Lab Grade Seating Committee Web Meeting

Wednesday, March 18, 2026 11:00—12:00 (New York Time)

Co-Chairs - Jim Connell - Kai Schuler

Please join my meeting from your computer, tablet or smartphone.
https://meet.goto.com/733358285

You can also dial in using your phone.
Access Code: 733-358-285 United States: +1 (571) 317-3116

More phone numbers

Austria: +43 7 2081 5337
Belgium: +32 28 93 7002
Canada: +1 (647) 497-9373
Denmark: +45 32 72 03 69
Germany: +49 892 0194 301
Italy: +39 0 230 57 81 80
United Kingdom: +44 20 3713 5011

PLEASE DO NOT USE A SPEAKER PHONE AS THIS CREATES STATIC, FEEDBACK AND ECHOING, WHICH INTERFERES WITH EVERYONE'S ABILITY TO PARTICIPATE IN THE WEB MEETING. THE SAME APPLIES IF YOU ARE ACCESSING THE CONFERENCE FROM A VOIP CONNECTION – DO NOT USE YOUR COMPUTER SPEAKERS YOU WILL NEED A HEADSET OR EAR PHONES.

Get the app now and be ready when your first meeting starts: https://meet.goto.com/install

AGENDA

I) Roll Call

II) Approval of Minutes

III) Old Business

a. Clarifying GS 2014:01 (DIN EN 6887-1&2) – Complete
b. Cleanroom Testing Method – Start with what can be done.

IV) New Business

a. SEFA 12 Edits from SEFA editor.
b. Proposed language for cleanroom introduction.
c. Need for cleanroom testing method?
d. Anything else

SCIENTIFIC EQUIPMENT & FURNITURE ASSOCIATION

2025 Annual Conference

Trump National Doral - Miami, Florida

Minutes of the SEFA 12 – Lab Grade Seating Committee

Friday, November 7, 2025 – 9:00 AM – (Byron Nelson Room)

Present :

Chair -	Kai Schuler	BIMOS Division of Interstuhl, GmbH
	Abbie Gregg	AM Technical Solutions
	Jim Connell	Biofit Engineered Products
	John DeVriendt	Biofit Engineered Products
	Jim Dahl	E Com Seating
	Scott Ebersole	E Com Seating
	Sara Grant	E Com Seating
	Tom Ricciardelli	SelecTech
Guests:	Steve McCauley	Absolute Testing LLC

The Meeting was called to order with the announcement of Ed Metzger's resignation as Co-Chair of the SEFA 12 Committee. Kai Schuler paid homage to Ed Metzger for his contributions to SEFA 12.

The first order of business was the election of Co-Chairs. Kai Schuler agreed to continue as Co-Chair and Jim Connell was nominated by E-Com Seating . The nomination was seconded by Tom Ricciardelli and unanimously approved.

Jim Connell petitioned for approval of the minutes of the February 12, 2025 Minutes. The Minutes were reviewed and approved. The group conveyed that the February minutes were not previously shared and it was agreed that the November Minutes would be shared directly.

Old Business : SEFA recommended Practices implemented in February
Group discussion on difficulty moving forward with 3rd party lab involvement
Recommendation was made to move clean room standard forward with current established practices. Group agreed. Jim Connell will continue the drafting of the Cleanroom Seating section with the goal of presenting to the Committee in early 2026.

New Business:

Kai Schuler advised that there was a need to amplify the reference to GS -2014:01 with the addition of DIN EN 6887-1&2 to section 6.0, Appendix III and mandatory features. This DIN

standard applies to Laboratory and Special Purpose Chairs and with its specific mention there could be an implication that DIN EN 1335 1& 2 would be acceptable. The group agreed with this change.

Additional New Business Request:
Group wished to be forwarded minutes directly.

Meeting Adjourned.

A Scientific Equipment & Furniture Association Standard

SEFA 12–2026
Laboratory-Grade Seating

SEFA World Headquarters
1320 Main Street
Suite 300
Columbia, SC 29201

Tel: 516-294-5424
www.sefalabs.com

SEFA SPELLS SAFE

TABLE OF CONTENTS

1. FOREWORD 3

1.1. About SEFA 3
1.2. SEFA Standards 3
1.3. Glossary 3
1.4. Disclaimer 3

2. AN INTRODUCTION TO LAB-GRADE SEATING 4

2.1. Standard Scope, Purpose, and Authors 4
2.2. Purpose of Good Laboratory Seating Equipment 4
2.3. Critical Workstation Design Issues 4
2.3.1. Operational Working Height Limitations 5
2.3.2. Forward-Leaning and Prolonged Static Postures 5
2.3.3. Rising Incidence of Seated Work 6
2.3.4. Varying Seating Requirements by Industry 6

3. LAB-GRADE SEATING PRODUCT REQUIREMENTS 7

3.1. Surface Requirements 7
3.2. Certification Requirements 8
3.3. Ergonomic Requirements 9

4. LAB-GRADE ESD CONTROL SEATING PRODUCT REQUIREMENTS 10

4.1. Construction Requirements 11
4.2. Cleaning Requirements 12
4.3. Wet vs. Dry Lab Requirements 13

5. SEFA LAB-GRADE CHAIR CLEANING PROTOCOL 14

6. SEFA LAB-GRADE SEATING MINIMUM REQUIREMENTS 15

6.1. SEFA Mandatory Features 15
6.2. SEFA Suggested Features 15
6.3. SEFA Minimum Requirements for ESD control seating 16

7. LABORATORY-GRADE SEATING CHEMICAL RESISTANCE TESTING 17

APPENDIX A: SEFA 49-CHEMICAL SPOT TEST REFERENCE PICTURES 19

APPENDIX B: SEFA LAB-GRADE SEATING SELECTION GUIDE 22

APPENDIX C: GLOSSARY 27

1. Foreword

1.1. ABOUT SEFA

The Scientific Equipment and Furniture Association (SEFA) is an international trade association comprising manufacturers of laboratory furniture, casework, and fume hoods, as well as members of the design and installation professions. SEFA exists to promote this industry and improve the quality, safety, and timeliness of the construction of laboratory facilities in accordance with customer requirements.

1.2. SEFA STANDARDS

SEFA and its committees develop and promote SEFA standards, which have domestic and international applications. Development of these standards considers the work of other standards organizations and information provided by government agencies.

SEFA standards are developed in and for the public interest. They are designed to promote a better understanding among designers, architects, manufacturers, purchasers, and end users and to assist purchasers in selecting the proper product to meet the user's specific needs.

These standards are periodically updated via biannual public meetings of the SEFA committee. The SEFA 12 co-chairs are Jim Connell (BioFit Engineered Products) and Kai Schuler (Bimos Division, Interstuhl GmbH & Co. KG). SEFA welcomes input from all relevant organizations at these meetings. For comments or questions, please contact SEFA at info@sefalabs.com.

NOTE

To reference SEFA 12 for project specification purposes, we suggest the following: "Laboratory-grade seating shall be in conformance to SEFA 12."

