

Technical cleanliness - Specifications

CS 0136/ Revision 02 / Author: CTLA-Nm

1 Scope

This company standard applies to Thomas Magnete GmbH.

2 Content

This company standard describes the handling of the topic "technical cleanliness" in relation to the products of the company Thomas Magnete GmbH.

This company standard is to be understood as a superordinate and supplementary document for the products on the subject of "technical cleanliness".

This company standard enters into force on the day of approval for components, means of production and processes in which specifications for technical cleanliness have been established with reference to this company standard.

2.1 Product

This chapter defines the most important aspects of "technical cleanliness" related to purchased parts from Thomas. The goal of the CS is to develop and implement a uniform standard of "technical cleanliness" for all relevant purchased parts. In order to implement this goal, the regulations and recommendations of this company standard are based on VDA 19 / ISO 16232. These can be considered as a standard work on "Technical Cleanliness", especially in the automotive industry.

2.1.1 Drawing specification

The technical cleanliness specifications must be defined on the drawing. The nomenclature is in accordance with VDA 19.1. The use of deviating internal standards and nomenclatures is not permitted. Reference must be made to the present company standard.

The VDA 19.1 nomenclature provides a description of "technical cleanliness" in accordance with the so-called CCC (Component Cleanliness Code), which must be used in every case. The CCC data can refer to a single component (reference value "N", see Figure 1) or to several components (reference value "n", see Figure 2). If the reference value "n" is used, it must be indicated on the drawing as a sampling size $n = X$ in order to determine the sampling size for the given limit values (see Figure 2).

The permissible number of particles in the respective size classes is given in whole numbers. For the reference value "N" (single component), the limit values in the CCC apply to a single component; for the reference value "n" (several components), the limit values in the CCC apply to the specified number of components (sampling size).

The particle size classes are based on the size classes according to VDA 19 / ISO 16232, but can be also combined as desired (see Figure 3-4). Unless otherwise described on the drawing, the particle size classes apply to the length of the particles, the length of a particle is defined here as Feret diameter. If it is necessary to distinguish between reflecting and non-reflecting particles, this must also be specified on the drawing. Basically, if not differently indicated on the drawing, fibers are not considered.

$$CCC = N(B755840/C43720/D36791/E938/F502/G394/H48/I7/J5/K2/L1/M1/N0)$$

Figure 1 - Specification of the CCC with a reference N, as well as particle limit values in absolute numbers per component.

$$CCC = n(H1/I - N0) \quad n=20$$

Figure 2 - Indication of the CCC with reference value n, as well as indication of the sampling size (exemplary: n = 20 components)

Number of particles per size class												
B	C	D	E	F	G	H	I	J	K	L	M	N
5	15	25	50	100	150	200	400	600	1000	1500	2000	3000
≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	<
15	25	50	100	150	200	400	600	1000	1500	2000	3000	

Figure 3 - Specification of particle size classes according to VDA 19 / ISO 16232

Number of particles per size class							
B - D	E	F	G	H	I	J	K - N
5	50	100	150	200	400	600	1000
≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	≤ x <	<
50	100	150	200	400	600	1000	

Figure 4 - Exemplary summary of individual size classes for simplified notation

2.1.2 Test methodology

The cleanliness test is carried out according to VDA 19.1. The equipment used by Thomas is qualified according to VDA 19.1 and corresponds to the state of the art.

3 Other applicable documents

VDA 19 Part 1 and 2

ISO 16232

4 Notes

For drawings that were released before 01/01/2014 and are based on the then valid company standard CS 0092, the following extract from the former company standard CS 0092 applies:

Thresholds:

Designation in the drawing ²⁾		Biggest hard particle [µm]	Biggest soft particle [µm]	Based on 100 cm ² area ¹⁾			Number of samples per analysis [pieces]
				Number of particles >15 µm (all) [pieces]	Number of particles >150µm (hard) [pieces]	Gravimetry [mg]	
cleanliness class 0	Component in the system without cleanliness requirements	No machining residues/dirt visible on visual inspection (without tools), individual fibers are permissible Not for new projects!					Max. 3
cleanliness class 1	Component in the system low cleanliness requirements (Cleanliness Standard 1)	800	10.000	10.000	8	5	3-10 (small parts more)
cleanliness class 2	Component in the system high cleanliness requirements (Cleanliness Standard 2)	400	4.000	2.000	2	1	3-10 (small parts more)
cleanliness class 9	Component in the system with special requirements	Individual definition by Thomas required! Definition is specified in the comment bar					

- 1) „Surface" means the area that can contaminate the customer system or is relevant from a functional point of view.
- 2) The cleanliness level in the finished device may differ from the delivery cleanliness. In these cases, the final cleanliness level of the individual part is saved in a table in the final assembly drawing. In addition, the cleanliness condition of the complete device is stated.

For all magnets, valves, actuators, dosing pumps and other Thomas end products before direct delivery to the customers.

Only for old products and adaptation projects.

Ensuring the required cleanliness

Thresholds:

Designation in the drawing		Biggest hard particle [µm]	Biggest soft particle [µm]	Based on 100 cm ² area ¹⁾			Number of samples per analysis [pieces]
				Number of particles >15 µm (all) [pieces]	Number of particles >150µm (hard) [pieces]	Gravimetry [mg]	
cleanliness class 1	devices with low cleanliness	800	10.000	10.000	8	5	3-5

	requirements						
cleanliness class 2	devices with high cleanliness requirements	400	4.000	2.000	2	1	3-5
cleanliness class 9	devices with special (customer) requirements	Individual definition by Thomas required!					3-5

1) "Surface" means the area that can contaminate the customer system or is relevant from a functional point of view.