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List of abbreviations:

APTE	Application of corporation (professional) methods
BD	Basic design
BEER	Beamline for European Materials Engineering Research
DD	Detail design
ESS	European Spallation Source
FAST	Function analysis system technique
FC	constraint functions
FP	main functions
HZG	Helmholtz-Zentrum Geesthacht
I&C	Instrumentation and control
NPI	Nuclear Physics Institute
PSS	Personal safety system
RTG	Rontgen radiations

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1 INTRODUCTION

The purpose of this document is to describe the sliding door design.

The design of sliding door is based on radiological shielding calculation as well as on civil structure of Experimental cave. In [1] are detailed the radiological calculations of the sliding door.

2 SLIDING DOOR DESIGN

2.1 GENERAL DESCRIPTION

The sliding door is part of the W2-BEER (herafter BEER) instrument. It is in the experimental cave in building E01. In Figure 1 is shown the configuration of the BEER instrument.

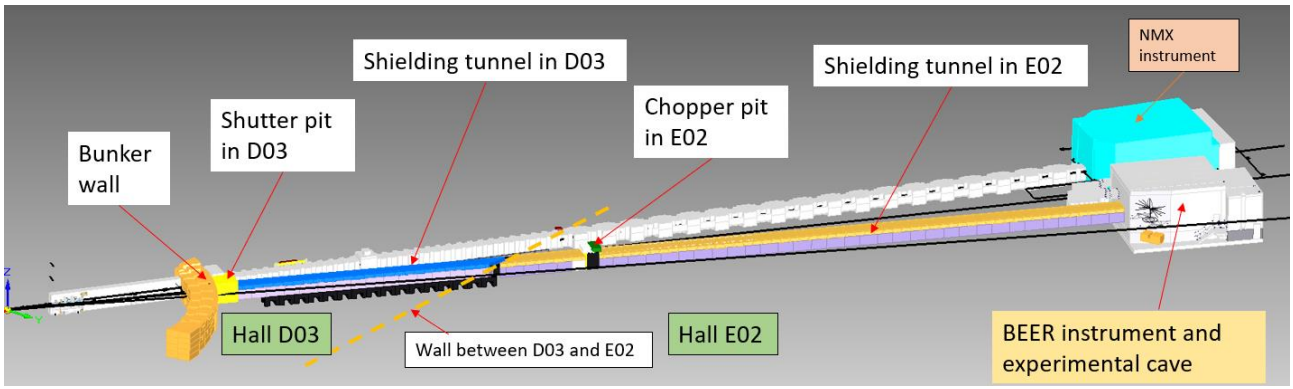


Figure 1: 3D view of BEER instrument and MNX instrument

The main functions of the sliding door are to:

- prevent penetration of neutrons as well RTG radiations out of Experimental cave
- ensure a safe operation for the personal

3D view of the sliding door in the experimental cave is shown in Figure 2.

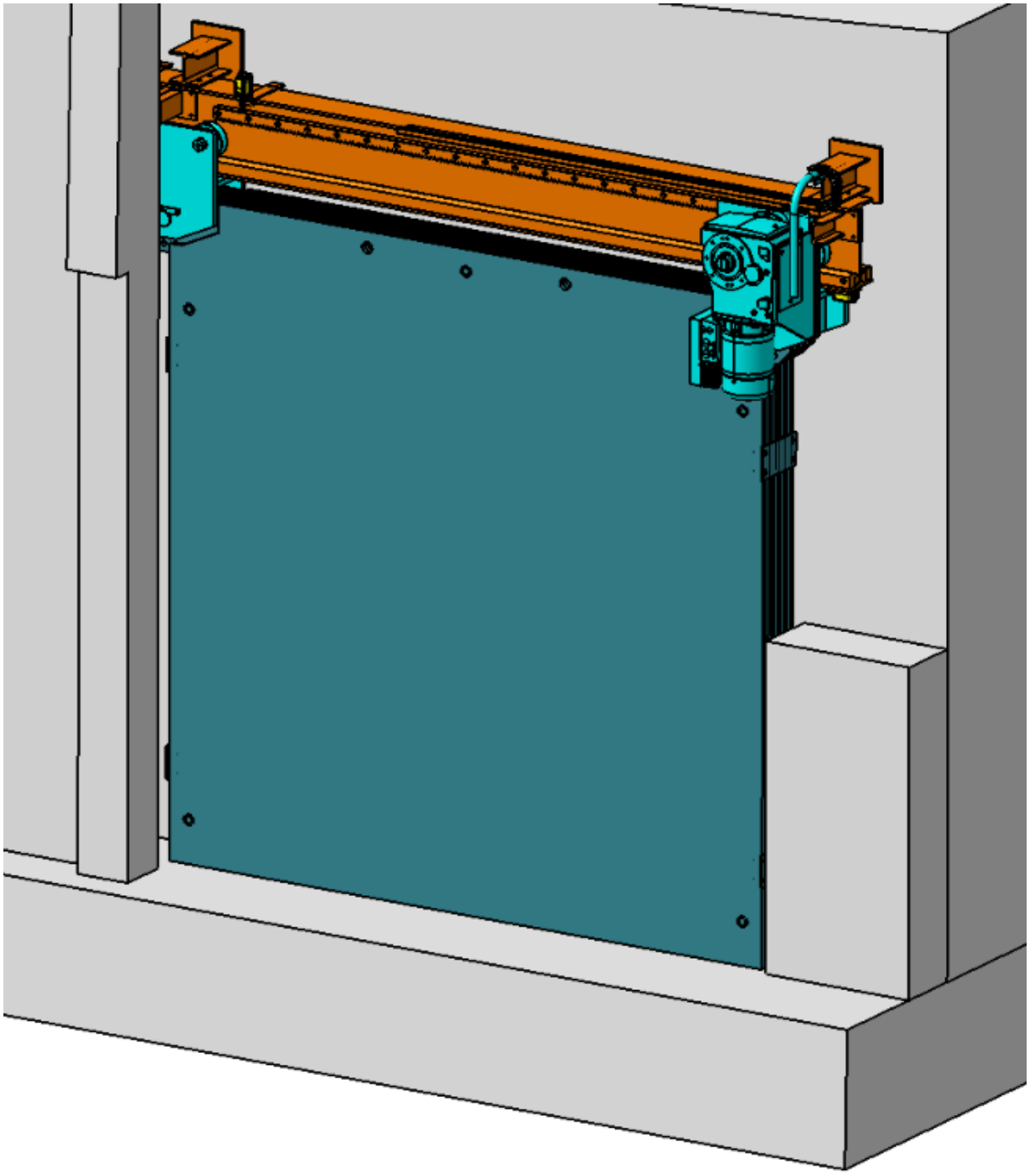


Figure 2: 3D view of the sliding door in experimental cave

2.2 INTERFACES

The main interfaces of the sliding door with other systems are described below.

Interface	To component
End-switch system	Personal safety system
Moving mechanism	Instrument control
Beam consoles	Wall of experimental cave

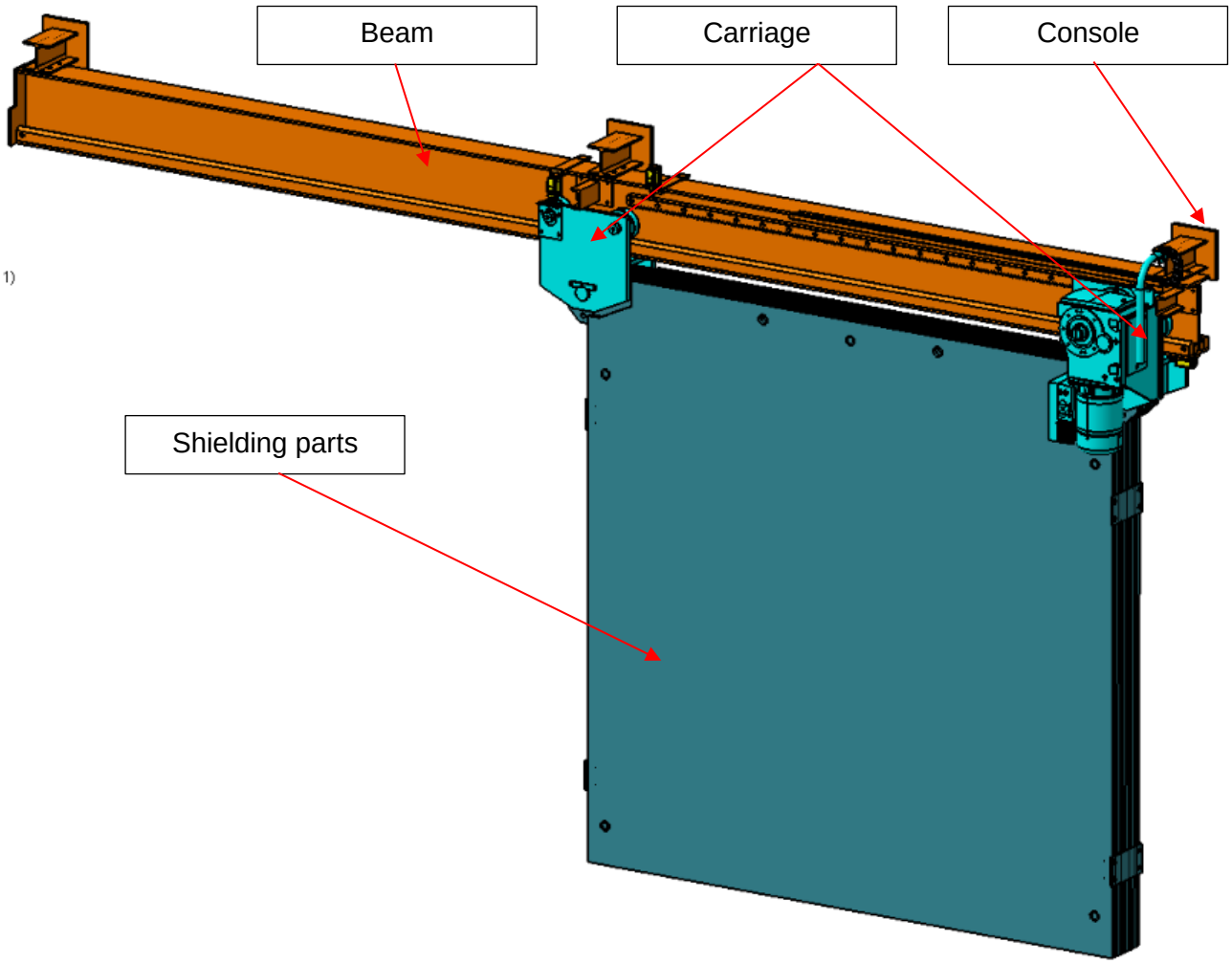
Table 1: Interfaces

2.3 MAIN PARAMETERS:

Weight:	9 992 kg
Dimensions:	2400 x 2400 x 200 mm (height x width x thickness)
Length of track (opening width):	2000 mm
Door opening time:	<40 s
Door closing time:	<40 s

2.4 BATTERY LIMITS

A 3D view of the sliding door is shown in Figure 3.



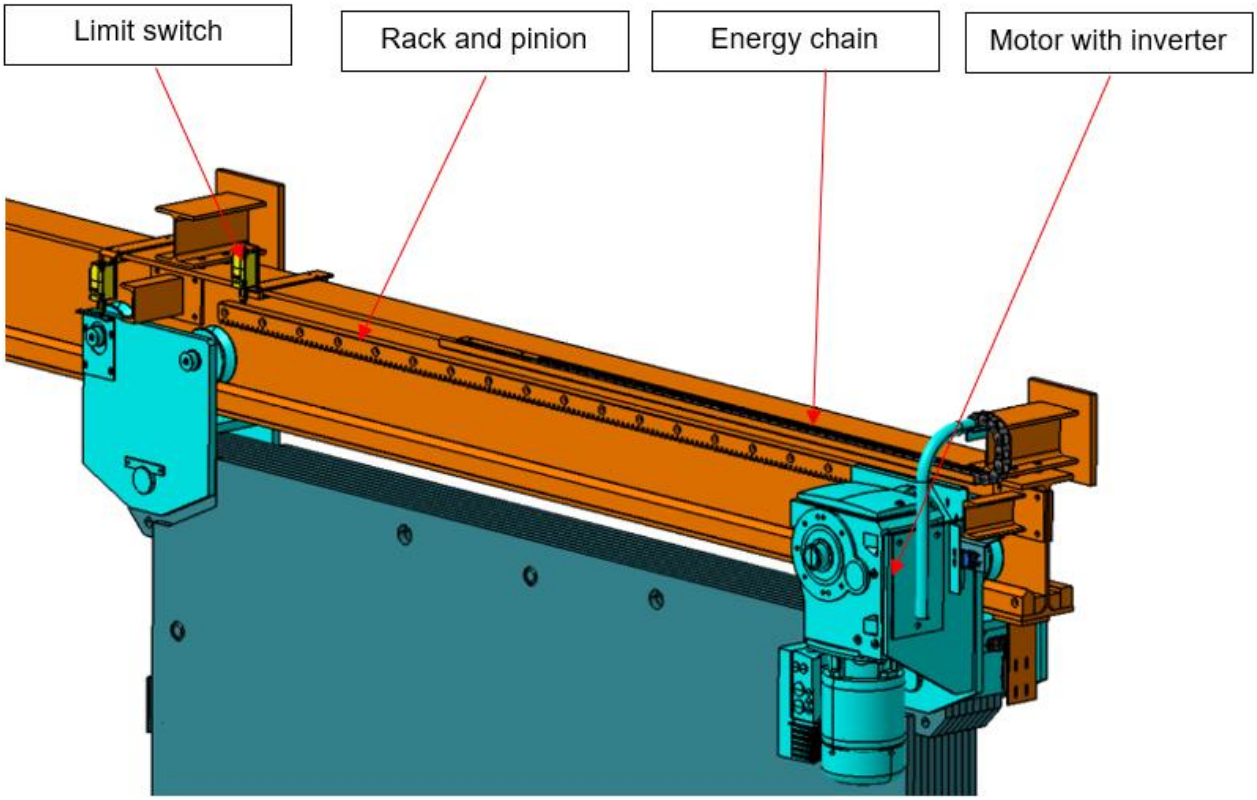


Figure 3: 3D view of sliding door

The sliding door includes the following parts:

- 3 x Consoles,
- Beam,
- 2 x Carriages,
- Electrical motor with built-in inverter,
- 1 x rack and pinion,
- Shielding part consisting of sheet layers,
- 2 x position switches for operation (closed and opened position),
- 2 x position switches for PSS Electric control panel,
- Energy chain,
- Electric control panel (could be part of BEER instrument I&C supply),
- Electric cables (could be part of BEER instrument I&C supply),

2.5 ASSUMPTIONS

- The sliding door is not classified as a safety component. One position switch, that detects when the sliding door is closed, is connected to PSS to permit personnel access or not. This switch is a safety classified component.

