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Fitting instructions for the Concentric Slave Cylinder (CSC)

The concentric slave cylinder (CSC) is subjected to just as much natural wear as the clutch or flywheel and should be replaced every time the clutch is changed.

There are a few important things to consider during installation in order to preserve the functionality and service life of the components.

Always read the specifications of the vehicle manufacturer

Correct procedure for fitting the CSC:

- Do not depress the pedal several times in succession when bleeding; depress just once and wait for hydraulic system to stabilize (risk of over pressure inside CSC)
- Do not use any lubricants or cleaning agents as they may damage the gaskets or the entire cylinder.
- Maintain always attention to the level of cleanliness.
- Only use brake fluid approved by the car manufacturer.
- Clean old gaskets or remove it (if supplied with CSC) and clean dust from the connection piece/area.
- Clean the transmission input shaft and verify not excessive wear on shaft seal swept area.
- Make sure the slave cylinder is installed flat against the transmission-mounting surface
- Ensure the adaptor is engaged before finally tightening the fixing bolts on the CSC.
- Install the slave cylinder fixing bolts and tighten per the vehicle manufacturer requirements.
- Fill the reservoir with an approved DOT 3 or 4 brake fluid.
- NEVER bleed the CSC if the clutch and flywheel are not yet assembled (reaction load to CSC)
- Make sure the CSC is not inclined/tilt during installation. Failure may lead to damage at the lugs or reduced service life (angular misalignment).
- Do not over tighten bleed screw.
- Bleed screw torque for Plastic housing (3 to 5 Nm) - for Aluminum housing (15 to 20 Nm)

ALWAYS CHANGE ALL CLUTCH SYSTEM FOR CLUTCH ACTUATION WITH WEAR RECOVERY

ALWAYS CHANGE THE CLUTCH FLYWHEEL AND THE DIAPHRAM

Dispose of the waste oil and used parts according to proper country and/or state disposal regulations

ASSEMBLY ERROR CAN DAMAGE THE CSC AND IT WOULD NOT BE COVERED BY WARRANTY.

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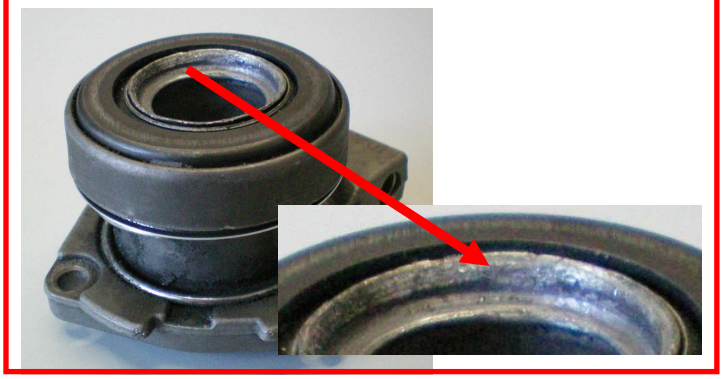
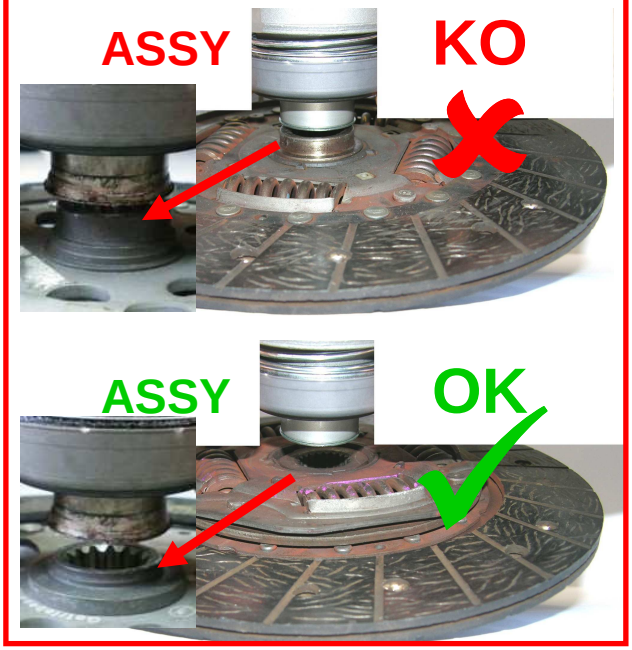
1 - ASSEMBLY ERROR FLYWHEEL OPPOSITE SIDE

Flywheel assembled in wrong way (opposite site) will damage the CSC causing deformation of the retaining ring and leaking.

