RYSEN™ Room Requirements

1 General

1.1 Objective

This document provides the general room requirements for the RYSEN™ system. The purpose of this document is to check whether the selected room meets the basic requirements for the RYSEN™ system.

1.2 System overview

The RYSEN™ system consists of the following main components:

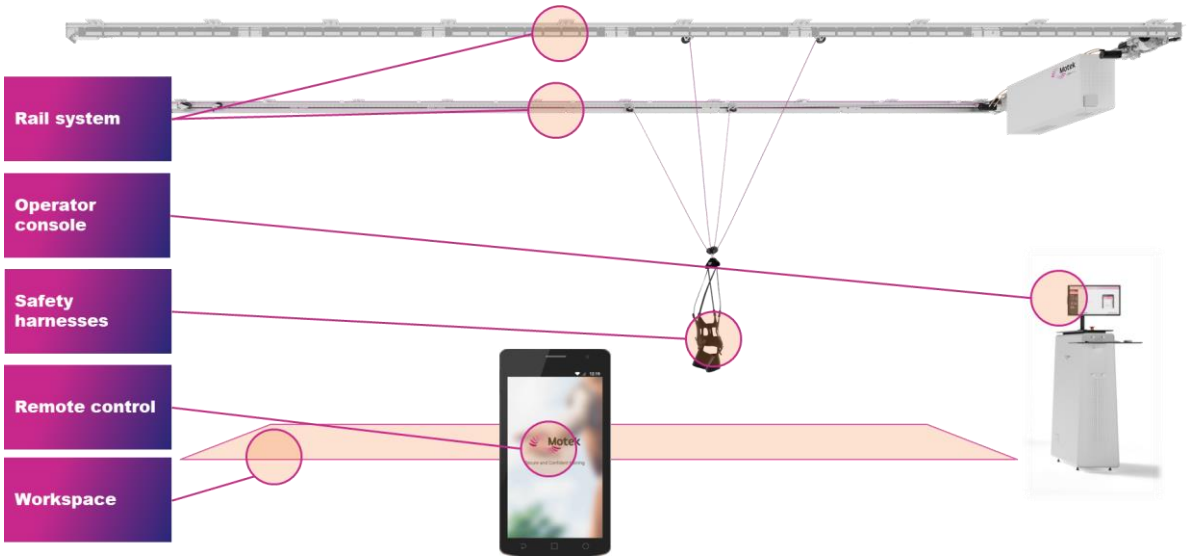


Figure 1: RYSEN™ system overview. See Table 1 for more info.

Table 1: RYSEN™ components and specifications

Item	Specification
Rail system	Two rails with two carts per rail.
Operator cabinet	Medical transformer, system computer, safety stop and battery charger.
Remote control	Rugged Smartphone for wireless system operation.
Safety harness	Patient body-weight support harness (small, medium, large).
RYSEN™ mounting	Connection between the RYSEN™ and the building.
Workspace	The functional usable space a patient can move in freely without feeling the virtual walls.
Virtual walls	The virtual walls are positioned on the sides of the workspace, as shown in Figure 2. It indicates a volume in which the slingbar may be present, but the user will be subjected to a force pushing her/him inwards, increasing in magnitude when going outwards.

2 Room size, system size and positioning

The RYSEN™ is by default available in multiple lengths up to 13.78m, as shown in Table 2. The lengths in this table refer to the total system length. The available workspace is a deduction from the system dimensions, as is displayed in Figure 2. Table 2 and Table 3 demonstrate the resulting workspace length and width respectively. For clarification of the definitions used, please see table 4. For custom sizes, please contact Motek.

Table 2: RYSEN™ system and workspace lengths.

RYSEN™ system length	Resulting workspace length
8.78m (28.8')	5.0m (16.4')
9.78m (32')	6.0m (19.7')
10.78m (35.3')	7.0m (23')
11.78m (38.6')	8.0m (26.2')
12.78m (41.9')	9.0m (29.5')
13.78m (45.5')	10m (33.1')

The system is available in continuous widths between 2.4m and 3.5m, but the width is dependent on the available height, as shown in Table 3. The ranges given apply to all measurements within that range - for example, a room 4.75m high can permit a RYSEN™ system max. width of 3.5m – or any deduction down to 3m.

If you require a portal frame (see section 3: Mounting), please take this into consideration when determining the room height, as the dimensions of the portal will reduce the available height.

Table 3: RYSEN™ system and workspace widths.

Room heights	RYSEN™ system width[1]	Resulting width workspace
3m – 3.25m (9.8' – 10.7')	2.4m (7.9') – 2.5m (8.2')	1.1m (3.6') – 1.2m (3.9')
3.25m – 3.75m (10.7' – 12.3')	2.4m (7.9') – 2.7m (8.9')	1.1m (3.6') – 1.4m (4.6')
3.75m – 4.25m (12.3' – 13.9')	2.4m (7.9') – 2.9m (9.5')	1.1m (3.6') – 1.6m (5.2')
4.25m – 4.75m (13.9' – 15.6')	2.6m (8.5) – 3.1m (10.2')	1.3m (4.3') – 1.8m (5.9')
4.75m – 5.25m (15.6' – 17.2')	3.0m (9.8') – 3.5m (11.5')	1.7m (5.6') – 2.2m (7.2')
5.25m to 7m (17.2' – 23')	In consultation with Motek	

[1] System width excludes mounting clamp widths. For more information, see Chapter 3.1

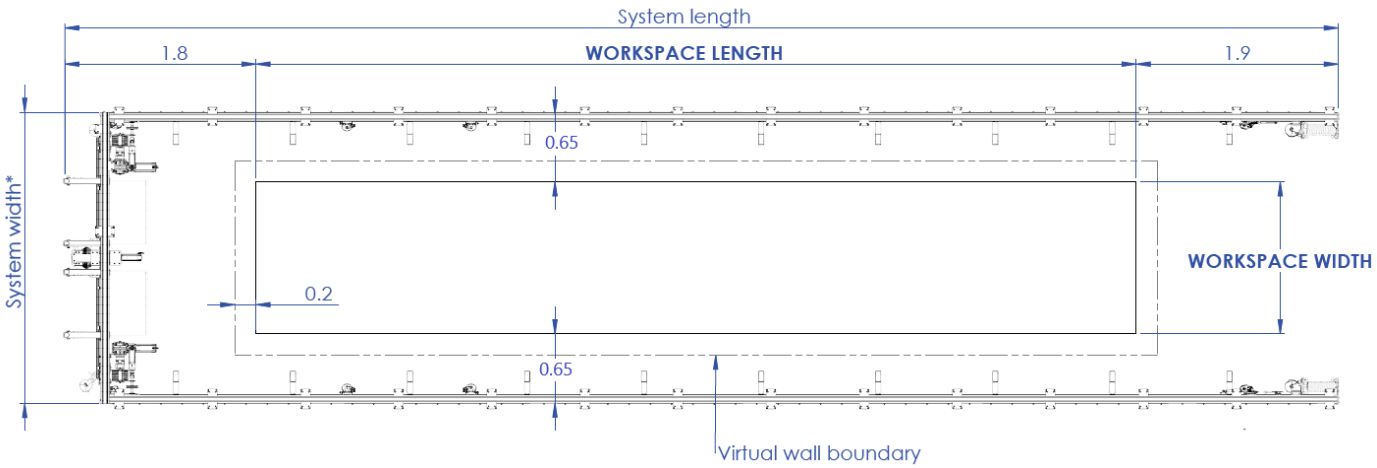


Figure 2: RYSEN™ top view. Workspace shown in relation to the distance to the virtual wall and rails. For system dimensions, consult Table 1 and Table 2. Dimensions shown in meters. Consult Table 4 for definitions and more explanation.

