ACCREDITED
QUALITY INSERTS

GirellaTirellaS

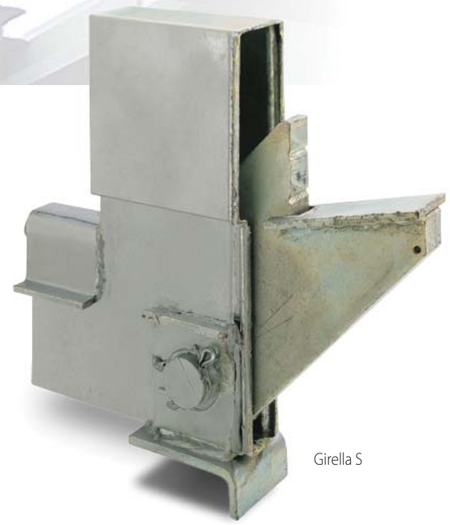
Corbel system

Girella Tirella S

Corbel systems

Girella and Tirella S

The requirements inspiring the design of Ruredil corbel systems are the product of over fifty years of experience working with special prefabrication technologies and products. The goals we aim to achieve with our systems include reduced labour, easy installation in production, quick and easy assembly, and versatility in use.
Ruredil's systems for supporting prefabricated horizontal panels, eliminating overhanging corbels and corrections during assembly, are divided into two types of corbel (both patented) with the same design criteria and the same potential for adjustment, even though they are physically different in order to adapt to different uses.
Girella and Tirella S corbels are intended exclusively for use preparing the appropriate accessories in the panel (panel plate S). Combined use of type S corbels with a panel plate not from the S line, and vice versa, is not permitted.



Girella S

Tirella S

The Girella S Corbel

The Girella S corbel includes an insert in the pillar and an insert in the panel, with no need to insert or apply anything on-site. The insert in the pillar (or other weight-bearing element, such as a vertical panel, floor slab, girder, etc.) consists of a corbel positioned flush with the cast in a box, where it remains during transportation and erection of the element. When the panel is assembled, after removing the safety cover, the corbel is extracted by rotation and, with no further assembly of metal elements, it is automatically positioned to offer a retractable support for the horizontal panel.
All this makes Girella S the first retractable corbel for supporting prefabricated panels.

The Tirella S Corbel

The Tirella S corbel is designed to solve problems in design and/or production in which reduced bulk, including height, is indispensable.
Tirella S is made up of three separate elements, an insert in the pillar (or other weight-bearing element), a corbel and an insert in the panel identical to the one used for the Girella S corbel. It differs from the latter in that during assembly the corbel is inserted in a housing created by removing the safety cover from the insert previously mounted on the weight-bearing element.

Easy positioning in formworks

Secure distribution of load without additional reinforcement

Vertical reinforcements

Great capacity for adjustment during assembly

Girella S Corbel

1 Rated load and characteristic resistance

The corbel's rated load, that is, the value in kN printed on the corbel, is the weight which the corbel, without any added reinforcements and for a specified concrete resistance, can support with the safety coefficients required by current legislation.
Girella S is available with two weight-bearing :

- 60 kN (technical info sheet 1)
- 120 kN ((technical info sheet 2)

1.1 Characteristic resistance of concrete

The characteristic resistance required of the panels is:

- Rck ≥ 25 N/mm^2

for pillars and girders:

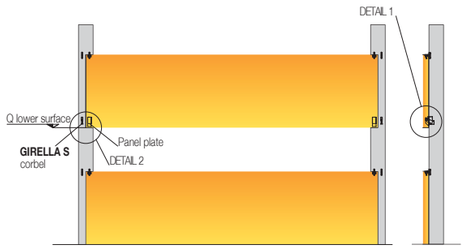
- Rck ≥ 25 N/mm^2 using the 60 kN corbel
- Rck ≥ 35 N/mm^2 using the 120 kN corbel.

1.2 Protective treatments

All components of the Girella S corbel are protected with 25 µm electrolytic galvanisation.
This means Girella S may be exposed to the weather with no need for further protection.

1.3 Fire resistance

On the basis of standard project recommendations, the corbel is inserted in a niche and entirely protected by concrete thick enough to guarantee R 180'.



GIRELLA TIRELLA S

1.4 Earthquake resistance

The corbel and upper retainer are tested on the basis of project seismic action to guarantee seismic connection even in a worst-case scenario. Refer to chapter 4 for more information.

1.5 Project recommendations

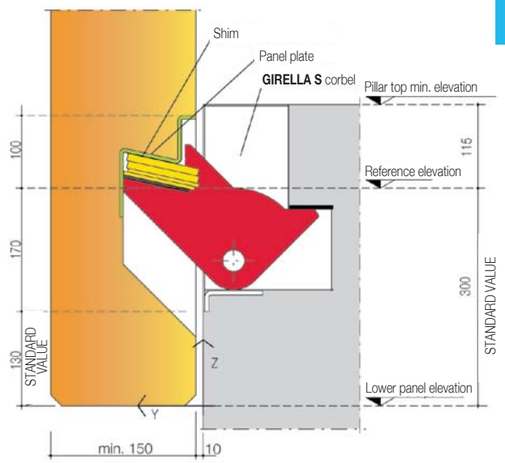
In preparing the project, it is essential to ensure that there is always a theoretical distance of 1 cm between the pillar and the horizontal panel (Y direction), which may then vary up to 2 cm more (distance between pillar and panel 3 cm). This adjustment, on the horizontal plane (Y direction), is permitted by the possibility of adding "L-shaped shims" (technical info sheets 9, 12). The "reference elevation" must appear in the plan, and is marked in relief on the plastic plate closing over the "Girella S corbel". The reference elevation in direction Z with respect to zero level for the project is thus determined in the standard way:

$$Q_{reference} = \text{Lower panel surface} + 30\ cm$$

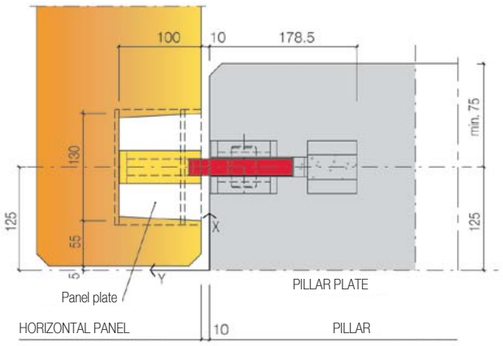
In special cases, using a "flush-mounted" type box, the standard elevation Q (30 cm) may be reduced to 15 cm, with a visible rather than a disappearing corbel (see fig. 8 on page 39). The distance in direction Z between the reference elevation and the foot of the pillar permits precise positioning of the corbel, with respect to which there is a tolerance of ± 2.5 cm, (fig. 2), due to errors in tracking or positioning the pillar level (which may be positive by up to + 4.5 cm if a spacer is welded onto the "panel plate", or shims are welded together up to a maximum of 2 cm).
Adjustment to achieve a tolerance of ± 2.5 cm is permitted by manually adding or removing shims (technical info sheets 7÷12). All the necessary adjustments will be made exclusively during assembly, with the corbel already turned into the final position. As for the tolerance granted by tracking errors in the pillar layout, in the horizontal layout according to direction X, we may distinguish between:

- ± 4 cm in the case of the "Girella S 120 kN corbel" combined with a "panel plate";
- ± 4,5 cm in the case of a "Girella S 60 kN corbel" combined with a "panel plate.

Detail 1



Detail 2

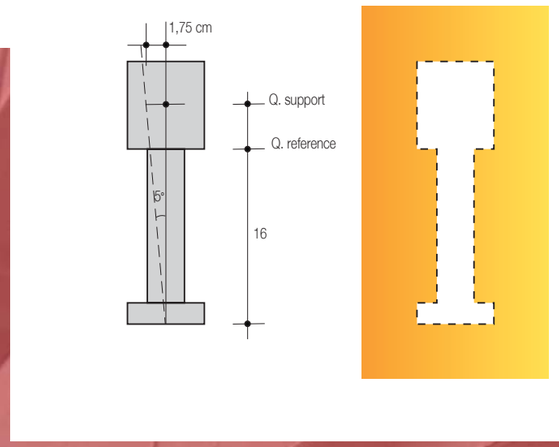


2 Use of the Girella S corbel

If Girella S is used between a vertical panel and a horizontal panel, the tolerance is:

- ± 0,5 cm in the case of a "Girella S 120 kN corbel" used with a "small panel plate";
- ±1 cm in the case of a "Girella S 60 kN corbel" used with a "small panel plate".

The tolerance granted for verticality errors in installation of the corbel is ± 5°, corresponding to about 1.75 cm over a height of 20 cm.
Obvious errors in the positioning of the panel plate, resulting in lack of flatness between the corbels and the panel plate, may be remedied with a lead plate 5 mm thick in place of the lower shim.



2.1 Positioning two "Girella S" corbels together on the same side of a pillar

Represents the most common and frequent way of positioning the corbels in the pillars (*see fig. 5-6*).
To obtain maximum fire protection efficiency, the best aesthetic finish (closing over the niche supporting the pane) and avoiding interruption of the current reinforcement rods, we recommend adopting the following distances in direction X:

- standard distance between the pillar axis and the axis of the Girella S corbel 12,5 cm;
- minimum distance between the axis of the Girella S corbel and the outer surface of the pillar 7,5 cm.

The distance between the axis of the panel plate and the outer surface of the panel must be 12 cm, if there is a 1 cm joint between the panels.

