Cleanroom and Cleanroom Rules
What is a Cleanroom:

A room in which the concentration of airborne particles is controlled, and which is constructed and used in a manner to minimise the introduction, generation, and retention of particles inside the room and in which other relevant parameters, e.g. temperature, temperature, humidity, and pressure, are controlled as necessary.

ISO 14644 Cleanrooms and Associated Controlled Environments
## Cleanroom Class Comparison

<table>
<thead>
<tr>
<th>ISO Classification Number</th>
<th>US FED 209E</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 1</td>
<td></td>
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<tr>
<td>ISO 2</td>
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<tr>
<td>ISO 3</td>
<td>CLASS 1</td>
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<tr>
<td>ISO 4</td>
<td>CLASS 10</td>
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<tr>
<td>ISO 5</td>
<td>CLASS 100</td>
</tr>
<tr>
<td>ISO 6</td>
<td>CLASS 1,000</td>
</tr>
<tr>
<td>ISO 7</td>
<td>CLASS 10,000</td>
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<tr>
<td>ISO 8</td>
<td>CLASS 100,000</td>
</tr>
<tr>
<td>ISO 9</td>
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</tbody>
</table>

**ISO 7 / CLASS 10,000 US FED 209E = 10,000 particles/ft³ per minute**
Examples of Required Cleanliness for Various Manufacturing Industries

- Aseptic Filling
- Aviation Instruments
  - Cleanroom Laundry
  - Dairy Products
  - General Pharmaceutical
  - Medical Equipment
  - Mushroom Growing
  - Semiconductor
- Automatic Control Devices
- Computer
- Electronic Parts
- Meat Processing like McDonald

GERDA

Cleanroom class:
- 10
- 100
- 1,000
- 10,000
- 100,000
CLEANROOM

VACUUM PUMP

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

EMERGENCY STOP

SITOVER

20 PASCAL

GRAY ROOM

EMERGENCY STOP

LOCK

30 PASCAL

ELECTRONIC

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER

HEPAFILTER
HUMANS IN CLEANROOMS

There are both physical and psychological concerns when humans are present in cleanrooms. Physical behavior like fast motion and horseplay can increase contamination. Psychological concerns like room temperature, humidity, claustrophobia, odors and workplace attitude are important. Below are several ways people produce contamination:

1. **Body Regenerative Processes**—Skin flakes, oils, perspiration and hair.

2. **Behavior**—Rate of movement, sneezing and coughing.

3. **Attitude**—Work habits and communication between workers.

**People are a major source of contamination in the cleanroom.**

Look at the people activities listed below.

Notice the number of particles produced per minute during these activities.

<table>
<thead>
<tr>
<th>PEOPLE ACTIVITY</th>
<th>PARTICLES/MINUTE (0.3 microns and larger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motionless (Standing or Seated)</td>
<td>100,000</td>
</tr>
<tr>
<td>Walking about 2 mph</td>
<td>5,000,000</td>
</tr>
<tr>
<td>Walking about 3.5 mph</td>
<td>7,000,000</td>
</tr>
<tr>
<td>Walking about 5 mph</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Horseplay</td>
<td>100,000,000</td>
</tr>
</tbody>
</table>

HORSEPLAY

THAT CAUSES ACCIDENTS IS SADOTAGE!
Personal Actions Typically Prohibited in Cleanrooms

1. Fast motions such as running, walking fast or horseplay.
2. Sitting or leaning on equipment or work surfaces.
3. Writing on equipment or garments.
4. Removal of items from beneath the cleanroom garments.
5. Wearing the cleanroom garment outside the cleanroom.
6. Wearing torn or soiled garments.
RULES FOR WORKING IN THE GERDA CLEANROOM

• All cleanroom users are required to pass a cleanroom training
• You are not permitted to eat or drink in the cleanroom
• Clean any item you bring inside the cleanroom
• Your cleanroom clothes must be put on in the correct order—cap, coat, shoes, if necessary gloves.
• Please ensure that your cleanroom clothes fit before you leave the changing area
• Close all buttons of the clean room coat, close the zips completely
RULES FOR WORKING IN THE GERDA CLEANROOM

• Cleanroom clothes must be washed or changed at least once a week.

• Do not leave your cleanroom clothes hanging in the changing area for weeks (if you are leaving), put it out to wash or throw it away!

• Always leave your cleanroom clothes on the coat-hanger.

• Keep the workplace clean.

• Horizontal surfaces must be cleaned frequently by every user!

• The cleanroom is no storage room...so please put back items to their storage place before you leave the cleanroom!

• Never leave the personell lock with your clean room garment on (except for emergency).
In Case of Emergency

- Always follow the rules set forth by LNGS
- If an emergency requires evacuation, leave the cleanroom immediately, do not stop to un-gown
- Inform other users before leaving