2.6 FUNCTIONAL ANALYSIS

A functional analysis of the sliding door has been performed using APTE method. An octopus diagram of the system is shown in Figure 4. The associated main functions “FP” and constraint functions “FC” are listed in Table 2.

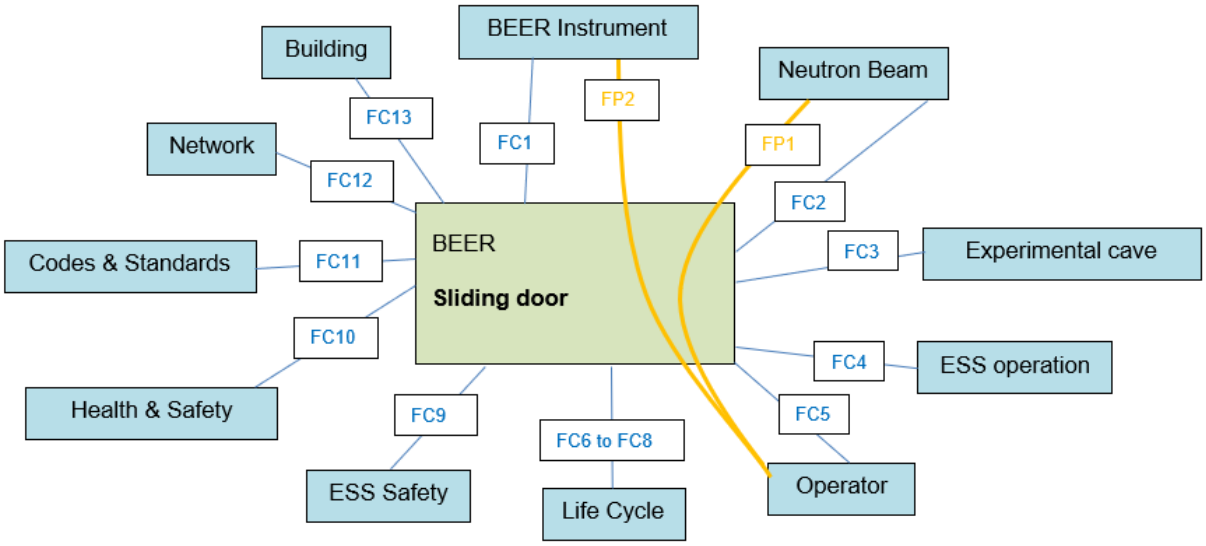


Figure 4: Octopus diagram of sliding door

FP1	To shield the neutron beam and allow a safe operator access in required areas
FP2	To be operated according to the operation and maintenance plan of BEER instrument
FC1	To be compatible with BEER instrument design
FC2	To be compatible with neutron beam
FC3	To be compatible with experimental cave design
FC4	To be compatible with ESS operation and maintenance plan
FC5	To be controlled by operators
FC6	To be maintainable
FC7	To allow inspection
FC8	To have a life time of XX years (tbd)
FC9	To be compatible with ESS safety requirements
FC10	To comply with health and safety rules
FC11	To comply with codes and standards
FC12	To connect with Network
FC13	To be compatible with Building design

Table 2: List of functions of sliding door

FAST diagrams of the above functions are shown below in Figure 5 and Figure 6

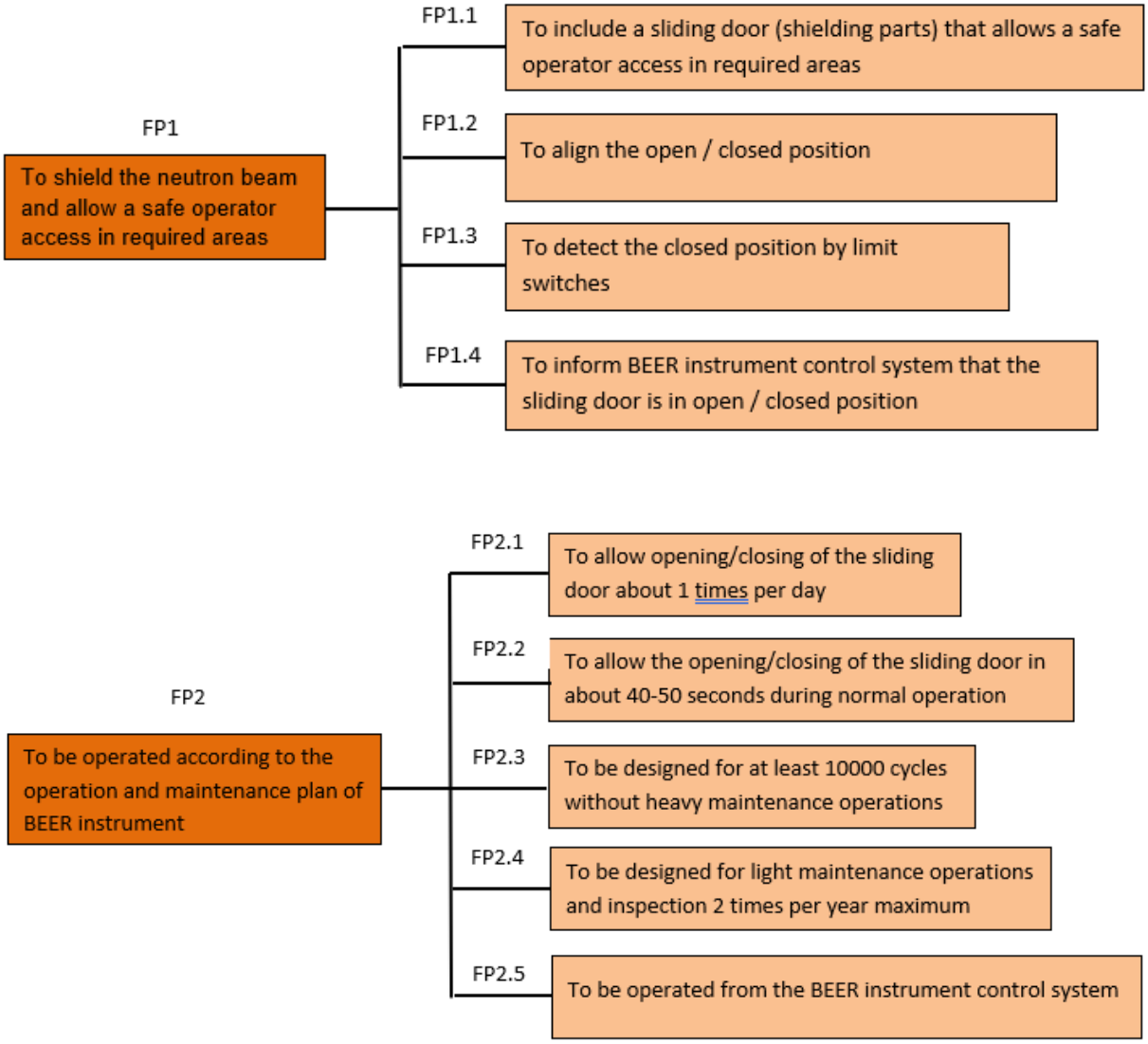
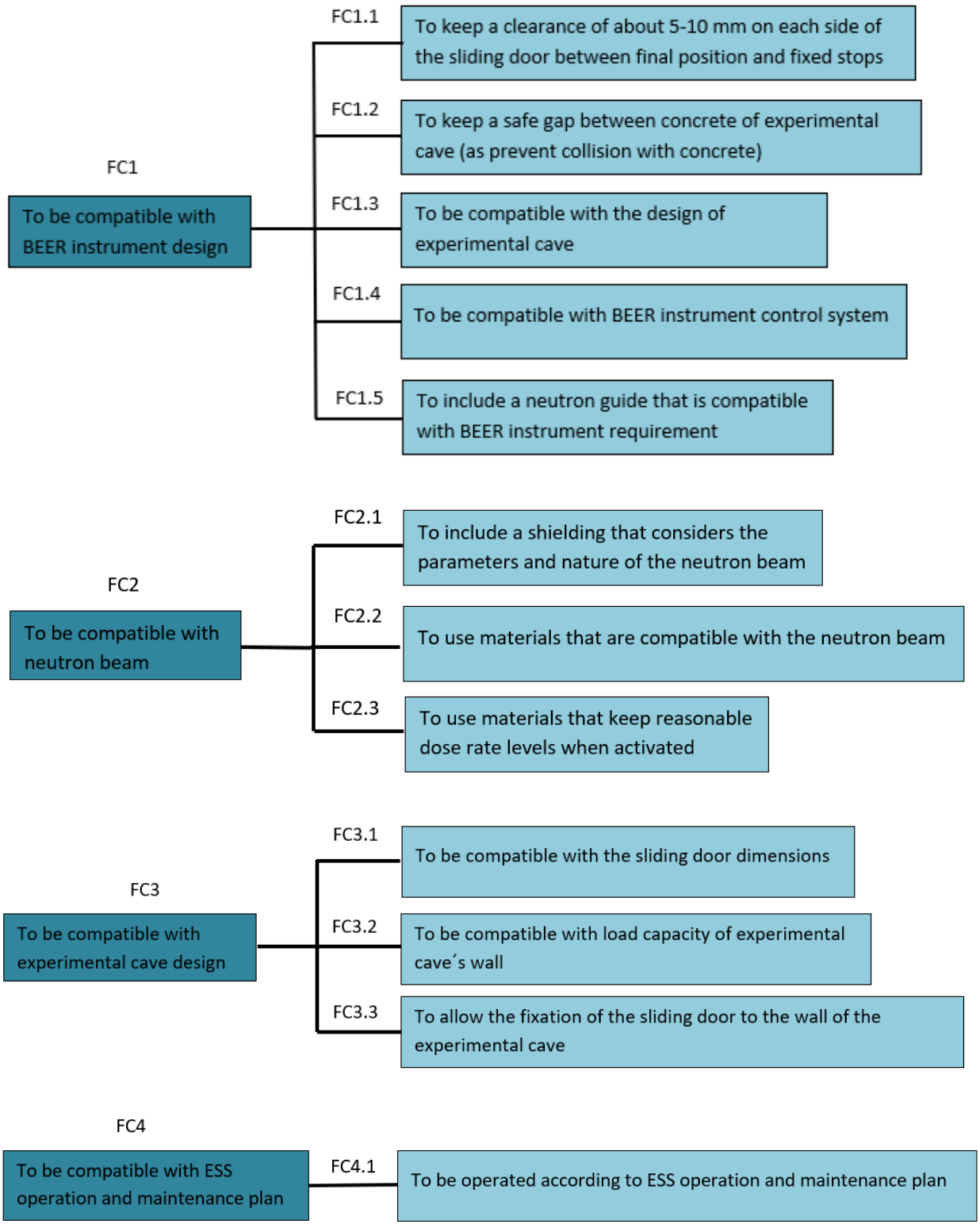
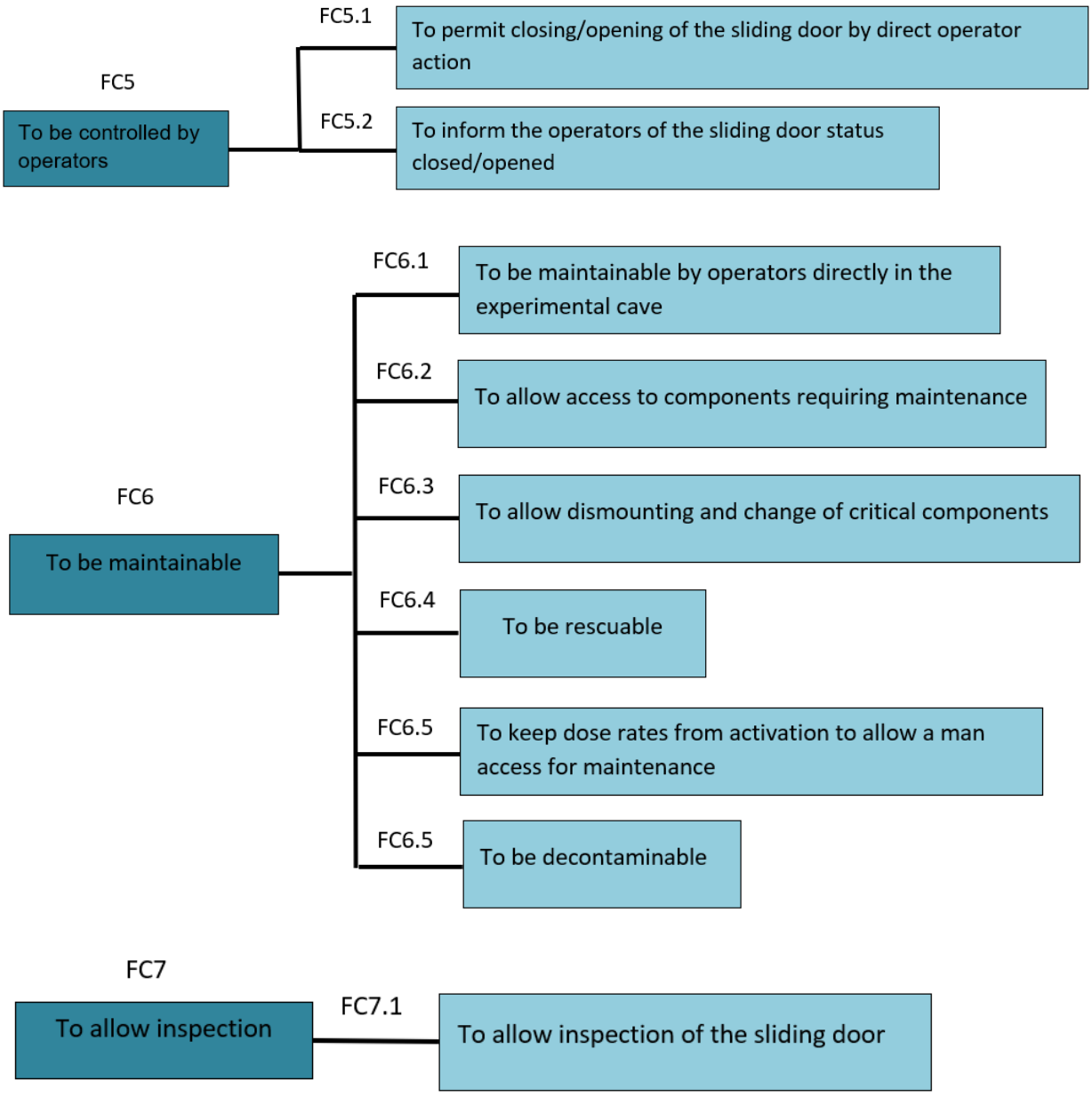
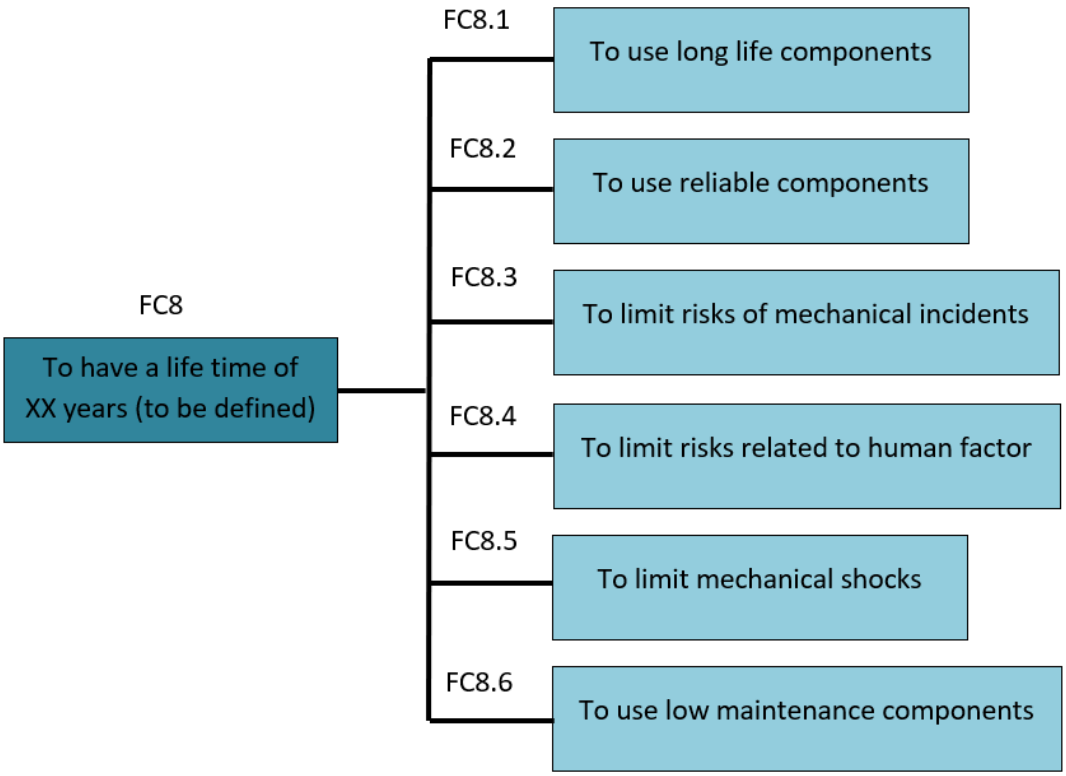
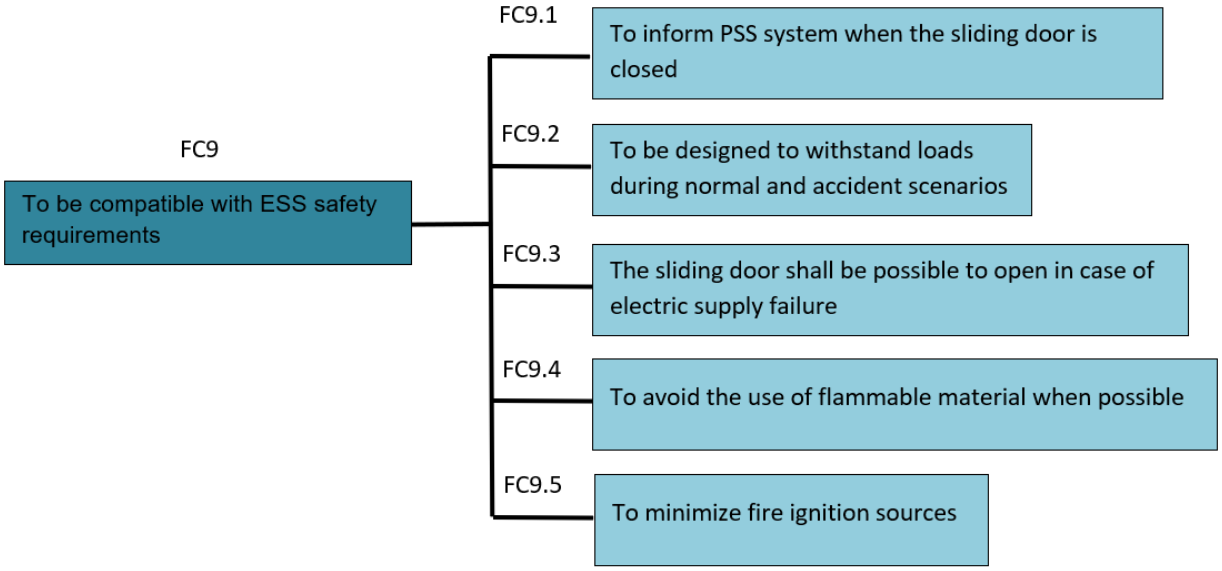


