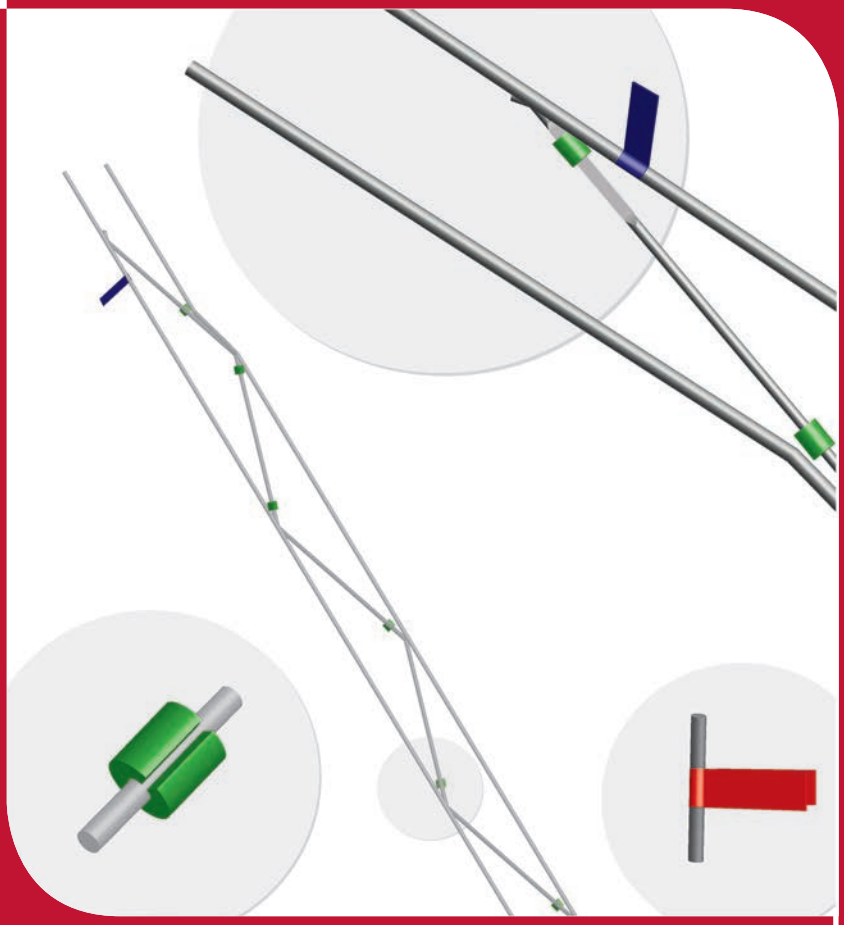
Steel for bricks



# geofor®

## High performance masonry reinforcement with **SAO device**

CE

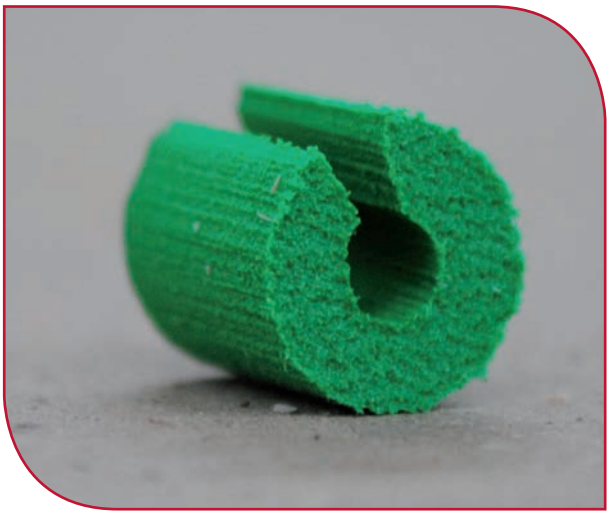
grupo GZ

## REASON AND WHY GEOFOR REINFORCEMENT

The presence of reinforcement in the walls of a masonry significantly increases its mechanical performance. Among other properties of the reinforced walls, the standards recognize an increase in the resistance to bending strength directly proportional to the amount of reinforcement and its effective width. These attributes are only true if a correct transmission of forces between adjacent pieces.

The transmission of forces in the central area of the reinforcement is produced by virtue of the tensile strength and compression of the steel that works according to the truss type model. So further requirements are not necessary other than the resistance and ductility guaranteed in the material. However at the ends of the pieces the truss loses its configuration, so that the transmission of forces between a piece and the adjacent one requires certain additional requirements. These requirements refer to the three fundamental aspects, related to the interaction between the reinforcement and the surrounding mortar: ADHERENCE, LENGTH OF OVERLAP AND LATERAL COATING.

The traditional reinforcement maintains its geometric configuration throughout the entire length of the piece, which can hinder the simultaneous implementation of the three above requirements in the overlap areas.



Our company **STEEL FOR BRICKS** proposes and guarantees constructive solutions for the walls of buildings that use the fundamental resource of mechanical benefit attributed by the reinforcement. With the reinforcement used until now you cannot demand rigor in the ends as described in the manuals, due to the great difficulty entailed in compliance and much less, it is posible to guarantee with certainty a correct implementation of work, since the reinforcement is hidden once built into the wall.

