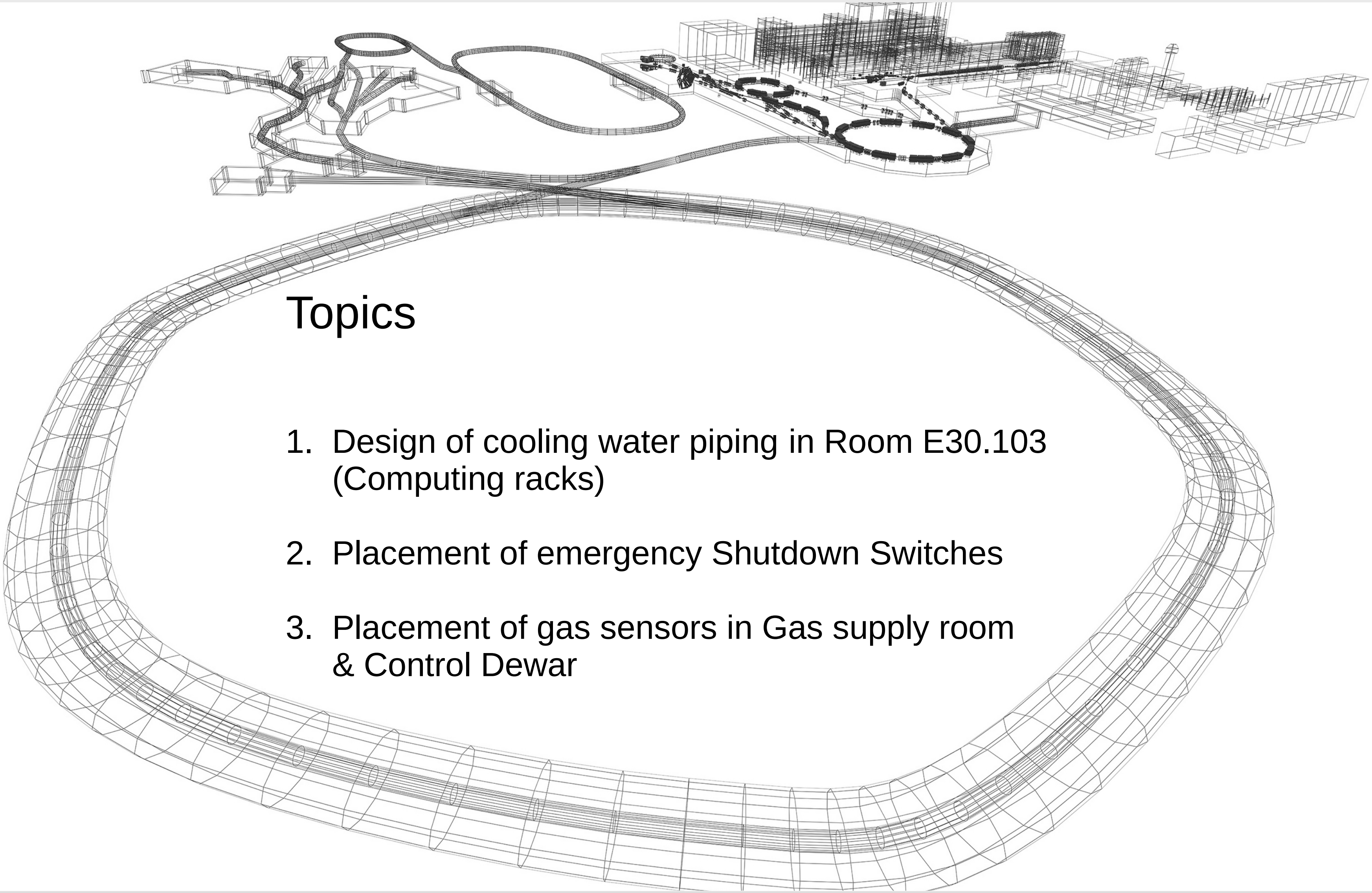


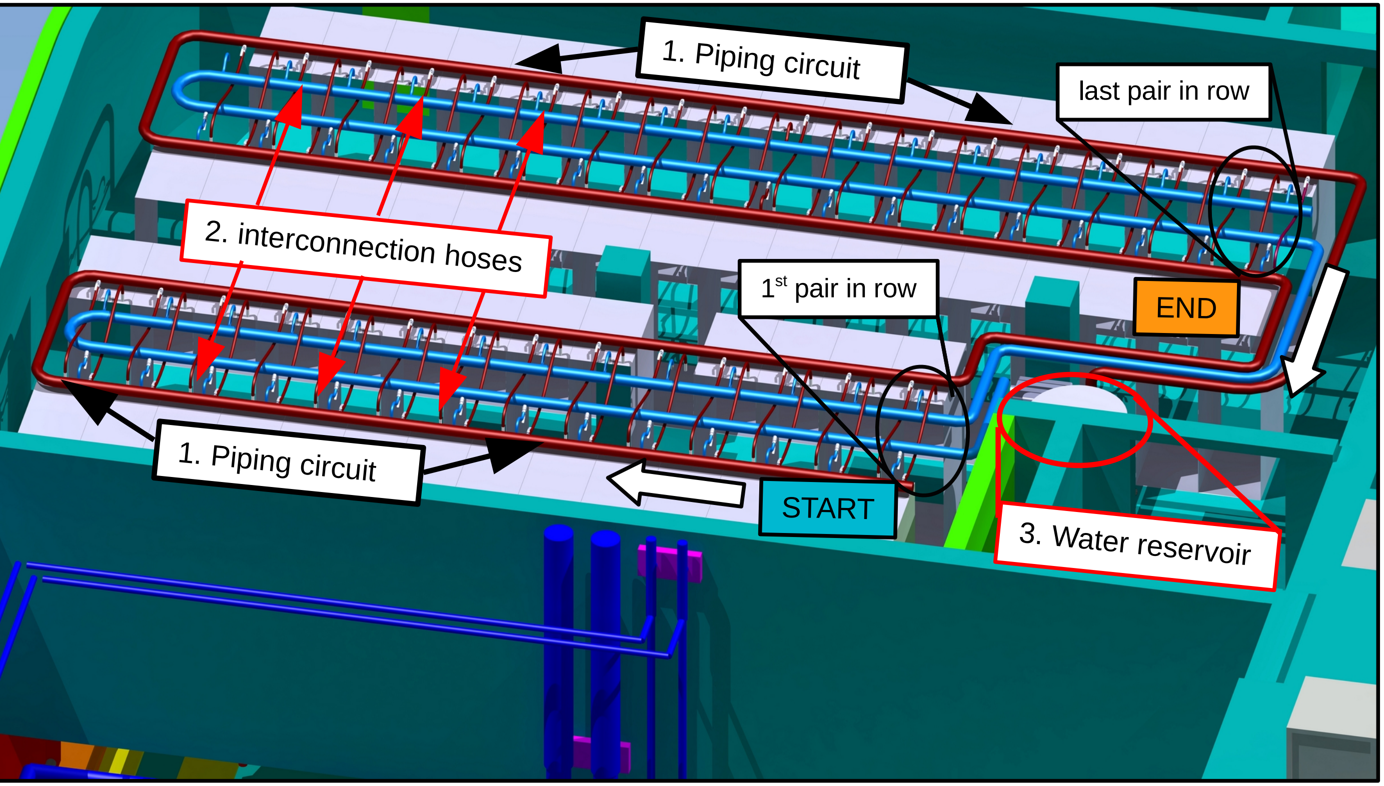
Topics

1. Design of cooling water piping in Room E30.103 (Computing racks)

2. Placement of emergency Shutdown Switches

3. Placement of gas sensors in Gas supply room & Control Dewar

1. Design of cooling water piping in Room E30.103 - “*Tichelmann*” routing concept -

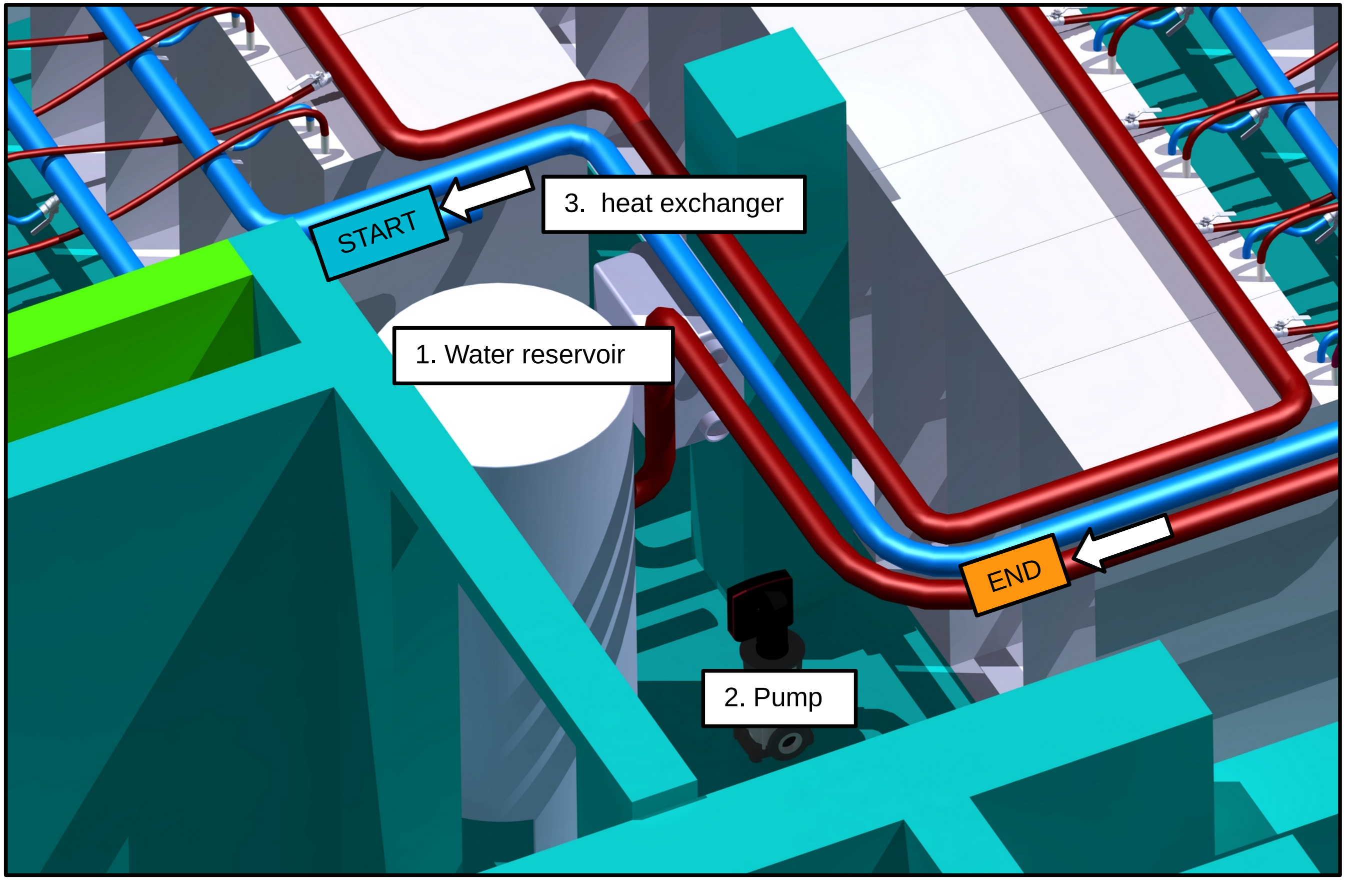


1. Piping conduit (blue and red)
2. Interconnection hoses to and from racks (blue and red)
3. Water reservoir

Overall length of piping circuit (Blue and red) to & from water reservoir assumed with 130 m

- Diameter (inner) of pipes assumed at 115 mm
- Diameter of connection hoses Assumed 1” (bore 25,4 mm)

1. Design of cooling water piping in Room E30.103 - Arrangement of assembly -