Fig. 5/A

2.2 Positioning two "Girella S" corbels together on adjacent sides of a pillar (corner pillar)

In the case of corner pillars, the corbels are positioned on two adjacent sides; in this case too it is best to maintain a distance of 12.5 cm between the axis of the pillar and the axis of the corbel (*see fig. 7-8*). The corbels are positioned in the same way, also in the presence of a vertical (or angular) corner panel.

Fig. 6/A

PILLAR WITH DOUBLE CORBEL

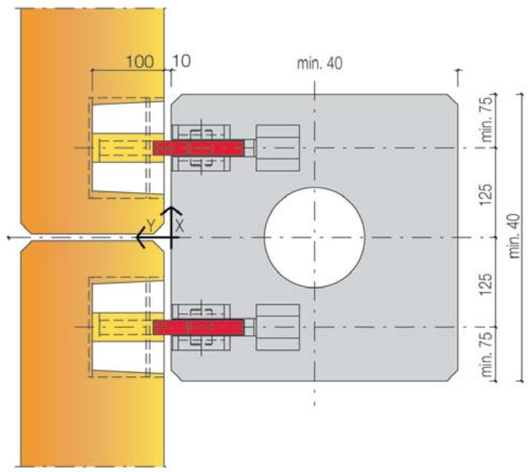


Fig. 5

CORNER PILLAR

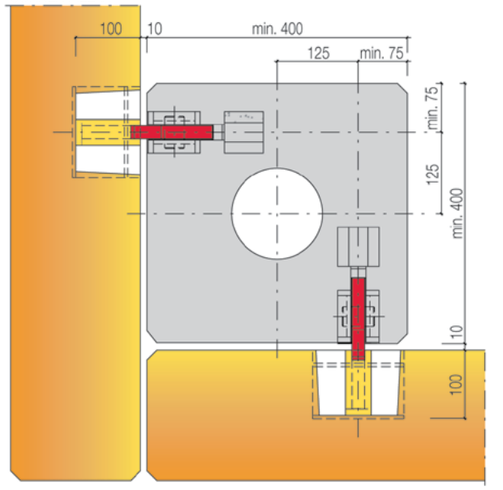


Fig. 6

2.3 PPOSITIONING A "GIRELLA S" CORBEL
AT THE HEAD OF THE PILLAR

If the corbel is to be positioned near the head of the pillar (reference elevation at a distance of less than 25 cm from the head of the pillar, ***see fig. 10***), **no additional reinforcement will be required** in the following cases:

- qif the permanent load on the pillar head, and particularly on the Girella S, is greater than Girella S's rated load (***see fig. 7***);

or:

- if there is reinforcement for distributing loads or top bracketing in the pillar head (requiring at least 5 cm above the top of the Girella S).

Except for these cases, additional reinforcement must be provided (2 Ø12 for both weight-bearing capacities) in accordance with the scheme shown in ***figure 9***.

Using a "flush-mounted" (magnetic or polystyrene) box, a minimum distance of 27 cm is obtained between the lower edge of the panel and the pillar head, as shown in ***figure 8***.

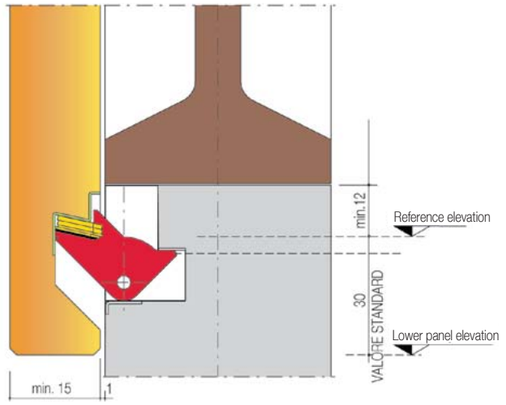


Fig. 7

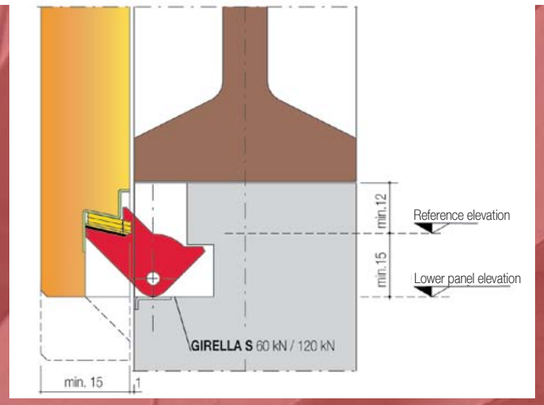


Fig. 8

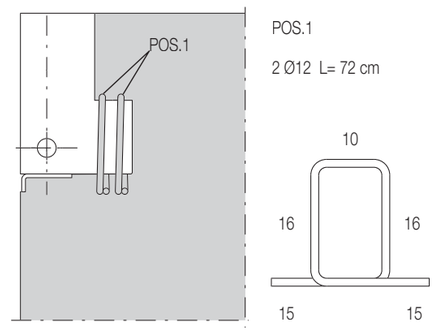


Fig. 9

Fig. 10

2.4 POSITIONING OF THE "GIRELLA S" CORBEL
ON A SELF-SUPPORTING PANEL

The corbel may alternatively be positioned in a panel, provided it is at least 20 cm thick, to support it hanging. In this case the "Girella S corbel" will be rotated 180° from its usual position, as shown in ***figura 11***.

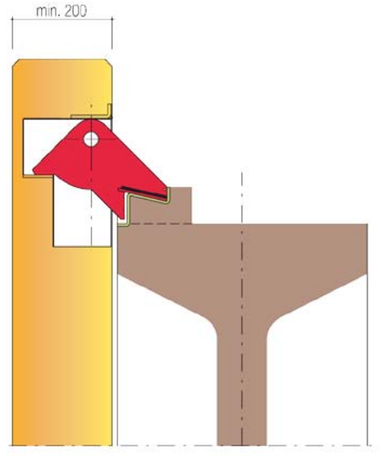


Fig. 11

2.5 POSITIONING TWO "GIRELLA S" CORBELS
IN A GIRDER OR CURB

If you wish the move the panel higher up, the corbel must be inserted in the wider part at the head of the girder, provided the reference elevation is ≥ 25 cm from the upper edge and ≥ 30 cm from the lower edge of the girder (***fig. 12***).

With concrete at least 16 cm thick under the box, if there is bracketing on the girder, **no reinforcement will be required.**

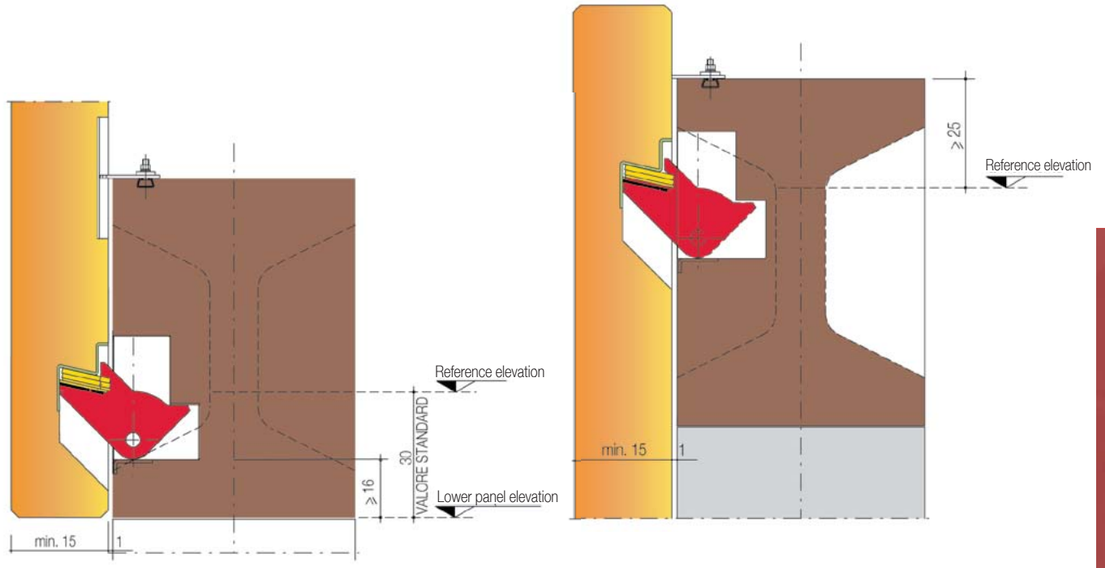


Fig. 12

If the distance between the reference elevation and the upper edge is between 11.5 and 20 cm, proceed with addition of 2 brackets ø12 (Pos.1) as shown in ***figure 9***.
If the distance between the reference elevation and the lower edge is < 30 cm, but ≥ 20 cm, add 2 brackets Ø16 (Pos.2) as shown in ***figure 14.***

If the corbel is inserted in a curb with a minimum thickness in which the distance between the reference elevation and the upper edge is between 25 and 11.5 cm, and at the same time the distance between the reference elevation and the lower edge is between 30 and 20 cm, add brackets (Pos.1 and Pos.2) as shown in ***figure 15***.