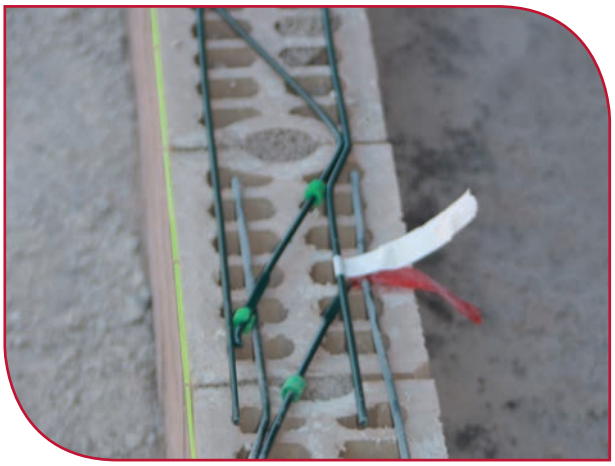
Again this background, R&D department of the **STEEL FOR BRICKS** company is committed to the responsibility of the technicians so that they rely on their proposals, knowing the extraordinary importance of the implementation of our products, have developed a revolutionary new range of masonry reinforcement, with the geometry

modified to enable the function that is assigned and fitted with the **SAO devices** that allow a rigorous control of the implementation at the site by visual inspection after the execution at the wall.

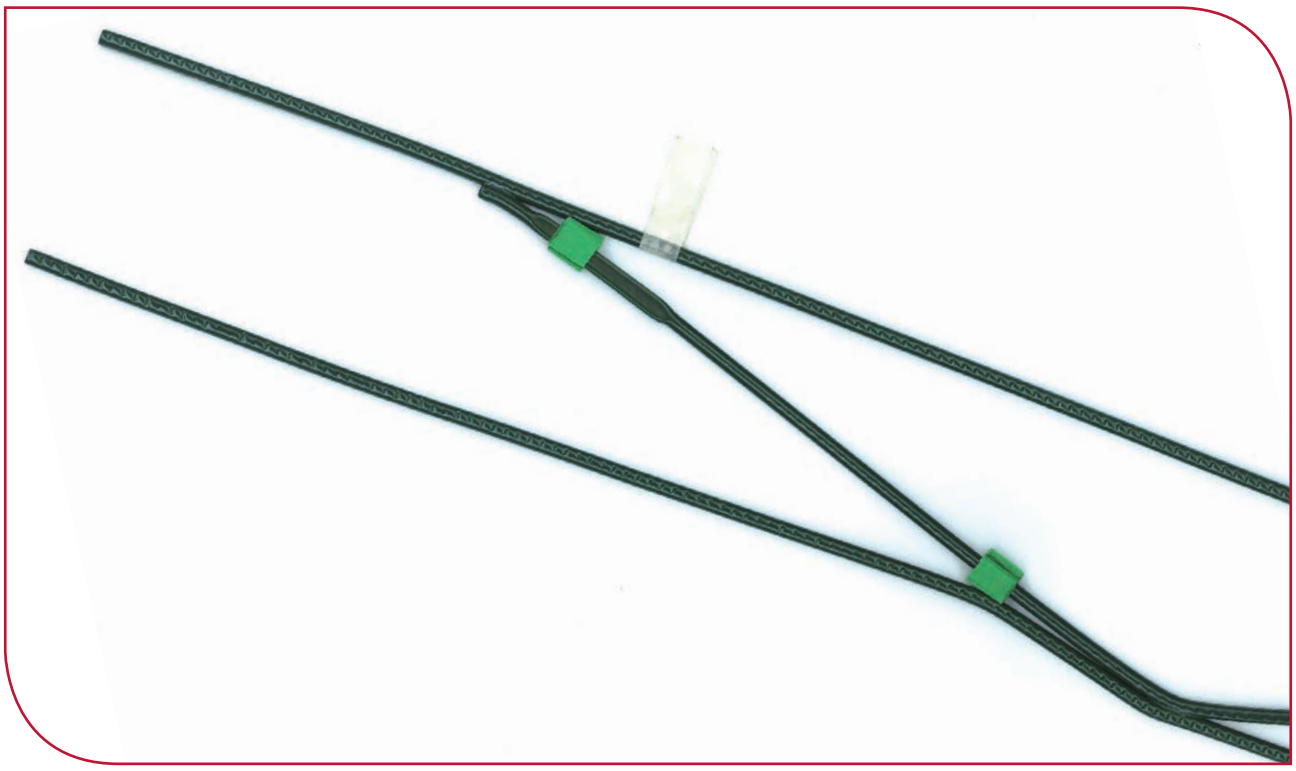
**geofor®** reinforcement is the product of a rigorous investigation, on the part of **STEEL FOR BRICKS**, on the mechanical properties attributed to reinforced walls and the results that can be reasonably expected by the working units carried out in the practice.

The research that has appeared in the new reinforcement **geofor®**, unique on the market, it is the consequence of the responsible attitude of **STEEL FOR BRICKS** as a supplier of products that have been assigned an important structural role. GZ Group has the backing of more than twenty years of experience not only in the suppply of products for construction, but, fundamentally on the assessment and development of proposals compromised with challenges, increasingly demanding, according to the standards.

The new **geofor®** reinforcement allows our company **STEEL FOR BRICKS** to maintain its commitment by ensuring at all times the results from the products we supply, doing so with the responsable attitude our customers deserve by



issuing the appropriate quality control certificates, that now should be extensive thanks to the masonry reinforcement characteristics present in the new **geofor®**.

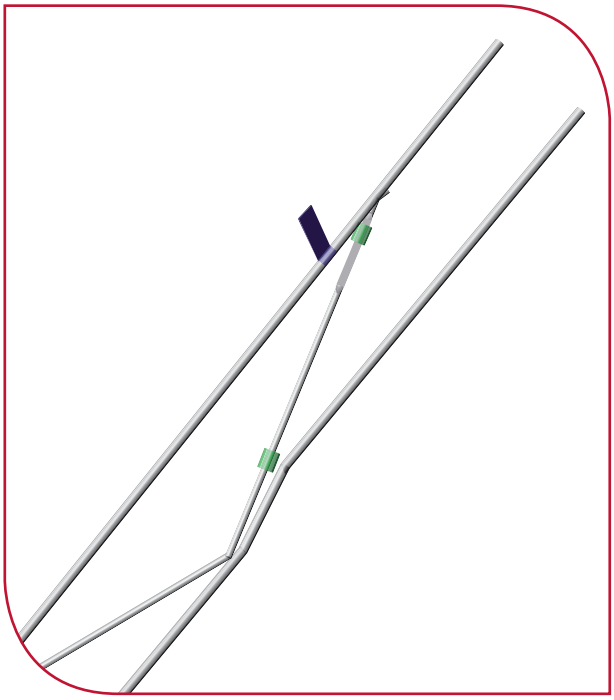


## DESCRIPTION

**geofor®** is a prefabricated reinforcement formed by two parallel longitudinal wires that are joined by a central wire. The central wire forms a truss structure and is soldered in the same plane of the structure along the inner side of the longitudinal wires. Therefore, there is no overlap of the longitudinal and transverse wires and the maximum reinforcement thickness is equal to the diameter of the longitudinal wires.