1.3. GLOSSARY

SEFA-defined terms are frequently used in contracts and other documents that define the products to be furnished or the work involved. To provide uniformity for users of these terms, the association has developed a glossary (SEFA 4 – 2024). Terms in bold in SEFA standard text are included in SEFA 4, as well as at the end of the standard in which they appear (see SEFA 12, Appendix C). The definitions shall be used to help resolve disputes or incorporated into relevant contracts and related documents.

Where a specific standard contains a definition that differs from the one in SEFA 4, the definition in the standard should be used. SEFA encourages interested parties to submit additional terms or suggest changes to terms already defined by the association.

1.4. DISCLAIMER

SEFA uses its best efforts to promulgate standards for the public benefit based on available information and accepted industry practices. SEFA does not guarantee, certify, or assure the safety or performance of any products, components, or systems tested, installed, or operated in accordance with SEFA standards, or that any tests conducted under its standards will be non-hazardous or free from risk. SEFA encourages the use of third-party independent testing.

2. An Introduction to Lab-Grade Seating

2.1. STANDARD SCOPE, PURPOSE, AND AUTHORS

SEFA 12 provides a comprehensive first source of information that covers the design, construction, installation, testing, maintenance, and safe use of laboratory chairs and stools.

This standard indicates seating product requirements for laboratories and is intended to provide regulatory agencies, architects, engineers, consultants, planners, manufacturers, dealers, specification writers, contractors, installers, facilities managers, and users with information helpful in evaluating the safety, durability, and structural integrity of laboratory chairs and stools. Users must follow manufacturer recommendations for each specific application and usage.

2.2. PURPOSE OF GOOD LABORATORY SEATING EQUIPMENT

Proper seating equipment directly affects laboratory workers in several critical ways:

- **Health** – Ergonomic chairs reduce sick day absences and thereby lower laboratory costs.[1]
- **Performance** – When laboratory workers feel comfortable and healthy, performance increases.[2] Whether in work efficiency, effectiveness, or quality, output improves as workers can concentrate on their tasks rather than discomfort from improper seating.
- **Safety** – Safety must be ensured for laboratory operations and laboratory workers.
- **Quality** – Proper seating equipment reduces errors and decreases rejects in laboratory output.[3]
- **Motivation** – Proper seating equipment helps ensure worker wellbeing and commitment.[4] Providing workers with ergonomic seating increases engagement. A quality working environment also attracts highly qualified employees.

2.3. CRITICAL WORKSTATION DESIGN ISSUES

In laboratory work, the distribution between activities while sitting and activities while standing is approximately 50:50.[5] This is a favorable ratio from an ergonomics perspective because dynamic alteration between sitting and standing is considered healthy, particularly for the back muscles and the spine. A closer examination of laboratory workstation design, however, indicates several critical issues.

---

[1] S. Penkala, H. El-Debal, and K. Coxon, "Work-related musculoskeletal problems related to laboratory training in university medical science students: a cross sectional survey," *BMC Public Health* 18 (2018): 1208; Oregon Occupational Health and Safety Administration publications, "The Advantages of Ergonomics."

[2] KS Sundaragiri et al., "Ergonomics in an oral pathology laboratory: Back to basics in microscopy," *J Oral Maxillofac Pathol* 18, suppl. 1 (2014): S103-10; Puget Sound Human Factors and Ergonomics Society, "Examples of Costs and Benefits of Ergonomics"; Occupational Safety and Health Administration, Laboratory Safety Guidance, OSHA Document 3404-11R, 2011.

[3] Oğuzhan Erdinç and Paul H.P. Yeow, "Proving external validity of ergonomics and quality relationship through review of real-world case studies," *International Journal of Production Research* 49, no. 4 (2011): 949-962; H. M. Selki, *A literature review of ergonomics programs* (paper presented at 3rd International Engineering Conference on Developments in Civil & Computer Engineering Applications, 2017), 191.

[4] Occupational Safety and Health Administration, Laboratory Safety Guidance, OSHA Document 3404-11R, 2011; Puget Sound Human Factors and Ergonomics Society, "Examples of Costs and Benefits of Ergonomics."

[5] Fraunhofer IAO, "Assessor's Statement Concerning the Functional Quality of the 'Labster' Laboratory Chair," conducted within a joint research project on laboratory work and laboratory design entitled "Lab 2020" (Fraunhofer IAO, n.d.).

2.3.1. OPERATIONAL WORKING HEIGHT LIMITATIONS

Laboratory workstations are typically shared by multiple people and are not assigned to specific users. To be ergonomically ideal for each individual, workstations must be adjustable. Unlike office environments, however, laboratory tables are built either for standing work (36 in./90 cm) or sitting work (30 in./75 cm). Depending on the primary type of work performed in a lab, one height will predominate. For example, standing-height tables are frequently used with tall chairs for work.

Laboratory chairs must accommodate a wide range of body shapes and sizes. Ideally, table heights should function for 90% of people (those with a body height between the 5th and 95th percentiles; see Figure 1). Humans have a large variation in body structure, though. The difference between the 5th and 95th percentiles of height can be 10 in. (25 cm). A chair alone cannot compensate for such differences, particularly because people below the 50th percentile in height may require a secure footrest for higher sitting positions.

		Body Height					
		Men			Women		
		Percentile					
		5	50	95	5	50	95
	Age group	Shown in mm (Europe) / inches (US)					
Europe	18 - 65	1650	1750	1855	1535	1625	1720
US	18 - 65	64.97	69.25	74.83	60.08	64.15	69.58

Figure 1. Reference body heights based on DIN 33402-2

Activities carried out while seated at a laboratory bench (with devices, test tubes, or pipettes, for example, as opposed to keyboard work) typically require the user to hold their arm at an unfavorable angle. Laboratory activities also often involve dynamic arm movements that occur significantly higher than the table's edge, at shoulder or head height. These activities frequently demand concentration and hand/eye coordination (e.g., filling small containers or handling materials and samples that are expensive or hazardous to health). When such activities continue for extended periods and laboratory tables are designed at a sitting height, executing the work while standing becomes difficult.

Laboratory design requires high working spaces (shelves and cabinets mounted at an elevated level) for storing devices or materials while working at a laboratory bench. In a laboratory environment, the actual working height may not be the tabletop itself, but rather the height from the floor to where the laboratory worker's hands perform the work, as in microscopy or other work performed on equipment or fixtures. Failure to account for the additional height can place stress on the shoulders, neck, and other parts of the body.

2.3.2. FORWARD-LEANING AND PROLONGED STATIC POSTURES

A study on the ergonomics of office environments concluded that workers spend approximately 30% of their time at workstations leaning forward in their chairs. While no comparable studies exist for laboratory work, the proportion of time spent leaning forward during laboratory activities is likely substantially higher. Leaning forward often occurs in conjunction with motionlessness, such as when looking through a microscope.

Leaning forward while sitting hinders proper breathing, digestion, and circulation to the lower legs and can cause spinal compression. This can lead to digestive and circulatory disorders, backaches, and musculoskeletal illnesses.

2.3.3. RISING INCIDENCE OF SEATED WORK

The proportion of work performed in a laboratory while seated is increasing, driven in part by growing computer usage (see figure below). Laboratory work processes are changing in such a way that evaluations and other tasks are conducted near devices. Additionally, the increasing prevalence of team-based work makes it necessary to remain close to colleagues even while performing evaluation work.

