TIROPRATICO

ALLIANT RELOADER MANUAL

In collaborazione con TIROPRATICO® *WEB*

Caution

Millions of men and women reload ammunition as a hobby or because the cost savings allow them to do more shooting. In order to become or to continue as a safe reloader, **you must be cautious and careful.** You are the production department and the quality control department. Later, when you shoot the ammunition that only you produced and checked, you are the person closest to the gun if it malfunctions because of faulty ammunition — yours.

Remember–you are dealing with an explosive material. You become a "miniature" manufacturer working with powders and primers that can, if misused, explode or burn, causing serious personal injury (including death) and property damage.

Read and study one or more good books that describe reloading techniques in detail. When using smokeless powders, use only the exact type and quantity recommended herein. Store and use smokeless powders–your powders–according to the safety rules listed in this booklet. Reload for quality, so that the safest and most accurate loads on the shooting line will be yours.

Ballistics

The ballistic data shown in this booklet were obtained in the laboratory under strictly controlled conditions. **You must load only those exact combinations that are listed.** Even then, different reloading techniques, plus industrial tolerances of each component, likely will cause your ammunition, or ammunition loaded by other competent laboratories, to yield slightly different ballistic data. Therefore, **charge recommendations in this booklet must never be exceeded.** Smart shooters and hunters know that accuracy, not maximum power, is their key to success.

Disclaimer

Alliant disclaims any warranties with respect to this product, the safety or suitability thereof, or the results obtained, whether express or implied, including, without limitation, any implied warranty of merchantability or fitness for a particular purpose and/or any other warranty. Buyers and users assume all risk, responsibility, and liability whatsoever for any and all injuries (including death), losses, or damages to persons or property arising from the use of this product, whether or not occasioned by seller's negligence or based on strict product liability or principles of indemnity or contribution. Alliant neither assumes nor authorizes any person to assume for it any liability in connection with the use of this product.

Powder Warnings

- **NEVER** substitute smokeless powder for black powder, or for Pyrodex, or for any other smokeless powder.
- **NEVER** mix together any two powders, regardless of type, brand, style, or source.
- **NEVER** use the data in this *Reloaders' Guide* for any other powders, even if advertised "similar to Bullseye" or "burns the same as Red Dot," etc.

Violation of any of the above could result in severe personal injury (including death) or gun damage.

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REV 7-96

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WARNING: The shotgun shell loading data in this booklet are for lead shot only. Steel shot cannot be substituted. Also, do not use buffers or fillers of any kind.

Smokeless Powders for Reloading

We currently offer 14 powders for use in reloading. These are listed in the order of decreasing burning rates. Each powder listed is "slower" than those preceding it and "faster" than those following it. Among these Alliant smokeless powders, for example, Red Dot® burns more slowly than Bullseye®, but faster than Green Dot®.

Powder	Principal Use[1]	Can Also be Used In[1]
Bullseye®	Handgun Loads	12-Gauge Light Target Loads
Red Dot®	Light and Standard Shotshell Loads, 12-, 16-, and 20-Gauge	Handgun Loads
American Select™	12-Gauge Target Loads	Handgun Loads
Green Dot®	Standard and Medium Shotshell Loads, 12-, 16-, and 20-Gauge	Handgun Loads
Unique®	All-Around Shotshell Powder, 12-, 16-, 20-, and 28-Gauge	Handgun Loads
POWER PISTOL™	High performance pistol loads such as the 9mm, .40 S&W, and 10mm	Moderate pressure pistol cartridges like the .38 Special, .380 Auto, and .45 ACP
Herco®	Heavy Shotshell Loads, 10-, 12-, 16-, 20-, and 28-Gauge	Heavy Handgun Loads
Blue Dot®	Magnum Shotshell Loads, 10-, 12-, 16-, 20-, and 28-Gauge	Magnum Handgun Loads
2400®	Magnum Handgun Loads	Some Rifle and Shotshell Loads
Reloder® 7	Light Rifle Loads	Silhouette Loads
Reloder® 12	Medium Rifle Loads	Silhouette Loads
Reloder® 15	Medium Rifle Loads	Silhouette Loads
Reloder® 19	Magnum Rifle Loads	Target and hunting rifle loads
Reloder® 22	Magnum Rifle Loads	Maximum hunting loads

[1] *Use only in the loads printed in this Guide.*

Packaging

Powder	1-lb Canister	4-lb Canister	5-lb Canister	8-lb Keg
Bullseye, Red Dot, American Select, Green Dot, Unique, Herco, 2400	x	x		x
Power Pistol™	x	x		
Blue Dot	x		x	
Reloder Series	x		x	

All 14 powders are always in stock at distributors' magazines throughout the U.S.A., and in most countries where reloading is legally permitted and popular. Any reloader unable to purchase any of the 14 powders at retail stores that handle powders should write to the address on the back cover. We cannot ship directly, but we will endeavor to correct supply shortages in your area.

Powder Information

Smokeless sporting propellants are of two basic types – single-base and double-base. Single-base propellants derive their energy from nitrocellulose and double-base from a combination of nitrocellulose and nitroglycerin. Alliant propellants range from the "near" single-base American Select (2% nitroglycerin) to the high nitroglycerin (40%) double-base Bullseye. In addition, our propellants contain stabilizers for long storage life and various other ballistic modifiers which reduce flash, improve combustion efficiency, and promote clean burning.

Some of our propellants also have a chemical coating on the surface to control the burning rate. This creates a progressive burn for achieving higher velocities at lower pressures. All of our propellants have a graphite glaze, which ensures smooth, consistent metering of charges through volumetric reloaders.

Alliant propellants are extruded and cut into circular flakes or cylinders by precision dies and cutting equipment. Granule size tolerances are very tight and uniform to prevent separation of different size granules and to ensure consistent ballistic performance, load after load.

By utilizing a precise combination of chemical formulation, granule size, and chemical coatings, we are able to tailor the burning characteristics of our propellants to achieve the best overall performance in a wide range of loads.

Because each of our propellants is specifically engineered to have different burn rates and performance characteristics, **NEVER BLEND OR MIX DIFFERENT POWDERS, AND USE ONLY THE GRADE AND QUANTITY RECOMMENDED IN THIS RELOADER'S GUIDE.**

All powders burn with great precision and rapidity inside the gun chamber, generating the hot, high-pressure gas that accelerates the bullet (or shot) and drives it toward the target. It is critically important for safety that the powder used is matched to the bullet (or shot) weight and other factors; otherwise, the gun parts may be deformed or may even burst and cause serious personal injury (including death). Shot-to-shot accuracy can also be degraded by deviations from recommended loads. Even after 80 years of producing and testing powders, ballisticians are unable to calculate and predict exact ballistic results; we must test-fire our powders with each set of components and record the results. Therefore, the ballistic values and recommended combinations listed in this booklet must be followed without deviation.

Working up charges. For shotgun loads, use the charge weight shown. However, for all rifle and pistol loads, first load and fire a few cartridges at 10% less charge than is shown, watching for any sign of excessive pressure (difficult extraction, flattened or blown primers, unusual recoil).

Handgun loads. Many pistol and revolver loads require only small amounts of fast-burning powders; therefore: (1) guard against accidental double charges, and even multiple charges, whether loading with handtools or with progressive loading devices; (2) be sure that each bullet is positioned in the case so that the minimum overall length is not violated.

Dram Equivalent

Prior to the commercialization of smokeless powder, shotgun shells were loaded with black powder. The weight measurement system used for black powder was "drams." Compared with black powder, smokeless powder is more dense and MUCH more energetic, so it cannot safely be measured and used like black powder. Indeed, a different weight system was selected for smokeless powder: "grains," wherein 7,000 grains equal one pound.

Since many shooters still wanted to be able to compare their smokeless powder loads with the original black powder loads, the term "dram equivalent" evolved. Simply stated, the dram equivalent is an indicator of the velocity of a particular shot load. But note that the charge and weight of smokeless powder must not be calculated from the dram equivalent.

Notice

We have inserted information on the properties and storage of smokeless powder for your understanding, so that you can avoid unnecessary risks when using it. This information, on pages 8 and 9, was published initially by the Sporting Arms and Ammunition Manufacturers' Institute, Inc., several years ago in the interest of safety. You must read these pages carefully and comply with the precautions listed. If you have questions, please call or write to us at the address on the back cover.