The steel used in its manufacture is in accordance with standard EN 10020.

**geofor®** comes with the CE marking in accordance with the specifications of the standard 845-3;2006 A1:2008.



## INCORPORATED SEPARATORS

**geofor®** incorporates in its transverse wires some plastic separators which are cylindrical whose role is to ensure the minimum coating of mortar and facilitate the correct implementation in work, as it allows you to place the reinforcement in the masonry before laying the mortar.

## PLUG STRUCTURE

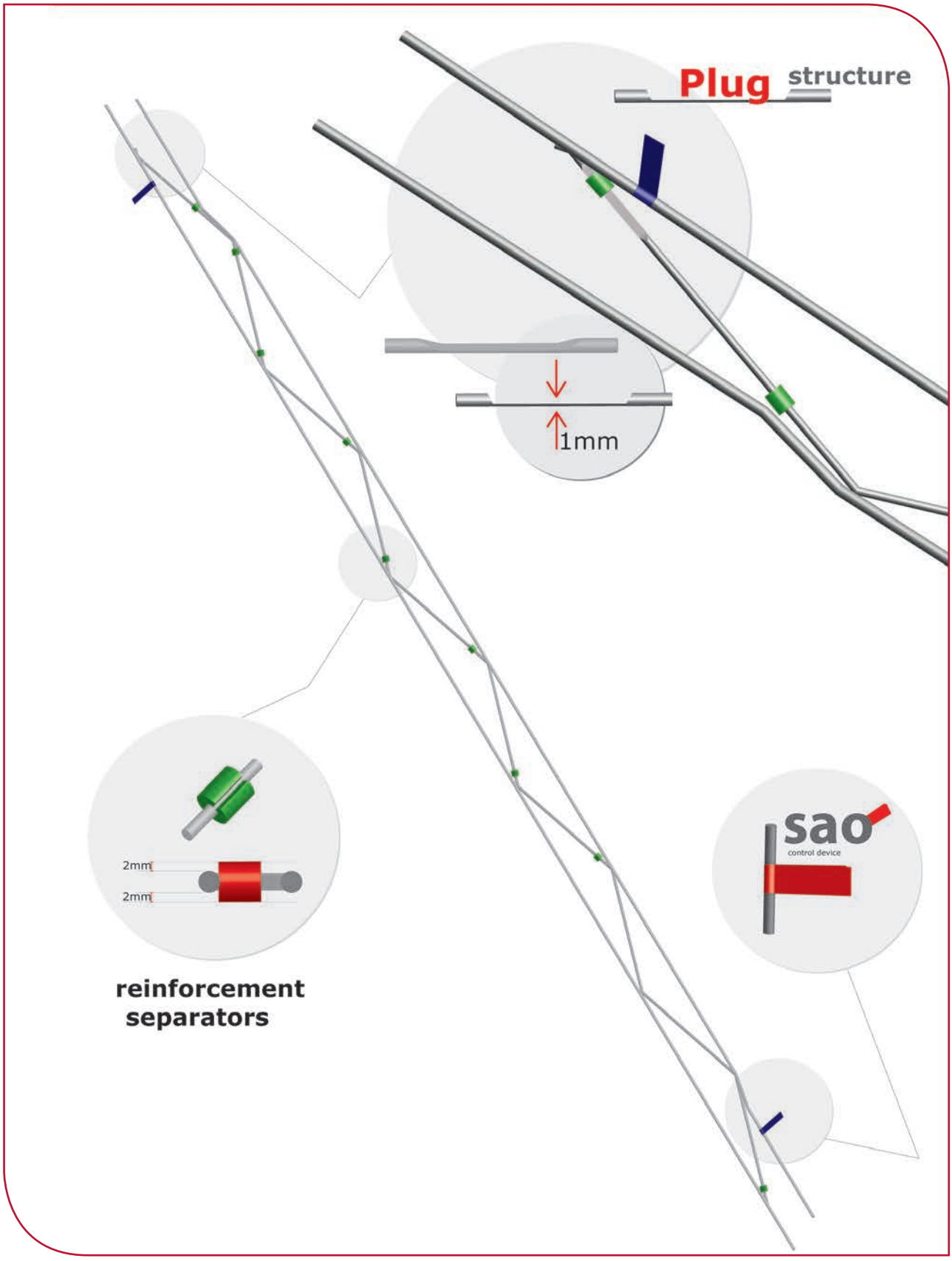
**geofor®** has an innovative design that makes it posible to achieve the overlap between reinforcement without the need for manipulation, keeping the area of the overlap the same nominal width of the reinforcement.

The ends of the **geofor®** pieces have a special geometric configuration in the form of a plug that allows the overlap of 250mm without having to cut any wire.

Also, the transverse wire in this area is flattened in order to guarantee the minimum coating of mortar.

## SAO DEVICE (System of self-control of the operator)

**geofor®** comes with some devices at both ends of the pieces that allow you to visually check, after implementation, that the amount of reinforcement in the wall corresponds to the project and that the length of overlap is that required by the regulations.