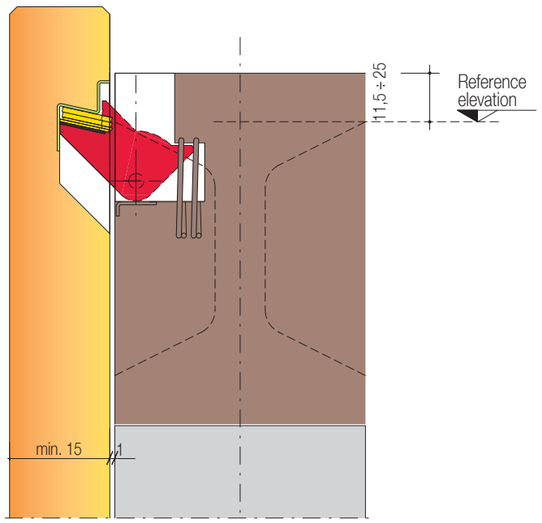


Fig. 13

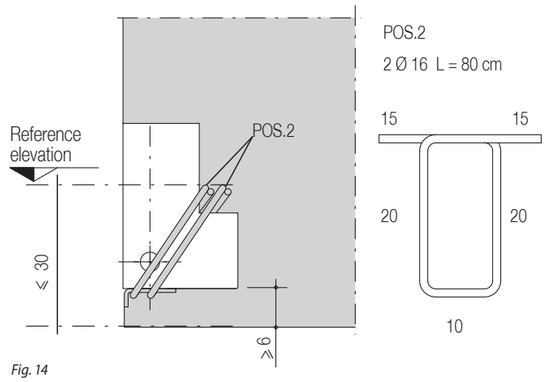


Fig. 14

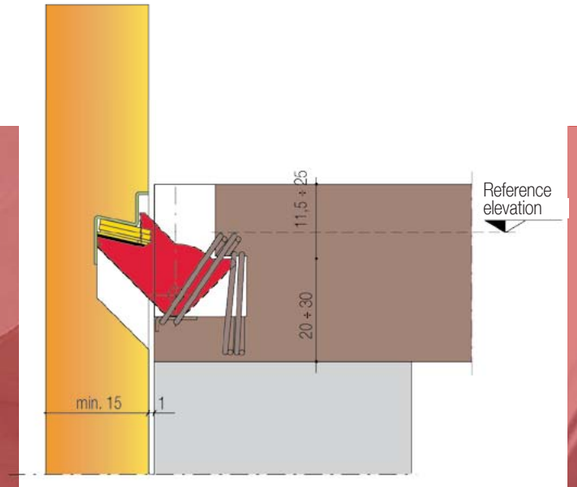
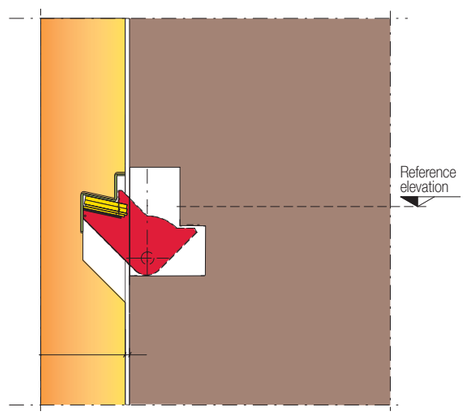


Fig. 15

2.6 Positioning the "Girella S" corbel

in a vertical panel supporting a horizontal panel

Girella S's reduced bulk even makes it possible to insert a corbel on the rib of a vertical panel, provided the weight-bearing ribbing is ≥ 15 cm thick.
A "small panel plate" (technical info sheet 6) will be inserted in the corresponding horizontal panel.
In this case too, the minimum thickness is 15 cm.
The axes of the small panel plate, of the Girella S corbel, of the horizontal panel and of the vertical panel must coincide.
During erection, while the horizontal panel is being lowered into position, intending to obtain a horizontal panel with a disappearing support, the blade of the Girella S corbel may be rotated using a cord inserted in the hole provided, as shown in ***figure 17***.



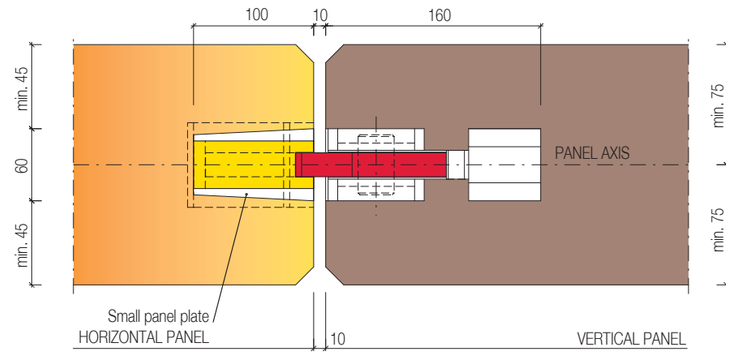


Fig. 16

Fig. 17

Fig. 18

Girella Tirella S

Tirella S Corbel

The "Tirella S" corbel, a Ruredil patent, is designed to solve difficulties in design or production in which reduced bulk, including height, is indispensable.
Tirella S is composed of an element to be inserted in the pillar (box), in which the corbel (blade) is inserted during assembly; the insert in the panel is identical to the one in the Girella S system (panel plate).
The reduced bulk and limited weight facilitate positioning of the corbel in the formworks.

3 Rated weight-bearing capacity and characteristic resistances

The rated weight-bearing capacity, that is, the value in kN printed on the corbel, is the weight that the corbel, without any additional reinforcement and for a specified characteristic resistance of concrete, can bear with the safety coefficients for steel and concrete required by the applicable legislation.
Tirella S is available with two rated weight-bearing:

- 60 kN (technical info sheet 26)
- 120 kN (technical info sheet 32)

3.1 Characteristic resistance of concrete

Requirement for panels: Rck ≥ 25 N/mm²
For pillars and girders: Rck ≥ 40 N/mm²

3.2 Protective treatments

All components of the Tirella S corbel are protected with 25 µm electrogalvanisation. Tirella S may therefore be exposed to the weather without any additional protection.

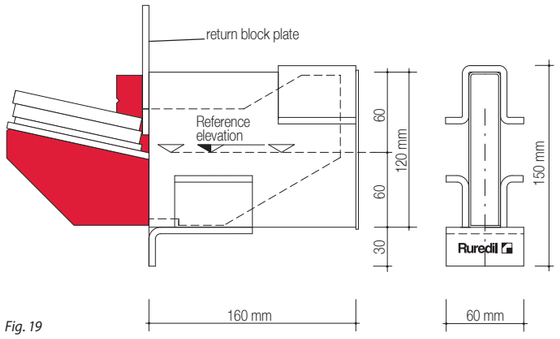
3.3 Fire resistance

For fire resistance, the corbel is inserted in a niche and completely protected by concrete thick enough to guarantee R 180'.

3.4 Earthquake resistance

The lower corbel and the upper retainer must be tested on the basis of project seismic action, thereby guaranteeing seismic connection even in a worst-case scenario.
For more information, refer to chapter 4.

Tirella S 60 kN



Tirella S 120 kN

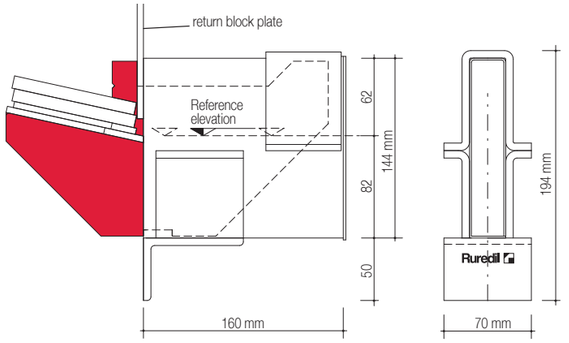


Fig. 19

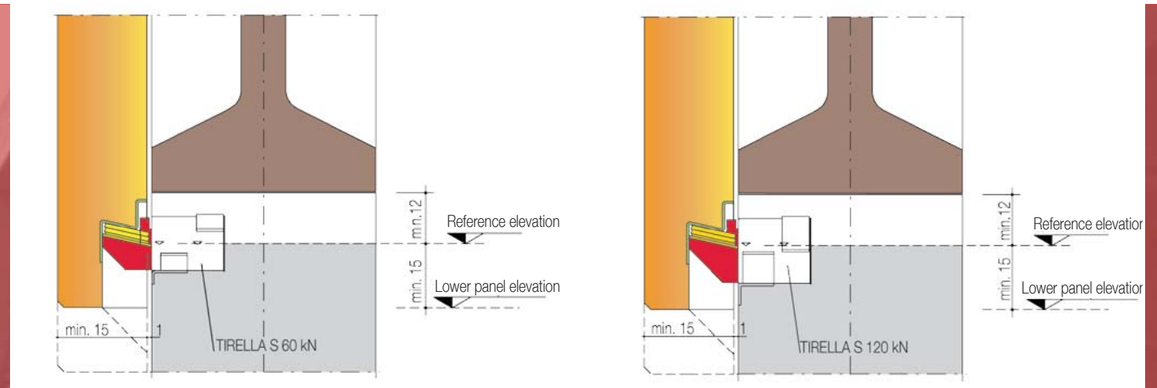


Fig. 20

3.5 Project recommendations

The Tirella S corbel has a thicker blade, but its height is reduced. The vertical bulk of the box is reduced to a minimum while leaving horizontal bulk practically unaltered and increasing thickness (2 mm) for easier welding to reinforcements when positioned and anchored in the formworks.
The corbel ensures the rated weight-bearing capacity with no additional reinforcement if covered by a minimum of 20 cm of concrete at the top; this may be reduced to 5 cm of there is a weight equal to the corbel's rated weight-bearing capacity at the head of the pillar or a Ø 16 reinforcement protecting corners. The criteria for positioning the Tirella S corbel in the pillar are exactly the same as those applicable to the Girella S corbel; refer to points 2.1 and 2.2. In the design phase, indicate the reference elevation with respect to zero project elevation, which, as in the case of Girella S, with use of a "magnetic box" or a "polystyrene box", (***see example on page 38***),), is thus determined as standard:

$$Q_{reference} = \text{Lower panel elevation} + 30\ cm$$

The exception is cases in which "flush-mounted boxes" are used (technical info sheets 28, 30) with the corbel in view, in which case:

$$Q_{reference} = \text{Lower panel elevation} + 15\ cm$$

Tirella S 60 kN

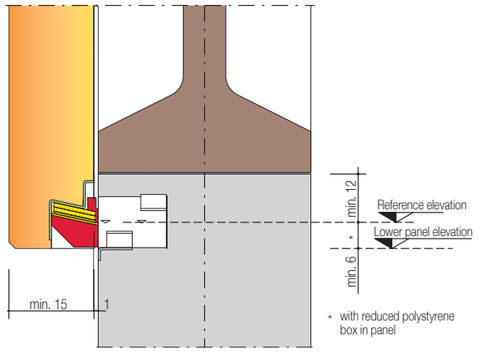


Fig. 21

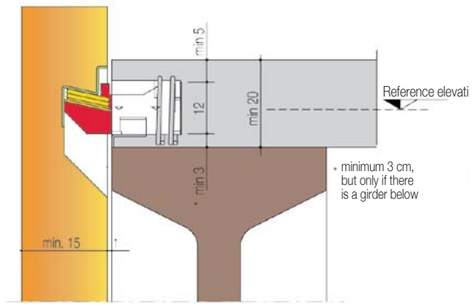
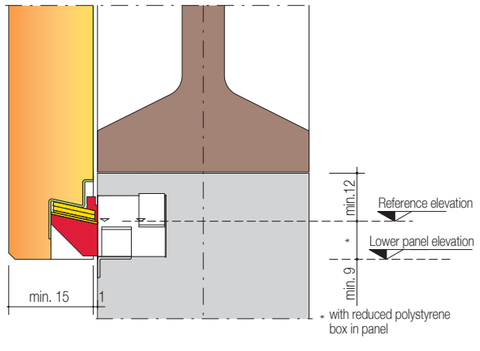


Fig. 22

Tirella S 120 kN



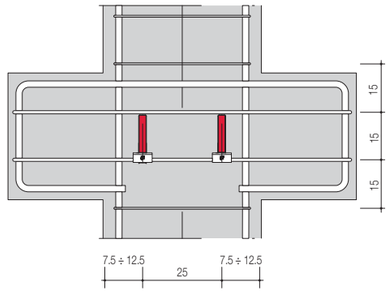


Fig. 23

Figure 21 illustrates how, using the Tirella S corbel and the "flush-mounted polystyrene box", we can achieve the lowest possible distance (18 cm with Tirella S 60kN, 21 cm with Tirella S 120kN) between the lower surface of the panel and the top of the pillar.
To obtain this, however, we must reduce the height of the "flush-mounted polystyrene box" (8 or 5 cm, respectively) while, at the same time, precisely positioning it to permit negative vertical adjustment by 2.5 cm (otherwise the corbel would emerge out of the lower surface of the panel). Therefore:

$$Q_{reference} = \text{Lower panel level} + 6\ cm$$
$$(+ 9\ cm, \text{with Tirella S } 120kN)$$

Tirella S may also be used when the corbel must be positioned in concrete of reduced thickness (for instance, in floor slab curbs, girders of reduced height, etc.), with the aid of additional brackets (see point 2.3, Pos.1), or in areas where there is a lot of reinforcement: Tirella S 60kN fist conveniently between brackets with a centre-to-centre distance of 12 cm, while Tirella S 120kN requires a vertical centre-to-centre distance of a minimum of 15 cm; in the case of overhanging elements (see fig. 24) of heights between 22 and 40 cm, brackets must be inserted (Pos.1 and Pos.2); refer to point 2.5.
Tirella S may be inserted in the vertical panel supporting the horizontal panel using the "small open polystyrene box" (technical info sheet 29) or the "small open magnetic box" (technical info sheet); in this case:

$$Q_{reference} = \text{Lower horizontal panel level} + 15\ cm$$

The tolerances for remedying errors in positioning and adjustment in the three orthogonal directions are the same as for Girella S 120kN. The shim plates for adjustment are also the same as for Girella S 120kN (0.5/120 – 1.0/120 – L/120). The Tirella S corbel is supplied including 4 shim plates, three adjustment plates plus one type 0.5/120 plate which may be used as shown in ***figure 26*** to prevent hammering between the panel and the pillar in the event of an earthquake.

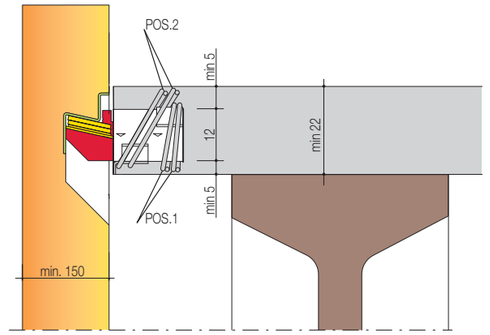


Fig. 24

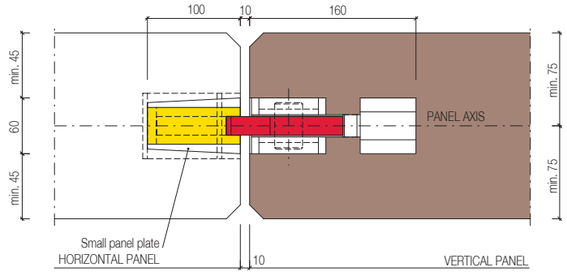


Fig. 25

Fig. 26

Girella S Tirella S Testing corbels for seismic action and for wind depression and counter-thrust

4 Wind counter-thrust test

NTC2008 provides for a wind thrust (characteristic action) which could cautiously be assumed to be:
(0,8 + 0,2) = 1 kN/m^2.
Wind pressure drives the panel against the pillar, and does not create any problems. The depression, on the other hand, is: (0.4 + 0.2) = 0,6 kN/m^2.
If we consider a panel 2.5 m high, 12 m long with a weight of 3,8 kN/m^2 the load on each corbel will be P = 57,00 kN (***see fig. 28***).
Wind depression is released on the 4 tips of the panel with a horizontal action equal to:
V = = 4,50 kN
tgα = = 0,079 therefore α = artg 0,079 = 4°,5
this angle is well below the 20° slope of the corbel. If there were a window under the panel, and the same height as it, the value of V would be doubled, while P would remain the same, and therefore:
tgα = 0,158 therefore α = 9° and in any case < 20°.
In the final analysis, under the effects of wind, the corbel ensures that the panel cannot slide on the inclined plane under the thrust of depression, thereby losing its support.

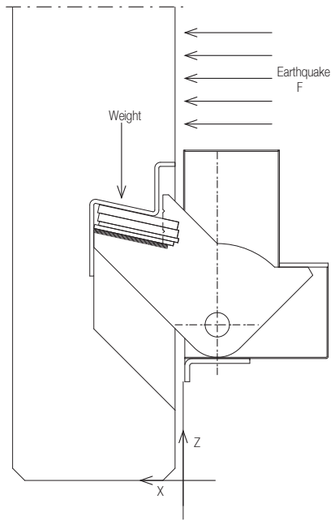


Fig. 27

4.1 Seismic action test (ref. NTC 2008; EC 8)

The Girella S and Tirella S corbels support horizontal panels which are anchored to the pillars and therefore subject to the same seismic acceleration as the structure. European calculation code EC8 is applied, and the panel is considered to be a non-structural element.
Seismic action is therefore worth: $Fa = S_a \cdot p \cdot \gamma_a / q_a$
where: γ_a = 1; q_a = 2 (for walls)

$$S_a = \alpha \cdot S \cdot \left[\frac{3\left(1+\frac{z}{h}\right)}{1+\left(1-\frac{T_A}{T_I}\right)} - 0{,}5 \right]$$

α = ratio between αa αg with maximum value 0,35
S = soil factor
z/h = maximum value 1
T_A = panel vibration period
T_I = structure vibration period

to simplify, we assume T_A/T_I= 1; S=1,35 and thus obtain:
$S_a = \alpha \cdot 1{,}35 \cdot = 7{,}425 \cdot \alpha$ Therefore

$$F_a = \frac{7{,}425}{2} \cdot \alpha \cdot p$$

with 0,05 ≤ α ≤ 0,35 depending on the zone.
An earthquake in zone Z does not increase vertical action.