Consequently, static writing activities at keyboards are also performed at laboratory benches, with the disadvantages previously described. This places even greater demands on the functional flexibility of chairs and emphasizes the importance of laboratory-focused ergonomic seating that allows for quick workspace changes.

2.3.4. VARYING SEATING REQUIREMENTS BY INDUSTRY

Depending on the industry and laboratory type, the specifications and general requirements for laboratory seating equipment may vary. An extract of the most important industries using laboratories, however, establishes a general overview of the requirements for chairs and stools, as illustrated below. (data from Fraunhofer IAO study):

3. Lab-Grade Seating Product Requirements

Laboratory work imposes seating requirements that are unlike those of any other working environment. In addition to maximum hygiene and easy cleaning, laboratory chairs must meet numerous requirements associated with routine laboratory tasks while allowing flexibility in work and minimizing space requirements. At the same time, aesthetics must not be compromised.

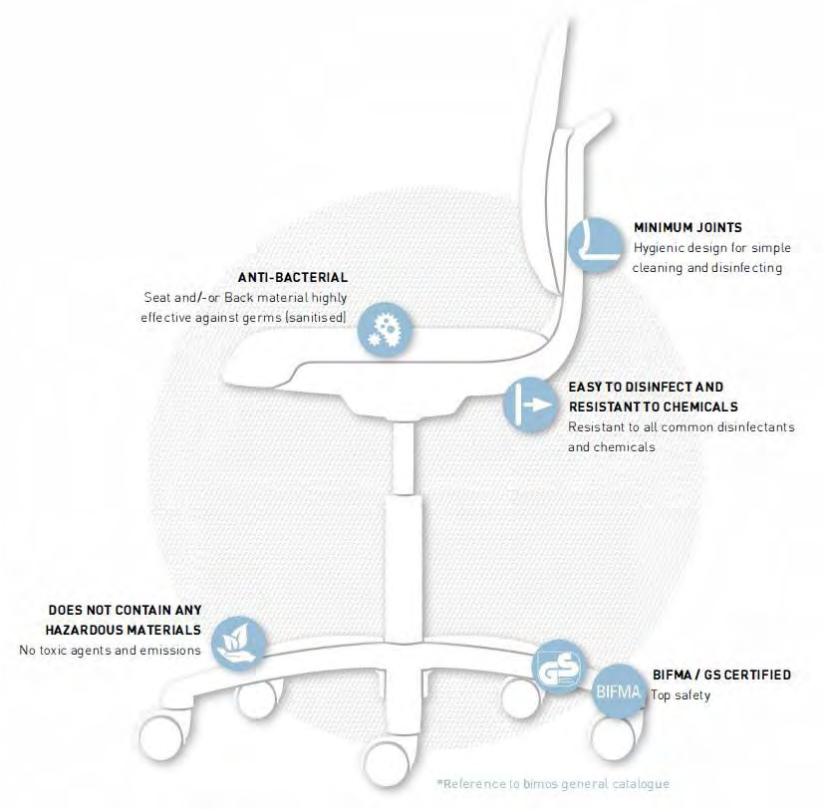
NOTE

The criticality of hygienic design depends on chair use.

Expectations for ergonomics and comfort are high, as laboratory tasks demand high levels of fine motor skills, precision, and concentration. Flexible configuration options reduce strain during demanding tasks that involve leaning forward, such as microscope or pipette work. Laboratory seating must be comfortable in terms of user experience and health aspects, enabling users to feel good in their workplace.

Materials used in laboratory seating must not contain hazardous materials that could cause harm to anyone touching the product throughout the manufacturing process and product life cycle.

To assist in specifying appropriate laboratory-grade seating products as outlined above and throughout Section 3, the SEFA Lab-Grade Seating Selection Guide is included in Appendix B. The guide helps specifiers and users describe their seating product needs and requirements in detail, and it gives laboratory-grade seating suppliers the ability to quote appropriate products to match those needs and requirements.



3.1. SURFACE REQUIREMENTS

Chair surfaces shall be designed to prohibit entrapment of dirt, fluids, and organic material that could contaminate the laboratory environment. They must have a minimum number of joints or gaps where germs and bacteria can accumulate, and any gaps, seams, or creases that could encourage bacterial or microbial growth must either be large enough to allow cleaning wipes or tools to reach any recesses and remove foreign material, or be completely sealed.

All materials used in laboratory seating must be easy for users to clean properly (see Section 5). Surfaces must be resistant to any abrasion or wipe-down effects caused by washing routines.

All surfaces must be easily accessible, hydrophobic, and resistant to liquids. Upholstery requirements vary by laboratory type:

- **Wet Labs** – In wet labs, upholstery cannot be of woven construction (such as cloth, wool, or mesh), absorbent, or porous, allowing fluids, chemicals, or spills to soak through to underlying cushioning or mechanical components and causing degradation or damage. Synthetic leathers (e.g., coated vinyl, coated urethane, coated silicone), are preferred for wet lab seating as they provide protection against spills and offer some chemical resistance. Leather should be considered cautiously, as it may not withstand organic cleaning or disinfecting agents or chemical reagent spills.
- **Dry Labs** – In dry labs, such as electronic and microelectronic labs, cloth upholstery is acceptable for use. While cloth is more difficult to clean and permits liquid penetration into cushioning, it may increase user comfort by dissipating body heat and moisture during extended sitting periods.

NOTE

The cloth, wool, or mesh fabrics used in traditional office settings are not suitable for wet labs. Upholstery for wet labs cannot be porous.

All upholstery shall, at a minimum, be tested to withstand abrasion resistance of 25,000 double rubs according to EN ISO 12947-2 (Martindale Method) or 30,000 double rubs per ASTM D4157 (Wyzenbeek Method).

Laboratory seating equipment in some environments must be easy to disinfect and resistant to chemicals; some seating may feature an antibacterial coating. The SEFA 49-Chemical Spot Test evaluates seat surface resistance to chemical spills (see Section 7). Many organic solvents are suspected carcinogens, toxic, or flammable. Great care should be exercised to protect personnel and the environment from exposure to harmful levels of these materials.

3.2. CERTIFICATION REQUIREMENTS

The top priority in the construction of any laboratory chair or stool must be safety. To verify seating equipment quality, products must be certified according to GS 2014:01 (DIN EN 6887-1&2) or ANSI/BIFMA X5.1 (US) and tested by an independent testing laboratory for adherence to one or both standards.

- **GS 2014:01** – Any product bearing the GS Mark has been independently tested and complies with minimum requirements of the German Product Safety Act (ProdSG). The GS Mark ("Geprüfte Sicherheit," or "Safety Tested") is a licensed mark of the German government that may only be issued by an accredited product safety testing and certification agency. The GS Mark is recognized throughout the EU as a symbol of safety, providing confidence that products bearing it are safe, legal, and of high quality.
- **ANSI/BIFMA X5.1** – This standard is generally applied to general-purpose office chairs, but it can also be applied to laboratory seating for product safety, as all tests are specified to be performed in worst-case product, condition, or furniture configurations (including height adjustment capability). The standard provides manufacturers, specifiers, and users with a common basis for evaluating the safety, durability, and structural adequacy of general-purpose chairs.

