SLIDING SHUTTERS

Technical Manual

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SLIDING SHUTTERS - IMPRINT

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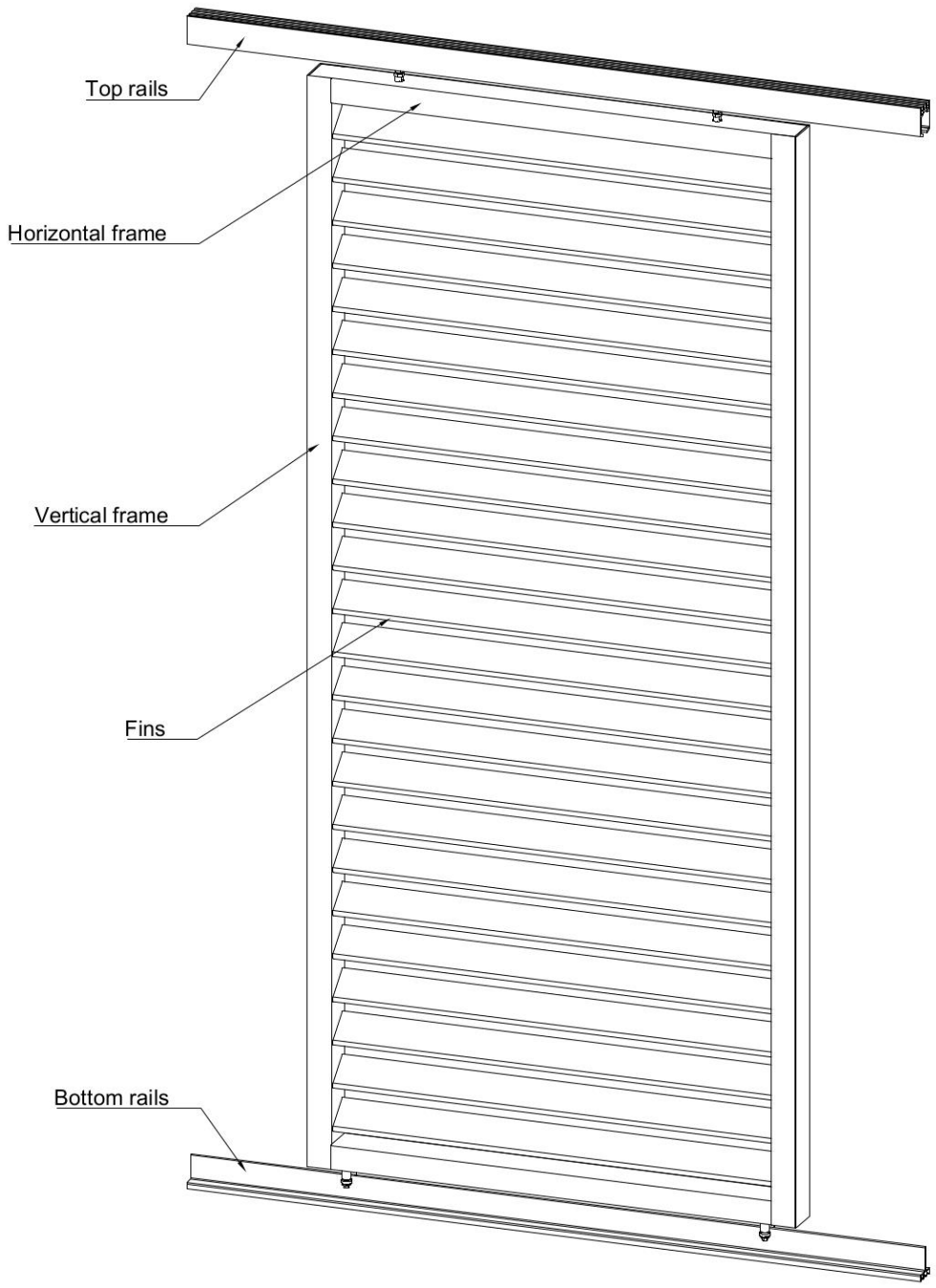
SLIDING SHUTTERS – TABLE OF CONTENT

INTRODUCTION

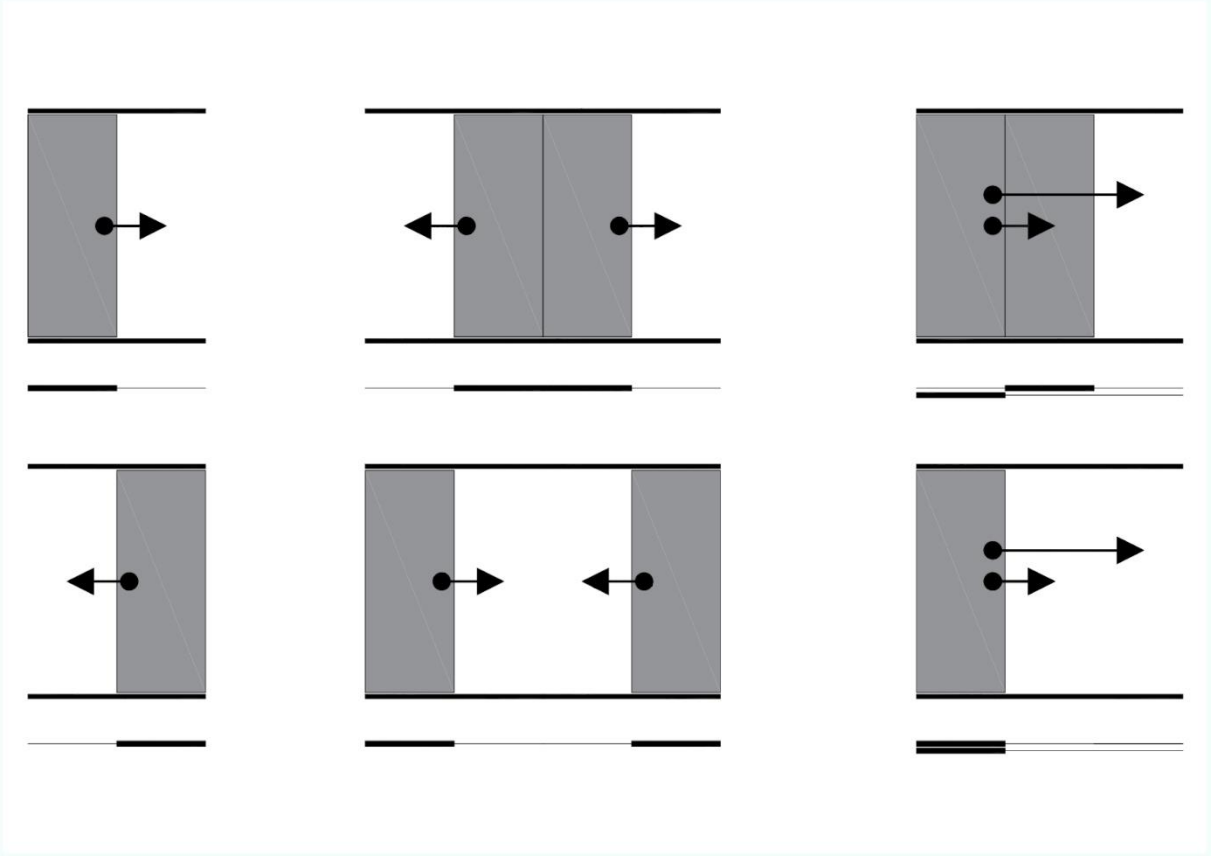
Building Elegance Sliding Shutters consist of the following components:

- Top and bottom rail: The rails provide fort he sliding of the shutters
- Horizontal and vertical frame: Forms the casing of the shutter and “carries” the fins.
- Fins: Available in wood and aluminium.



CONFIGURATIONS

The shutter can slide manually or it can be motorized making it possible for the system to function in places where manual positioning is not possible. It also allows for the shutters to become a part of a total building management system which optimises the shading performance of the shutter. Several configurations are possible. See examples below.



Single shutter
Single rail

Motorized: Yes
Manual: Yes

Two shutters
Mid-opening
Single rail

Motorized: Yes
one or two motors
Manual: Yes

Multiple Shutters
Multiple rails

Motorized: Yes
one, two or more motors
Manual: Yes

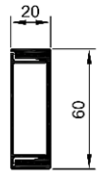
Should you need any further information about motorized sliding shutters, please refer to the document « 0105 Sliding Shutter-Motorization » or feel free to contact us at any time.

PROFILES

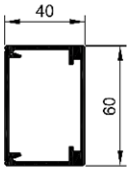
Below is an overview of all profiles
that are being used to assemble a sliding shutter

Frame profiles

Vertical frames

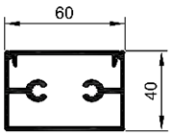


Slimline vertical frame
Application: fixed system
Material: Aluminium



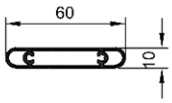
Vertical frame 60x40
Application: fixed system
and adjustabel system
Material: Aluminium

Horizontal frames

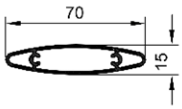


Horizontal frame 60x40
Application: fixed system
Material: Aluminium

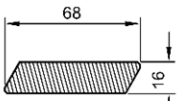
Fins



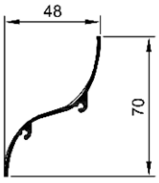
Fin alu rounded 60x10
Application: fixed system
Material: Aluminium



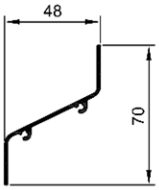
Fin alu foil 70x15 fixed
Application: fixed system
Material: Aluminium



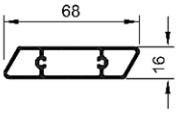
Fin WRC rhomboid 68x16
Application: fixed system
and adjustable system
Material: Western Red Ceder



Fin alu S 70x48
Application: fixed system
Material: Aluminium

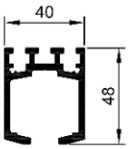


Fin alu Z 70x48
Application: fixed system
Material: Aluminium

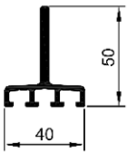


Fin alu rhomboid 68x16
Application: fixed system
Material: Aluminium

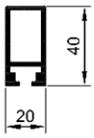
Rail profiles



Top Rails 40x48
Max. shutter weight: 120kg
Material: Aluminium



Bottom Rails T 40x50
Material: Aluminium



Bottom Rails box 20x40
Material: Aluminium

DIMENSIONS - GENERAL

Both top and bottom rails of a sliding shutter system are fixed to consoles. The space between the top and bottom console is called the “clear height”. When the cleir height is known, the shutter height can be determined.

When the preferred shutter height and width are determined a checkup must be done whether they fit within the possible range of frame dimensions:

The maximum possible shutter dimensions (height and width) depend on:

- Frame type
- Fin system
- Fin type
- Windloads that act on the shutter surface

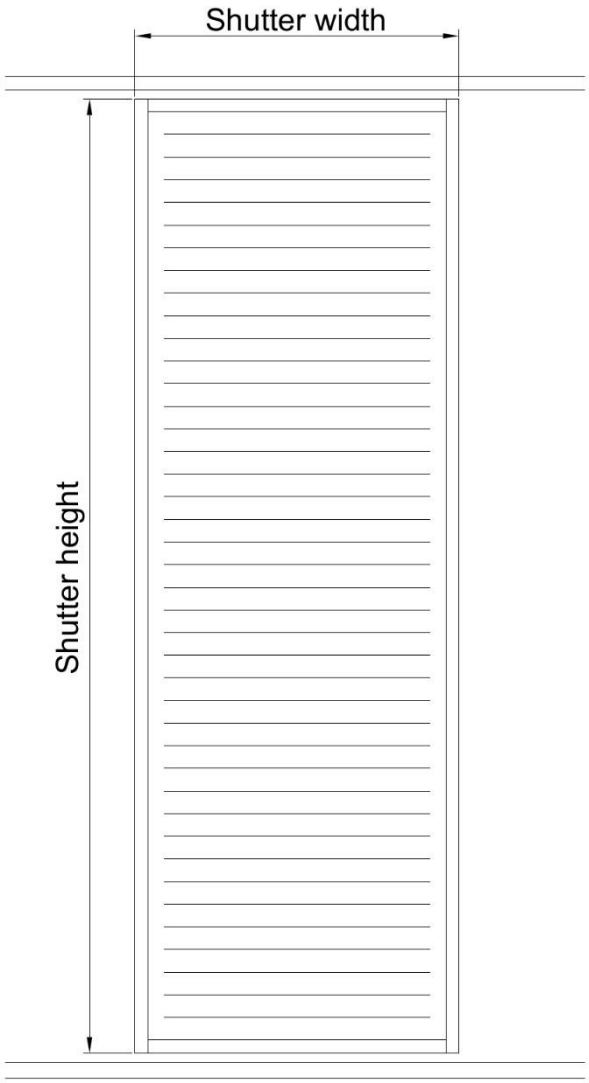
To determine if a certain configuration of frame and fins is possible, do the following two checks:

1. Check frame strength:

   Per frame type and fin system, a maximum possible shutter height is given, depending on shutter width and wind loads (See graphs on next pages).

2. Check fin spans:

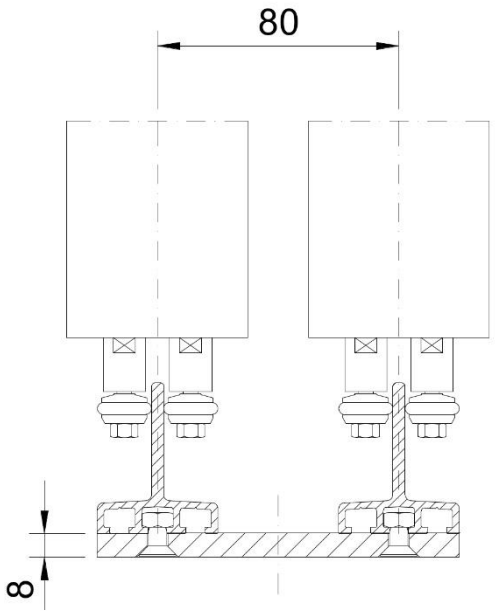
   Check if chosen fin can span the shutter width that is set at check #1. (See the fin span graph)

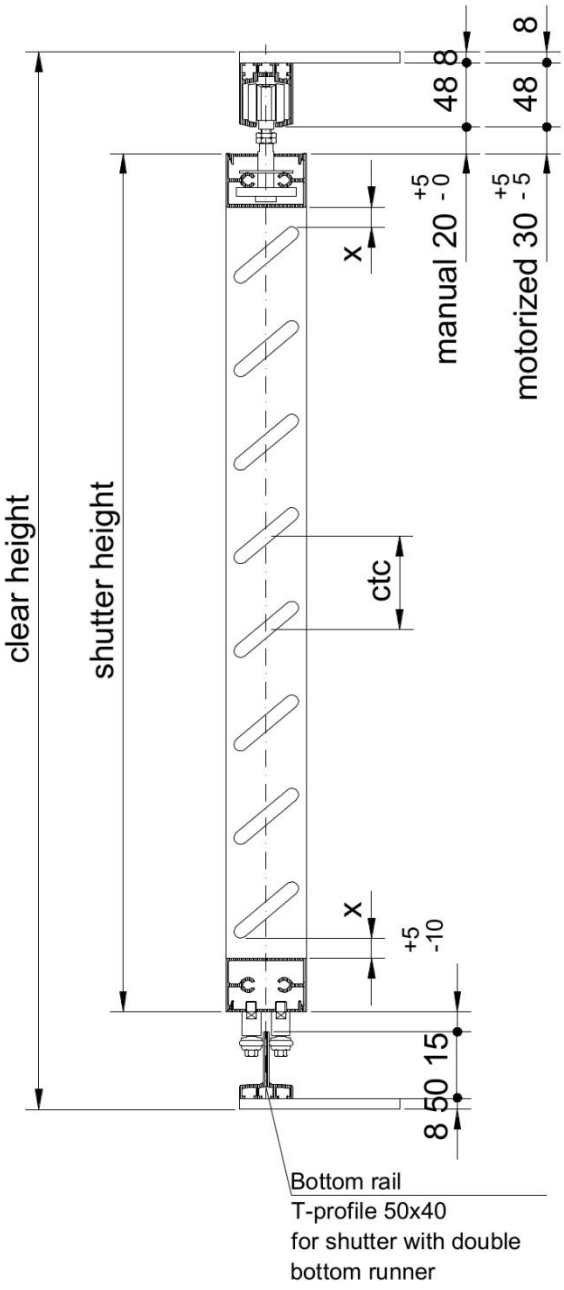


DIMENSIONS – CLEAR HEIGHT (BOTTOM RAIL T-PROFILE)

The picture below shows the relationship between the "clear height" and the resulting "shutter height".

