Mercedes-Benz
Company Standard

DBL 6516
Date published: 2016-08

Total no. of pages (including annexes): 14
Person in charge: Andreas Grossmann
Email: andreas.grossmann@daimler.com
Plant: 010; Dept.: PT/TVL
Phone: +49 (0)711 17 56449
Date of translation: 2016-09

Specification of Residual Dirt Limit Values

Preface

The existence of this DBL does not make the specification of limit values compulsive. It is merely intended to standardize the procedure in cases where the indication of limit values is required.

Residual dirt limit values in component drawings usually lead to an increased production / testing effort which may be quite significant depending on the limit value specified. Limit values should therefore be set after careful consideration.

This edition supersedes the previous edition 2010-05 of this Standard.

Changes

In comparison with edition 2010-05, the following changes have been made:

- Editorial revision
- Normative reference revised (DBL 6515 removed, VDA 19 Part 1 included)
- Terms and definitions revised
- Notes on the basic absence of abrasive particles (corundum, silicon carbide) included
- Definition of fibers added
- Association table (Fig. 2) revised, adjusted to current limit values and marked as an example
- DS relevance added
- Escalation and application of limit values explained
- Limit value specifications and examples revised

NOTE: This translation is for information purposes only.
The German version shall prevail above all others.

Contents

1 Scope

This DBL covers both the specification of particulate residual dirt limit values and the specification of the residual dirt recovery and evaluation methods for the inspection of the cleanliness of components. Organic contamination (e.g. oil, grease) and cleaning agent residues do not fall within the scope of this DBL.

The residual dirt limit values stated here are valid until when the packaging is opened by an employee of Daimler AG or a person acting on their behalf.

Table 1: Product versions, overview

Residual dirt limit value Product version	Cleanliness level	Examples of workpieces
Extremely function-critical .10	Ultra-fine cleanliness	Injection systems
Highly function-critical .20	Fine cleanliness	Pressurized oil areas of major assemblies
Function-critical .30	Normal cleanliness	Unpressurized oil areas, water-contact areas
Less function-critical .40	Coarse cleanliness	Raw and semi-finished parts
Particulate undefined .50	Particulate undefined cleanliness	Body components, prior to welding work

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any changes) applies.

DBL 8585	General Requirements – Environmental Protection, Hazardous Substances, Dangerous Goods – Negative Substance List for the Selection of Materials
MBN 10317-0	CAD Drawings / 3D CAD Models Documentation Requirement - Identification of Parts, Assemblies and Special Characteristics Principles - Obligatory Documentation Requirement for Component Parts / Assemblies
MBN 10317-2	CAD Drawings/3D CAD Models Documentation Requirement - Identification of Parts, Assemblies and Special Characteristics Specific Values and Use Cases (MBC, VAN, and Buses)
MBN 10317-3	CAD Drawings/3D CAD Models Documentation Requirement - Identification of Parts, Assemblies, and Special Characteristics Instructions and Use Cases for Characteristics Created by Special Processes (Truck)
VDA 19 Part 1	Inspection of Technical Cleanliness – Particulate Contamination of Functionally Relevant Automotive Components
VDA 19 Part 2	Quality Management in the Automotive Industry – Technical Cleanliness in Assembly - Environment, Logistics, Personnel and Assembly Equipment
ISO 16232	Road Vehicles - Cleanliness of Components of Fluid Circuits

3 Terms and definitions

Evaluation method:	The method used for determining the residual dirt content.
Component:	Individual element of a unit which cannot be further dismantled nondestructively.
Assembly:	Integration of multiple components into a unit.
Fibers:	A long, thin entity defined by: the ratio of extended length to the maximum incircle that is larger than 20 and has a width, measured over the maximum incircle, that is less than or equal to 50 µm (VDA 19 Part 1, 2)
Function-critical:	Impact on malfunctions of components or groups of components
Test cleaning method:	The method used for removing the residual dirt from the component
Cleanliness class:	Cleanliness requirement dependent on the functional relevance of the component/group of components.
Recontamination:	Contamination which is deposited on the component after a cleaning process and reduces the previously achieved cleaning quality.
Residual dirt:	Damaging particles still contaminating components after their completion, and potentially impairing or preventing the subsequent manufacturing process or the correct functioning of the component or assembly.

