

The Elan Factory - Product Data Sheet



Copper-Nickel-Silicon valve guides for Lotus Engines

Copper-Nickel-Silicon valve guides provide superior performance when compared with the Original Equipment Manufacturers component. The metal alloy used in the manufacture of these components has a remarkable blend of physical and mechanical properties not found in any other commercially available material. This alloy develops its unique performance from being heat-treated but remains fully stress relieved in the hardened condition. This means that close machining tolerances can be attained whilst the finished component will not be subject to any form of stress cracking.

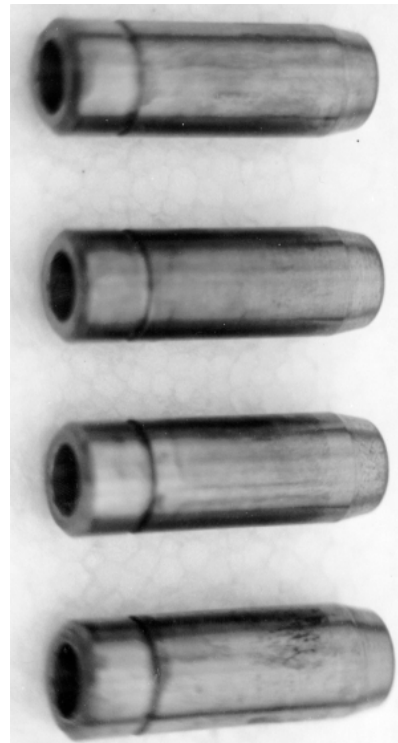
The combination of strength, corrosion resistance, high conductivity, wear resistance means this alloy is ideal for the manufacture of valve guides, valve seats, gears and little end bushes. When these components employed in an internal combustion engine, they are required to have superior thermal conductivity, wear resistance and strength at engine temperatures - especially high performance engines.

When Copper-Nickel-Silicon alloy is compared with other materials it demonstrates superior characteristics.

- Tensile strength is equal to, or better than stainless steel, low alloy steels and most copper based alloys.
- Excellent wear resistance, anti-friction properties, especially under high loading against hardened steels.
- Hardness is superior to many steels and most traditional non-ferrous alloys.
- Impact strength is equal to many steels and strength increases as temperatures approach cryogenic levels.
- Thermal conductivity is very high and increases with temperature, providing exceptional rate of heat transfer.
- Corrosion resistance is better than copper based alloys and copper its self.

Valve guides manufactured from Aluminium-bronze or cast iron are no longer appropriate to fit in performance engines when there are superior materials available such as Copper-Nickel-Silicon alloy. Exhaust valves have to withstand excessive amounts of heat, the bulk of which is dissipated from the valve by conduction through its contact with the valve guide and the valve seat. By using Copper-Nickel-Silicon alloy valve guides, it allows valves to run up to 200 degrees Centigrade cooler than using the cast iron material commonly used for valve guides. This is a major benefit that minimises the possibility of valves overheating and subsequently burning out. Cosworth and Lotus use this same material in high performance engines such as in the Esprit Turbo.

The Elan Factory has designed and offers high performance valve guides for all Lotus Engines. These same valve guides are manufactured to our specifications in the UK and supplied exclusively to The Elan Factory. Great care has been taken to optimise the design of the valve guides to reduce port obstruction whilst presenting the valve stem with a maximum bearing surface area. This results in improved gas-flow and extended wear life for the valve stem and guide. These design considerations are particularly important in the Ford/Lotus twin cam engine, as the valve guides are only 1.5 inches in length! Because the original valve guides are relatively short and are made from cast iron, they have a limited life when subjected to sustained high RPM.



Fitting instructions

When fitting these guides to an engine, they require special machining as the material is very hard and it is difficult to obtain a good surface finish. A "D" shaped cross-section tungsten-carbide reamer or a diamond tipped tool or hone is recommended for this purpose to ensure optimum bore finish. Do not under any circumstances attempt to use a conventional fluted reamer for this operation. This machining operation is important, as valve guide clearances are critical to ensure the correct operation of the engine and to minimise oil consumption.

Inlet valve stem clearance in valve guide = 0.0003" to 0.0023"

Exhaust valve stem clearance in valve guide = 0.0025" to 0.003"

Note: All valve guides are an interference fit in the cylinder head = 0.0005" to 0.0015"

For further information regarding Copper-Nickel-Silicon alloy valve guides, performance products or genuine Lotus products, please phone The Elan Factory on (613) 9761-1903 or fax on (613) 9739-8944. Alternatively you can write to The Elan Factory at 5 Marong Court, Boronia Heights 3155, Melbourne, Australia or e-mail at elanfactory@optusnet.com.au