BESTO
ESD TECHNOLOGY

Apparel

PRODUCT DATA SHEET

# ESD CLEANROOM APPAREL

Our ESD Cleanroom Apparel is designed to provide effective electrostatic discharge (ESD) control while maintaining cleanroom compliance, comfort, and durability. Suitable for use in controlled environments, this apparel helps protect sensitive components, products, and processes from static-related damage and contamination. With a focus on consistent performance and long-term wear, the garments are engineered to support daily operations while meeting strict ESD and cleanroom requirements.

Manufactured using ESD-safe conductive fabrics, the garments are engineered to deliver consistent performance, even after repeated industrial washing and sterilization. The apparel supports long working hours with a lightweight and ergonomic design, ensuring operator comfort without compromising protection.

Available in smock jackets, pants, and one-piece jumpsuits, the apparel offers flexible coverage options to suit different operational needs.

## Features

- Anti-Static (ESD-Safe) Fabric
- Low-Lint & Cleanroom Compatible
- Breathable & Comfortable for Long Wear
- Sterilizable & Industrial Washable
- Durable Construction with Ergonomic Fit

With multiple sizes and color options, it supports team uniform consistency while complying with industry standards such as ANSI/ESD S20.20, IEC 61340, and ISO 14644-1.

# SECTION 2: Cleanroom Clothing System Standards

Our ESD Cleanroom Apparel is designed to provide maximum protection against electrostatic discharge (ESD) while ensuring cleanroom compliance, comfort, and durability. Made from 99% polyester and 1% carbon conductive filament, the garments feature anti-static, low-lint, breathable, and sterilizable properties, suitable for sensitive environments.

The line includes smock jackets, one-piece jumpsuits, and pants, offering full-body or partial coverage depending on operational needs. Each piece is engineered with elastic cuffs, ergonomic design, and easy-access front closures, providing a secure fit and allowing freedom of movement for operators.

Ideal for electronics, semiconductor, pharmaceutical, and precision manufacturing industries, these garments meet ANSI/ESD S20.20, IEC 61340, and ISO 14644-1 standards. They are designed for industrial washing and repeated sterilization without compromising ESD performance or comfort. Available in various sizes (S–10XL) and colors, our apparel ensures safe, reliable, and efficient operation in controlled environments.

## 2.1 Fabric Typical Standards Specifications

The garments are lightweight yet durable, allowing operators to work efficiently without restriction. The full-coverage design of jumpsuits and elastic cuffs prevents particle escape, maintaining cleanroom standards.

Jacket and pants provide flexibility for layered cleanroom clothing systems, while still delivering consistent ESD protection. With multiple color options and sizes, the apparel can be customized to suit team uniform requirements.

| Details & Specifications: | |
|---|---|
| Model | : ESD Jacket & Pant |
| Sizes | : S - 10XL (Unisex) |
| Fabric | : 99% Polyester + 1% Carbon Conductive Filament |
| Properties | : Anti-Static, Low-Lint, Breathable, Sterilizable, Durable, Full-Coverage |
| Application Industry | : Electronics, Semiconductor, Pharmaceuticals, Cleanrooms |
| Performance | : ESD Dissipation, Particle Control, Comfortable Fit, Industrial Washable |
| Production Standard | : ANSI/ESD S20.20, IEC 61340, ISO 14644-1 |
| Colors | : |

# SECTION 2: Cleanroom Clothing System Standards

## 2.1 Fabric Typical Standards Specifications (Cont.)

| Details & Specifications: | |
|---|---|
| Model | : ESD Smock Jacket |
| Sizes | : S - 7XL (Unisex) |
| Fabric | : 99% Polyester + 1% Carbon Conductive Filament |
| Properties | : Anti-Static, Low-Lint, Breathable, Sterilizable, Durable, Full-Coverage |
| Application Industry | : Electronics, Semiconductor, Pharmaceuticals, Cleanrooms |
| Performance | : ESD Dissipation, Particle Control, Comfortable Fit, Industrial Washable |
| Production Standard | : ANSI/ESD S20.20, IEC 61340, ISO 14644-1 |
| Colors | : |

| Details & Specifications: | |
|---|---|
| Model | : ESD Jumpsuit |
| Sizes | : S - 10XL (Unisex) |
| Fabric | : 99% Polyester + 1% Carbon Conductive Filament |
| Properties | : Anti-Static, Low-Lint, Breathable, Sterilizable, Full-Body Coverage |
| Application Industry | : Electronics, Semiconductor, Pharmaceuticals, Cleanrooms |
| Performance | : ESD Dissipation, Particle Control, Comfortable Fit, Industrial Washable |
| Production Standard | : ANSI/ESD S20.20, IEC 61340, ISO 14644-1 |
| Colors | : |

