

Test Specification
Technical cleanliness appendix - external (Gearbox area)



Prüfvorschrift
Technische Sauberkeit Anhang - extern (Getriebebereich)

F03ZY000WE

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This document replaces all previous editions.

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Dieses Dokument löst alle vorherigen
Ausgaben ab.

Initial release of documents / Dokumentenerstfreigabe

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1 General Information

1.1 Scope of application

This test specification defines customer specific requirements in addition to test specification F03ZY0007N. It applies to all parts in the area of the gearbox, in particular to all parts that get into contact with the gearbox oil and potentially introduce particles into the oil circuit.

1) High risk components

The manufacturing process contains identified sources for hard particles (e.g. grinding processes, sand casting, machine environment, etc.)
This leads to close monitoring of component cleanliness during series production, including analysis per REM-EDX (or equivalent verification).

2) Low risk components

- a. The manufacturing process of the components demonstrably does not contain any source of hard particles according to the definition (e.g. injection molded plastic components)
An evidence during PPAP is required (Questionnaire technical cleanliness incl. consideration of the machine environment, one-time cleanliness analysis of the components incl. REM-EDX (or equivalent verification)).
- b. If the evidence is unambiguous and a source of hard particles can be excluded, no EDX analysis accompanying the series is required.
A new verification is carried out within the scope of the requalification.
- c. Any process changes that may trigger a change in the risk assessment (e.g. introduction of a new process step with a source of hard particles, change in the machine environment) are notifiable and lead to a reassessment of the risk for hard particles.

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Referenced documents:

VDA 19 Part 1 – 2015-03: Inspection of Technical Cleanliness

VDA 19 Part 2 – 2010-10: Technical cleanliness in assembly

ISO 16232 – 2018-12: Road vehicles – Cleanliness of components and systems

The terms and definitions used in this test specification are given in the referenced documents.

2 Cleanliness requirement respectively permissible particle limit values

Reference area is stated on the technical drawing. Cleanliness testing according VDA19 / ISO16232.

It is differentiated between hard and non-ferrous particles which requires a material analysis (EDX-analysis) in addition to light optical analysis. A particle is counted as a hard particle if the particle has a ferrous share of more than 55 % within the result of EDX-analysis.

In addition to this, it must be ensured that abrasive residues, corundum, or materials of a similar nature do not exceed a particle size of 300µm. This can be verified by process chain analysis, detection by SEM-EDX or an equivalent method.

Other hard mineral materials and abrasive residues are also counted as hard particles, like natural grain materials: flint, quartz, corundum, emery, garnet, natural diamond or synthetic grain materials: Titanium oxides, corundum, silicon carbides, chromium oxides, cubic boron nitride, diamonds and anything similar to what is mentioned above.

In individual cases a deviation from this specification can be agreed by RB technical cleanliness experts.

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2.1 Gearbox related cleanliness requirement

PERTAINS ONLY TO INNER VOLUME (GEARBOX SPACE).		
Anforderung wird nur für den Innenraum (Getriebebereich) gefordert.		
CLEANLINESS REQUIREMENT		
Reference value: 1000 cm ² of component surface		
Particle type (resp. restriction): hard particles*		
*Definition of hard particles: particles with ferrous share of >55 % and corundum and other hard mineral materials and abrasive residues		
ISO size class	Particle Size [µm]	Number of particles allowed [hard / non-hard]
B - D	5 - 50	No requirement
E	50 - 100	2000 / No requirement
F - G	100 - 200	500 / 1500
H ^{*1}	200 - 400	250 / 300
I	400 - 600	6 / 50
J	600 - 1000	0 / 6
K - L	1000 - 2000	0 / 0
M - N	2000 - Infinite	0 / 0
		Permissible number of fibers ^{*2}
Fiber length [µm]	<1000	No requirement
	1000 - 2500	10
	>2500	0
Escalation model: C		

^{*1} It must be ensured that abrasive residues, corundum, or materials of a similar nature do not exceed a particle size of 300 µm. This can be verified by process chain analysis, detection by SEM-EDX or an equivalent method.

^{*2} Applies to sealing surfaces

3 Selection of appropriate extraction / analysis methods

3.1 Declining test and blank value

Test parameters are defined via declining tests according to VDA19 / ISO16232. The correct declining behavior must be shown for all 6 extractions conducted in a row. A blank value test, which falls below the maximal limit required by VDA19 / ISO16232, is necessary immediately before the complete declining test.

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