Important Safety and Health Precautions

To perform in a gun, powders must ignite easily and burn rapidly. These characteristics require use of common sense to avoid accidents. YOU MUST OBSERVE THESE PRECAUTIONS:

1. DO NOT smoke when reloading.
2. DO NOT use spark-producing tools.
3. DO NOT mix powders of different kinds.
4. DO NOT leave powder where children can get it.
5. DO NOT try to load when distracted.
6. Avoid an open fire or working near spark-producing machinery.
7. Pour out only the amount of powder needed for immediate work.
8. Check the powder measure each time it is used. Make sure the settings have not been accidentally changed. Check-weigh “thrown charges” frequently.
9. Clean up any spilled powders. Use a brush and dustpan; do not use a vacuum cleaner. Dispose of spilled powder as described in the SAAMI pages of this Guide.
10. Store powder only in its original container, which was carefully designed for this usage. DO NOT REPACKAGE. Do not purchase or accept any Alliant powder not in its original, FACTORY-SEALED container.
11. Be sure the powder container is completely empty before discarding. Do not use the container to store other powders or materials, or for any other purpose.
12. Always keep in mind that smokeless powder is an explosive material and highly flammable. It should always be stored and handled in such a way as to avoid impact, friction, heat, sparks, or flame.
13. Wear safety glasses when reloading.
14. This material contains nitroglycerin. Inhalation, skin contact, or ingestion may cause severe headache, nausea, and lowering of blood pressure. THEREFORE, THE FOLLOWING PRECAUTIONS MUST BE OBSERVED WHEN HANDLING POWDERS:

    A. Do not take internally. In case of ingestion, cause vomiting. Call a physician.

    B. Avoid contamination of food, beverages, or smoking materials.

    C. Avoid breathing dust. Ensure adequate ventilation during handling.

    D. Wash thoroughly after handling and before eating, drinking, or smoking.

    E. Do not carry powder in clothing.

You must also always remember:

1. Establish a routine for reloading. It will result in more uniform loads and less chance of error.
2. Some primers are more powerful than others (they produce more gas at a higher temperature). Use only the primers specified herein.
3. Shotshell wads differ in their sealing ability. Use only the load combinations specified herein.
4. If you use cast bullets, their diameter, hardness, lubrication, and crimp will affect the ballistics.
5. The shotshell loads in this booklet are for use with LEAD SHOT ONLY!
6. Use only the brands of powder and components shown in our tables. Do not substitute other types.
7. Discharging firearms in poorly ventilated areas, cleaning firearms, or handling ammunition may result in exposure to lead, a substance known to cause birth defects, reproductive harm, and other serious physical injury. Have adequate ventilation at all times. Wash hands and face thoroughly after handling and before coming in contact with food, chewing materials, and smoking material.

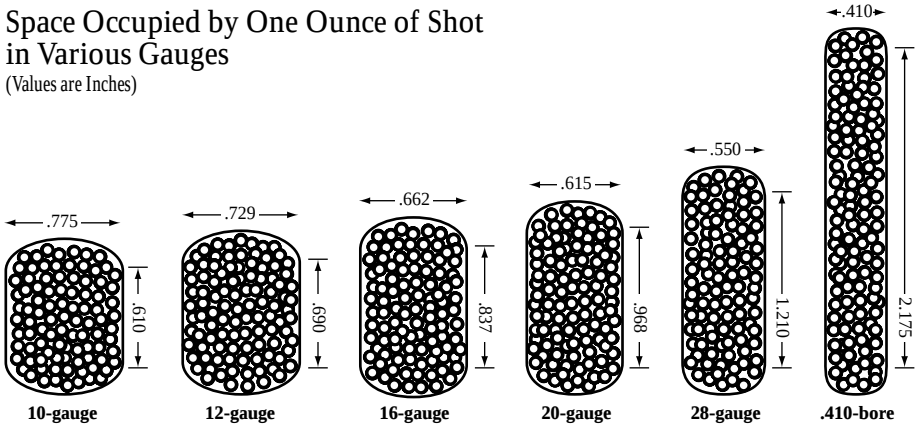
Reference Tables

Approximate Number of Pellets in Specific Weights of Lead Shot (Sizes 2 Through 9)

Weight, oz	No. 2	No. 4	No. 5	No. 6	No. 7½	No.8	No. 8½	No. 9
½	45	67	85	112	175	205	242	292
¾	67	101	127	168	262	308	363	439
⅞	79	118	149	197	306	359	425	512
1	90	135	170	225	350	410	485	585
1⅛	101	152	191	253	393	461	545	658
1¼	112	169	213	281	437	513	605	731
1⅜	124	186	234	309	481	564	665	804
1½	135	202	255	337	525	615	730	877

Space Occupied by One Ounce of Shot in Various Gauges

(Values are Inches)



Internal Diameter of the Barrel in Several Shotgun Gauges

10-Gauge—0.775-Inch
12-Gauge—0.729-Inch
16-Gauge—0.662-Inch
20-Gauge—0.615-Inch
28-Gauge—0.550-Inch
.410-Bore—0.410-Inch

Reference Tables (continued)

Number of Shells That Can Be Loaded with One Pound of Powder at Various Grains Per Load

(The term grain is a measure of weight: 7,000 grains equal one pound)

Grains/ Load	Loads/ Pound	Grains/ Load	Loads/ Pound	Grains/ Load	Loads/ Pound	Grains/ Load	Loads/ Pound	Grains/ Load	Loads/ Pound	Grains/ Load	Loads/ Pound
12	583	23	304	34	205	45	156	56	125	67	104
13	538	24	291	35	200	46	152	57	123	68	103
14	500	25	280	36	194	47	149	58	121	69	101
15	466	26	269	37	189	48	146	59	119	70	100
16	437	27	259	38	184	49	143	60	117	71	99
17	411	28	250	39	179	50	140	61	115	72	97
18	388	29	241	40	175	51	137	62	113	73	96
19	368	30	233	41	170	52	135	63	111	74	95
20	350	31	225	42	166	53	132	64	109	75	93
21	333	32	218	43	162	54	130	65	108	76	92
22	318	33	212	44	159	55	127	66	106	77	91

Typical Percentage of Pellets in a 30-Inch Circle at 40 Yards (Pattern) for Various Choke Sizes

(Choke is a Constriction at the Muzzle of a Shotgun Barrel)

Full Choke—70%

Improved Modified Choke—65 to 70%

Modified Choke—55%

Improved Cylinder—50%

True Cylinder—40%

Ballistic Data

The velocity and pressure obtained with the specific combinations of shell, wad, primer, bullet or shot weight, powder, and powder weight provided in this booklet were obtained in a laboratory, where considerable effort is made to control the load and test conditions. Velocity was measured with a chronograph (electric stopwatch). Pressure was measured either by compressing copper cylinders, or electronically, by use of a piezoelectric transducer.

Guns are designed to take a considerable amount of internal pressure, but if this is exceeded, they burst violently. Be alert to signs of excess pressure, such as heavy recoil, flattened primers, or blown primers. Don't make changes in the suggested loads.

Tone variations (shaded areas) used in the reloading tables are for ease of reading and do not represent preferred loads.

Each shotshell table lists DRAM EQUIVALENT in the first column. This number is not used in any way during reloading. The quantity of powder to use is listed in GRAINS, which are a measure of weight, under each powder column.

Every reloader needs a good-quality scale for weighing each powder charge, or for checking the weight of powder thrown by volumetric loaders.

Special Notes Regarding Components Other Than Powder

A. Shotgun Shells. Manufacturers may sell ammunition under different brand names that are identical for reloading purposes. Following are popular variations. When in doubt, consult the ammunition producer.

- Federal Hi Power Plastic same as Duck and Pheasant, Field, Game, and Dove and Squirrel or Top Gun.
- Federal Premium (Integral Base Wad)
- Remington-Peters. Same as Mohawk brand shells.
- Winchester AA-Type (Compression-Formed) same as AA Target, Upland and Super Double X.
- Winchester Polyformed Type (Reifenhauser Tube) same as Duck and Pheasant, Dove and Squirrel, and Sears Brand.

B. Primers

- CCI 109 and CCI 209 are ballistically identical and can be interchanged.
- CCI 209M (Magnum) is "hotter" and cannot be substituted for CCI 109 or 209. Use 209M only as listed.
- Rem. 209 is "hotter" and cannot be substituted for Rem. 97★ or Rem. 209P primer.
- Rem. 209P is interchangeable with Rem. 97★ primer.
- Federal 209A is "hotter" and cannot be substituted for Federal 209.

C. Wads. Card wads and fiber wads are used for certain slug and buckshot loads and a few light shotshell loads. Do not interchange wads.

D. Shot. Use only clean lead shot. DO NOT USE STEEL SHOT IN SHOTSHELL LOADS LISTED IN THIS GUIDE.

E. Shot Buffers. Do not add any buffers or fillers of any kind to shotshell loads listed in this Guide.

F. Cards and Fillers. For revolver, pistol, and rifle cartridge reloading, do not add any cards, kapok, or fillers of any kind to loads listed in this Guide.

Black Powder

Black powder is entirely different from smokeless powder. NEVER substitute one for the other. Smokeless powders have much more energy than black powder. NEVER attempt to use smokeless powder in black powder guns or saluting cannon; they may blow up and cause serious personal injury (including death).

1996 Powder Bushing Charts

A reloading scale is *required* to check the nominal weight of a powder charge.

Powder bushings can vary in the charge weight they drop and could vary as much as several grains under certain conditions.

Powder density, moisture content, and loading technique can cause a variation from the bushing weights listed on the charts. Also, the loading machine vibration affects charge weights. A complete loading cycle should be completed to *assure* an average powder charge weight.

