

Special Cleaning and Packaging (SC-11)

Specification SCS-00011

Scope

This document specifies guidelines used by Swagelok® Company and its suppliers to ensure compliance with product cleanliness requirements as stated in ASTM G93 Level C.

Application of the document is limited to wetted system components.

This document must be used in conjunction with product catalogs, technical bulletins, and reports.

Specification Requirements

- Components shall be assembled, lubricated, tested, and packaged according to the practices described in this document.
- All components shall meet the requirements of Swagelok *Standard Cleaning and Packaging (SC-10)* catalog, [MS-06-62](#), prior to processing products to this specification.
- ASTM G93 Level C specifies that nonvolatile residues must be removed to a level of 6 mg/ft² (66 mg/m²) or less.
- Wetted surfaces in assembled products shall be lubricated with nonhydrocarbon lubricants, such as Krytox® 240AC, as described in the product catalog. Special lubricants can be provided on request. For products that have tube fitting or elastomer seal end connections, refer to document SCS-00663 to further specify the cleaning and lubrication requirements for these products.
- Finished products shall be packaged individually in a sealed plastic bag. The package shall be labeled:

**Swagelok Special Cleaning
and Packaging (SC-11)**

ASTM G93 Standard Practice for Cleaning Methods and
Cleanliness Levels for Material and Equipment
Used in Oxygen-Enriched Environments, Level C

Do not open bag until ready for use.

- Bagged products shall be boxed for protection from contamination and damage during shipment and storage.
- Accessory items such as handles, actuators, tags, etc. that are not in direct contact with the wetted process will be cleaned to the requirements of SCS-00010 and lubricated according to the standard product catalog requirements.

Process Verification and Control

The special cleaning process shall be monitored and controlled by direct oxidation carbon coulometric detection of carbon residues based on ASTM G144, using test coupons prepared and cleaned by techniques based on ASTM G121 and ASTM G122. This practice ensures that the cleaning process meets the requirements of ASTM G93 Level C.

Cleaning, Drying, and Inspection

Components are cleaned in multistep processes that ensure thorough cleaning, rinsing, draining, and drying. These processes combine:

- Heated aqueous immersion cleaning with cleaning agents selected in accordance with ASTM G127
- Ultrasonic agitation techniques based on ASTM G131
- Multistage deionized water immersion rinsing exceeding the high quality water requirements in ASTM G127 and NQA-1, then “of the cleaning agent”
- Noncombustive drying for the removal of rinse waters from components without depositing residues
- Visual inspection for contaminants as indicated in ASTM G93, NQA-1, and CGA 4.1 with the aid of bright illumination and ultraviolet light

Assembly and Testing

- Cleaned components are protected from damage and contamination.
- Cleaned components are assembled in a clean, well-lighted work area. Assembly work areas, equipment, and methods are designed and maintained to protect cleaned components from contamination.
- As described in the product catalog, nonhydrocarbon lubricant is applied to threads, mating surfaces, O-rings, and seals to prevent galling, reduce friction, and promote proper sealing. Tube fitting or elastomer seal end connections refer to SCS-00663 for additional specific cleaning and lubricant requirements.
- Production tests of assembled products, as described in the product catalog, are done with clean, dry nitrogen or helium.

Packaging and Identification

- End connections are covered with clean caps and plugs, as needed, to protect threads and other critical surfaces, and to maintain cleanliness.
- Finished products are packaged to protect them from contamination and damage.
- Each product is packaged individually in a sealed plastic bag.
- Bagged products are packed in boxes with suitable protective material.
- Boxes are identified with the part number and quantity.

Referenced Documents

Swagelok Documents

Standard Cleaning and Packaging (SC-10) catalog, MS-06-62, Special Cleaning of Swagelok Tube Fittings, SCS-00663

ASTM Standards

G93, Practice for Cleaning Methods and Cleanliness Levels for Material and Equipment Used in Oxygen-Enriched Environments

G121, Practice for Preparation of Contaminated Test Coupons for the Evaluation of Cleaning Agents

G122, Test Method for Evaluating the Effectiveness of Cleaning Agents

G127, Guide for the Selection of Cleaning Agents for Oxygen Systems

G131, Practice for Cleaning of Materials and Components by Ultrasonic Techniques

G144, Test Method for Determination of Residual Contamination of Materials and Components by Total Carbon Analysis Using a High-Temperature Combustion Analyzer

Other References

Compressed Gas Association Standards

CGA G-4.1, Cleaning Equipment for Oxygen Service
ASME NQA-1 Subpart 2.1