



FM HARDWARE ZONE AND CLEANROOM TRAINING

Background Topics

Contamination Prevention
FM Hardware Zone
Cleanrooms

Procedures and Regulations

General Rules
Gowning
Behavioral Guidelines
Cleaning and Maintenance
Emergencies

**DISRUPTIVE SPACE
SOLUTIONS FOR A
BETTER TOMORROW**

CONTAMINATION PREVENTION

- The presence of particles on a system or setup may cause damage or inaccurate data
- Flight Hardware cannot be cleaned or repaired once in space (e.g. Camera's and solar panels)
- We might have a shared launch with someone who needs strict contamination control
- Our customers expect us to keep a high standard in this regard

Common sources of contamination



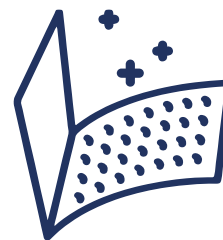
Hair and skin cells
Grease from skin
Cosmetics



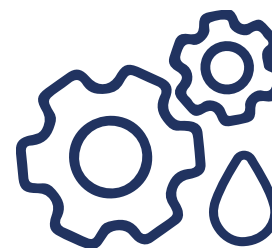
Clothing fibers



Paper and Carboard



Trapping
Stuck to Velcro



Machine Lubricants
Coolants
Solder Fluxes



Smoke particles
in breath

