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Author	Message
PedroDaGr8 HID KING Joined: 05 Feb 2007 Posts: 1552 Tue Jun 09, 2009 10:38 PM	Post subject: Everything you ever wanted to know about HID bulbs. QUOTE

Whoo hoo. University quality baby!!!!

About this thread: The goal of this thread is to provide a convenient location to research ANYTHING you can think of about HID bulbs. Everything will be discussed from comparing the different bulb types to their construction to the differences between OEM and kit bulbs. The first section deals with the various OEM bulbs. If you do not care about this, skip on down to the next section to learn more about the bulbs themselves.

What are the different OEM bulbs and how are they different?

Philips Bulbs

85122 - **Philips** standard bulb. It starts at 4300K but after around 100hrs or so it color shifts (turns bluer) to around 5000K.

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85122 + - Starts at 4300K just like the 85122, but STAYS at 4300K and does not color shift. This bulb remains yellower than a color shifted bulb. Note: some ebay sellers mention Limited Edition bulbs or that 85122+ are 5000K. BOTH of these statements are lies. First, there is NO LE bulb. Second, as I mentioned these bulbs start at 4300K and stay there.

Image Copyright 2009 rondy_ (Used with permission)

Both the 85122+ and 85122 are similar in brightness. There is a difference of around 200lumens max between the two, which is not a noticeable difference. So the choice of bulb should be based more on which color you prefer. Older adults tend to prefer yellower colors, while younger adults tend to prefer bluer colors.

85122 CM - A bulb designed to allow a person to replace a single burnt out bulb and match the color of already color shifted bulbs. So it starts and stays at 5000K

85122 CX - This bulb is also known as the **Philips** Crystal Vision. It is the highest color temperature **Philips** makes that is DOT approved. This bulb is considered the replacement for the 85122CM. As they now have a bulb that doesn't color shift, denoting one a color match makes little marketing sense. It is unknown if there are any differences between 85122CM and 85122CX. The bulb is denoted by its light blue ceramic return wire.

Image Copyright 2009 D1S (Used with permission)

85122 LL - This is a long life bulb, it is the stock bulb for the Lexus LS430.

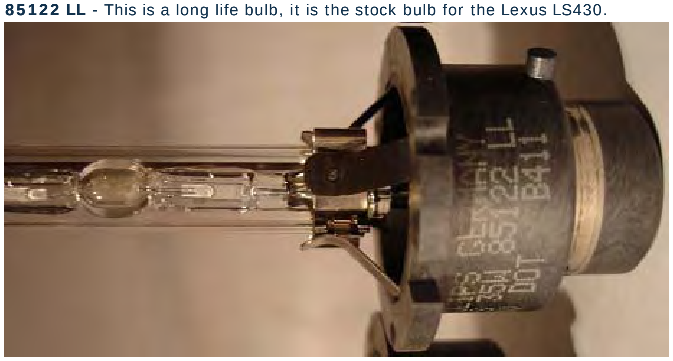
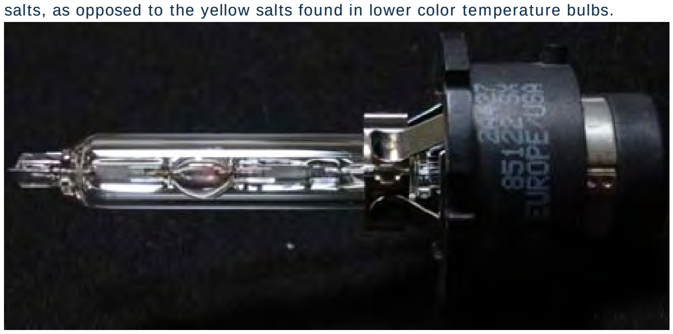


Image Copyright 2009 emoshun (Used with permission)

85122 SX - This bulb is a rare bulb by **Philips** intended for the Japanese Domestic Market ONLY. The bulb states on the base Not Intended for use in Europe/USA. It has a 5700K color temperature, slightly lower than the 85122WX. Note the reddish brown salts, as opposed to the yellow salts found in lower color temperature bulbs.