Figure 5: FAST diagram of Main Functions of the sliding door


FC1
To be compatible with BEER instrument design
FC1.1
To keep a clearance of about 5-10 mm on each side of the sliding door between final position and fixed stops
FC1.2
To keep a safe gap between concrete of experimental cave (as prevent collision with concrete)
FC1.3
To be compatible with the design of experimental cave
FC1.4
To be compatible with BEER instrument control system
FC1.5
To include a neutron guide that is compatible with BEER instrument requirement
FC2
To be compatible with neutron beam
FC2.1
To include a shielding that considers the parameters and nature of the neutron beam
FC2.2
To use materials that are compatible with the neutron beam
FC2.3
To use materials that keep reasonable dose rate levels when activated
FC3
To be compatible with experimental cave design
FC3.1
To be compatible with the sliding door dimensions
FC3.2
To be compatible with load capacity of experimental cave´s wall
FC3.3
To allow the fixation of the sliding door to the wall of the experimental cave
FC4
To be compatible with ESS operation and maintenance plan
FC4.1
To be operated according to ESS operation and maintenance plan


FC5
To be controlled by operators
FC5.1
To permit closing/opening of the sliding door by direct operator action
FC5.2
To inform the operators of the sliding door status closed/opened
FC6
To be maintainable
FC6.1
To be maintainable by operators directly in the experimental cave
FC6.2
To allow access to components requiring maintenance
FC6.3
To allow dismounting and change of critical components
FC6.4
To be rescuable
FC6.5
To keep dose rates from activation to allow a man access for maintenance
FC6.5
To be decontaminable
FC7
To allow inspection
FC7.1
To allow inspection of the sliding door


FC8
To have a life time of XX years (to be defined)
FC8.1
To use long life components
FC8.2
To use reliable components
FC8.3
To limit risks of mechanical incidents
FC8.4
To limit risks related to human factor
FC8.5
To limit mechanical shocks
FC8.6
To use low maintenance components


FC9
To be compatible with ESS safety requirements
FC9.1
To inform PSS system when the sliding door is closed
FC9.2
To be designed to withstand loads during normal and accident scenarios
FC9.3
The sliding door shall be possible to open in case of electric supply failure
FC9.4
To avoid the use of flammable material when possible
FC9.5
To minimize fire ignition sources

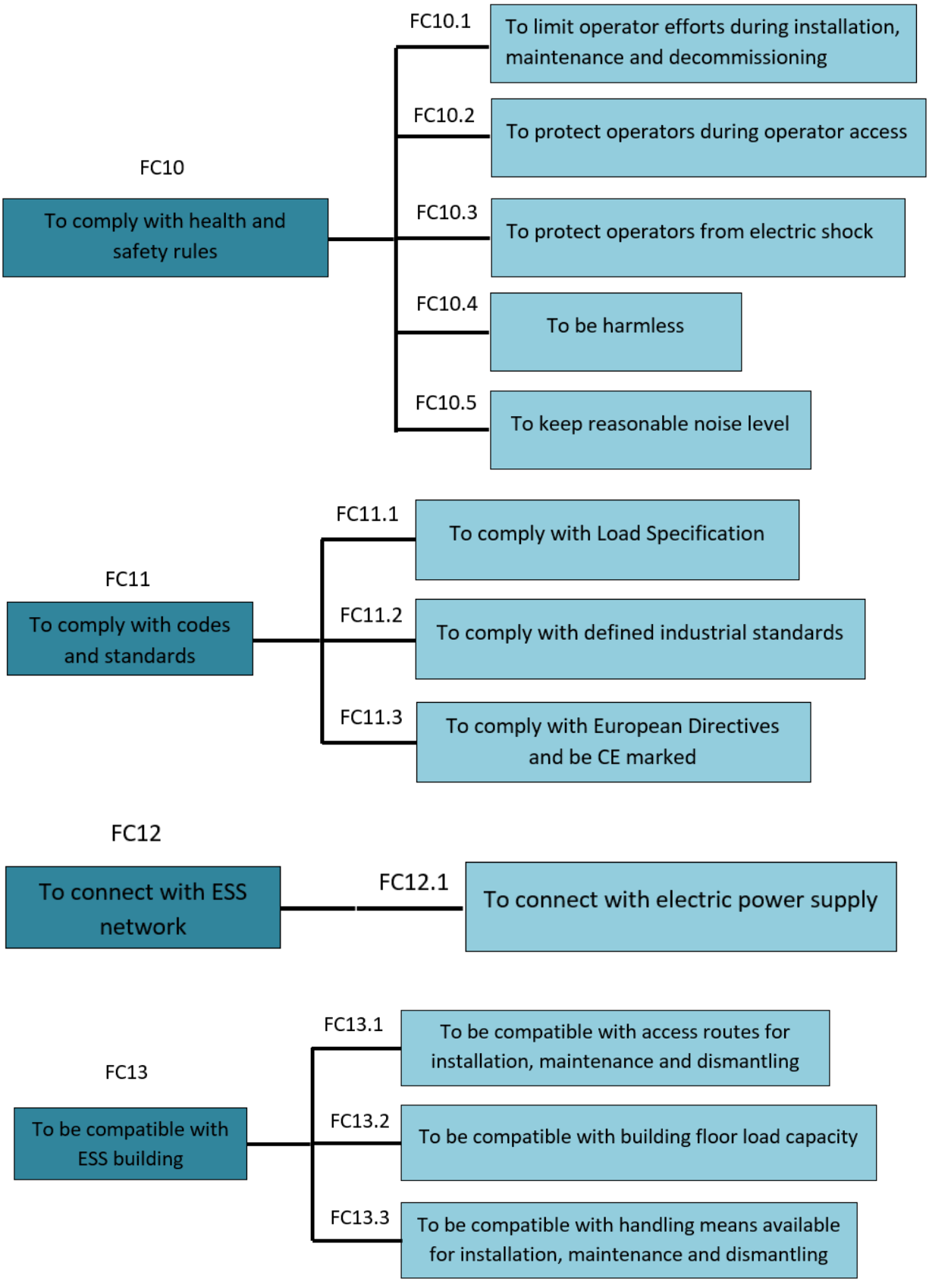


Figure 6: FAST diagram of Constraint Functions of the Sliding door

2.7 REQUIREMENTS

The requirements that apply to the sliding door are listed below in Table 3.

Id	Requirement description
R1	The sliding door shall include a shielding parts that allows a safe operator access in required areas
R2	The sliding door shall align the open / closed position
R3	The sliding door shall detect the closed position by limit switches
R4	The sliding door shall inform BEER instrument control system that the sliding door is in open / closed position
R5	The sliding door shall allow opening/closing of the sliding door about 1 times per day
R6	The sliding door shall allow the opening/closing of the sliding door in about 40-50 seconds during normal operation
R7	The sliding door shall be designed for at least 10000 cycles without heavy maintenance operations
R8	The sliding door shall be designed for light maintenance operations and inspection 2 times per year maximum
R9	The sliding door shall be operated from the BEER instrument control system
R10	The sliding door shall keep a clearance of about 5-10 mm on each side of the sliding door between final position and fixed
R11	The sliding door shall keep a safe gap between concrete of experimental cave (as prevent collision with concrete)
R12	The sliding door shall be compatible with the design of experimental cave
R13	The sliding door shall be compatible with BEER instrument control system
R14	The sliding door shall include a neutron guide that is compatible with BEER instrument requirement
R15	The sliding door shall include a shielding that considers the parameters and nature of the neutron beam
R16	The sliding door shall use materials that are compatible with the neutron beam
R17	The sliding door shall use materials that keep reasonable dose rate levels when activated
R18	The sliding door shall be compatible with the sliding door dimensions
R19	The sliding door shall To be compatible with load capacity of experimental cave´s wall
R20	The sliding door shall allow the fixation of the sliding door to the wall of the experimental cave
R21	The sliding door shall be operated according to ESS operation and maintenance plan
R22	The sliding door shall permit closing/opening of the sliding door by direct operator action
R23	The sliding door shall inform the operators of the sliding door status closed/opened
R24	The sliding door shall be maintainable by operators directly in the experimental cave
R25	The sliding door shall allow access to components requiring maintenance
R26	The sliding door shall allow dismounting and change of critical components
R27	The sliding door shall be rescuable
R28	The sliding door shall keep dose rates from activation to allow a man access for maintenance
R29	The sliding door shall be decontaminable
R30	The sliding door shall allow inspection of the sliding door
R31	The sliding door shall use long life components
R32	The sliding door shall use reliable components
R33	The sliding door shall limit risks of mechanical incidents
R34	The sliding door shall limit risks related to human factor
R35	The sliding door shall limit mechanical shocks
R36	The sliding door shall use low maintenance components
R37	The sliding door shall inform PSS system when the sliding door is closed
R38	The sliding door shall be designed to withstand loads during normal and accident scenarios
R39	The sliding door shall be possible to open in case of electric supply failure
R40	The sliding door shall avoid the use of flammable material when possible
R41	The sliding door shall minimize fire ignition sources
R42	The sliding door shall limit operator efforts during installation, maintenance and decommissioning
R43	The sliding door shall protect operators during operator access
R44	The sliding door shall protect operators from electric shock
R45	The sliding door shall be harmless
R46	The sliding door shall keep reasonable noise level
R47	The sliding door shall comply with Load Specification
R48	The sliding door shall comply with defined industrial standards
R49	The sliding door shall comply with European Directives and be CE marked
R50	The sliding door shall connect with electric power supply
R51	The sliding door shall be compatible with Building access routes for installation, maintenance and dismantling
R52	The sliding door shall be compatible with building floor load capacity
R53	The sliding door shall be compatible with handling means available for installation, maintenance and dismantling

Table 3: List of requirements applicable to the sliding door

2.8 DESCRIPTION

2.8.1 SLIDING DOOR KINEMATIC

The sliding door kinematic is shown in Figure 7-10.

