100% Proof

Many people do not understand the importance of proof marks. Bill Harriman focuses on the role they play in safe shooting.

For the past 30 years, we have seen the gradual phasing out of the old Imperial system of weights and measurements in favour of the metric system. I have always counted myself fortunate to be a member of the 'transitional generation', who has had the opportunity to see both systems in parallel and adapt from one to the other.

For those of my parents' generation who were reared on the imperial system alone, metrication can be a nightmare. Indeed, many of my more senior correspondents in the *Sporting Answers* section of *Shooting Times* ask me to translate the new metric proof marks into the imperial values that they understand.

A gun's proof marks are a permanent safety *aide-memoire* to give you the correct information for choosing a cartridge that can be used safely in your particular gun. When you buy a box of cartridges, always read the manufacturer's data printed on it and use that information to satisfy yourself that its contents are safe to use in your gun.

Before we get down to the technical details, we need to understand the history of the way in which shotguns have been proofed in modern times. From 1896 onwards, British guns were always marked with the maximum service load – in ounces – of shot for which the gun was proved. Additionally, the type of powder – black or smokeless – was specified. This was normally just in the simple terms of 'nitro proof', though specific nominated powders, such as Schultze, sometimes appeared instead.

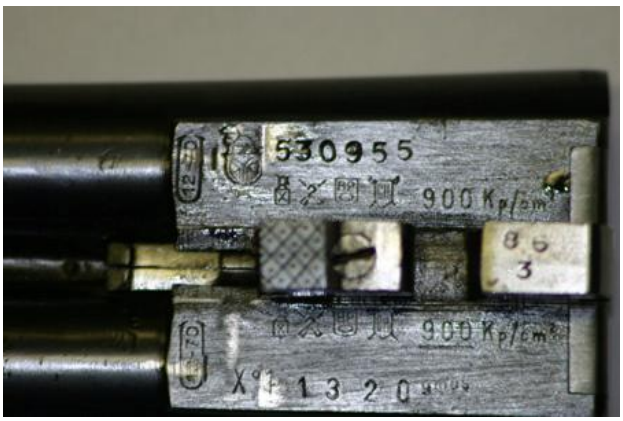
After 1925 and until 1989, this information was supplemented by the inclusion of the chamber length in inches. Thus, armed with these three pieces of information, the shooter could choose a cartridge that fell within their limits, knowing this was safe to use in his gun.

In 1955, the first metric markings appeared, with the option to have the chamber length marked in millimetres. Table one gives the metric equivalent for the imperial chamber length. From 1984 to 1989, where metric proof was used, it was marked in kilograms per square centimetre, for example 900 or 1,200kg. These were the standard and magnum proof pressure values respectively. Alternative imperial proof marks introduced in 1954 gave service pressures in tons per square inch, marked as '3 tons'. In the case of the Birmingham Proof House, this was marked as '3 tons per square inch' until 1954.

In 1989, all proof data was marked in metric using the bar as the unit of measurement. The use of kilograms per square centimetre was dropped. Under this system, 850 bar represented standard proof, with 1200 bar being special or magnum. While it is possible to use a mathematical factor to convert one pressure unit to another, this conversion is only valid if the two sets of values have been arrived at using the same pressure measuring system. For example, the 1954 Rules of Proof used the Lead Crusher Radial system. This measured pressure in units of tons per square inch.

Today, all International Proof Commission (CIP) Proof House use the Radial Transducer system to measure pressure, with bar as the unit of measurement. The two systems are not simply convertible by mathematical means. However, there is sufficient data to give approximate conversions.

Table two sets these out in detail. Table three gives mathematical factors, but these are only valid when the same pressure measuring system has been used.



It should not be assumed that guns proved under the 1925 or earlier Rules of Proof are safe to use with modern cartridges merely by staying below the shot weight marked on the gun. There is a trend among modern manufacturers to increase pressures to obtain higher velocities. In such circumstances, it is prudent to consider reproof of such guns. A competent gunsmith will advise if reproof is viable.

