u>	<u>Max. Bullet Wt. (grs.)</u>	<u>Service Maximum Average Pressure</u>	<u>Minimum & Maximum Pressure Values of Proof Cartridges (psi/100)</u>		<u>Max. E.V.</u>
			<u>Minimum Average</u>	<u>Maximum Average</u>	
6mm Rem	100	650	870	930	167
7mm Mauser	175	510	680	730	129
7mm Rem Mag	175	610	815	875	154
7mm Wby Mag	175	650	370	930	167
7mm-08 Rem	140	610	815	875	154
7-30 Waters	120	450	600	645	116
7.62x39	123	450	600	645	116
8mm Mauser	170	350	470	500	90
8mm Rem Mag	220	650	870	930	167
22-250 Rem	55	650	870	930	167
222 Rem	55	500	670	715	129
223 Rem	55	550	735	785	141
243 Win	100	600	800	860	154
25-06 Rem	120	630	840	900	161
257 Rob +P	117	580	775	830	148
264 Win Mag	140	640	855	915	167
270 Win	150	650	870	930	167
280 Rem (7mm Exp Rem)	165	600	800	860	154
284 Win	150	560	750	800	141
30 Carb	110	400	535	570	103
30-06 Sprg	220	600	800	860	154
30-30 Win	170	420	565	600	109
300 Sav	180	470	630	670	122
300 Wby Mag	220	650	870	930	168
300 Win Mag	220	640	855	915	167
303 Brit	180	490	655	700	129
308 Win	200	620	830	890	135
32 Win Spl	170	420	565	600	109
338 Win Mag	225	640	855	915	167
35 Rem	200	335	450	480	83
375 H&H Mag	300	620	830	890	161
44 Rem Mag	240	360	480	515	90
444 Marlin	240	420	565	600	109
45-70 Govt	405	280	375	400	70

SECTION IV - DEFINITIVE PROOF LOADS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

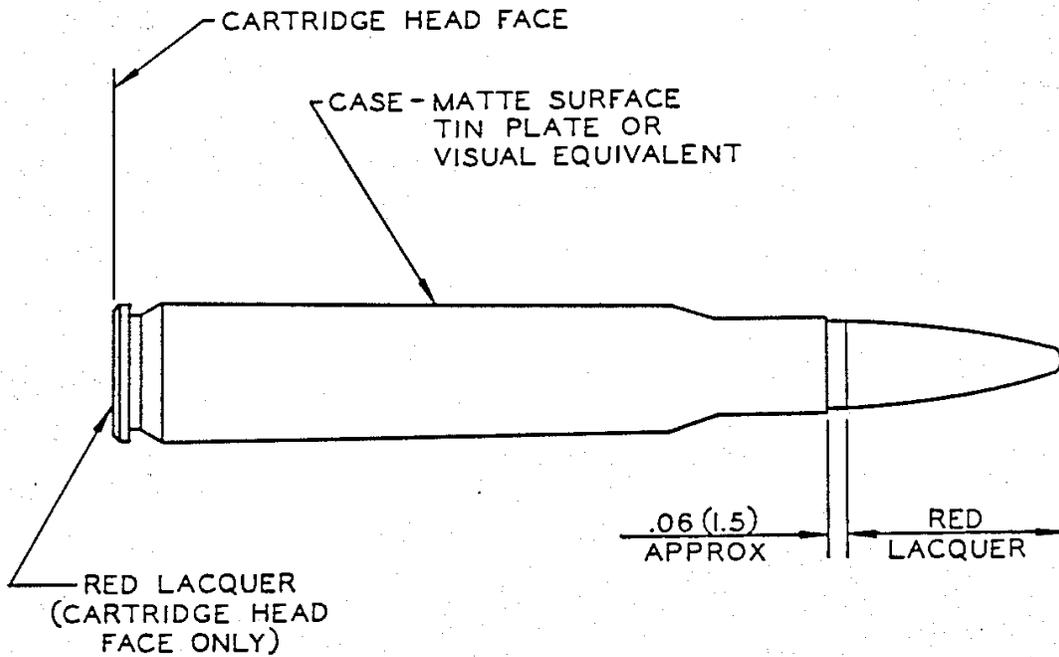
SOURCE

Centerfire Rifle Definitive Proof Loads should be used for one purpose only: the proof testing for centerfire rifles.

A list of suppliers may be obtained from the SAAMI Office, P.O. Box 838, Branford, Connecticut 06405.

SECTION IV - DEFINITIVE PROOF LOADS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

CARTRIDGE IDENTIFICATION



NOTE
(XX.XX) = MILLIMETERS

SECTION IV - DEFINITIVE PROOF LOADS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

PACKAGE IDENTIFICATION

DANGER - HIGH PRESSURE

Definitive Proof Cartridges for use
only in Proof Range.

These cartridges are loaded to SAAMI
recommendations.

Firearm to be fired only from a fixed
rest with operator properly protected.

(Red lettering on white background)

SECTION IV - DEFINITIVE PROOF LOADS
CENTERFIRE RIFLE
SAAMI VOLUNTARY PERFORMANCE STANDARDS

PROOF LOAD
DISPOSAL

Proof ammunition is specially loaded to generate chamber pressures substantially higher than all commercially produced ammunition. It is intended to be used only to verify the ability of firearms to withstand pressures substantially higher than service loads during testing. Proof Loads may be hazardous in some guns. Shooters conducting test firing should be adequately protected. Proof Load pressures for individual calibers generally are those established by SAAMI.

Proof ammunition, and all related packaging, is distinctively marked for visual recognition. We recommend special care not to mix these loads with any other types of ammunition.

Unsafe metal stresses can be created in cartridge cases when Proof Loads are fired. They should not be reloaded. As a condition of purchase, the buyer agrees to dispose of such fired cases only in ways that eliminate any possibility of being reloaded at all, and will furnish evidence of such handling upon request. Proof Loads not used by the buyer may not be resold; if not needed, they may be returned to the manufacturer for disposal. Failure to comply with the above precautions will be sufficient cause for immediate termination by the manufacturer of all Proof Load business activity with the buyer.

A signed statement will be required of the customer's acceptance of the above stated accord. Failure to have this document in the suppliers file will preclude shipment of Proof Load orders.