The information in these tables has been supplied by the reloading machine manufacturers and *is not a reloading recommendation* or a result of Alliant's testing.

Lee Powder Bushing Chart (Units shown in grains)

Bushing #	.095	.100	.105	.110	.116	.122	.128	.134	.141	.148	.151*	.155	.163	.171	.180	.189	.198
Red Dot	11.0	11.6	12.2	12.8	13.5	14.2	14.8	15.5	16.4	17.2	17.5	18.0	18.9	19.8	20.9	21.9	23.0
Green Dot	12.3	13.0	13.6	14.3	15.1	15.8	16.6	17.4	18.3	19.2	19.6	20.1	21.2	22.2	23.4	24.5	25.7
Unique	14.3	15.0	15.8	16.5	17.4	18.3	19.2	20.1	21.2	22.2	22.7	23.3	24.5	25.7	27.0	28.4	29.7
Herco	13.9	14.6	15.3	16.1	16.9	17.8	18.7	19.6	20.6	21.6	22.0	22.6	23.8	25.0	26.3	27.6	28.9
Blue Dot	18.0	19.0	19.9	20.8	22.0	23.1	24.3	25.4	26.7	28.0	28.6	29.4	30.9	32.4	34.1	35.8	37.5
2400	21.0	22.1	23.2	24.3	25.6	27.0	28.3	29.6	31.2	32.7	33.4	34.3	36.0	37.8	39.8	41.8	43.8

**NOTE: Only available with Lee Load-Fast.*

Hornady Powder Bushing Chart for 366 Auto and Apex 91 (Units shown in grains)

Grains	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Red Dot			384	393	405	423	438	453	468	480	489	498	510	519																					
American Select							417	423	432	447	456	468	477	483																					
Green Dot			363	378	390	405	420	435	447	456	468	480	492	501	513	522	534	—	549	558															
Unique				342	354	369	381	393	405	414	423	435	444	453	465	474	483	492	501	—	510														
Herco				357	369	381	393	405	414	426	438	450	462	471	477	489	498	—	513	522	531	—	549	558	564	573	—	588	594							
Blue Dot									366	372	381	390	396	408	414	423	435	441	447	459	468	474	483	489	495	501	510	516	522	531	534	543	549	555	561
2400		256	266	—	291	300	312	324	330	339																									

Ponsness/Warren Powder Bushing Chart (Units shown in grains)

Bushing #	1A	2A	3A	A	B	C	C1	D	D1	E	E1	E2	F	F1	F2	G	G1	H	I	J	J1	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
Bullseye										16.2	16.8	17.7	18.7	19.4																							
Red Dot											11.6	12.2	12.9	13.4	13.7	14.5	14.7	15.7	16.5	16.8	17.3	17.6	18.5	19.4	20.7	20.9	21.3	21.9	22.9									
American Select																	16.4	17.5	18.2	18.8	19.4	19.9	20.6	22.0													
Green Dot											11.7	12.3	13.1	13.6	13.8	14.7	14.9	15.9	16.7	17.0	17.5	17.9	18.8	19.6	21.1	21.3	21.8	22.3	23.2	23.6	25.3	26.5					
Unique									12.6	14.2	14.8	15.6	16.5	17.2	17.5	18.7	19.0	20.2	21.2	21.7	22.3	22.7	24.0	25.0	26.8	27.1	27.6										
Herco									12.3	13.8	14.4	15.1	16.0	16.6	16.9	18.0	18.3	19.5	20.5	20.9	21.5	21.9	23.0	24.0	25.7	26.0	26.5	27.1	28.1	28.8	30.7	32.1	33.1	34.9	35.4	37.2	
Blue Dot									16.4	18.4	19.2	20.1	21.3	22.2	22.6	23.9	24.3	25.9	27.2	27.7	28.5	29.1	30.6	31.9	34.2	34.5	35.2	36.0	37.5	38.1	40.7	42.5	43.8	46.5	47.2	49.5	55.7
2400		12.3	13.2	15.2	16.1	16.8	17.6	18.3	19.0	21.3	22.2	23.3	24.7	25.7	26.1	27.7	28.2	30.0	31.5	32.2	33.1	33.7	35.5	37.1	39.8	40.2	41.1	42.0	43.8	44.5	47.5	49.8					

MEC Powder Bushing Chart (Units shown in grains)

Bushing #	10	11	12	12A	13	13A	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Bullseye	8.6	9.1	9.6	10.1	10.6	11.2	11.7	12.3	12.9	13.5	14.1	14.8	15.4	16.1	16.8	17.5	18.2	18.9	19.6	20.4	21.2	21.9	22.8	23.7
Red Dot	6.3	6.7	7.1	7.5	7.9	8.3	8.7	9.2	9.6	10.1	10.6	11.1	11.6	12.1	12.6	13.1	13.7	14.2	14.9	15.7	16.4	17.1	17.8	18.5
American Select	6.9	7.3	7.7	8.2	8.6	9.1	9.6	10.1	10.6	11.1	11.7	12.2	12.8	13.3	13.9	14.5	15.1	15.7	16.4	17.0	17.7	18.3	19.0	19.7
Green Dot	6.7	7.2	7.6	8.0	8.4	8.9	9.3	9.8	10.3	10.8	11.3	11.8	12.4	12.9	13.5	14.0	14.6	15.2	15.8	16.4	17.0	17.7	18.3	19.0
Unique	7.5	7.9	8.4	8.9	9.4	9.9	10.4	10.9	11.4	12.0	12.6	13.1	13.7	14.5	15.1	15.8	16.4	17.1	17.7	18.4	19.1	19.8	20.5	21.1
Herco	7.9	8.3	8.8	9.3	9.8	10.4	10.9	11.4	12.0	12.6	13.2	13.8	14.4	15.0	15.7	16.3	17.0	17.7	18.4	19.1	19.8	20.6	21.3	22.1
Blue Dot	10.8	11.3	11.9	12.5	13.1	13.7	14.4	15.0	15.7	16.3	17.0	17.7	18.4	19.2	20.1	21.0	21.9	22.8	23.7	24.6	25.5	26.4	27.3	28.2
2400	11.8	12.5	13.3	14.0	14.8	15.6	16.4	17.2	18.1	18.9	19.8	20.7	21.7	22.6	23.6	24.6	25.6	26.6	27.7	28.8	29.9	31.0	32.1	33.3

MEC Powder Bushing Chart continued (Units shown in grains)

Bushing #	32	33	34	35	36	37	38	38A	39	39A	40	40A	41	41A	42	42A	43	43A	44	44A	45	45A	46
Bullseye	24.6	25.5	26.4	27.3	28.2	29.1	30.1	31.0	31.9	32.8	33.7	34.7	35.7	36.9	38.1	39.4	40.7	42.0	43.3	44.6	46.0	47.4	48.8
Red Dot	19.2	19.9	20.6	21.3	21.9	22.7	23.3	24.1	24.7	25.2	25.9	26.6	27.3	27.9	28.4	29.3	29.9	30.8	31.5	32.1	32.7	33.4	34.1
American Select	20.4	21.1	21.8	22.6	23.3	24.1	24.9	25.7	26.5	27.3	28.1	28.9	29.8	30.7	31.5	32.4	33.3	34.2	35.2	36.4	37.0	38.0	39.0
Green Dot	19.6	20.3	21.0	21.7	22.4	23.2	23.9	24.7	25.4	26.2	27.0	27.8	28.6	29.4	30.3	31.1	32.0	32.8	33.7	34.6	35.5	36.4	37.4
Unique	21.7	22.5	23.2	24.0	24.8	25.6	26.5	27.3	28.2	29.0	29.9	30.8	31.7	32.6	33.5	34.5	35.4	36.4	37.4	38.4	39.4	40.4	41.4
Herco	22.9	23.7	24.5	25.3	26.2	27.0	27.9	28.8	29.7	30.6	31.5	32.4	33.4	34.3	35.3	36.3	37.3	38.3	39.3	40.4	41.4	42.5	43.6
Blue Dot	29.1	30.5	31.6	32.7	33.8	35.0	36.1	37.3	38.5	39.7	40.9	42.2	43.4	44.7	46.0	47.4	48.7	50.1	51.5	52.9	54.3	55.7	57.2
2400	34.5	35.7	36.9	38.1	39.4	40.7	42.0	43.3	44.6	46.0	47.4	48.8	50.2	51.6	53.1	54.6	56.1	57.6	59.2	60.7	62.3	63.9	65.6

S A A M I
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Properties and Storage of Smokeless Powder

Ammunition handloading has become increasingly popular in recent years. This information discusses properties of smokeless powder and offers recommendations for its storage.

This information is intended to increase the knowledge of all concerned individuals and groups regarding smokeless powder. The statements and recommendations made are not intended to supersede local, state, or Federal regulations. Proper authorities should be consulted on regulations for storage and use of smokeless powder in each specific community. A leaflet entitled *"Sporting Ammunition Primers: Properties, Handling, & Storage for Hand Loading"* supplements this information on smokeless powder.