NOTE

SEFA encourages testing as described in this document to be performed and documented by a SEFA-approved third-party testing facility. Visit sefalabs.com for a current list of SEFA-approved test labs.

3.3. ERGONOMIC REQUIREMENTS

Ergonomic seating is intended to provide not only proper function but also subtle, critical aspects of user comfort. People who are more comfortable in their chairs can sit productively for longer durations and focus on the work at hand, increasing concentration and work quality. Chairs that do not provide effective support and adjustability can significantly increase spinal stress, resulting in discomfort and increased injury risk. Laboratory seating equipment must therefore fulfill general ergonomic requirements.

Ergonomics can be divided into two categories: ergonomic design (e.g., self-explanatory adjustment features, knobs, mechanism handles) and ergonomic technical features (e.g., lumbar support, waterfall front edge, adjustable height, adjustable backrest, adjustable footring). Ergonomic design is a minimum requirement for laboratory equipment. It can be replaced or enhanced with technical ergonomic features depending on the work task, physical workspace, or work environment. Ergonomic requirements for laboratory seating equipment include:

- **Control Design** – Ergonomic seating incorporates a range of adjustability by design. Users must be able to quickly and easily achieve a comfortable posture and make adjustments as needed. To achieve this, intuitive design and consistency in control placement and function are essential. All chair or stool adjustments must be manipulable while seated to efficiently enable user comfort.
- **Ease of Movement** – Seating comfort is created in part by the ability to move intuitively on a chair or stool. The objective of an ergonomic chair is to allow movement when needed or wanted while continuously supporting the body. When laboratory work requires fine motor skills, the chair should have the ability to be locked in the required seating posture to prevent movement that could disrupt the work.
- **Seat Tilt Function or Waterfall Seat Edge** – These features allow blood circulation through the legs and reduce spinal compression even when working in a leaning forward position.
- **Backrest Design** – Freedom of movement is especially important throughout the back area. A narrowing upper backrest structure or hinging/moving backrest ensures freedom of arm and back movement without hindering workflows that require, for example, the user to reach behind the chair. Adjustable lumbar support should be provided to enable proper posture.

4. Lab-Grade ESD Control Seating Product Requirements

Many laboratories' environments have a high sensitivity to static electricity and electrostatic discharge (ESD). Such laboratories may include facilities handling sensitive electronic devices, explosives or military ordnance, and pharmaceuticals, as well as microbiological labs where static discharge can compromise research integrity. Cleanroom environments may also require electrostatic management, as static buildup attracts particulate matter.

The control of electrostatics is crucial in many of these areas due to the minute scale of the work being performed. Electrostatic charges can accumulate to several thousand volts during routine laboratory activities, while many electronic circuits, for example, can be damaged with under 100 volts of discharge.

Electrostatic charges typically accumulate when two materials make contact, then separate. The friction between the parts exacerbates electrostatic buildup, a phenomenon known as triboelectric charging. Triboelectric charging can be observed when a person rubs a balloon on their head and their hair stands on end or walks across carpet and receives a spark from a door handle.

Advancing technology in laboratory environments has amplified the risk from ESD events. As electronic components have undergone progressive miniaturization, their sensitivity to voltage has increased, leading to the potential for a larger impact from the presence of electrostatic charges. Similarly, as biological and pharmaceutical research is increasingly performed on the nanoscale level, there is an increasing risk of electrostatic attraction (ESA) drawing in particulates and critical contamination (e.g., airborne bacteria), potentially disrupting work being performed at microscopic dimensions.[6]

Worker movement and seating repositioning in the workspace can generate triboelectric charges through friction. When combined with the close proximity of seating to the work being performed, this elevates ESD risk. A typical chair without ESD control can generate charges of up to 18,000 volts at 10%-25% relative humidity, a strong concern in ESD-protected areas (EPAs).[7] This is what makes proper ESD control seating a critical component in ESD management within EPAs.

The fundamental principle of ESD control is charge avoidance: Materials that do not accumulate charge cannot discharge. Properly designed ESD control seating applies this principle by continuously dissipating triboelectric charges before they reach damaging voltage levels.

Without proper grounding, electrostatic charges will accumulate in the laboratory seating and create discharge risks to sensitive work being performed in the EPA. ESD control seating must therefore maintain continuous connection to earth ground to function effectively. Grounding paths include conductive flooring, a grounded mat, or an equivalent method.

---

[6] S. Meschke et al., "The effect of surface charge, negative and bipolar ionization on the deposition of airborne bacteria," *J Appl Microbiol* 106, no. 4 (2009): 1133-9.

[7] ESD Association, *Fundamentals of Electrostatic Discharge, Part 1: An Introduction to ESD* (Rome, NY: ESD Association, n.d.), "Examples of Typical Static Generation Voltage Levels," table.

ANSI/ESD S20.20 designates ESD control seating as a secondary means of personnel grounding. Grounding methods such as wrist straps and heel grounders remain mandatory as the primary means of personnel grounding for work in EPAs. ESD control seating complements these controls by draining charges from laboratory seating that would otherwise introduce voltages into the work environment.

NOTE

ANSI/ESD S20.20 designates ESD control seating as a *secondary* means of personnel grounding.

4.1. CONSTRUCTION REQUIREMENTS

ESD control seating must be grounded to function effectively. The ESD control seating product incorporates an electrical circuit in which all components are electrically connected, creating a continuous path to a groundable point. Any electrostatic charge generated triboelectrically in the chair is immediately dissipated through this path (see Figure 2). For example, if a seated worker repeatedly rubs their arm across the armrest pad while performing a task, static electricity is generated. In a properly designed ESD control chair, the armrest pad is electrically bonded to the arm support and through the rest of the chair assembly, allowing the charge to flow unimpeded to a grounded floor, mat, or other grounding mechanism.

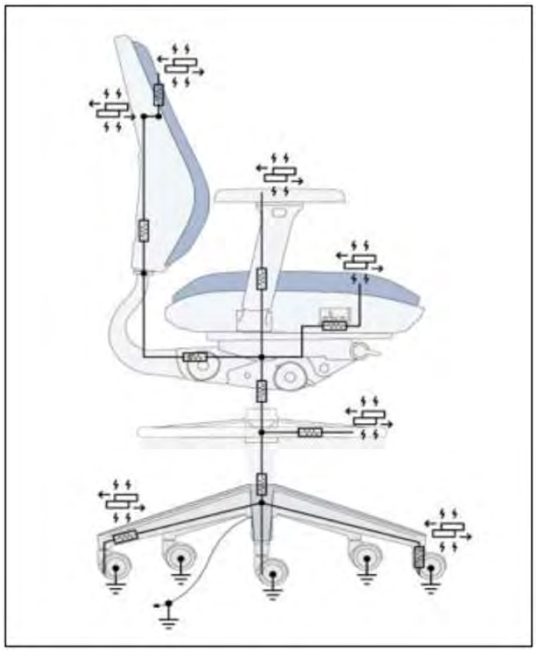
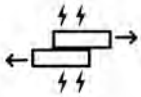
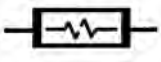


Figure 2. ESD control seating electrical path

Figure 2 Key	
Symbol	**Description**
	Triboelectrically generated electrostatic charge
	Earth ground
	Electrical path with total measured resistance of <1.0 x 10^9

When designing a chair for ESD control, manufacturers should consider three basic electrical material characteristics:[8]

- Insulative Materials: Surface resistance or volume resistance $\geq 1.0 \times 10^{11}$ ohms
- Conductive Materials: Surface resistance or volume resistance $< 1.0 \times 10^{4}$ ohms
- Dissipative Materials: Surface resistance or volume resistance $\geq 1.0 \times 10^{4}$ ohms and $< 1.0 \times 10^{11}$ ohms. For ESD control seating, component parts should test $< 1.0 \times 10^{9}$ ohms for proper ESD control. The upper range of the static dissipative classification (1.0×10^{9} to 1.0×10^{11} ohms) is considered acceptable only for electronics packaging and ESD control garments based on electrostatic decay time.