1. Water reservoir located between entrance & concrete pillar

- Dimension
  2m height x 1.1 m (Diameter)

2. Water Pump (assumed → 2,2 KW) placed between water reservoir and heat exchanger.

- Dimension approx.
  800 mm height x 400 mm^2

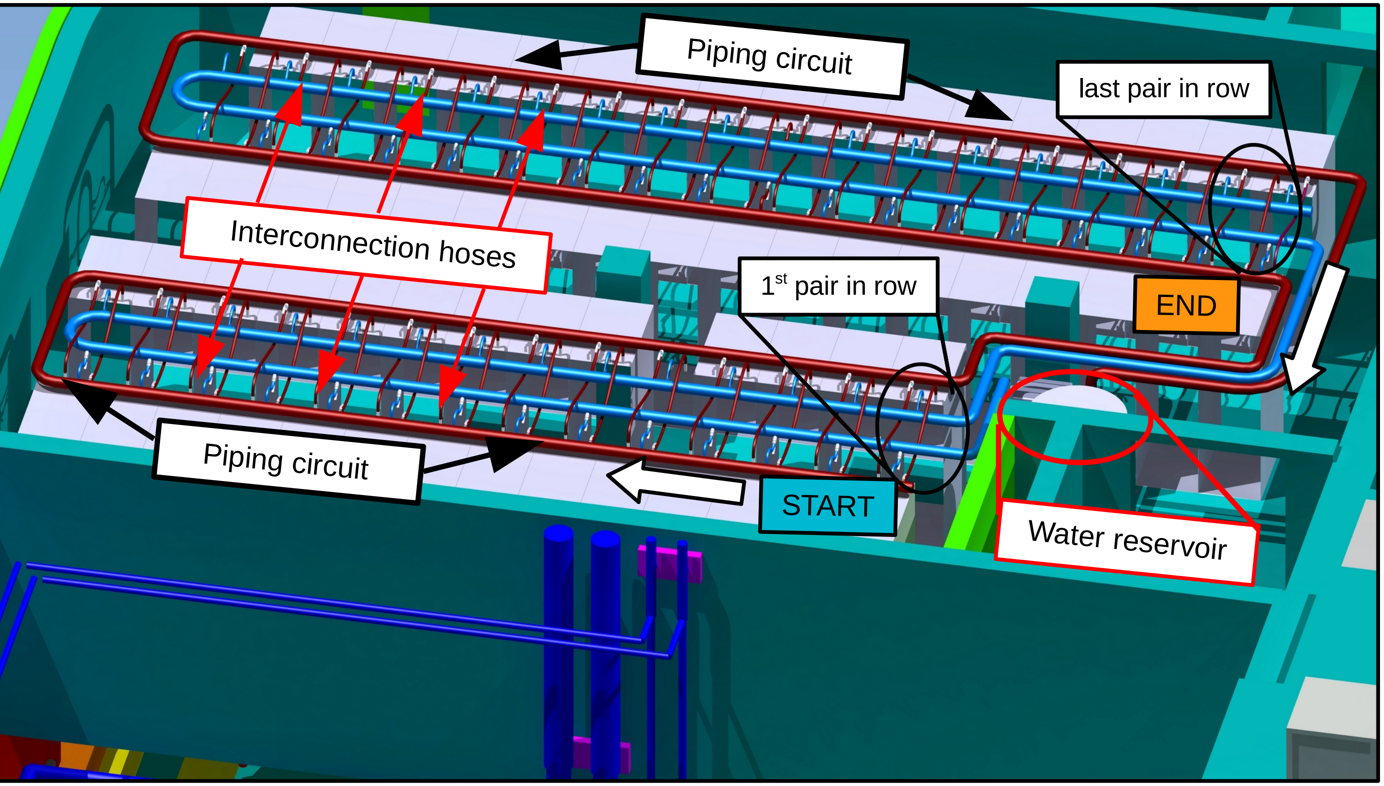
3. (Primary) heat exchanger is fixed to pillar at approx. 1m height.

- Dimension assumed
  400 x 400 x 800 mm Height

<u>Important Note:</u>

(Heat exchanger serves as placeholder only, very likely to change dimension)

1. Design of cooling water piping in Room E30.103 - "*Tichelmann*" routing concept -



Challenge:

- "Last pair in row" needs equal amount of cooling water as "first pair in row" and all others
- Finding equal length for forward & return pipes to water reservoir (check → head losses !)