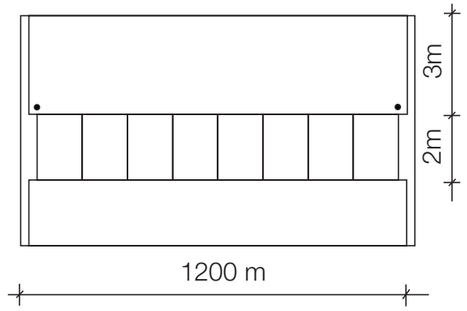


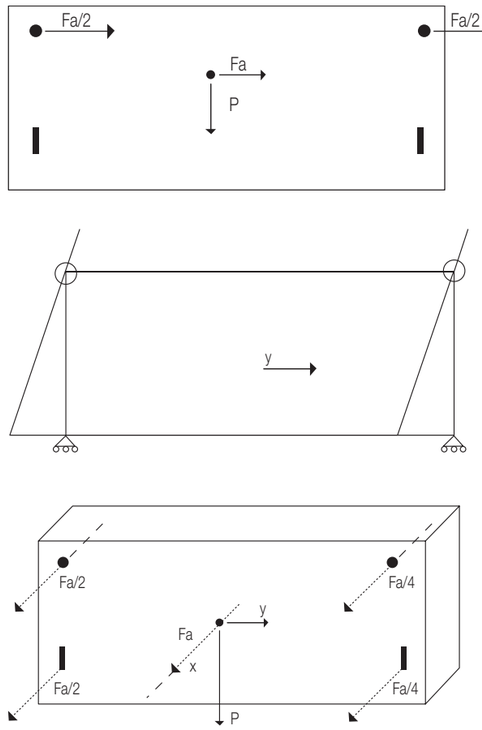
Fig. 28

Earthquake in y
The static scheme for a y earthquake, provided the panel does not participate in the rigidity of the frame structure, is that of 2 hinges in the 2 upper connections, and 2 trolleys in the lower one.

corbels Girella S and Tirella S have a support with ample tolerance, permitting a shift in direction y of ± 3 cm, which is more than sufficient to consider the upper edge of the panel a hinged rod connecting the 2 pillars, which do not oppose structural shift. The upper hinge is subject to a pull worth:

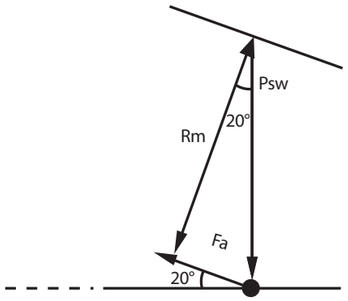
$F_a/2 = 3{,}7125 \cdot p \cdot \alpha = 1{,}85 \cdot p \cdot \alpha$ (kN)
where p = panel weight
α = project acceleration coeff.
As a function f of p and of α, the upper retainer must be tested; there are no problems with the corbel.

Earthquake in x
In the case of an earthquake in x, the panel receives a thrust Fa due to project seismic acceleration, the intensity of which is proportionate to the mass of the panel, depending on the height above the ground of the panel's centre of gravity and related to amplifying coefficients depending on the soil type and the panel's vibration period (according to the formula contained in NTC 2008). Action F_a is divided into equal parts over 4 points, in the event that the 2 Girella S and Tirella S corbels should be capable of preventing the panel from detaching from the wall, climbing the 20° inclined plane.
With the hypotheses previously made in the NTC, considering for precautionary purposes the height of the panel's centre of gravity to coincide with the height of the pillar (z/h = 1), we obtain:
$F_a = 3{,}7125 \cdot p \cdot \alpha$ (kN)
where:
p is the weight of the panel kN
$\alpha = \frac{a}{g}$ = project acceleration coefficient, variable between 0,05 a 0,35.



Horizontal thrust F_a on the corbel may be expressed by noting the weight of the panel resting on the corbel, which is worth $P_{sw} = P/2$

$$F_a = \frac{3,7125}{4} \cdot 2\, P_{sw} \cdot \alpha = 1,85 \cdot Psw \cdot \alpha$$



With a 20° inclination of the corbel, we may set up the following ratio:

$$tg\ 20° \leq \frac{1,85 \cdot \alpha \cdot P_{sw}}{P_{sw}}$$

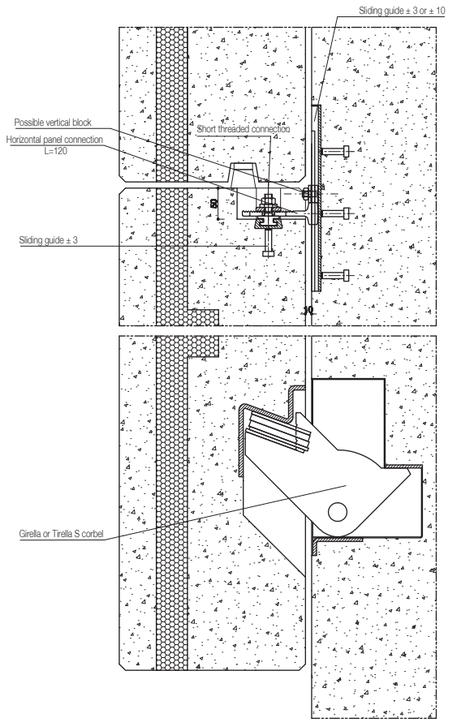
demonstrating that the corbel's possibility of contrasting horizontal seismic action does not depend on the weight of the panel, but only on the seismic acceleration coefficient α = a/g from which:

$$\alpha_{limit} = \frac{tg\ 20°}{P_{sw}} \quad \frac{0,364}{1,85}$$

that is, the maximum acceleration coefficient for which the corbel retains the panel is:

$$\alpha_{\ limit} = \mathbf{0,2}$$

In the case of seismic acceleration coefficients over 0.2, a vertical lock is applied to the type FISIS F0/00 upper retainer to prevent the panel from lifting. This device can resist an upward thrust of 30 kN (SLU).



In this case the value of $P_{sw} = P/2$

$$\alpha^*_{limit} = \frac{0,364\ (Psw + 30)}{1,85\ P_{sw}}$$

in the case of a 60 kN corbel

$$\alpha^*_{limit} = \frac{0,364\ (60 + 30)}{1,85\ .\ 60} = 0,30$$

which is the maximum seismic acceleration coefficient envisaged.

If this test does not work out, for instance due to a coefficient of $\alpha > 0,30$, the high elevation at which the panel is positioned, or type C soils, or in any case in which it is considered appropriate not to use the vertical lock, it is always possible to bind the panel to the pillar, in the corbel area, with an FISIS 30 type FO/10 connector.
From this discussion we may conclude that the Girella S (Tirella S) corbel is capable of withstanding seismic action with an acceleration coefficient ≤ 0.2; it is capable of withstanding seismic action using a simple, economical locking device applied to the upper seismic connection (FO/00) in in all areas with $0.2 < \alpha \leq 0,30$.
In particular cases (overlapping panels, horizontal panels supported by vertical panels, etc.) it is necessary to consider the need for FISIS 30 type FO/10 connections positioned at corbel height.

Positioning during casting

5 Positioning of corbels in formworks

When positioning corbels in the pillars during production it is essential to take the "reference elevations" into account, just as in the design stage. As the notch on the plastic lid is not always visible, "reference elevation" corresponds to the lower base of the wider part of the metal box of the "Girella S" corbel and to the continuous horizontal line all along the length of the box when using the "Tirella S" corbel.

In the case of Girella S, welds must be made on the reinforcements rather than on the 0.5 mm sheeting.

Fig. 29

Fig. 30

Fig. 34

Fig. 31

Positioning the Girella S In a pillar

Positioning the Tirella S corbel in a pillar

Fig. 32

Fig. 33

5.1 Positioning of the "Panel Plate"

in the formworks using the "magnetic box"

(technical info sheet 24)

In the event of suspension between the pillar and the panel, there will be a "panel plate" (technical info sheet 5). In the event of suspension between the vertical and horizontal panel, the "small panel plate" (technical info sheet 6) will be used.
The plate, buried in the fresh concrete, is positioned in the panel with a reusable steel template known as a "magnetic box" (technical info sheet 17) for the "panel plate" and a "small magnetic box" (technical info sheet 18) for the "small panel plate".

The template, in the head position, contains a permanent magnet that anchors the panel plate in place. The magnetic box has 2 Ø8 holes on its upper side the right size for two M8 screws, of use for anchoring the box to the sides of the panel formworks. The upper side of the box must be on the same level as the height of the side, and therefore flush with the panel surface.
The handle provided in the "magnetic box" permits rapid removal when removing the formworks (***see figure 41***). The "magnetic box" should be treated with form release agent to facilitate removal of the panel from the formworks. Disposable polystyrene boxes are also available as an alternative to the magnetic boxes (technical info sheets 28, 29, 30).

Fig. 35

Fig. 36

Positioning Girella S corbel in a vertical panel

Fig. 37

Fig. 38

Positioning Tirella S corbel in a vertical panel

Fig. 40

Fig. 39

Fig. 41

6 CORBEL ASSEMBLY

With the pillars mounted, check the correspondence of the "reference elevation" shown on the plastic lid with the project reference elevation.
The necessary thickness is thus created before extracting or inserting the corbels, if there are no errors in the position of the "panel plate".
Shims are positioned by simply fitting them into the blades of the corbels.

If, during assembly, you find that it has come out by more than the +2.5 cm permitted by normal adjustment at the pillar (direction Z), you may weld shims onto the "panel plate" up to a maximum of 2 cm, reaching +4.5 cm.
If the elevation is lower than -2.5 cm, "emergency corbels" must be used.

Fig. 42

Fig. 43

Fig. 44

7 EMERGENCY CORBEL

IIn the event of an error exceeding the possible tolerances, or if by mistake you have omitted to position the "Girella S corbel" or the "Tirella S box", use an "emergency corbel" (technical info sheets 3, 4).

There are 2 different weight-bearing capacities: the "S 120kN emergency corbel" and the "S 60kN emergency corbel".

The "S emergency corbel" has 8 holes. The 4 holes closest to the corbel axis or the 4 holes farthest away from it will be used, depending on their geometric compatibility with the reinforcement rods in the pillar. To make the most of the panel's potential for horizontal adjustment, you should use the 4 holes closest to the axis of the corbel if possible.