ESD control chairs should avoid insulative materials, with components predominantly constructed from conductive or static dissipative materials. For long-term ESD control performance, volume conductive materials should be used instead of surface conductive materials, which rely on a conductive coating that can wear away over time and compromise component effectiveness. Volume conductive materials incorporate conductive elements (e.g., carbon, carbon fiber, metal flakes) throughout the entire material matrix or are inherently conductive throughout their full thickness (e.g., sheet steel). This construction does not wear off and ensures the chair maintains ESD control effectiveness throughout its service life.

NOTE

ANSI/ESD S20.20 requires seating products used in ESD-protected areas to have a point-to-ground electrical resistance $< 1.0 \times 10^{9}$ ohms when measured in accordance with ANSI/ESD STM12.1.

4.2. CLEANING REQUIREMENTS

Dirt buildup can impact the conductivity of chair components, particularly casters. To maintain ESD control performance, the following cleaning protocols should be implemented:

- Clean all visible surfaces regularly
- Use ESD control–compatible cleaners, water, or mild soap and water; avoid cleaners containing plastics (e.g., silicone)
- Use non-linting wipes or cloths; avoid paper tissues, which deposit fibers on conductive surfaces
- Periodically test ESD control seating to verify that cleaning protocols have not degraded ESD control performance

[8] EOS/ESD Association, Inc., Fundamentals of Electrostatic Discharge, Part One – An Introduction to ESD (Rome, NY: EOS/ESD Association, Inc., 2020).

4.3. WET VS. DRY LAB REQUIREMENTS

Not all EPA labs involve wet bench chemistry. Specifiers must therefore indicate whether ESD control chairs will be used in a wet or dry EPA lab, as this distinction influences seating feature decisions (particularly upholstery selection).

Dry labs have a lower risk of chemical spills on seating surfaces, allowing cloth upholstery materials to be used. Cloth materials can achieve volume conductivity through carbon and/or metallic fibers woven throughout the warp and fill yarns. Conductive elements must be used throughout the fabric to eliminate insulative dead zones.

Wet labs experience frequent chemical spills during routine operations. Cloth upholstery is therefore unsuitable for these environments; ESD control–compatible faux leather upholstery must be specified instead. These materials achieve ESD protection through carbon and/or metallic particles blended throughout the materials, or through a homogenous conductive layer beneath the top finish layer that continuously dissipates surface-generated electrostatic charges. ESD control chairs being considered for wet lab use must also pass the SEFA-49 Chemical Spot Test as described in Section 7.

Non-upholstered ESD-safe surfaces, including all-metal seats and backrests, semi-soft integral urethane components, and hard plastic seats and backrests made volume-conductive through carbon or metal additives are also acceptable in EPA laboratories. Regardless of surface type, the maximum resistance to ground of the finished seat and backrest assemblies cannot exceed 1.0×10^9 ohms.

5. SEFA Lab-Grade Chair Cleaning Protocol

The SEFA lab-grade chair cleaning protocol provides a recommended process for ensuring the long-term durability of laboratory seating in challenging environments. Following the protocol is not required for seating in dry labs. This protocol should not conflict with any other stated cleaning process as defined by governmental or corporate regulations.

For proper cleaning, begin at the top of the chair or stool and proceed downward to ensure cleaning solutions and contaminants are removed as they drip or fall to lower components.

1. Dry-clean surfaces with a clean cloth to remove loose dirt, dust, and organic material.
2. Wet-clean surfaces with warm water and mild detergent, scrubbing as necessary to remove stubborn dirt and contaminant.
3. Rinse surfaces with clean water and a clean cloth. **Do not use high-pressure spray equipment,** as it may force liquids into gaps and crevices where chair components meet.
4. Manually dry surfaces or allow them to dry completely.
5. Apply disinfectant or a cleaning solution at the recommended concentration for the appropriate contact time. Do not exceed the recommended concentration or contact time, as this may degrade upholstery, plastic, and rubber components or create conditions that lead to the corrosion of metal parts. Such outcomes may result in premature failure of chair parts and may void the manufacturer's warranty.
6. Wet-clean surfaces with warm water and mild detergent. This is crucial for surfaces that are susceptible to damage from disinfectant or cleaner chemicals.
7. Rinse surfaces again with clean water and a clean cloth.
8. Manually dry surfaces or allow them to dry completely.
9. In high-risk areas, repeat steps 5-8 using a broad-spectrum disinfectant.

NOTE

Do not clean oil or grease from the shaft of height-adjustable gas springs or pneumatic pistons, as this will interfere with their function and may result in shortened service life or premature failure.

6. SEFA Lab-Grade Seating Minimum Requirements[9]

To establish SEFA 12 compliance, manufacturers must submit independent third-party testing conducted by a SEFA-approved facility. Manufacturers may test a single chair or may test a worst-case scenario (e.g., tallest chair with highest backrest, representing highest tip vulnerability), to qualify all chairs within the same line. Model numbers for all chairs within the line must be documented by the test facility in the GS 2014:01 (DIN EN 6887-1&2) or ANSI/BIFMA X5.1 Certificate of Testing. Complete test results will include the mandatory features certificates and test report as indicated below, as well as a copy of the product brochure.

6.1. SEFA MANDATORY FEATURES

- Safety (at least one)
  - GS 2014:01 (DIN EN 6887-1&2)
  - ANSI/BIFMA X5.1
- Seat/Backrest Upholstery
  - EN ISO 12947-2 (Martindale Method) minimum of 25,000 rubs or ASTM D4157 (Wyzenbeek Method) minimum of 30,000 double rubs with #10 cotton duck
  - SEFA 49-Chemical Spot Test
  - Wet labs: Upholstery cannot be porous in nature, such as typical cloth, wool or mesh fabrics used in traditional office settings
- Non-Upholstered Seat/Backrest
  - Non-upholstered surfaces are not subject to upholstery abrasion rub tests
  - SEFA 49-Chemical Spot Test
  - Solid or semi-solid seat/backrest surfaces cannot be absorbent in nature, allowing chemicals, organic fluids, or cleaning fluids to soak into the seating surface, causing degradation or damage
- ESD Testing (at least one)
  - EN 61340-2-3
  - ANSI/ESD STM12.1

6.2. SEFA SUGGESTED FEATURES

- Adjustment controls should be intuitive and easily operable from the seated position.
- Seating should provide support to critical ergonomic areas such as the lumbar spine, with adjustability to accommodate individual preferences.
- For extended use, chairs should support user movement throughout the workday while allowing lockable positioning for precision tasks.
- Seating should enable uninhibited blood flow to the lower extremities through a forward seat tilt function or flexible waterfall front edge.