Aim:

Finding a clever routing strategy

To be clarified:

→ choice of tube size & quality

Question:

How can the "Tichelmann" be implemented for PANDA)

(It works for the GREEN CUBE)

How many racks are needed ?
Assumption now → 59 Racks

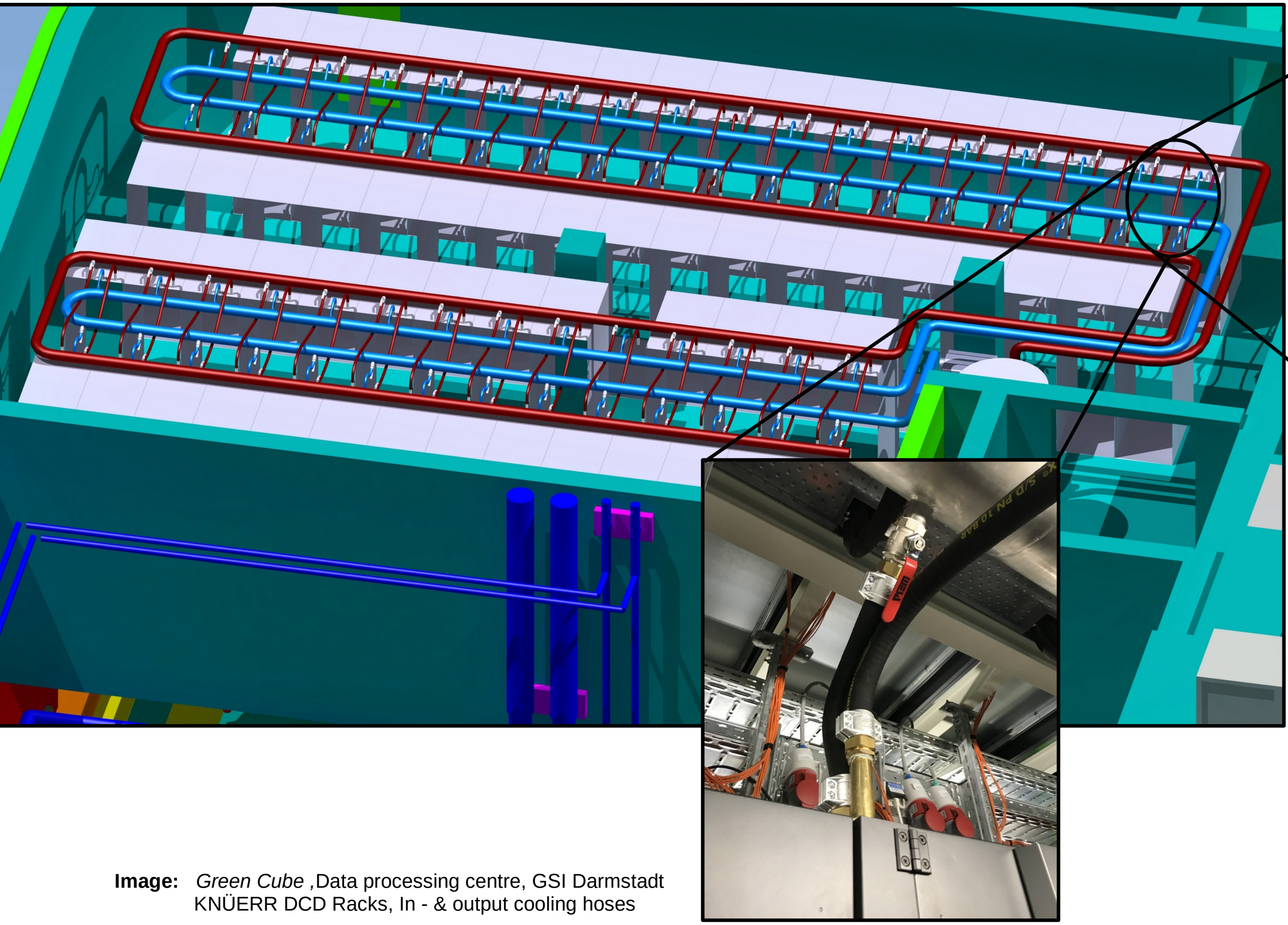
Advantage:

No hydraulic regulation needed if input parameters are chosen with care.

Disadvantage:

May come with higher material costs (depending on topology).

1. Design of cooling water piping in Room E30.103 - Hose connections -



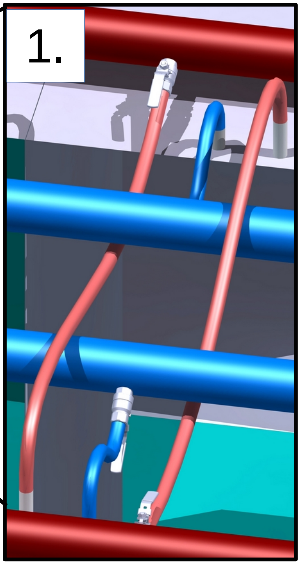


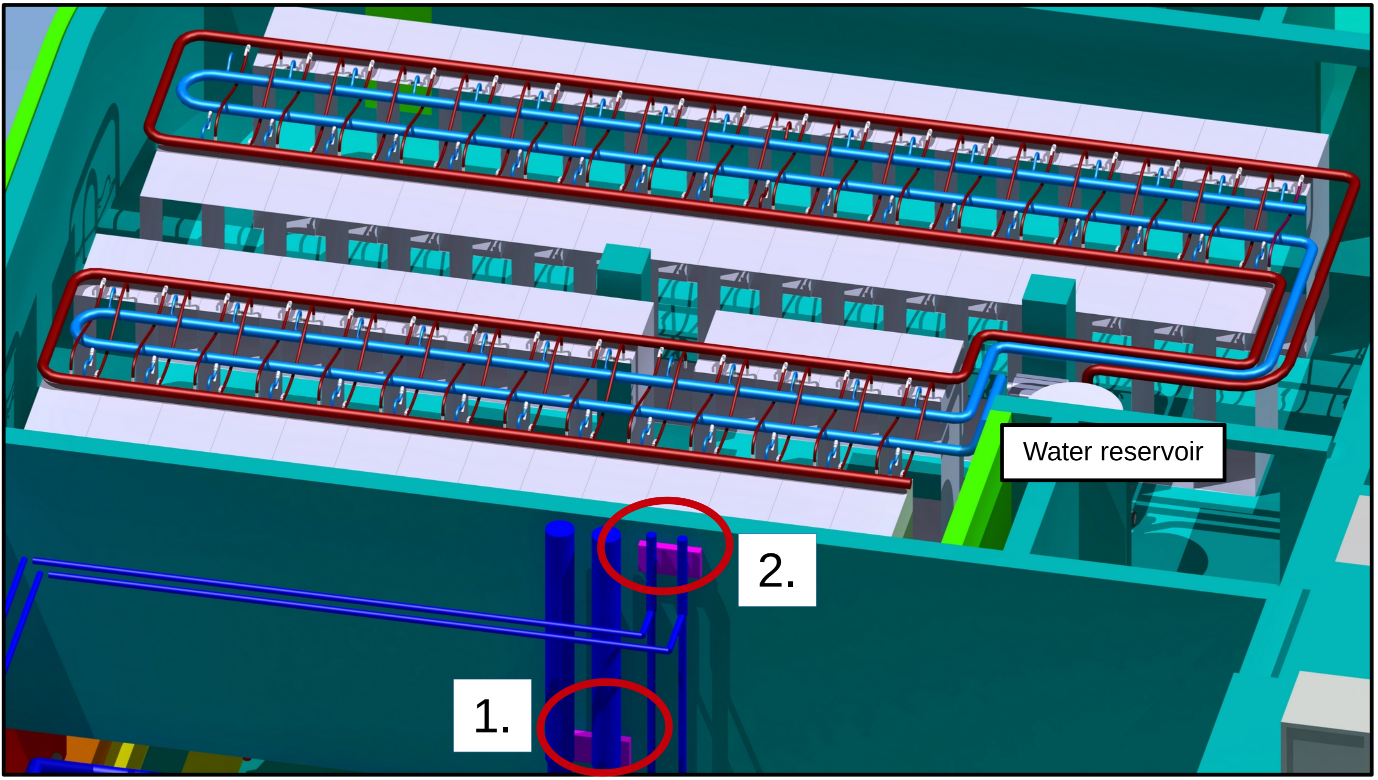
Image: *Green Cube* ,Data processing centre, GSI Darmstadt
KNÜERR DCD Racks, In - & output cooling hoses

1. ball valves attached to welded stubs keep off water from In - and outlet tubes

   Crucial for maintenance and installment

   Facilitates change if leakage occurs (hoses assumed as beeing weakest part in chain)

1. Design of cooling water piping in Room E30.103 - Building infrastructure water access -



Main access water piping routes.