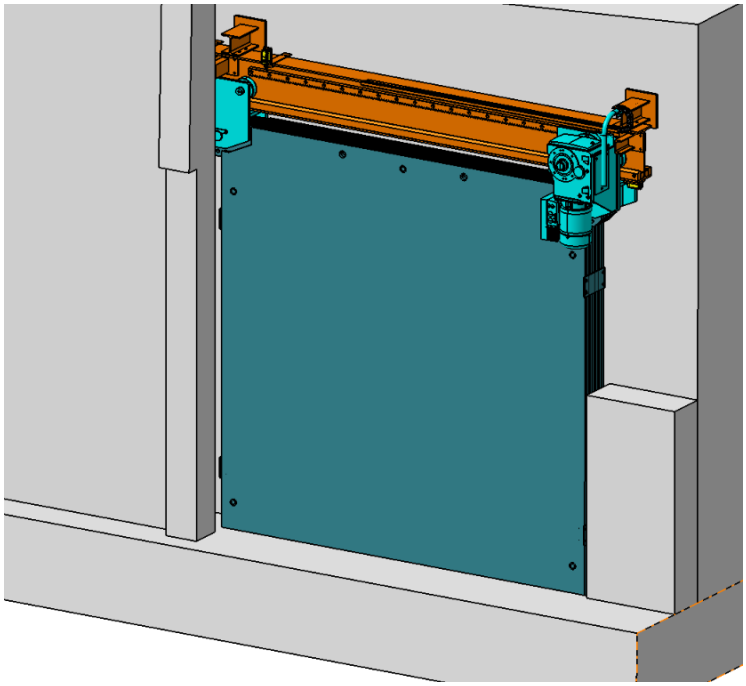


Figure 7: Kinematic of sliding door - closed position - 3D view

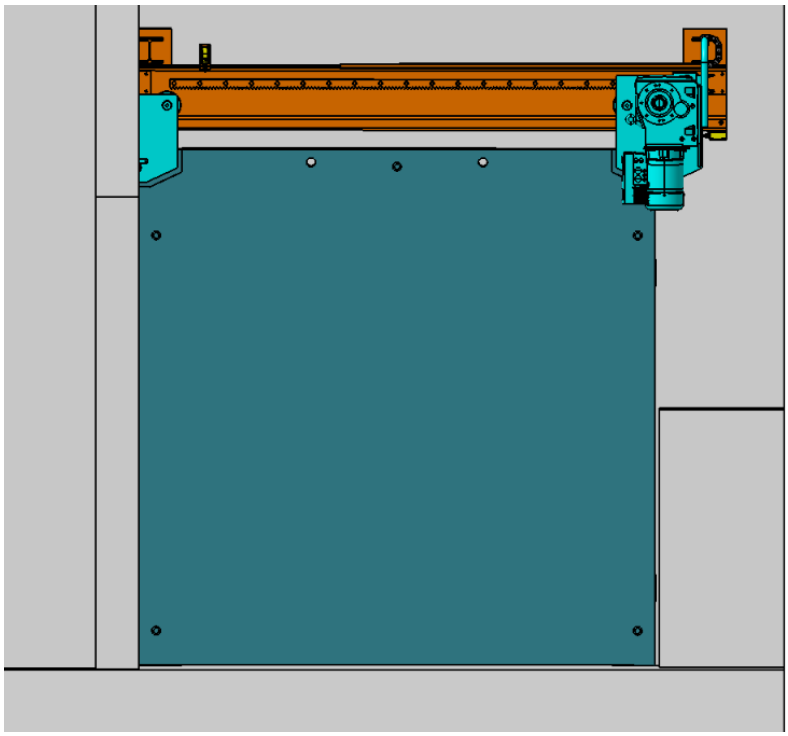


Figure 8: Kinematic of sliding door - closed position

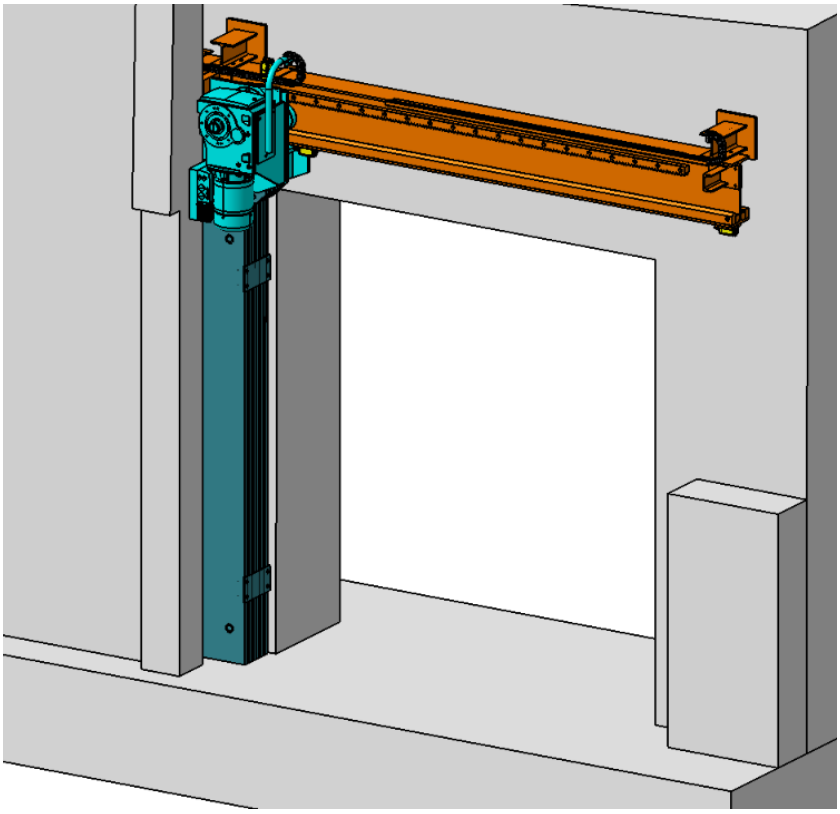


Figure 9: Kinematic of sliding door - opened position - 3D view

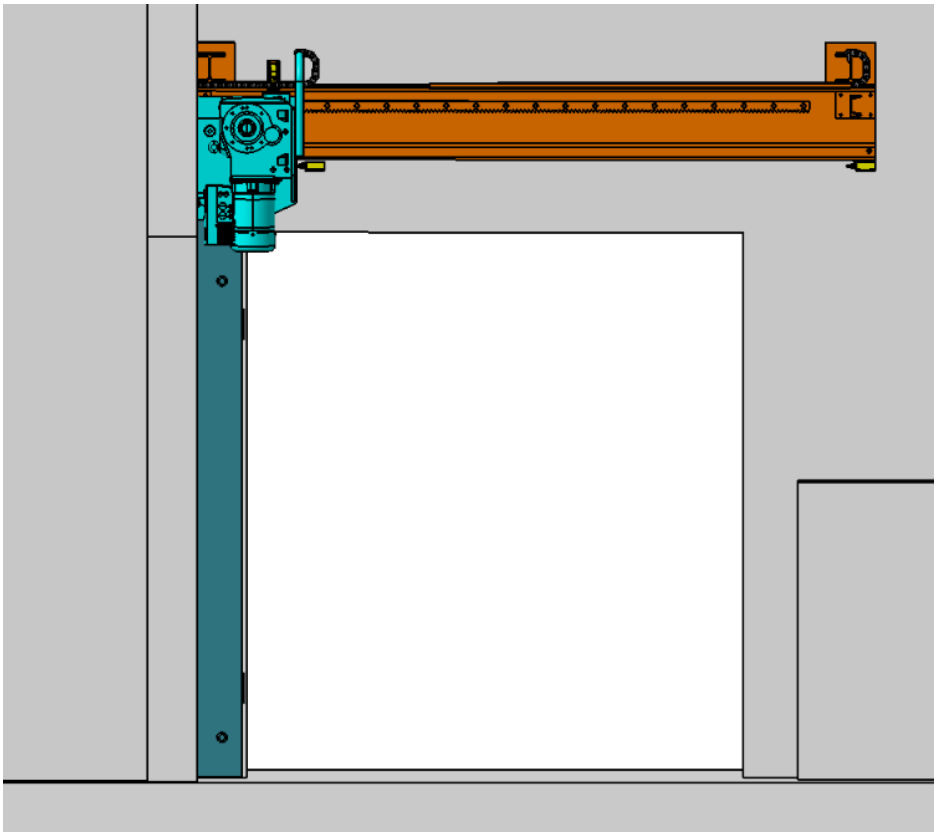


Figure 10: Kinematic of sliding door - opened position

In the Picture 7 and 8, the sliding door is shown in closed position and in the Picture 9 and 10, the sliding door is shown in opened position. When the sliding door is in opened position, the hole in concrete of experimental cave is fully uncovered. To perform this, the sliding door is driven by Electrical motors with built-in inverter.

2.8.2 SLIDING DOOR MAIN PARTS

A 3D view of the sliding door is shown in Figure 3. Each part are described below.

2.8.2.1 SHIELDING PART

The shielding composition and dimensions have been defined based on radiological calculations performed in [1]. The shielding part dimensions are about 2400 x 2400 x 200 mm, its weight is about 9077 kg. It consists from 10 pcs of carbon sheets.

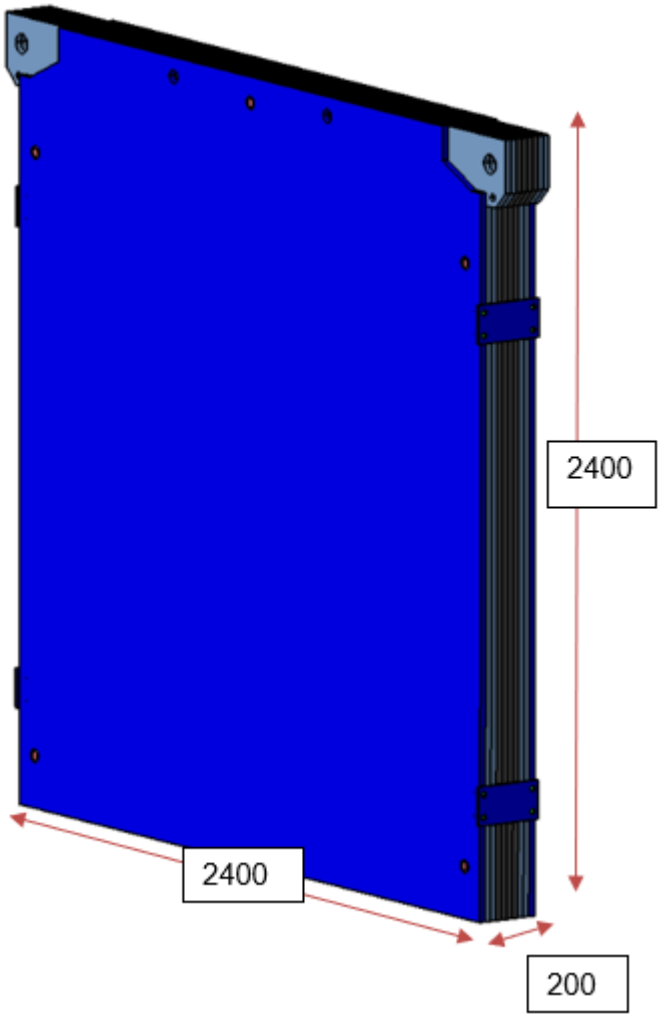


Figure 11: Shielding parts - main dimensions

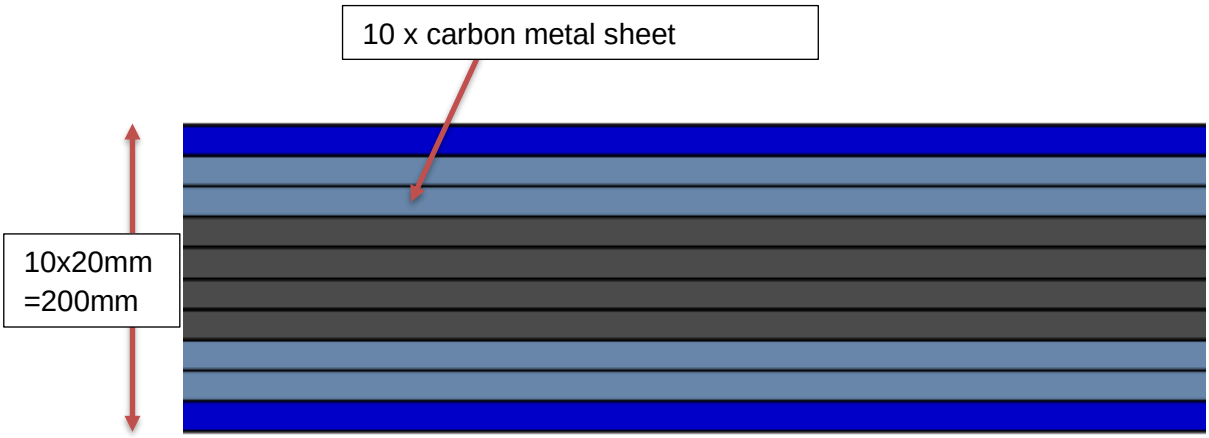


Figure 12: Shielding part - cut out - composition

The shielding part is designed as sandwich structure of carbon metal sheets in appropriate dimensions – see Figure 12. The sheets are made from construction carbon steel S235JR+N with less than 0,2% of cobalt. This content must be confirmed by certificate 3.1 according to EN 10204.