Properties of Smokeless Powder

Smokeless powders, or propellants, are essentially mixtures of chemicals designed to burn under controlled conditions at the proper rate to propel a projectile from a gun.

Smokeless powders are made in three forms:

1. Thin, circular flakes or wafers
2. Small cylinders
3. Small spheres

Single-base smokeless powders derive their main source of energy from nitrocellulose.

The energy released from double-base smokeless powders is derived from both nitrocellulose and nitroglycerin.

All smokeless powders are extremely flammable; by design, they are intended to burn rapidly and vigorously when ignited.

Oxygen from the air is not necessary for the combustion of smokeless powders since they contain sufficient built-in oxygen to burn completely, even in an enclosed space such as the chamber of a firearm.

In effect, ignition occurs when the powder granules are heated above their ignition temperature. This can occur by exposing powder to:

1. A flame such as a match or primer flash.
2 An electrical spark or the sparks from welding, grinding, etc.
3. Heat from an electric hot plate or a fire directed against or near a closed container even if the powder itself is not exposed to the flame.

When smokeless powder burns, a great deal of gas at high temperature is formed. If the powder is confined, this gas will create pressure in the surrounding structure. The rate of gas generation is such, however, that the pressure can be kept at a low level if sufficient space is available or if the gas can escape.

In this respect smokeless powder differs from blasting agents or high explosives such as dynamite or blasting gelatin, although smokeless powder may contain chemical ingredients common to some of these products.

High explosives such as dynamite are made to detonate, that is, to change from solid state to gaseous state with evolution of intense heat at such a rapid rate that shock waves are propagated through any medium in contact with them. Such shock waves exert pressure on anything they contact, and, as a matter of practical consideration, it is almost impossible to satisfactorily vent away from the effects of a detonation involving any appreciable quantity of dynamite.

Smokeless powder differs considerably in its burning characteristics from common "black powder."

Black powder burns essentially at the same rate out in the open (unconfined) as when in a gun.

When ignited in an unconfined state, smokeless powder burns inefficiently with an orange-colored flame. It produces a considerable amount of light brown noxious smelling smoke. It leaves a residue of ash and partially burned powder. The flame is hot enough to cause severe burns.

The opposite is true when it burns under pressure as in a cartridge fired in a gun. Then it produces very little smoke, a small glow, and leaves very little or no residue. The burning rate of smokeless powder increases with increased pressure.

If burning smokeless powder is confined, gas pressure will rise and eventually can cause the container to burst. Under such circumstances, the bursting of a strong container creates effects similar to an explosion.

For this reason, the Department of Transportation (formerly Interstate Commerce Commission) sets specifications for shipping containers for propellants and requires tests of loaded containers — under actual fire conditions — before approving them for use.

When smokeless powder in D.O.T. approved containers is ignited during such tests, container seams split open or lids pop off — to release gases and powder from confinement at low pressure.

How to Check Smokeless Powder for Deterioration

Although modern smokeless powders are basically free from deterioration under proper storage conditions, safe practices require a recognition of the signs of deterioration and its possible effects.

Powder deterioration can be checked by opening the cap on the container and smelling the contents. Powder undergoing deterioration has an irritating acidic odor. (Don't confuse this with common solvent odors such as alcohol, ether and acetone.)

Check to make certain that powder is not exposed to extreme heat as this may cause deterioration. Such exposure produces an acidity which accelerates further reaction and has been known, because of the heat generated by the reaction, to cause spontaneous combustion.

Never salvage powder from old cartridges and do not attempt to blend salvaged powder with new powder. Don't accumulate old powder stocks.

The best way to dispose of deteriorated smokeless powder is to burn it out in the open at an isolated location in small shallow piles (not over 1" deep). The quantity burned in any one pile should never exceed one pound. Use an ignition train of slow burning combustible material so that the person may retreat to a safe distance before powder is ignited.

Considerations for Storage of Smokeless Powder

Smokeless powder is intended to function by burning, so it must be protected against accidental exposure to flame, sparks or high temperatures.

For these reasons, it is desirable that storage enclosures be made of insulating materials to protect the powder from external heat sources.

Once smokeless powder begins to burn, it will normally continue to burn (and generate gas pressure) until it is consumed.

D.O.T. approved containers are constructed to open up at low internal pressures to avoid the effects normally produced by the rupture or bursting of a strong container.

Storage enclosures for smokeless powder should be constructed in a similar manner:

1. Of fire-resistant and heat-insulating materials to protect contents from external heat.
2. Sufficiently large to satisfactorily vent the gaseous products of combustion, which would result if the quantity of smokeless powder within the enclosure accidentally ignited.

If a small, tightly enclosed storage enclosure is loaded to capacity with containers of smokeless powder, the walls of the enclosure will expand or move outwards to release the gas pressure — if the powder in storage is accidentally ignited.

Under such conditions, the effects of the release of gas pressure are similar or identical to the effects produced by an explosion.

Hence only the smallest practical quantities of smokeless powder should be kept in storage, and then in strict compliance with all applicable regulations and recommendations of the National Fire Protection Association (reprinted at end of leaflet).

Recommendations for Storage of Smokeless Powder

STORE IN A COOL, DRY PLACE. Be sure the storage area selected is free from any possible sources of excess heat and is isolated from open flame, furnaces, hot water heaters, etc. Do not store smokeless powder where it will be exposed to the sun's rays. Avoid storage in areas where mechanical or electrical equipment is in operation. Restrict from the storage areas heat or sparks which may result from improper, defective or overloaded electrical circuits.

DO NOT STORE SMOKELESS POWDER IN THE SAME AREA WITH SOLVENTS, FLAMMABLE GASES, OR HIGHLY COMBUSTIBLE MATERIALS.

STORE ONLY IN DEPARTMENT OF TRANSPORTATION APPROVED CONTAINERS.

Do not transfer the powder from an approved container into one which is not approved.

DO NOT SMOKE IN AREAS WHERE POWDER IS STORED OR USED. PLACE APPROPRIATE "NO SMOKING" SIGNS IN THESE AREAS.

DO NOT SUBJECT THE STORAGE CABINETS TO CLOSE CONFINEMENT.

STORAGE CABINETS SHOULD BE CONSTRUCTED OF INSULATING MATERIALS AND WITH A WEAK WALL, SEAMS OR JOINTS TO PROVIDE AN EASY MEANS OF SELF-VENTING.

DO NOT KEEP OLD OR SALVAGED POWDERS. Check old powders for deterioration regularly. Destroy deteriorated powders immediately.

OBEY ALL REGULATIONS REGARDING QUANTITY AND METHODS OF STORING. Do not store all your powders in one place. If you can, maintain separate storage locations. Many small containers are safer than one or more large containers.

KEEP YOUR STORAGE AND USE AREA CLEAN. Clean up spilled powder promptly. Make sure the surrounding area is free of trash or other readily combustible materials.

10-3 Smokeless Propellants.

10-3.1 Quantities of smokeless propellants not exceeding 25 lb (11.3 kg) in shipping containers approved by the U.S. Department of Transportation, may be transported in a private vehicle.

10-3.2 Quantities of smokeless propellants exceeding 25 lb (11.3 kg) but not exceeding 50 lb (22.7 kg), transported in a private vehicle, shall be transported in a portable magazine having wood walls of at least 1-in. (25.4-mm) nominal thickness.

10-3.3 Transportation of more than 50 lb (22.7 kg) of smokeless propellants in a private vehicle is prohibited.

10-3.4 Commercial shipments of smokeless propellants in quantities not exceeding 100 lb (45.4 kg) are classified for transportation purposes as flammable solids when packaged according to U.S. Department of Transportation Hazardous Materials Regulations (Title 49, Code of Federal Regulations, Part 173.197a), and shall be transported accordingly.

10-3.5 Commercial shipments of smokeless propellants exceeding 100 lb (45.4 kg) or not packaged in accordance with the regulations cited in 10-3.4 shall be transported according to U.S. Department of Transportation regulations for Class B propellant explosives.

10-3.6 Smokeless propellants shall be stored in shipping containers specified by U.S. Department of Transportation Hazardous Materials Regulations.

10-3.7 Smokeless propellants intended for personal use in quantities not exceeding 20 lb (9.1 kg) may be stored in original containers in residences. Quantities exceeding 20 lb (9.1 kg), but not exceeding 50 lb (22.7 kg), may be stored in residences if kept in a wooden box or cabinet having walls of at least 1-in. (25.4-mm) nominal thickness.

10-3.8 Not more than 20 lb (9.1 kg) of smokeless propellants, in containers of 1-lb (0.45-kg) maximum capacity, shall be displayed in commercial establishments.

10-3.9 Commercial stocks of smokeless propellants shall be stored as follows:

(a) Quantities exceeding 20 lb (9.1 kg), but not exceeding 100 lb (45.4 kg), shall be stored in portable wooden boxes having walls of at least 1-in. (25.4 mm) thickness.