Options:

1. Ø 168 mm line outer diamater

   Access routes are tucked inside false floor between, E20.103 and E30.103

   → cooling water piping conduit en route to water reservoir will start from ground level

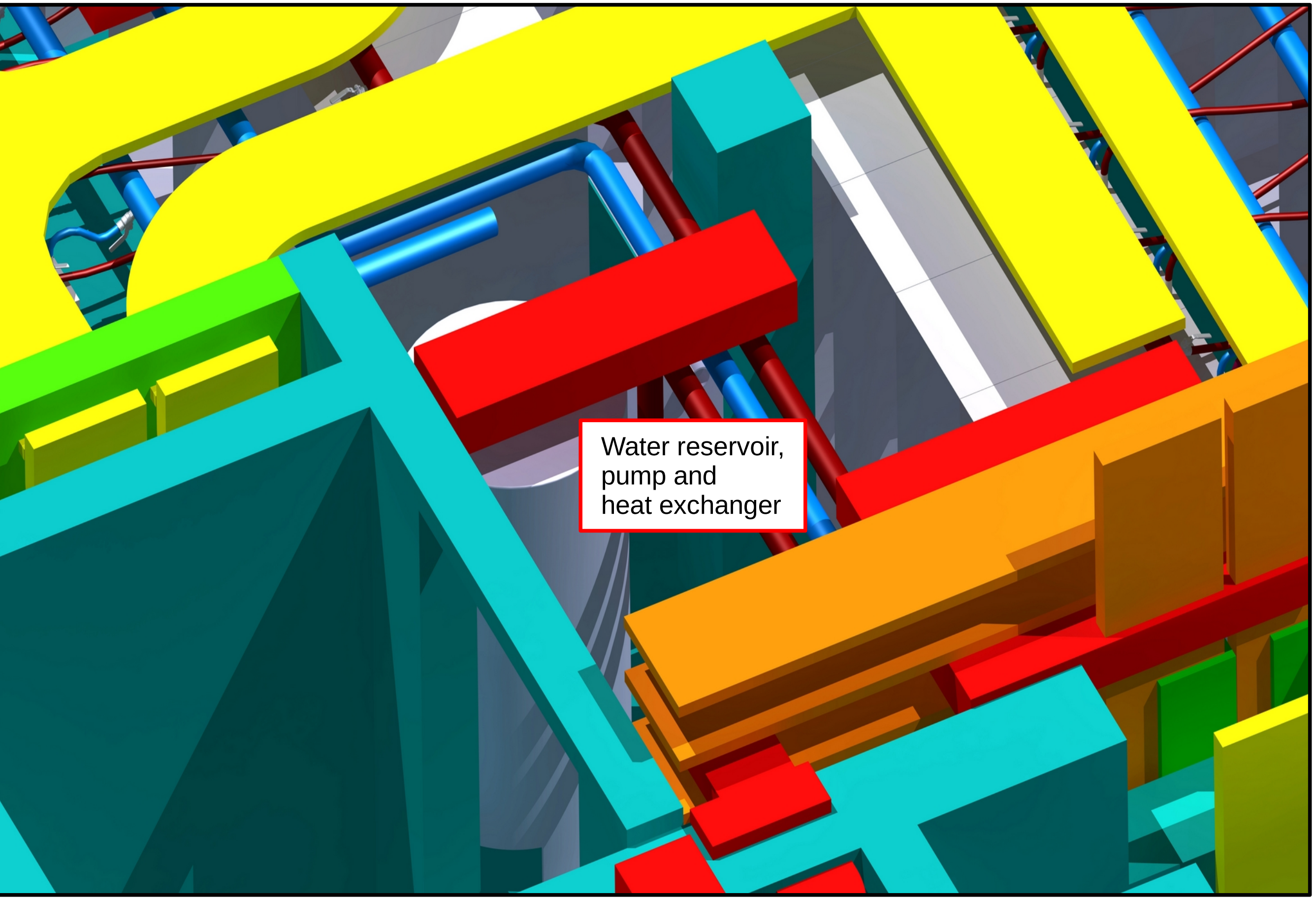
2. Ø 88 mm line

   → cooling water piping conduit will start at top level of racks
   → height 2.2m

<u>To be clarified:</u>

Which option will suit purposes best to avoid piping deviations en route to water reservoir ?

1. Design of cooling water piping in Room E30.103 - Room situation with other assembly -



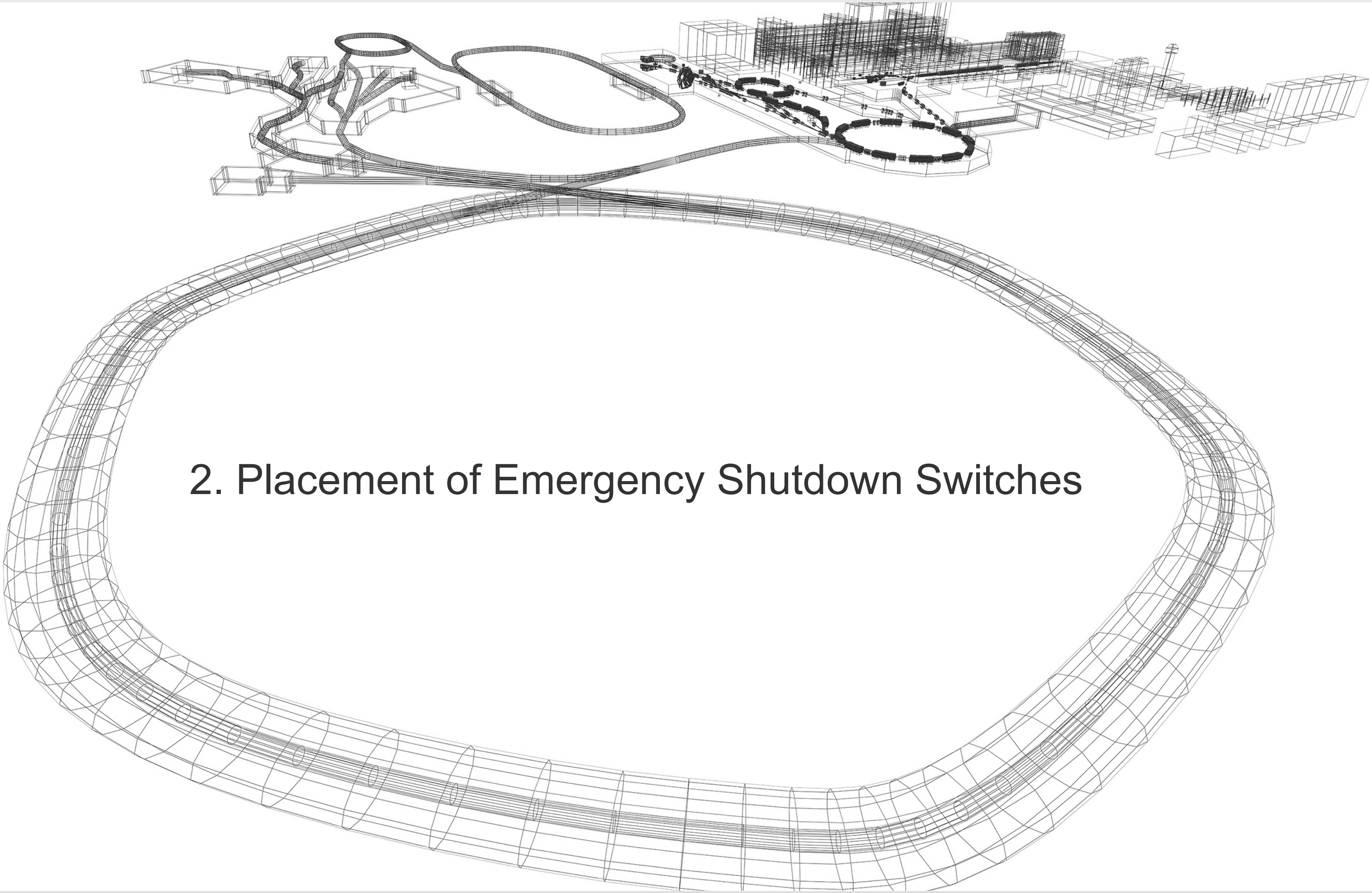
Actual Design does not penetrate existing Technical building infrastructure inside the room

