ENGE SOLUTIONS

◆ Experts in Technical Cleanliness ◆

# TECHNICAL CLEANLINESS

*ALL IN ONE PLACE, SERVICE, TRAINING, CONSULTING AND EQUIPMENTS*


ISO16232:2018 | VDA19.1:2026 | VDA19.2:2010 | ISO4406 | ISO4407

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# Experts in
# TECHNICAL CLEANLINESS

The largest contamination analysis laboratory in South America, fully equipped to meet the market's technical cleanliness demands.

Technical Cleanliness is a set of standards and methods used to determine the contamination level of components and to standardize analysis procedures, enabling the classification of acceptable particle cleanliness levels for different applications.

The automotive industry has long been at the forefront of technical cleanliness requirements, driven by the continuous evolution of engines and precision components. Today, an increasing number of automotive parts and systems include specified cleanliness requirements. Engineering drawings often contain not only dimensional tolerances but also cleanliness specifications such as the CCC (Component Cleanliness Code) that components must comply with. The main reasons include:

- Reduced tolerances make systems more sensitive to contamination and particles;
- Component cleanliness is directly related to system performance and service life;
- Large particles can cause critical failures and loss of functionality.

ISO 16232:2018 establishes extraction and analysis methods for determining the technical cleanliness level of components and defines the equipment required for evaluation. Analyses are performed in a Cleanliness Laboratory, a controlled environment with monitored temperature and airborne particle concentration, using specialized equipment for contamination extraction and quantification.

# Our
# SERVICES

High-quality services delivered by specialists, providing customers with the convenience and confidence of working with an experienced partner.

### Cleanliness Analysis

We perform technical cleanliness analyses on components and parts for the automotive, agricultural, and hydraulic industries, as well as on fluids, membrane filters, particle traps, and particle stamps.

### Decay Curve

We validate extraction methods for technical cleanliness analyses through decay curve testing, ensuring compliance with ISO 16232 and VDA 19.1 requirements.

### Material Analysis

Advanced SEM/EDX analyses for material identification, chemical characterization, and contamination source determination through Energy Dispersive X-ray Spectroscopy (EDS).

### Training

We offer specialized training in Technical Cleanliness and Hydraulic Fluid Analysis, based on ISO 16232, VDA 19.1, VDA 19.2, ISO 4406, and ISO 4407 standards.

### Consulting

Consulting for component cleaning processes, industrial parts washers, and cleanrooms in compliance with ISO 14644 standards.

### Turn Key Solutions

Complete solutions for Technical Cleanliness laboratories, including equipment, consumables, and accessories for every stage of the analysis process.

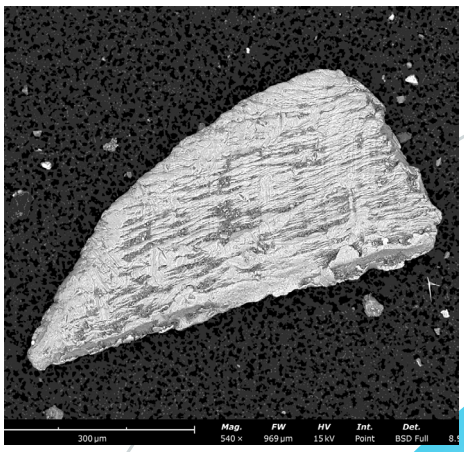

*Enge Solutions Microscopy Laboratory*

# Our LABORATORY

Backed by proven expertise and more than 40,000 analyses successfully completed.

Our laboratory is the only facility in South America performing technical cleanliness analyses in an ISO Class 7 Cleanroom. Equipped with a Gläser ACM 17 particle extraction cabinet, a JOMESA automatic particle counting stereo microscope, and advanced optical analysis systems, it follows the latest Technical Cleanliness methodologies. We analyze both small and large components.

We offer contamination extraction, particle classification (metallic and non-metallic), chemical composition identification, and gravimetric testing in accordance with ISO 16232:2018, VDA 19.1:2026, ISO 4406, and ISO 4407. Our team is qualified by Gläser GmbH (Germany) and supports additional customer-specific cleanliness requirements and industry standards.




*Metallic particle observed by SEM/EDS*

# Our REPORT

The report includes complete information on the extraction method, extraction fluid, equipment used, images of the largest metallic and non-metallic particles identified, and gravimetric analysis results.

Enge Solutions reports follow the European reporting standard and are available in both Portuguese and English.

## A Reliable Partner Driven by Expertise and **Efficiency**


*Enge Solutions Particle Extraction Laboratory*

"A success story.
ENGE SOLUTIONS was founded in 2004 focused on the development of cleaning processes and after starting the representation of the German company Gläser GmbH, the largest service provider in Europe, China and the United States, Enge Solutions became the largest service provider in cleanliness analysis of South America and the only one with the ability to analyze small and large parts."



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