The sliding doors are designed to be assembled on site. Due to mounting on site (limited weight capacity of crane, max. 5 tones), the shielding part is divided to two sub-assemblies. Each sub-assembly are connected by bolts together – see figure 13 and 14. The sub-assemblies are mounted together using connected plates with bolts (orange parts) – see Figure 15.

(The sheet used for shielding part of sliding door could be hot-rolled sheets (Kvarto), which are manufactured in dimensions of thickness 5 to 200 mm, width 1000 - 3000mm, length 2000 - 12000mm, and grades S235JR + N, S355J2 + N according to EN 10025-2, EN 10029, EN 10163, EN 10204 3.1.)

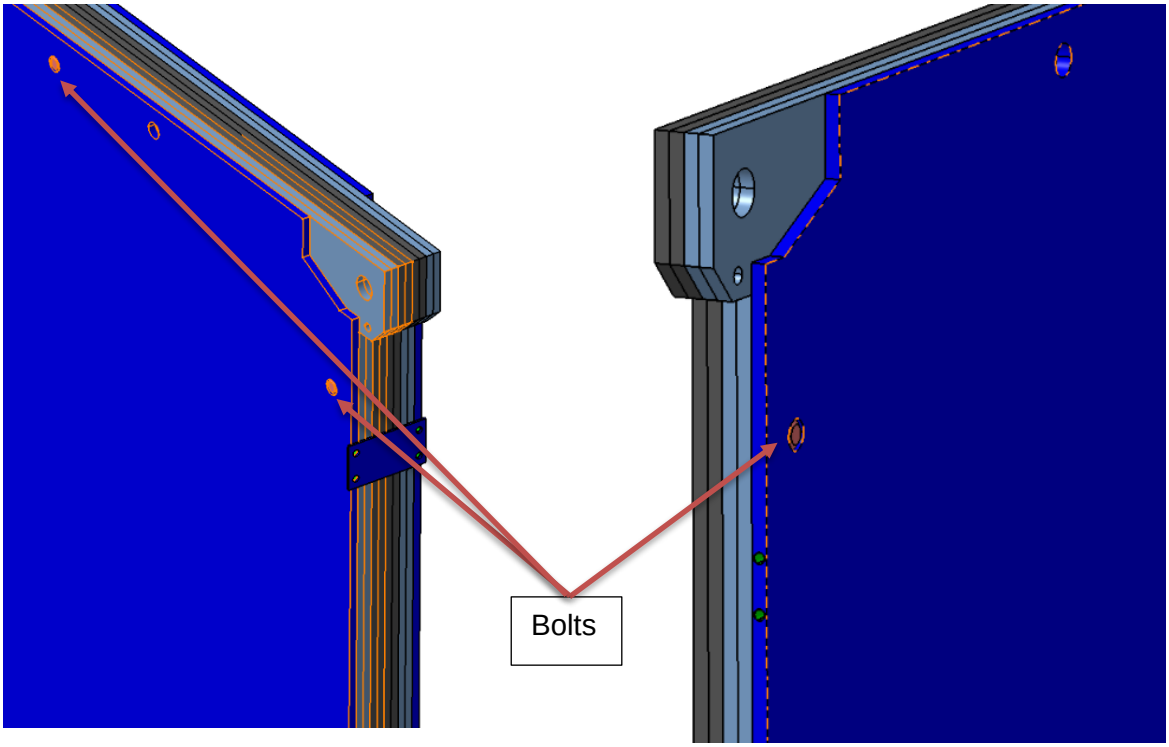


Figure 13: Shielding part - assembly

Figure 14: Shielding part - one sub-assembly

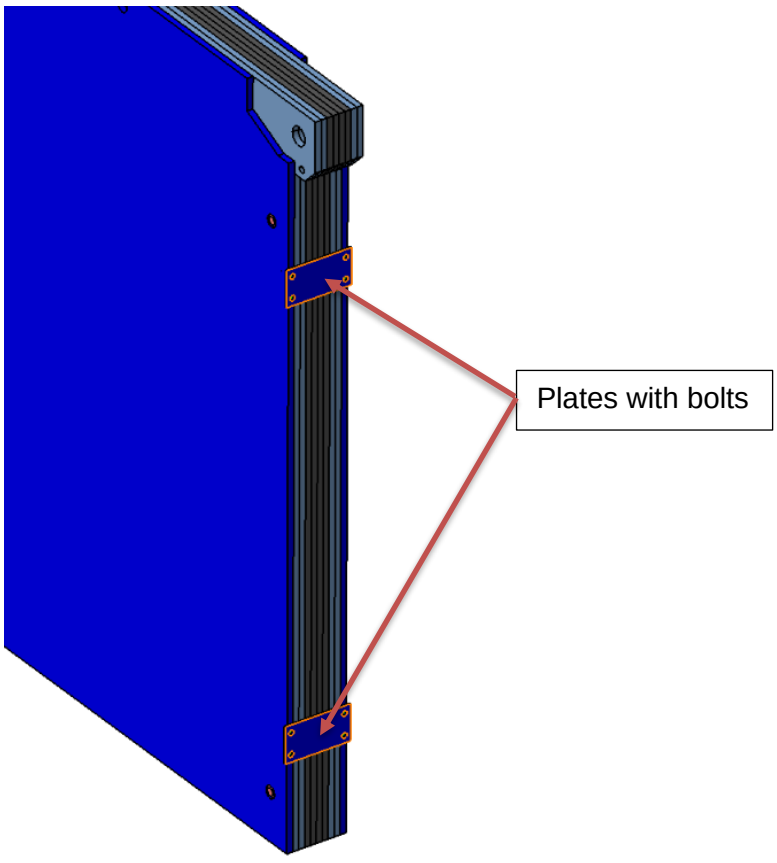


Figure 15: Shielding part - all assembly

The shielding includes:

- 10 x carbon steel sheets,
- inner side covered by a 1mm B4C layer equivalent,
- fasteners

2.8.2.2 BEAM

The beam is manufactured from IPE profile according to DIN 1025-5, size 300mm, length about 5400mm, material is carbon steel S355J2 with less than 0,2% of cobalt. This content must be confirmed by certificate 3.1 according to EN 10204.

On the beam profile are mounted consoles for installation on experimental cave´s wall (red part), consoles for limit stops (turquoise part), profiles for guidance (violet part), and rack for pinion (grey part).

The beam is controlled for stress and deformation – see chap. 2.8.

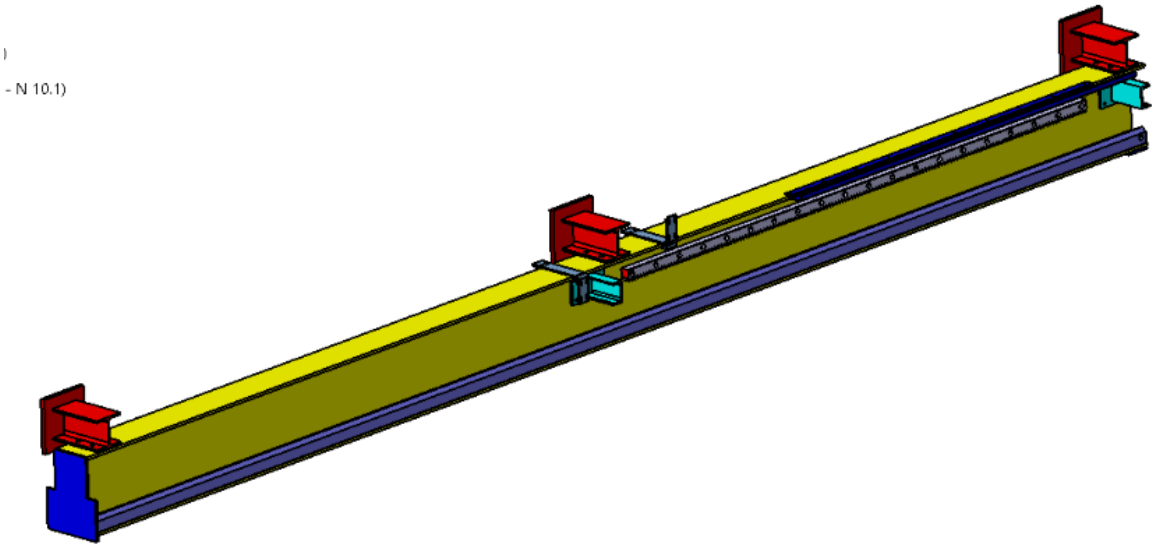


Figure 16: Beam - main parts

The beam includes:

- 1 x IPE profile,
- 3 x consoles for mounting on the wall experimental cave,
- 2 x consoles for limit stops,
- 1 x guidance profile Single Edge V Slide – HSS33 – Hepcomotion,
- 1 x guidance profile Flat track 33 – Hepcomotion,
- Fasteners.

2.8.2.3 CARRIAGES

As the translation parts are used the carriages with wheel. These wheels run on profiles for guidance.

In the Figure 17, the carriage in left side is without drive, it is meant, is without action part. The carriage in right side is including drive. The drive consist from motor, gear fox and pinion.