"S 120kN emergency corbel" (figure 45):
length ≥ 155 mm with M16 steel mechanical screw anchor, with tensile strength ≥ 24 kN and shearing strength ≥ 52 kN

"S 60kN emergency corbel" (figure 46):
length ≥ 130 mm with M16 steel mechanical screw anchor, with tensile strength ≥ 24 kN and shearing strength ≥ 52 kN.

Position the screw anchors in the 2 lower holes first, and then the 2 upper holes. The emergency corbels are supplied without shims.
Adjustment in three directions is performed following the same instructions and procedures as for the "Girella S corbel".

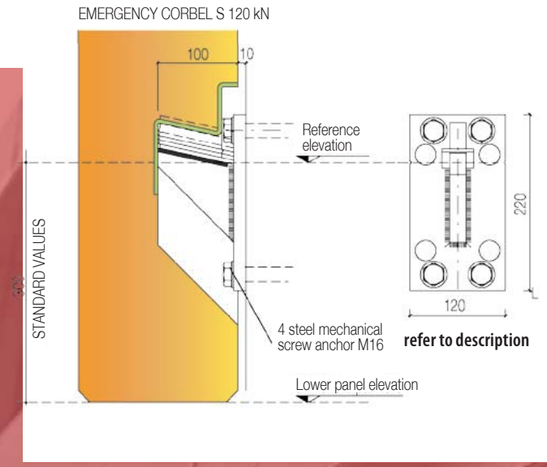


Fig. 45

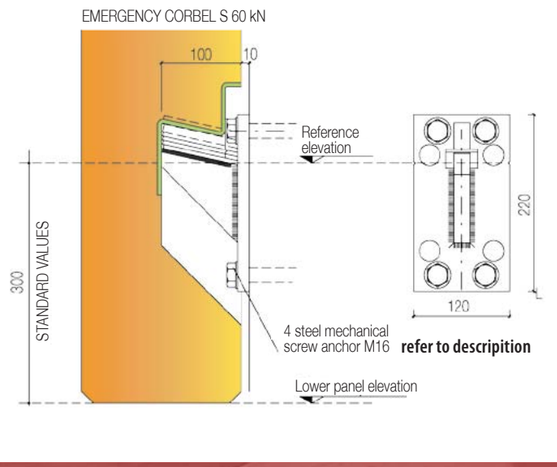
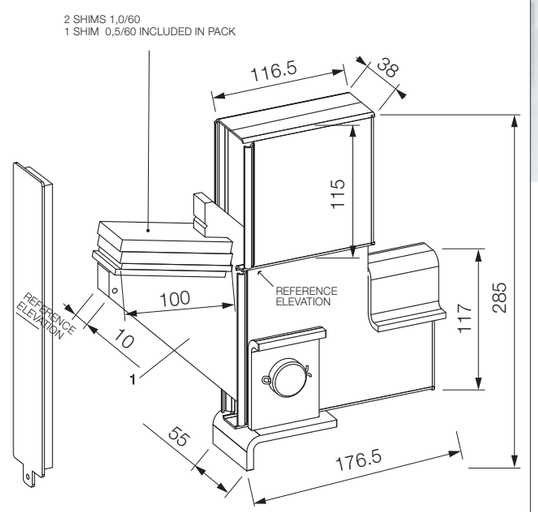


Fig. 46

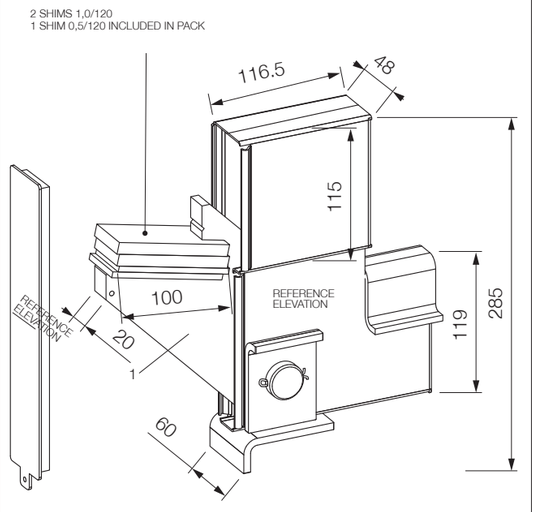
Girella S Tirella S

Technical info sheets



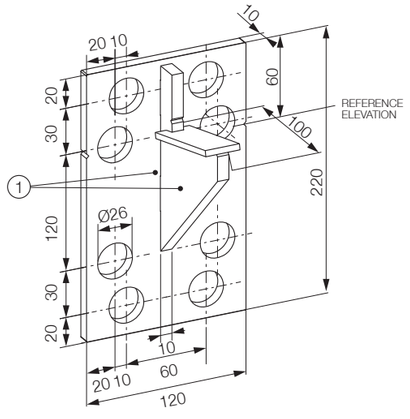
INFO SHEET 1

RUREDIL S.P.A. :	"GIRELLA S" SYSTEM
ARTICLE	**60Kn GIRELLA S CORBEL**
CODE	0310601001
PACK	1 PIECE
MATERIAL	Fe 510 FOR 1, Fe 360 FOR THE REST
GALVANISATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	60 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



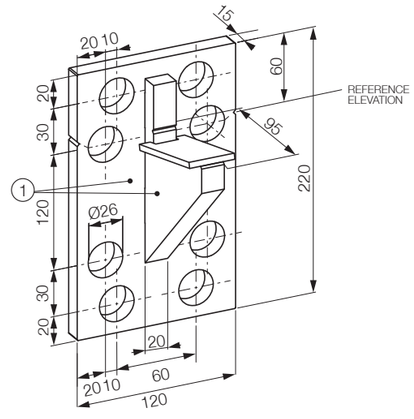
INFO SHEET 2

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**120Kn GIRELLA S CORBEL**
CODE	0310601002
PACK	1 PIECE
MATERIAL	Fe 510 FOR 1, Fe 360 FOR THE REST
GALVANISATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	120 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



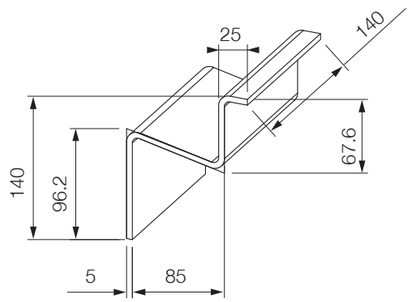
INFO SHEET 3

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**60Kn EMERGENCY CORBEL S**
CODE	0310402001
PACK	1 PIECE
MATERIAL	Fe 510 FOR POS.1E Fe 360 FOR THE REST
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	60 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



INFO SHEET 4

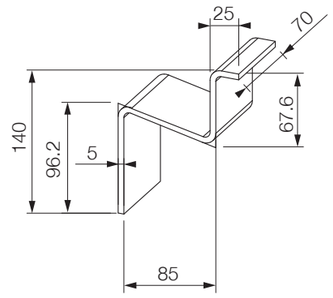
RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**120Kn EMERGENCY CORBEL S**
CODE	0310402002
PACK	1 PIECE
MATERIAL	Fe 510 FOR POS.1,E Fe 360 FOR THE REST
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	120 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



INFO SHEET 5

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**PANEL PLATE S**
CODE	0310403001
PACK	1 PIECE
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE	UNIVERSAL PANEL INSERT: PILLAR/PANEL NODE

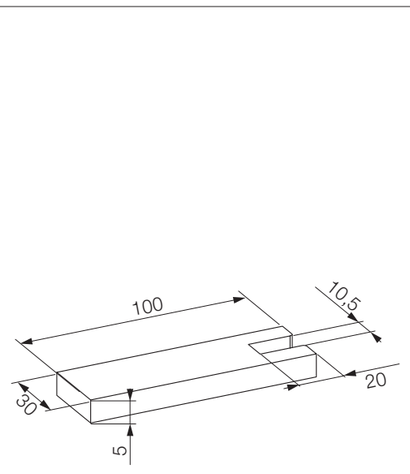
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 6

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SMALL PANEL PLATE S**
CODE	0310403002
PACK	1 PIECE
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE	UNIVERSAL PANEL INSERT: PILLAR/PANEL NODE

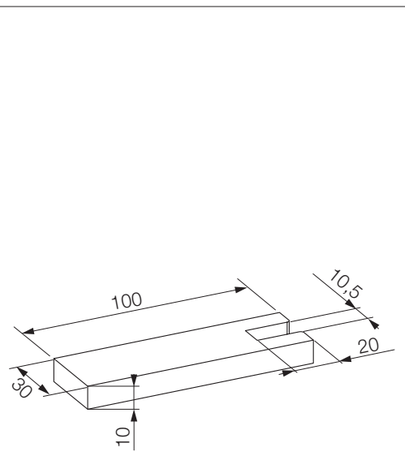
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 7

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SHIM 0.5/60 kN**
CODE	0310004001
PACK	200 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	60 kN GIRELLA CORBEL, 60 kN EMERGENCY CORBEL

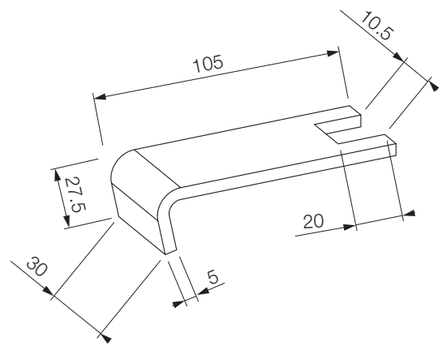
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 8