---

[9] Thanks to David E. Swenson, President, Affinity Static Control Consulting, L.L.C. and Carl Newburg, President, Microstat Laboratories/River's Edge Technical Service, Inc., both members of the ESD Association, and Maciej Noras, PhD, Associate Professor at the Energy Production & Infrastructure Center at the University of North Carolina – Charlotte and Steve Fowler, Consultant with Fowler Associates, Inc., both members of the Electrostatics Society of America, for their input in writing this section.

6.3. SEFA MINIMUM REQUIREMENTS FOR ESD CONTROL SEATING

- ESD control seating must fulfill the minimum requirements as described in Section 6.1.
- ESD control seating is recommended to include the features described in Section 6.2.
- ESD control norms (at least one):
    - **DIN EN 61340-5-1 and EN 61340-2-3** – According to EN 61340-5-1, seating products shall be tested according to EN 61340-2-3
    - **ANSI/ESD S20.20 and STM12.1** – According to ANSI/ESD S20.20, seating products shall be tested according to ANSI/ESD STM12.1

NOTE

The SEFA 49-Chemical Spot Test is only necessary for ESD control chairs considered for use in wet labs.

7. Laboratory-Grade Seating Chemical Resistance Testing

The SEFA 49-Chemical Spot Test is used to evaluate seating surface resistance to chemical spills. Provide flat and smooth (6) 4" x 12" (100 mm x 300 mm) test samples of upholstery material or (49) 3" x 3" (75 mm x 75 mm) (or equivalent seating surface to test all 49 chemicals) of the seating surface material (PU or urethane Foam, or other polymer).

If flat and smooth samples are unavailable due to surface texturing, shape, or patterning, the test facility shall supply a glass cover that prevents evaporation of the test reagent, ensuring the saturated cotton ball remains wet for the duration of the test process per Method A below.

Place samples on a flat surface, clean with soap and water, and blot dry. Condition samples for 48 hours at 73±3°F (23±2°C) and 50%±5% relative humidity, or per currently accepted ASTM guidelines. Test samples for chemical resistance using 49 chemical reagents by one of the following methods:

NOTE

Many organic solvents are suspected carcinogens, toxic and/or flammable. Exercise appropriate care to protect personnel and the environment from exposure to harmful levels of these materials.

- **Method A** – Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.57 cc) bottle and inverting the bottle onto the sample surface. The cotton ball shall remain in contact with the sample for the duration of the test.
- **Method B** – Test non-volatile chemicals by placing five drops of the reagent on the surface of the sample and covering with a 24 mm watch glass, convex side down.

For both methods, leave the reagents on the sample for 15 minutes. Wash the sample with deionized water, dry with a towel, and evaluate both top and bottom surfaces after 24 hours at 73±3°F (23±2°C) and 50%±5% relative humidity, or per currently accepted ASTM guidelines, using the following rating system (see Appendix A for sample pictures):

- Level 0 – No detectable change
- Level 1 – Slight change in color or gloss, or warping, twisting, or deforming of material
- Level 2 – Slight surface etching or severe staining
- Level 3 – Pitting, cratering, swelling, or erosion of surface with obvious and significant deterioration of surface top coat, exposing raw expanded foam layers

NOTE

Four observations should be performed by the test associate at a distance of 12 in.–17 in. (300 mm–430 mm) at varying angles of not less than 75° from each other.

Results will vary by manufacturer due to differences in finish formulations. Laboratory grade finishes shall result in no more than four (4) Level 3 conditions. Any instance of the seating surface absorbing or allowing a chemical to penetrate the surface will result in immediate test failure. Individual test results for the specified 49 reagents will be verified using the established third-party, independent SEFA test form on the following page. Suitability for a given application is dependent upon the chemicals used in a given laboratory.

SEFA 49-Chemical Spot Test

Test Date: _____ **Test Performed By:** _____
Sample Description: _____ **Type of Material Coated:** _____
Coating Type: _____

Rating Scale

- **Level 0 – No detectable change**
- **Level 1 – Slight change in color or gloss, or warping, twisting, or deforming of material**
- **Level 2 – Slight surface etching or severe staining**
- **Level 3 – Pitting, cratering, swelling, or erosion of surface with obvious and significant deterioration of surface top coat, exposing raw expanded foam layers**

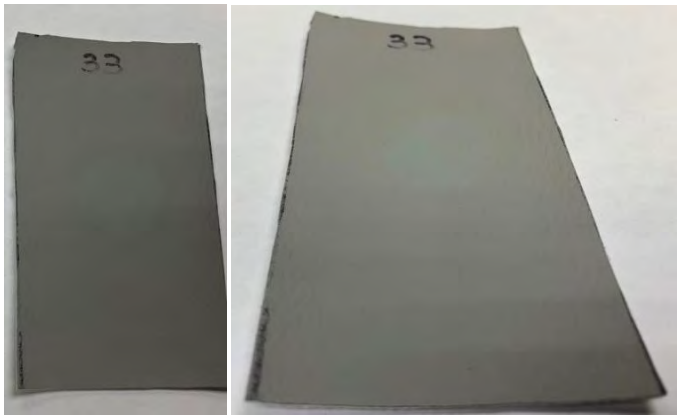
Test No.	Chemical Reagent	Test Method	Rating	Comments
1.	Acetate, Amyl	A		
2.	Acetate, Ethyl	A		
3.	Acetic Acid, 98%	B		
4.	Acetone	A		
5.	Acid Dichromate, 5%	B		
6.	Alcohol, Butyl	A		
7.	Alcohol, Ethyl	A		
8.	Alcohol, Methyl	A		
9.	Ammonium Hydroxide, 28%	B		
10.	Benzene*	A		
11.	Carbon Tetrachloride	A		
12.	Chloroform	A		
13.	Chromic Acid, 60%	B		
14.	Cresol	A		
15.	Dichloroacetic Acid	A		
16.	Dimethylformamide	A		
17.	Dioxane	A		
18.	Ethyl Ether	A		
19.	Formaldehyde, 37%	A		
20.	Formic Acid, 90%	B		
21.	Furfural	A		
22.	Gasoline	A		
23.	Hydrochloric Acid, 37%	B		
24.	Hydrofluoric Acid, 48%	B		
25.	Hydrogen Peroxide, 30%	B		
26.	Iodine, Tincture of	B		
27.	Methyl Ethyl Ketone	A		
28.	Methylene Chloride	A		
29.	Mono Chlorobenzene*	A		
30.	Naphthalene	A		
31.	Nitric Acid, 20%	B		
32.	Nitric Acid, 30%	B		
33.	Nitric Acid, 70%	B		
34.	Phenol, 90%	A		
35.	Phosphoric Acid, 85%	B		
36.	Silver Nitrate Saturated	B		
37.	Sodium Hydroxide, 10%	B		
38.	Sodium Hydroxide, 20%	B		
39.	Sodium Hydroxide, 40%	B		
40.	Sodium Hydroxide Flake	B		
41.	Sodium Sulfide Saturated	B		
42.	Sulfuric Acid, 33%	B		
43.	Sulfuric Acid, 77%	B		
44.	Sulfuric Acid, 96%	B		
45.	Sulfuric Acid, 77% & Nitric Acid, 70% (equal parts)	B		
46.	Toluene	A		
47.	Trichloroethylene	A		
48.	Xylene	A		
49.	Zinc Chloride Saturated	A		

*If use of this chemical is permitted by law in the country where this testing is being performed.