(b) Quantities exceeding 100 lb (45.4 kg), but not exceeding 800 lb (363 kg), shall be stored in nonportable storage cabinets having walls of at least 1-in. (25.4-mm) thickness. Not more than 400 lb (181 kg) may be stored in any one cabinet and cabinets shall be separated by a distance of at least 25 ft. (7.63 m) or by a fire partition having a fire resistance of at least 1 hour.

(c) Quantities exceeding 800 lb (363 kg), but not exceeding 5,000 lb (2268 kg), may be stored in a building if the following requirements are met:

1. The warehouse or storage room shall not be accessible to unauthorized personnel.
2. Smokeless propellant shall be stored in nonportable storage cabinets having wood walls at least 1 in. (25.4-mm) thick and having shelves with no more than 3 ft (0.92 m) separation between shelves.
3. No more than 400 lb (181 kg) shall be stored in any one cabinet.
4. Cabinets shall be located against walls of the storage room or warehouse with at least 40 ft (12.2 m) between cabinets.
5. Separation between cabinets may be reduced to 20 ft. (6.1 m) if barricades twice the height of the cabinets are attached to the wall, midway between each cabinet. The barricades shall extend at least 10 ft (3 m) outward, shall be firmly attached to the wall, and shall be constructed of ¼-in. (6.4-mm) boiler plate, 2-in. (51-mm) thick wood, brick, or concrete block.
6. Smokeless propellant shall be separated from materials classified by the U.S. Department of Transportation as flammable liquids, flammable solids, and oxidizing materials by a distance of 25 ft (7.63 m) or by a fire partition having a fire resistance of at least 1 hour.
7. The building shall be protected by an automatic sprinkler system installed according to NFPA 13, Standard for the Installation of Sprinkler Systems.

(d) Smokeless propellants not stored according to (a), (b) and (c) above shall be stored in a Type 4 magazine constructed and located according to Chapter 6.

Pistol and Revolver Loads

Cartridge/Bullet	Primer	Min. OAL (inches)	Bbl Length	Bullseye			Red Dot			American Select			Green Dot			Unique			Power Pistol			Herco			Blue Dot			2400		
				Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi	Chg Wt	fps	psi
.25 Auto																														
50 FMC	Rem. SP 1½	0.875	2.0	1.3	760	15,000	1.1	740	15,500				1.4	785	15,400	1.7	760	14,800				1.7	735	15,600						
.32 Auto																														
71 FMC	Rem. SP 1½	0.984	4.0	2.2	835	12,500	2.1	805	12,900				2.3	810	11,900	2.5	820	11,200				3.2	880	13,500						
.32 H&R Magnum																														
85 JHP	Fed. 100	1.320	5.0	3.4	1,020	18,700	3.4	1,030	19,200				3.5	1,035	19,500	4.1	1,050	18,700				4.6	1,060	18,900	6.6	1,100	19,000			
90 LWC (target)		1.100	5.0	2.2	800	9,500	2.1	800	9,400				2.2	805	9,600	2.5	800	8,400				2.8	805	8,500	3.7	805	7,800			
90 LWC		1.180	5.0	3.3	1,060	19,600	3.1	1,020	20,000				3.3	1,050	20,400	3.7	1,110	20,300				4.0	1,070	20,400	5.1	1,150	20,300	6.2	1,150	20,400
98 LRN		1.320	5.0	3.4	1,020	19,500	3.1	980	19,700				3.5	1,010	19,600	4.0	1,000	19,000												
9x18mm Makarov																														
95 JHP	Win. W.S.P.	0.965	4.0	3.6	970	21,200													4.7	1,010	21,600									
100 FPJ	1½-108	0.965	4.0	3.6	960	21,100	3.1	905	21,300				3.5	925	21,300				4.7	995	21,400									
100 LRN		0.965	4.0	3.2	920	21,000	2.7	865	21,300				3.2	910	21,600	4.3	985	20,900	4.2	950	21,600									
9mm Luger																														
95 FMJ	Win. W.S.P.	1.055	4.0	5.5	1,295	31,400	5.3	1,285	32,100				5.5	1,240	25,500	6.5	1,250	26,400	7.8	1,445	32,900	6.8	1,225	24,400	8.3	1,180	22,000			
115 FMJ	1½-108	1.120	4.0	5.0	1,180	31,000	4.5	1,150	32,600				4.7	1,150	30,000	6.1	1,185	30,100	6.7	1,280	33,500	6.3	1,180	28,700	8.0	1,190	29,200			
125 L		1.150	4.0	4.9	1,165	32,100	4.5	1,145	32,000				5.2	1,165	32,100	6.0	1,165	29,400				6.2	1,165	28,500	8.2	1,190	29,700			
125 FMJ		1.150	4.0	4.9	1,155	32,000	4.6	1,145	33,000				5.2	1,150	32,100	6.2	1,170	31,300	6.6	1,235	34,000	6.5	1,180	32,700	8.2	1,170	29,900			
147 XTP		1.140	4.0	4.2	1,010	32,900	3.4	895	32,400				3.7	930	32,200	4.4	1,010	32,700	5.7	1,095	34,000	4.9	1,010	30,500	6.2	1,050	30,200			
.357 Magnum																														
110 JHP	Fed. 200	1.560	5.6	9.0	1,690	31,700	7.7	1,560	34,000				10.0	1,660	31,300	10.0	1,735	34,100	9.7	1,690	34,000	13.0	1,885	33,300	16.0	2,040	33,800			
125 JSP		1.570	5.6	8.4	1,550	32,800	7.0	1,410	34,000				7.3	1,415	33,600	9.6	1,585	33,800	9.2	1,555	33,500	9.8	1,590	33,600	14.5	1,795	34,000	17.6	1,810	31,800
148 LWC (target)		1.330	5.6	2.8	780	10,000	2.7	775	12,400				2.8	780	14,100	3.3	775	10,000												
148 LWC		1.330	5.6	5.7	1,475	34,000	4.6	1,300	33,600				5.1	1,310	34,000	6.4	1,465	33,800				6.7	1,510	33,900	10.0	1,625	33,800	12.2	1,675	33,800
158 LSWC		1.580	5.6	6.5	1,320	33,900	5.5	1,215	34,000				6.0	1,240	34,000	6.8	1,295	33,900				7.9	1,365	33,900	10.3	1,490	33,600	15.3	1,620	34,000
158 JSP		1.575	5.6	6.8	1,250	33,100	6.0	1,160	33,400				7.0	1,215	34,000	7.8	1,280	33,200	8.0	1,305	33,800	8.2	1,305	34,000	10.7	1,420	33,300	15.2	1,535	33,100
170 FMJ		1.585	5.6	6.2	1,175	33,900	5.4	1,025	33,600				6.1	1,090	33,700	6.8	1,175	33,600	8.0	1,195	33,300	7.0	1,175	33,500	9.7	1,310	33,800	12.1	1,365	33,600
180 JFP		1.580	5.6	6.3	1,135	34,000	5.3	930	33,200				6.0	1,010	34,000	7.0	1,125	33,800	7.0	1,145	33,800	7.2	1,110	34,000	9.7	1,260	33,300	12.5	1,300	32,700
200 LRN		1.575	5.6	5.3	1,085	33,900	4.6	990	33,600				5.0	1,015	34,000	6.0	1,105	33,900				6.1	1,105	33,900	8.2	1,225	33,900	10.0	1,245	32,800
.38 Super Auto +P																														
115 JHP	Rem. SP 1½	1.255	5.0	5.5	1,240	33,900	4.7	1,155	33,500				5.7	1,225	33,800	6.6	1,265	33,800	7.3	1,345	34,400	6.8	1,260	34,000	10.2	1,360	33,000			
130 FMJ		1.260	5.0	5.1	1,170	33,600	4.5	1,095	33,900				5.2	1,135	33,600	6.2	1,200	34,000	6.8	1,255	34,600	6.3	1,180	33,500	9.1	1,265	32,500			
147 XTP		1.275	5.0	5.0	1,095	34,000	4.5	1,035	34,000				4.7	1,045	33,500	5.8	1,105	34,000	6.2	1,155	34,900	6.4	1,135	33,800	8.6	1,220	33,900	10.9	1,215	33,600
158 L		1.275	5.0	4.6	1,030	33,600	4.0	985	34,000				4.9	1,025	33,900	5.9	1,085	33,800				6.0	1,080	33,100	8.3	1,190	33,900			
.38 Special																														
110 JHP	Fed. 100	1.430	5.6	4.5	1,085	14,900	4.0	1,000	15,800				4.6	1,050	16,000	5.6	1,090	15,400				5.6	1,090	15,800	7.8	1,170	15,700			
125 JSP		1.440	5.6	4.4	1,000	15,300	3.9	950	15,600				4.3	985	15,900	5.3	1,015	16,000				5.5	1,040	16,000	7.3	1,035	15,600			
148 LWC (target)		1.180	5.6	2.7	785	14,600	2.3	730	14,800				2.7	765	14,600	3.2	775	14,100												
148 LWC		1.180	5.6	2.8	815	15,900	2.5	750	15,500				2.9	800	15,900	3.3	815	15,300				3.5	820	16,000	5.3	810	13,600			
158 LSWC		1.420	5.6	3.6	910	15,500	3.1	835	15,800				3.5	870	15,600	4.3	920	16,000				4.5	930	15,800	6.1	955	15,600	7.5	990	15,500
160 JSP		1.435	5.6	3.5	805	15,600	3.2	715	15,700				3.4	750	15,800	4.2	800	15,600				4.4	805	16,000	6.2	845	15,800	7.6	850	15,900
200 LRN		1.540	5.6	3.0	760	15,100	2.8	725	15,100				3.1	750	15,500	3.6	780	15,700				3.8	785	15,500	5.3	850	16,000	7.0	870	15,800
.38 Special +P																														
90 JHP	Fed. 100	1.410	5.6	5.5	1,340	17,000	4.5	1,245	17,000				5.1	1,260	16,900	6.3	1,300	16,800				6.5	1,310	17,100	9.1	1,345	16,900			
110 JHP		1.430	5.6	5.0	1,175	17,400	4.2	1,040	17,500				4.8	1,100	17,400	5.9	1,160	17,500	6.5	1,200	17,100	5.9	1,150	17,500	8.2	1,205	16,800			
125 JSP		1.445	5.6	4.8	1,090	17,500	4.1	965	17,000				4.6	1,015	17,500	5.6	1,070	17,500	6.3	1,165	17,200	5.8	1,050	16,900	7.5	1,065	16,900			
158 LSWC		1.420	5.6	3.8	945	17,200	3.2	855	16,800				3.7	910	17,200	4.5	950	17,100				4.7	965	17,300	6.3	995	17,000	7.8	1,035	17,400
160 JSP		1.435	5.6	3.7	820	17,100	3.3	750	17,400				3.6	770	17,300	4.4	885	17,100	4.9	880	17,300	4.6	835	17,200	6.3	905	17,400	7.8	910	17,500
200 LRN		1.540	5.6	3.3	795	17,100	2.9	750	17,000				3.2	775	17,100	3.7	800	17,100				4.0	825	17,000	5.5	885	17,100	7.1	890	17,500