Plug structure
1mm
2mm
2mm
reinforcement separators
sao
control device

## TYPES

### I. ACCORDING TO THE TYPE OF WIRE

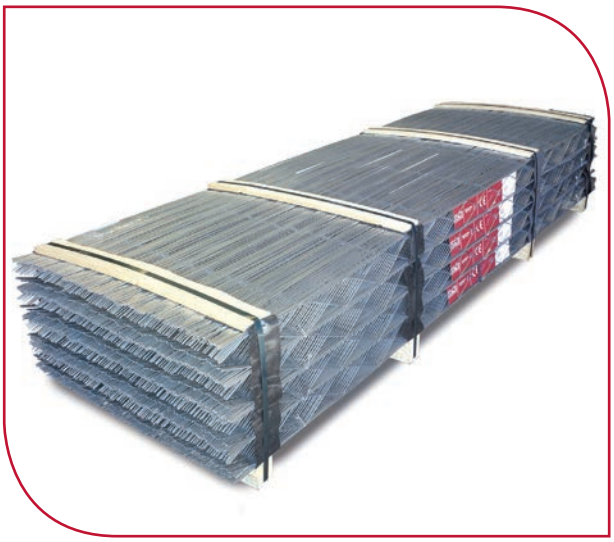
Smooth

Corrugated (upon request)

### II. ACCORDING TO TYPE OF PROTECTION AGAINST CORROSION

- **geofor®** Z, manufactured with steel wire with a heated zinc galvanized coating with a minimum of 70 gr/m² in accordance with standard EN 10244.
- **geofor®** I, manufactured with stainless steel according to the standard EN 10088.
- **geofor®** E, manufactured with steel wire in galvanized zinc coating with a minimum hot dip galvanized of 70 gr/m² according to the standards of EN 1022 and subsequent epoxy coating of at least 80 µm according to the standard of EN 10245.

## PRESENTATION



- 3050 mm pieces.
- Packets of 25 units.
- Pallets of 40 packages (1000 units of 3050 mm)
- Each package contains an ID label with the description of product,its barcode and batch number.

## DIMENSIONS

| TYPES OF GEOFOR | | | | | | |
|---|---|---|---|---|---|---|
| NAME/NUMBER | WIDTH (mm) | Ø wire longitudinally (mm) | Ø wire transversally (mm) | REINFORCED AREA ($mm^2$) | WEIGHT (kg) | LENGTH (mm) |
| **GEOFOR Z** 4055/Z | 55 | 3,7 | 3 | 28,56 | 0,689 | 3050 |
| **GEOFOR Z** 4075/Z | 75 | 3,7 | 3 | 28,56 | 0,694 | 3050 |
| **GEOFOR Z** 4100/Z | 100 | 3,7 | 3 | 28,56 | 0,702 | 3050 |
| **GEOFOR Z** 4160/Z | 160 | 3,7 | 3 | 28,56 | 0,729 | 3050 |
| **GEOFOR Z** 4200/Z | 200 | 3,7 | 3 | 28,56 | 0,751 | 3050 |
| **GEOFOR E** 4055/E | 55 | 3,7 | 3 | 28,56 | 0,700 | 3050 |
| **GEOFOR E** 4075/E | 75 | 3,7 | 3 | 28,56 | 0,705 | 3050 |
| **GEOFOR E** 4100/E | 100 | 3,7 | 3 | 28,56 | 0,713 | 3050 |
| **GEOFOR E** 4160/E | 160 | 3,7 | 3 | 28,56 | 0,750 | 3050 |
| **GEOFOR E** 4200/E | 200 | 3,7 | 3 | 28,56 | 0,762 | 3050 |
| **GEOFOR I** 4055/I | 55 | 3,7 | 3 | 28,56 | 0,698 | 3050 |
| **GEOFOR I** 4075/I | 75 | 3,7 | 3 | 28,56 | 0,703 | 3050 |
| **GEOFOR I** 4100/I | 100 | 3,7 | 3 | 28,56 | 0,711 | 3050 |
| **GEOFOR I** 4160/I | 160 | 3,7 | 3 | 28,56 | 0,738 | 3050 |
| **GEOFOR I** 4200/I | 200 | 3,7 | 3 | 28,56 | 0,761 | 3050 |

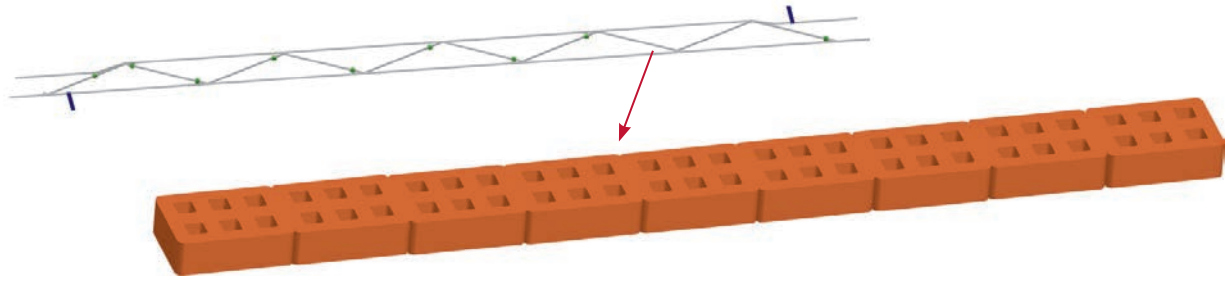
Other widths avaliable upon request.