Table 4: RYSEN dimensioning definitions

Definition	Description
System length	Total length of the RYSEN™ system.
System width	Width of the RYSEN™ system **(excluding mounting clamp width*2)**
Workspace length	= System length – (1.8+1.9m)
Workspace width	= System width – (0.65+0.65m)
Mounting clamp	A series of clamps (Type A or Type B) used to mount the RYSEN™. Dependent on scenario. For more information, consult Chapter 3.1.

2.1 Console position

The console of the RYSEN™ - consisting of the operator desk and computer - can be positioned at different positions within the therapy facility. It is possible to place the console within a 6m radius of the main RYSEN™ system (motors and cabinets), see Figure 3**Error! Reference source not found.**.

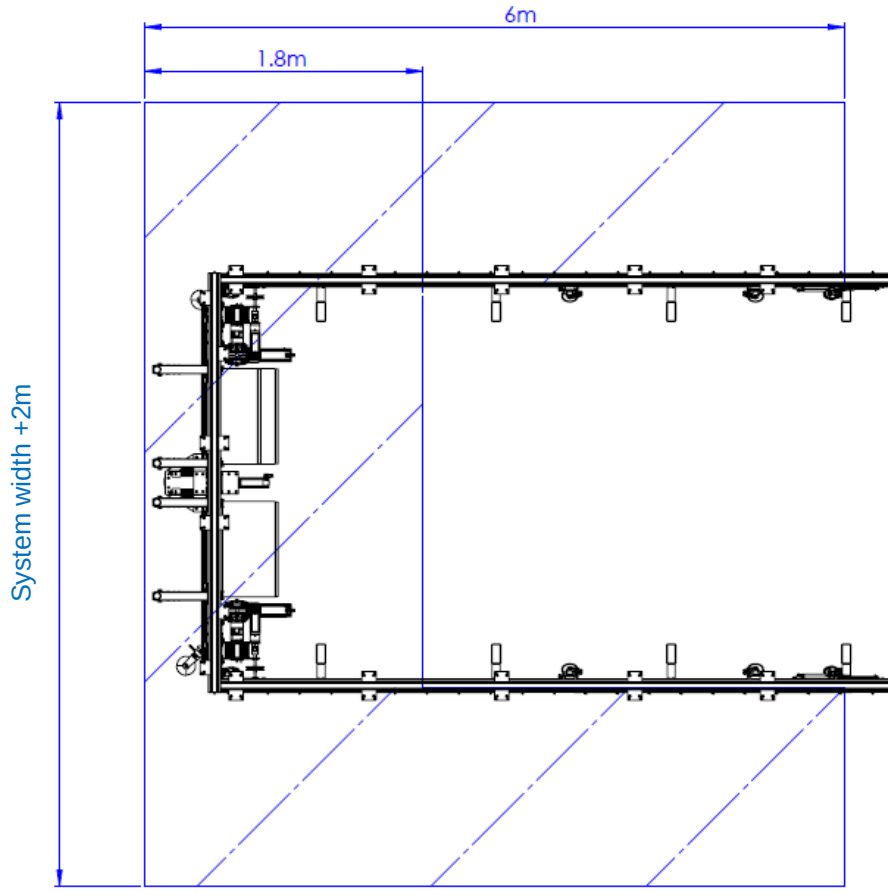


Figure 3: Area in which the console can be placed, relative to RYSEN™ system

2.2 Room drawings

Motek can provide a customized drawing to demonstrate the RYSEN™ system in your facility. Please contact your project management consultant to discuss this option.

3 Mounting

3.1 Mounting method

The RYSEN™ can be mounted in one of three methods described below, depending on the intended room of installation. Following chapters describe the different mounting methods.

Method	Description
Halfen channel	A series of channels which are cast into the concrete of new-builds. For rooms or buildings which are not yet constructed, a slotted profile mount is recommended, see chapter 3.1.1.
Concrete mounting	For existing sites, with solid concrete ceilings see chapter 3.1.2.
Portal mounting	For sites where it is not possible to mount to the ceiling, a steel construction can be used. If the ceiling does not comply to the requirements listed below, the RYSEN can be mounted on a portal, which shall be provided by the client, see chapter 3.1.3.

The exact mounting configuration at the client facility will be determined in consultation with Motek.

3.1.1 Halfen channel mounting

The most favourable method for a RYSEN™ installation, is to mount the system using cast-in channels. For to-be-constructed rooms or buildings, it is advised to cast these channels into the ceiling, see Figure 5. They can be inserted at a specified offset; the RYSEN™ is subsequently clamped to these channels. HTA-CE 40/25 is the advised channel, from German supplier *Halfen*. For extended requirements and further explanation, please see Appendix I.

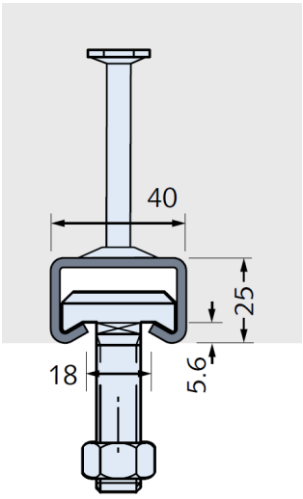


Figure 4: Halfen section view

3.1.2 Concrete mounting

If the RYSEN™ is to be installed in an existing location, it can also be mounted to a solid concrete ceiling. This is achieved by installing a series of anchors in the ceiling at specified locations. The RYSEN™ is subsequently mounted to the anchors. The number of anchors will depend on the size of system. For extended requirements and further explanation, please see Appendix II.

3.1.3 Portal mounting

If cast-in channels and anchor mounting are not feasible, it is possible to install the RYSEN™ to a portal frame (a steel construction). It must be noted that the design and construction of a portal will not

be carried out by Motek. Motek will provide sufficient requirements and support where necessary. For extended requirements and further explanation, please see Appendix III.

3.1.4 Vibrations

Structurally weak ceilings might cause unwanted vibrations that affect the RYSEN™ operation. Floor vibration, especially in the upper stories of the buildings, is a common occurrence. Therefore, it is strongly recommended that the RYSEN™ be installed in the building at the entrance level with no basement underneath, or at the basement level. It is the customer's responsibility to make sure that floor vibration is not going to affect operations.

3.1.5 Other ceiling requirements

The ceiling is required to be level within 10mm, with a smooth surface.

