

# DMF failure diagnosis – visual inspection.



| Clutch driven plate                                                                                                                                                                                               | In-between primary and secondary flywheel                                                                                                                        | Friction surface                                                                                  | Friction surface                                            | Friction surface                                | Ball bearing                                                                                          | Plain bearing                     | Plain bearing                                                                                                                                                                   | Low thermal load                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                   |                                                                                                                                                                  |                                                                                                   |                                                             |                                                 |                                                                                                       |                                   |                                                                                                                                                                                 |                                                                                                                            |
| <b>DESCRIPTION</b>                                                                                                                                                                                                | <b>DESCRIPTION</b>                                                                                                                                               | <b>DESCRIPTION</b>                                                                                | <b>DESCRIPTION</b>                                          | <b>DESCRIPTION</b>                              | <b>DESCRIPTION</b>                                                                                    | <b>DESCRIPTION</b>                | <b>DESCRIPTION</b>                                                                                                                                                              | <b>DESCRIPTION</b>                                                                                                         |
| • Clutch disc burnt                                                                                                                                                                                               | • Burnt residues of abraded clutch facing at the DMF's outer edge or in the ventilation holes                                                                    | • Scoring                                                                                         | • Localised, dark hot spots<br>→ sometimes in large numbers | • Cracks                                        | • Grease egress<br>• Bearing seized<br>• Sealing cap missing or discoloured brown due to thermal load | • Damaged or destroyed            | • Worn out<br>→ in relation to the diameter, the maximum radial bearing clearance for a new part is 0.04mm with an admissible increase throughout its service life up to 0.17mm | • Friction surface slightly discoloured (gold / yellow)<br>→ no tarnish at the outer edges of the DMF or in the rivet area |
| <b>CAUSE</b>                                                                                                                                                                                                      | <b>CAUSE</b>                                                                                                                                                     | <b>CAUSE</b>                                                                                      | <b>CAUSE</b>                                                | <b>CAUSE</b>                                    | <b>CAUSE</b>                                                                                          | <b>CAUSE</b>                      | <b>CAUSE</b>                                                                                                                                                                    | <b>CAUSE</b>                                                                                                               |
| • Thermal overload of the clutch driven plate, occurring e.g. if the wear limits were exceeded                                                                                                                    | • Thermal overload of the clutch driven plate                                                                                                                    | • Worn out clutch<br>→ clutch lining rivets score on friction surface                             | • Thermal load                                              | • Thermal overload                              | • Thermal overload or mechanical damage / overload                                                    | • Wear and / or mechanical impact | • Wear and tear                                                                                                                                                                 | • Thermal load                                                                                                             |
| <b>EFFECT</b>                                                                                                                                                                                                     | <b>EFFECT</b>                                                                                                                                                    | <b>EFFECT</b>                                                                                     | <b>EFFECT</b>                                               | <b>EFFECT</b>                                   | <b>EFFECT</b>                                                                                         | <b>EFFECT</b>                     | <b>EFFECT</b>                                                                                                                                                                   | <b>EFFECT</b>                                                                                                              |
| • Thermal load applied on the DMF                                                                                                                                                                                 | • Residues of the abraded friction material can penetrate into the arc spring channel and cause malfunction                                                      | • Limited power transmission capability<br>→ the clutch is unable to generate the required torque | • None<br>• (DMF subject of thermal load)                   | • Loss of the DMF's operational reliability     | • Insufficient bearing lubrication<br>→ DMF fails                                                     | • DMF is defective                | • ≤ 0.17mm: None<br>• > 0.17mm: Increased tilting of the second flywheel                                                                                                        | • None                                                                                                                     |
| <b>REMEDY</b>                                                                                                                                                                                                     | <b>REMEDY</b>                                                                                                                                                    | <b>REMEDY</b>                                                                                     | <b>REMEDY</b>                                               | <b>REMEDY</b>                                   | <b>REMEDY</b>                                                                                         | <b>REMEDY</b>                     | <b>REMEDY</b>                                                                                                                                                                   | <b>REMEDY</b>                                                                                                              |
| • Perform a visual inspection for signs of thermal discoloration on the DMF<br>→ For damage assessment, refer to:<br>„low thermal load“<br>„mean thermal load“<br>„high thermal load“<br>„very high thermal load“ | • Replace DMF and clutch                                                                                                                                         | • Replace DMF and clutch                                                                          | • No remedial measures required                             | • Replace DMF and clutch                        | • Replace DMF and clutch                                                                              | • Replace DMF and clutch          | • Replace DMF and clutch if bearing clearance exceeds 0.17 mm                                                                                                                   | • No remedial measures required                                                                                            |
| Mean thermal load                                                                                                                                                                                                 | High thermal load                                                                                                                                                | Very high thermal load                                                                            | Friction control disc                                       | Primary flywheel                                | Starter ring gear                                                                                     | Sensor ring                       | Grease egress                                                                                                                                                                   | Balance weights                                                                                                            |
|                                                                                                                                                                                                                   |                                                                                                                                                                  |                                                                                                   |                                                             |                                                 |                                                                                                       |                                   |                                                                                                                                                                                 |                                                                                                                            |
| <b>DESCRIPTION</b>                                                                                                                                                                                                | <b>DESCRIPTION</b>                                                                                                                                               | <b>DESCRIPTION</b>                                                                                | <b>DESCRIPTION</b>                                          | <b>DESCRIPTION</b>                              | <b>DESCRIPTION</b>                                                                                    | <b>DESCRIPTION</b>                | <b>DESCRIPTION</b>                                                                                                                                                              | <b>DESCRIPTION</b>                                                                                                         |
| • Friction surface discoloured blue due to temporary thermal load (220 °C)<br>→ no discoloration in the rivet area                                                                                                | • Tarnish in rivet area and/or at the outer diameter. No tarnish on the friction surface<br>→ the DMF was in continued operation after high thermal had occurred | • DMF discoloured blue/purple at the lateral or back sides and/or visibly damaged, e.g. cracks    | • Friction control disc melted                              | • Secondary flywheel scores on primary flywheel | • Starter ring gear heavily worn                                                                      | • Sensor ring teeth distorted     | • Minor grease egress<br>→ slight trails of grease leaking from the openings or seal caps<br>• Heavy grease leakage 20 g<br>→ housing covered with g rease                      | • Loose or missing<br>→ indicated by clearly visible welding spots                                                         |
| <b>CAUSE</b>                                                                                                                                                                                                      | <b>CAUSE</b>                                                                                                                                                     | <b>CAUSE</b>                                                                                      | <b>CAUSE</b>                                                | <b>CAUSE</b>                                    | <b>CAUSE</b>                                                                                          | <b>CAUSE</b>                      | <b>CAUSE</b>                                                                                                                                                                    | <b>CAUSE</b>                                                                                                               |
| • Discolouration of the friction surface is a normal occurrence during operation                                                                                                                                  | • High thermal load (280°C)                                                                                                                                      | • Very high thermal load                                                                          | • High thermal load inside the DMF                          | • Friction ring of the plain bearing worn out   | • Defective starter                                                                                   | • Mechanical damage               | • Owing to design small of amounts of grease egress is allowed                                                                                                                  | • Incorrect handling                                                                                                       |
| <b>EFFECT</b>                                                                                                                                                                                                     | <b>EFFECT</b>                                                                                                                                                    | <b>EFFECT</b>                                                                                     | <b>EFFECT</b>                                               | <b>EFFECT</b>                                   | <b>EFFECT</b>                                                                                         | <b>EFFECT</b>                     | <b>EFFECT</b>                                                                                                                                                                   | <b>EFFECT</b>                                                                                                              |
| • None                                                                                                                                                                                                            | • Depending on the duration of the thermal load applied, the DMF is defective                                                                                    | • DMF is defective                                                                                | • Limited operational reliability of the DMF                | • Noise emission                                | • Noise occurring during engine start                                                                 | • Engine runs unevenly            | • None for minor grease egress<br>• Insufficient lubrication of the arc springs caused by heavy grease leakage                                                                  | • DMF out of balance<br>→ loud humming                                                                                     |
| <b>REMEDY</b>                                                                                                                                                                                                     | <b>REMEDY</b>                                                                                                                                                    | <b>REMEDY</b>                                                                                     | <b>REMEDY</b>                                               | <b>REMEDY</b>                                   | <b>REMEDY</b>                                                                                         | <b>REMEDY</b>                     | <b>REMEDY</b>                                                                                                                                                                   | <b>REMEDY</b>                                                                                                              |
| • No remedial measures required                                                                                                                                                                                   | • Replace DMF and clutch                                                                                                                                         | • Replace DMF and clutch                                                                          | • Replace DMF and clutch                                    | • Replace DMF and clutch                        | • Replace DMF and clutch<br>• Perform starter function test                                           | • Replace DMF and clutch          | • A little grease egress requires no further action<br>• Replace DMF and clutch if grease leakage is heavy                                                                      | • Replace DMF and clutch                                                                                                   |