- These may include, for example:

- Machining chips
- Sand
- Blasting shot residues
- Metals
- Abrasive residues (e.g. silicon carbide)
- Lint
- Paint
- Plastic particles

A distinction is **not** made between hard and soft particles; only the damaging effect of the particles relative to the respective component/group of components is **relevant**. This shall be taken into consideration in the limit value specification; it shall be stated here which particles the limit values pertain to (e.g. only metallic particles or all particles).

4 General requirements

For safety requirements, homologation (in particular, exhaust emissions) and quality, the existing statutory requirements and laws shall be complied with. In addition, the relevant requirements of the Daimler Group shall apply.

All materials, procedures, processes, components, and systems shall conform to the current statutory requirements regarding regulated substances and recyclability.

DBL 8585 shall be observed.

Abrasive particles, such as corundum or silicon carbide (Mohs hardness >= 7) for example, shall generally be avoided as contamination of the components. If abrasive particles cannot be excluded as contamination due to production-related reasons, this shall be clarified with the responsible developer and corresponding limit values – pertinent to abrasive particles – shall be specified in addition to the "normal" limit values.

5 Specification of limit value procedure

5.1 General principles

The principles underlying the specification of residual dirt limit values through to the indication of the component cleanliness on drawings are as follows:

- The cleanliness limit value of a component pertains – unless specified otherwise – to the functional surfaces (or media-wetted surfaces) of a component.

- The function of the component determines the level of the residual dirt limit value, the permissible particle types, the type of limit value specification and the escalation level.

- The residual dirt value of a component depends on the analytical method. Consequently, the analytical method according to VDA 19 Part 1 shall always be stated.

- The component category (classification of the component according to its geometry; for examples see VDA 19 Parts 1, 2) and the test requirement determine the test cleaning method.

5.2 Functional view of the component

For the specification of residual dirt limit values:

- The function of the component shall be evaluated (see 5.3 Product versions)
- The workpiece areas relevant for testing shall be defined (reference to functional areas of a component such as pressure oil chamber, unpressurized oil chamber, water jacket, etc.)
- The components involved shall be considered as an integral whole, taking account of their interaction (e.g. camshaft adjuster: inclusion of all areas on the pressurized oil side such as main oil duct in crankcase, cylinder head)
- The media involved (e.g. oil, water, air) shall be taken into account.
- Examination of the technical feasibility of the targeted limit value and, if necessary, a determination of the time and effort for any possible process optimization which might result from this shall be conducted.

Sensible limit values for components can only be specified on the basis of a thorough examination and evaluation of the function. Care shall be taken to coordinate the residual dirt limit values where interacting components are involved.

5.3 Product versions and cleanliness levels

Components shall be classified into sensitivity groups with regard to their function. This emphasizes the sensitivity of the component and has direct consequences for its necessary production, packaging and analysis methods, as well as for the escalation in case the limit values are exceeded.
The more sensitive a component, a subassembly or a major assembly, the lower the particle contamination for correct functioning shall be.

A product version represents a classification into a sensitivity group.

For the purpose of a distinct classification, particle size ranges – and, as a result, also the smallest defined particle size – are assigned to product versions, which correspond to the cleanliness levels.

Degrees of purity (Table 1) are required for the categorization of production resources and environments (see also VDA 19 Part 2). It should be noted that very low limit values also require corresponding production resources and environments that are available, which can lead to an increase in costs.

Table 2: Example of the assignment of the product versions to particle size ranges

<table>
<tr><th>5 to 15 µm</th><th>15 to 25 µm</th><th>25 to 50 µm</th><th>50 to 100 µm</th><th>100 to 200 µm</th><th>200 to 400 µm</th><th>400 to 600 µm</th><th>600 to 1000 µm</th><th>1000 to 2000 µm</th><th>2000 to 3000 µm</th><th>> 3000 µm</th></tr>
<tr><td colspan="6">.10</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="4">.20</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="5">.30</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="5">.40</td></tr>
<tr><td colspan="11">.50, no limit value specification</td></tr>
</table>

The product version classification is based on the sensitivity of the component and the smallest defined particle size class (see **example** table (Table 2).

If the component has more than one sensitive area (e.g. pressure oil, unpressurized oil chamber and water jacket), then the most sensitive area is decisive for the product version classification.