See Special Reloading Precautions on page 56. See NOTES and KEY on page 46.

continued on next page

Cartridge/Bullet	Primer	Min. OAL (inches)	Bbl Length	Bullseye Chg Wt	Bullseye fps	Bullseye psi	Red Dot Chg Wt	Red Dot fps	Red Dot psi	American Select Chg Wt	American Select fps	American Select psi	Green Dot Chg Wt	Green Dot fps	Green Dot psi	Unique Chg Wt	Unique fps	Unique psi	Power Pistol Chg Wt	Power Pistol fps	Power Pistol psi	Herco Chg Wt	Herco fps	Herco psi	Blue Dot Chg Wt	Blue Dot fps	Blue Dot psi	2400 Chg Wt	2400 fps	2400 psi
.380 Auto																														
88 JHP	Win.	0.960	3.7	3.2	980	14,300	3.1	965	14,600				3.4	940	14,600	4.0	920	13,600				4.1	995	14,900	6.0	1,000	14,700			
90 JHP	1½-108	0.960	3.7	3.0	940	12,900	3.1	940	14,300				3.2	890	12,800	4.0	940	14,000				4.0	960	14,800	6.0	980	14,800			
90 XTP		0.960	3.7																4.8	1,105	21,500									
95 FMJ		0.975	3.7	3.2	900	14,700	3.1	885	14,900				3.5	890	14,700	4.2	910	14,600	4.7	1,065	21,000	4.4	910	14,600	6.5	910	14,200			
100 FMJ-RN		0.975	3.7	3.3	985	20,100	2.8	920	19,900				3.1	955	20,000	4.3	1,005	19,500	4.6	1,035	20,600									
.38/40 Win.																														
150 gr. Sierra JHP	Rem. 2½	1.585	5.6	6.5	960	12,600	6.2	910	12,800				6.8	950	12,700	8.2	990	13,200				9.2	995	13,100	11.8	1,020	13,100	14.1	970	13,100
180 gr. Sierra JHP		1.585	5.6	5.6	820	12,200	5.1	740	12,500				5.6	745	12,700	6.9	815	13,200				7.3	795	13,100	10.3	875	13,200	13.0	875	13,400
200 gr. Hornady FMJ/FP		1.585	5.6	5.3	750	12,400	4.8	685	12,400				5.5	730	12,500	6.7	765	13,100				7.3	785	13,300	9.9	840	13,500	12.7	830	13,500
.357 Sig.																														
90 JHP	Fed. 100	1.090	4.0	9.3	1,660	37,100	7.1	1,495	35,400				7.8	1,545	36,500	9.2	1,615	37,100	11.4	1,715	37,000	10.1	1,625	34,600	12.8	1,690	35,300			
115 JHP		1.150	4.0	8.0	1,435	36,400	6.4	1,285	37,100				6.9	1,305	37,000				10.0	1,505	36,200	8.7	1,400	36,600	11.3	1,495	37,400			
124 TMJ		1.195	4.0	7.0	1,325	37,000	6.0	1,215	37,200				6.5	1,255	36,800				9.5	1,435	37,200	8.3	1,345	37,600	10.6	1,405	36,900			
147 XTP		1.138	4.0	5.8	1,145	36,800							4.8	1,010	37,100	5.8	1,110	37,200	7.8	1,245	37,000	6.4	1,140	37,600	8.2	1,205	35,800			
.40 S&W Auto																														
135 JHP	Win.	1.105	4.0	7.6	1,350	33,600	6.7	1,280	33,200				7.5	1,330	33,100	8.5	1,290	26,600	9.3	1,340	34,000									
150 JHP	1½-108	1.105	4.0	6.7	1,225	34,000	5.9	1,155	34,000				6.2	1,175	33,800	8.0	1,245	34,000	8.2	1,215	33,300	8.2	1,215	33,900	11.5	1,285	34,000			
170 XTP		1.124	4.0	5.5	1,015	33,500	5.1	985	34,000				5.6	1,045	33,700	6.7	1,075	33,800	7.3	1,105	33,300	7.4	1,125	34,000	9.8	1,170	33,900	12.1	1,110	33,600
180 JHP		1.125	4.0	5.5	1,015	33,900	5.0	980	34,000				5.3	1,010	33,600	6.4	1,065	33,800	6.9	1,050	33,700	7.0	1,045	34,000	8.8	1,065	34,000	10.9	1,025	33,900
190 JHP		1.130	4.0	5.4	955	34,000	4.9	895	33,600				5.1	955	33,600	6.1	1,010	34,000	6.9	1,020	33,100	6.7	1,000	33,800	8.7	1,040	33,800	10.6	975	33,600
200 FMJ		1.130	4.0	4.6	945	33,600	4.1	890	33,500				4.3	890	33,600	5.3	955	33,900	6.3	960	33,700	5.8	955	34,000	7.9	960	33,800	8.5	925	33,600
10mm Auto																														
135 JHP	Fed. 150	1.250	5.5																10.6	1,530	35,600									
150 JHP		1.250	5.5																9.7	1,415	35,600									
155 HP		1.250	5.5	6.7	1,190	34,000										7.5	1,200	33,800				8.2	1,230	33,800	11.5	1,340	34,100	13.6	1,270	33,600
155 L		1.250	5.5																9.5	1,320	33,000									
170 HP		1.250	5.5	6.2	1,135	34,000										6.9	1,135	34,100				7.5	1,145	33,600	10.1	1,180	33,500	12.6	1,190	33,800
180 JHP		1.250	5.5	6.4	1,125	35,900										7.0	1,125	35,700	8.7	1,240	34,900	7.5	1,140	35,800	10.4	1,220	35,800	12.9	1,210	36,000
180 L		1.250	5.5																8.7	1,235	34,700									
190 JFP		1.250	5.5	6.3	1,050	35,500										6.7	1,025	35,500	8.2	1,200	35,900	7.2	1,050	35,800	10.0	1,185	36,000	12.5	1,195	35,800
200 FMJ		1.260	5.5	5.3	940	33,600										5.8	940	33,700	7.7	1,145	35,600	6.5	965	33,500	8.9	1,110	33,800	11.2	1,115	34,100
.41 Rem. Magnum																														
200 HP	Rem. 2½	1.580	5.8	8.0	1,235	35,700	7.5	1,200	33,400				8.3	1,170	35,000	10.0	1,280	35,700				10.1	1,320	35,900	14.0	1,470	36,000	17.5	1,420	34,700
210 JSP		1.575	5.8	8.3	1,245	34,300	8.2	1,225	34,300				8.7	1,165	35,800	10.1	1,265	35,400				10.3	1,320	34,800	13.5	1,425	33,800	17.5	1,425	33,900
220 JHP		1.575	5.8	7.5	1,150	35,800	7.4	1,125	35,900				7.9	1,140	35,800	9.3	1,215	35,300				9.3	1,220	35,800	12.5	1,365	35,800	16.4	1,365	34,300
.44 S&W Special					c.u.p.			c.u.p.						c.u.p.			c.u.p.						c.u.p.			c.u.p.			c.u.p.	
180 JHC	Win. 7-111	1.600	5.6	6.5	910	12,000	6.4	885	12,100				6.7	925	12,400	9.0	985	12,500				9.8	1,000	12,600	13.5	1,020	11,900	16.0	950	11,400
					c.u.p.			c.u.p.						c.u.p.			c.u.p.						c.u.p.			c.u.p.			c.u.p.	
246 LRN		1.590	5.6	4.5	765	11,700	4.3	740	11,900				5.0	785	11,900	6.0	800	11,700				7.7	805	12,100	9.2	845	12,300	11.3	805	11,500
.44/40 Win.	Rem. 2½				c.u.p.			c.u.p.						c.u.p.			c.u.p.						c.u.p.			c.u.p.			c.u.p.	
200 JSP		1.590	24	6.6	1,070	12,300	5.9	920	12,400				6.6	990	12,200	8.0	1,090	12,400				8.5	1,100	12,500	12.0	1,225	12,500	14.5	1,230	12,500
					c.u.p.			c.u.p.						c.u.p.			c.u.p.						c.u.p.			c.u.p.			c.u.p.	
240 L		1.580	24	5.0	850	12,200	4.7	800	12,300				5.5	850	12,200	6.7	950	12,500				7.1	955	12,400	9.9	1,125	12,500	12.0	1,130	12,500
.44 Rem. Magnum																														
180 JHC	Fed. 150	1.585	5.7	11.5	1,520	33,400	10.0	1,410	34,600				11.3	1,470	34,600	13.0	1,550	35,000				13.6	1,560	34,900	19.0	1,725	34,000	23.3	1,760	33,700
200 JHP		1.575	5.7	11.0	1,420	34,000	9.7	1,320	34,800				10.7	1,370	34,500	13.0	1,475	34,400				13.0	1,455	34,500	17.0	1,565	33,400	23.2	1,665	34,300
225 JHP		1.575	5.7	9.5	1,270	34,600	8.2	1,185	34,600				9.2	1,220	34,700	10.7	1,290	34,800				11.0	1,285	34,700	15.2	1,445	34,900	20.5	1,510	34,400
240 L (GC)		1.600	5.7	9.8	1,175	34,400	8.8	1,175	34,900				9.5	1,170	34,800	11.8	1,255	35,000				12.5	1,330	33,800	16.6	1,475	34,700	20.6	1,510	34,700
240 JSP		1.585	5.7	8.9	1,215	34,700	7.7	1,090	35,000				8.7	1,190	35,000	10.3	1,250	34,900				10.5	1,245	34,700	14.4	1,380	34,800	18.7	1,440	34,800
265 JFP		1.620	5.7	8.3	1,110	34,800	7.1	1,000	34,800				7.8	1,045	35,000	9.3	1,125	34,600				9.5	1,125	34,700	12.7	1,250	34,600	17.0	1,300	34,600
300 HP/XTP		1.600	5.7	7.5	955	34,800	6.7	855	35,000				6.9	865	35,000	8.3	955	34,800	9.1	1,015	34,500	9.4	1,015	35,000	11.7	1,105	34,200	15.9	1,190	35,000
310 LSWC		1.600	5.7	6.8	975	35,000	5.8	885	34,900				6.2	895	34,600	7.2	965	34,800				8.0	1,005	35,000	10.7	1,110	34,900	13.5	1,150	34,600