3.2 Load requirements

The table below shows the peak vertical and horizontal load and includes a safety factor of 4. For the horizontal load, a max width of 3.5 m is taken into account. Please consult Motek for taller systems.

Table 5: Peak loads

Peak vertical load	Peak horizontal load
1000 kg	1100 kg

3.3 Dimensioning considerations

Please determine the suitable type of mounting clamp (Chapter 3.1) for your scenario and apply the additional clamp widths, to determine the ultimate width of your RYSEN™ system. For a summarized reference of clamp types, please see table 5. For additional information regarding clamp types, see Appendix IV & V.

Important note: The system width does not account for the dimensions of the mounting clamps.

Table 5: RYSEN™ mounting clamp dimensions

Clamp Type	Use	Dimension
Type A	Halfen channel and concrete mounting	Add 218mm (109mm x 2) to system width
Type B	Portal mounting	Add 100mm (50mm x 2) to system width

4 Environmental conditions

The RYSEN™ will be used in a dedicated room in a physiotherapist clinic or rehabilitation center. This room may host other physiotherapy equipment relevant for BWS exercises, such as walking bars, beds or loose objects that the therapist may decide to use during training. The RYSEN™ may also be installed in a room in which other patient sessions take place at the same time. Be aware, there are no object(s) or subject(s) in the workspace of the RYSEN™ that might get caught in the sling bar, harness or ropes when the RYSEN™ is being used.

Use environment characteristics that could affect interaction with the device

1. The room will be either naturally or artificially lit. The device is not intended to be used in dark or poorly-lit environment.
2. Excessive noise or loud noise that may disturb the user's ability to operate the RYSEN™ is not expected.

The system is designed for the following environmental conditions:

Table 6: operating conditions RYSEN

Item	Specification
Temperature	10 deg C (50 deg F) - 30 deg C (86 deg F)
Relative Humidity	20% - 90% (non-condensing)
EMC radiation	< 3 V/m

4.1 Lighting

1. It is recommended to install remotely-controlled dimmable lighting, that can be controlled by the operator.
2. For disturbance-free operation it is recommended to install an 'in use light' at the entrance of the room, which can be operated from near the console/mobile switch.

4.2 Cable routing

Please take into consideration, the cabling necessary to power and operate the system. From the console, a power cable is required to reach a nearby power outlet (power requirements listed in section 6). From the console to the RYSEN cabinets (mounted on the ceiling) a series of 4 cables are routed; see figure 4. Typically this will be routed through cable ducting. If your facility requires a portal, it is possible to route the cabling through the portal frame.

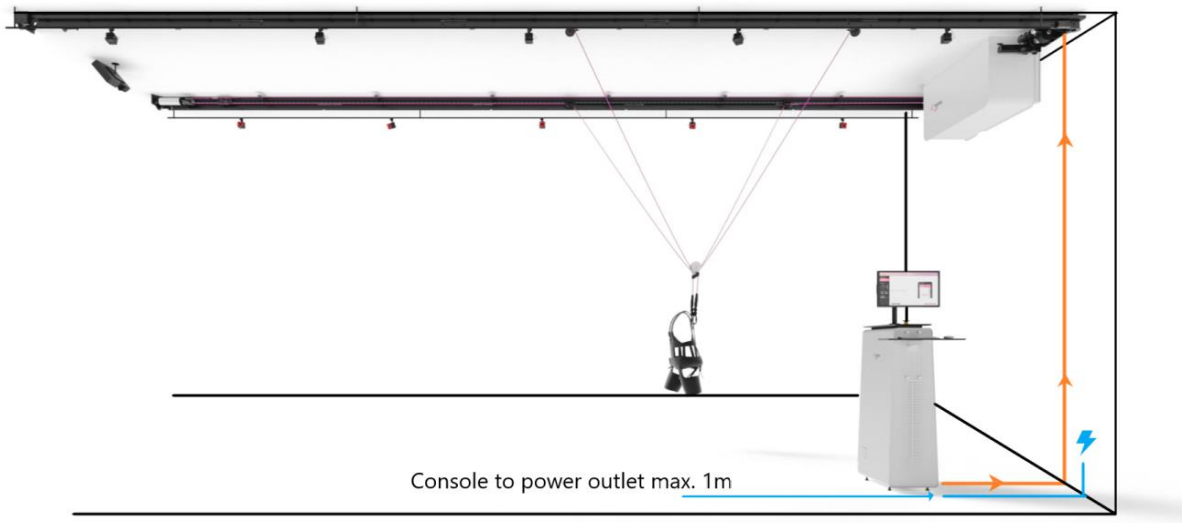


Figure 5: cable routing for the RYSEN.

4.3 Other room requirements

The RYSEN™ system requires the following from its surroundings.

1. **Climate controlled:** the system typically produces heat, thus a climate controlled room and ventilation is required.
2. **Noise free:** prevent disturbing sounds and prevent the audio disturbing somebody else, average noise in the room should be < 80 dB.
3. **Stable power supply:** no power surges or drops of more than 10% are allowed.

Note: The RYSEN cannot be connected to another network. It should also be taken into account, that the system will yield EMC and produces noise.

5 Electrical power and Heat dissipation

5.1 Power requirements

The RYSEN™ requires one 230V 50-60Hz power socket with a rated current of 16A and a circuit breaker with D-characteristic.

Note: Due to local deviations, one times single phase 3680 VA must be provided by the client.

5.2 Locations of power outlets

The location of the power outlet should be within 1 (one) meter of the chosen console position. one single-phase plug is required.

5.3 Grounding

The facility shall provide a properly grounded 16A socket for the console's mains plug. The socket shall be hospital grade for US installations.

6 Revision History

The history of this document is logged by the Document Management System.

7 Appendix I – Halfen channel mounting

Please see requirements for Halfen channel mounting.