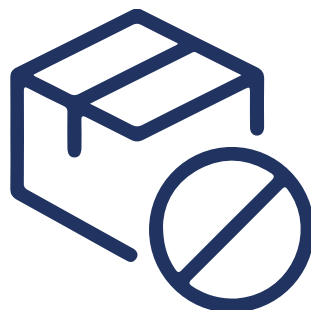
CONTAMINATION PREVENTION

- By working **consistently** in terms of contamination control, risk is reduced

Prevention control methods



Limit movement of
people and goods



Banning materials
that generate
contamination



Cleaning materials
that come into the
area

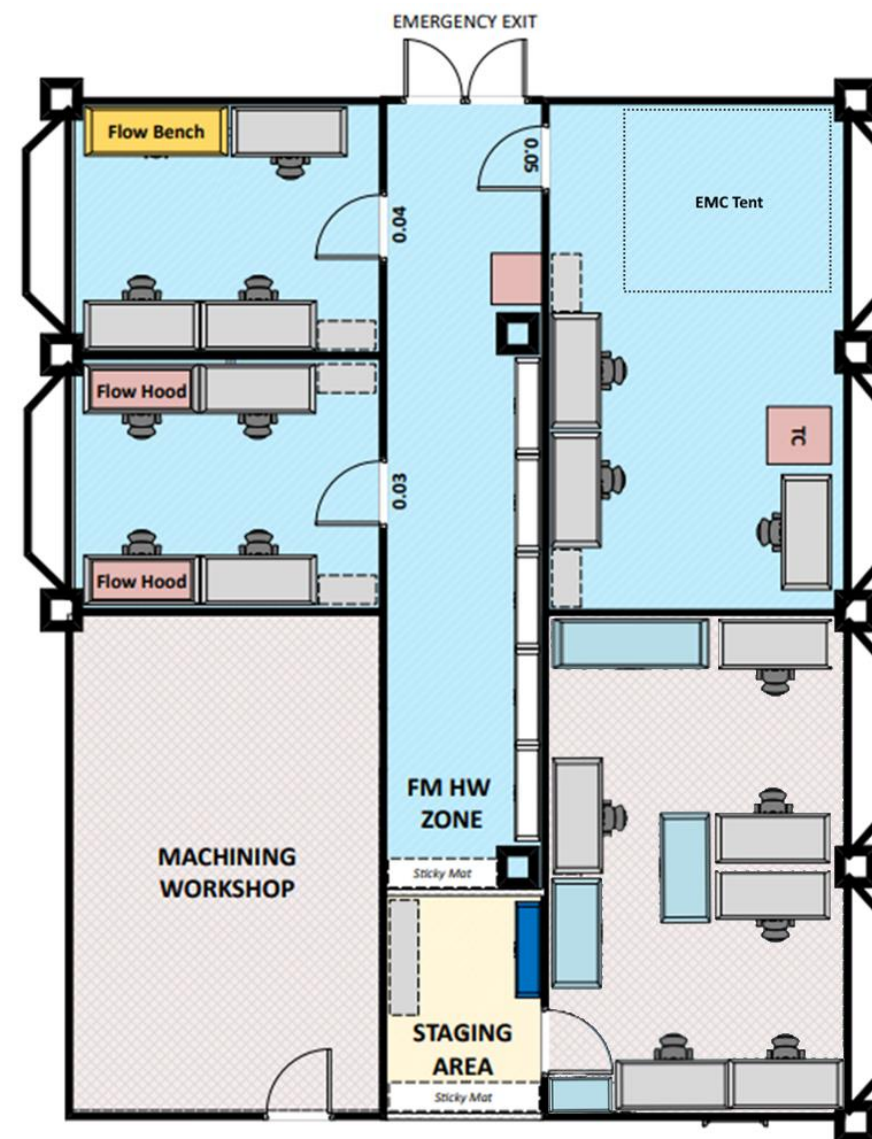


Wearing protective
clothing

FM HARDWARE ZONE

Flight Model (FM) Hardware Zone specifications:

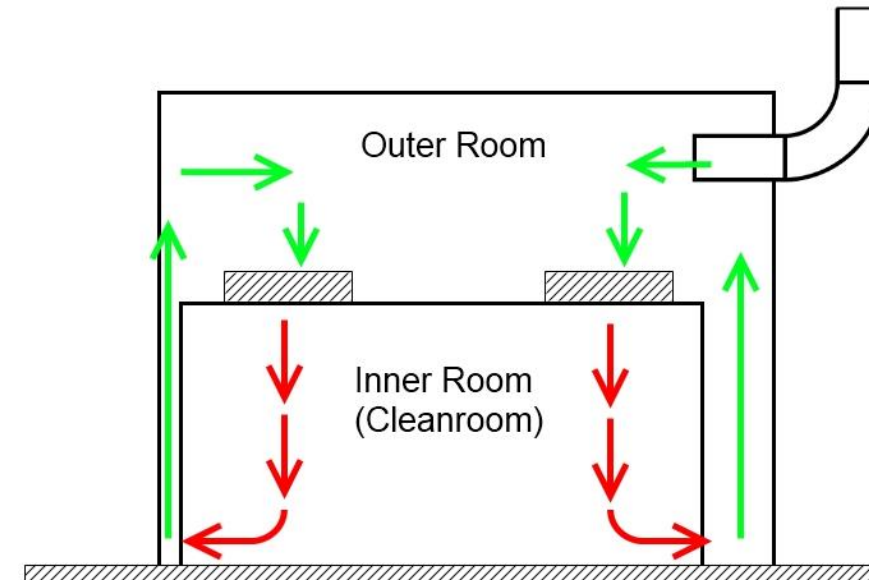
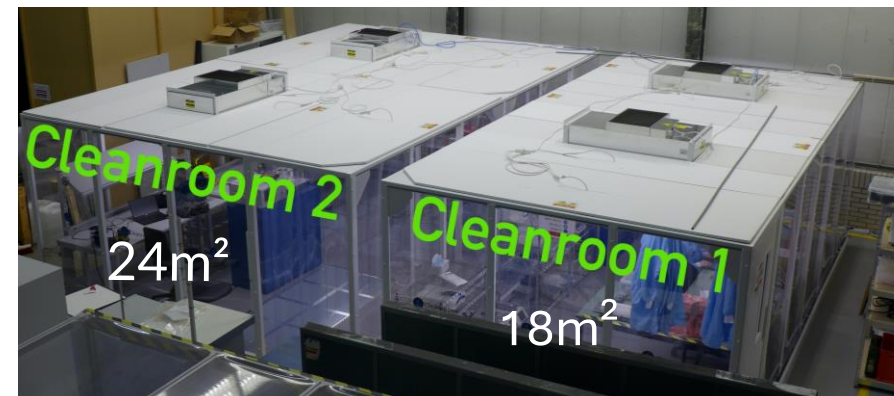
- General use: Unregulated Class 100.000 – ISO 8
 - Cleaned regularly
- No overpressure
 - Contaminated air from outside can infiltrate the area
 - Dust particles can move freely
- Normal use: Freely available to multiple projects
 - Max. 4 people in 0.03
 - Max. 4 people in 0.03
 - Max. 6 people in 0.05
 - When a higher limit is needed request it with the health and safety officer
- ESD clothing required