Same goes for water reservoir, pump and Heat exchanger

All Conduit situated underneath adjacent Infrastructural assemblies

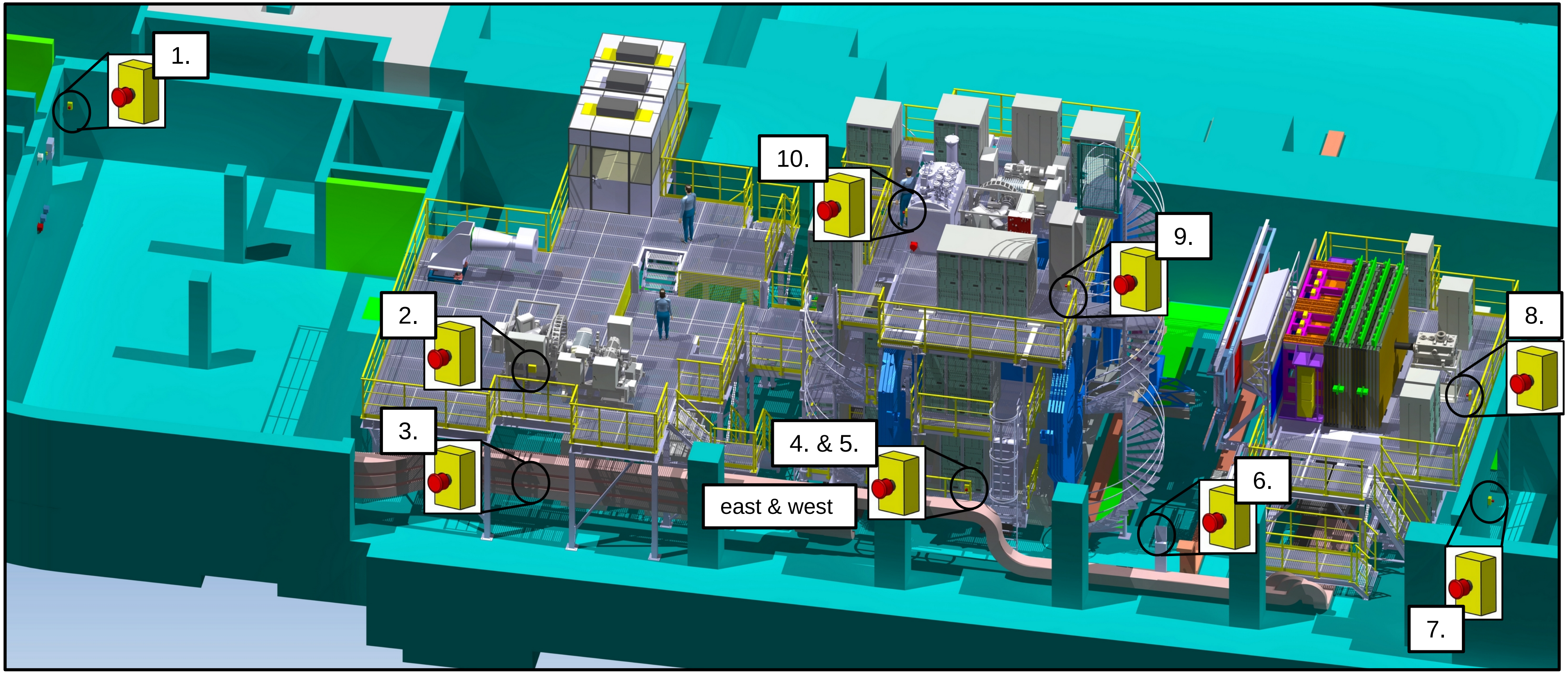
Space to some degree in height direction is available in case piping needs to be changed.

→ bigger dimensions of piping can be realized



2. Placement of Emergency Shutdown Switches

2. Placement of Emergency Shutdown Switches (Total of 26 Emergency Shutdown Switches)



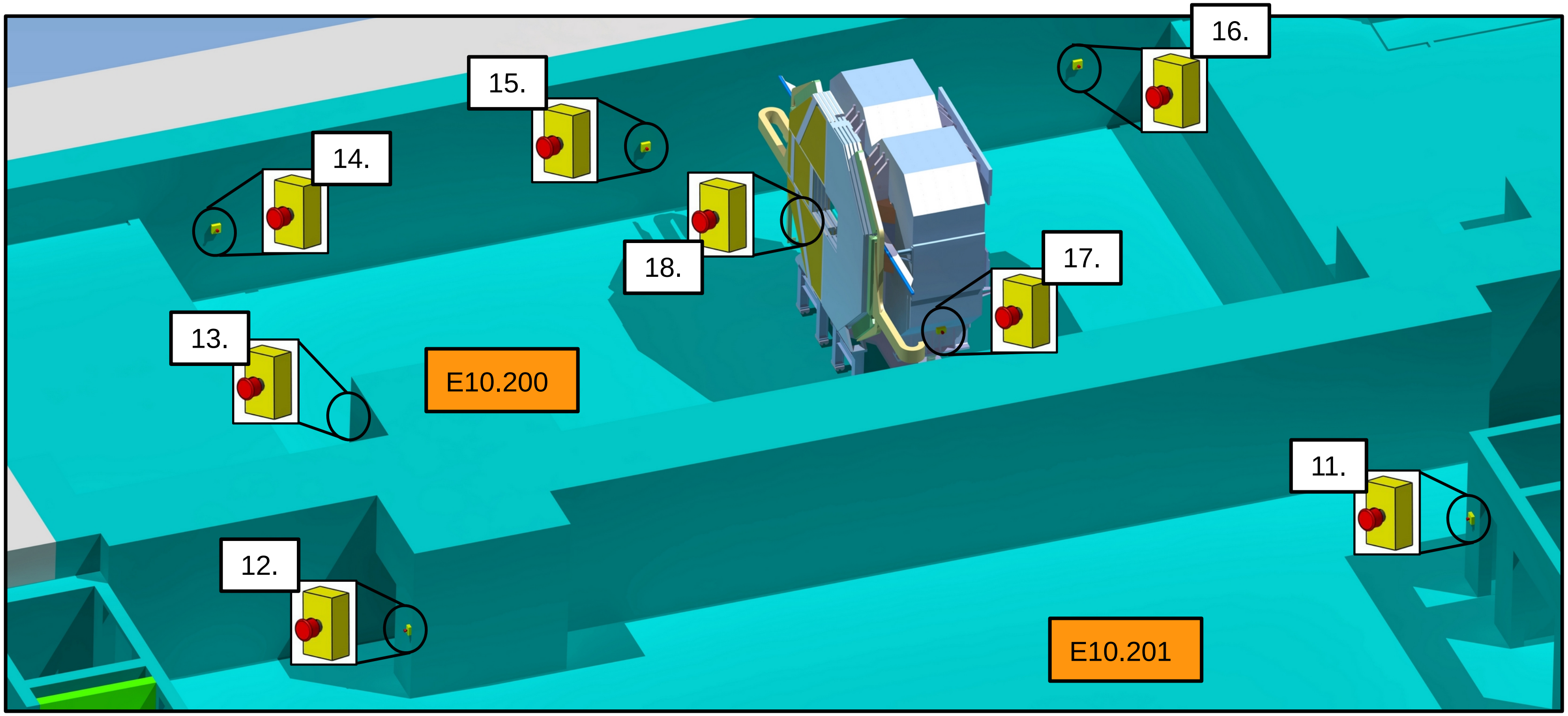
Several Entities:

- Switches assigned to special zones
- Switches moving with the experiment
- Switches coordinated by PANDA / HESR

1. E10.103 Gas supply room
2. column 10 (on extended platform)
3. column 10 (underneath platform)
4. & **5.** E10.201 Solenoid, east & west,
(**Special Zone:** orderly fast ramp down)

6. northwest corner of Solenoid
7. E10.306 (Workshop)
8. on top of forward spectrometer platform
9. on top of solenoid platform E30.201
10. Target equipment,
(**Special Zone**: acting locally)