# ADVANTAGES

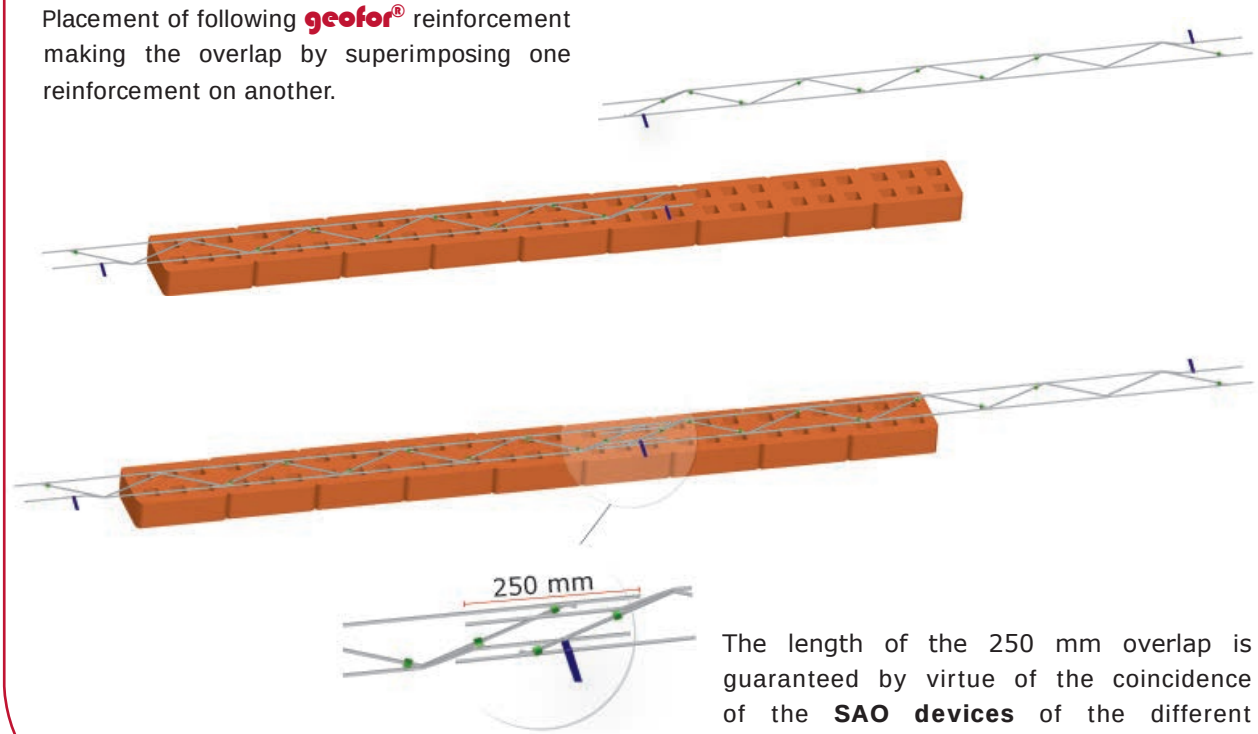
## POSITIONING

The **geofor®** reinforcement enables placement without manipulation by the operator. This achieves a rapid implementation that also makes the cost of the unit construction cheaper, as well as enable the correct implementation of fundamental aspects such as mechanical behaviour, such as quantities, the length of overlap and the mortar covering.

**geofor®** placement before the mortar.

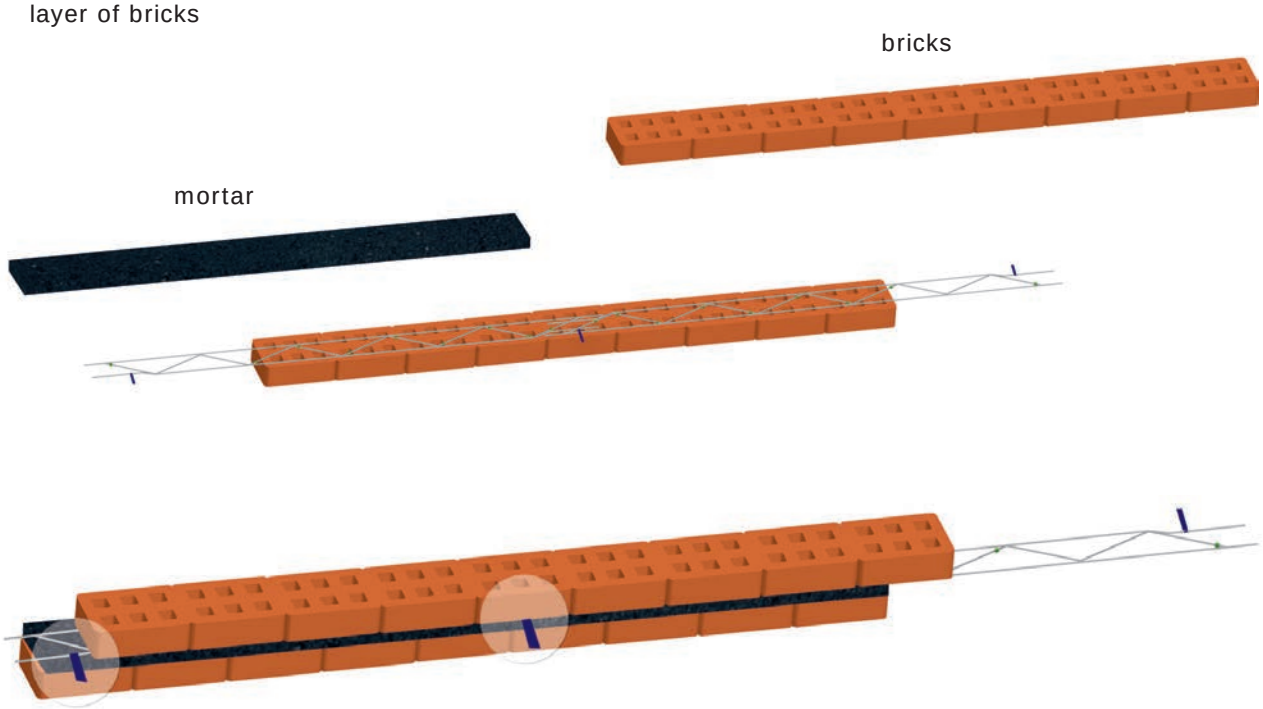


Placement of following **geofor®** reinforcement making the overlap by superimposing one reinforcement on another.