Retaining ring damage



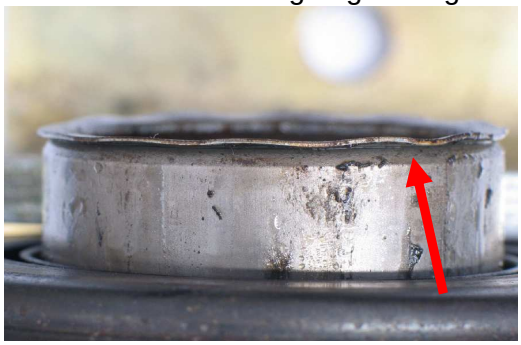


- •Always read the specifications of the vehicle manufacturer
- •Prior disassembly mark the external side of the flywheel with a colored dot to remind the correct assembly side
- •Original spare parts flywheel is marked on the correct assembly side

2 - ASSEMBLY ERROR – OVER STROKE

In case of error in assembly or bleeding the CSC system could work in over stroke. An exceed of stroke will result in the damaging of the retaining ring or in the damaging of the primary seal as the sliding sleeve can slip out of the guidance and the sealing ring can shear off when it is pressed in the guidance again.

Over-stroke retaining ring damage



Typical Over-stroke seal damages

- •Always read the specifications of the vehicle manufacturer
- •Do not depress the pedal several times in succession when bleeding; depress just once
- •Assembly the clutch system with the correct mechanical clutch tools for “counter force free”
- •NEVER bleed the CSC alone – bleed only when flywheel and clutch are assembled

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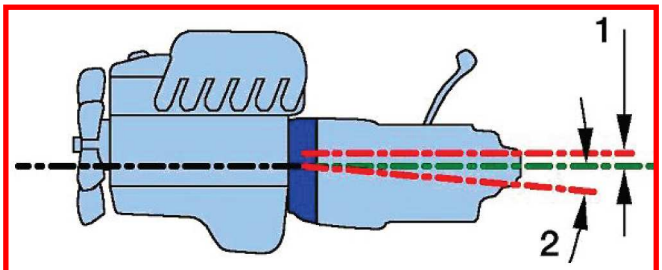
3 - AXIAL AND ANGULAR SHAFT/ENGINE MISALIGNMENT

Excessive axial or angular (or both) CSC assembly error (reference to gear shaft) lead to a reduced functional and service life of CSC **reducing the life of the shaft seal (gearbox input shaft seal).**



1: parallel offset ; **2**: Angular offset

The root cause for excessive axial or angular (or both) CSC assembly error is to be found in alignment errors between engine and shaft.
Possible cause of misalignment are:

- Centering between engine and gear box is not correct (deformation, heavy dirt or wear);
- Other parts (e.g. grounding straps) trapped between engine and gear box during installation);
- Flange bolts loose or not properly tightened;
- Close-tolerance sleeves or pins missing / damaged;
- Gearbox input shaft with no guidance as pilot bearing in the flywheel is absent or badly worn;
- Clutch bell housing warped because attaching bolts have not been evenly tightened or deformed due to the effect of force such as dropping or striking hard when fitting;

In case of excessive axial and angular misalignment and shaft seal wear, shaft rotation can generate mineral oil mist that could go in contact with internal **CSC primary seal with high volume change** leading to leakage and low service life.

- Always read the specifications of the vehicle manufacturer
- Assembly the clutch system with the correct mechanical clutch tools for “counter force free”
- Always check the finish of the surface of the shaft in seal working area prior to assemble CSC

4 – BRAKE FLUID ERROR – FLUID NOT CORRECT

Clutch hydraulic system MUST be filled only with BRAKE FLUID. Never use mineral oil and always use the oil manufacturer as requested on owner vehicle manual.