- Manual shutter height = Clear height - 149mm
- Motorized shutter height = Clear height - 159mm



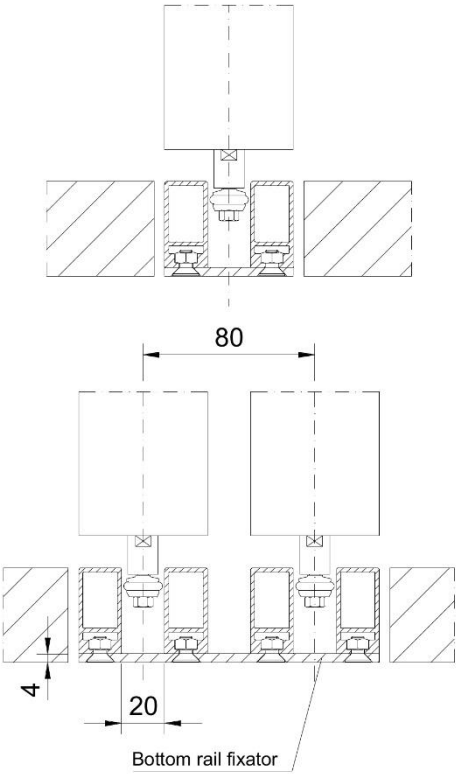


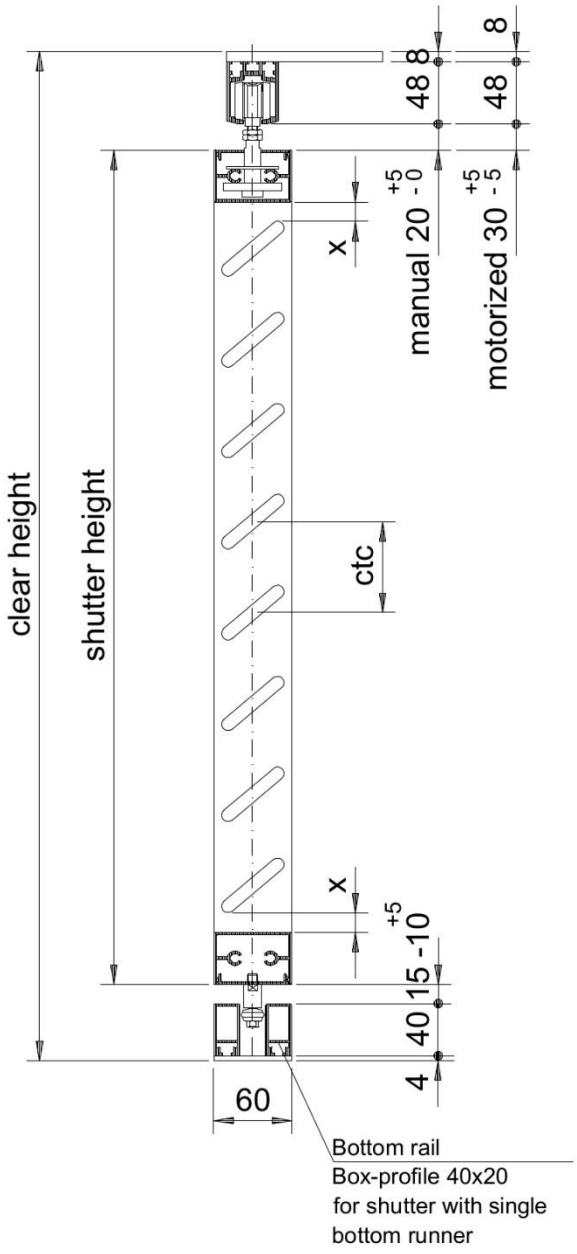
As the shutter height is determined by the clear height, and the fin center to center distance is fixed per fin type, a distance "X" remains. This distance will equally be divided at the top and bottom of the shutter.

DIMENSIONS – CLEAR HEIGHT (BOTTOM RAIL BOX PROFILE)

The picture below shows the relationship between the "clear height" and the resulting "shutter height".

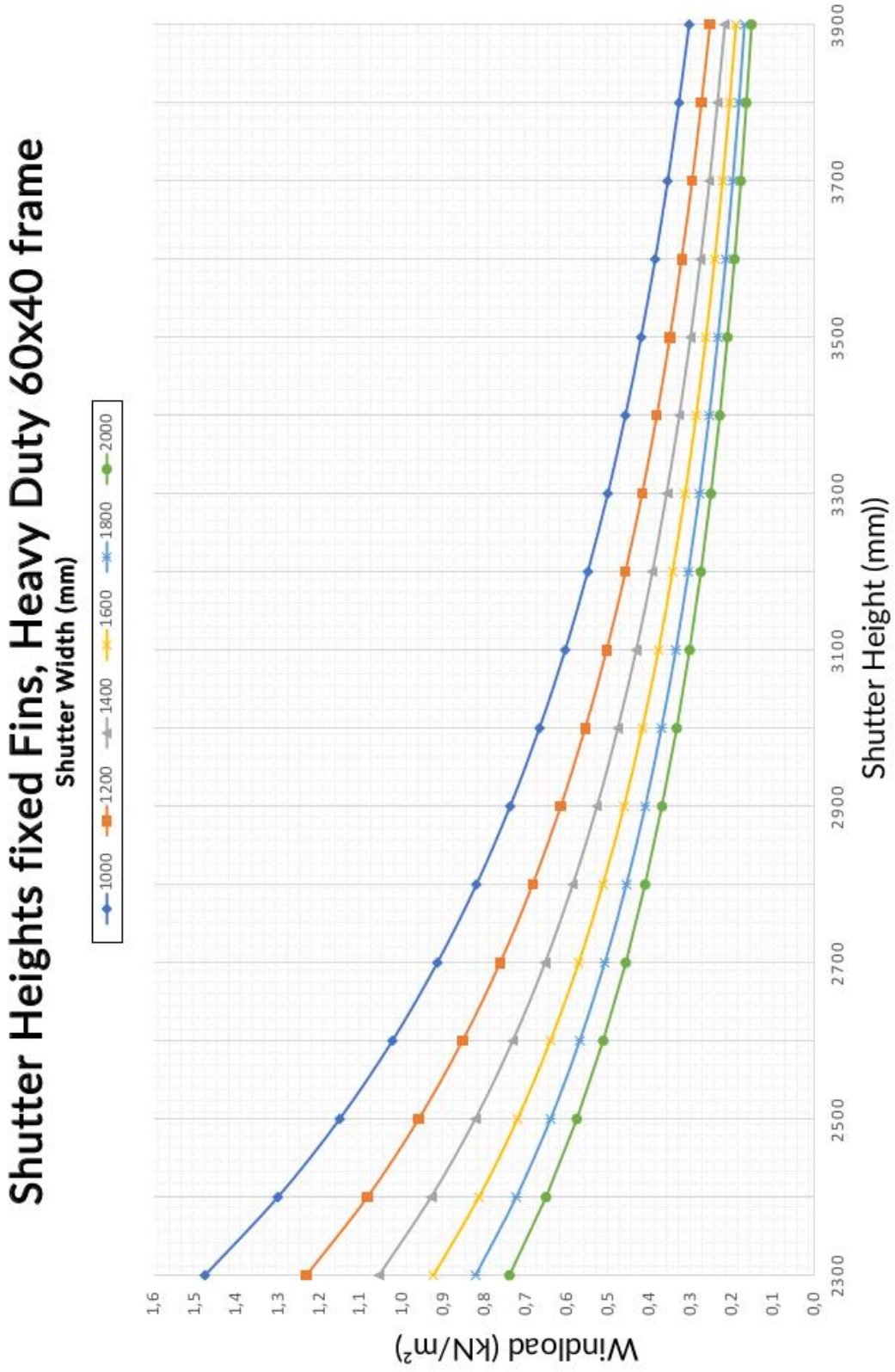
- Manual shutter height = Clear height - 135mm
- Motorized shutter height = Clear height - 145mm



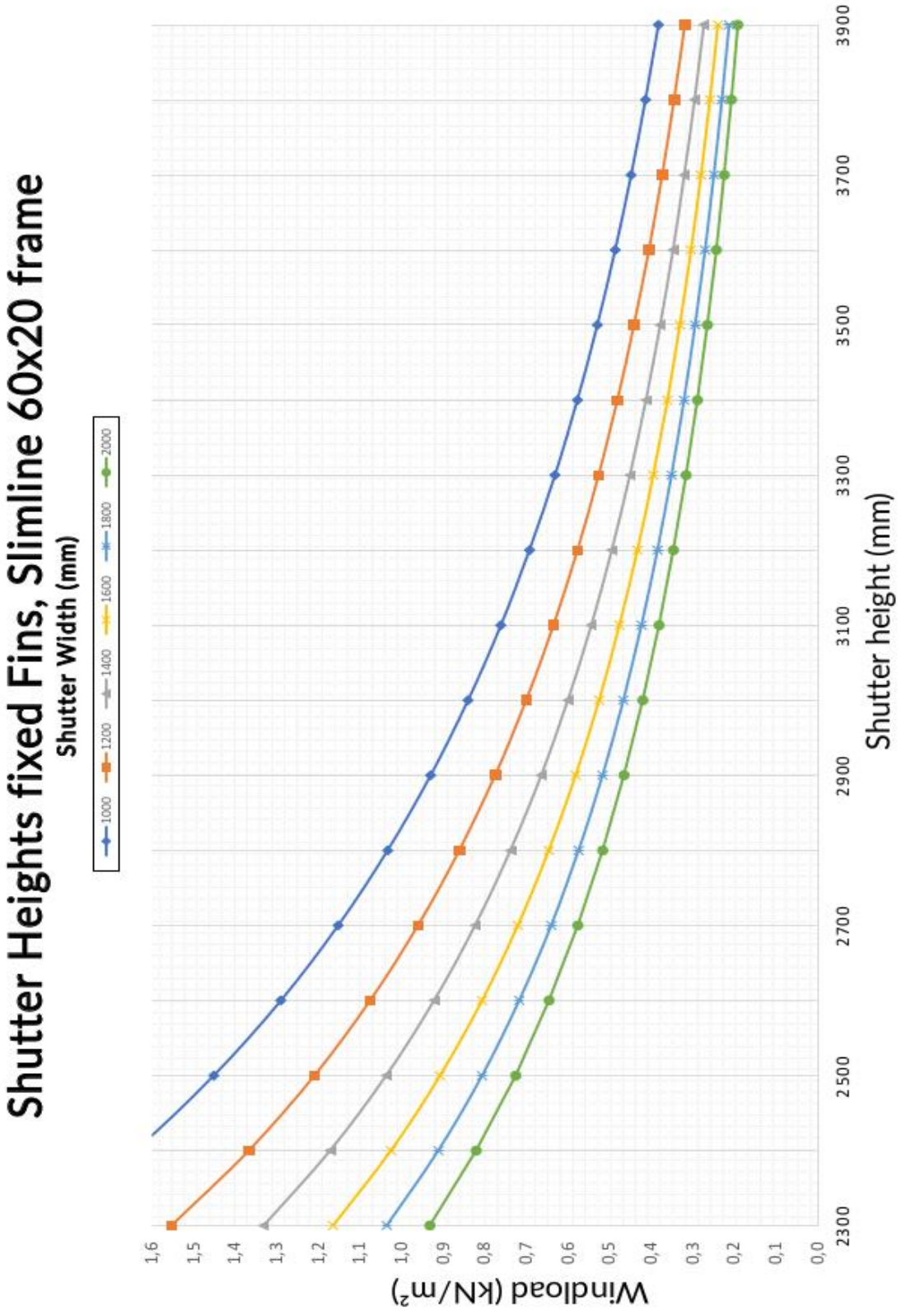


As the shutter height is determined by the clear height, and the fin center to center distance is fixed per fin type, a distance "X" remains. This distance will equally be divided at the top and bottom of the shutter.

