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# TECHNICAL REPORT

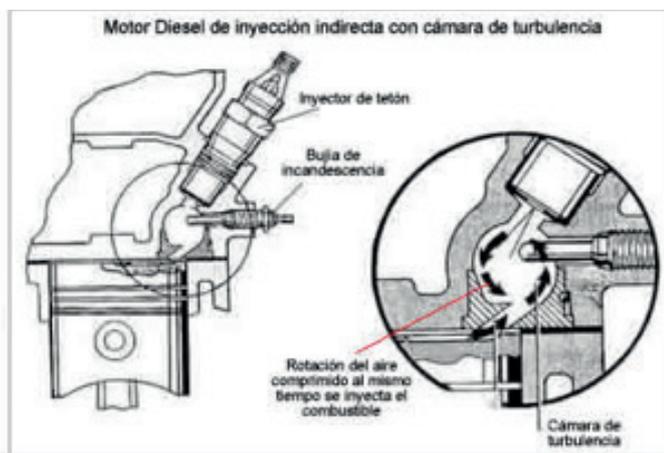
Assembly and disassembly of  
prechambers in diesel engines  
with direct injection



## INTRODUCTION

Precombustion chamber system is **used in diesel engines**. Diesel is injected into the **turbulence chamber** (prechamber) burning a part of it (precombustion).

**Pressure increases**, so combustion **gases and remaining diesel mix with the air in the combustion chamber**, where diesel burns definitely.



In this way, you **get a more progressive and less violent combustion**, and as a consequence a **more silent performance** of the engine is achieved, with fewer vibrations.

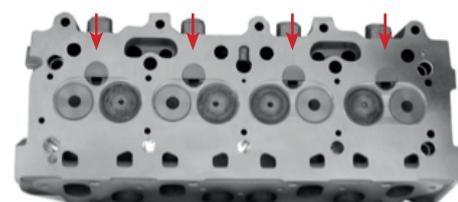
**Disadvantages of these engines** are: lower power, more fuel consumption and a worse cold start.

## DISPOSITION OF PRECHAMBERS

The **prechamber is inside** its housing in the head; the assembly is not by pressure, but **they are assembled very accurately in the head**.

This overheight makes **the chamber adjust in its place due to the pressure** exerted by the head, fixing its position and assure sealing.

If you compare the flat surface of the head with prechambers, you will notice an **overheight respect to the head**; measures of this overheight depend on each manufacturer.



## AJUSA HEAD GASKETS FOR DIRECT INJECTION ENGINES

Due to high temperatures and pressure in the prechamber areas, **Ajusa uses different types of steel to reinforce these areas.** Obviously, design of these reinforcements is according to the engine manufacturer.

| REFERENCES | EUROPEAN NOMEN. | AISI | Tensile (N/mm) | Elongation at break (%) | Gasket type |
|------------|-----------------|------|----------------|-------------------------|-------------|
| F016400-02 | 1.4404          | 316L | 530 - 680      | 45 MIN                  | FIBRAS      |
| F015400-01 | 1.4301          | 304  | 540 - 750      | 45 MIN                  | MLS         |
| F019450-02 | 14310           | 301  | 1150 - 1300    | 18 MIN                  | MLS         |

### REINFORCEMENTS FOR FIBER GASKETS



### REINFORCEMENTS FOR MLS GASKETS

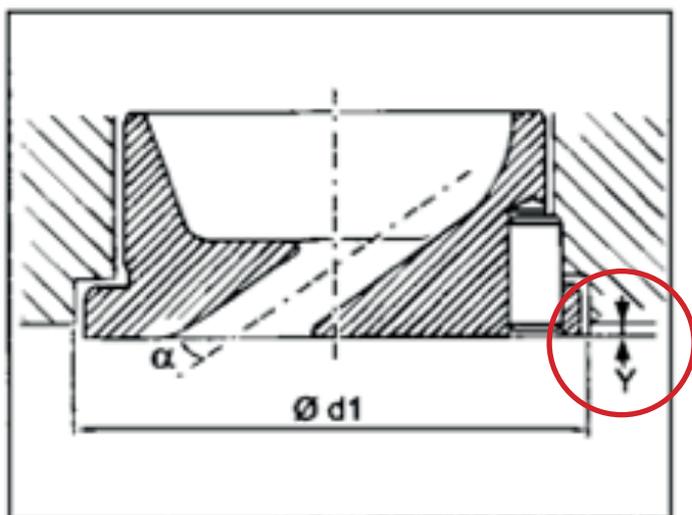


## SUGGESTIONS WHEN FLATTENING A HEAD WITH PRECHAMBERS

You must know that most of engine manufacturers **do not recommend to machine the head surface beyond limits with very tight tolerances**; however engine builder professionals are **qualified to perform these operations**.

When you flatten a head of a direct injection diesel engine, it is recommended to disassemble previous the prechambers. Once the head is flat, **prechambers must be assembled**; prechambers have varied in the overheight respect to the head, so it is necessary to machine their housing and get the right tolerance.

In this way, the **head gasket will be able to absorb the height differences**, assuring sealing in the combustion chamber.



Maximum distance for the machining of the prechamber housing.

## MOST FREQUENT PROBLEMS

1. Heads are usually made of aluminum, **while prechambers are made of steel**; due to the difference of materials, **expansion coefficients are different**, so prechamber may be loose inside its housing; this effect is more evident if there is an overheating.
2. If during prechambers **assembly the overheight respect to the flat surface of the head** is not controlled and it is out of the specifications marked by the manufacturer, **this may cause the following failures**: lack of sealing in the combustion chamber, movement of the prechamber inside its housing and the consequent deterioration of the elements in contact.
3. You must always keep in mind the **correct election of the thickness of the head gasket**, after checking the piston height respect to the block; in this way, **we will continue to keep the constant compression ratio** and we will secure a good performance.