The lower the product version (e.g.: .10), the more sensitive the component is to contamination. At the same time, however, the technological effort required to achieve that cleanliness level and to maintain it until assembly will be higher.

If no particulate residual dirt limit value shall be assigned to a component, it shall be classified as product version .50. Additional requirements with regard to the cleaning result (e.g. degree of degreasing, etc.) shall be described in the component-specific requirement specifications and do not fall within the scope of this DBL.

Note:

The transport and storage packaging are defined as an obligatory consequence of the selection of the product versions.

6 Limit value indications

6.1 General

The limit values always pertain to – unless specified otherwise– all particles except for fibers. Limitations such as "relates to metals, metal oxides and sand" shall always be additionally stated. Due to their typically very high expansion, fibers are always stated separately.

Component sensitivity is assessed based on the product version (assignment to the cleanliness level). The residual dirt limit value is specified by allocating concrete figures.

There are a number of possibilities for expressing the cleanliness of the component using limit values (see VDA 19 Part 1 and ISO 16232-10).

Depending on the product version, the following limit value types shall be used at Daimler AG when new limit values are assigned:

- Particle size distribution
- Gravimetry/largest particle size (only permissible for product version .40)

Particle size distribution is a very representative method for defining a limit value. Processes can be conveniently optimized on the basis of the results of the analysis. In comparison, gravimetric indications are only suitable for this purpose with restrictions.

Both Daimler AG and the supply industry have at their disposal - usually across the whole range - appropriate automated equipment for the analysis of the particle size distribution.

Existing limit value specifications documented on drawings which deviate from this requirement (e.g. gravimetry) are only required to be changed retrospectively when the drawing is revised.

In the event of a requirement for a limit value type deviating from the particle size distribution during the assignment of new limit values, a special permit from Development is required which will only be granted in justified exceptional cases.

6.2 Definition of the limit values

When new limit values are assigned for components of product versions .10 to .30, the value shall always be indicated in the form of the particle count/size class. The gravimetric values may be indicated in addition.

Indication of the gravimetry/largest particle as limit value specification is permissible for product version .40 only.

It is pointed out again that no classification of the particles in hard or soft is made. If abrasive particles, such as corundum, silicon carbide, etc., shall be separately itemized, then either an exact definition of the particle with its name or a definition of the Mohs hardness (analysis with REM/EDX necessary) shall be carried out.

Example:
Corundum particles >100 µm are not allowed
or
Particles with a Mohs hardness of >=9 and a length of >100 µm are not allowed.

To be taken into account in this regard is that these requirements place significantly higher demands on the equipment of the test lab. Consequently, the use of a scanning electron microscope with EDX is then necessary, which can lead to a cost increase for the component.

6.3 Stating the limit value

Determination:	At Daimler AG, the following determinations were made with regard to the declaration of the limit values:
- PC engines:	The limit value always pertains to the component and/or the assembly (ZB), or the scope of supply (LU)
- PC transmissions:	The limit value always pertains to a standardized surface of 1000 cm^2
- Truck engines:	The limit value always pertains to a standardized surface of 1000 cm^2

Note: Previously existent limit values are listed in the respective limit value lists. In these lists the limit values are arranged according to functional spaces and alphabetically listed. It should be noted in this regard that parts with different functional spaces (e.g. crankcase: pressure oil chamber, unpressurized oil chamber and water jacket) are listed in all affected function areas.

6.3.1 Gravimetry and largest particle

The simplest way of indicating the cleanliness of a component is the definition of a maximum dirt mass and relating it to the component itself (e.g. 10 mg/component).

The limit value indication of the maximum dirt mass in relation to a reference area of 1000 cm^2 (e.g. 10 mg/1000 cm^2) represents an extension. For this type of indication, the examined workpiece area "A" in [cm^2] shall be known. During the subsequent residual dirt analysis process (see VDA 19 Part 1), the determined gravimetric measured value shall be converted to this reference area to present the result.

Calculation: Gravimetry per 1000 cm^2 area $= \frac{GB*1000}{A}$

GB = gravimetry of component
A = component area [cm^2]

To increase the informative value of the gravimetric limit value indication, the largest permitted damaging particle is additionally indicated at its longest dimension (e.g. L <= 1500 µm).