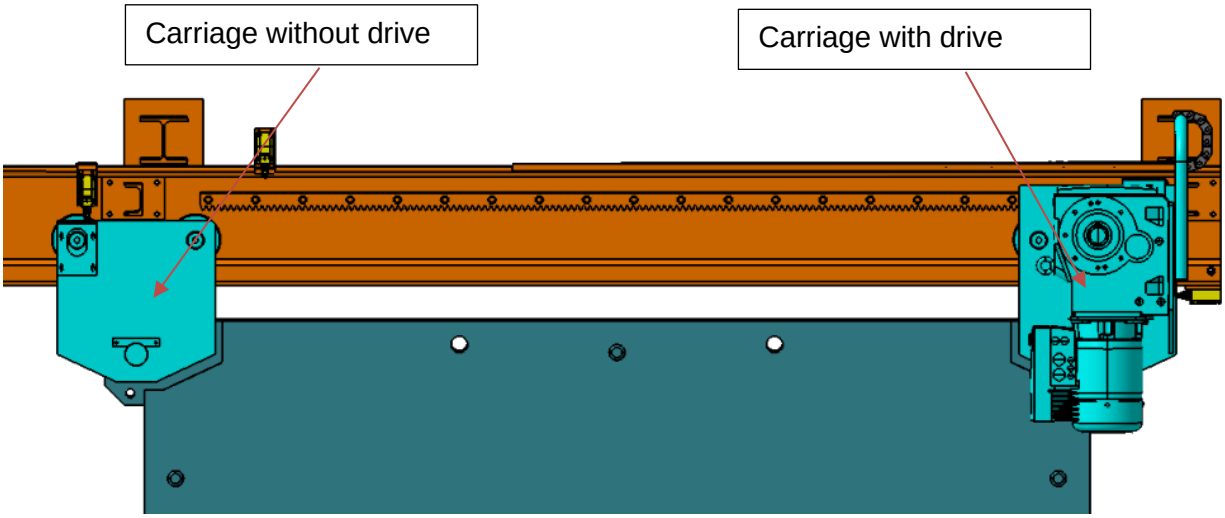


Figure 17: Carriges

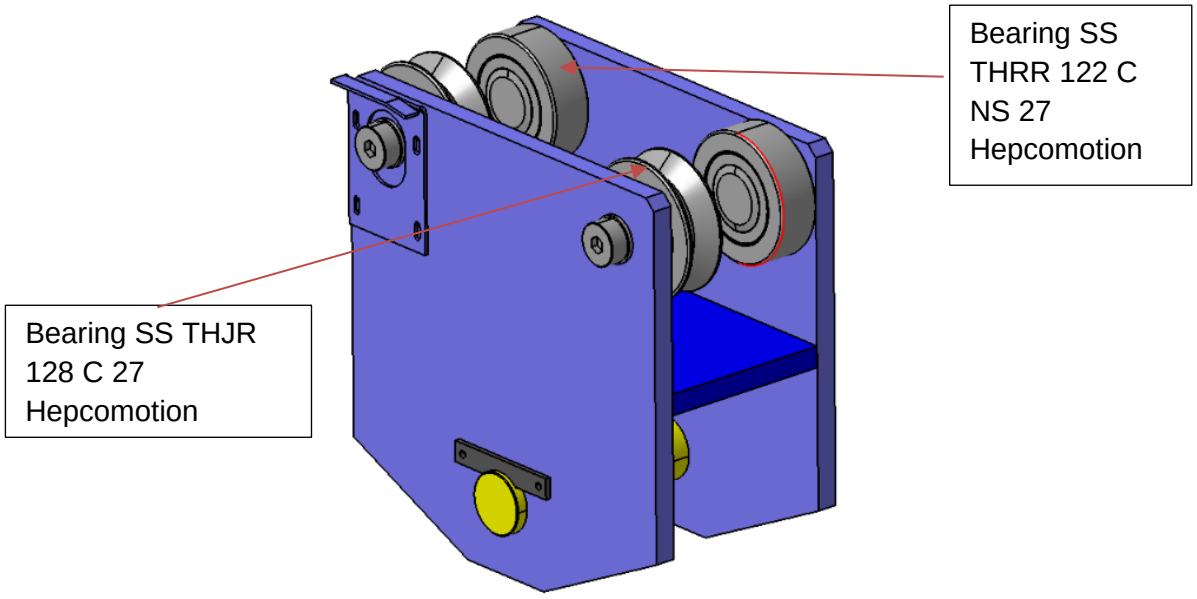


Figure 18: Carriage without drive

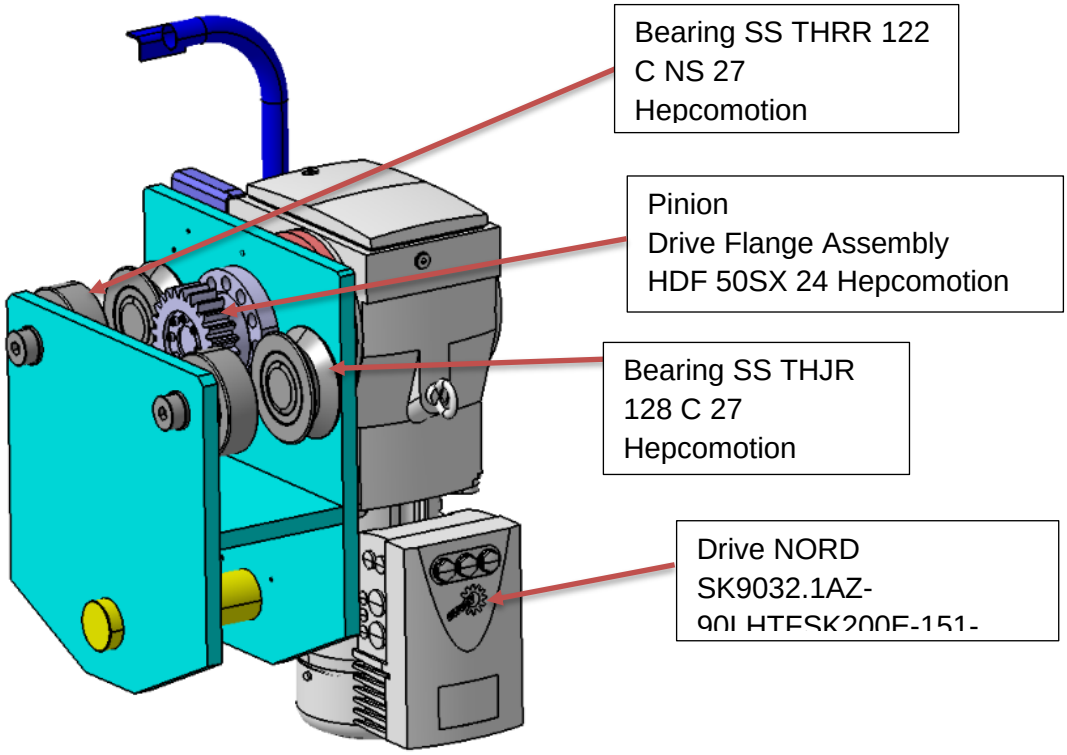


Figure 19: Carriage with drive

2.8.2.4 POSITION SWITCHES

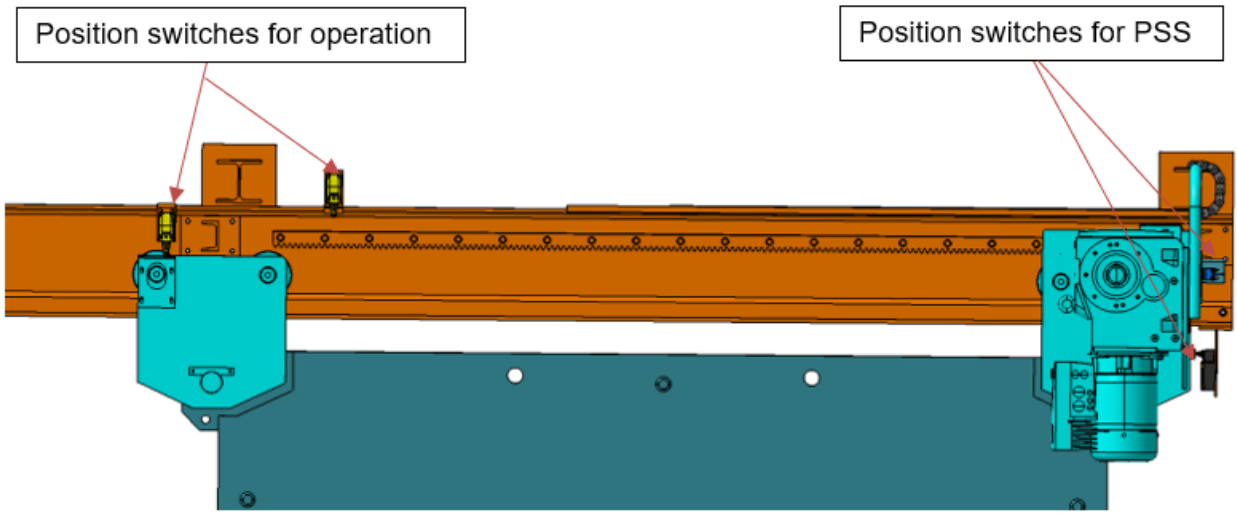


Figure 20: Sliding door - position switches

The position switches connected to PSS are safety classified components. PSS will monitor the closed position of the sliding door via two safety switches.

4 position switches are included in the sliding door design:

- One switch SIEMENS 3SE5212-0KB01 to detect the open position of the sliding door. Signal to be sent to the BEER instrument control system,
- One switch SIEMENS 3SE5212-0KB01 to detect the closed position of the sliding door. Signal to be sent to the BEER instrument control system,
- One safety classified switch SIEMENS 3SE6605-3BA (magnetic) with magnet 3SE6704-3BA to detect the closed position of the sliding door. Signal to be sent to the PSS,
- One safety classified switch SIEMENS 3SE5112-1QV10 (mechanical) with actuator 3SE5000-0AV07-1AK 2 to detect the closed position of the sliding door. Signal to be sent to the PSS.

PSS switches are part of ESS scope.

2.8.2.5 ELECTRIC CONTROL PANEL

The electrical box and control panel is near to the door – see picture 21.

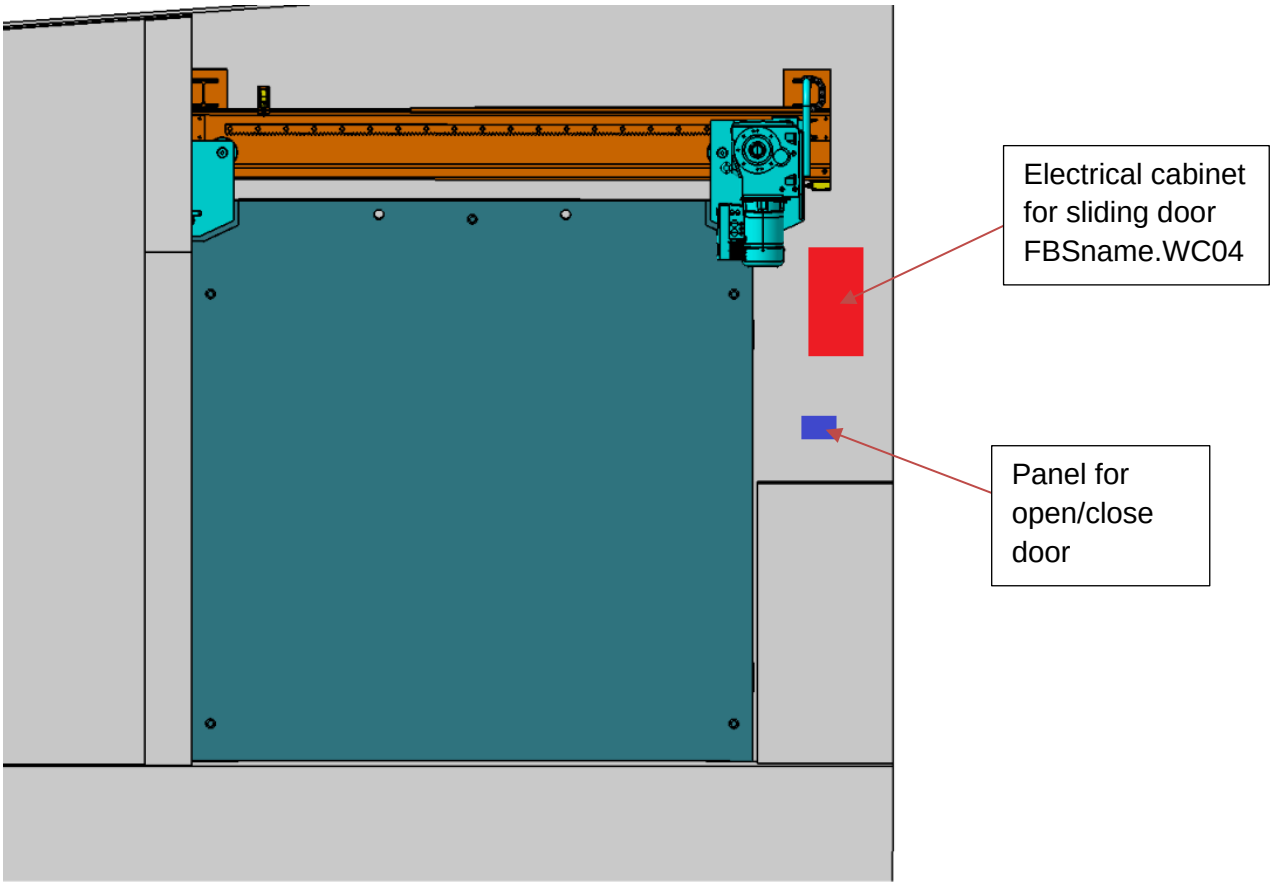


Figure 21: Sliding door - electro interface

2.8.2.6 ELECTRIC CABLES

Work on electric cables design (specification, routing) is still to be performed.

2.8.2.7 INTERFACE WITH EXPERIMENTAL CAVE

In the wall of experimental cave are installed the anchorage contact plates for welding of consoles of beam. The nominal reaction force on anchorage contact plate is 26,8 kN. The consoles of beam are welded to the contact plates. The design of the anchorage contact plates is compatible with the design of sliding door.

According to radiological calculation note [1] the possible gap between floor and sliding door is 10mm – this gap cannot be increased. The possible gap between wall and sliding door is 40 mm and it couldn't be increased.

The total weight of the sliding door is 10 920 kg.

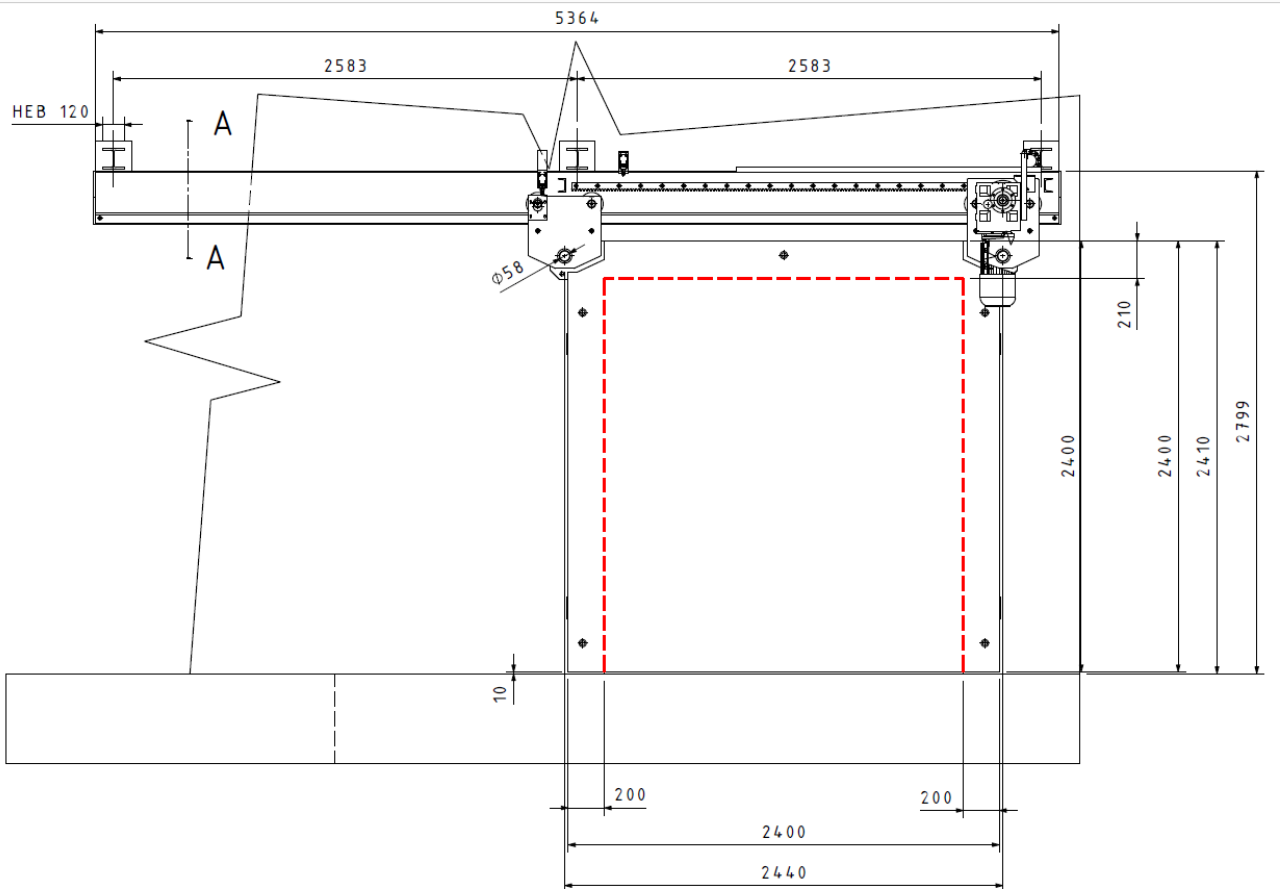


Figure 22: Sliding door - interface view

2.9 CALCULATIONS

2.9.1 BEAM DEFORMATION

The beam for sliding door is oversized for normal operation conditions.

Using the static equivalent method, the deformation and stress in the beam of sliding door have been assessed with the software RDM Le Mans.

For static evaluation is the beam represented by easy beam with force operating in the middle of them. The force is the half of weight of sliding door. This case is the most conservative.

Maximal stress is 60,57 MPa (the permitted value is about 250MPa) – see Figure 23.