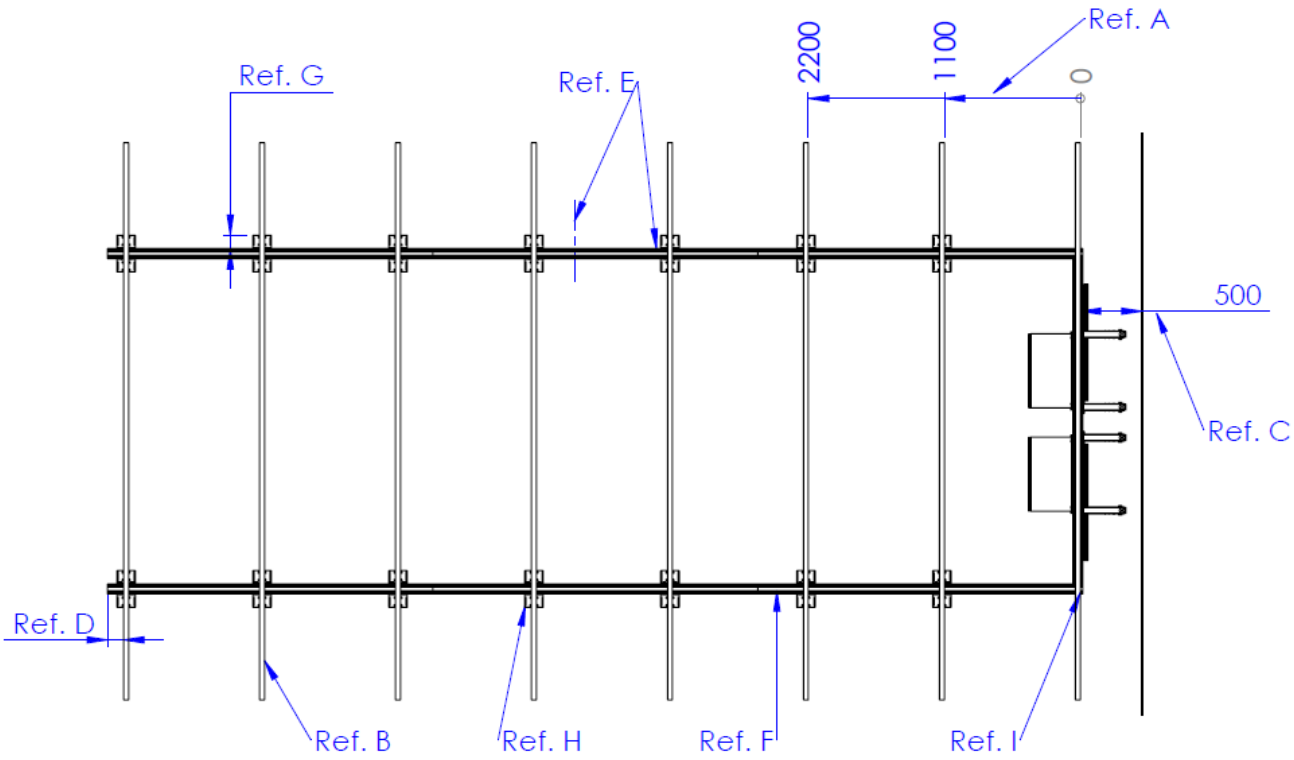


Figure 6: Top view of RYSEN

Table 7: Halfen channel requirements

Item	Specification
Ref. A	Recommended spacing: 1.1m (+/-0.1m). Consider length of RYSEN system and Ref. D.
Ref. B	Halfen Channel: **HTA-CE 40/25**
Ref. C	Minimum distance (0.5m) between 1st Halfen channel and wall.
Ref. D	Distance from last Halfen channel to end of RYSEN system should not exceed 0.2m.
Ref. G	Clamp width 11cm. Account for this distance on both sides of system.

Motek Project Management: Please view document RB015-3027-Rysen Mounting considerations, pg. 3; for additional considerations.

Appendix II – Concrete mounting

Please see requirements for concrete anchor mounting.

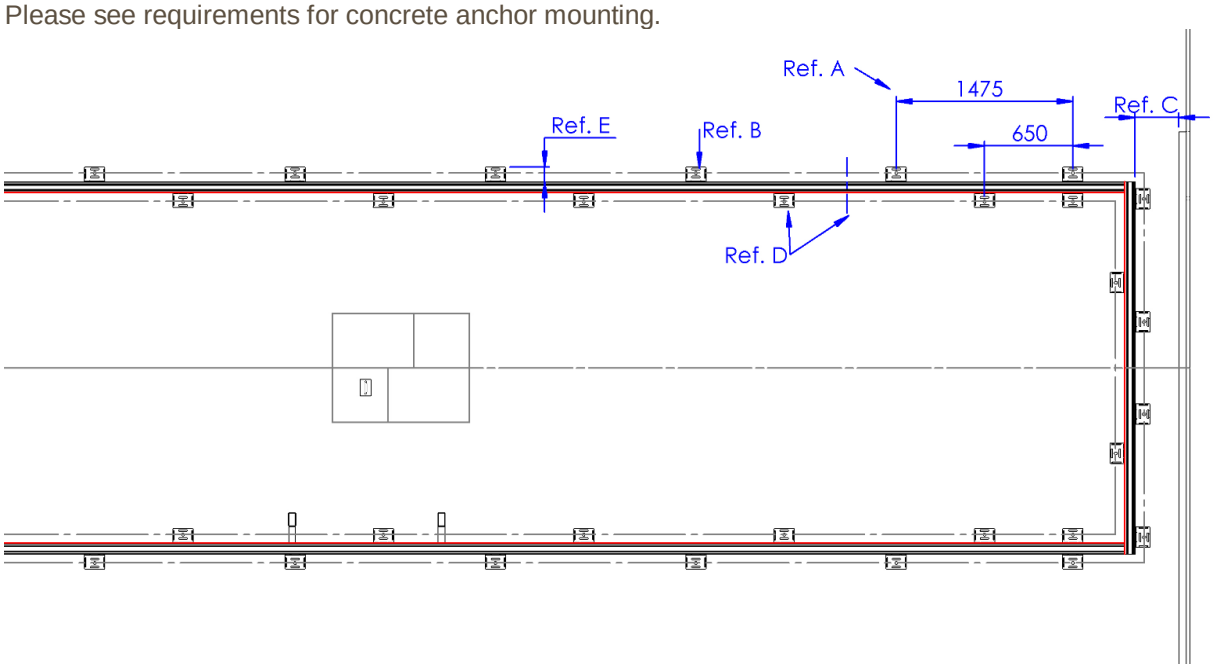


Figure 7: Top view. Concrete anchor mounting

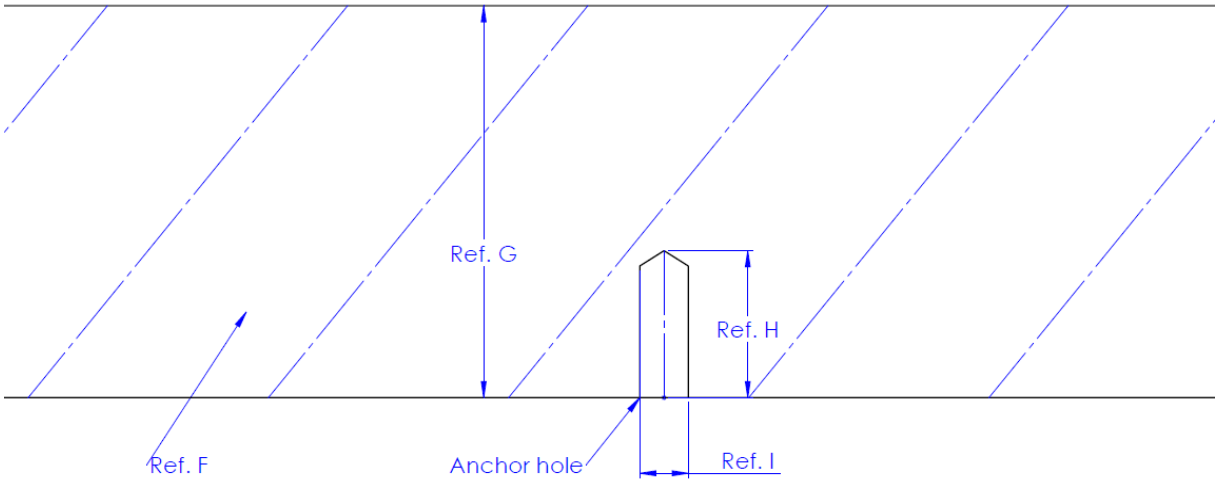


Figure 8: Concrete section view

Table 8: Concrete mounting requirements

Item	Specification
Ref. A	Clamp offset distances. Can vary depending on system requirements
	Note opposing clamps are offset, unlike Halfen profile mounting.
Ref. C	Minimum distance to wall: 0.5m
Ref. E	Clamp width 11cm. Account for this distance on both sides of system
Ref. F	Concrete must be solid.
Ref. G	Minimum concrete depth: 30cm

Ref. H	Anchor depth: 10cm
Ref. I	Anchor diameter: M16

Motek Project Management: Please view document RB015-3027-Rysen Mounting considerations, pg. 5; for additional considerations.