See Special Reloading Precautions on page 56. See NOTES and KEY on page 46.

continued on next page

Pistol and Revolver Loads (continued)

Cartridge/Bullet	Primer	Min. OAL (inches)	Bbl Length	Bullseye Chg Wt	Bullseye fps	Bullseye psi	Red Dot Chg Wt	Red Dot fps	Red Dot psi	American Select Chg Wt	American Select fps	American Select psi	Green Dot Chg Wt	Green Dot fps	Green Dot psi	Unique Chg Wt	Unique fps	Unique psi	Power Pistol Chg Wt	Power Pistol fps	Power Pistol psi	Herco Chg Wt	Herco fps	Herco psi	Blue Dot Chg Wt	Blue Dot fps	Blue Dot psi	2400 Chg Wt	2400 fps	2400 psi
.455 Webley						c.u.p.			c.u.p.						c.u.p.			c.u.p			.			c.u.p.						
220 MK IV L	CCI 300	1.000	6.0	3.6	765	12,500	3.4	745	12,400				3.5	755	12,300	4.4	800	12,600				4.8	790	12,700						
265 HB RN L		1.245	6.0	3.8	750	c.u.p. 12,600	3.4	685	c.u.p. 12,300				3.6	690	c.u.p. 12,400	4.3	710	c.u.p. 12,600				4.9	735	c.u.p. 12,700	6.8	770	c.u.p. 12,600			
.45 A.C.P.																													
155 Cast Lead	Federal 150	1.270	5.0	6.9	1,175	19,400	5.8	1,155	18,800				6.6	1,165	19,300	7.8	1,190	19,200				8.5	1,185	19,100						
180 LWC		1.190	5.0	5.4	985	15,800	4.8	900	14,100				5.3	910	14,500	6.0	875	13,400				6.7	950	15,800	9.0	920	13,600			
185 JHP		1.275	5.0	6.7	995	19,400	5.9	940	19,500				6.8	990	19,300	8.2	1,030	18,900	8.6	1,025	18,800	8.2	990	18,500						
200 LSW (target)		1.190	5.0	4.0	790	9,800	4.0	805	9,400				4.3	805	9,900	5.1	810	9,600												
200 JHP		1.175	5.0	6.0	960	19,400	5.2	890	19,200				5.9	915	18,900	7.1	975	19,500	7.4	965	19,900	7.7	955	19,300	10.6	1,000	19,500			
230 L (target)		1.190	5.0	4.0	810	13,900	4.0	810	12,800				4.3	805	13,200	5.0	790	11,800				5.2	815	13,600						
230 JHP		1.230	5.0	5.4	865	19,200	5.0	820	19,500				5.4	845	19,500	6.4	880	19,400				7.0	875	19,500	9.8	915	19,300			
230 FMC		1.190	5.0	5.0	905	16,200	5.0	910	16,200				5.4	920	15,800	6.0	895	16,000	7.2	895	20,000	6.2	890	16,200	8.5	900	16,200			
240 JHP		1.210	5.0	5.0	810	18,900	4.5	770	19,200				5.0	790	19,300	5.9	820	19,200				6.5	820	19,200	8.3	865	19,300			
260 JHP		1.210	5.0	4.5	725	19,400										5.4	760	19,400				5.9	750	18,600	8.3	780	19,000			
240 JHC		1.190	5.0																6.5	835	19,900									
.45 ACP +P																														
185 JHP	Fed. 150	1.190	5.0																9.1	1,075	21,700									
200 JHP		1.190	5.0																8.2	1,030	22,200									
230 FMC		1.190	5.0																7.5	930	22,000									
240 JHC		1.190	5.0																7.1	890	22,200									
.45 Colt						c.u.p.			c.u.p.						c.u.p.			c.u.p.						c.u.p.			c.u.p.			
200 JMPH	Win. 7-111	1.550	7.3	6.0	870	11,800	7.0	915	12,600				8.0	940	12,500	9.0	895	11,600				9.5	895	11,400	13.0	925	11,800			
250L		1.550	7.3	5.4	805	c.u.p. 11,800	6.0	830	c.u.p. 12,000				6.8	855	c.u.p. 12,300	8.0	850	c.u.p. 11,800				9.0	910	c.u.p. 12,600	11.5	890	c.u.p. 12,200			
300 HP/XTP		1.580	7.3	5.0	605	c.u.p. 12,400	4.8	550	c.u.p. 12,200				5.7	645	c.u.p. 12,500	6.8	690	c.u.p. 12,600				7.2	670	c.u.p. 12,500	10.0	730	c.u.p. 12,300	12.5	735	c.u.p. 12,200
.45 Win. Magnum																														
200 JHP	Win. 7-111	1.475	5.0													14.0	1,385	34,500				17.0	1,490	37,000	22.0	1,570	37,200	26.8	1,580	37,200
230 FMJ		1.475	5.0													13.1	1,270	34,900				16.0	1,370	37,500	20.0	1,430	36,900	25.4	1,475	37,300
260 JHP		1.475	5.0													11.5	1,145	34,400				14.5	1,250	37,400	18.6	1,340	36,900	22.5	1,345	37,100

NOTES and KEY pertain to Pistol and Revolver tables.
See Special Reloading Precautions on page 56.