When selecting the hydraulic fluid to be used, it is essential to comply with the manufacturer‘s specification.
If the wrong hydraulic fluid is used, the seals in the system will be damaged. In systems which are combined with the brake system, faults may arise in the brake system.
POTENTIAL FOR ACCIDENTS!

Volume change - contact with mineral fluid

- Always read the specifications of the vehicle manufacturer
- Always use DOT3 / 4 fluid – DO NOT USE MINERAL OIL
- Dispose of the waste oil according to proper country and/or state disposal regulations.
- Always avoid use of grease or other lubricants / cleaning agents in contact with CSC

NUOVA TECNODELTA S.p.A.
HYDRAULIC PARTS FOR BRAKES AND CLUTCHES
FRAZ. POCOLA, 62 – 14016 TIGLIOLE (AT) ITALIA
TEL. 0141/668111 – FAX 0141/668145

FOR FURTHER INFORMATION:
info@nuovatecnodelta.it

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5 - BLEEDING ERROR – OVER PRESSURE

A brake bleeding device should not be connected and switched on during manual bleeding.
If the clutch pedal is actuated with a brake bleeding device connected, the concentric slave cylinder can be "over-pressurized". An "over-pressurized" concentric slave cylinder is no longer able to function and must be replaced!

Manual bleeding should be carried out using the following process:

1. Depress clutch pedal
2. Open bleed valve
3. Keep clutch pedal depressed until fluid appears – **Do not release!**
4. Close bleed valve
5. Release clutch pedal slowly

Do not depress the pedal several times in succession when bleeding; depress just once

The clutch bleeding cycle must be repeated **20 to 25 times to guarantee complete bleeding**. Top up the level of the fluid in the reservoir between the cycles. The level of the fluid must not drop below the minimum mark on the reservoir during bleeding!

Problems with bleeding mainly occur in concentric slave cylinders with bleed valves in the hydraulic line. **It is recommended only bleeding these systems manually**.

- Always read the specifications of the vehicle manufacturer
- Always use DOT3 / 4 fluid – DO NOT USE MINERAL OIL
- Prefer manual bleeding for CSC
- Dispose of the waste oil according to proper country and/or state disposal regulations.

6 – BRAKE FLUID / CLUTCH SYSTEM / CSC CLEANLINESS

Contamination may cause sporadic leaks when dirt articles accumulate under the sealing lip and may also cause permanent leaks when the lip seal swells.

In order to avoid premature failure it is required to observe the important hints listed below:

- Exclusively use brake fluid with at least DOT 3.
When open, do not store the fluid longer than one year.
- Change the fluid at planned interval (see car owner manual / 120.000 km in normal use)
- Drain the old fluid and rinse the line system with sufficiently new fluid.
- Remove the compensating reservoir and clean it carefully.
- The entire CSC system must be free from oil and grease. Otherwise the lip seals swell.
- Avoid grease on hands and oil on cleaning rags.
- Make sure to remedy any leaks on engine and gearbox. Make sure that the gear bell housing is sufficiently sealed.
- In order to avoid contamination during repair work, always close hydraulic and pipe connectors properly,

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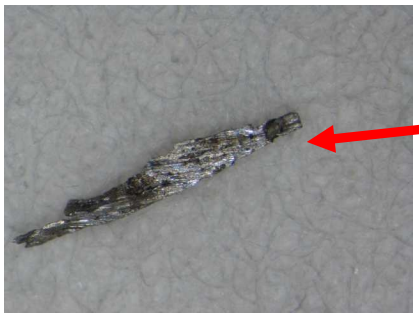
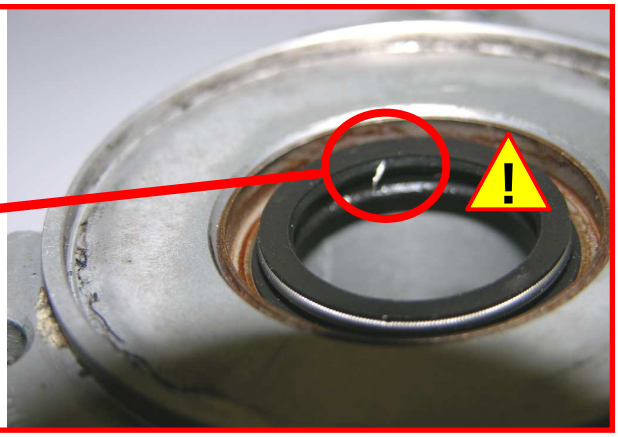
7 - CONTAMINATION – GEAR SHAFT