To check whether or not the Dual Mass Flywheel (DMF) is in good working order by performing a thorough visual inspection plus measurements using the LuK DMF special tool.

This provides a reliable assessment of the DMF's overall condition.

A worn and defective DMF will compromise driver comfort and significantly reduce operational reliability of the clutch and gearbox significantly.

This is why the DMF's condition should be checked whenever a clutch repair is performed.

## Measurements

A 100% functional test of the DMF includes, among other things, a test of the arc springs' characteristics during compression. This test must be performed at a special test facility as it cannot be carried out with standard workshop equipment. However, the LuK DMF special tool 400 0080 10 allows repair professionals to perform the most important measurements – freeplay angle and rock – in a workshop environment.



LuK DMF special tool, quoting no. 400 0080 10



Measuring freeplay angle



Measuring rock

The freeplay angle is the angle at which the DMF's primary and secondary masses can be rotated against each other until load is exerted on the arc springs. Rock occurs when the rotably supported masses of the DMF are tilted towards or away from one another.

A detailed technical DMF brochure along with set values for freeplay angle and rock are available for download at:  
[www.Schaeffler-Aftermarket.com](http://www.Schaeffler-Aftermarket.com)  
or: [www.REPPERT.COM](http://www.REPPERT.COM)

For further information:  
Phone: +49 (0) 180-17 53-333  
Fax: +49 (0) 6103-753-297  
E-Mail: [LuK-AS@Schaeffler.com](mailto:LuK-AS@Schaeffler.com)

**SCHAEFFLER**  
AUTOMOTIVE AFTERMARKET