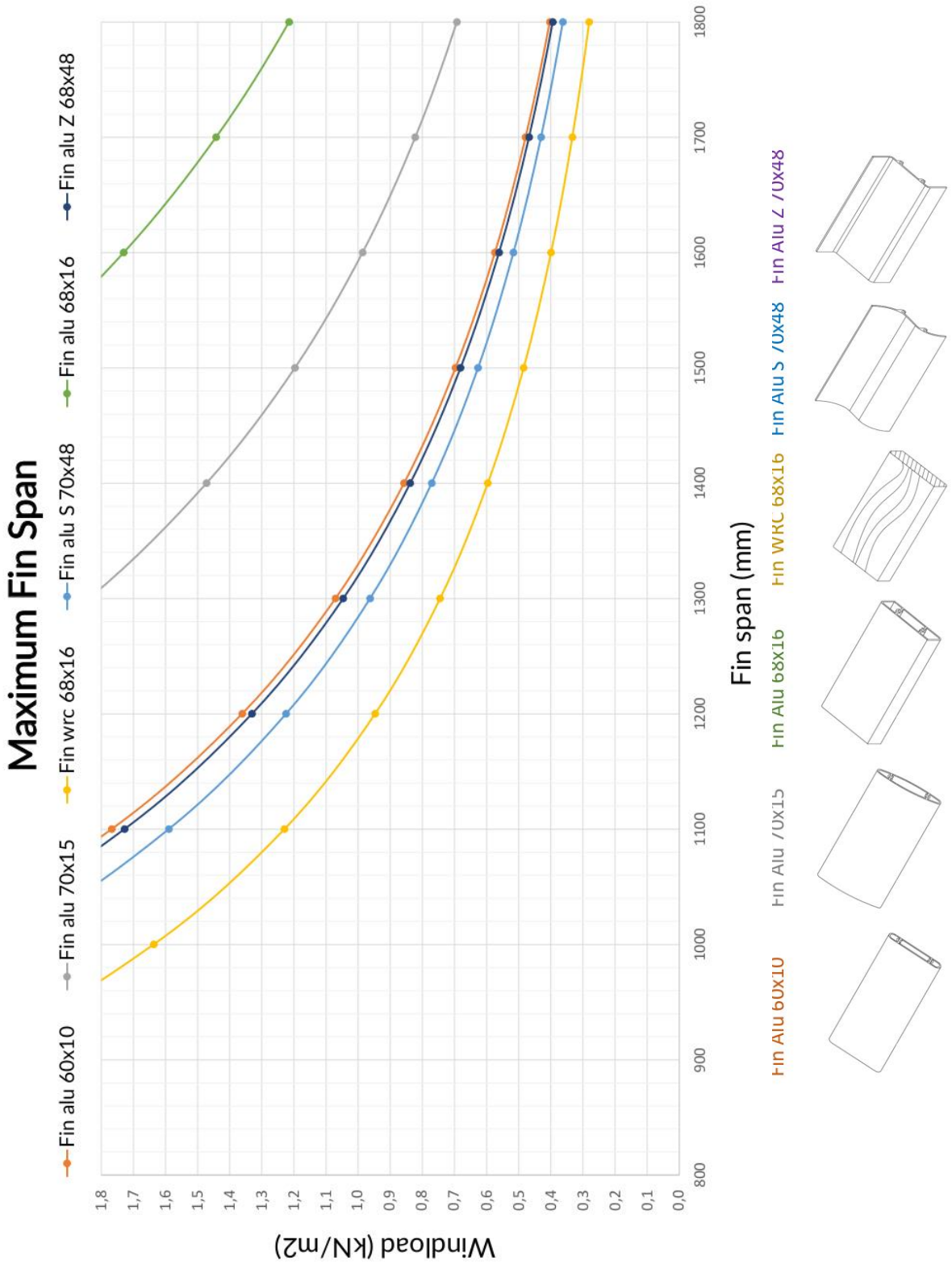
DIMENSIONS – 60x40 FRAME DIMENSIONS



DIMENSIONS – 60x20 FRAME DIMENSIONS

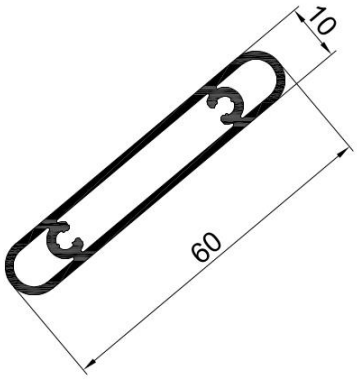


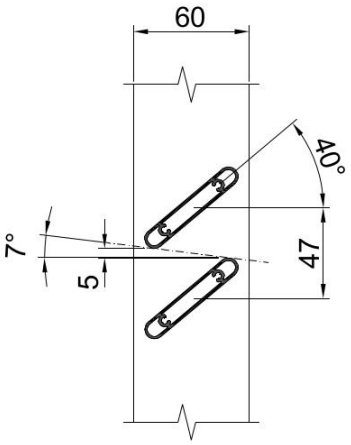
DIMENSIONS – FIN SPANS

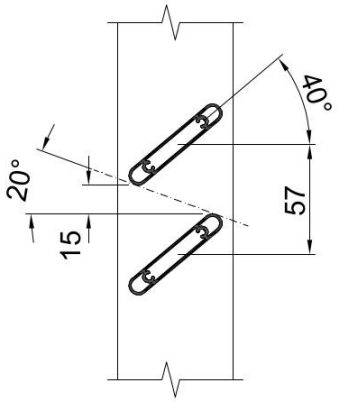


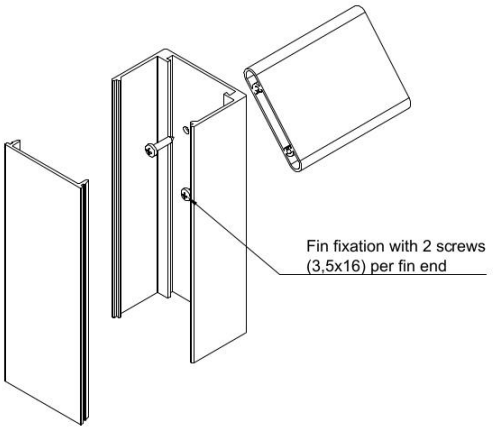
FIN FIXATIONS – FIN ALU ROUNDED 60x10

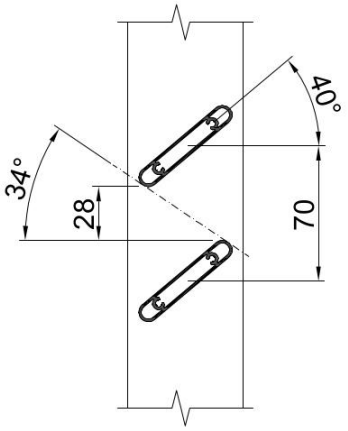
Fin fixations – Fin alu rounded 60x10





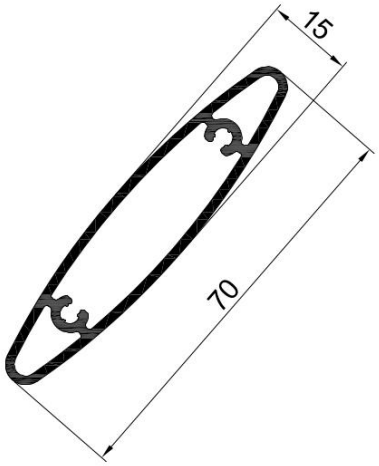


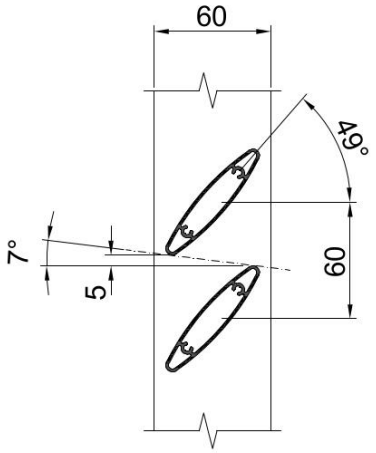


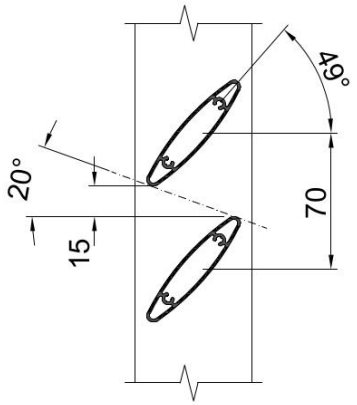


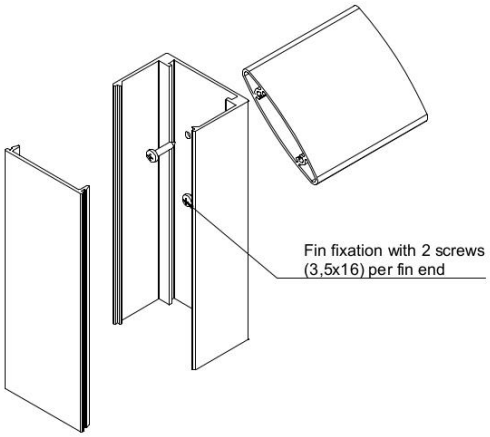
FIN FIXATIONS – FIN ALU FOIL 70x15

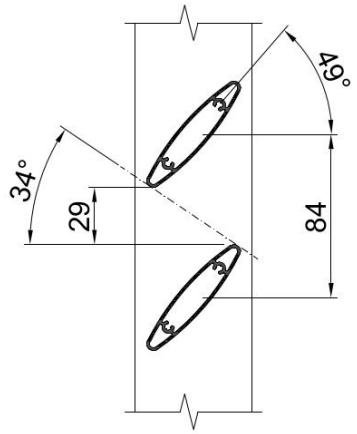
Fin fixations – Fin alu rounded 60x10



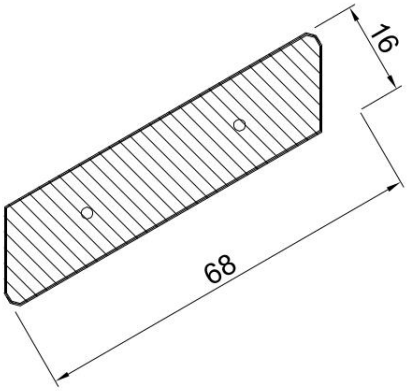


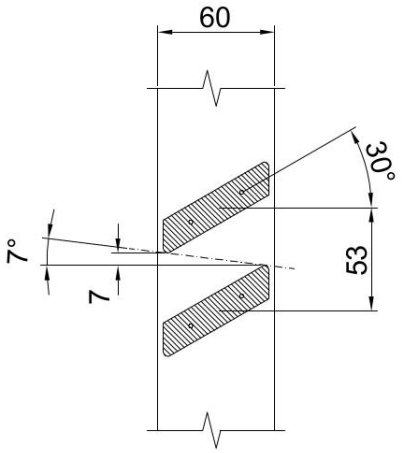


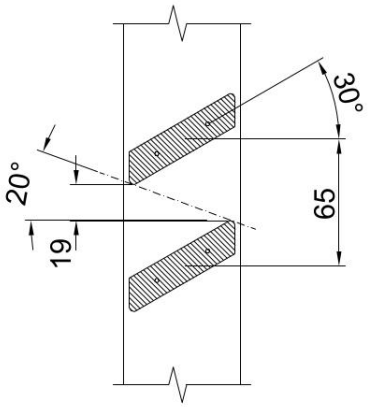


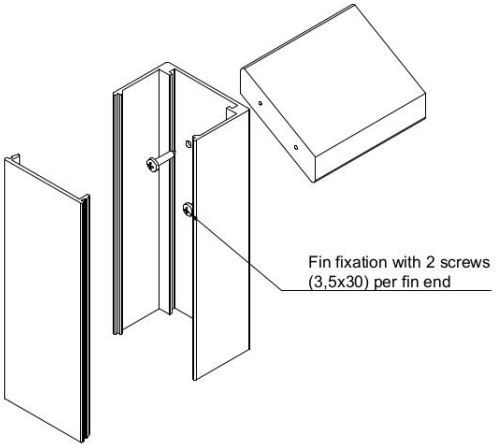


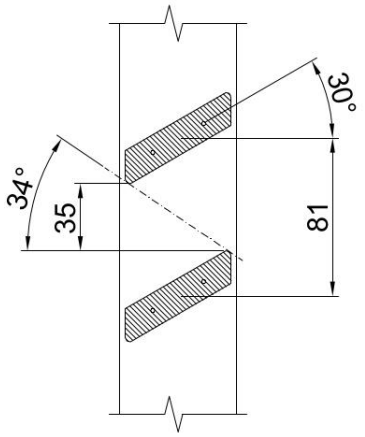
Fin fixations – Fin WRC Rhomboid 68x16











FIN FIXATIONS – FIN ALU S 70x48

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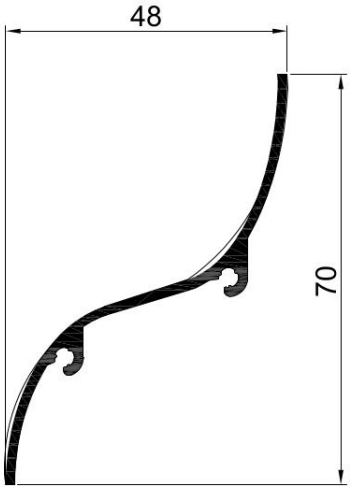