The specific anchor locations will depend on a variety of factors. Considering the many length and width configurations, please contact development department for a tailored drawing. For a 12m system, it would typically require 42 anchors.

The anchors must be marked and drilled accurately, to ensure correct alignment of the RYSEN system. An example drawing of anchor positions is shown in Figure 10.

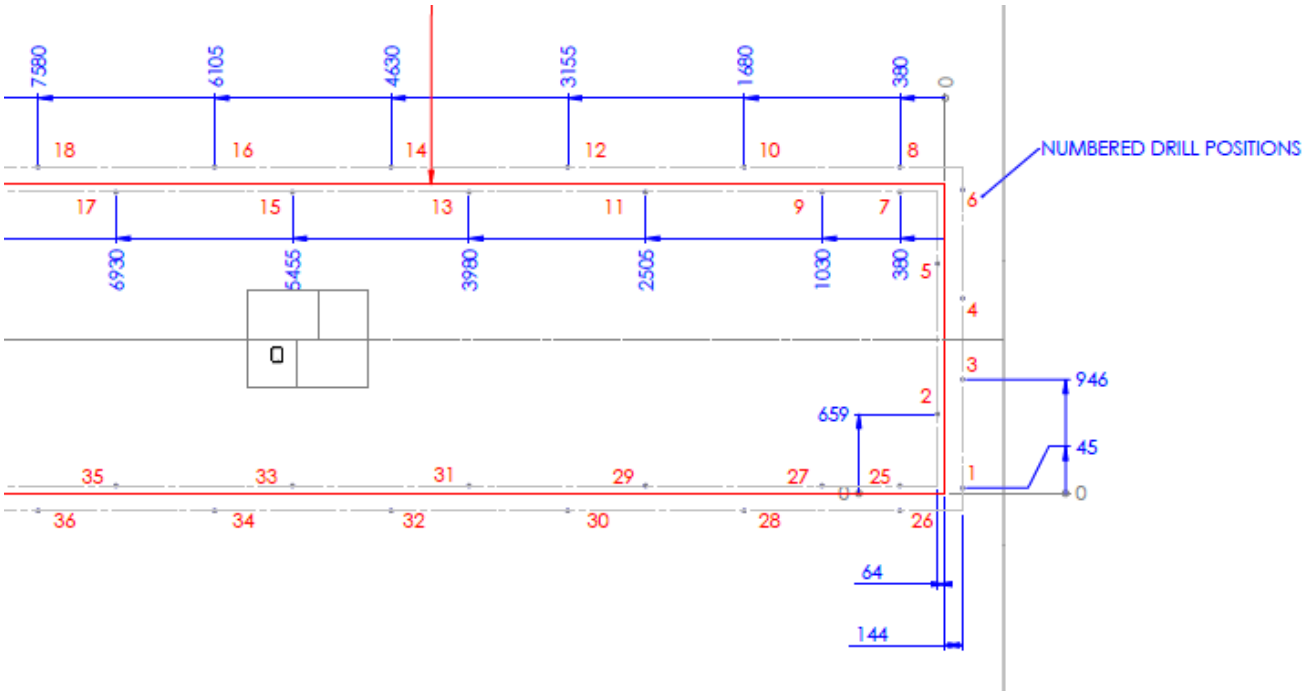


Figure 9: Top view. Concrete anchor positions (example)

Appendix III – Portal mounting

Please see requirements for portal mounting.

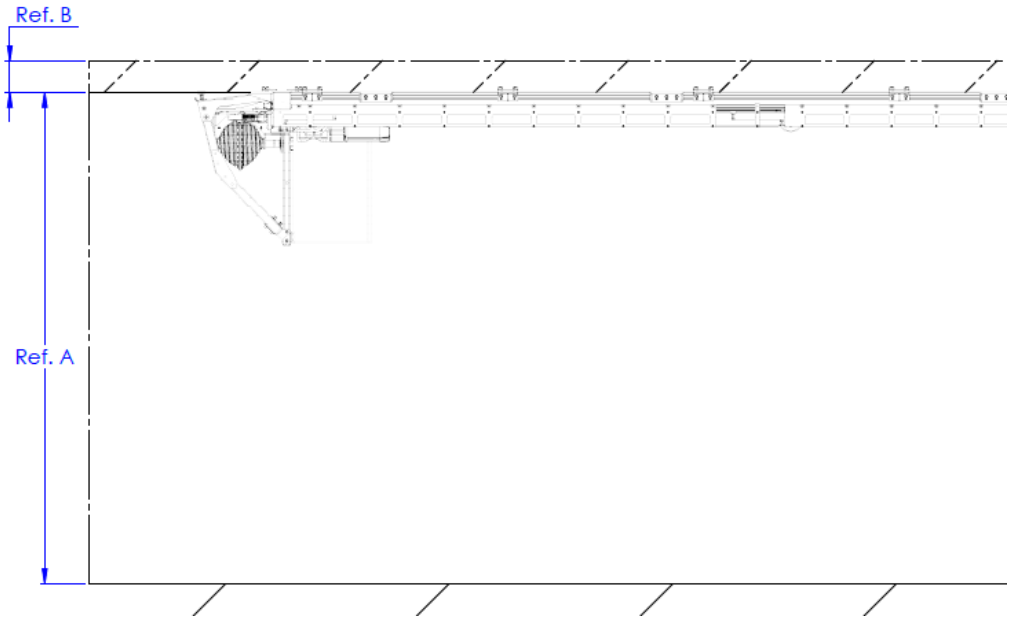


Figure 10: RYSEN™ side view. Mounting offset

Table 9: Definitions of Figure 10

Reference	Description
Ref. A	Floor to mounting height (typically ceiling height). Minimum 3m.
Ref. B	Possible offset due to portal frame. This height is custom per design of portal and must be defined by contractor of portal. A guideline measurement is 150mm.