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85122 UB - This is called the **Philips** Ultra Blue. There is some controversy about the color temperature of this bulb. Most list it as 6000K but the literature list that as the color of the side bands, the bulb itself is likely not 6000K as it has yellow salts (indicative of a lower color temperature). The blue bands on the sides of the bulb cause the bulb to appear REALLY blue from the sides, while not sacrificing light output in the center. It has a blue return wire, similar to the CX and WX models.

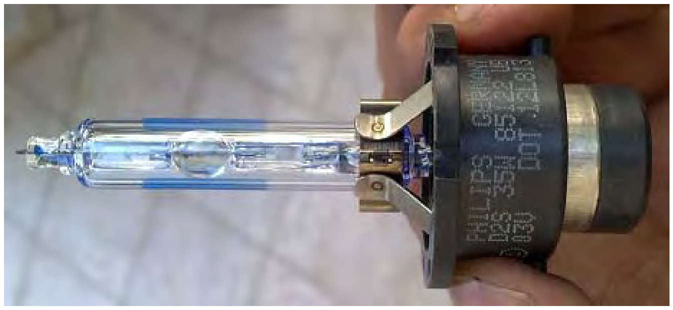

Image Copyright 2009 alexopth1512 (Used with permission)

85122 WX (aka Ultinon) - This **Philips** 6000K bulb. It does colorshift to a bluer color. Its characteristic features are the dark blue almost purple ceramic return wire and they bright reddish brown salts.

85122 YX (aka Ultinon 3000k) - This is **Philips** 3000K bulb, it has a yellow return wire and yellow glass.

85123 - A 5000K bulb that was common in the late 90s early 200Os. It was found in a few German luxury vehicles. I don't think it is made anymore.

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85126 - This bulb is the D2R version of the D2S 85122 bulb. You will find similar offerings to the 85122 series, with the suffixes (i.e +, WX, etc.) meaning the same thing.

85126 + - This is the D2R version of the 85122+ bulb. Just like the 85122+, it starts at around 4300K color temperature and does not color-shift during its useful life.

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DL35 - An alternate 35W bulb made by **Philips**. Not approved for automotive use, instead being intended for indoor use. It has a color temp of 3900K and produces 3600 lumens. Has a similar construction to the DL50, including the "fat-boy" tube structure. It has a smaller arc chamber than the DL50 though.

Image Copyright 2009 CateraMV6 (Used with permission)

DL50 - **Philips** true 50W bulb. Not approved for automotive use, but works great with a 50W ballast. The original generation of DL50 has the "fat-boy" tube structure as seen below.

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DL50/740 The newer generation of the DL50, it no longer has the "fat-boy" tube structure, instead having the same tube structure as the regular 85122 bulbs.

A quick note about 50W bulbs. Gearbox did a test of light output and thermal temperature of bulbs with a 50W ballast. He tested the supposed 50W bulb that came with the kit, an 85122 (a 35W bulb) and a DL50. The 50W kit bulb ran hotter than the 85122 or the DL50. This means more than likely the supposed 50W kit bulb was actually a cheap 35W kit bulb.

GE Bulbs

GE Xenstation 53500 - One of the few bulbs produced by GE, a manufacturer who is trying to enter the OEM market. This bulb is their OEM D2S bulb which has a 4200K color temperature.

GE Xenstation 53510 - The D2R version of the Xenstation 53500. It also has a 4200K color temperature and is designed for OEM use.

GE Blue Xenstation 53550 - This bulb is also known as the GE Xenstation 53550 Blue. It is a 5100K bulb with deep reddish salts. It is not approved for use on public roads in Europe/USA due to its blue color.

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GE Super Blue Xenstation 53560 - Another bulb from GE, this one has a 9000K color temperature, the highest color temperature available from any of the OEM manufactuers. As with most high color temperature bulbs it has deep reddish salts. This bulb is also known as the GE Xenstation 53560 Super Blue. It is not approved for use on public roads in Europe/USA due to its blue color.

GE Blue Xenstation 53570 - This bulb is also known as the GE Xenstation 53570 Blue. It is a 5100K bulb with deep reddish salts. It is not approved for use on public roads in Europe/USA due to its blue color. It is the D2R version of the Xenstation 52550

D2S bulb.