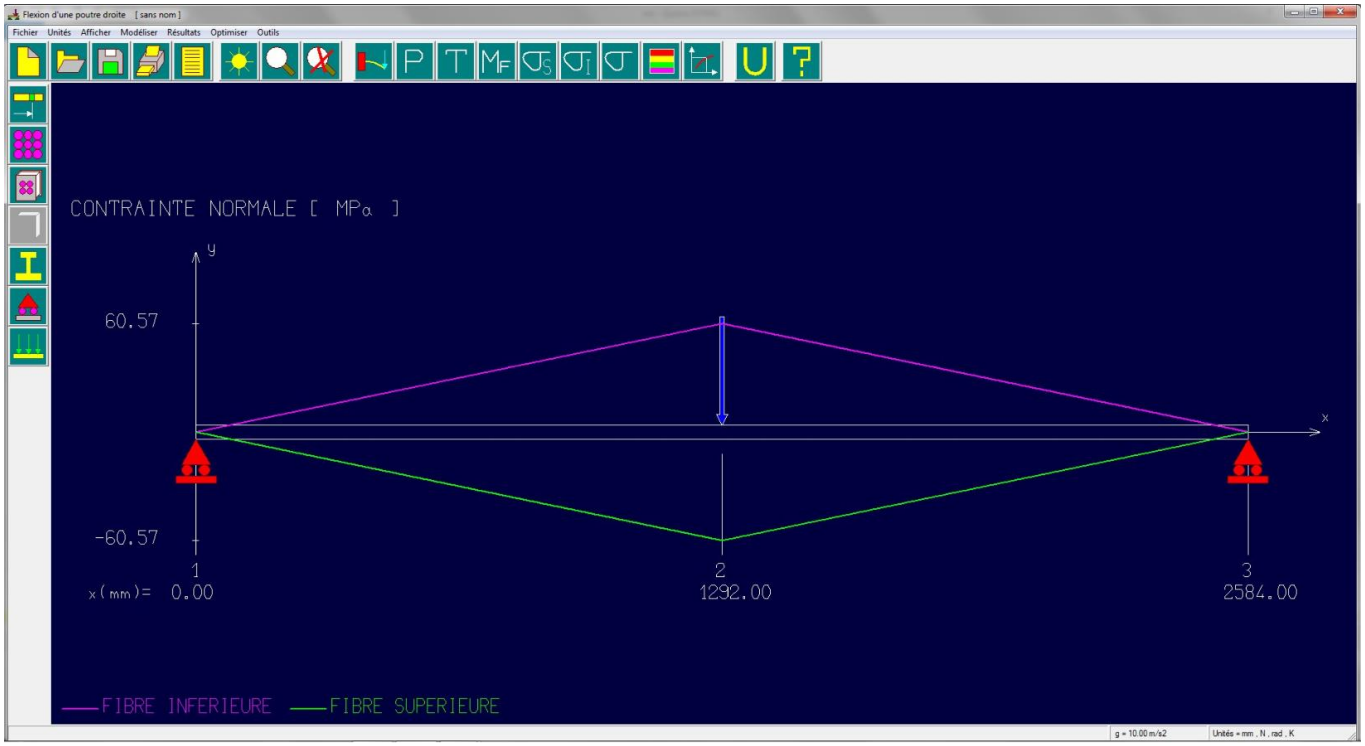


Figure 23: Stress of beam

Maximum displacement obtained is 1.07 mm – see Figure 24.

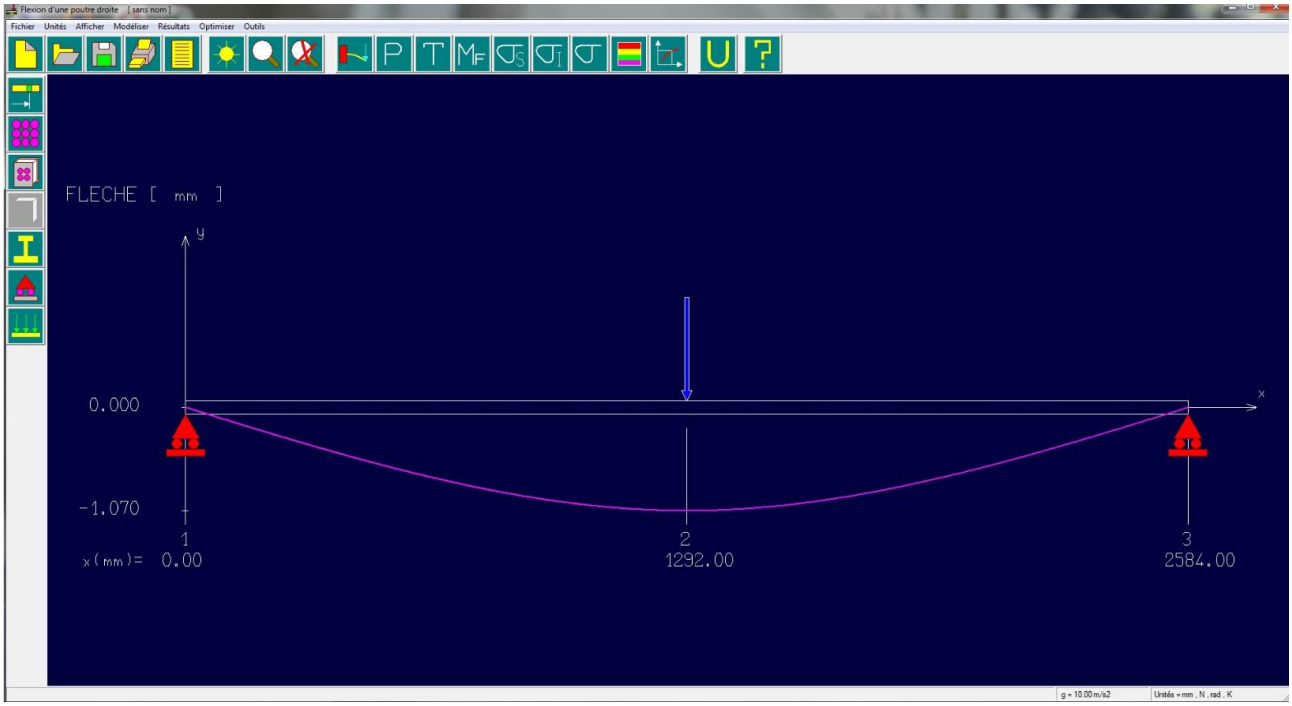


Figure 24: Deformation of beam

The conclusion is that the beam is acceptable.

3 TRANSPORT, ASSEMBLY AND COMMISSIONING

There is no specific requirements regarding the transport of the sliding door. The equipment shall be packed and transported to ESS site without any damage.

The supplier shall guarantee that equipment will be packed and transported to the site safely and without any damage. The installation and removing of the equipment for maintenance purposes will be performed by the means of lifting devices; using a crane located in the Experimental Hall 3 (E01).

FAT and SAT shall be included in the sliding door scope of supply. During FAT and SAT all the functions of the sliding door shall be tested.

The time schedule shall be studied so that it is compatible with the installation of experimental cave.

4 SURFACE TREATMENT

The inner side of door shall be covered by a 1mm B4C layer equivalent.
The other sides should be covered by standard layer as prevent before corrosion.

5 OPERATION AND MAINTENANCE

The sliding door has been designed to require minimum preventive maintenance. Check of the engine and limit switches once or twice a year are recommended by the supplier. As mentioned above, operator access is supposed to be possible for hands on maintenance operations.

Corrective maintenance in case of component failure could include:

- Change of motor
- Change of position switches

6 MOUNTING

As written In chapter 2.8.2.1, the sliding doors are designed to be assembled on site. Due to mounting on site (limited weight capacity of crane, max. 5 tones), the shielding part is divided to two sub-assemblies. Each sub-assembly are connected by bolts together – see figure 14 and 15. The sub-assemblies are mounted together using connected plates with bolts (orange parts) – see Figure 15.

For mounting will be used the crane located in the Experimental Hall 3 (E01).

6.1 ANTICIPATED INSTALLATION PROCEDURE – STEP BY STEP

a) STEP 1
   - Welding of consoles for beam before installation of experimental hutch

b) STEP 2
   - Installation experimental hutch – if necessary

c) STEP 3
   - Installation of one-half of carriages

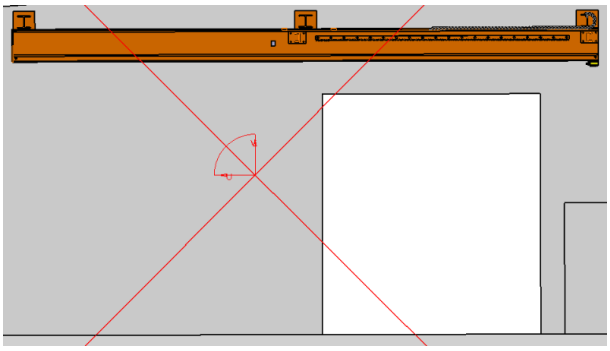
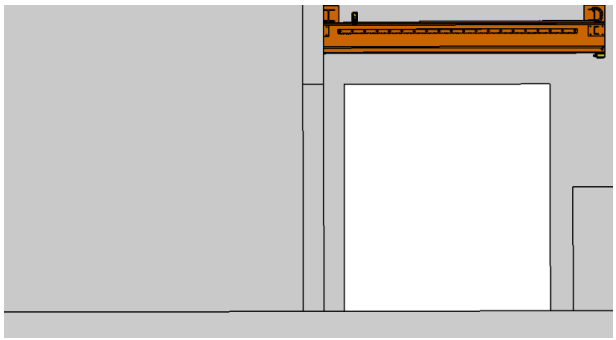
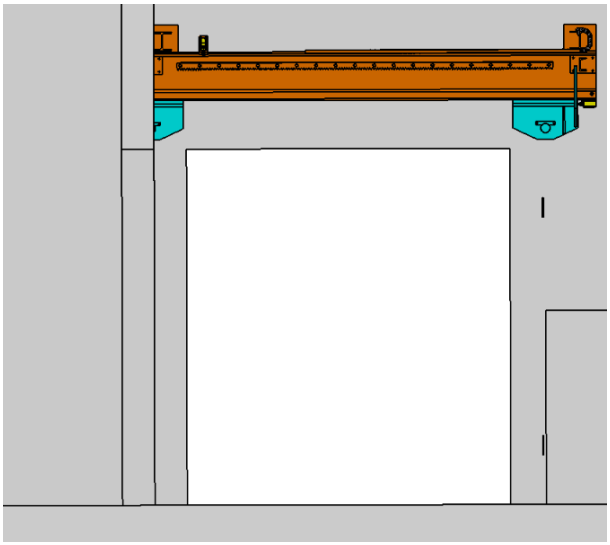
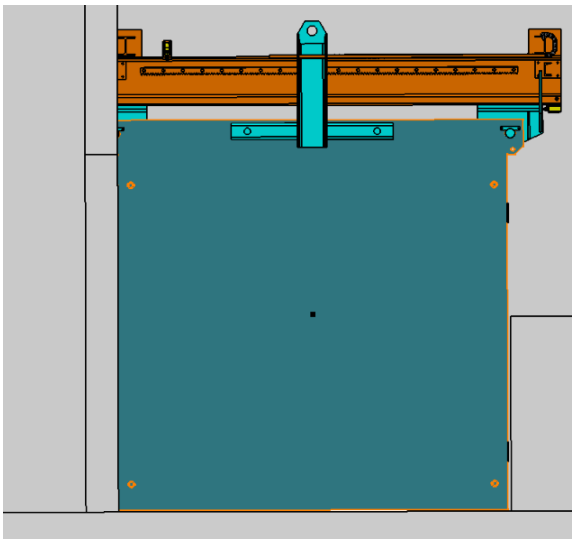
d) STEP 4
   - Installation of one-half shielding part using manipulation tool

e) STEP 5
   - Installation of second half shielding part using manipulation tool

f) STEP 6
   - Final installation (completion) of carriages

g) STEP 7
   - Installation of electrical components (drive, position switches,….)

The above steps are represented in slideshow below.

Step 1	Step 2
	
Step 3	**Step 4**
	

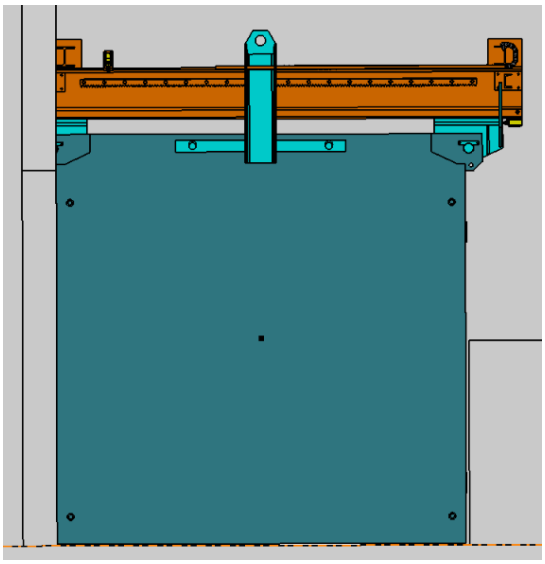
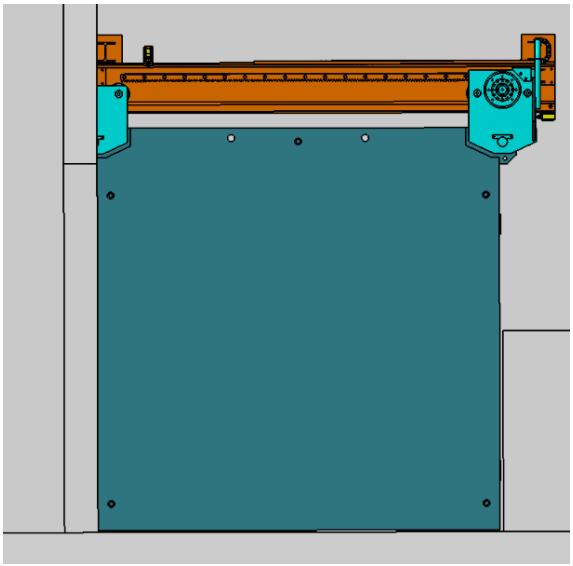
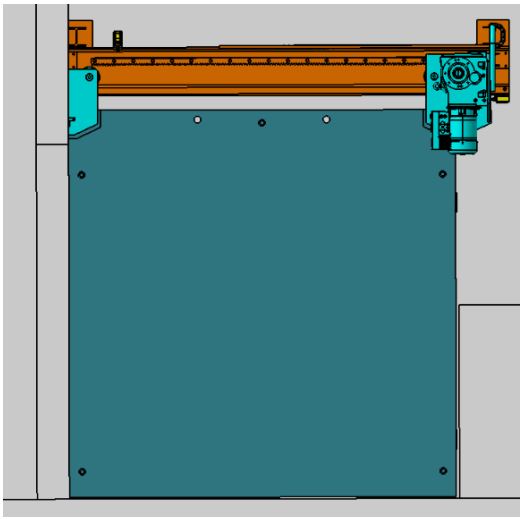
Step 5	Step 6
	
Step 7	
	

Table 4: Slideshow of mounting

6.2 MANIPULATION TOOL

In first step of installation is necessary to weld the consoles and mounted the beam, because of installation impossibility after installation of control hutch.