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SHIMS 1.0/60 kN**
CODE	0310004006
PACK	100 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	60 kN GIRELLA CORBEL 60 kN EMERGENCY CORBEL

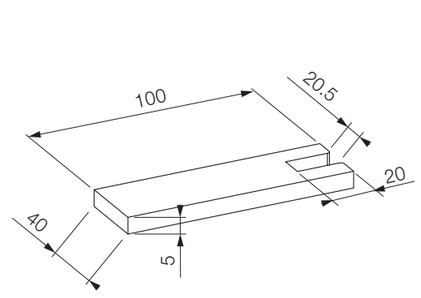
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 9

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**L-SHAPED SHIM 0.5/60 kN**
CODE	0310004011
PACK	200 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	60 kN GIRELLA CORBEL 60 kN EMERGENCY CORBEL

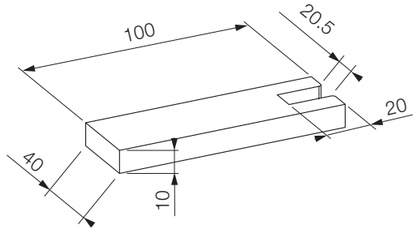
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 10

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**L-SHAPED SHIM 0.5/120 Kn**
CODE	0310004002
PACK	200 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	M120 kN GIRELLA CORBEL, 120 kN EMERGENCY CORBEL

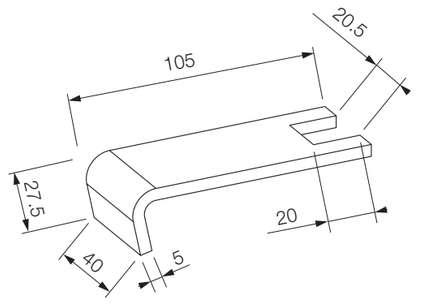
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 11

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SHIM 1.0/120 kN**
CODE	0310004007
PACK	100 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	GIRELLA 120 kN CORBEL, 120 kN EMERGENCY CORBEL

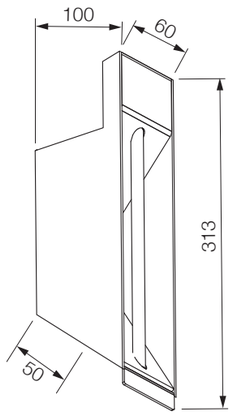
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 12

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**L-SHAPED SHIM 0.5/120 kN**
CODE	0310004012
PACK	200 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
USE WITH:	120 kN GIRELLA CORBEL, 120 kN EMERGENCY CORBEL

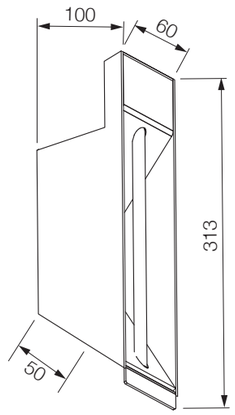
DIMENSIONAL TOLERANCES: UNI EN 22768-C



INFO SHEET 17

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SMALL MAGNETIC BOX S**
CODE	0310404003
PACK	1 PIECE
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
DESCRIPTION	SMALL RECYCLABLE ELEMENT FOR POSITIONING PANEL PLATE

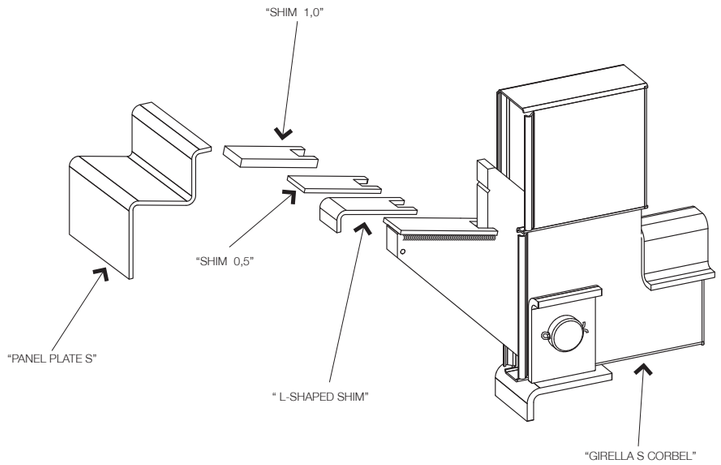
DIMENSIONAL TOLERANCES: UNI EN 22768-C



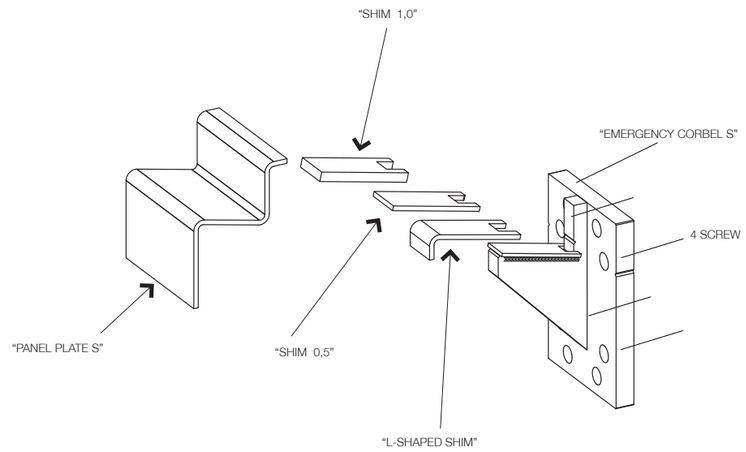
INFO SHEET 18

RUREDIL S.P.A. :	"GIRELLA S" CORBEL SYSTEM
ARTICLE	**SMALL MAGNETIC BOX S**
CODE	0310404003
PACK	1 PIECE
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
DESCRIPTION	SMALL RECYCLABLE ELEMENT FOR POSITIONING PANEL PLATE

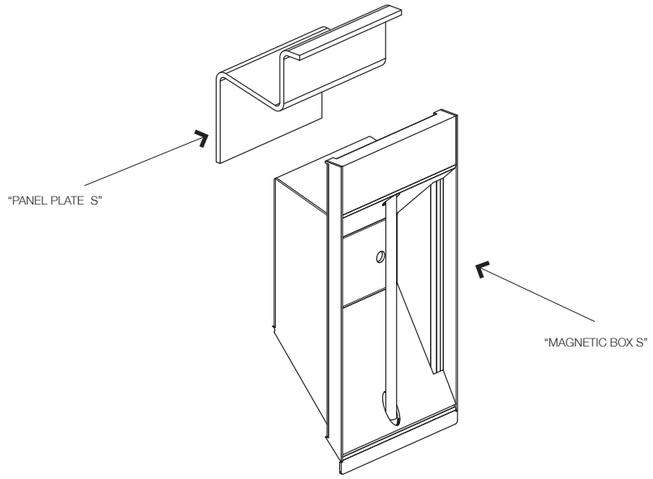
DIMENSIONAL TOLERANCES: UNI EN 22768-C



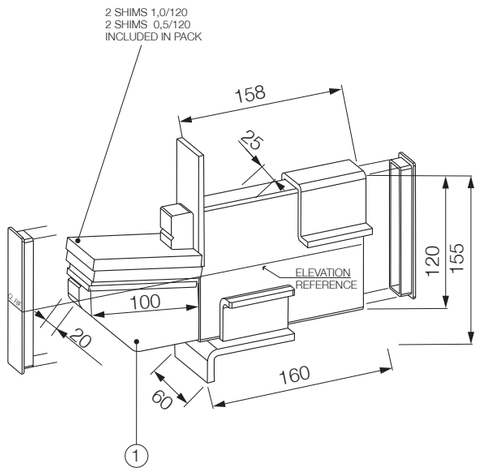
INFO SHEET 21 RUREDIL S.P.A. : **"GIRELLA S" CORBEL SYSTEM**



INFO SHEET 22 RUREDIL S.P.A. : **EMERGENCY CORBEL S**

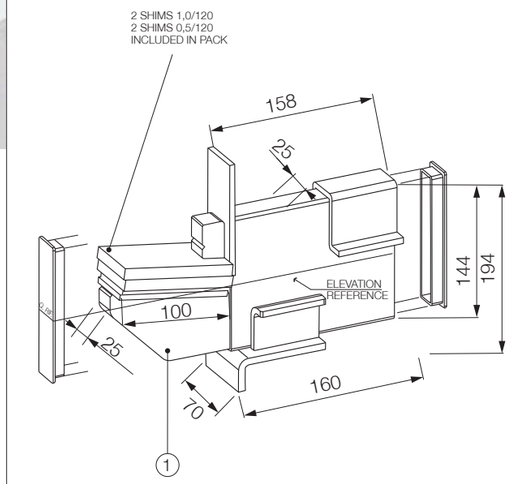


INFO SHEET 24 RUREDIL S.P.A. : **POSITIONING OF THE "PANEL PLATE" IN THE FORMWORKS**



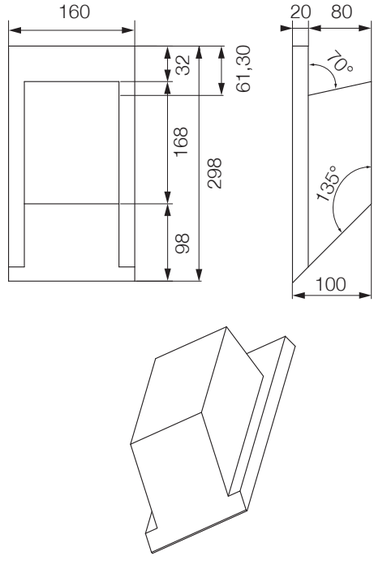
INFO SHEET 26

RUREDIL S.P.A. : "TIRELLA S" CORBEL SYSTEM	
ARTICLE	**60kN "TIRELLA S" CORBEL**
CODE	0310401001
ARTICLE	**TIRELLA S 60kN BOX**
CODE	0310406001
PACK	4 PIECES
MATERIAL	Fe 510 POS. 1, Fe 360 FOR THE REST
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	60 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