6.3.2 Particle size distribution

The assessment of the particle size distribution is specified in VDA 19 Part 1 and ISO 16232.

Note: Deviating from VDA 19 Part 1 and ISO 16232, the following particle size classes have been defined at Daimler AG, for technical reasons:

Consolidation of classes 100 µm to 150 µm and 150 µm to 200 µm into class 100 µm to 200 µm (see Table 3, Particle size classes).

Particle size class
5 ≤ X < 15 µm
15 ≤ X < 25 µm
25 ≤ X < 50 µm
50 ≤ X < 100 µm
100 ≤ X < 200 µm
200 ≤ X < 400 µm
400 ≤ X < 600 µm
600 ≤ X < 1000 µm
1000 ≤ X < 2000 µm
2000 ≤ X < 3000 µm
3000 ≤ X

Table 3: Particle size classes

To improve readability and if expedient, the particle size classes may be consolidated (see examples)

In particle size distribution, the limit value is defined by assigning a maximum number of particles to size classes.

Four particle size classes shall be assigned and filled with numbers. This shall be done by starting with the maximum permissible particle size and adding values to the size class with this limit value, 2 smaller ones and 1 larger one. The particle count for the largest permissible size class shall always be assigned with the quantity = 0.

In the case of product version .30 (.40), it is acceptable for the smallest particle size class not to specify a limit value specification for the particle count. However, the supplier shall indicate the values determined during the analysis. This shall be reported as follows:

Example: 100 to 200 µm: shall be reported.

The limit value shall be assigned according to the following procedure (Table 4):

Determination step	Example
1. Assignment to product version	.20 = class definition
2. Largest permissible particle in the affected component or functional space	Pressure oil chamber 500 µm
3. Determination of the size class for the longest permissible particle.	400 ≤ X < 600 µm
4. Determination of the 2 smaller particle size classes.	200 ≤ X < 400 µm, 100 ≤ X < 200 µm
5. Determination of the next higher particle size class	600 ≤ X < 1000 µm
6. Specification of the particle count per size class in pcs.	600 ≤ X < 1000 µm = 0 400 ≤ X < 600 µm <= 1 200 ≤ X < 400 µm <= 4 100 ≤ X < 200 µm <= 80
7. Complete indication on drawing	See Section 6.3.5

Table 4: Procedure for specifying limit values

During the assignment of the limit value it should be noted that the number of fine particles < 200 µm usually increases exponentially. This should be reflected in a limit value to be assigned which includes this particle size class, by means of an exponential increase of the particle count (increase of the smaller particle sizes).

This progress depends, among other factors, on the production equipment technology used (e.g. filtration). A significant effort is required with regard to the equipment technology to reduce the fine particle count, and this shall be taken into account when the limit values are assigned.

As in the case of gravimetry, a reference to the area is possible for the particle size distribution. In this case, too, a reference area of 1000 cm² is normally selected. For this evaluation type, a conversion shall be carried out for each particle size class. If in doing this a number smaller than 1 is obtained, it shall be rounded up to one decimal place. All results larger than 1 shall be rounded up to a whole number.

Calculation:

$$\text{Number of particles per size class and 1000 cm}^2\text{ surface area} = \frac{APG * 1000}{A}$$

APG = particle count / size class
A = component area [cm²]

Example:

Size class 100 to 200 µm: 123 particles
Size class 200 to 400 µm: 2
Component area: 4500 cm^2

Calculation for size class 100 µm to 200 µm $= \frac{123*1000}{4500}$ = 27,33→, indication: 28 particles

Calculation for size class 200 µm to 400 µm $= \frac{2*1000}{4500}$ = 0,44→, indication: 0,5 particles

Note:

The indication of the size distribution shall preferably be related to the component. Indications per unit area only make sense if used in comparison with similar components of a different size.

Furthermore, it shall be noted that with regard to the limit value specification per unit area, the actually introduced contamination will be too highly assessed, particularly for very small components.

When analyzing small parts (component surface area < 500 cm^2), the sample size shall be selected in such a way that there is a minimum surface area of 500 cm^2 per random sample, unless the filter saturation becomes so high that an assessment of the filter is impeded.