Contamination on shaft coming from disassembly or re-assembly operation may cause leaks when dirt articles accumulate under the sealing lip of the gear side shaft seal or on the bell-house sealing o-ring. and may also cause permanent leaks when the lip seal swells.

Aluminum swarf causing leakage from gear side





- •Clean old gaskets or remove it (if supplied with CSC)
- •Clean the transmission input shaft and verify not excessive wear on shaft seal swept area
- •Do not use any lubricants or cleaning agents as they may damage the gaskets / oring
- •Maintain attention to the level of cleanliness and verify visually that no contamination is present on shaft seal and oring

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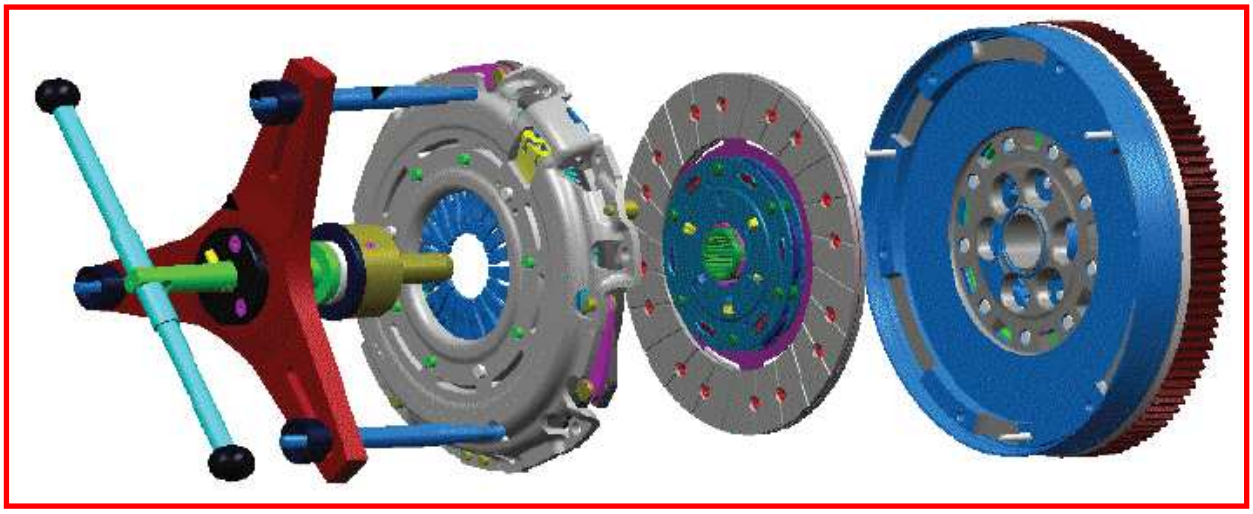
CORRECT CLUTCH ASSEMBLY PROCEDURE “COUNTER FORCE FREE”

The method of mounting the lid on the fly has a major impact on the functional characteristics of clutch system – specially for the self adjusting clutches - and thus on CSC performance and service life (**load/height**).

In order to comply and maintain compliance of clutch system compared to these characteristics, it is necessary to fit the clutch in the absence of reaction force ("Counter Force Free") disengaging the clutch, prior to approach the flywheel, through a special tool.



Special clutch system assembly tool
web catalogue USAG P/N 485 K1 (only for reference)