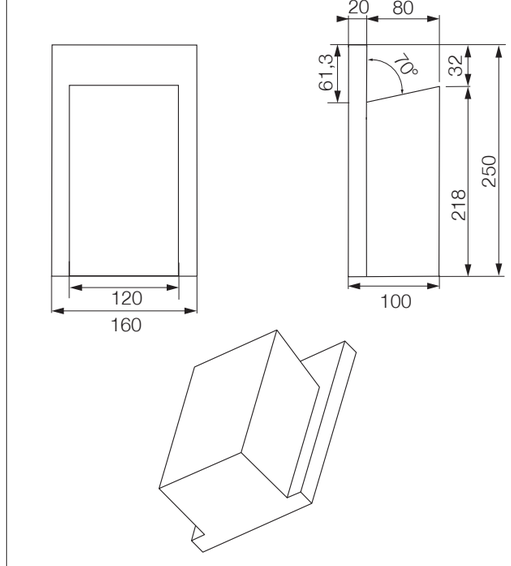
INFO SHEET 27

RUREDIL S.P.A. : "TIRELLA S" CORBEL SYSTEM	
ARTICLE	**120kN "TIRELLA S" CORBEL**
CODE	0310401002
ARTICLE	**TIRELLA S 120kN BOX**
CODE	0310406002
PACK	4 PIECES
MATERIAL	Fe 510 POS. 1, Fe 360 FOR THE REST
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
CAPACITY	120 kN
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



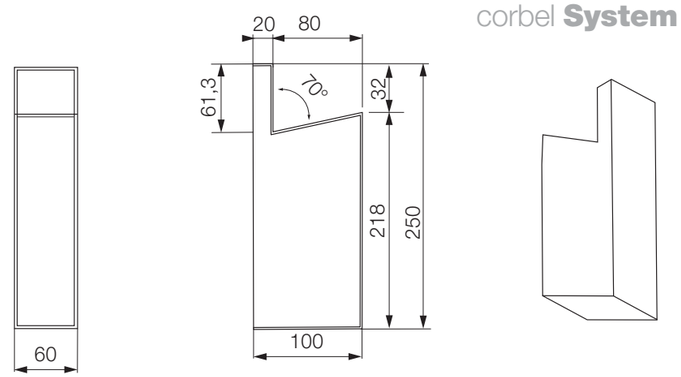
INFO SHEET 28

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**POLYSTYRENE BOX S**
CODE	0310405001
PACK	40 PIECES
MATERIAL	POLYSTYRENE DENSITY 25 kg/mc
DESCRIPTION	DISPOSABLE ELEMENT FOR POSITIONING PANEL PLATE
DIMENSIONAL TOLERANCE: + 2mm	



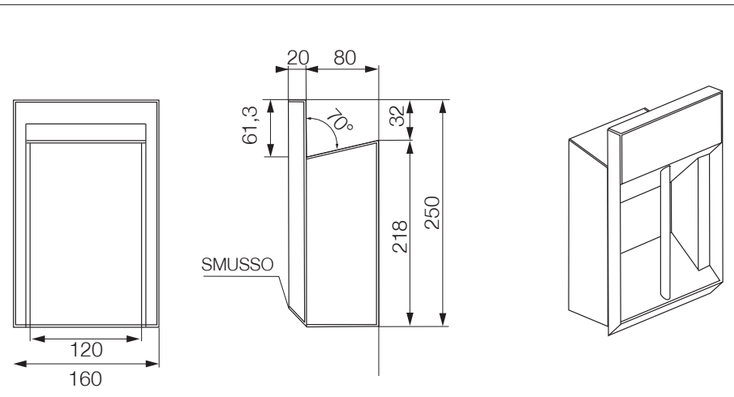
INFO SHEET 29

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**FLUSH POLYSTYRENE BOX S**
CODE	0310405002
PACK	40 PIECES
MATERIAL	POLYSTYRENE DENSITY 25 kg/m^3
DESCRIPTION	DISPOSABLE ELEMENT FOR POSITIONING PANEL PLATE
DIMENSIONAL TOLERANCES: ± 2 mm	



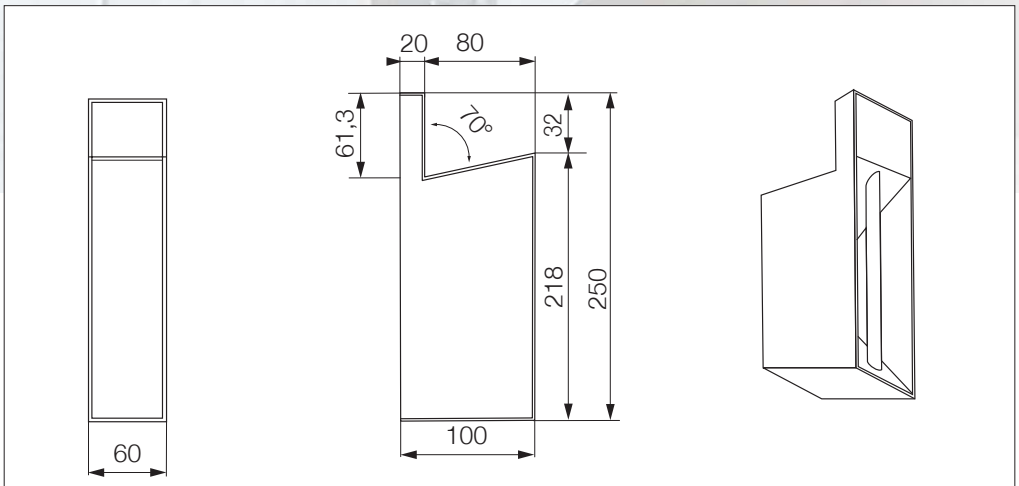
INFO SHEET 30

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**SMALL OPEN POLYSTYRENE BOX S**
CODE	0310405003
PACK	80 PIECES
MATERIAL	POLYSTYRENE DENSITY 25 kg/m^3
DESCRIPTION	DISPOSABLE ELEMENT FOR POSITIONING SMALL PANEL PLATE
DIMENSIONAL TOLERANCES: ± 2mm	



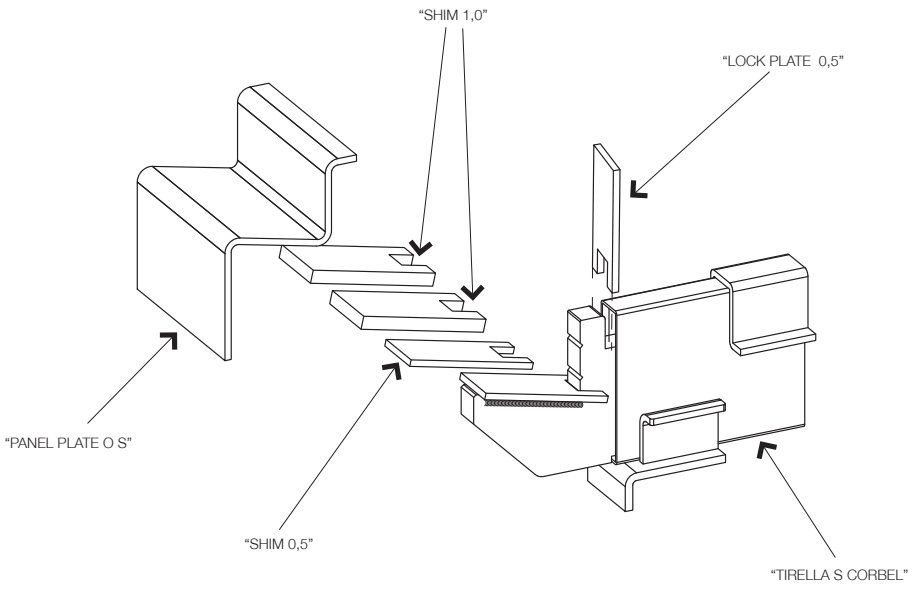
INFO SHEET 31

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICOLO	**FLUSH MAGNETIC BOX S**
CODE	0310404002
PACK	1 PIECES
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
DESCRIPTION	RECYCLABLE ELEMENT FOR INSTALLATION OF PANEL PLATE
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



INFO SHEET 32

RUREDIL S.P.A. : "GIRELLA S" CORBEL SYSTEM	
ARTICLE	**SMALL OPEN MAGNETIC BOX S**
CODE	0310404004
PACK	1 PIECE
MATERIAL	Fe 360
GALVANIZATION	ELECTROLYTIC WHITE 25 mic. thick
DESCRIPTION	RECYCLABLE ELEMENT FOR INSTALLATION OF SMALL PANEL PLATE
DIMENSIONAL TOLERANCES: UNI EN 22768-C	



INFO SHEET 33

RUREDIL S.P.A. : **"TIRELLA S" CORBEL SYSTEM**

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