

CYLINDER HEAD GASKETS INSTRUCTIONS FOR A CORRECT ASSEMBLY

DISASSEMBLY

Let the engine cool at room temperature and then take away the stopper of the expansion tank of the cooling circuit. Once the engine is dry, loosen the screws in the reverse order that will be used in tightening.

CLEANING

Clean thoroughly the contact surfaces between the cylinder heads and the block. Be careful not to scratch them. This can be done with trichloroethylene or paint thinner. Then, clean the cooling circuit. Use a male screw to clean the threads of the block and a wick to clean and eliminate burrs of the head's clearance holes. Draw all dirt, water or oil situated on the holes into a syringe and then use compressed air to clean the machine product remnants to avoid a false torque of the cylinder head. Protect your eyes with safety glasses.

CHECKINGS

Make sure that the flatness side of the head and the block are within the admitted tolerances:

Four-cylinder engines and V8: 0.05 mm max (0.002")

Six-cylinder engines: 0.127 mm max (0.005")

Diesel engines: consult manufacturer specifications since the tolerances vary according to the model.

In cases of cylinder head distortion (which imply an excessive grinding without considering the admitted tolerances) try a grinding heat treatment in which the head is heated in a special oven that is bolted to a heavy steel plate shimming the places with severe distortions. This should be done in specialized workshops that have the technology needed to do this type of work.

Verification of the block blueprint roughness and the cylinder head:

ROUGHNESS	GASKET «SANDWICH»	GASKET METALGRAF® AND MULTILAYERS
Steel block or head	2,3 um (maximum)	0,5 / 1,0 um
Cast block or head	3,8 um (maximum)	1,5 / 1,8 um

In the cases of metal layer and multi-layer gaskets, the surface softness is a critical factor. If the plane surfaces are too rough, the gasket won't be able to fill the lines of their machining thus causing compression, liquid refrigerant or lubricant leaks. Use a roughness meter to verify the roughness of the planes.

PIECE OF ADVICE: As a general rule, if a cylinder head of an engine that has a layer gasket is disassembled and only the upper section is being repaired (meaning that the block is not being disassembled), you should use a **Metalgraf®** gasket to assemble it since this will better tolerate the differences that might be in the block blueprints. When choosing a gasket, consider the variation that exists in the compression relation.

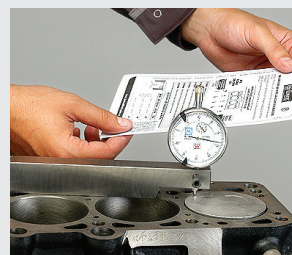
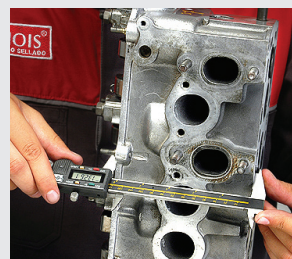
Make sure that the cylinder head is not excessively grinded. A gasket by itself can't compensate this difference in height (in some cases the valves can touch the piston or excessively increase the compression relation). If this happens, ask for special oversize or strengthened gaskets.

Remember that the reduction in the combustion chamber will cause temperature and pressure increases that will force the engine components. In these cases, the cylinder head gasket acts as an engine "fuse" since that is the first part to fail. If this didn't happen, serious engine damages would soon arise, such as drill holes in the piston caused by detonations (engine backfire), burnt valves, ring damages, cam misalignments, etc.

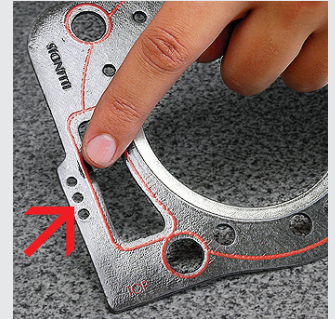
In diesel engines, measure with a comparator the piston projecting in comparison with the block blueprint; the highest measure is the one that will be taken as a reference. Also, use that measure to select the thickness of the gasket (notches).

