

ARE YOU PLUGGED IN?

It all started on a whim, and I've had many of those over the years. I bought two sets of 10mm plugs for my 401 from EBAY. The seller's advice was to check the heat range first, what's one of those I thought, bought first and then started my search on the internet. Being a technical "Klutz", by the time I finished I was on information overload and my head was buzzing and I've left a huge amount out of this article.

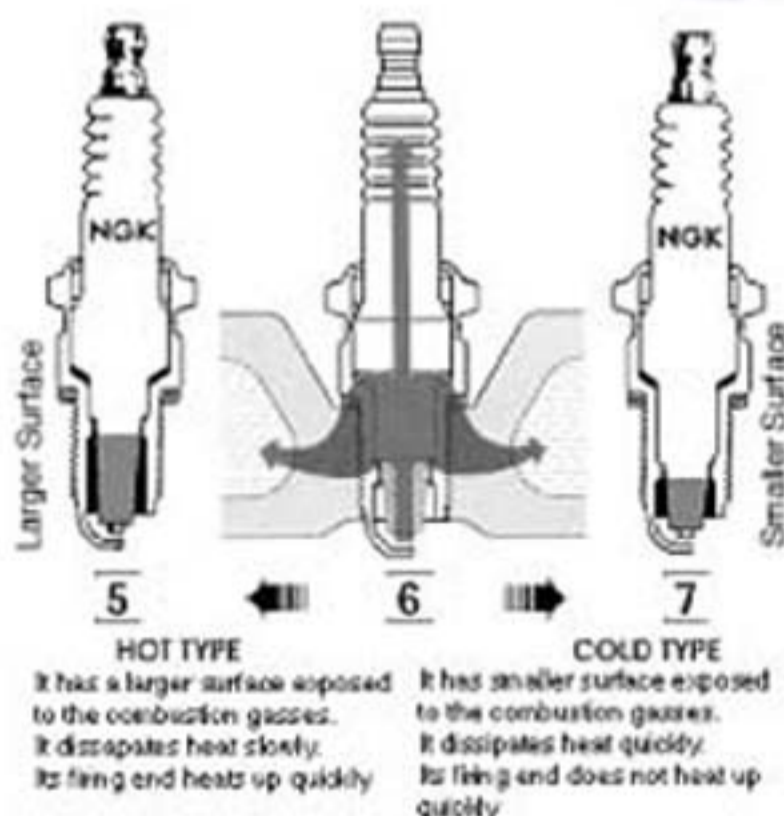
Everyone reading this (condensed) article may already be experts on Spark plugs and know all there is to know but in case there are those like me, who thought all you did was screw in your plugs without over tightening them, connect the leads and "hey presto!" the petrol is ignited when you start up and run. If only life was that simple, so I thought I would pass on some of what I found out.

Firstly, the plugs I bought were NGK C6H and C7HSA. The first mystery was why I couldn't find C6H on any data sheet, only C6HSA. After a lot of searching I gave up and phoned NGK directly. They were very helpful and explained that the C6H has not been made for quite a long time and they were nickel cored, whereas the C6HSA was current and had a copper core, like the C7HSA.

So what is the heat range? The first thing I learned that had never occurred to me was that spark plugs do not create heat; they basically remove unwanted heat from the combustion chamber. This is broken down to a numbering system for each manufacturer, which lists the plugs ability to dissipate heat away from the combustion chamber. The temperature of the spark plug's firing end must be kept low enough to prevent pre-ignition, but high enough to prevent fouling.

The heat that the electrode section of the spark plug receives due to combustion is dispersed through the path in the figure below. Spark plugs with a high degree of heat dispersal are called high heat range (cold type) and those with a low degree of heat dispersal are called low heat range (hot type). It basically means a cold plug transfers heat rapidly from the firing tip into the engine head, which keeps the firing tip cooler, whilst a hot plug has a much slower rate of heat transfer, which keeps the firing tip hotter.

The heat range numbers used by spark plug manufacturers are not universal, i.e. a 10 heat range in Champion is not the same as a 10 heat range in NGK etc. Some manufacturers numbering systems are opposite the other, for Champion, Autolite and Splitfire, the higher the number, the hotter the plug. For Japanese manufacturers (NGK, Denso), the higher the number, the colder the plug. So, the spark plug can help maintain the optimum combustion chamber temperature and the primary method used to do this is by altering the internal length of the core nose, in addition, the alloy compositions in the electrodes can be changed. This means you may not be able to visually tell a difference between heat ranges.