GE Super Blue Xenstation 53580 - Another bulb from GE, this one has a 9000K color temperature, the highest color temperature available from any of the OEM manufactuers. This bulb is also known as the GE Xenstation 53580 Super Blue. It is not approved for use on public roads in Europe/USA due to its blue color. It is the D2R version of the Xenstation 52560 D2S bulb.

Koito Bulbs

Koito D2S - While Koito as a maker of OEM components, it is likely they licensed this from one of the Big 3 OEM HID bulb makers (**Philips**, GE or OSRAM). Very little is known about this bulb or its origins. As it is OEM it is likely 4100-4300K in color.

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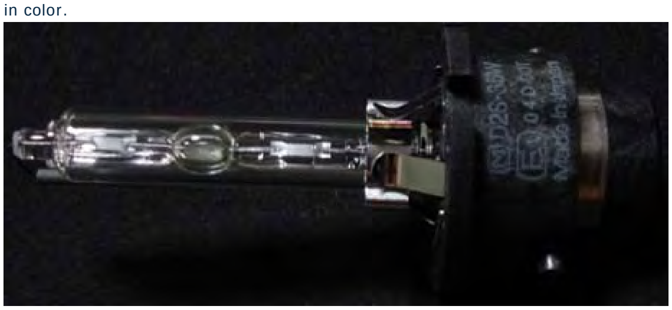
Panasonic(Matsushita) Bulbs

Panasonic D2S - Similar to the unknown Koito D2S bulb, Panasonic likely licensed this bulb from one of the Big 3 OEM HID bulb makers (**Philips**, GE or OSRAM). Panasonic is a subsidiary of Matsushita, hence the [M] on the bulb. Very little is known about this bulb (though I have heard rumors that **Philips** makes the bulbs for Panasonic). Just as with the Koito, it is likely 4100-4300K in color.



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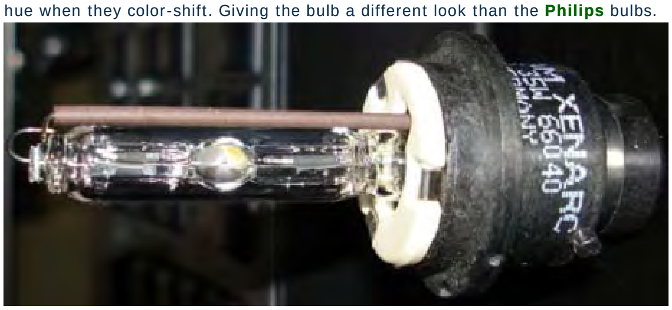
OSRAM / Sylvania Bulbs

Xenarc 66040 - According to data I have found, this bulb is 4300K with an output of 3210 lumens. Osrams often take a pinkish hue when they color-shift. Giving the bulb a different look than the **Philips** bulbs.



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Xenarc 66240 - It appears this bulb is 4300K with an output of 3200 lumens. This bulb is a new generation replacement for the Xenarc 66040. It is unknown what if any functional differences exist between the two. Though structurally, the newer bulb now has the metal base support structure and no longer has the white cap over the base. Osrams often take a pinkish hue when they color-shift. Giving the bulb a different look than the **Philips** bulbs.


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Note: If you have pictures of any of the bulbs that lack pictures above or know of bulb models not listed above, please let me know.

Why are OEM bulbs better than kit bulbs?

There are multiple reasons that OEM bulbs are better than kit bulbs. The first is that OEM bulbs run cooler than kit bulbs (read above for the test that showed it).

This is due to the amount and mix of salts. HID bulbs use expensive transition metal iodide salts. The OEM manufacturers have spent countless dollars developing precise salt mixtures that run the coolest and produce the most light. These mixture formulas are closely a closely guarded trade secret. Along with this, these salts can be VERY VERY expensive in high purities. So kit makers tend to scrimp on the amount of salts making the bulb run even hotter. This evident by the fact of when you look in the arc chamber in kit bulbs it looks virtually clear while in OEM bulbs there is a noticable yellow (or in the case of Ultinons and bright reddish brown) salt deposit.