The metric system does not just apply to proof marks, but to cartridges as well. Decision XV-7 of the CIP requires that all cartridges that are sold must be tested to see that they comply with internationally agreed standards of pressure, dimensions and performance.

The information given on boxes will show the case length in millimetres, the chamber length in both inches and millimetres and the shot load in both ounces and grams.

Under the CIP system, the minimum level of proof is based on chamber length. All that you need to do is to match CIP-approved cartridges, marked on the side of the box, to the chamber length of your CIP-proved gun.

In the case of magnum loads, these are only allowed for cartridges over 70mm. Table four gives a list on imperial shot loads in ounces together with their metric equivalent in grams.

It is also common for European guns to carry marks that indicate the degree of choke at their muzzles. These are expressed by a series of small asterisks. The larger the number of asterisks, the more open the choke is bored. Table five gives full details of this choke-marking system. In the case of screw-in chokes, small notches on the edge of the choke represent the asterisks.

The proof marks on your gun are not stamped their for decorative purposes or to help historians like me to date guns. They are put there for your safety to tell you what loads are suitable for use in your gun. Equally, the information printed on boxes of cartridges has not been put there as an afterthought to fill up a bit of space.

Take 10 minutes to have a good look at your gun's proof marks and make sure that you understand what they mean. Also, read and understand the information on cartridge boxes and relate it to the marks on your gun. A combination of the two will make sure that you never load an unsuitable and potentially unsafe cartridge into your gun.

- I am grateful to Roger Hancox, Proof Master of the Birmingham Gun Barrel Proof House, for supplying much of the technical data contained in this article.

If you are unsure about proof markings, take advice from gunsmiths, the firearms team at BASC or the Proof Houses themselves. Proof Masters in London and Birmingham can be contacted at the addresses below:

The Proof Master
The Proof House
48 Commercial Road
London E1 1LP

The Proof Master
The Gun Barrel
Proof House
Banbury Street
Birmingham B5 5RH

TABLE 1

CHAMBER LENGTHS

2in	50mm
2 ½ in	65mm
2 ¾ in	70mm
3in	75mm

TABLE 2

1954 Rules of Proof converted to CIP values

Chamber length	Highest mean service pres. Tons per square inch (1954 Rules) lead crusher system	Converted to CIP Copper Crusher (bar)	1954 Proof Pressure converted to CIP Copper Crusher (bar)
12-2 ½	3	542	867
12-2 ¾	3 ¼	587	939
12-3	3 ½	632	1011
12-3 MAG	4	722	1155

As the CIP minimum Copper Crusher Proof Pressure is 850 bar and High Performance (Magnum) 1200 bar, the 1954 values as converted to the CIP Copper Crusher System are acceptable.

However, this assumes that any shotgun proved under the 1954 rules is still in proof. If this is the case, the following applies:

Guns marked (1954 Rules)

12-2 ½	3 tons	can use CIP approved cartridges marked 12-65
12-2 ¾	3 ¼ tons	can use CIP approved cartridges marked 12-70
12-3	3 ½ tons	can use CIP approved cartridges marked 12-70
12-3 MAG	4 tons	can use CIP approved cartridges marked 12-76

TABLE 3

Mathematical conversion factors

To convert tons per square inch to bar	Multiply by 154.4441
Kilogram per square centimetre	Multiply by 157.48775
To convert kilogram per square centimetre to bar	Multiply by 0.980665
Tons per square inch	Multiply by 0.0063497
To convert bar to kilogram per square centimetre	Multiply by 1.019716
Tons per square inch	Multiply by 0.0064748

These factors can only be used to convert different pressure units that have been derived by using the same pressure measuring system.

TABLE 4

Shot loads

Ounces	Grams	Ounces	Grams
1 ⅝	46	15/16	26.5
1 ½	42.5	7/8	25
1 ¼	36	13/16	23
1 3/16	34	5/8	17.5
1 1/8	32	9/16	16
1 1/16	30	7/16	12.5
1	28.5	5/16	9

TABLE 5

CHOKE MARKINGS

Full	*
¾	**
½	***
¼	****
Cylinder	*****

This article first appeared in *Shooting Times & Country Magazine* July 1999