Example: A regulating valve with the surface area of 33 cm^3, 500 cm^2 / 33 cm^2 =15,15 ➔ 16 components per analysis

6.3.3 Specification of the test cleaning method

The selection of the test cleaning method to be used depends on the component category, the component function and the material.

It is important to specify the test method in order to avoid incorrect applications of the test cleaning methods and consequently faulty conclusions regarding the residual dirt values determined.

In addition to the limit values, the test cleaning method in accordance with VDA 19 Part 1 shall be specified. Reference to VDA 19 Part 1 without further detailed information is sufficient in this process (test cleaning parameters and details are specified in component-specific work instructions in accordance with VDA 19 Part 1).

Example: Test cleaning method according to VDA 19 Part 1: Spraying

6.3.4 Escalation level indication

Because statistical methods can only be applied very restrictively with regard to component cleanliness, it is necessary to specify an escalation level pertaining to the response to the exceeding of limit values. The following shall be observed in this regard:

- The escalation strategy takes into account the random occurrence of outliers.
- This shall be taken into account when establishing limit values. The limit values shall be as realistic as possible. Safety margins shall not be used, as otherwise there is an excessive risk of failure for the component.
- The specified limit values may be 100 % exploited.
- Only if the limit value is exceeded shall the respective escalation strategy be applied.

The escalation level indicates which measures are required to be taken when limit values are exceeded. The following escalation levels are available for selection.

A: Exceeding the limit value is extremely likely to result in a failure

B: Exceeding the limit value is very likely to result in a failure

C: Exceeding the limit value may result in a failure

Careful consideration shall be given to the selection of the escalation level, as classification in level "A" results in significantly increased time and costs (for escalation strategy, refer to Annex A).

The assignment of a component to a product version is irrelevant for the determination of the escalation level. Only the probability of failure when the limit value is exceeded is important.

6.3.5 Limit value indications:

In the future, specification of a limit value will no longer generally be done on the drawing.

The current specified value lists for the engines of the Truck division and for the engines and transmissions of the Passenger Car division can be requested via the email address pool-id.technische_sauberkeit@daimler.com.

Primarily the limit value in these specified value lists shall be used. No distinction is made between the individual major assembly model series in this regard.

For parts which require deviating limit values due to engineering design or technical reasons, these shall still be stated on the drawing.

The limit value on the drawing is always valid with priority; if no limit value is noted on the drawing, then the value in the limit value list of Annex C, Table 5 or the embedded limit value list in Annex D, Table 6 shall be valid.

6.3.6 Tabular limit value specification in the limit value list

The following details are necessary to specify the residual dirt limit value:

- The component surface area in cm^2 (for surface area reference) to be examined
- Indication of DBL 6516 and product version
- Type of test cleaning method according to VDA 19 Part 1
- Escalation level A, B or C
- Particle size distribution (tabular), possibly gravimetry and largest particle
- Addenda, such as no fibers >1000 µm, can be listed as the last item (under notes)
- Limitations, such as "only metallic particles" or "metals, metal oxides and sand"
- If particularly critical particles – such as corundum, silicon carbide, etc. – shall be restricted, then a second line with the limit values shall be created

The indication on the drawing is then made as follows:

For the component cleanliness limit value, see the limit value table for Cars or, respectively, Truck, version: XX

If the exceeding of a limit value can lead to a safety-related malfunction, "Yes" shall be entered under DS-relevant and this shall be identified in the development documentation with the corresponding DS attribute as per MBN10317 and A059 8012.

6.3.7 Limit value specification on the drawing

The following indications on the drawing are required when determining the residual dirt value:
The component surface area [cm^2] to be tested – (for surface area reference)
Indication of DBL 6516 and product version
Type of test cleaning method according to VDA 19 Part 1
Escalation level A, B or C
Particle size distribution (as table), if appropriate, maximum permissible particle size [µm]
Additions such as no lint > 500 µm may be listed as last item (following test cleaning method).
If the exceeding of a limit value can lead to a safety-related malfunction, then this shall be identified in the development documentation as per MBN10317 and A059 8012 with the corresponding DS attribute.