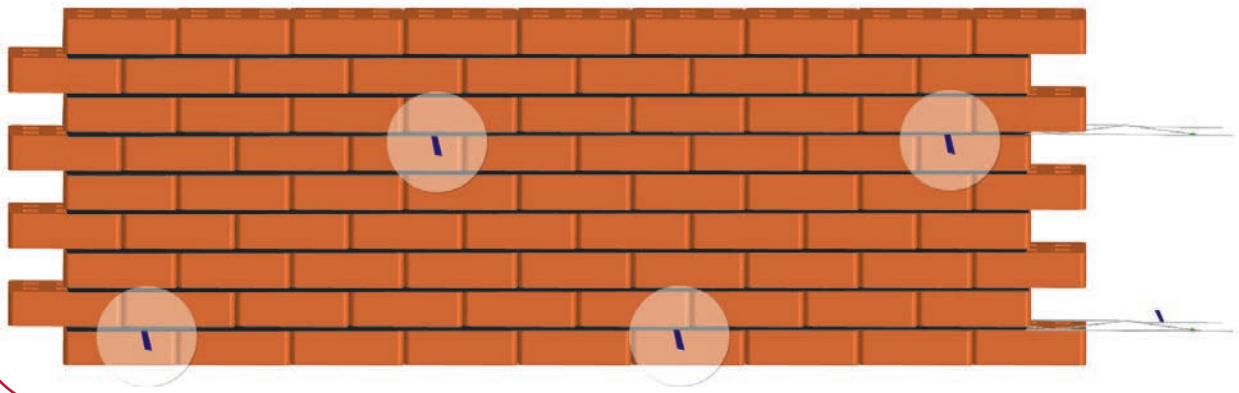



The length of the 250 mm overlap is guaranteed by virtue of the coincidence of the **SAO devices** of the different reinforcements.

Place the mortar and the following layer of bricks



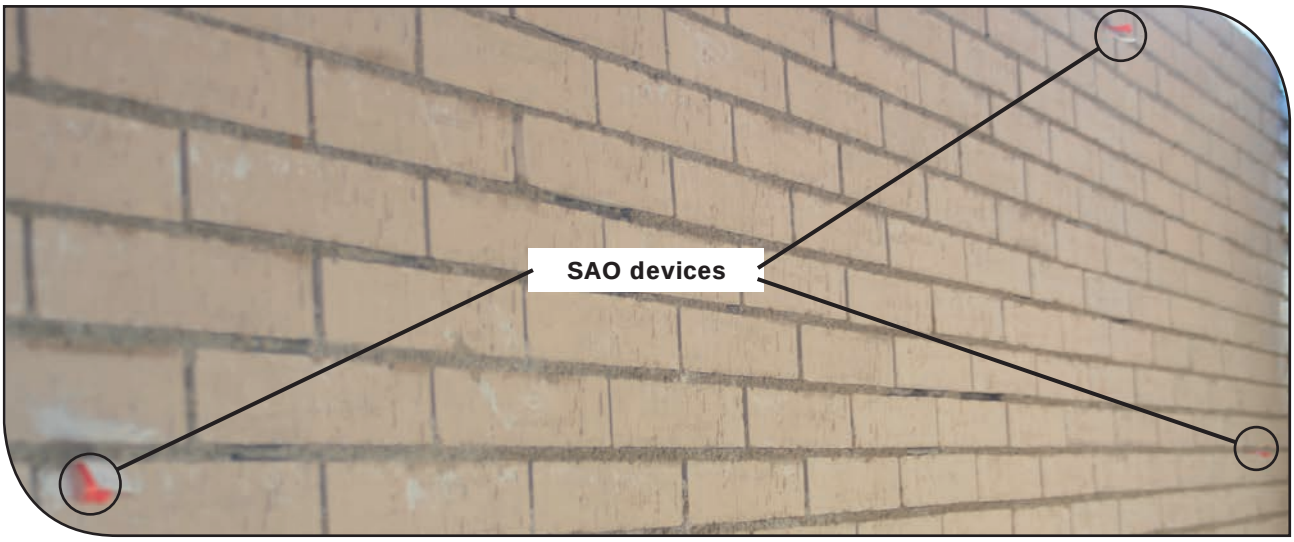

The **SAO devices** allow you to visually check the amounts of reinforcement and their correct placement.



## GUARANTEES

### 1. QUANTITY CONTROL

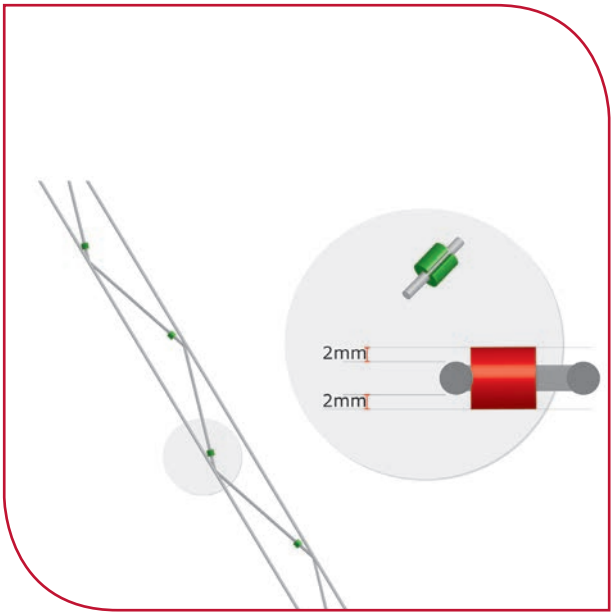
**SAO devices** allow you to check that the amount of reinforcement placed in the wall is what corresponds to those specified in the Project.

