



# Looking for ALTERNATIVES

**Mark Underwood** considers the burn rate comparison charts published by manufacturers and their ‘usefulness’

**Nearly all smokeless powder manufacturers produce burn rate comparison charts.** These show a range of powders with their comparative burn rates tabulated against each other, usually with their own powders in prime position. Looking at one of these charts it might appear that changing from one powder to another is very straightforward, but it is in fact not simple at all.

## Source of the data

The burn rates of powders are measured in a special device called a closed bomb, which is basically a sealed chamber in which small samples of propellants are ignited and the rate and force of the burn are measured. Because the rates are measured under laboratory conditions, they are not necessarily produced under the same conditions and variables that reloading ammunition creates. The powder charge is positioned very precisely above the ignitor in the closed bomb, unlike a charge in a case which can move around and lie differently depending on how it sits when the round chambered. All of the organisations that publish

these charts state that the information is NOT to be used for developing loads, so why do these charts exist?

## Why change powder?

Sometimes your existing powder might not be available in the shops or, as we experienced recently, legislation is introduced to effectively outlaw certain powders. Having used Hodgdon's Trail Boss in my .45-70 Government calibre loads for a few years, supplies dried up when EU restrictions banned its import and I found myself in need of

an alternative propellant. Even though we have now left the EU, the legislation remains in place. Fortunately, relatively ‘new to the UK’ brands like Ramshot have taken their place on the shelves.

There can also be times when a load just isn't working in a particular gun, with poor accuracy or consistency, and if tweaking the load does not improve things then you might need to switch powders. Even when a propellant is listed in the reloading data for a specific calibre, sometimes the loads just will not perform in your rifle.

## The same but different

Powders which appear on the same line or next to each other on a chart might have the same or a similar burn rate, but they will also have other characteristics that mean they cannot be simply substituted for each other in your loads. There are a number of differences between powders that mean a straight substitution of one for another is unsafe.

## Load density

One such difference can be the ‘load density’ (the space the propellant occupies in the case) and this has a



**Hodgdon's Trail Boss was my go-to powder for .45-70 Government, unfortunately, it is no longer available in the UK**



These two powders sit next to each other on a burn rate chart, but 12-grains of each occupies a very different amount of space in the case



If you have room on your reloading bench, a closed bomb is the device you need for measuring powder burn rates

direct effect on the chamber pressure, a critical safety factor in reloading. The bigger, or more oddly shaped grains of powder will occupy more space in the case, and some will have more gaps between the grains themselves. This affects the way in which they can burn in the available space. The closed bomb used to measure the burn rates does not replicate the load density or case capacity for each and every load that might be published in reloading data.

Flakes, grains and doughnuts

The size and shape of the individual grains of different powders can vary enormously and this affects the way they perform in a number of ways. Trail Boss is a good example of this; the large doughnut-shaped grains, with the hole through the middle, means that there is a lot of space in and around the grains inside the case. This relatively large amount of exposed surface area allows the powder to burn very quickly and unimpeded.

Brands available at Henry Krank											
Ramshot	Hogdgon	IMR	Alliant	Vihtavuori	Lovex	Vectan	Rottwell	P&P	Norma	Winchester	Reload Swiss
	Titewad		Bullseye	N310	D013	BA10	P805			WFL	
ZIP	Clays	Red			S011					WST	
	Intern. Clays	Hi Skor 700x	Red Dot	N320	S015	BA 9 1/2	P801			WSH	RS12
	Titegroup	Target	American Select		D032	AS		BP01			
	HP 38	Green	Green Dot	N32C						WC231	
True Blue		Trail Boss			S030					Auto Comp	
		(Unequal*)		N330	S020	A1	P804				
	Univer. Clays		Unique		S035	BA9					
	HS6		Power Pistol	N340	D036			BP02			RS20
	CFE Pistol	Hi Skor 800x	Herc0	3N37		A0					
	Longshot			N350		BA 7 1/2					
		Blue	Blue Dot	3N38	D0337.1	SP 2 Practical	P806				RS24
			Steel	N105							
Enforcer	H110		2400	N110	D037.2	BA 6 1/2				WC296	RS30
	Lil Gun	4227			S040			BP03			
					D060	SP3					
	H4198	4198	Reloader 7	N120	S053	Tubal 2000			200		RS36
	H322				D063		R901				
	Benchmark	3031									
X-Terminator	H335			N130	S060		R902		201		
	H4895	8208 XBR		N530	D073.4	Tubal 3000					RS40
	Varget			N133	D073.5	SP7		BP06	202		
TAC	BLC-2	4895								WC748	
Wild Boar	CFE 223	Enduron 4166		N135		SP 9	R903				
	Leverrevolution	4064	Reloader 15	N140	D073.6	Tubal 5000			203B		RS50
Big Game	H380	4320		N540	S062	SP 11		BP07			RS52
							R907				
	H414			N150	S065				URP		
				N550						WC760	RS60
	H4350	Enduron 4451				Tubal 7000	R904		204		RS62
Hunter	Hybrid 100V		Reloader 19	N160	S070			BP08			
	H4831 SC	4831		N560			R905				
	H4831	Enduron 4955							MRP		
			Reloader 22	N165	S071	Tubal 8000			MRP2		RS70
	Superformance			N565				BP09	217		
		7828	Reloader 25								
Magnum	H1000	Enduron 7977		N170							
	Retumbo	7828SSC		N570		SP 13					RS80
	H50 BMC	Enduron 8133		24N41							
	US869			20N29	D100						

Burn rate charts can never reflect the differences between powders in the correct proportion and can only place powders in approximate burn rate envelopes. **Never use these to determine/ calculate loads - Always refer to reputable load guides / manuals.**

This burn rate chart from Henry Krank can help you select an alternative powder

Ramshot's True Blue powder, which appears on the same line of some burn rate comparison charts as Trail Boss, has smaller and more regular shaped grains. These sit more closely packed inside the case with less space between them and so less exposed surface area. The different size and shape of these two propellant grains demonstrate how the amount of surface area exposed - the critical area that actually burns - can vary enormously between charges of the same weight of different powders placed together on a burn rate chart.

Coated powders

Single-base propellants, consisting mainly of nitrocellulose, are usually coated with other chemicals to stabilise them and control the burn rate. The type and amount of coating can obviously vary, even between batches of the same powder. As a result, super-accurate bench rest shooters will normally try to stick to the same batch of powder for maximum consistency.

Conclusion

So to answer the original question, why do these charts exist? In practical terms, burn-rate charts are simply comparison guides intended to point you towards an alternative powder and give you a starting point to develop alternative handloads, not a plug and play substitute. The idea is for you to look up a propellant that is in the same ball-park on the chart as the one you are currently using, then go to the specific reloading data for that powder and develop a new load from a safe starting point.

Having considered why these charts are provided, it is necessary to end with a stern cautionary note: NEVER use a burn rate comparison chart to select another powder and just duplicate the charge weight you have been using for your previous powder.

Many thanks to Henry Kranks and co. Ltd for providing the burn rate chart used here. **GM**  
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