

# Special Cleaning and Packaging (SC-11)

## Specification SCS-00011 Revision A

### 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)*, 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/ft<sup>2</sup> (66 mg/m<sup>2</sup>) or less.
- 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.
- 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.
- Heated aqueous cleaning with cleaning agents selected in accordance with ASTM G127
- Ultrasonic agitation techniques based on ASTM G131
- Multistage deionized water rinsing for complete removal of cleaning agent
- Noncombustive drying for the removal of rinse waters from components without depositing residues
- Visual inspection performed with the aid of bright illumination or ultraviolet light.

### Assembly and Testing

- Cleaned components are protected from damage and contamination.
- Cleaned components are assembled in a clean, well-lit 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.
- Production tests of assembled products, as described in the product catalog, are done with clean, dry nitrogen or helium.

### 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:

### 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, quantity, and packaging date code.

## Referenced Documents

### **Swagelok Documents**

*Standard Cleaning and Packaging (SC-10)*, MS-06-62

### **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 (2004), Cleaning Equipment for Oxygen Service