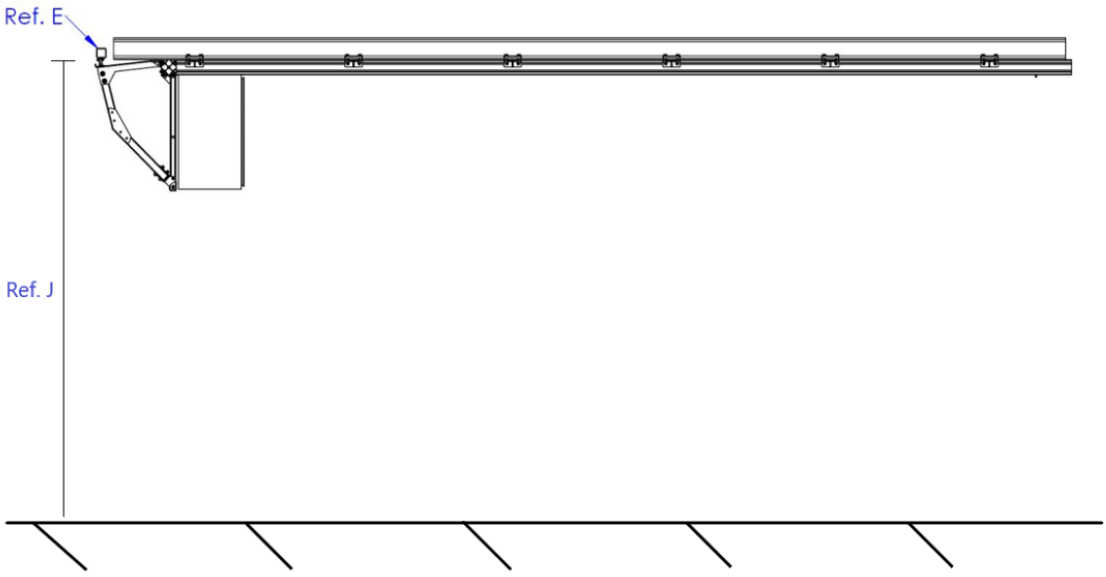


Figure 11: Portal mounting side view

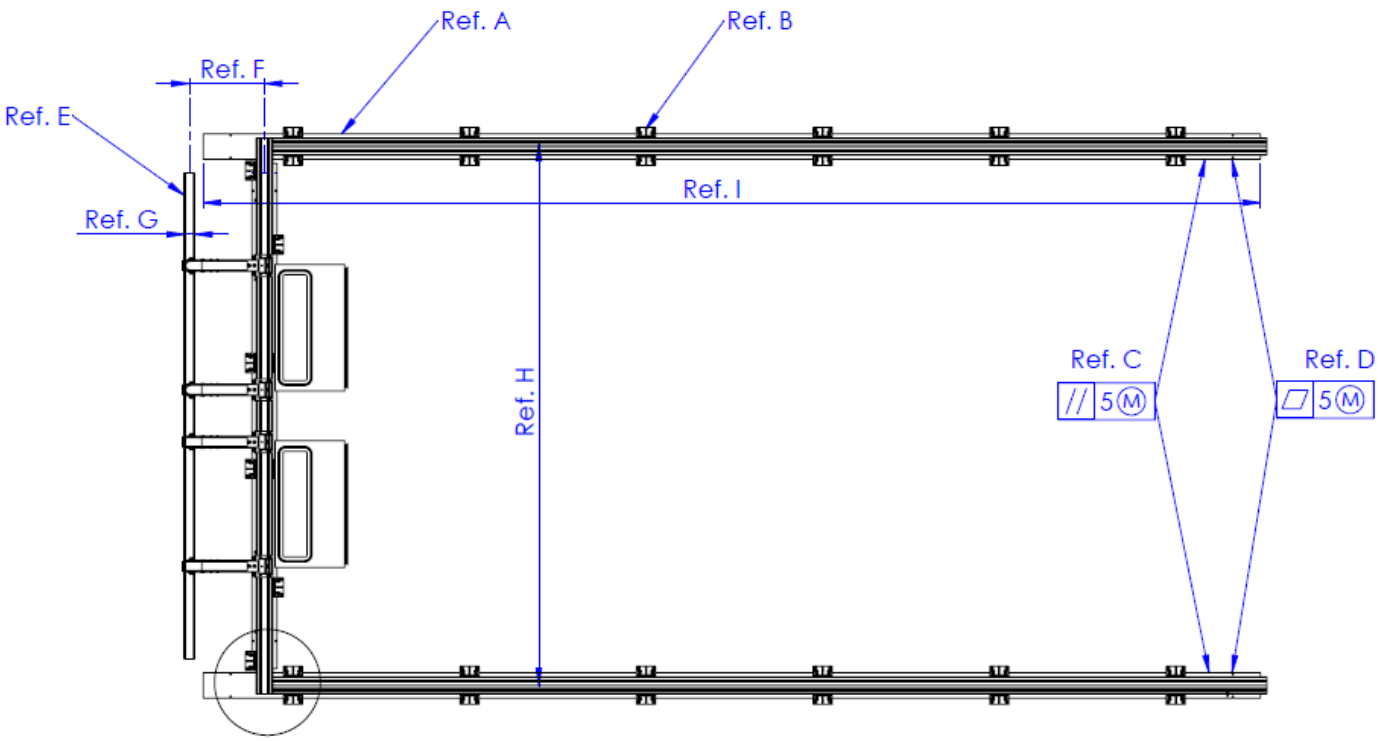


Figure 12: Portal mounting top view

Table 10: Portal mounting requirements

Item	Specification
Ref. A	Beam type: HEA120.
Ref. B	Type B Clamp (AS038-S0008). See Appendix V.
Ref. C	Beams must be parallel within 5mm.
Ref. D	Beams must be planar within 5mm (13.78m system). -0.5mm per meter reduction.
Ref. E	Additional support beam required to support cabinet brackets.
Ref. F	Center-to-center distance 355mm.
Ref. G	Beam dimensions 50x50x3mm.
Ref. H	Dependent on system width.
Ref. I	Dependent on system length.
Ref. J	Height range 3m – 5m. Above 5m please consult Motek
Loading	See chapter 3.1.1. for loading requirements
Attachment	The RYSEN must be mounted to HEA120 beams, using RYSEN-specific clamps (Type B). If this beam specification (HEA120) is not possible, please contact Motek.
Vibrations	The portal cannot have natural frequencies lower than 20Hz. For other requirements regarding vibrations, see chapter 3.1.4.