Overall, our ESD Cleanroom Apparel provides a reliable and compliant solution for controlled environments where electrostatic protection and cleanliness are critical. Designed for durability, comfort, and consistent performance, the apparel supports long-term use, repeated laundering, and strict cleanroom protocols, helping organizations maintain operational efficiency, product safety, and regulatory compliance.

# SECTION 3: Design & Safety Features

## 3.1 Standard Product Features

### ESD Jacket & Pant

**Secure Neck Area**

Collar with button fastening keeps the neck area neat and ensures proper garment positioning.

**Pen Pocket**

Provides convenient storage for pens and small tools during work.

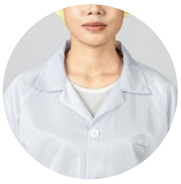
**Sleeves Cuff**

Cuffs and button fastening keep sleeves in place when arms are raised, ensuring proper coverage.

**Bottom Cuff**

Cuff at the bottom of the jacket helps prevent the jacket from riding up during movement.

### ESD Smock Jacket



**Secure Neck Area**

To ensures proper positioning of the smock jacket.

**Pen Pocket**

Allows easy access during work without affecting garment performance.

**Hands Pocket**

Convenient storage for small items while maintaining a neat and functional design.

**Sleeves Cuff**

Stretchable and adjustable sleeve cuffs keep sleeves securely in place when arms are raised.

### ESD Jumpsuit

**Ventilated Ear Area**

Mesh ventilation at the ear area allows airflow while maintaining cleanroom compliance.

**Front Zipper Closure**

Allows easy wearing and removal of the jumpsuit.

**Functional Pockets**

Built-in pockets offer convenience without compromising cleanliness or comfort.

**Back Hood Fit**

Elastic and adjustable design at the back of the head ensures a secure and comfortable fit.

# SECTION 4: Garment Care, Storage & Risk Management

## 4.1 Risk Reduction

BESTO ESD cleanroom apparel is designed to **reduce the risk of electrostatic discharge (ESD) and particle contamination** in controlled environments. Proper selection, correct sizing, and consistent use of the garment help minimize exposure risks to **sensitive electronic components and cleanroom processes**.

To maintain effectiveness, garments should be **regularly inspected** for wear, damage, or contamination. Damaged or excessively worn apparel should be **repaired or replaced** to ensure continuous protection and compliance with ESD and cleanroom standards.

## 4.2 Storage

BESTO ESD apparel should be stored in a **clean, dry, and well-ventilated environment** away from direct sunlight, excessive heat, or moisture. Proper storage helps preserve the **anti-static properties, fabric integrity, and cleanroom performance** of the garments.

When not in use, garments should be **folded neatly or hung** to prevent deformation and contamination. Avoid storing ESD apparel with **non-cleanroom clothing or chemical substances** that may compromise cleanliness or fabric performance.

## 4.3 Washing & Care Instruction

| | |
|---|---|
| Washing Method | : Machine wash or cleanroom laundry. |
| Washing Temperature | : Cold to warm water (≤ 40°C). |
| Fabric | : 99% Polyester + 1% Carbon Conductive Filament. |
| Properties | : Anti-Static, Low-Lint, Breathable, Sterilizable. |
| Application Industry | : Electronics, Semiconductor, Pharmaceutical, and others. |

The effectiveness of anti-static protective clothing may be affected by wear, damage, improper laundering, and possible contamination. To maintain ESD performance and cleanroom compliance, we recommend washing garments under controlled conditions. Use **mild, neutral detergents only**, and avoid **bleach, fabric softeners, or chlorine-based chemicals**, as these may damage the conductive fibers and reduce static dissipation performance.