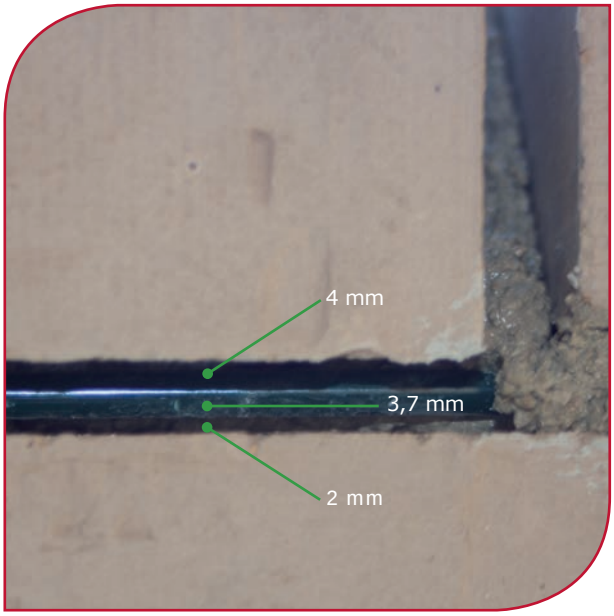



### 2. CONTROL OF TECHNICAL ASPECTS

#### 2.1. COVERING

The separators incorporated into the transverse wires guarantee mortar coating between the reinforcement and the piece of masonry required in the Eurocode. This coating is continous throughout the whole reinforcement preventing any moisture bridges.



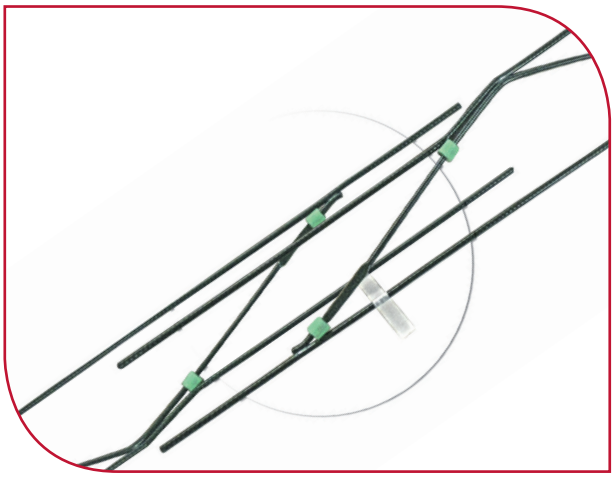



## 2.2. ADHESION

Given that our geofor® reinforcement has a truss type configuration, this means only good adhesion conditions are essential at the ends of the pieces (in the area of overlap).

The adhesion at the end is guaranteed through tests, which is declared in the regulatory CE marking, which is guaranteed by the manufacturer.

The specific configuration of the reinforcement for this purpose, guarantees that these results are always replicated in working conditions.



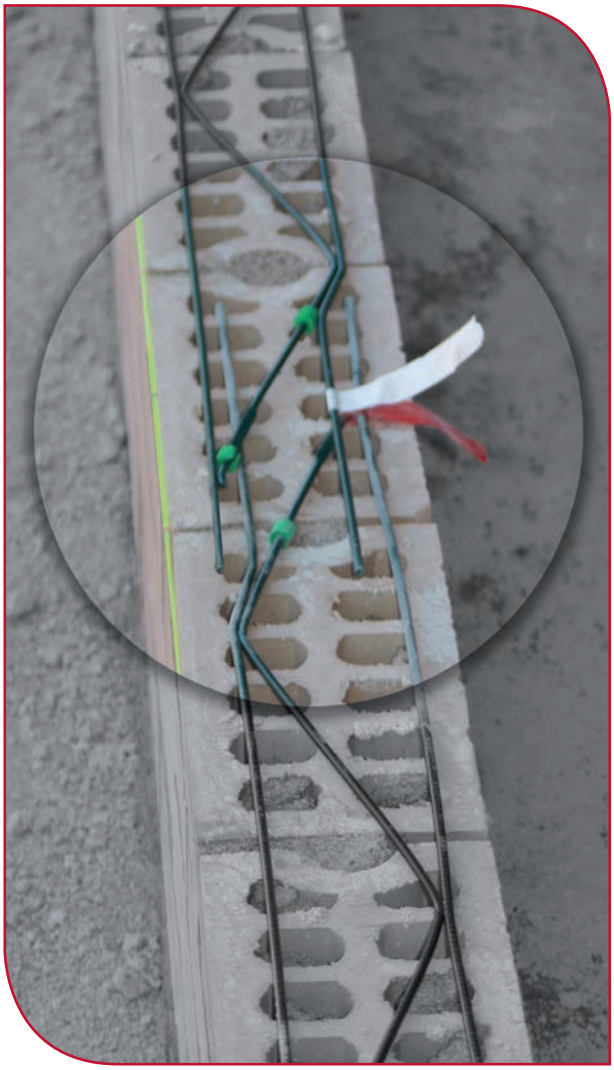
## 2.3. OVERLAP

For a reinforced masonry to properly work it is essential that there is a correct transmission of forces between adjacent pieces of reinforcement.

This transmission of forces occurs in the areas of overlap by adhesion between the reinforcement and the mortar that surrounds it, which it is not only important that there is a sufficient length of overlap, but also that there is an essential requirement for a correct side coating between the longitudinal wires on the reinforcement overlap.

### OVERLAP ERRORS WITH TRADITIONAL MASONRY REINFORCEMENT



The **"plug structure"** of the **geofor®** reinforcement ensures all these requirements without any need for manipulation by the operator. In turn, the **SAO device** prevents any error by the operator in the implementation work of the reinforcement and allows you to check later after the implementation in the wall, that both overlaps with their lateral coatings are the correct ones.