Deflection	The portal shall not deflect more than 1 mm under a vertical load of 140kg and a horizontal load of 150kg

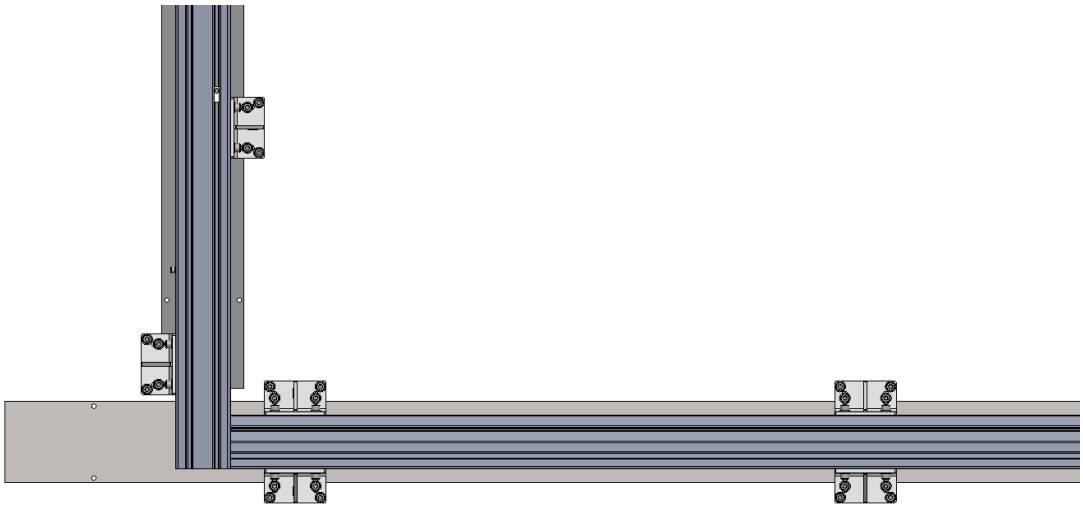


Figure 13: ITEM beam clamped to H-Beam - bottom

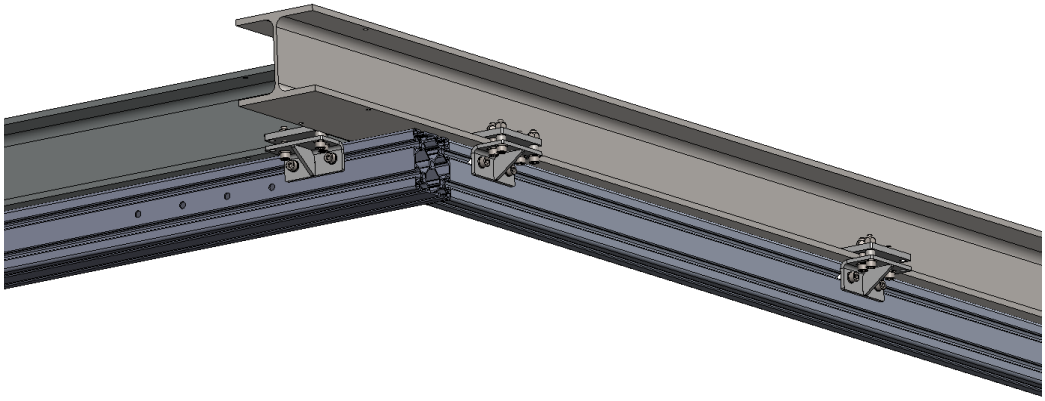


Figure 14: ITEM beam clamped to H-Beam - iso

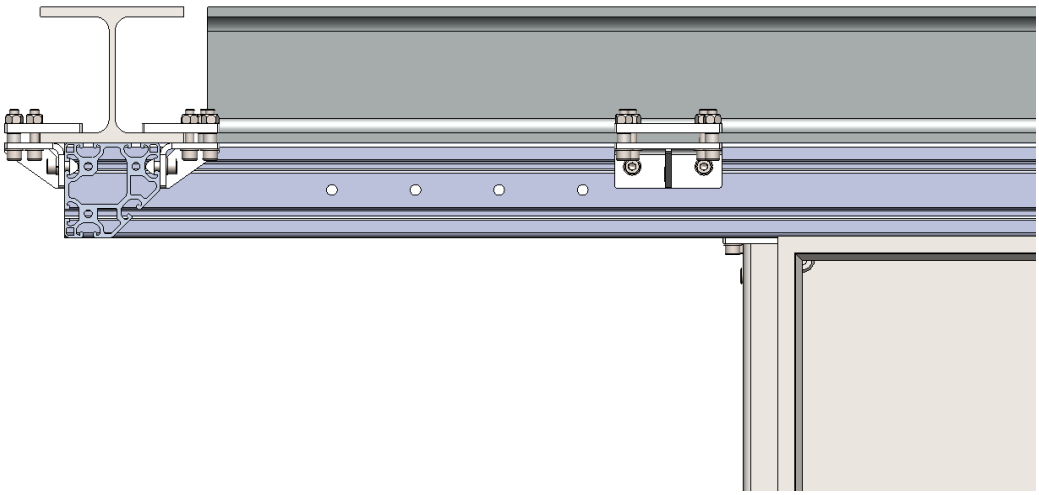


Figure 15: ITEM beam clamped to H-Beam - end

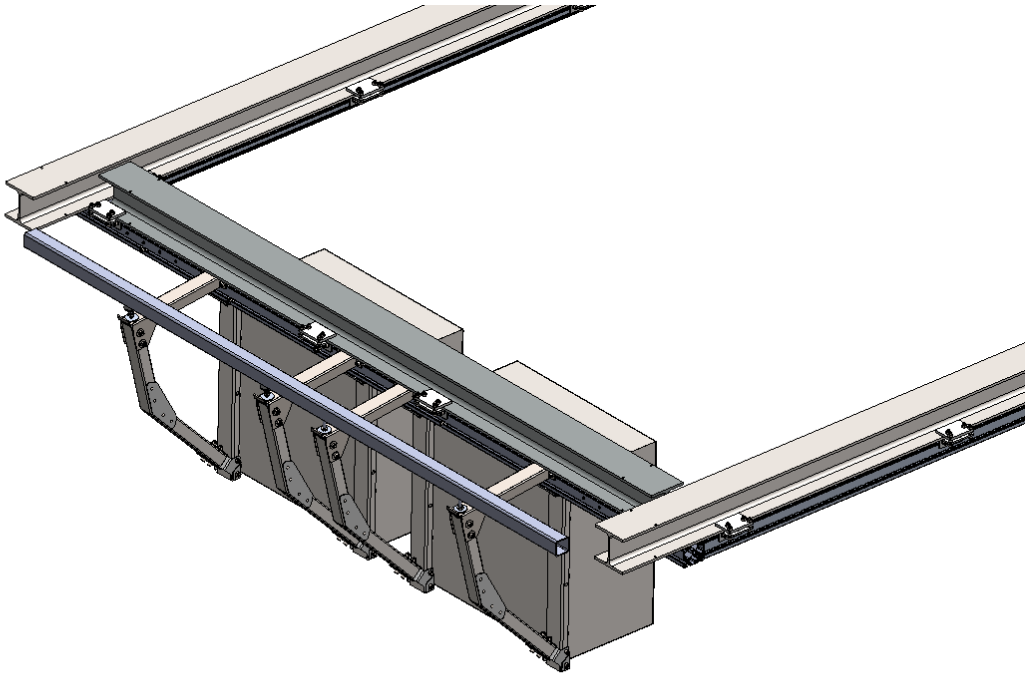


Figure 16: ITEM beam clamped to H-Beam – top iso

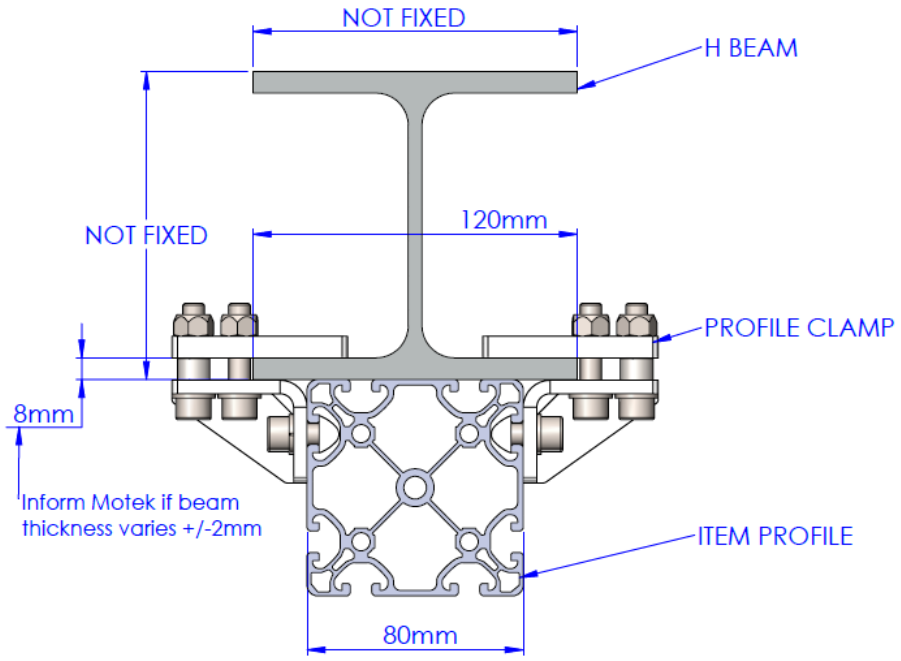
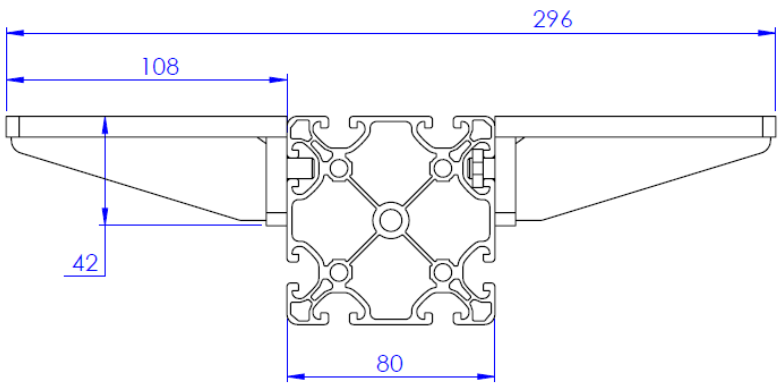
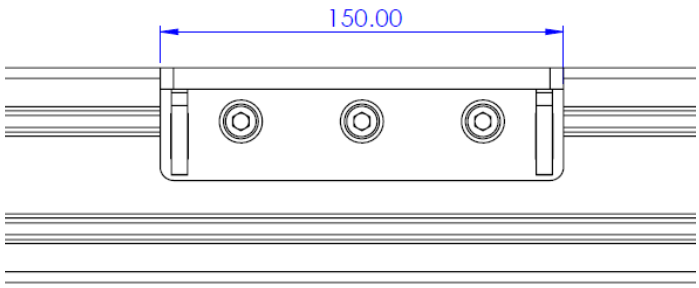


Figure 17: RYSEN mounting to H beam.

Appendix IV – Clamp Type A

Table 11: Specifications

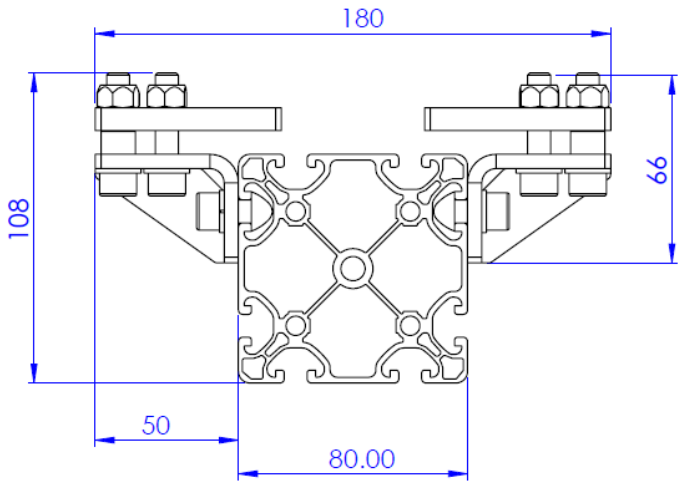
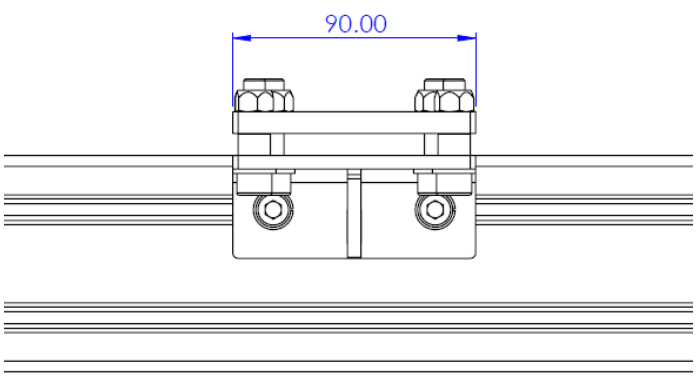
Item	Specification
Clamp type	**Clamp type A** - *(RB015-S0140)*
Use	Halfen profiles and concrete mounting
Additional width to RYSEN system	**216mm (108*2)**
Section view	

Front view	
Halfen Channels	x2 Halfen bolts: (*M12-HS 40/22 40mm-GVs4.6)* per clamp are required.