2. Placement of Emergency Shutdown Switches - Level E.10 -

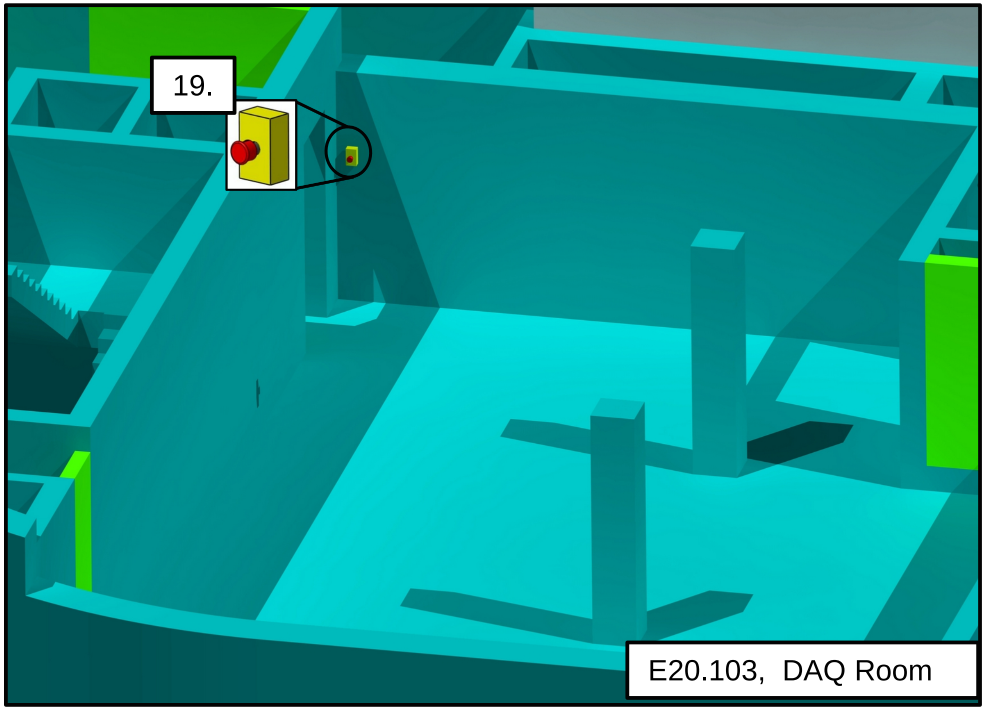


- Responsibility by Jülich HESR -

E 10.201 **11.** Room left to workshop
12. southern person lock to maint. area

E10.200 **13.** person lock to beam area
1**4.,15. & 16.** clutched to Beam tunnel east
17. & 18. DIPOLE (east and west)
(**Special Zone:**
requires an orderly fast ramp down, local action)

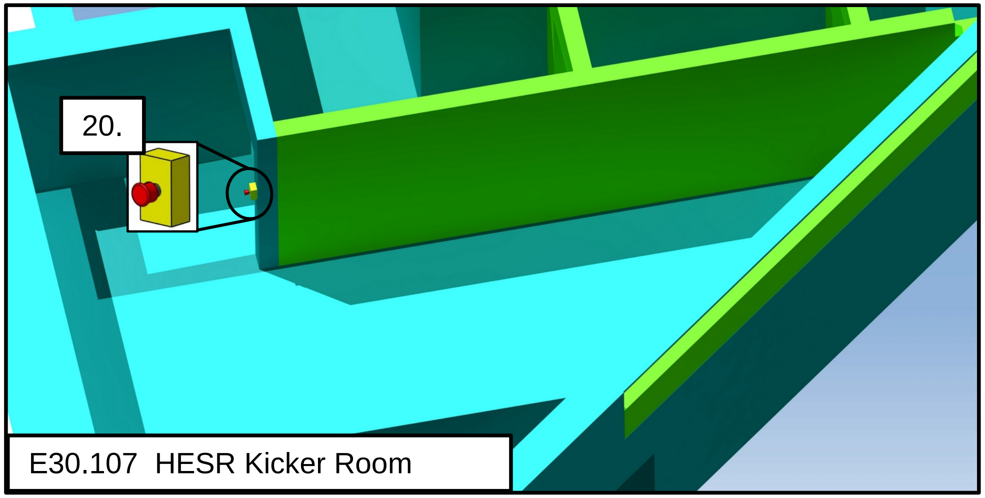
2. Placement of Emergency Shutdown Switches - Level E.20 -

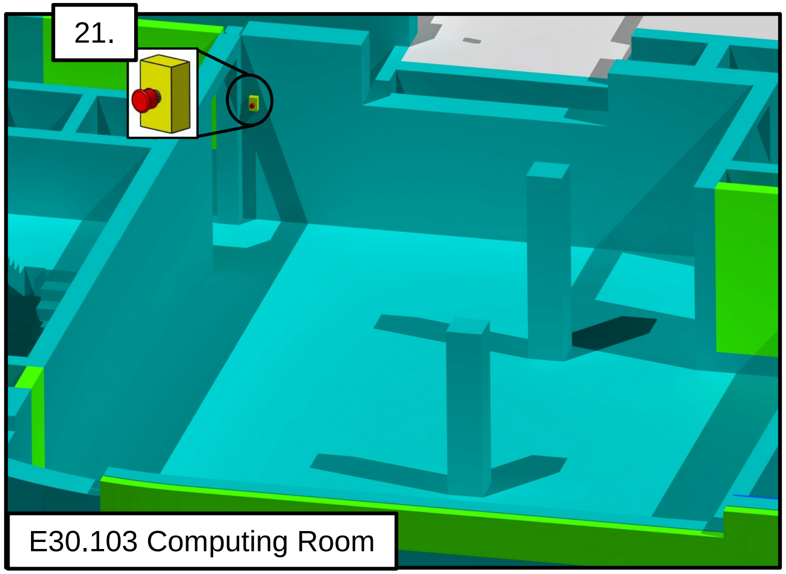


1 Switch inside DAQ Room

19. Close to entrance same height as in gas supply room E30.103

2. Placement of Emergency Shutdown Switches - Level E.30 -

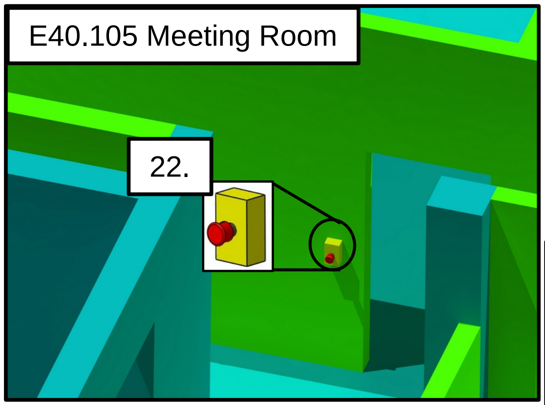


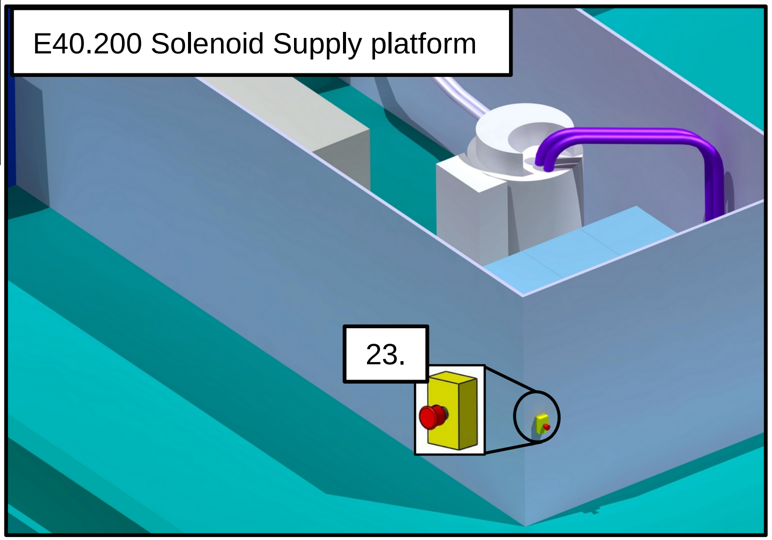


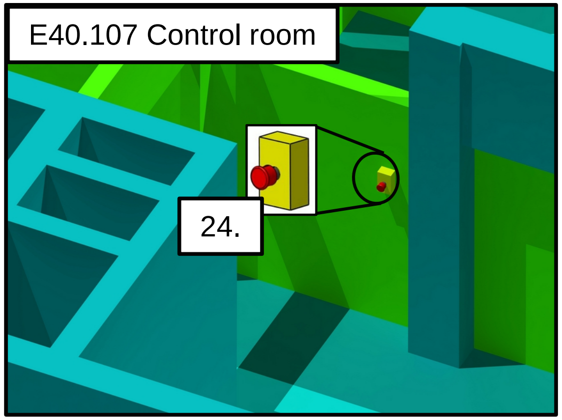
1 Switch inside HESR Kicker Room & 1 Switch inside Computing Room