CLEANROOMS

Cleanroom specifications:

- General use: Class 100.000 – ISO 8
 - Capable of providing Class 10.000 – ISO 7
- Overpressure (10-15 Pa)
- Normal use: Reservation Required
 - Max. 4 people for ISO 8
 - Max. 3 people for ISO 7
- Cleanroom clothing required



GENERAL RULES



- Only authorized users may enter the FM Hardware zone / Cleanrooms unescorted
 - You become an authorized user by following this training course (and after a supervised visit)
 - Authorized users are required to follow this training yearly



- Visitors are allowed if the max. number of people is not exceeded
 - Check with the responsible team working in the cleanroom if visitors are allowed for that project
 - If no one is in the cleanroom, check visitor approval with PM / TL of all projects involved
 - If the visitors need to access hardware in the cleanroom, make sure they receive this training



- Do not enter the FM Hardware zone / Cleanrooms unless absolutely needed
 - Entry to the Cleanrooms is forbidden when in poor health or while using pharmaceutical drugs with red or yellow labels
 - Entry to the cleanrooms is not advised when dealing with airway infections or diseases, check with the health & safety officer

**DIT GENEESMIDDEL KAN HET
REACTIEVERMOGEN VERMINDEREN.**
(autorijden - bedienen van machines -
spelen op straat) Pas op met alcohol!

GENERAL RULES



- No Food or Drinks allowed in the FM Hardware zone / Cleanrooms (as in all labs)



- Always wear the required garments
 - hairnet, coat, shoe covers, (beard mask) and gloves
 - never open the coat in the FM Hardware zone / Cleanroom



- Always cough or sneeze away from any hardware
 - Cover the lower part of your face with your hands or clean cloth
 - Throw away the cloth or used gloves immediately

GOWNING

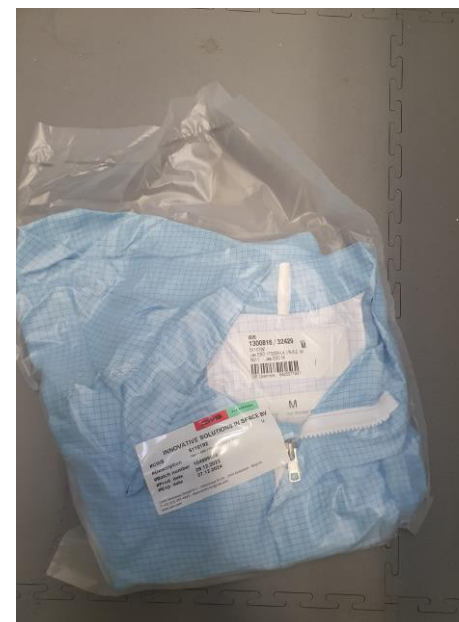
Put on the required garments in the appropriate order:

1. Hat
2. Coat
3. Shoe covers,
4. Gloves (and beard mask)

FM Hardware Zone

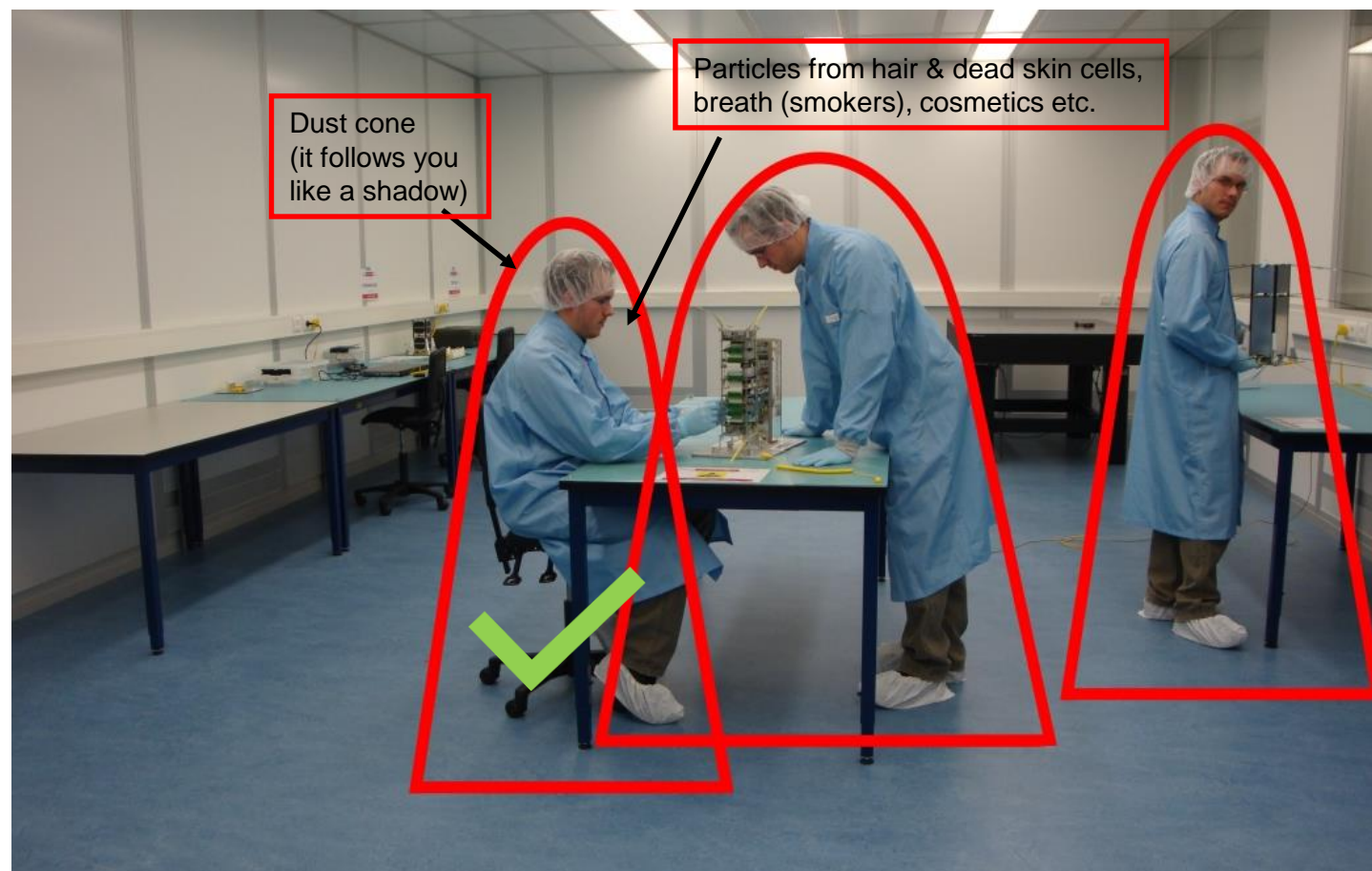


Cleanrooms



BEHAVIORAL GUIDELINES

Be conscious of ones 'dust cone' and keep hardware out as much as possible



CLEANING AND MAINTENANCE



- Clean the items you bring into Cleanrooms
 - Wipe the items with an alcohol wipe
 - Clean as much of the item as possible
 - Make sure there are no dust particles left on the item



- Cleaning the FM Hardware Zone & Cleanrooms
 - Check the cleaning sheet before starting work
 - Clean your workbench before starting every workday
 - The floor (including the airlock) and sticky mats should be checked and replaced/cleaned every week by the users
 - Use the vacuum cleaner or wipes to clean the tables, cabinets, and the floor weekly
 - Fill in the weekly cleaning schedule after cleaning

EMERGENCIES



In case of emergency, get out of the FM Hardware zone or Cleanrooms as fast as possible!

NOTE: Shoe covers can be slippery

CHECKLIST

Step	Description	Check	Comment
1.	Mission background read and understood (see ICARUS Wiki)		
2.	Cleanroom introduction read and understood (see ICARUS Wiki)		
3.	Cleanroom procedures and regulations read and understood		
4.	Gowning process successful		
5.	Cleanroom material cleaned		

Activity performed by: ICARUS Trainee
Date: