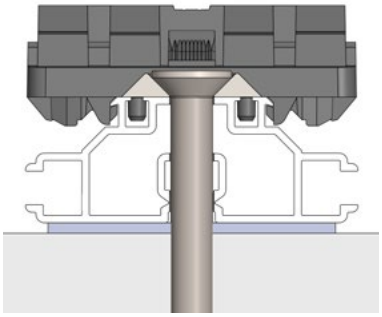
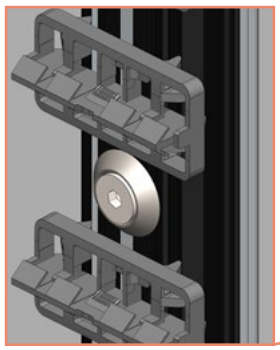
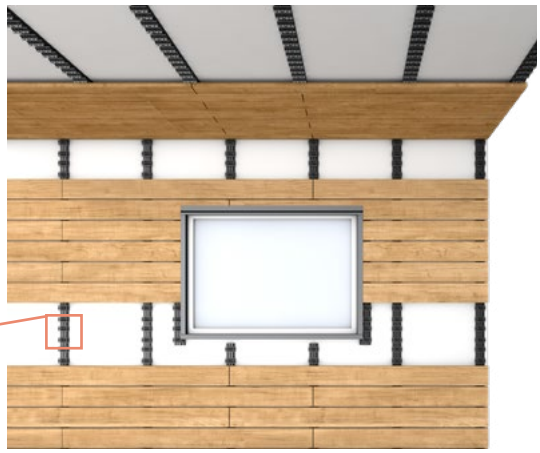
CHOOSING THE CORRECT FASTENERS FOR YOUR PROJECT

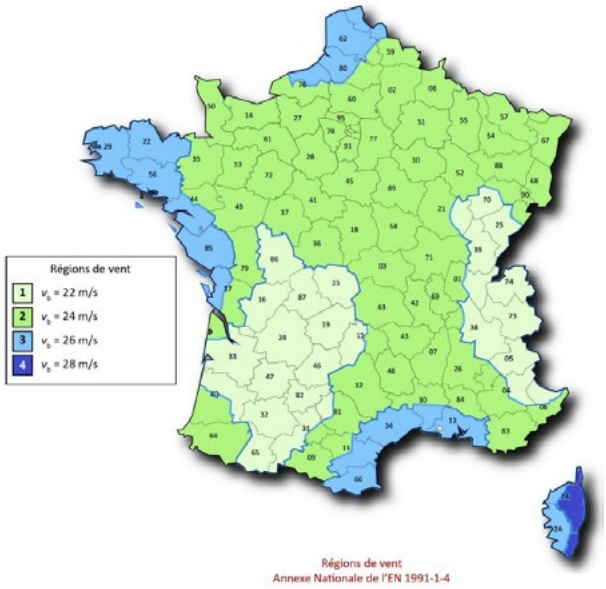
Application example for choosing appropriate fasteners







1. Determine the wind zone of the project



2. Determine the pull-out value according to the wind zone

MAX. CALCULATED PULL-OUT FORCE (ULS-STR WEIGHTED) IN N

Flat Terrain (Co = 1)

	RUGOSITÉ				
ZONE	**0**	**II**	**IIIa**	**IIIb**	**IV**
1	756	687	587	517	500
2	834	759	646	567	542
3	913	828	702	615	587
4	998	903	763	665	634
Guadeloupe	1356	1222	1022	881	838
Guyana	575	526	460	414	400
Martinique	1171	1058	891	770	734
Réunion	1263	1140	954	824	783
Mayotte	1088	957	831	716	683

3. Calculate tensile strength with modifying coefficients

$$\left(\frac{Kmod}{\gamma m}\right) = 0.69$$

$$\left(\frac{\text{Pull-out value}}{0.69}\right) = \text{minimum tensile strength of the fastenener}$$

4. Choice of fastener (screw, stud, angle bracket, etc.) with Ftens K value > the minimum tensile strength.

Fastener with European technical approval

ETA CE
Agrément Technique Européen

Definitions:
- *Ftens K: Characteristic tensile strength of the fastener*
- *γm: Defines the uncertainty of the material properties 1.3*
- *Service Class Kmod: Average humidity of the wood when used 0.9*

CALCULATION EXAMPLE

1. Determine the wind zone and roughness according to the area in which the site is located.
2. Obtain the minimum pull-out value from the tables provided in each rail's technical data sheet, depending on the orography.
3. Calculate the minimum tensile strength of the fastener.
4. Select the fastener(s) using an example from the supplier's catalogue.

HERE'S AN EXAMPLE FROM A SITE IN SOCHAUX, IN THE DOUBS REGION:

1. By observing the wind zone map, we can determine that this site is in a wind region 2.

2. Take the maximum pull-out force from the table on page 7, taking into account the wind zone, roughness and orography.
   In this case, 565 N
   In this case:
   - Height less than 10 metres
   - Roughness IIIb
   - Wind zone 2

MAX. CALCULATED PULL-OUT FORCE (ULS-STR WEIGHTED) IN N

All orography (Co = 1,15)

	RUGOSITÉ				
ZONE	**0**	**II**	**IIIa**	**IIIb**	**IV**
1	810	722	592	499	476
2	910	814	669	565	533
3	1009	902	741	628	592
4	1116	997	819	693	654
Guadeloupe	1561	1394	1146	969	915
Guyana	576	510	421	356	336
Martinique	1332	1191	981	828	783
Réunion	1445	1293	1061	897	845
Mayotte	1228	1065	906	760	717

3. Calculation of minimum tensile strength:

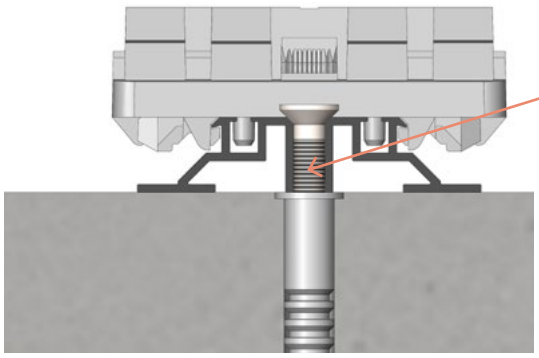
$$\text{Modifying coefficients} = \left(\frac{0,9}{1,3}\right) = 0.69 \qquad \left(\frac{565}{0,69}\right) = 818,8\ \text{N}$$

The fastener must have a tensile strength greater than **818.8 N**.

All that remains is to choose a fastener with a higher value than the one just defined.

FASTENER CATALOGUE EXAMPLE WITH FLAT RAIL / START RAIL / MINI RAIL

In this case study, the fastener used to connect the rail to the wall is as follows:



The assembly is secured in place by means of the fastener:

Lag bolt, anchor stud, concrete screw

The fastener must be able to withstand the minimum tensile force calculated in point 3 above.

Reminder:
Ftens,k=818,8 N

The characteristic strength of fasteners can be found in supplier catalogs or in the fastener's declaration of performance.

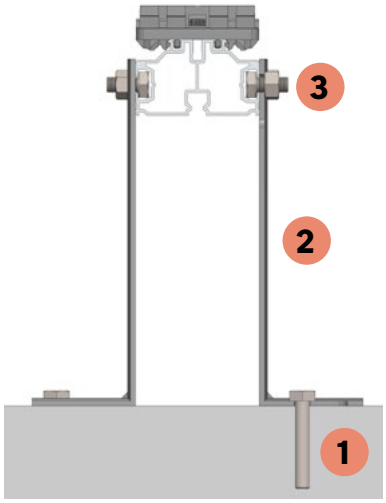
Below is an example of a table showing the characteristics of fasteners

CHARACTERISTIC PROPERTIES

Item	Characteristic tensile strength [Ftens,k] [KN]	Characteristic shear strength in [kN]
Concrete screw ø 6x60	2	2,8
Concrete screw ø 8x80	2	2,8

EXAMPLE OF A SCREWS AND BOLTS CATALOG WITH PR 24 / PR39

In this case study, the fasteners used to connect the rail to the wall are as follows:



The assembly is secured by means of a fastener.

1: Lag bolt / anchor bolt / concrete screw
2: Cladding angle
3: M8 hex head bolt

Fasteners must be able to withstand the minimum tensile force calculated in point 3 above.

The characteristic strength of fasteners can be found in supplier catalogs or in the fastener's declaration of performance.

Below are examples of tables showing fastener characteristics

CHARACTERISTIC PROPERTIES

Item	Characteristic tensile strength [Ftens,k] [KN]	Characteristic shear strength in [kN]
Concrete screw ø 6x60	2	2,8
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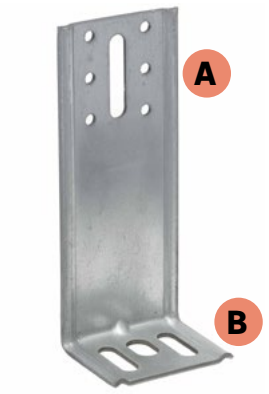

CHARACTERISTIC PROPERTIES

Références	Fixations				Characteristic tensile strength [Ftens,k] [KN]
	Side A		Side B		
	Qty	Type	Qty	Type	
Équerre 155x53x64	1	ø8.5x40	2	ø8.5x16.5	2,8
Équerre 165x53x64	1	ø8.5x40	2	ø8.5x16.5	2.8