Concrete mounting	x1 M16 anchor is required per clamp. Length dependent on situation.
Clamp quantity	A *generalized* quantity per length can be seen below (based on 3.5m wide system).

System length	Quantity w/ Halfen profiles*	Quantity w/ Anchors*
7.78m	28	28
8.28m	28	30
8.78m	32	32
9.28m	32	34
9.78m	36	36
10.28m	36	38
10.78m	40	40
11.28m	40	42
11.78m	44	44
12.28m	44	46
12.78m	48	48
13.28m	48	50
13.78m	52	52

** This is a generalized quantity, suitable for most situations. This could vary per installation, use this as a guide.*

Appendix V – Clamp Type B

Item	Specification
Clamp type	**Clamp type B** - *(AS038-S0008)*
Use	Portal mounting
Additional width to RYSEN system	**100mm**
Section view	
Front view	
Clamp quantity	A *generalized* quantity per length can be seen below (based on 3.5m wide system).

System length	Quantity*
7.78m	30
8.28m	32
8.78m	34

	9.28m	36
	9.78m	38
	10.28m	40
	10.78m	42
	11.28m	44
	11.78m	46
	12.28m	48
	12.78m	50
	13.28m	52
	13.78m	54
* This is a generalized quantity, suitable for most situations. This could vary per installation, use this as a guide.		