The second is quality control. The OEM manufacturers test each bulb before it leaves the factory. The bulbs are tested for arc chamber shape, arc chamber position, light color, light intensity, etc. Kit bulbs often are not tested at all. It is not uncommon to have arc chambers that are not in the tightly specified location or are not the proper shape. This results in weird looking cut-offs, decreased intensity etc. Also, it is not uncommon to get a pair of 6000K kit bulbs that are either more blue (closer to 8000K or 1000K) or more yellow than 6000K. Sometimes, with horrible QC a pair of supposedly matched bulbs, in fact are not, with one bulb being more yellow or blue than the other.

The third reason, which is explained in more detail later, is that kit bulbs tend to use pure tungsten electrodes while OEM bulbs use thoriated tungsten electrodes. For why this is important, see the section **What are the electrodes in HID bulbs made out of?**

Salts: Myths and Questions

Myth: The amount of salts denotes the age of the bulb.
This is partially false. The amount of salt does not really change with one caveat. The volume does increase slightly due to the sputtering of the electrodes, but it is not really that noticable. More importantly, the salts will turn more gray overtime as the metal from the electrodes is sputtered into the mixture of salts.

Myth: Visible Salts are a bad thing.
Competely FALSE. The salts are what actually produce the light in the bulb. Less salts mean a bulb that runs hotter.

Myth: Changing the salts prevents color shifting.
This is completely false. The blue you see in color shifting is the same blue you see at start-up. It is due to a type of light emission around the tips of the electrodes. By changing the shape or make of the electrode, you can design a bulb that will not turn bluer as the electrode is sputtered and deformed or where the blue emission is in a location where the projector will not pick it up.

Why are there salts in a bulb?
The salts actually produce the light in the bulb. When the bulb first fires, it fires at around 25kV. This is required to start the arc. At first, the blue you see is from a type of emission around the two electrodes. As the arc continues the temperature in the arc chamber rises, vaporizing the salts. These vaporized salts are then ionized by the arc into a plasma. This plasma is what emits light. It also serves to allow the required arc voltage to drop to around 84V.

What are some of the salts used in HID bulbs

Common Salts and their colors for HID
Sodium Iodide - White
Thallium Iodide - yellow crystals that become red at 170oC
Scandium Iodide - yellow powder
Dysprosium Iodide - deep yellow powder
Indium Iodide - deep red-brown color

Mercury Iodide - Yellow
The last one may or may not be added, but it may form due to the presence of iodide from the other salts.

More rare salts:
Cerium Iodide-Yellow
Neodymium Iodide - Green
Holmium Iodide - yellow
Erbium Iodide - Pink
Thulium Iodide - Yellow
Gadolinium Iodide - yellow
Ytterbium Iodide - yellow

Which are the most common salts?
The main salts in 4300K bulbs are Scandium Iodide and Sodium Iodide, Dysprosium Iodide is also added to some bulbs. While in higher temperature bulbs, more Indium Iodide is used. This is what gives the salts in those bulbs their red color. It also is really expensive and hazardous to use, which is what gives them their cost.

The exact mixture of salts is unknown, as each company has its own proprietary formula. Trace salts can be added to flesh out the spectrum some, improving CRI.

Why do all ballasts run AC current?
Some early bulbs ran DC current, but they suffered from short bulb life. This is because, in DC one electrode is constantly bombarded by high speed positive ions. This results in a noticeable shortening and deforming of the electrode. Over time, this erodes away the electrode to the point that it fails. By running AC, the high-speed ions, hit both electrodes, essentially doubling the life of the bulb. Another benefit is that the electrodes, run a little cooler using AC because the anode and cathode change about 400X per second compared to DC where 1 is always anode and the other always cathode (shared heat 2 electrodes vs 1). Also, I seem to recall some discussion on AC arcs are easier to maintain than DC arcs. Maybe someone can clarify this for me.

What is color shifting?
Color shifting is when a bulb, once fully warmed up, transitions to a bluer color temperature. This is due to the deformation of the electrodes that occurs as time goes on. To understand this, one must understand that near the electrodes, a region of plasma glows deep blue. As the electrodes are deformed, this region grows larger and contributes more to the color of the bulb. Bulbs that do no color shift have modified electrodes to prevent this deformation. Another tactic is to make it so that the blue area around the electrodes is not in an area that the projector can "see". This helps to minimize its effect as well.