Unfortunately, this beam prevents direct access of crane hook and must be manufacture some special manipulation tool. One idea is in figure 25.

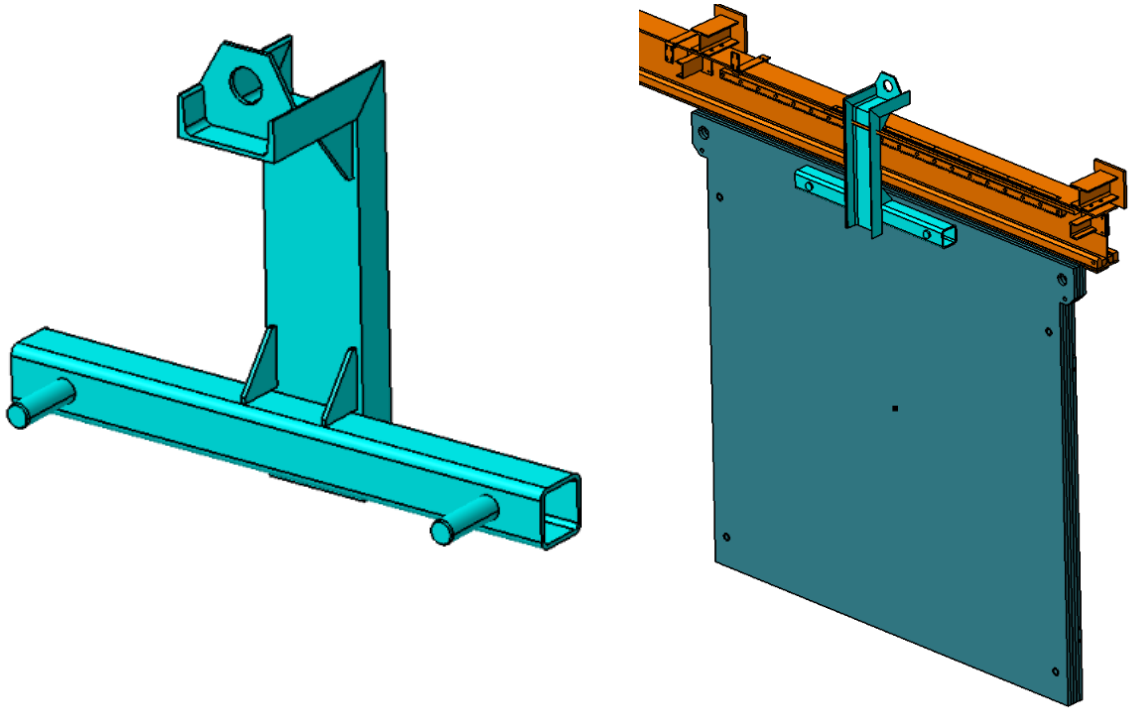


Figure 25:Manipulation tool

7 COMPLIANCE MATRIX

Id	Requirement description	Status	Justification/Comment
R1	required areas	A	See Technical report
R2	The sliding door shall align the open / closed position	A	See Technical report
R3	The sliding door shall detect the closed position by limit switches	A	See Technical report
R4	The sliding door shall inform BEER instrument control system that the sliding door is in open / closed position	C	Electric connection between sliding door and BEER I&C not performed yet
R5	The sliding door shall allow opening/closing of the sliding door about 1 times per day	A	See Technical report
R6	The sliding door shall allow the opening/closing of the sliding door in about 40-50 seconds during normal operation	A	See Technical report
R7	The sliding door shall be designed for at least 10000 cycles without heavy maintenance operations	A	See Technical report
R8	The sliding door shall be designed for light maintenance operations and inspection 2 times per year maximum	A	See Technical report
R9	The sliding door shall be operated from the BEER instrument control system	C	Electric connection between sliding door and BEER I&C not performed yet
R10	The sliding door shall keep a clearance of about 5-10 mm on each side of the sliding door between final position and fixed stops	A	See Technical report
R11	The sliding door shall keep a safe gap between concrete of experimental cave (as prevent collision with concrete)	A	See Technical report
R12	The sliding door shall be compatible with the design of experimental cave	A	See Technical report
R13	The sliding door shall be compatible with BEER instrument control system	C	To be studied during design of BEER I&C
R14	The sliding door shall include a neutron guide that is compatible with BEER instrument requirement	A	See Technical report
R15	The sliding door shall include a shielding that considers the parameters and nature of the neutron beam	A	See radiological calculation report.
R16	The sliding door shall use materials that are compatible with the neutron beam	A	See Technical report
R17	The sliding door shall use materials that keep reasonable dose rate levels when activated	A	See radiological calculation report
R18	The sliding door shall be compatible with the sliding door dimensions	A	See Technical report
R19	The sliding door shall To be compatible with load capacity of experimental cave´s wall	A	See Static calculation note for experimental cave
R20	The sliding door shall allow the fixation of the sliding door to the wall of the experimental cave	A	See Technical report and static calculation note
R21	The sliding door shall be operated according to ESS operation and maintenance plan	C	To be checked with ESS
R22	The sliding door shall permit closing/opening of the sliding door by direct operator action	C	To be implemented during purchasing
R23	The sliding door shall inform the operators of the sliding door status closed/opened	C	To be implemented during purchasing
R24	The sliding door shall be maintainable by operators directly in the experimental cave	C	To be implemented during purchasing
R25	The sliding door shall allow access to components requiring maintenance	A	See Technical report
R26	The sliding door shall allow dismounting and change of critical components	A	See Technical report
R27	The sliding door shall be rescuable	B	It should be possible to rescue using a crane
R28	The sliding door shall keep dose rates from activation to allow a man access for maintenance	A	See radiological calculation report.
R29	The sliding door shall be decontaminable	A	See Technical report
R30	The sliding door shall allow inspection of the sliding door	A	See Technical report
R31	The sliding door shall use long life components	A	See Technical report
R32	The sliding door shall use reliable components	A	See Technical report
R33	The sliding door shall limit risks of mechanical incidents	C	To be implemented during purchasing
R34	The sliding door shall limit risks related to human factor	C	To be implemented during purchasing
R35	The sliding door shall limit mechanical shocks	A	See Technical report
R36	The sliding door shall use low maintenance components	A	See Technical report
R37	The sliding door shall inform PSS system when the sliding door is closed	C	To be implemented during purchasing
R38	The sliding door shall be designed to withstand loads during normal and accident	A	See Technical report section 2.8
R39	The sliding door shall be possible to open in case of electric supply failure	A	See Technical report
R40	The sliding door shall avoid the use of flammable material when possible	A	See Technical report
R41	The sliding door shall minimize fire ignition sources	A	See Technical report
R42	The sliding door shall limit operator efforts during installation, maintenance and decommissioning	B	Should be studied more in detail
R43	The sliding door shall protect operators during operator access	C	To be implemented during purchasing
R44	The sliding door shall protect operators from electric shock	C	To be implemented during purchasing
R45	The sliding door shall be harmless	C	To be implemented during purchasing
R46	The sliding door shall keep reasonable noise level	C	To be implemented during purchasing
R47	The sliding door shall comply with Load Specification	A	See Technical report section 2.7
R48	The sliding door shall comply with defined industrial standards	C	To be implemented during purchasing
R49	The sliding door shall comply with European Directives and be CE marked	C	To be implemented during purchasing
R50	The sliding door shall connect with electric power supply	C	To be implemented during purchasing
R51	The sliding door shall be compatible with Building access routes for installation, maintenance and dismantling	A	No issue foreseen
R52	The sliding door shall be compatible with building floor load capacity	A	No issue foreseen
R53	The sliding door shall be compatible with handling means available for installation, maintenance and dismantling	A	No issue foreseen

A	Fully implemented in the design
B	Partially implemented in the design and complete implementation shall not be a problem
C	Not implemented in the design but future implementation shall not be a problem
D	Not implemented in the design and future implementation could be a problem

Table 5: Compliance matrix

8 RISKS ASSESSMENTS

Description of Risk			
[Cause] As a result of:	**[Event] There is a risk that:**	**[Consequence] Which would result in:**	**Mitigation**
Bad design of sliding door	The Sliding door does not work properly	Redesign of the sliding door, delay, increase of costs	Design reviews, communication with suppliers, include margin in the design, FAT and SAT,
Wrong radiological calculations	Higher dose rates than calculated	Increase of shielding size, redesign of the sliding door, delay, increase of costs	Include margin in radiological calculations, verify calculations
New requirements added, too high cost	Change of the sliding door´s design	Redesign of the sliding door, delay, increase of costs	Check requirements with ESS and UJF, cost estimation of the sliding door, communication with suppliers
Design not adapted, difficulty to procure required, materials	Difficult to find suppliers	Redesign of the sliding door, delay, increase of costs	Design reviews, communication with suppliers, use simple and robust design
Bad coordination with experimental cave installation. Delay with the delivery of the other parts of instrument	Installation on site not possible	Delays, increase of costs	Coordinate the installation sequences, look after suppliers to get components on time, choose reliable suppliers
Complexity of requirements underestimated, capacity of the design overestimated	Sliding door does not fulfil all the requirements	Redesign of the sliding door, delay, increase of costs	Design reviews (including requirements review), define realistic requirements, communication with suppliers, include margin in the design, FAT and SAT,
Delay during shutter supply, delay of other components supply, delay during installation of shutter	Shutter is not installed on time	Delays, increase of costs	Coordinate the installation sequences, look after suppliers to get components on time, choose reliable suppliers
Complex design, low number of suppliers	Sliding door´s cost is higher than expected	Increased project budget	Anticipate an increase of sliding door´s cost in the project budget, Try to get as many tenderers as possible during the purchase of the storage racks, Investigate options to reduce the system cost

Table 6: Risk assessments

9 CONFORMITY WITH EU REGULATIONS

The Sliding door must be manufactured according to all requirements and in the end must be confirmed by CE marking.

Devices, including accessories, delivered to ESS shall be designed in compliance with:

- European directives
- Swedish laws and standards
- Relevant Europeans and ISO standards
- ESS standards and regulation

The documentation shall be issued in English.

10 APPLICABLE DIRECTIVES, STANDARDS AND REGULATIONS

ČSN EN 287-1 Welding. Testing of Welders. Fusion welding. Part 1: Steel

ISO 9712 Qualification and certification of employees NDT – General principles

ČSN EN ISO 9001:2008 Quality Management Systems – Requirements

ČSN ISO 10005:2006 Quality Management Systems - Regulations for the Quality Plan

ČSN EN ISO 14731 Welding Supervision Tasks and Responsibilities

ČSN EN 1090-2 A1 (732601) Execution of Steel Structures and Aluminum Structures - Part 2: Technical Requirements for Steel Structures.

ČSN EN 10029 09/91 Heat-processed Rolled Steel Sheet in Thickness of 3 mm or Higher - Dimensional Tolerances

ČSN EN ISO 898-1 12/99 Mechanical Characteristics of Fixation Elements made from Carbon Steel and Alloy Steel - Part 1: Screws and Pins

ČSN EN 10204 01/05 Metal Products – Types of Control Documents

ČSN EN 10025-1 03/05 Structural Steel Heat-processed Products - Part 1: General Technical Supply Conditions

ČSN EN 10025-2 03/05 Structural Steel Heat-processed Rolled Products - Part 2: General Technical Supply Conditions for Structural Non-alloy Steel

ČSN EN 10025-3 03/05 Structural Steel Heat-processed Rolled Products - Part 3: General Technical Supply Conditions for Weldable Fine-grain Structural Steel in Normalized Condition/Normalized rolling

ČSN EN 10025-4 03/05 Structural Steel Heat-processed Rolled Products - Part 4: General Technical Supply Conditions for Weldable Fine-grain Structural Steel Obtained by Thermo-mechanical Rolling

ČSN EN 10025-6 03/05 Structural Steel Heat-processed Rolled Products - Part 4: General Technical Supply Conditions for Flat Steel Products with High Limit of Flexibility in Hardened and Tempered Condition

ČSN EN 10163-1 05/05 Supply Conditions Regarding Condition of the Surface of Sheets, Wide Steel and Molded Heat-processed Rolled Steel Sheets - Part 1: General Data

ČSN EN 10163-2 05/05 Supply Conditions Regarding Condition of the Surface of Sheets, Wide Steel and Molded Heat-processed Rolled Steel Sheets - Part 2: Sheets and Wide Steel

ČSN EN 10163-3 05/05 Supply Conditions Regarding Condition of the Surface of Sheets, Wide Steel and Molded Heat-processed Rolled Steel Sheets - Part 3: Molded Steel

ČSN EN 10088-2 09/05 Stainless Steel - Part 2: Technical Supply Conditions of Sheets and Steel Strips Resistant to Corrosion for General Use

ČSN EN 10021 03/07 General Technical Conditions of Supply of Steel Products

EN 1993 EUROCODE 3

Machine Directive 2006/42/EC

Standards for electric equipment are still to be defined.

11 ANNEXES

Name	Archive number	Document number
DPS.01.07 – Sliding door - assembly	BEER_-CV-900008d	ESS-0462070
DPS.01.07 – Sliding door – Carriages with engine	BEER_-CV-900009d	ESS-0462628
DPS.01.07 – Sliding door – Carriages	BEER_-CV-900010d	ESS-0462629
DPS.01.07 – Sliding door – Beam	BEER_-CV-900011d	ESS-0462631
DPS.01.07 – Sliding door – Shielding part	BEER_-CV-900027d	ESS-0462632

12 REFERENCES

[1] ESS-04664148 Radiation safety Analysis
[2] ESS-0403282 ESS - Instrument Technical Interfaces
[3] ESS-0039311 Rules for Plants & Process Design

13 DOCUMENT REVISION HISTORY

Revision	Reason for and description of change	Author	Date
1	First issue	Michal Kašpar	2018-10-15
2	Second issue	Martin Vaňkát	2019-08-15
3	Third issue	Martin Vaňkát	2020-04-06