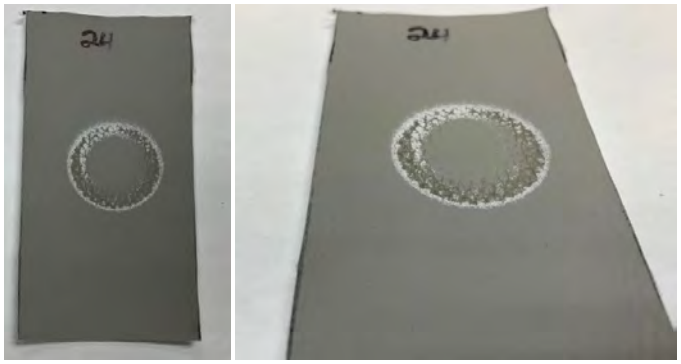
Appendix A:
SEFA 49-Chemical Spot Test Reference Pictures

COATED SILICON UPHOLSTERY

LEVEL 1: GLOSS/COLOR CHANGE



LEVEL 2: COLOR CHANGE AND SLIGHT SURFACE ETCH



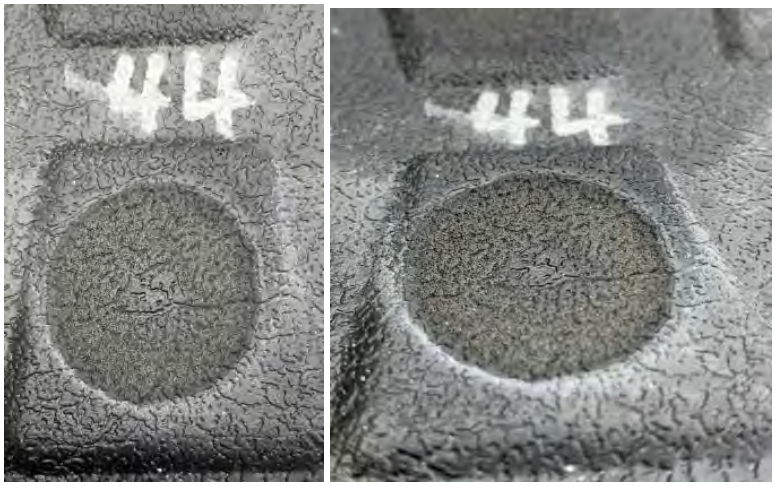
LEVEL 3: SURFACE EROSION

URETHANE/PU FOAM

LEVEL 1: GLOSS CHANGE

LEVEL 2: SLIGHT SURFACE ETCH

LEVEL 3: SURFACE EROSION



PVC/VINYL

LEVEL 1: SLIGHT GLOSS CHANGE


LEVEL 2: GLOSS/COLOR CHANGE


LEVEL 3: SURFACE SWELLING


Appendix B:
SEFA Lab-Grade Seating Selection Guide

The seating selection guide is designed to help specifiers and users detail their laboratory seating requirements, ensuring proper chair and stool selection for their specific applications. By documenting user needs, multiple quotes from multiple manufacturers can be obtained while ensuring the seating meets user requirements and manufacturer specifications align with those requirements. While not exhaustive, this guide gives users and manufacturers a structured framework for identifying requirements to expedite the specification and quoting process.

Seating Styles – *For each chair or stool type under consideration, check the appropriate box. If considering multiple types, use one form per style.*	☐ Lab chair/stool with backrest ☐ Lab stool without backrest ☐ Lean/stand stool with or without backrest
Durability/Safety – *The seating must comply with either GS or ANSI/BIFMA standards. Must also pass the SEFA 49-Chemical Spot Test.*	☐ GS or ANSI/BIFMA ☐ SEFA 49-Chemical Spot Test
Cleanability – *Required for wet lab use only; must meet all requirements.*	☐ Surfaces are able to be cleaned with mild cleaning solutions without degrading the surface or retaining solutions. ☐ Upholstery is not a woven construction, such as cloth, wool, or mesh. ☐ Surfaces are not made from porous or absorbent materials that would retain spills or cleaning agents or allow them to soak through to underlying cushioning or mechanical components.
ESD Properties – *If an ESD control chair is being specified, it must pass either or both tests for electrical resistance.*	☐ < 1.0×10^9 ohms tested per EN 61340-2-3 ☐ < 1.0×10^9 ohms tested per ANSI/ESD STM12.1

NOTE

Due to the importance of upper torso stability for critical hand-eye coordination tasks and mental concentration in laboratory applications (e.g., microscopy, pipetting, pharmaceutical compounding), as well as for reducing spills and errors, especially in crucial areas such as biosafety laboratories, torso-balance seating (e.g., exercise ball seating, spring seating) is excluded from this selection guide.

Chemical Resistance

Using a scale of 0 to 3, rate the exposure the laboratory seating will have to cleaners and chemicals. Provide appropriate details regarding chemical names, concentrations, and other relevant information on the lines below to ensure the proper chair is specified.

☐ 0 ☐ 1 ☐ 2 ☐ 3

Mild cleaners/chemicals → Harsh cleaners/chemicals

Disinfecting Properties

Using a scale of 0 to 3, indicate the need for disinfecting properties. Detail any specific requirements for your laboratory on the lines below.

☐ 0 ☐ 1 ☐ 2 ☐ 3

None → Does not support growth → Self-disinfecting

Ergonomic Features

Using a scale of 0 to 3, indicate the importance of ergonomics in your laboratory chair selection. Provide details such as postures, tasks performed, user height, sitting duration, and preferred adjustment types on the lines below.

☐ 0 ☐ 1 ☐ 2 ☐ 3

Basic features/adjustments → Maximum features/adjustments

ESD Properties

Using a scale of 0 to 3, indicate the level of resistance required. Specify any special requirements for your operation on the lines below.

☐ 0 ☐ 1 ☐ 2 ☐ 3

Insulative (>1.0 × 10^{11} ohms) → Static Dissipative (≥1.0 × 10^{4} and <1.0 × 10^{9} ohms) → Conductive (< 1.0 × 10^{4} ohms)

No static control properties

Proposed Classification Features

Check the boxes for your preferences of chair or stool features for each component. Multiple boxes may be selected per feature (e.g., a specifier may select an upholstered seat with a waterfall front and a seat slide). Check all features the user indicates they prefer. For stools without backrests, leave the backrest column blank.