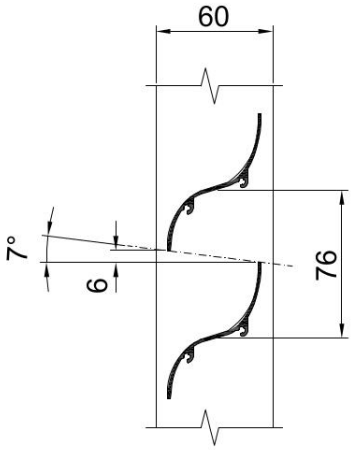

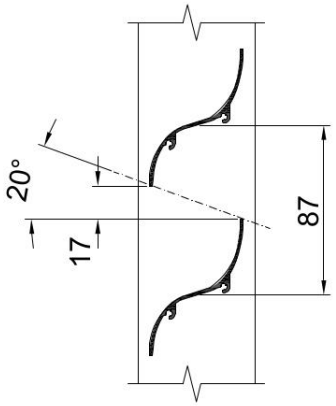

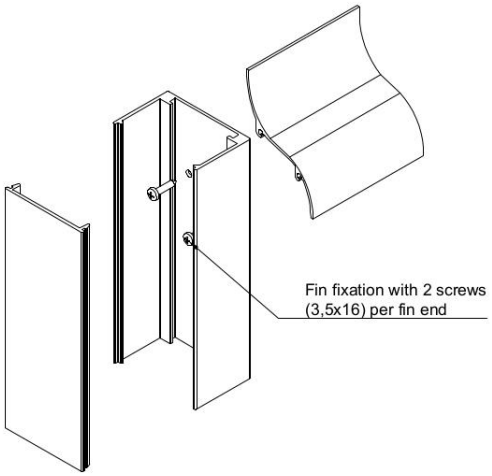

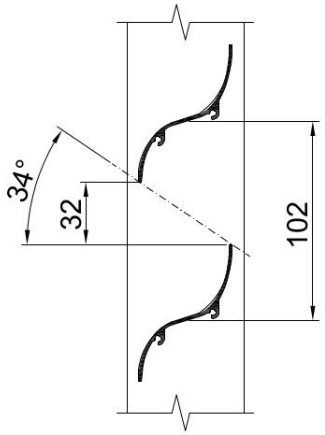

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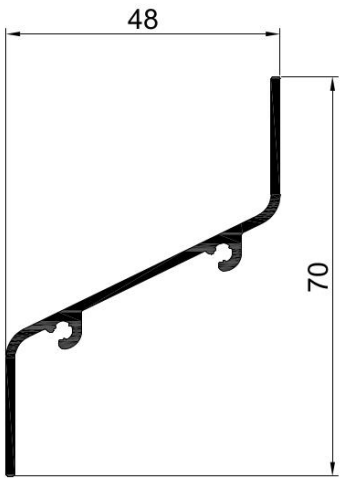
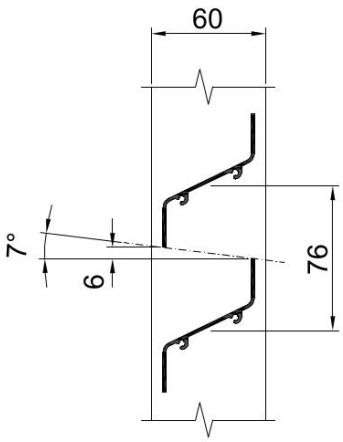
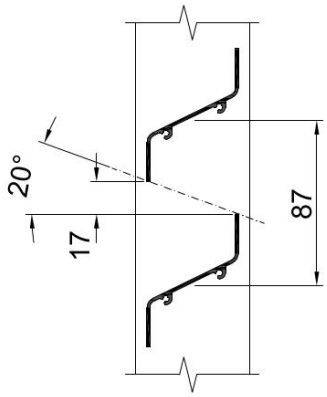
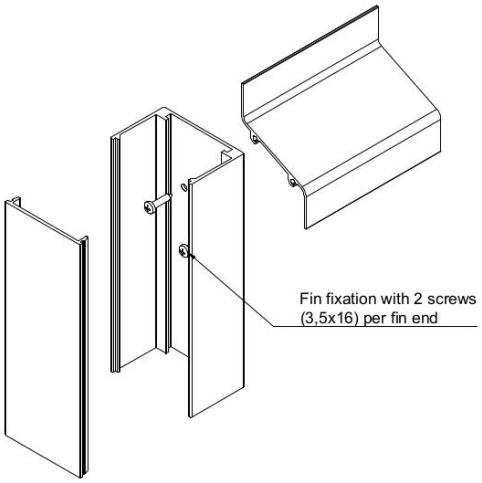
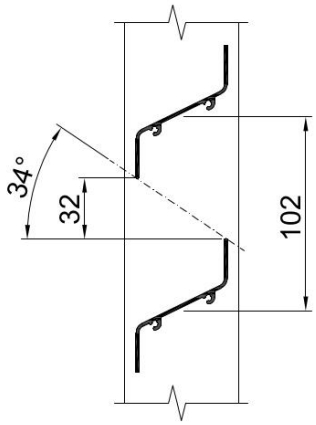


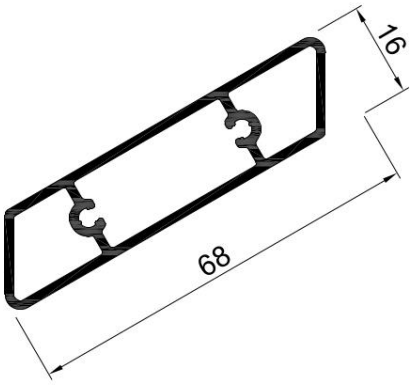


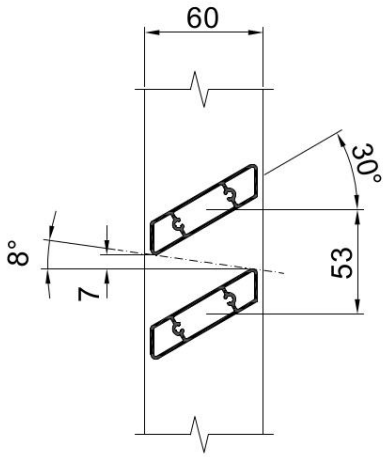


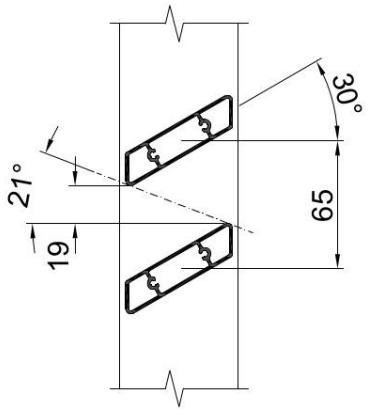


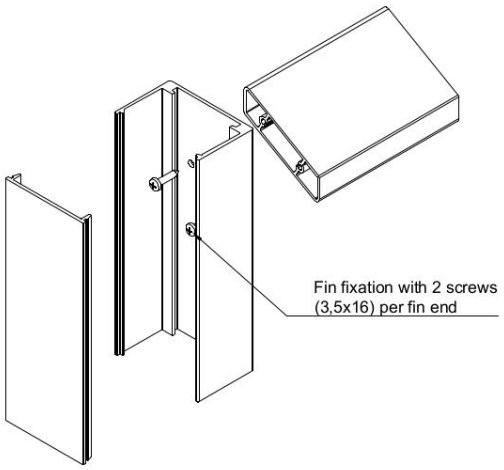


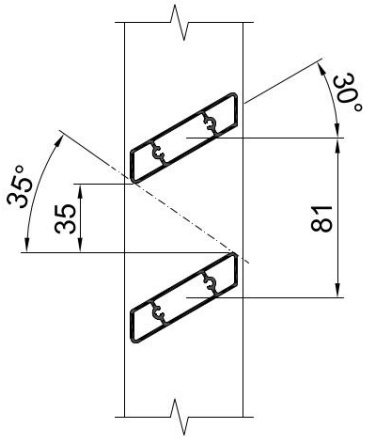
Fin fixations – Fin Alu Rhomboid 68x16



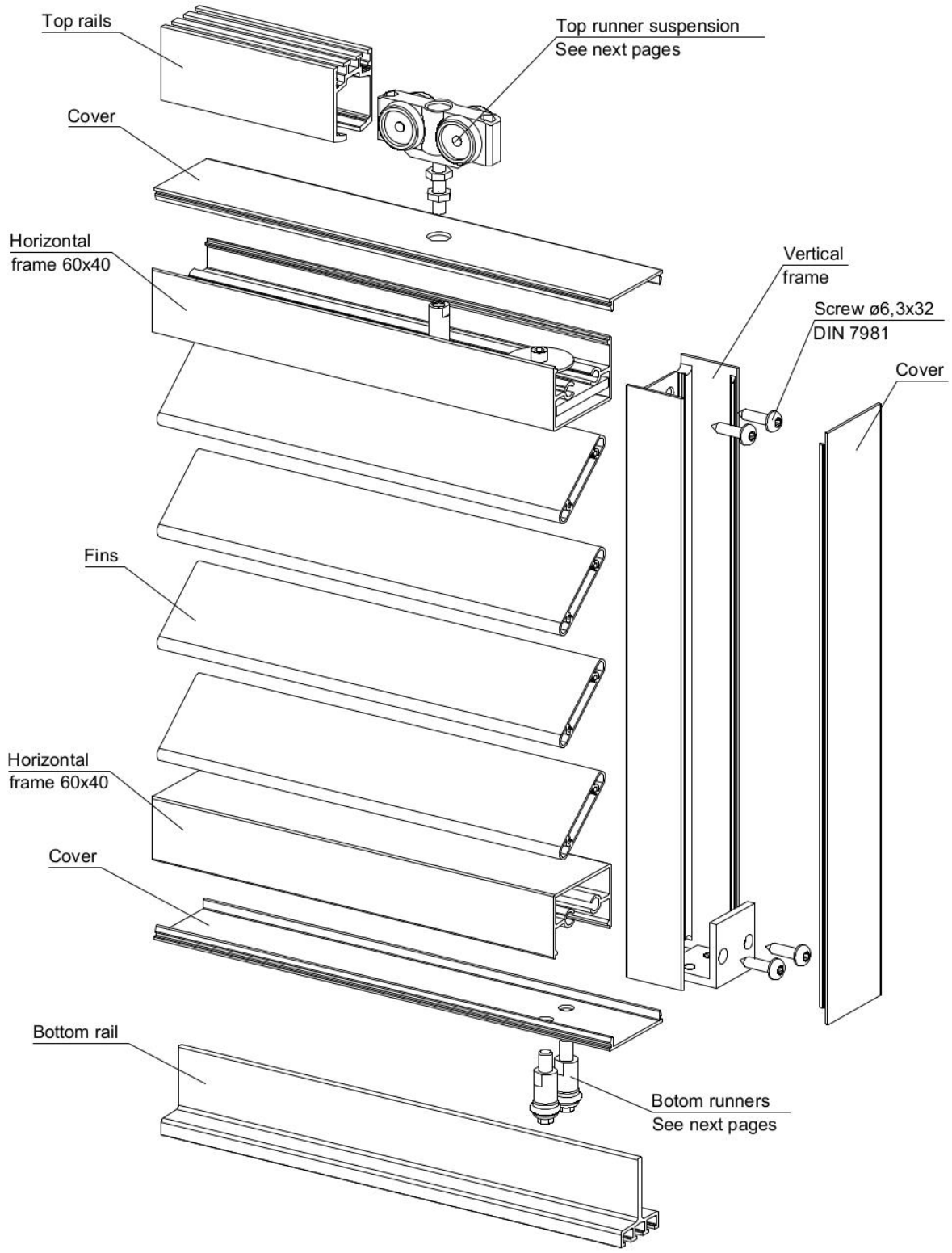




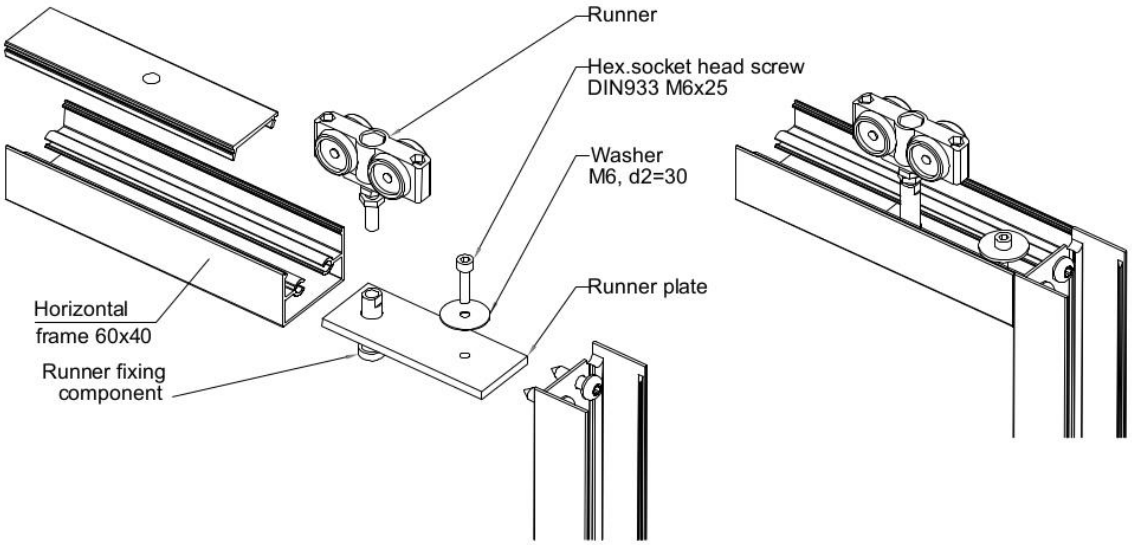


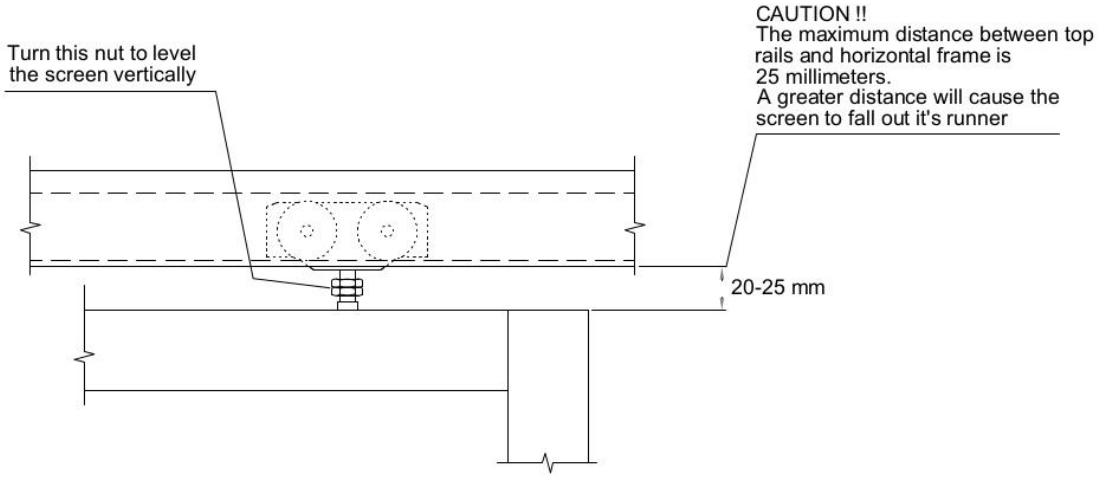


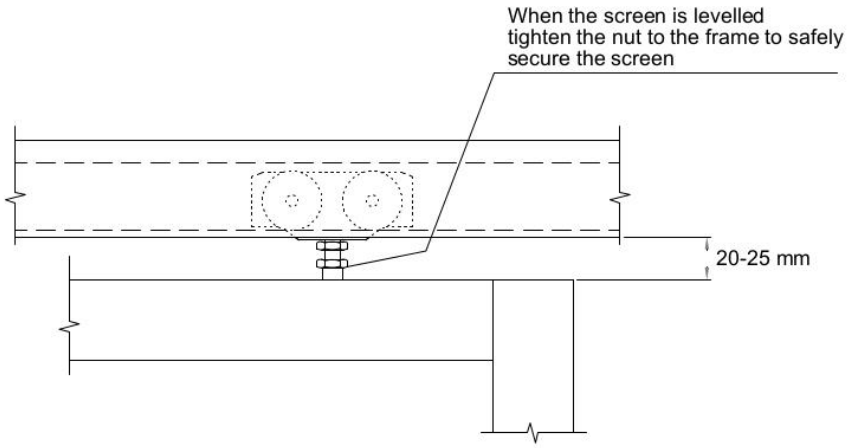
HEAVY DUTY 60x40 FRAME – FRAME ASSEMBLY



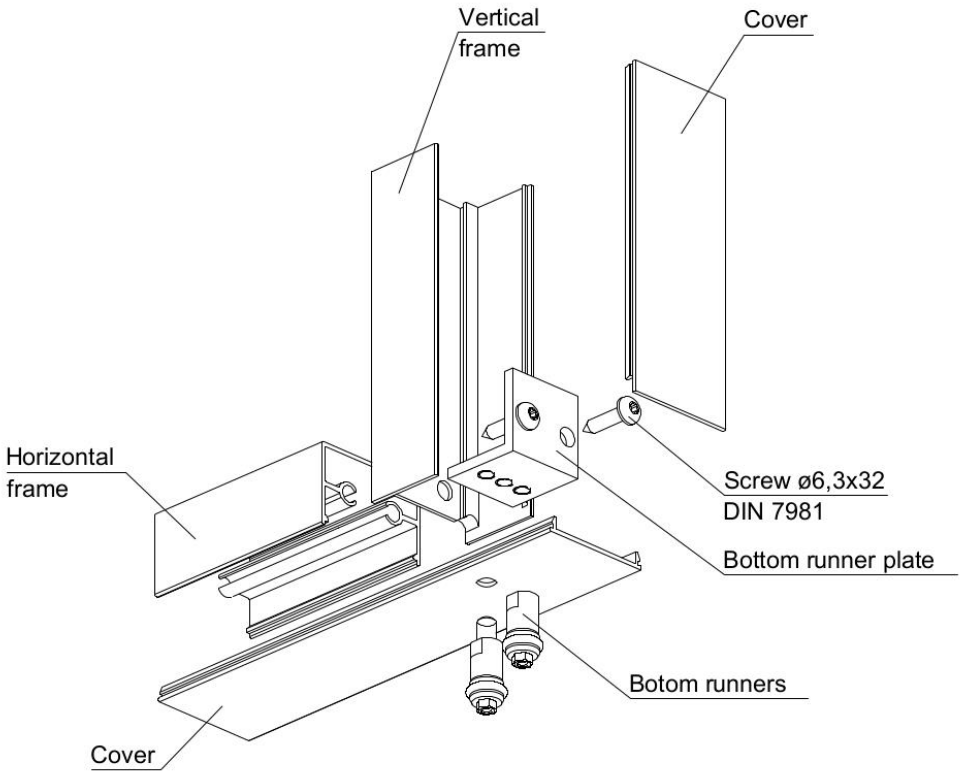
HEAVY DUTY 60x40 FRAME – TOP RUNNER ASSEMBLY

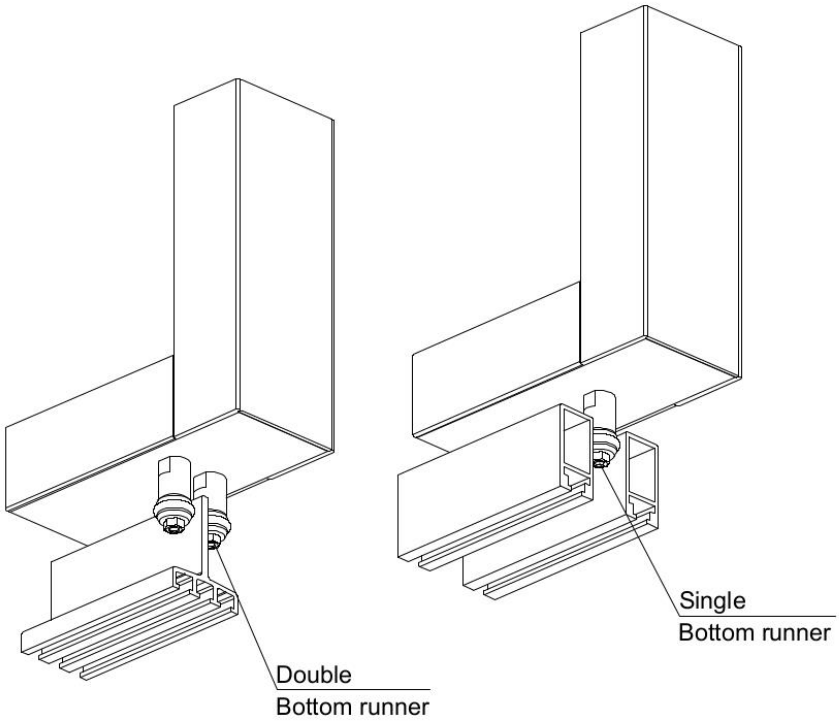




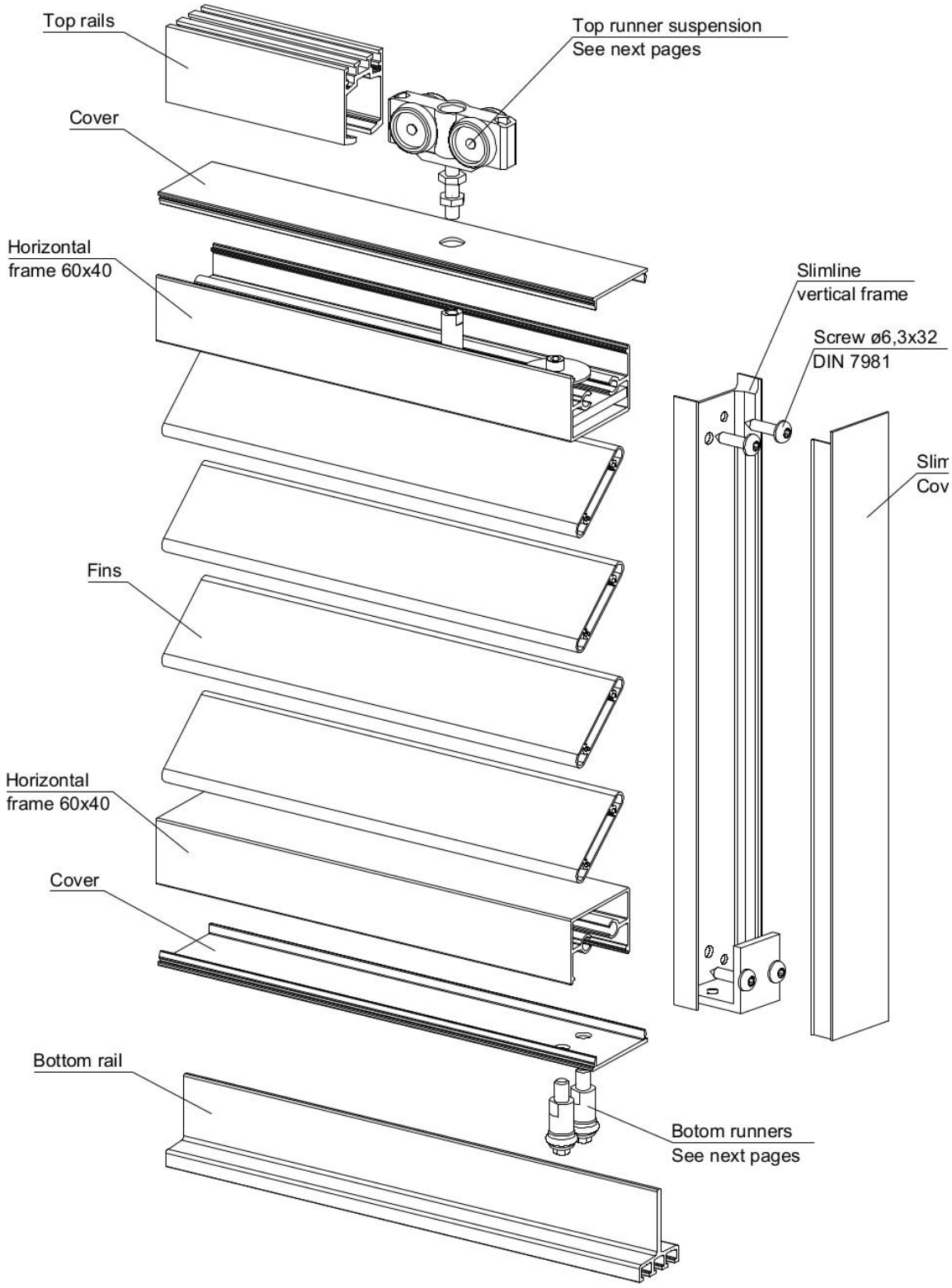


HEAVY DUTY 60x40 FRAME – BOTTOM RUNNER ASSEMBLY

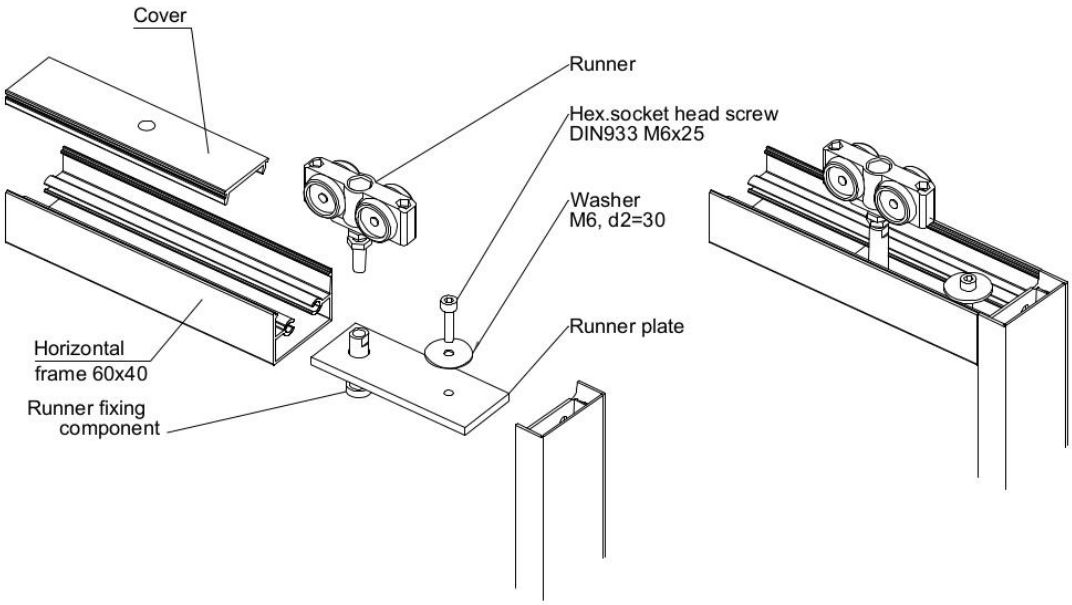


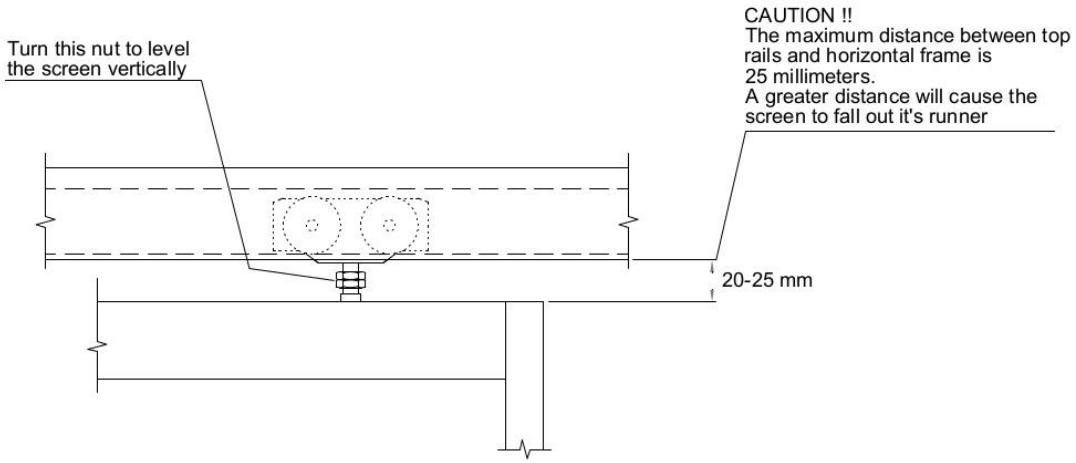


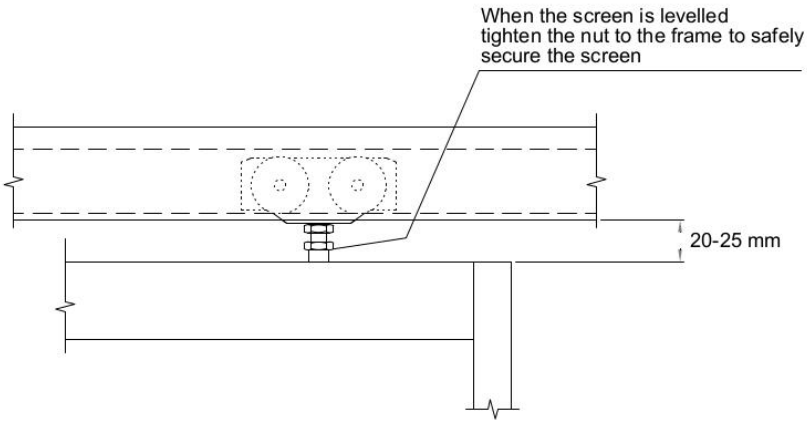
SLIMLINE 60x20 FRAME – FRAME ASSEMBLY



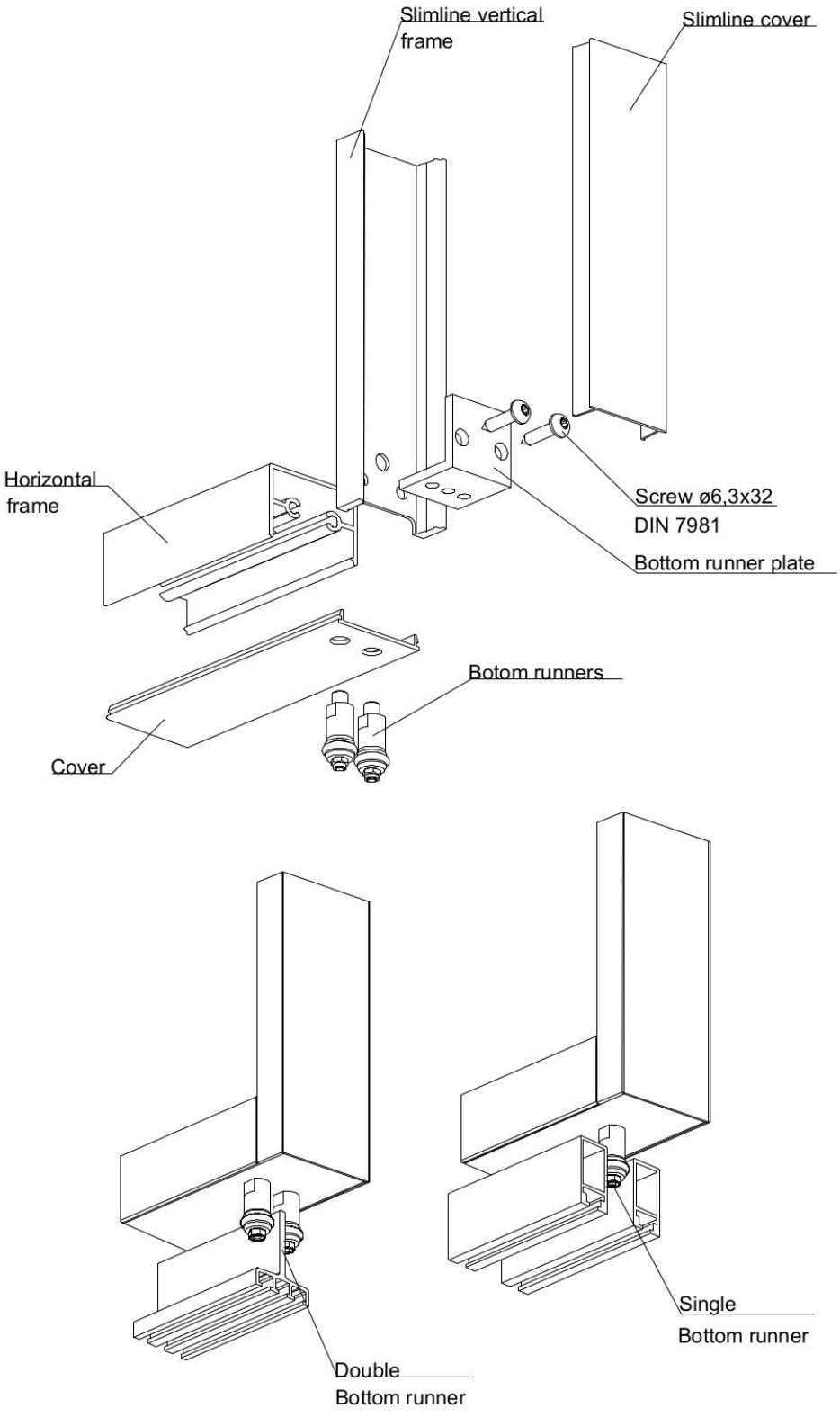
SLIMLINE 60x20 FRAME – TOP RUNNER ASSEMBLY





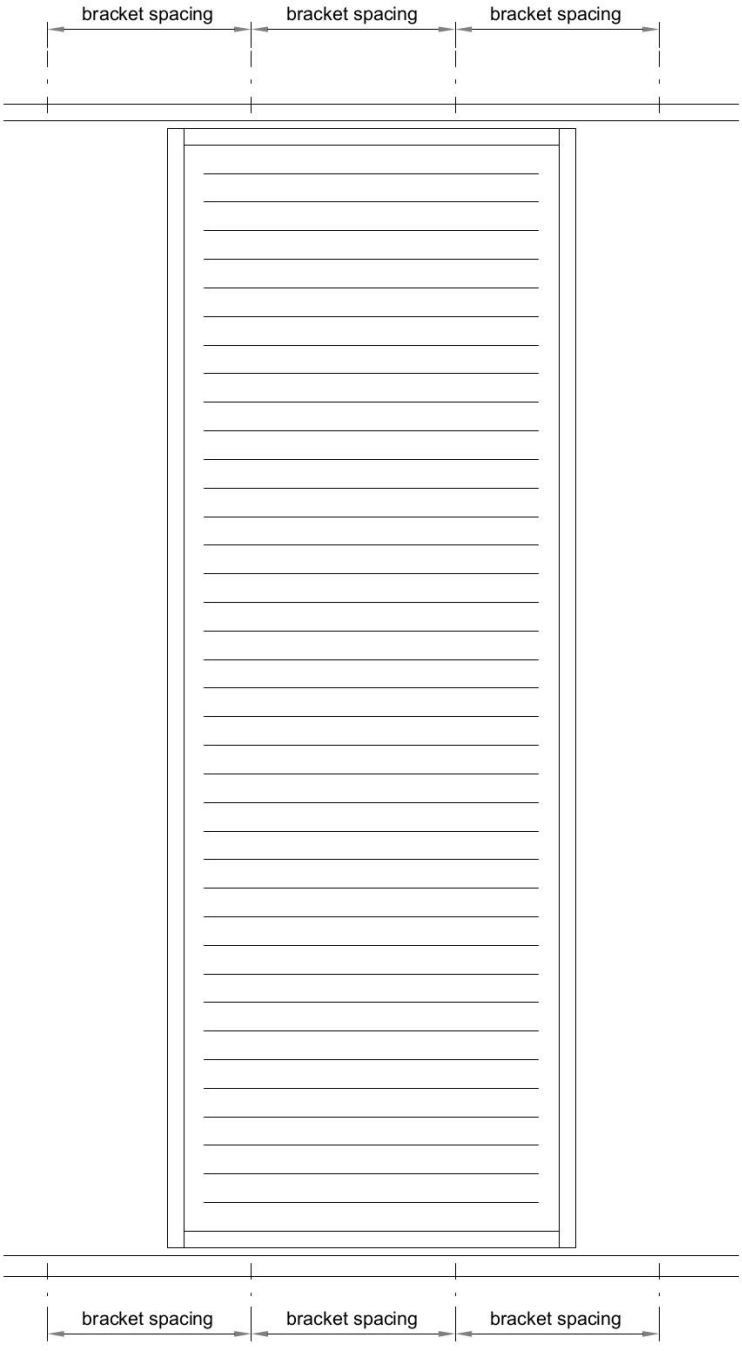


SLIMLINE 60x20 FRAME – BOTTOM RUNNER ASSEMBLY

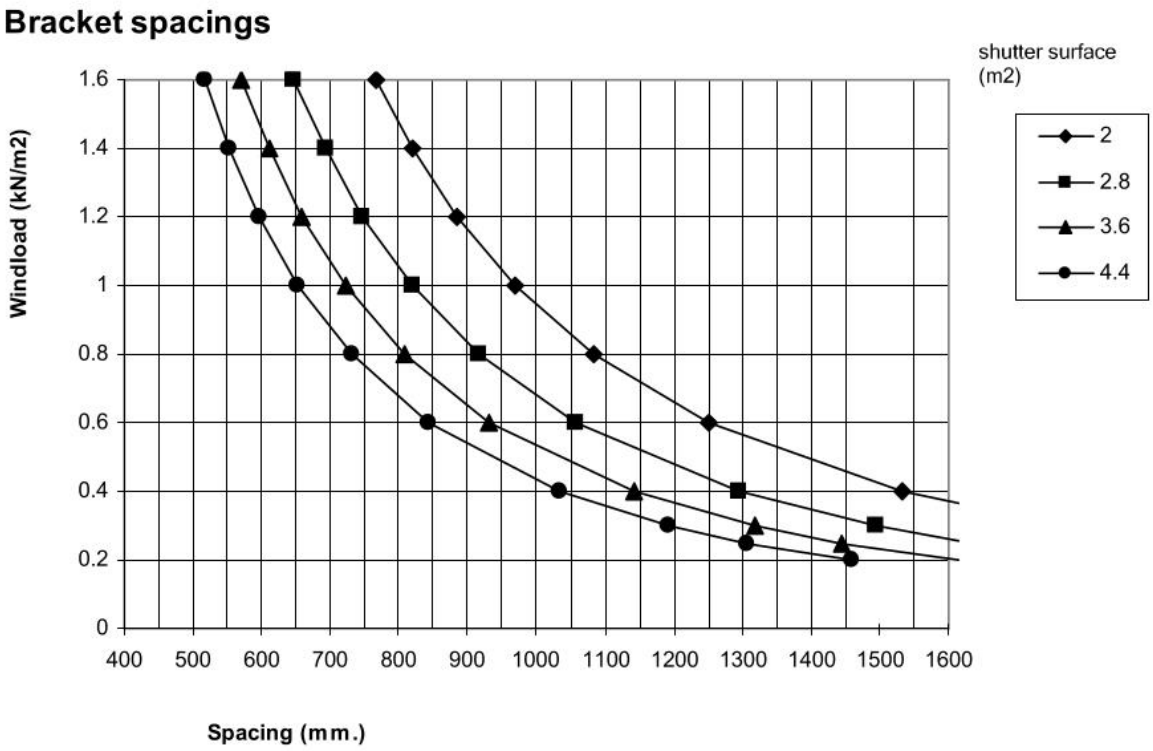


RAIL FIXATION - INTRODUCTION

Fixation of the top and bottom rails to a building structure (like a ceiling, balcony, steel beam etc) is done with multiple rail brackets. For the top rails there are 2 standard solutions and the bottom rails is fixed with screws. These solutions are explained on the next pages.
Depending on windload and shutter surface, the distance between the rails-brackets can vary. The graph on the next page shows which fixation distance should be used.



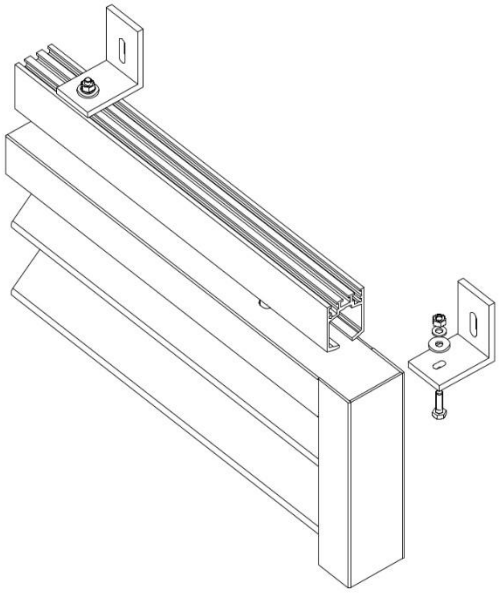
RAIL FIXATION – BRACKETS SPACING

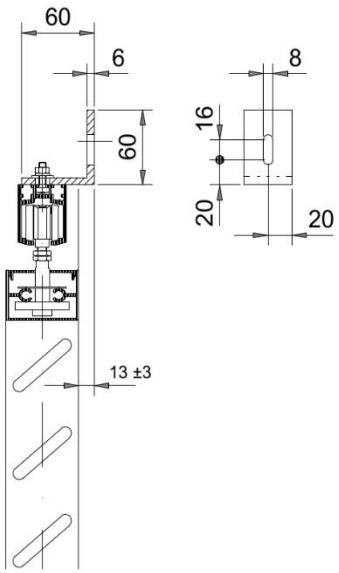


Please note :
for calculation of a fixation distance with a shutter surface other than shown in the graph, the fixation distance according to a 2,8m2 screen distance can be multiplied with :

$$\sqrt{\frac{2,8}{shuttersurface}}$$

RAIL FIXATION – RAIL BRACKET 1





There are two load-combinations that can act on the sliding shutter:

1. Fweight + Fwind (pressure)
2. Fweight + Fwind (suction)

The resulting action forces on the bolt that fixes the rail bracket are:

1.Fv = Fweight, Fh = (2,4 * Fweight) - (Fwind(pressure))
2.Fv = Fwelght, Fh = (2,4 * Fweight) + (2 * Fwind(suction))

Loads, applied on the rails brackets come from the dead weight of the shutters and wind induced pressure and suction on the shutters :

The connection between the bracket and the building structure must be able to withstand the above loads.

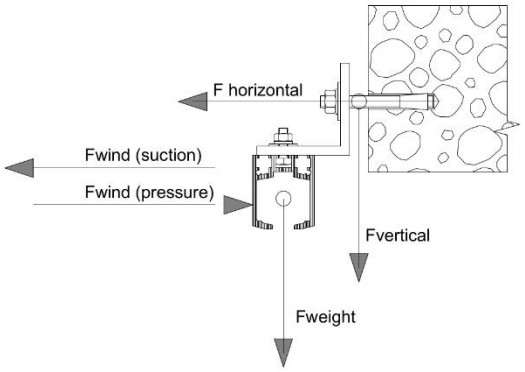
1. Shutter weight (Fweight)
To calculate the shutter weight shown in the picture below as "Fweight", the square-meter shutter weight must bemultiplied with the actual shutter surface :
The square-meter shutter weight mainly depends on fin-type :

Fin 1 (Alu rounded 60x10): 83 N/m²
Fin 3 (Alu foil 70x15) : 106 N/m²
Fin 5 (WRC 68x16) : 82N/m²
Fin 6 (Alu S 70x48) : 93N/m²
Fin 7 (Alu Z 70x48) : 93N/m²
Fin 8 (Alu R 68x16) : 114N/m²

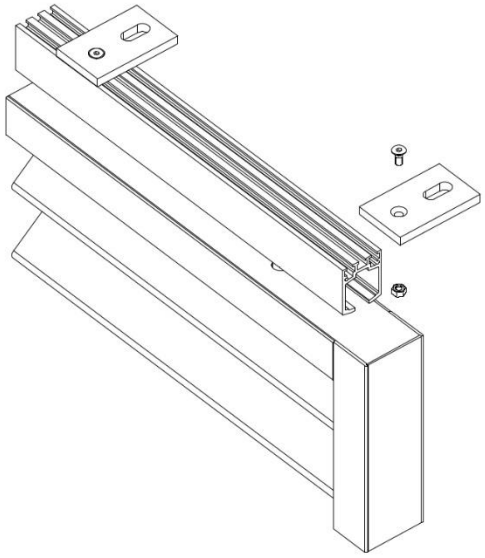
All screen weights have been calculated with a fin center to center distance of 67 mm. For a more precise weight calculation of screens with a different fin ctc distance, the above weights can be multiplied with : 67 / ctc.

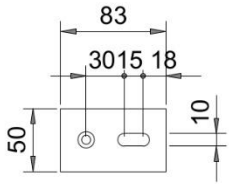
2. Windload (Fpressure / Fsuction)
Windloads that act on the shutter can occur as pressure and as suction. In the drawing below they are "Fpressure" and "Fsuction".

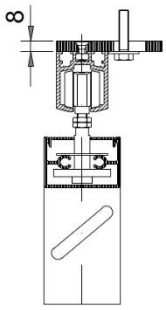
The maximum windload on a rails bracket is as follows :
maximum windload = ((shutter-surface) * (windload)) / 2



FIXATION – RAIL BRACKET 2







Loads, applied on the rail brackets come from the dead weight of the shutters and wind induced pressure and suction on the shutters:
The connection between the bracket and the building structure must be able to withstand the above loads.

1. Shutter weight (Fweight)
To calculate the shutter weight shown in the picture below as "Fweight", the square-meter shutter weight must be multiplied with the actual shutter surface:
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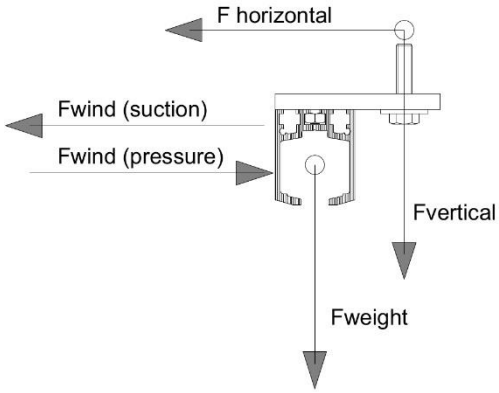
Fin 8 (Alu R 68x16) : 114N/m²

Alu screen weights have been calculated with a fin center to center distance of 67mm.
For a more precise weight calculation of shutters with a different fin ctc distance, the above weights can be multiplied with: 67 / ctc.