**SAO devices**

**"plug structure"**

AT THE ENDS OF THE REINFORCEMENT IT IS ESSENTIAL THAT THE THREE REQUIREMENTS OF ADHESION, SIDE COATING AND LENGTH OF OVERLAP BECAUSE 95% OF PATHOLOGICAL PROCESSES IN REINFORCED MASONRIES ARE PRODUCED BY DEFICIENCIES IN ONE OR MORE OF THESE REQUIREMENTS.

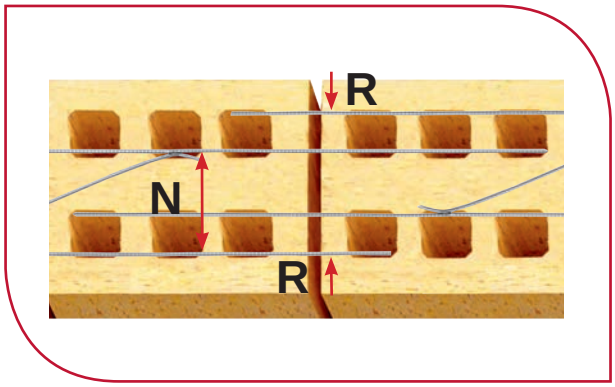
**GEOFOR** IS THE ONLY BED JOINT REINFORCEMENT ON THE MARKET THAT ENSURES THE SIMULTANEOUS COMPLIANCE OF ALL THESE REQUIREMENTS.

## 3. TECHNICAL BENEFITS

### 3.1. INCREASED RESISTANCE TO BENDING IN THE WALL

Unlike what occurs with all the existing reinforcement on the market, in which the overlap is performed on the outside of each reinforcement piece, **geofor®** is the only reinforcement that overlaps in its interior, thanks to the "**PLUG structure**" that characterizes it.

**TRADITIONAL MASONRY REINFORCEMENT**



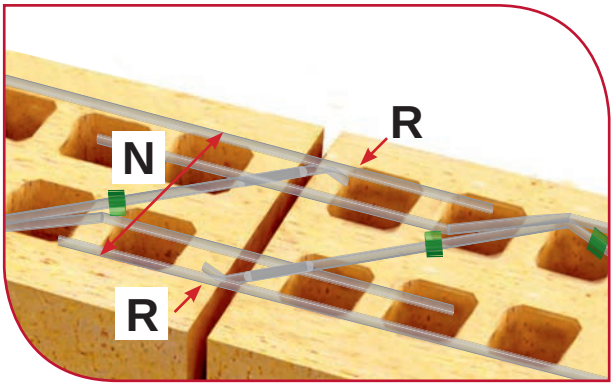

N - NOMINAL WIDTH OF THE REINFORCEMENT

R - REAL WIDTH OF THE REINFORCEMENT = N + 20 mm + Ø OF THE LONGITUNDINAL WIRE.

To choose the reinforcement that is more appropriate for the wall, you should choose the wider reinforcement that meets this formula:

Total width of the mortar ≥ that of R + 30 mm

**MASONRY REINFORCEMENT GEOFOR**




N - NOMINAL WIDTH OF THE REINFORCEMENT

R - REAL WIDTH OF THE REINFORCEMENT = N

To choose the reinforcement that is more appropriate for the wall, you should choose the wider reinforcement that meets this formula:

Total width of the mortar ≥ that of N + 30 mm.

This means that, for an equal width of reinforcement, using **geofor®** allows you to use greater widths, which means a greater mechanical arm of the section and consequently, a proportional increase in the resistance capacity in the bending of the wall. This effect may increase the mechanical strength of the reinforced wall by up to 20 %, without increasing the amount of steel and therefore, without increasing the cost of construction.

In effect, the resistance to bending capacity that corresponds to the section of compound material, as is the case in the reinforced wall it is essentially obtained as the product of two parameters: the area of the section of the longitudinal wires (that represents the strength of steel) and the separation between them (which represents the strength of steel):

$M_{Rd} = U_s \cdot z_s = A_s \cdot f_{yd} \cdot a_s$

Being:

$M_{Rd}$ resistance to bending capacity

$A_s$ the area of steel on each face

$f_{yd}$ resistance of steel

$a_s$ the width of the reinforcement

As you can see in the above formula, an increase in the width of reinforcement, assumes an increase of the same proportion in the resistance of the wall, while keeping the same section of wires.

| | TRADITIONAL REINFORCEMENT | REINFORCEMENT WITH PLASTIC SEPARATORS | geofor® |
|---|---|---|---|
| ADHESION | X | R | ✔ |
| COATING | X | R(1) | ✔ |
| OVERLAP | X | R | ✔ |
| PROTECTION | ✔ | ✔ | ✔ |
| CONTROL OF EXECUTION | X | X | ✔ |
| WITHOUT MANIPULATION | X | X | ✔ |
| INCREASE IN RESISTANCE OF BENDING IN THE WALL | X | X | ✔ |
| | | | |

X - Very difficult or imposible to achieve in work.

R - Possible but need to manipulate in work.

✔ - Without the manipulation and with full guarantee in the implementation in work.

(1) Due to the necessary cutting of the wires in the reinforcement to perform a correct overlap the steel is unprotected less than 3cm from the outer edge. This does not affect the reinforcement with the stainless steel finish.

**THE COMBINED USE OF GEOFOR® REINFORCEMENT AND GEOANC® ANCHORS IN THE GHAS SYSTEM GIVES YOU A PIECE OF MIND AND GUARANTEES THE COMPLIANCE OF THE EUROCODE FOR:**

- **OPERATORS**
- **BUILDERS**
- **CHARTERED BUILDING SURVEYORS**
- **ARCHITECTS AND ENGINEERS**
- **DEVELOPERS**

Steel for bricks

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## Other companies in the GZ Group:

GEO HIDROL TECNO GZ ZFoam



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