Example 1
DBL 6516.40 (function-critical component)
Test cleaning method: Ultrasound – VDA 19 Part 1
Escalation level C
Residual contamination per component: max. 4 mg, L<= 500 µm

Example 2
Component area: 850 cm^2
DBL 6516.40 (function-critical component)
Test cleaning method: Low-pressure spraying – VDA 19 Part 1
Escalation level C
Residual contamination per 1000 cm^2 surface: 50 mg / 1000 cm^2 , L<= 1000 µm
Max. 3 lint pieces with a length < 1500 µm

Example 3
DBL 6516.10 (extremely function-critical component)
Test cleaning method: low-pressure rinsing – VDA 19 Part 1
Escalation level A
Particle size distribution:

Particle size [µm]	Max. particle count / size class
25 to 50	1000
50 to 100	100
100 to 200	2
200 to 400	0

Without any limitation, the limit value shall always be valid for all particles except for fibers. If metallic particles shall be limited, for example, the following table is necessary:

Particle size [µm]	Max. particle count / size class, relating to metallic particles
25 to 50	1000
50 to 100	100
100 to 200	2
200 to 400	0

Example 4
DBL 6516.20 (highly function-critical component)
Test cleaning method: Ultrasound – VDA 19 Part 1
Escalation level B
Particle size distribution:
Maximum particle size: L<= 1500 µm

Particle size [µm]	Max. particle count / size class
200 to 400	)*
400 to 600	500
600 to 1000	8
> 1000	0

)* = indication of particle count for verification, but not as limit value

7 Packaging

Because the limit values shall be adhered to until the packaging is opened by an employee of Daimler AG or a person acting on their behalf, the suitable packaging plays an important role. It shall always be selected so that the cleanliness of the components is ensured throughout the entire logistics process.

The following approaches have proven themselves as suitable for packaging (**examples**):

.10 Individual packaging; if required, individually sealed-in or with a special load carrier for the component that is closed on all sides; in case of lines: openings closed

.20 Special load carriers, closed on all sides or individually packaged in foil. In case of the usage of small load carriers, the parts shall always be packaged in (side-folding) pouches. Suitable deep-drawn sheeting with cover and additional film hood

.30 Small load carriers (always covered with foil), parts – also multiple – packaged in foil pouches, thermoformed film with cover and additional film hood

.40 Parts on a pallet (with PE foil) or in a wire-mesh pallet (padded with foil pouch)

Note: VCI pouches and films have proven themselves in this regard, which – in addition to protecting the components against recontamination – also protect against corrosion.

If VCI pouches are used for components, on which liquid sealant is applied as part of the assembly process, the compatibility of the VCI active agent with the liquid sealant shall be checked in advance.

8 Procedure for the specification of limit values if no reference values are known

8.1 Determining the actual condition of component predecessor

Determination of contamination of the component predecessor, from which limit values for the new component are derived.

Caution: This procedure is conditional upon comparable tolerances, operating requirements and functions of the component.

8.2 Determining the actual condition of functional trial parts

Determination of the contamination of functional trial parts, from which limit values for the new production part are derived.

Caution: The dirt contamination during preproduction is frequently lower, as no production processes and equipment are used!

8.3 Competitive analysis of comparable components

Comparison with similar components from other manufacturers, provided that the exposure is largely identical.

8.4 Utilization of suppliers' experience

Suppliers already have a great deal of experience with regard to the residual dirt problems associated with certain components (e.g. common rail, camshaft adjuster etc.). Limit values may be discussed in a very qualified way, checked and defined jointly, if required.

8.5 Limit value definition by failures

If failures occur in the field due to residual dirt, the existing limit values may have to be made more severe or, if no limit values exist, limit values may have to be introduced.

9 Analytical examination of failures

Where the nature of damage to components is indicative of failure due to residual dirt, the precise cause shall be determined. For this purpose, besides the methods used already such as, for example, scanning electron microscopy, the possibility of examining the workpieces in their assembled state exists, e.g. by means of computer tomography. In this context it is important to note that the damaging particles are often removed during dismantling operations, and conclusions about the cause of the failure can therefore no longer be drawn. The size of the damaging particle shall be at least 10 µm in this case due to the resolution of the computer tomograph.

With regard to the analysis of failures it is important that the components are not dismantled, and are supplied in a condition which is changed as little as possible. Manual precleaning using wipes or similar shall be avoided. If the components are filled with fluid (e.g. fuel or oil), the fluid shall remain in the component or be refilled completely into clean bottles and submitted.