2. Windload (Fpressure/ Fsuction)
Windloads that act on the shutter can occur as pressure and as suction. In the drawing below they are "Fpressure" and "Fsuction". The maximum windload on a rail bracket is:
Maximum windload = ((shutter surface) * (windload)) /2



There are two load-combinations that can act on the sliding shutter:

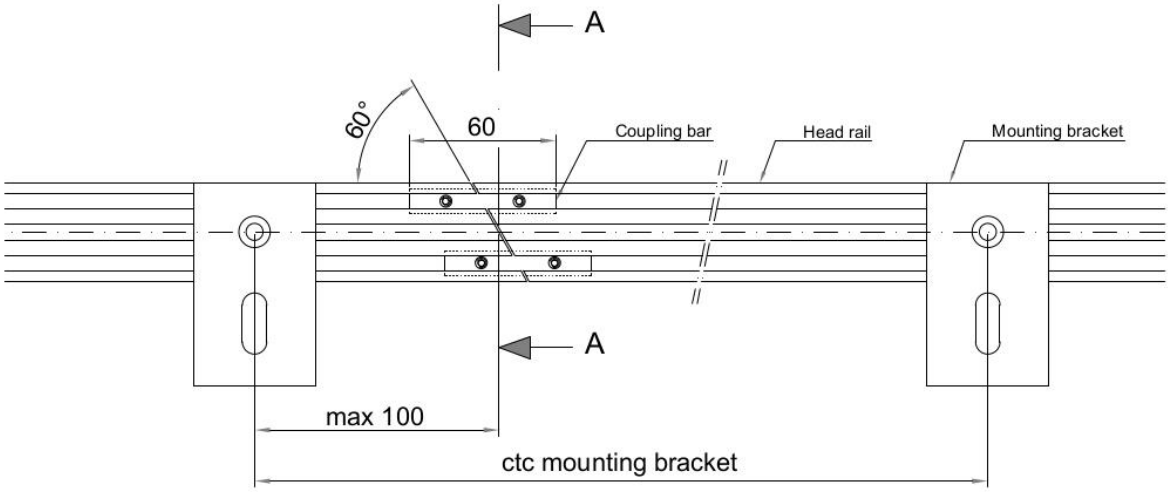
1. Fweight + Fwind (pressure)
2. Fweight + Fwind (suction)

The resulting action forces on the bolt that fixes the rail bracket are:

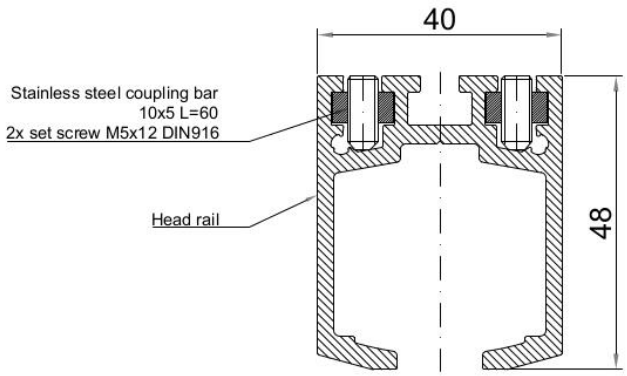
1.Fvertical =5 * Fweight
Fhorizontal = - Fwind (pressure)

2.Fvertical = 5 * Fweight
Fhorizontal = Fwind (suction)

RAIL FIXATION – HEAD RAIL COUPLING



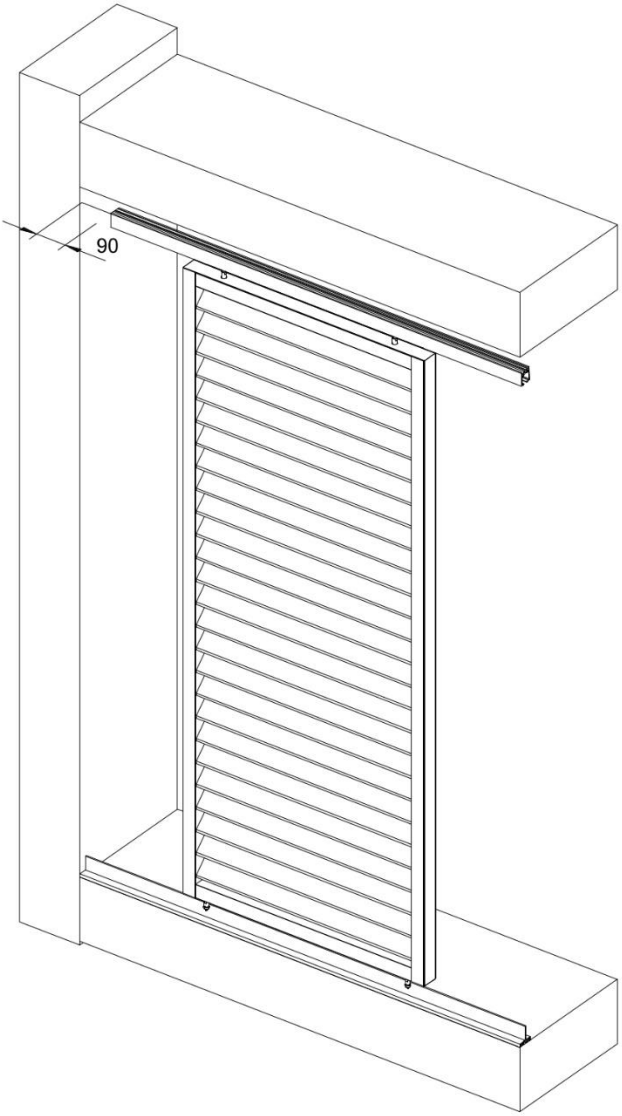
Section A-A

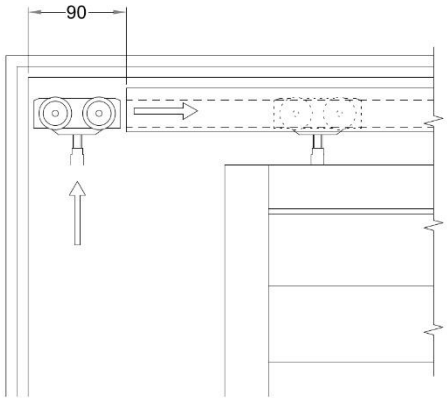


RAIL FIXATION – SHUTTER INSTALLATION

To be able to slide the top runner into the rails, a free space between the rails-end and the building structure of 90mm. is needed.
(see picture on the right)

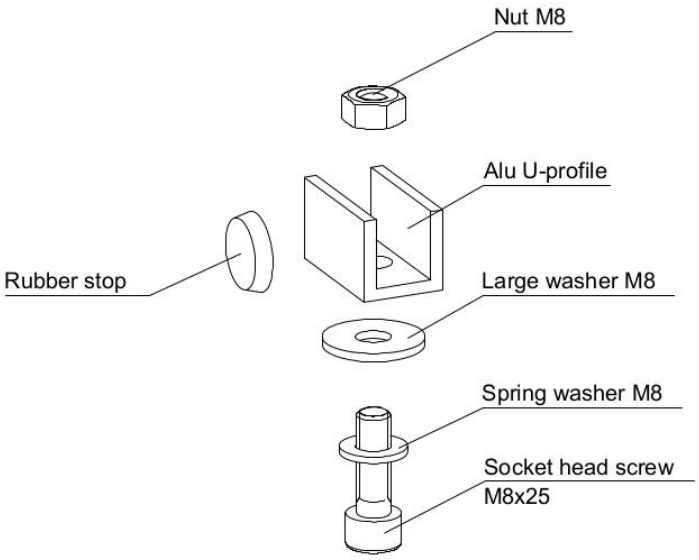
A possible instruction for installing the shutter :
1. Install top rails.
2. Install bottom rails.
3. Place runners into top rails.
4. Place shutters onto bottom rails
5. Connect shutter to the top rails.

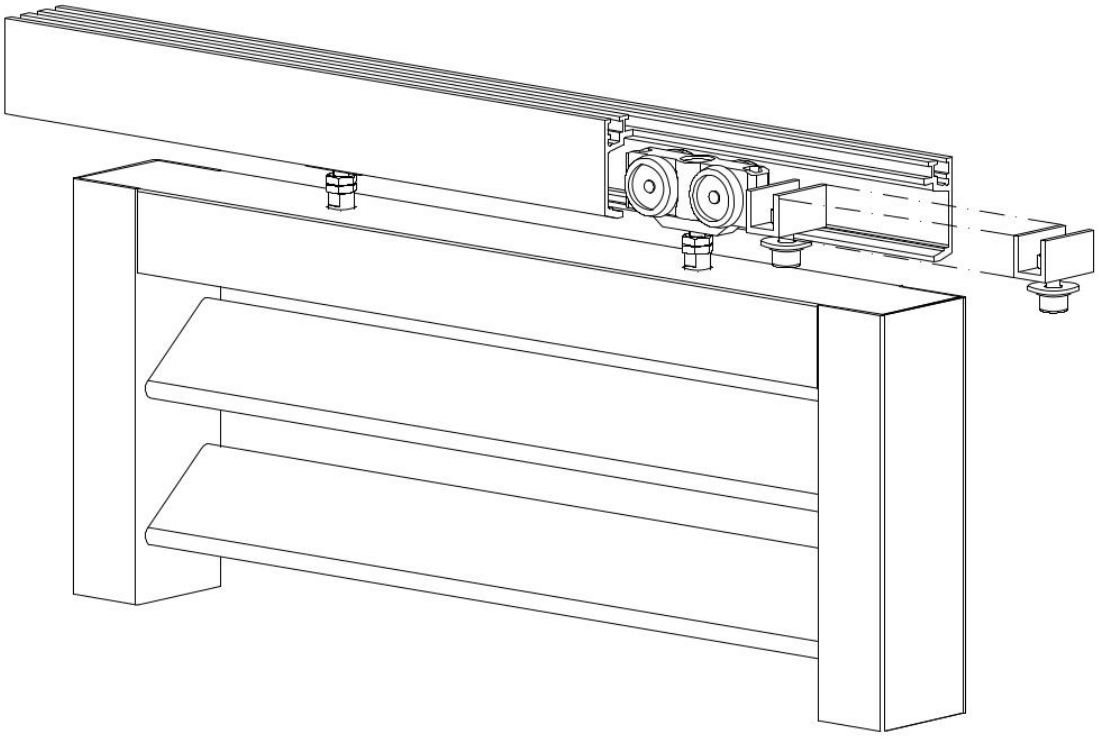




RAIL FIXATION – ENDSTOP

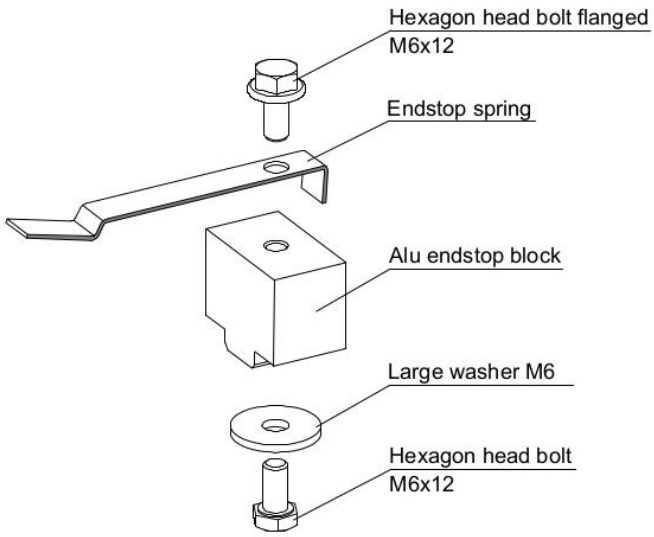
The endstop can be used to mark the end-position of the shutter accurately
Typically for use with motorized shutters