For seat height, subtract 10 in.–12 in. (25 cm–30 cm) from the working height. This measurement provides an approximate range for the midpoint of the chair or stool height adjustment range. When determining working height, include the height of fixtures or equipment, such as microscopes or testing equipment. Account for aprons, drawers, or other workbench features that may interfere with user leg clearance.

For features that may need further explanation, illustrations are provided on the following pages.

Seat	Backrest	Control Functions	Foot Support	Casters	Armrests	Base Construction	Seat Height
☐ Upholstered	☐ Upholstered Backrest	☐ Adjusts from Seated Position	☐ Fixed Footring	☐ Casters for Hard Surface Floors	☐ Fixed Armrests	☐ Cast Aluminum	☐ Desk Height
☐ Non-Upholstered	☐ Non-Upholstered Backrest	☐ Tilt Tension Control	☐ Adjustable Footring	☐ Safety Casters (won't roll away)	☐ Height Adjustable Armrests	☐ Coated Steel	☐ Medium Bench Height
☐ Waterfall Front	☐ Lumbar Support	☐ Weight-Activated	☐ Attached Foot Support	☐ Locking Casters	☐ Width Adjustable Armrests	☐ Reinforced Composite	☐ High Bench Height
☐ Seat Slide	☐ Backrest Height Adjustment	☐ Swivel Tilt	☐ External Foot Support	☐ Glides	☐ Depth Adjustable Armrests	☐ Chrome-Plated Steel	
☐ Seat Height	☐ Backrest Depth Adjustment	☐ No Tilt	☐ No Foot Support		☐ Armrest Swivel Adjustment		
	☐ Backrest Swivel	☐ Forward Seat Tilt					
		☐ Recline Lock Out					
		☐ Synchro-Tilt					

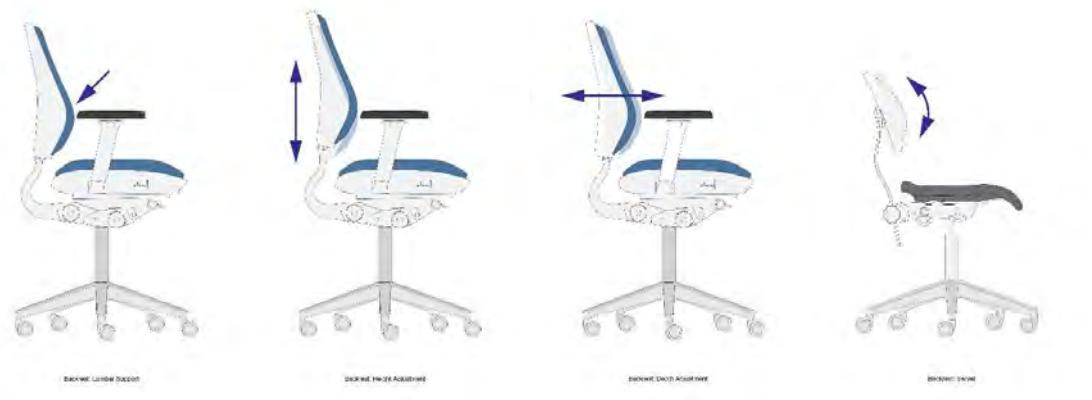
Other notes:

SEATS

Waterfall Front *Seat Slide* *Adjustable Seat Height*

BACKREST

Lumbar Support *Backrest Height Adjustment* *Backrest Depth Adjustment* *Backrest Swivel*



ARMRESTS

Height Adjustable Armrests *Depth Adjustable Armrests*

Width Adjustable Armrests *Armrest Swivel Adjustment*

CONTROL FUNCTIONS

Tilt Tension Control

Weight-Activated Control

Swivel Tilt

Forward Seat Tilt

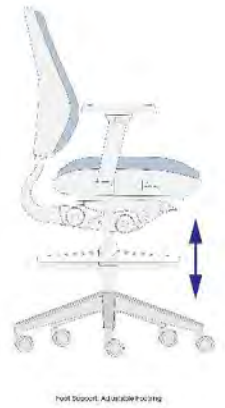
Recline Lock Out

Synchro-Tilt

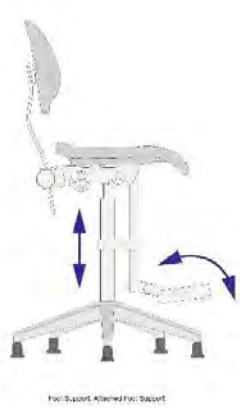
FOOT SUPPORT

Fixed Footring

Adjustable Footring



Attached Foot Support



External Foot Support

Appendix C: Glossary

abrasion resistance – A material's ability to withstand wear from repeated rubbing or friction.

antibacterial coating – Surface treatment that inhibits bacterial growth.

cleanroom – A controlled environment where particulate matter, temperature, and humidity are regulated.

conductive materials – Materials with surface or volume resistance less than 1.0×10^4 ohms.

dissipative materials – Materials with surface or volume resistance between 1.0×10^4 and 1.0×10^{11} ohms.

double rub – A standard measurement unit for abrasion testing consisting of one forward and one backward motion.

dry lab – A laboratory environment with minimal risk of chemical spills. *See also* wet lab.

electrostatic discharge (ESD) – The sudden flow of electricity between two electrically charged objects.

ESD control seating – Chairs or stools designed to continuously dissipate electrostatic charges through grounded pathways.

ESD-protected area (EPA) – A defined space where electrostatic discharge controls are implemented to protect sensitive work or materials.

footring – A circular support attached to the chair base for resting feet at elevated seating positions.

forward seat tilt – A feature allowing the front of the seat to tilt downward.

grounding – The process of connecting an object to earth ground to dissipate electrical charges.

GS mark (geprüfte sicherheit) – A German government-licensed safety mark indicating a product has been independently tested and complies with the German Product Safety Act.

hydrophobic – A material property of being resistant to and repelling water or liquids.

laboratory bench – The work surface in laboratory settings. *See also* sitting height, standing height.

laboratory-grade seating – Chairs and stools specifically designed to meet the design, construction, and safety requirements of laboratory environments.

lumbar support – A backrest feature providing support to the lower back region.

reagent – A chemical substance used in testing to evaluate material resistance.

recline lock out – A control feature preventing backward tilt of the seat or backrest.

seat slide – A feature allowing the forward and backward adjustment of seat depth.

SEFA 49-Chemical Spot Test – A test used to evaluate a seat surface's resistance to chemical spills.

sitting height – Standard laboratory work surface height of approximately 30 inches (75 cm).

standing height – Standard laboratory work surface height of approximately 36 inches (90 cm).

swivel tilt – Mechanism allowing the seat to tilt while rotating.

synchro-tilt – Mechanism coordinating seat and backrest movement in a synchronized ratio.

tilt tension control – Adjustment mechanism controlling resistance to backward tilt.

triboelectric charging – The accumulation of electrostatic charges caused by the friction and subsequent separation of two materials.

volume conductive materials – Materials with conductive elements throughout their entire structure.

waterfall front edge – A seat design with a gently curved or sloped front edge.

weight-activated control – A mechanism that adjusts automatically based on user body weight.

wet lab – Laboratory environment with frequent exposure to liquids and chemicals. *See also* dry lab.

working height – The actual elevation where hands perform laboratory tasks.