

SB019

Fitting Precombustion Chamber Cups

The correct fitting of precombustion chamber cups (PCCs) has a big influence on the life of the cylinder head and cup repair. Nearly all knock-in PCCs have an interference fit and protrusion above the cylinder head face. There are few exceptions and *the manufacturer's fitting instructions and specifications should always be followed*. In most cases, the PCC bore is no longer round, being distorted from the extreme temperatures and pressures in this area of the cylinder head. In a significant percentage of cases, the head repair is the result of the engine being overheated and this further adds to the likelihood of the PCC bore in the cylinder head being distorted.

The life of a precombustion chamber cup is highly dependent on its ability to transfer heat through to the cylinder head. Excessive engine temperatures, abnormal fuelling or combustion, poor fuel quality, malfunctioning EGR valves, excessive turbo boost, intercooler inefficiency and faulty vehicle operation are some of the factors which can adversely influence PCC operation and life. If the PCC does not have the correct fit in the cylinder head PCC bore, then it will overheat and there are few materials that can withstand the temperatures the PCCs experience. Ordinary steel PCCs (magnetic and usually cheaper) will distort and crack more easily and to a greater extent than quality alloyed steel (non-magnetic and more expensive) PCCs.

Heat transfer from any given shaped object is governed by the relationship between the volume of the object and the area of its surface that promotes cooling - this ratio is known as the MODULUS. The higher the modulus, the slower it cools. The lower the modulus, the quicker it cools. In the case of PCCs, external corner edges cool quicker than flat surfaces and faces, which in turn cool quicker than internal corner edges. Figures 1 and 2 below indicate the external cooling edges marked A for two variations in cup design.

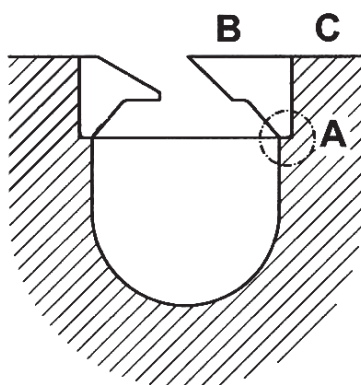


Figure 1.

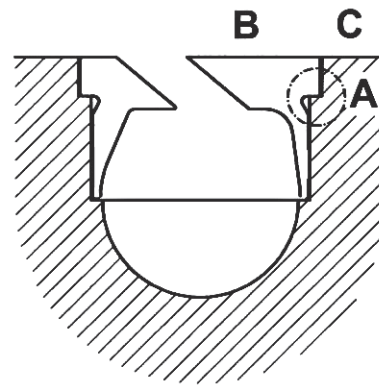


Figure 2.

To ensure the PCC has good contact with the cylinder head, most O.E. manufacturers recommend PCC protrusion of between 0.03 to 0.06 mm (B to C in Figures 1 and 2) and an interference fit of around 0.04 to 0.06 mm. These specifications become more critical the greater the cylinder head PCC bore distortion. Using Loctite or similar products to fix loose PCCs into a cylinder head is a risky practice and is strongly discouraged.