HEAT RANGE CROSS REFERENCE CHART					
	NGK	PULSTAR	DENSO	CHAMPION	BOSCH
	2	-	-	18, 19	10
	4	-	-	14, 16	9
	5	1	-	11, 12	8
	6	1	-	9, 10	6, 7
	7	1	-	7, 8	5
	8	-	-	6, 61, 63	4
	9	-	-	4, 59	3
	9.5	-	-	57	-
	10	-	-	55	2
	10.5	-	-	53	-
	11	-	-	-	-
	11.5	-	-	-	-
	12	-	-	-	-

So, I found out what a heat range was and next I needed to know what my 401 required. Hot enough to stop fouling but not too hot to cause any expensive problems. This also depends on the state of wear in the engine. A nice clean burning engine is certainly different to a very tired engine; the latter seems to require a hotter plug to "burn off" any excess engine oil in the combustion chamber. The general advice by the manufacturers and others was to err on the side of the colder plug, unless mucky plugs required something hotter but this of course is a matter of personal choice.



So NGK's recommendation was that I should start in the 7 heat range and see where I go from there but I'm not sure they were referring to the 2 litre engine. However, whilst a lot of the heat range charts agreed with each other, the odd one showed some differences, so I'm going with the majority.

What if I want use plugs other than NGK? Bristol Cars advice was a Champion Z9Y but going by the charts this is a heat range 6 plug. Looking at the advice from Spencer-Lain Jones on the BOC Website, and the problems with holed pistons, he recommends NGK C6HSA for standard (Touring) engines and C7HSA's for sports engines. Summed up by the phrase,

"our advice is to use the highest heat rated plug that your engine will tolerate under the condition for which you use it."

Of course the choice of plugs is also now somewhat dictated by unleaded petrol, which apparently burns hotter and therefore needs more heat dissipation. But this begs the question, "what effect does my petrol additive have on unleaded petrol? Is the heat range changed back to what it was with 4 star petrol." Another internet search revealed yet contradictions.

Using NGK as my benchmark not every chart lists the same conversion and some seem to mix up the heat ranges, hence the reason I've only included one chart for plug comparisons. I realise that differing people will swear by different plugs and I'm going to keep my final choice simple Bristol's recommend Champion and Spencer Lain-Jones NGK, so I will stick to these and play around with the heat ranges and see what my plugs look like when I take them out. However, it is possible to over think many questions and disappear up one's exhaust pipe!

Dealing with used plugs being removed from your car and examining the condition of each, there is a great article at http://www.ngksparkplugs.com/techinfo/spark_plugs/faq/faqread2.asp 12 different pictures of various plug conditions. Too big to take up any more space in the bulletin but it really is worth reading and printing off for reference use. It's the good, the bad, the ugly and everything in between. Indeed, there is much more explained on http://www.ngksparkplugs.com/techinfo/spark_plugs.

Some of my data in this article came from this site but also from a number of others. Search the web and absorb! One area that I've not dealt with, nor do I intend to do so, is that of plug materials and configurations. My C6H's were Nickel cored, whilst most common plugs now seem to be Copper cored. Then there is Iridium, Iridium Platinum and Premium Platinum coring etc etc. etc., all of these are supposed to be the best thing since sliced bread but are they any good in a 2 litre and I bet they cost a lot more?

Decoding the numbers on plugs was a mixed bag as well. Champion Z9Y broke down as Z = 10mm; 9 = the heat range and Y = a standard projected core nose. As to NGK's C7HSA, NGK now have a different numbering system for more current plugs but C = 10mm; 7 = the heat range; S = std 2.5mm centre electrode and "A" currently means special design.

Another surprise in my searching was the variety of plug tips. I'm used to seeing just the standard projected tip and my old KLG PTEN L50's had a platinum "ground" inset into the end of the plug so that it was level with the centre electrode and was not projected. Whilst the term electrode is commonly used for the bit onto which the spark jumps, it really is a "ground" or a ground electrode as there is only one centre electrode in each plug. The pictures show a standard plug and variations in grounds from a slanted one up to four grounds on one plug.

The 4 ground looks exotic and there was a time I would have gone for the exotic like the go faster



stripes I fitted to my Mark 1 Cortina all those years ago but now I'm a lot older and allegedly more sensible. I ask "apart from fashion, is there any point in fitting them, even if I could get the right size and temperature range and will they be any good in my 401 anyway?"

Bob Weafer

P.S. If you think the subject of plugs is complicated, just take a look at Motor Oil. Very complicated and definitely down to personal choice. I'm using Valvoline 20-50 racing oil, now called VR1, which is mineral based. So what about you and why? email bob@short-mat-holidays.com.