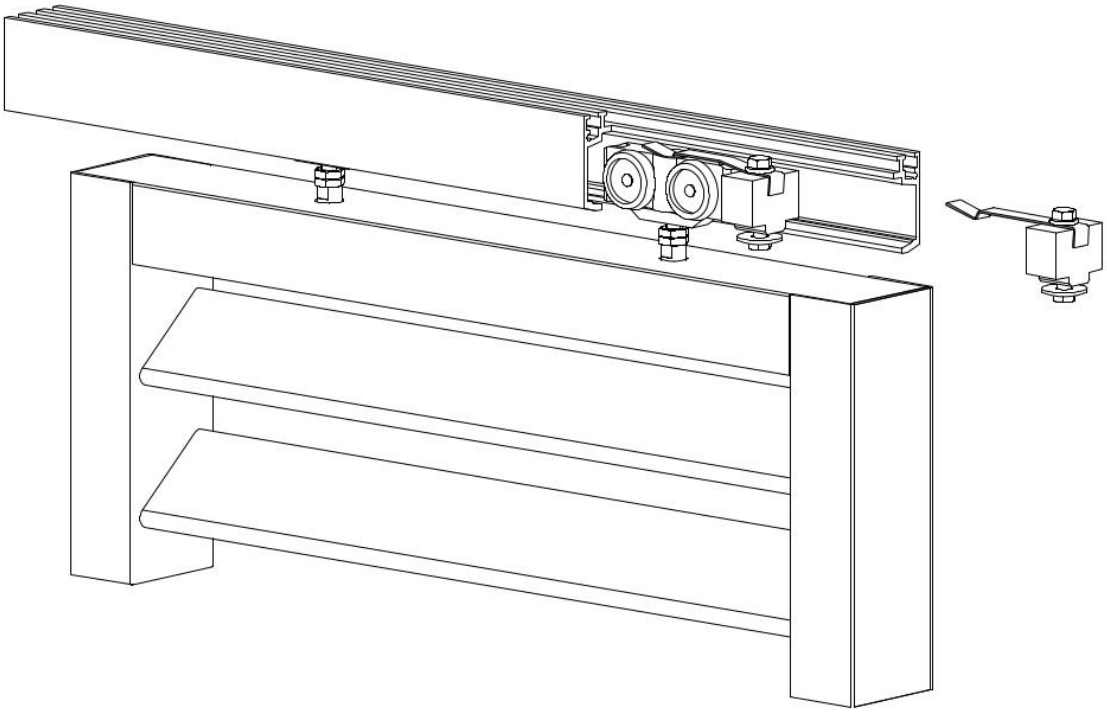




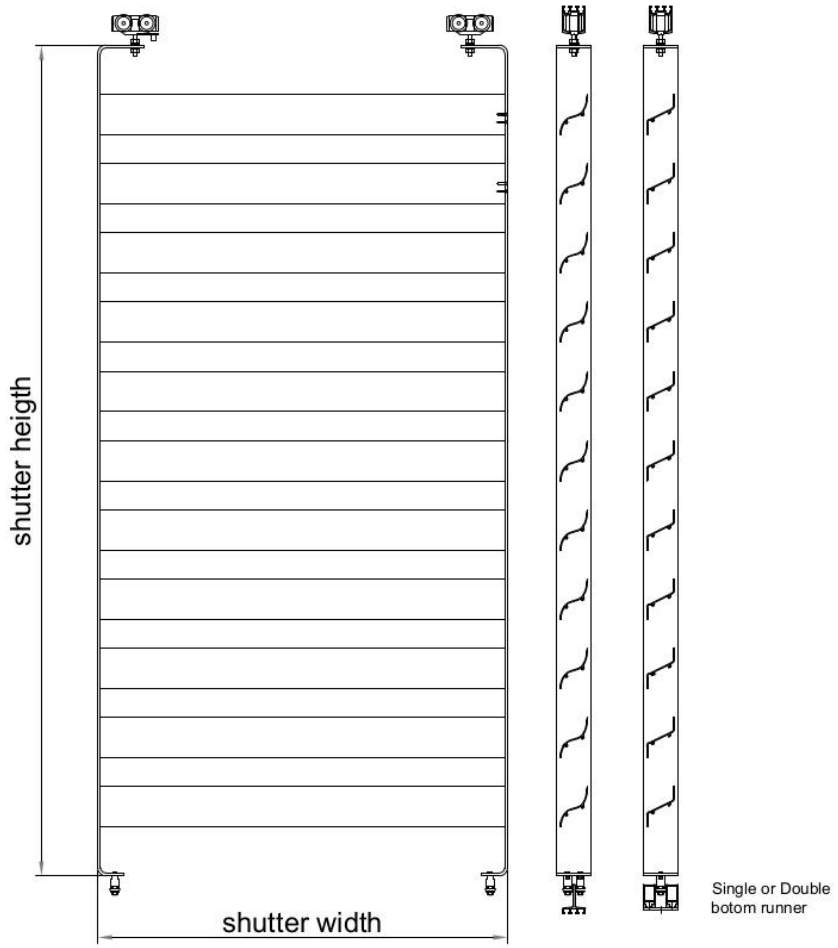
RAIL FIXATION – SPRING ENDSTOP

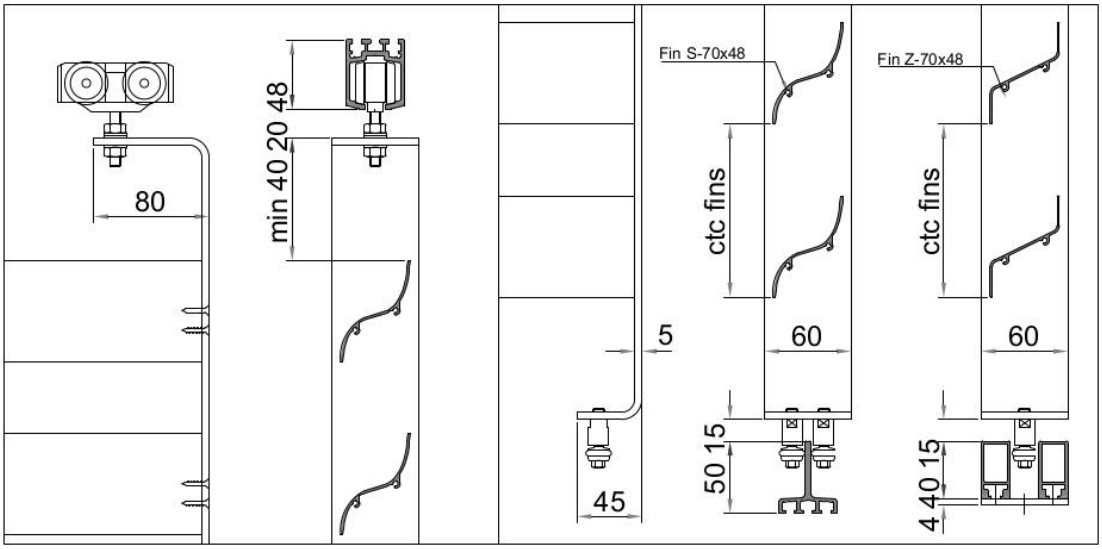
The spring endstop can be used to mark the end-position of the shutter accurately and hold this position fixed . Only to use with manual shutters





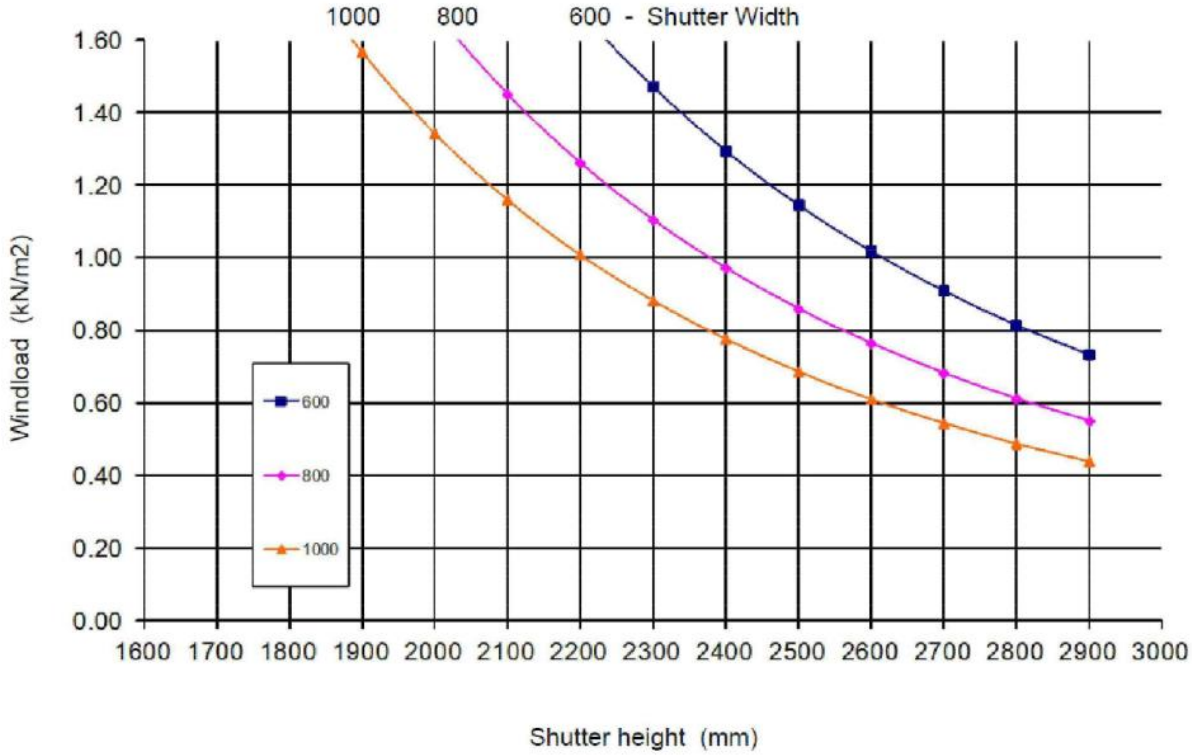
FLAT BAR FRAME 60x5

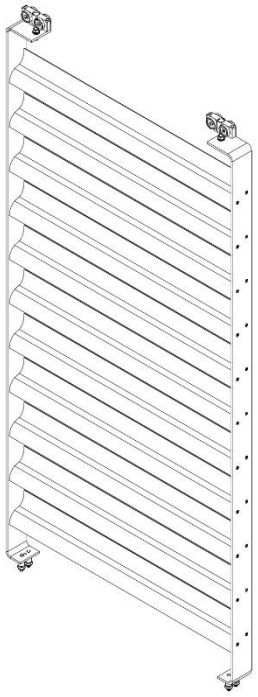




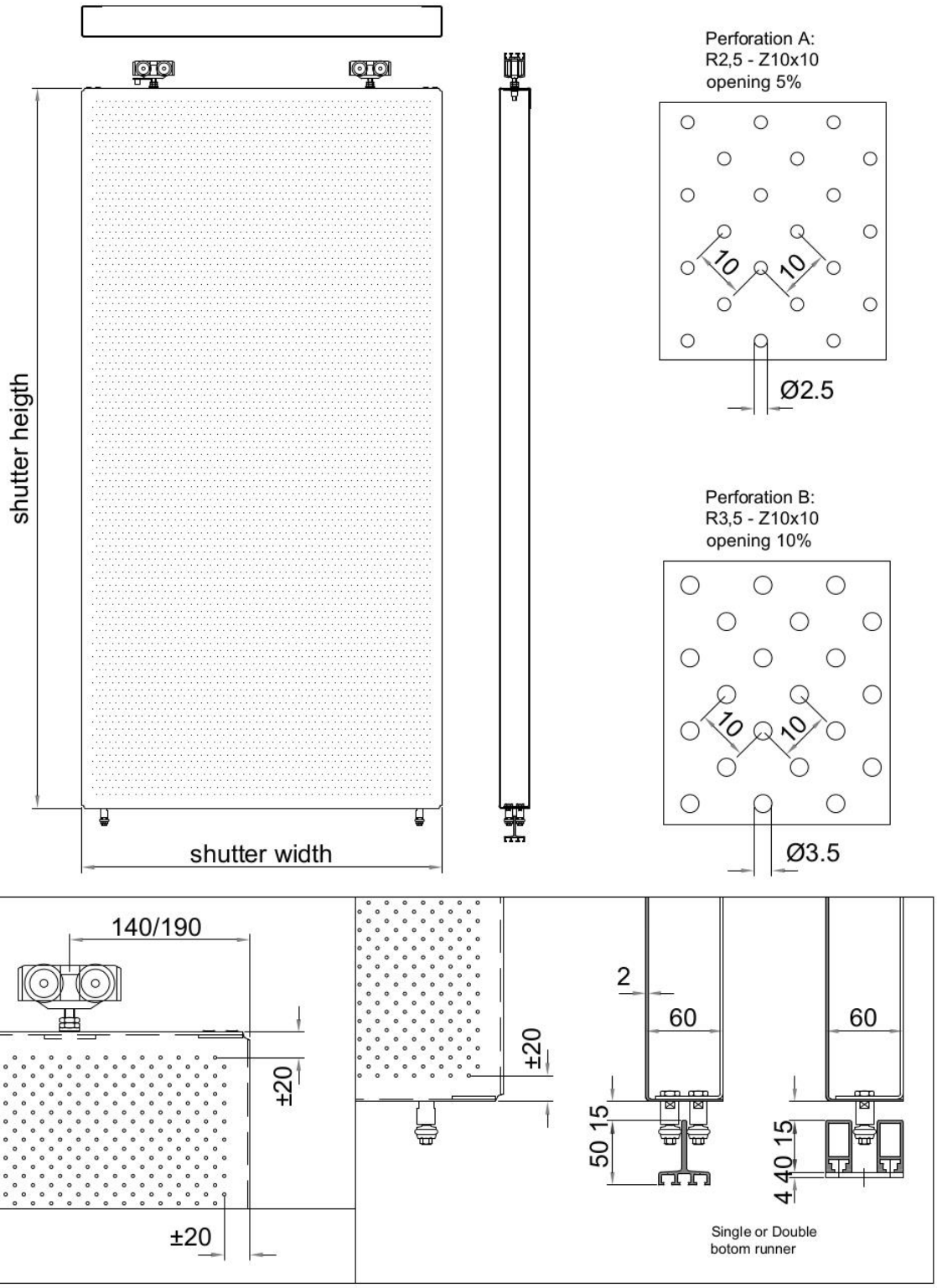
FLAT BAR FRAME 60x5 – FRAME DIMENSIONS

Shutter heights fixed fin S 70x48 – Z 70x48
Flat bar frame – Opening fins 40%



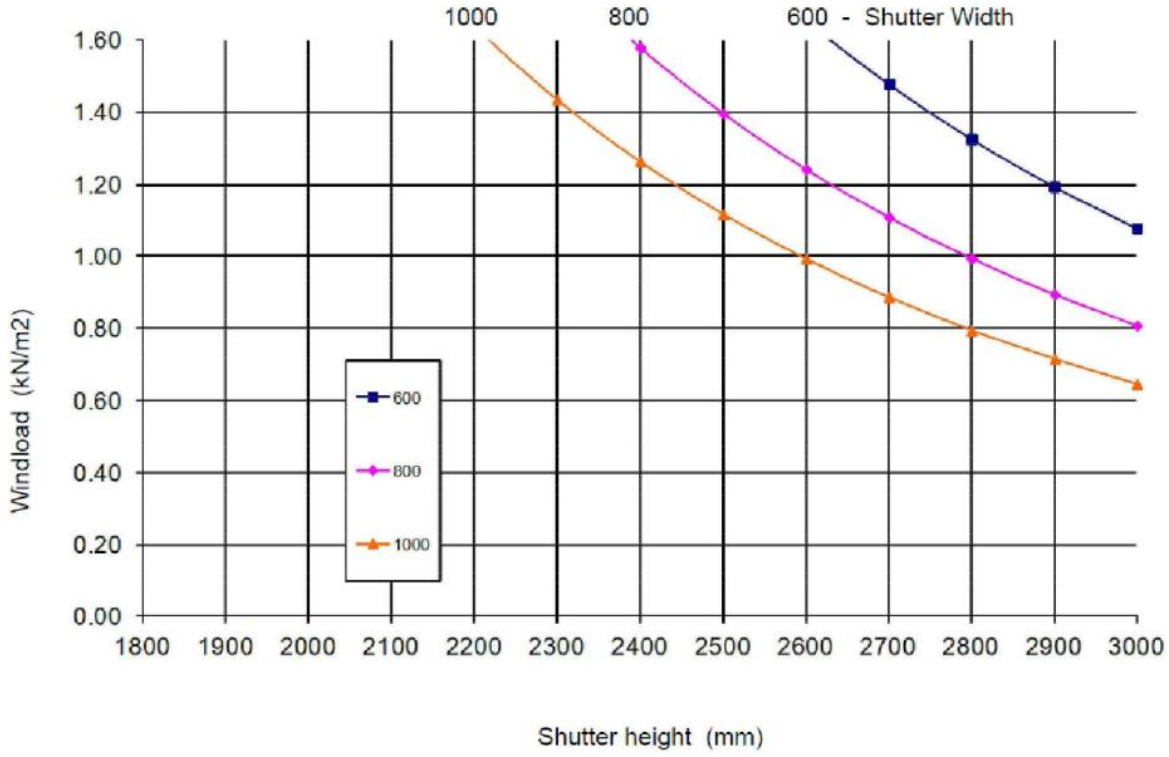


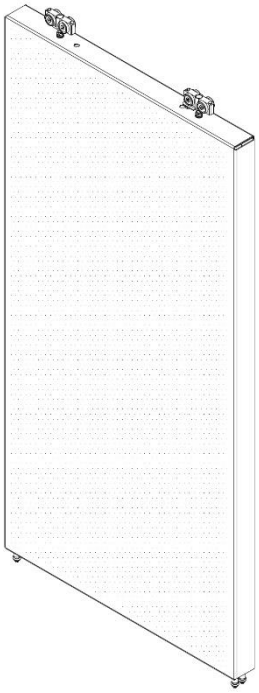
PERFO SHEET SHUTTER



PERFO SHEET SHUTTER – FRAME DIMENSIONS

Shutter heights perfo shutter – opening 5-10%





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