Note: Color shifting should not be confused with the bright blue color at warm up. While this blue color DOES come from the same regions, it occurs before the salts vaporize, when IT is one of the ONLY sources of light. Once the salts vaporize, this is suppressed and the light transitions to its proper color temperature.

Why are there TWO glass tubes on a bulb.
If you look at a bulb, you will notice the arc chamber is surrounded in glass, while there is a second glass tube covering the whole bulb. The reason is the two glasses do two different things. The inner glass is a type of glass that can handle the high temperatures and pressures generated by the arc, while letting light out. The outer glass acts as a UV filter to remove the large amounts of UV radiation produced my HID bulbs. This is why you should NEVER operate a bulb that has a cracked or missing outer glass cover. The UV radiation is so intense it can blind you and/or give you a horrible burn (equivalent to a sunburn, but can be as bad as 2nd and 3rd degree).

How long to D2S bulbs last?
Unlike halogen bulbs, which typically die when the filament snaps, HID bulbs have very few methods of mechanical failure. This results in bulbs can last an excessively long time (thousands and thousands of hours), but as time goes on the output of the bulb decreases. According to some spec sheets, at around 1500 hrs of use, an HID bulb is only emitting around 75% of its brightness. So assuming linear lifespan (which is likely not a valid assumption, but for clarities sake we will assume it is), at around 3000 hrs, the bulb is at 50% brightness. This means, a bulb may still be working long after its luminous output has fallen below that of a halogen bulb.

What are the electrodes in HID bulbs made out of?
In OEM bulbs the electrodes are made out of thoriated tungsten. Thoriated tungsten electrodes were introduced approximately fifty years ago as an alternative to the use of pure tungsten electrodes. Thoriated means that the electrodes contain 1-2% (by weight) of Thorium dioxide (ThO_2). Thorium dioxide is added to the tungsten to promote electrode life, which helps the bulb last longer. The added thorium dioxide also promotes a more stable arc than an electrode made of pure tungsten. Aftermarket bulbs on the other hand often use the cheaper tungsten electrodes. This is another reason for the reduced life and less than desirable luminescent properties found in aftermarket bulbs.

If anyone has anything else to add to this, please let me know.

Also, if anyone has pictures of said bulbs I would LOVE to add those. Even if it is mainly of the base showing the **model** number. I will host them on my own server, unless you prefer to host them yourself. I just ask that even if you post them you give me unlimited permission to use them STRICTLY in this post and no where else. That way in the future, even if your server dies I can rehost them elsewhere. Basically, what I am saying is, I want permission to rehost them if the need should arise. Nothing more nothing less, not wanting ownership of them or anything like that. You will be credited with supplying the pictures etc. and ownership and copyright etc. will be noted as belonging to you and fully retained by you.

Thanks for additions, information and corrections: D1S, Oculus, emoshun, dorkiedoode and alexopth1512
Picture Thanks: alexopth1512, emoshun, rondy_, SM_SNIPER, D1S and CateraMV6

Last edited by PedroDaGr8 on Wed Jul 01, 2009 12:18 AM; edited 18 times in total

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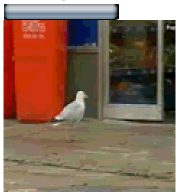
| Oculus | HID MASTER!  Joined: 26 Jun 2005 Posts: 2960 Wed Jun 10, 2009 12:56 AM	Post subject: QUOTE Excellent write up. I would include try to include these below. 85122LL 85123 85126 or any info on the D2R bulbs which is similar. Report Post To Moderators

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Author	Message
teamsvtour HID Guru Joined: 25 Nov 2005 Posts: 866 Location: Pennsylvania Wed Jun 10, 2009 1:06 AM	Post subject: QUOTE Has it been formally confirmed the 85122CM does not colorshift and stays at ~5000k? I hear back and forth that it does and it does not colorshift further _________________ MY FEEDBACK THREAD http://hidplanet.com/forums/viewtopic.php?t=31393 Report Post To Moderators

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Author	Message
D1S HID Guru Joined: 27 Apr 2005 Posts: 866 Location: Wild Blue Yonder	Post subject: QUOTE Quote "Why are there salts in a bulb? The salts actually produce the light in the bulb. When the bulb first fires, it fires at around 2400V." This should be about 25,000VDC or 25KV, you need to add a zero.