IMPORTANT: Compare the thickness of the previous gasket with the one that will be used (if possible, using a micrometer). When selecting a gasket, the notches that identify thickness are important (diesel engines) but also take into account that the new joint must be approximately 4% to 8% thicker than the gasket that was previously used.

Check the tightening screws of the cylinder head. In engines that indicate torque in kilograms, check that the length matches the original measure. If it is "stretched" or the thread surface is damaged, DISCARD IT.



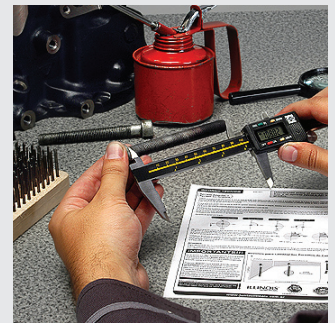
In case you reuse the screws, whisk the thread, lubricate the under head area and let drain for 30 minutes. By doing this, you diminish the loss of torque caused by the friction of the screw thread. If the screw has an integrated washer, you should lubricate within the washer and the screw head. **CAUTION!!!** Never lubricate the washer face against the head gasket. If the screws are of different lengths, respect the correct position of each one, if you don't do this, you could cause a false torque and the cylinder head will not support the block properly. Never use different types of bolts since the materials and designs can be different.



It is **ESSENTIAL** to use NEW washers and screws in engines with angular tightening.

In engines with interchangeable wet sleeves, you should check the correct projecting of them in comparison with the block blueprint. Determine the thickness of the sleeve seat "shim" and remember that you should put only one per sleeve.

Use a comparator and the tolerances specified by the manufacturer. It is very important that the sleeves are positioned in a way that the projecting is layered from cylinder No.1 to cylinder No. 4 or viceversa.

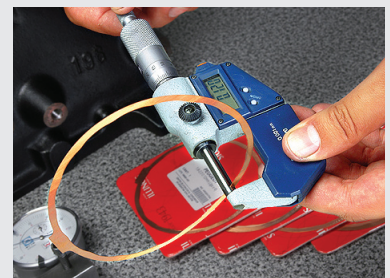


ASSEMBLY

Don't apply any additional product to the cylinder head gasket (silicone, grease, sealants) since it will cause a thickness and therefore the gasket won't settle correctly. The gasket must be dry placed. The same gasket mustn't be assembled twice, it is important to make all the adjustments when the engine is cold.

The cooling circuit will only be completed after the assembling process is finished.

Fasten the fixing screws to the cylinder head following the order and system indicated by the manufacturer.



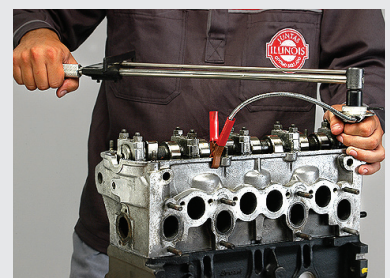
IMPORTANT: Many modern engines have different torque specifications depending on the screws head position. The tightening system is also indicated since many times the traditional cross or spiral system is incorrect for the proper settlement of the head to the block.

Start the engine (without forcing it) until it reaches a normal temperature. Let it cool to room temperature and tighten with the same final torque that was used in the previous stage.

- If the tightening is in kilograms: work on the screws one by one and in the same order that was used for the tightening, let loose 90° and tighten to the final value.
- If the tightening is angular: instead of using a torque wrench use a goniometric wrench (or a torque wrench with an adaptable goniometer) to have the best possible accuracy in the applied angles.



ADVICE: When using the angular method, the tightening must be applied all at once firm and evenly. If you stop the tightening halfway or loose the tautness that is being applied before reaching the final position, it is likely that the applied torque won't have the value specified by the manufacturer. When the tightening of the valves final lights is between 600 and 1000 km, check to ensure that the screws haven't become loose. If needed, repeat the final tightening process. Remember that if you are using the tightening in kilograms, the engine must be cold and the cooling circuit must be empty.



Follow the recommendations of this report and the ones that appear in the product packaging very carefully. Take into account that some procedures that were previously used are no longer valid because of the engines evolution, new materials and technological changes.