NOTES:

1. *Do not intermix cases of different manufacture, nor bullets, nor primers.*
2. *Be sure that each case is crackfree and completely empty.*
3. *Unless specifically recommended, use standard primers. Magnum primers are neither needed nor recommended for most calibers.*
4. *Do not exceed the powder weight shown, and guard against accidental multiple charges of powder.*
5. *Start with 10% less powder than shown. Work up gradually, watching for signs of high pressure.*
6. *Be sure that every completed cartridge is not shorter than the length listed.*
7. *Watch for signs of case head separation.*

KEY

BR	*=Bench Rest*	*M*	*=Match*	*in.*	*=inches*
FMC	*=Full Metal Case*	*psi*	*=Chamber pressure, piezo system*	*gr.*	*=grains*
FMJ	*=Full Metal Jacket*			*Vel.*	*=velocity*
FN	*=Flat Nose*	*PSP*	*=Pointed Soft Point*	*fps*	*=feet per second*
FP	*=Flat Point*	*RN*	*=Round Nose*	*c.w.*	*=powder charge weight*
FS	*=Fail Safe*	*SB*	*=Solid Base*	*c.u.p.*	*=chamber pressure, in copper units*
GC	*=Gas Check*	*SJ*	*=Semijacketed*		
HB	*=Hollow Base*	*SP*	*=Soft Point*	*Min OAL*	*=minimum overall length, measured from base to tip of bullet*
HC	*=Hollow Cavity*	*Sp. Pt.*	*=Spire Point*		
HP	*=Hollow Point*	*WC*	*=Wad Cutter*		
J	*=Jacketed*	*Wt*	*=weight*		
L	*=Lead*	*Bbl*	*=barrel*		

Pistol and Revolver Cartridges Special Reloading Precautions

Most pistols and revolvers function best when loaded with a quick-burning powder such as Bullseye. Since peak pressure is reached very quickly, the SEATING DEPTH of the bullet is very important: the deeper the bullet, the higher the pressure. If the bullet is seated too deeply, dangerous pressures will be generated, which could burst the gun and cause severe personal injury (including death).

Equally critical is the powder charge. Guard AGAINST multiple charges when reloading. Certain cartridges (notably .38 Special) have been reloaded accidentally with double and even triple charges, with catastrophic results when fired in the gun.

A. Prevent deeply seated bullets.
   1. Your assembled cartridges must be as long as, or longer than, the minimum length listed for the combination you are reloading.
   2. Set your bullet station accordingly and lock tool securely.
   3. Keep bullet station clean of accumulating lead and grease.
   4. Inspect all loaded rounds for overall length.
   5. Be sure every bullet is held tightly by shell mouth, especially pistol loads (recoil drives magazine against bullet noses of contained cartridges).

B. Prevent multiple charges.
   1. Handloading: Keep track of every powder charge, then look inside all shells and compare powder levels.
   2. Progressive reloading: Be sure every shell is truly empty; don't back up the turret; don't jiggle the handle; don't use a shell to clean out the powder train (use a paper cup or equivalent).

C. Inspection.
   1. Discard cases with split mouths.
   2. Discard cases with enlarged primer pockets.
   3. Do not use cases that are designed for primer-propelled practice cartridges; such cases may not be designed for full power loads.

Physical Effect of Gun Recoil (Kick)

The rearward motion of every gun, its recoil, increases when heavier shot or heavier bullets are fired, and when higher velocity loads are fired. This motion must be opposed by the shoulder, or the pistol hand, of the shooter. Whenever the recoil is perceptibly annoying to the shooter, accuracy on succeeding firings undoubtedly diminishes.

When the shooting condition demands heavy loads and high velocity, recoil kick can be reduced by using a heavier gun, and by spreading the force over a larger area of the anatomy, such as by using a wider stock, larger grip, plus shoulder pad or softer grip.

Excellent publications available to the reloader, plus his or her own growing sophistication, have generated a wholesome trend away from maximum loads and toward accuracy of loads no more powerful than needed to accomplish the particular shot. Reducing recoil increases accuracy.

Contributing to increased accuracy as well as the pleasantness of shooting is in two main areas:

1. This *Reloaders' Guide* includes many reduced loads.
2. Our research indicates that the burning rate of powders has a modest effect on recoil. For example, whenever two or more powders are listed for the same load, the slower one usually is chosen by the expert shooter as giving milder felt recoil. An intriguing aspect of reloading at home is the freedom to assemble, for example, trap loads with Red Dot or Green Dot powder, then to shoot them alternately to decide which seems more comfortable.

Handloading Precautions

1. Understand what you are doing and why. Read handbooks and manuals on reloading. Talk to experienced reloaders. Write or call suppliers of components if you have questions or are in doubt.
2. Stay *alert* when reloading. Do not reload when distracted.
3. Establish a loading procedure and follow it. Do not vary your sequence of operations.
4. Examine empty cases (shotshell or metallic) to be sure they are in good condition before reloading. Never force live cartridges into or out of the chamber of a gun.
5. Do not use cases that are designed for primer-propelled practice cartridges; such cases may not be designed for full power loads.
6. Do not *ream* out or *enlarge* flash holes of metallic cartridge cases. This may change the ignition rate and result in dangerous pressures.
7. Do not punch out live primers. Fire the empty primed shells in a gun.
8. Do not mix primers. Primers differ in brisance of ignition, which affects pressure and velocity. Use only the primer listed.
9. The shotshell loading data in the *Reloaders' Guide* are for *LEAD SHOT only.* *DO NOT USE STEEL SHOT.*
10. One-piece plastic wads for shotshells vary in compressibility and gas-sealing effectiveness. Use only the wad listed.
11. If you "throw," or measure powder charges by volume, check-weigh the charge frequently. Do not *mix* powders.
12. Do not use powders near a flame, spark-producing machinery, or heating device. Do not expose powders to temperatures above 100°F.
13. Keep out of reach of children.
14. Do not smoke while reloading.

Crusher/Piezo Pressure Tabulation

The following table lists the maximum average pressures, measured by the crusher system (c.u.p.) or piezo system (psi), utilized for the centerfire rifle recommendations in this brochure.

The values listed in the "c.u.p" and "psi" columns are approximately the same pressure. The difference is due to the measuring system used and does not indicate that a pressure change has occurred.

Cartridge	C.U.P.	PSI	Cartridge	C.U.P.	PSI
.22-250 Remington	53,000	62,000	7mm Remington Magnum	52,000	61,000
.222 Remington	46,000	50,000	.280 Remington	50,000	60,000
.223 Remington	52,000	55,000	.30 Carbine	40,000	
6mm Remington	52,000	65,000	.30-06 Springfield	50,000	60,000
.243 Winchester	52,000	60,000	.30-30 Winchester	38,000	42,000
.25-06 Remington	53,000	63,000	.300 Savage	46,000	
.257 Roberts	45,000	54,000	.300 Winchester Magnum	54,000	64,000
.257 Roberts +P	50,000	58,000	.303 British	45,000	49,000
.270 Winchester	52,000	65,000	.308 Winchester	52,000	60,000
7mm-08 Remington	52,000	57,500	8mm Mauser	37,000	
7-30 Waters	40,000	45,000	8mm Remington Magnum	54,000	65,000
7 x 57 Mauser	46,000	51,000	.338 Winchester Magnum	54,000	64,000
			.35 Remington	35,000	
			.45-70 Government	28,000	

Notes

Some Publications on Reloading

These and other good literature pertinent to reloading usually are stocked at local gun and ammunition retail stores.

Title	Publisher
Basic Rules for Reloading Safety	National Reloading Manufacturers Association 4905 S. W. Griffith Drive Beaverton, OR 97005
Handloading	NRA Bookservice 11250 Waples Mill Road Fairfax, VA 22030
Speer Reloading Manual	Blount Industries Box 856 Lewiston, ID 83501
RCBS Reloading Guide	RCBS Box 1919 Oroville CA 95965
Tips on Better Reloading	Remington Arms Bridgeport, CT 06602
Hornady Handbook of Cartridge Reloading *Hornady Reloading Tools and Accessories*	Hornady Mfg. Co. Box 1848 Grand Island, NB 68801
Sierra Bullets Reloading Manual	Sierra 10532 Painter Avenue Santa Fe Springs, CA 90670
Lyman Cast Bullet Handbook *Lyman Shotshell Handbook* *Lyman Pistol and Revolver Handbook*	Lyman Products Middlefield, CT 06455
Nosler Reloading Manual	Nosler Bullets, Inc. P.O. Box 671 Bend, OR 97709
How to Reload Shotshells and Why	MEC 715 South Street Mayville, WI 53050
Ponsness-Warren Catalog	Ponsness-Warren Box 8 Rathdrum, ID 83858
Handloaders' Digest *ABC's of Reloading*	DBI Books 540 Frontage Road Northfield, IL 60093
The Handbook of Shotshell Reloading	SKR Industries, Inc. P.O. Box 1382 San Angelo, TX 76092

Alliant Techsystems
New River Energetics
Route 114 P.O. Box 6
Radford, VA 24141-0096

Visit our web site at
http://reloading.ATK.com