20. Close to entrance, (**responsibility of Jülich)**
21. Close to entrance, same position as E10.103 Gas Supply Room

2. Placement of Emergency Shutdown Switches - Level E.40 -



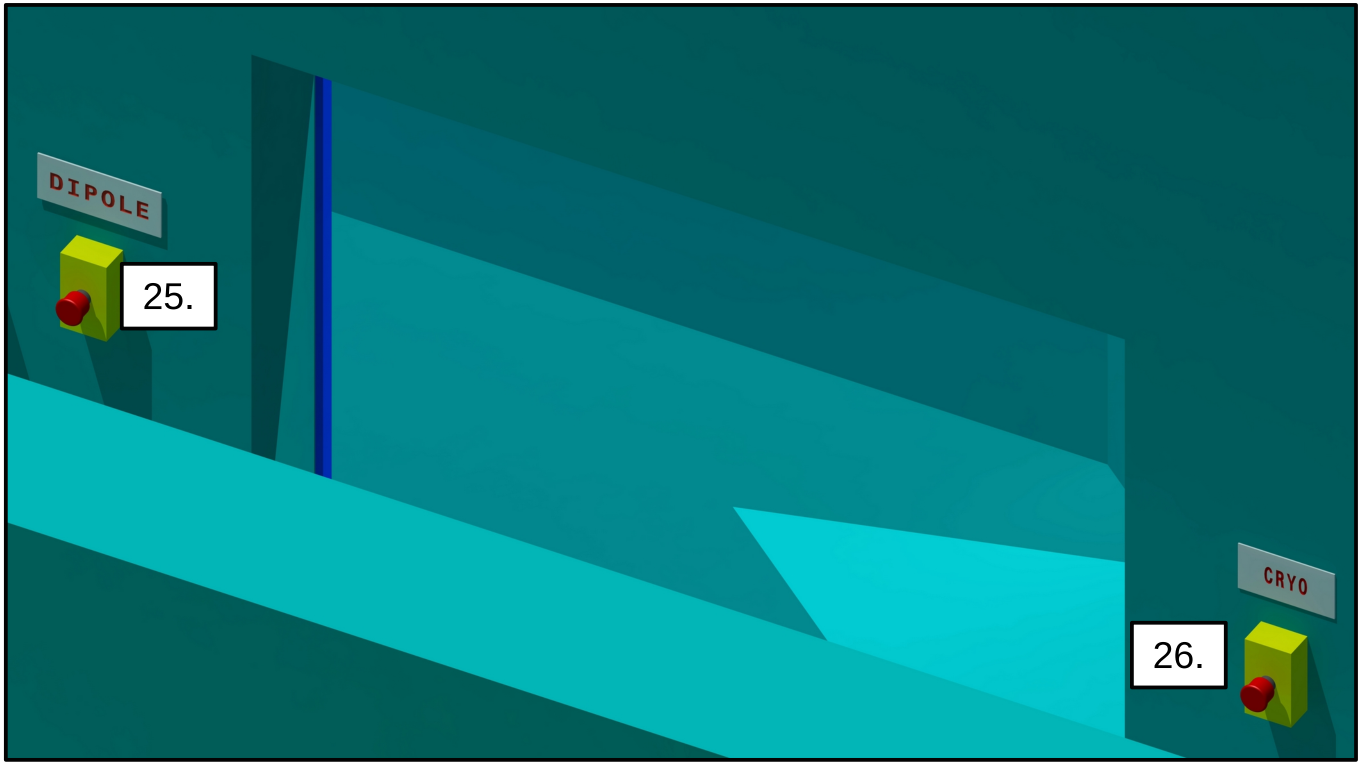




3 more Switches

22. E40.105 Meeting Room, attached to floor close to entrance
23. E40.200 Solenoid Supply platform, attached to lattice room, (**Where is the entrance forseen ?**)
24. E40.107 Control Room, close to exit

2. Placement of Emergency Shutdown Switches (DIPOLE, Cryo Compressor)



Finally 2 Switches located inside E40.310 (Cryo Compressor Room)

Important note:

- Restricted access to power converter room E40.308

  Switch No. 26., E40.308.1 needs to be placed elsewhere

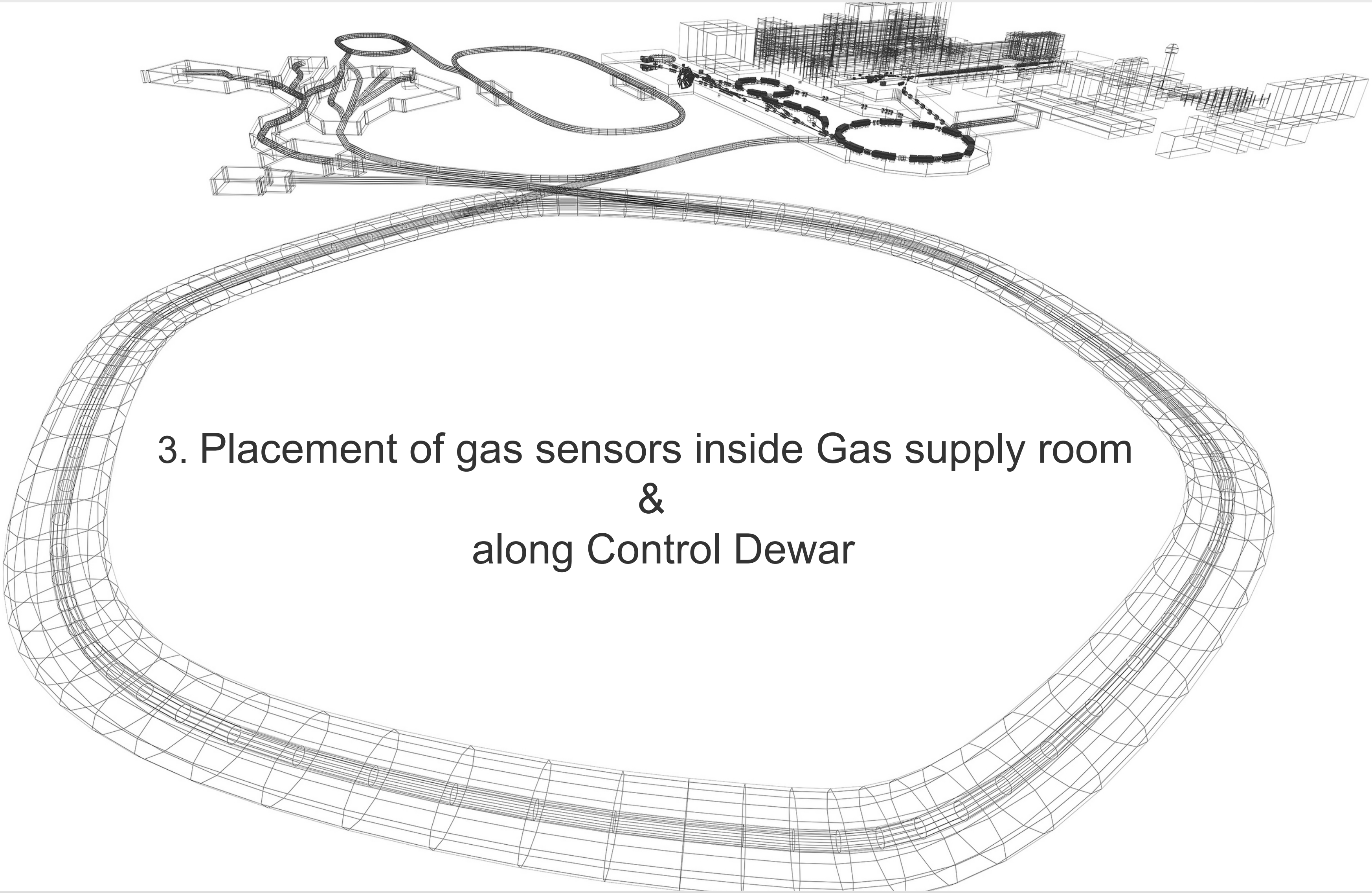
  Solution:

  Placement of both emergency switches located inside Room E40.310

  Both switches are tagged with respective nameplates

  → prevents confusion in case of malfunction of respective machine

25. E40.310.DIPOLE NG, left of entrance (**Special Zone:** triggers ordinary fast ramp down)
26. E40.308 Cryogenic Equipment, entrance right (**Special Zone:** coordinated with Cryogenics Department)

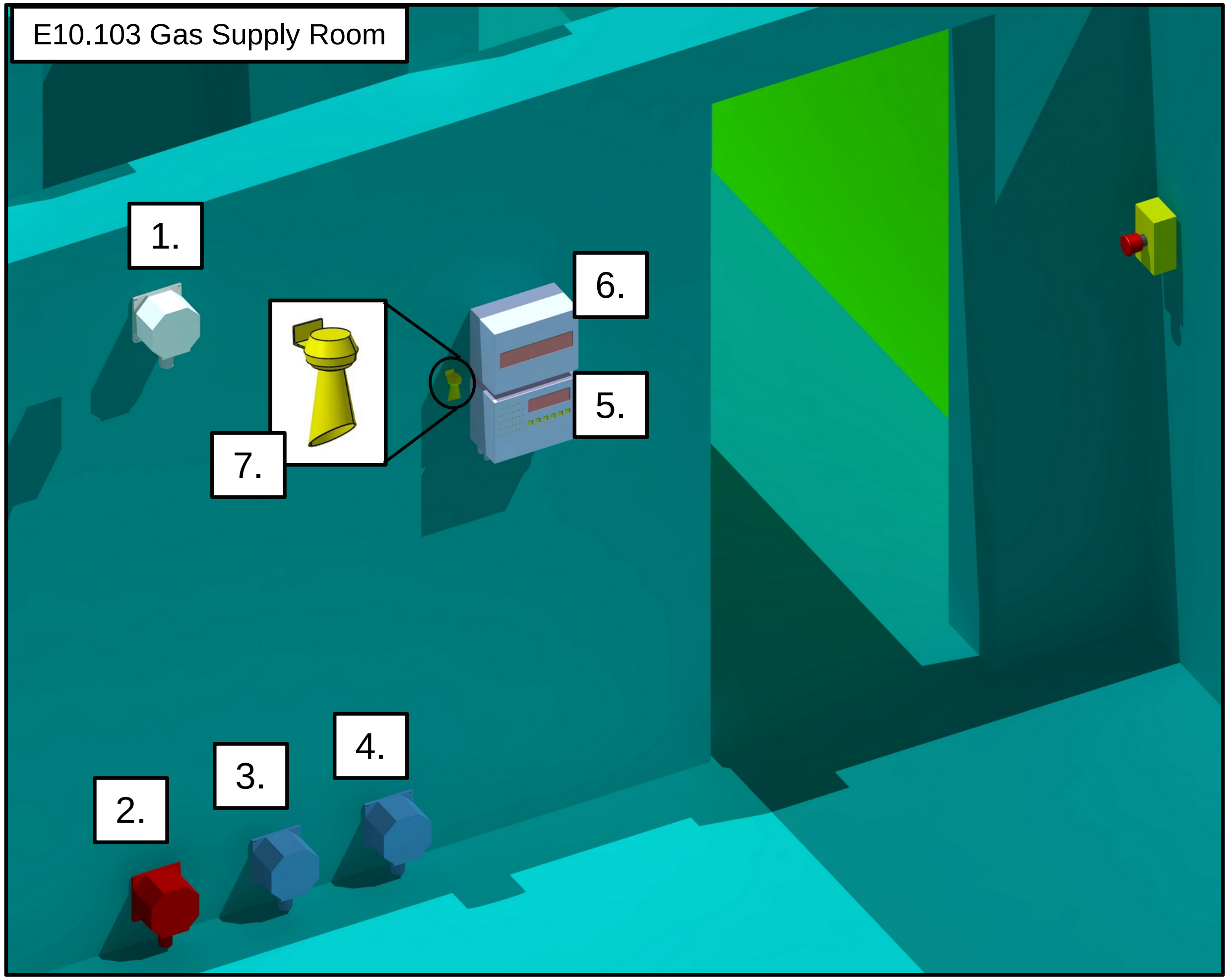


3. Placement of gas sensors inside Gas supply room

&

along Control Dewar

3. Placement of gas sensors in the Gas supply room



- Sensor Station -

Sensor station close to entrance.

Coverage of 6 Gases, only 4 sensors:

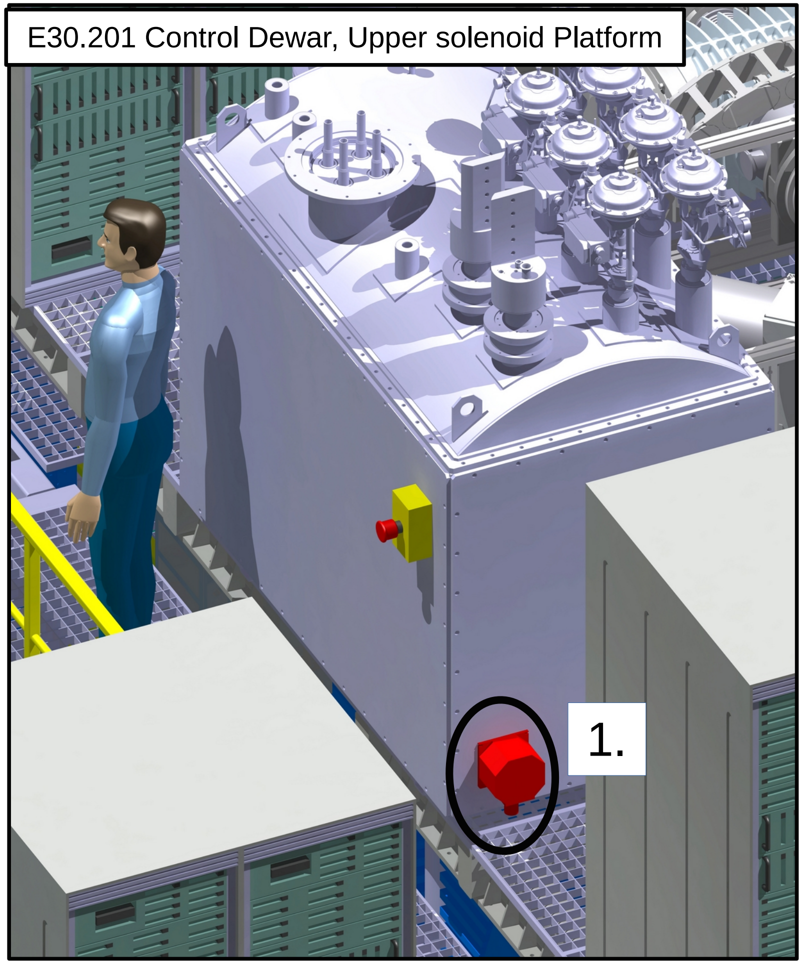
1. upper → detects O2 shortage
& sniffs Argon alike
2. Lowest in row, left →
sniffs Hydrogen
Option: either Type “ExClass 1*****”
or “ExClass 0” (none at all)
3. Lowest middle, senses CO2
4. Lowest right, senses gases
C4H6 & C2H10 Ethane & Isobutan
5.
Signal Station continuously measures actual state.
6. Optical Signal
7. Minihorn (emits up to 92dB)

Question: are 92dB audible enough ?

Optional signal cable can be laid to controlroom for screening.

*** H2 Sensor EX Class1 compliant avalable surplus of 400 ,- Euro each unit making a total of 5100,- Euro / otherwise 4300,- Euro**
(refers to offer from Company EXtox / Unna)

3. Placement of H2 gas sensor along the Control Dewar



1.

2nd H2 Gas Sensor planned to attach close to the Control Dewar for Monitoring H2 Emissions.

An even surface is needed to attach sensor on outside of box perimeter

Options:

Possible location of device on same height as emergency switch or close towards gridded floor.

To be attached in a way as not to pose any risks or impediments when operating

Outlook:

- Placement of water distribution manifolds for primary cooling circuits for MVD, EMC & Solenoid magnet

- Updating the Routing of the cooling water cycle in E30.103, Computing Room
- Updating the Routing of Incoming Transfer/-Lines (Helium,N2)

- Detailed Routing of Experimentgas-lines to the Gas Supply Room & and to the Spectrometer

THANK YOU