Garments should be washed **separately or with other ESD cleanroom clothing** to prevent lint contamination and fabric abrasion. Thorough rinsing is required to remove detergent residues that may affect ESD properties. Dry garments using **low heat tumble drying or air drying**. High temperatures and over-drying may reduce fabric durability and garment lifespan. Regular inspection after washing is recommended to ensure the garment remains **clean, intact, and compliant** with cleanroom and ESD standards.

# SECTION 5: Safety, Handling & Protective Measures

## 5.1 General Measures

### First-Aid Measures

- **Skin Contact:** Generally safe; remove if irritation occurs.
- **Eye Contact:** Rinse with water if fibers or dust enter eyes.
- **Inhalation:** No known hazard.
- **Ingestion:** Not applicable.

### Fire-Fighting Measures

- **Extinguishing Media:** Water spray, foam, dry chemical, $CO_2$.
- **Special Hazards:** Burning fabric may release smoke, carbon monoxide.
- **Protective Equipment:** Use SCBA and protective clothing.

### Accidental Release Measures

- **Skin Contact:** Generally safe; remove if irritation occurs.
- **Eye Contact:** Rinse with water if fibers or dust enter eyes.
- **Inhalation:** No known hazard.
- **Ingestion:** Not applicable.

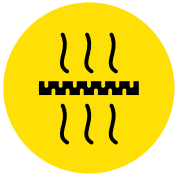
### Handling and Storage

- Wear as instructed in cleanroom or ESD-controlled areas.
- Avoid contact with sharp objects.
- Store in a clean, dry area away from sunlight or chemicals.

**Warning:** Cleanroom apparel should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Cleanroom fabrics should have slip-resistant materials on the outer sole of boots, shoe covers, or other garment surfaces in conditions where slipping could occur.

**CLEANLINESS PERFORMANCE**
Low-lint fabric construction helps reduce particle contamination, suitable for cleanroom and controlled environments.


**ELECTROSTATIC DISCHARGE**
Specially engineered material dissipates static electricity to protect sensitive electronic components.



**BREATHABLE & COMFORTABLE**
Lightweight fabric allows air circulation, ensuring comfort during long working hours.

**STERILIZABLE & WASH-RESISTANT**
Lightweight fabric allows air circulation, ensuring comfort during long working hours.

**FULL BODY COVERAGE**
Provides wide surface coverage to minimize direct contact and contamination, ensuring complete ESD protection.

**EASY WEAR**
Allows quick wearing and removal while maintaining full-body protection.

# SECTION 6: Exposure Control & Garment Protection

## 6.1 Exposure Controls / Personal Protection

- Use full ESD garments, gloves, and footwear as appropriate.
- Inspect garments for tears or worn ESD fibers.
- Maintain hand hygiene after handling damaged garments.

# SECTION 7: Maintenance & User Responsibility

## 7.1 Maintenance, Inspection & Disposal

- **Inspection:** Regularly check garments for wear, damage, broken seams, or loss of ESD performance. Replace or repair as needed.
- **Maintenance:** Avoid sharp objects, chemicals, and heat sources. Follow recommended washing and drying procedures to maintain anti-static properties.
- **End-of-Life Disposal:** Dispose of damaged or worn-out garments according to local environmental and safety regulations. Do not burn or incinerate, as smoke and toxic gases may be released.
- **Record Keeping:** Maintain usage and washing logs to track garment lifespan and ensure compliance with cleanroom and ESD standards.
- **Recycling:** If possible, segregate fabric components for recycling to minimize environmental impact.

## 7.2 Training And User Responsibility

- Users must be trained to properly wear, handle, and store ESD garments.
- Inspect garments before and after use; report any damage.
- Follow cleanroom and ESD protocols at all times.
- Maintain simple usage and washing logs to ensure ESD performance.

Proper use, maintenance, and handling of BESTO ESD garments ensure anti-static performance, cleanroom compliance, and user safety throughout the garment's lifespan.

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# CLEANROOM APPAREL

SIRIM SGS CTI CENTRE TESTING INTERNATIONAL

High-quality cleanroom apparel from BESTO ESD Technology, proven and certified by SIRIM, SGS, and CTI Lab Tested.


## Critical Connectivity Points for Grounding & Continuity

1. Hood to Coverall
2. Sleeve to Body
3. Cuff to Sleeve
4. Coverall to Boot
5. Boot Sole

Critical points on the garment and footwear ensure continuous grounding to safely dissipate static electricity, protecting both the wearer and sensitive equipment.

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