

CONTINUITY CONNECTION



User Manual 2008

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B.S.Italia[®]
Styl-Comp Group

innovazione basata sull'esperienza
innovation based on experience

PLEASE CAREFULLY READ THE INFORMATION AND INSTRUCTIONS PROVIDED IN THIS USER MANUAL BEFORE USING ANY COMPONENT MAKING UP THE CONTINUITY CONNECTION SYSTEM (INTERNATIONAL PATENT).

Please contact B.S.Italia if you have any doubts about the correct use of the components described in this manual:

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B.S.Italia is an ISO 9001 certified company and the CONTINUITY CONNECTION system is designed and built in compliance with:

B.S.Italia certification



- Reference norms:
Eurocodes EC2, EC3, EC8
- Ministerial Decree n° 97 9/01/97 "Technical standards concerning the calculation, performance and testing of structures made from normal and prestressed reinforced concrete and metal structures"
- Ministerial Decree (Ministry of Infrastructure and Transport) 14/09/2005 "Technical standards for buildings"
- Ministerial Decree (Ministry of Infrastructure and Transport) 14/01/2008 "Technical standards for buildings"
- General parts: Eurocodes and state of the art
- Materials and surface treatment: ISO, EN, DIN and UNI standards
- Material testing: SINAL accredited laboratories - SINAL belongs to EA (European Accreditation)
- Quality System: ISO 9001 through IGQ - IGQ belongs to CISQ, which in turn belongs to IQNet Reg.Nr. IT-0188
- System audit tests carried out by the Department of Structural Mechanics at Pavia University

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SISTEMA DI CONNESSIONE DI CONTINUITÀ

Connecting precast columns to foundation works, combining portions of columns between each other, the bonding of precast concrete walls to foundation works are some of the problems regarding the joining of concrete elements one to the other (precast or not). The "Continuity Connection" tweaked to link precast columns to foundation works or portions of columns between each other. This system is able to create a mutual frame tie between parts restoring the reinforcement bars' structural continuity without having to overlap them, offering the precast world new and interesting innovations. The latter makes the use of the system to connect elements faster, more immediate and extremely precise, furthermore it allows an engineering optimization of the metal inserts embedded in the concrete manufactures. The system's mechanical behaviour is progressive. During the transitory stage related to the erection, the mechanical joint between column and the foundation works takes place through the fixing ring-nut that placed between the adjustment foot (assembled to the column) and the anchoring base (seated in foundation) creates a mechanical connections between the two elements. This allows to erect the column and adjust height and verticality conveniently operating on the adjustment feet without using struts or other additional bracing system : it results in a precise, safe, fast and extremely economical erection. After the element's erection and its exact plumb verticality, the anchoring sleeves have to be filled with the purpose-made mortar, capable of developing incredibly high resistance in a extremely short time.





The following main features are outlined:

- **no shoring:** entailing an undisputed increase in erection speed and lower laying prices;
- **adjustable laying:** the system allows a wide range of adjustability on the foundation tolerances and when verticizing the elements to be linked. This permits to recover erection and/or production mistakes not only of precast elements but also of the in situ ones, favoring erection accuracy;
- **system's strength:** the intrinsic high strength capacity of the connection (that always exceeds 160% of the yealding value of the reinforcement rebars resulting in a perfect continuity). This means it can be used under any kind of strain static or dynamic, resulting adaptable to norms and regulations of all the industrilized countries;
- **universality:** the anchoring sleeve can be combined with rebars with different diameters from Ø12 mm - #4 to Ø32 mm - #10. Allways allowing elevated coupling tolerances between the rebar end the anchoring sleeve. Thanks to this universality there's no more the need to combine a differet kind of sleeve for different rebar diameters, avoiding inconvenient production mistakes and simplifyfing the designer's work;
- **the anchoring sleeve's doubled adherence:** the 3D modelling of the sleeve is purpously designed to favor internal and external adherence of system embedded in the manufact's concrete. Resulting in an adhesion mechanism similar more to the one of a reinforcement rebar than to the one of classic metal insert. Besides avoiding the interruption of the reinforcement and the confinement in critical areas such as the column/foundation connection, exploits the external sleeve's adherence optimizing the internal force trasmission.





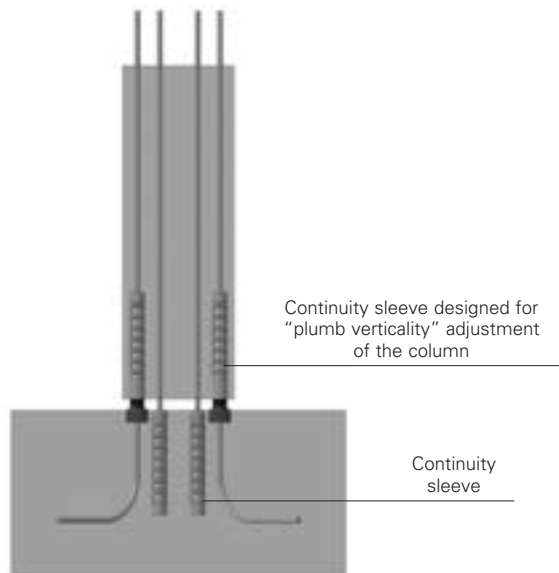
Description of the system

CONTINUITY CONNECTION, an anti-seismic connection system for concrete elements, **guarantees transfer of the forces between two rebars**, doing away with the need to overlap the rebars and eliminating the risk of eccentricity in the junction components or the bars inside concrete elements. This type of connection - **a perfect alternative to cast-in-place structures** - is the ideal solution in terms of anti-seismic performance.

CONTINUITY CONNECTION exploits the concept of adhesion via a concrete matrix between the rebars and sleeve, thus guaranteeing virtually perfect continuity between precast elements typical of cast-in-place structures.

Thanks to an innovative adjustment system, CONTINUITY CONNECTION lets you use precast concrete elements without the need for temporary support or shoring. In fact, this innovative result is based on the **principle of the adjustable foot placed between two metal elements already fitted inside the elements you want to connect**.

Overall view of the Continuity Connection system



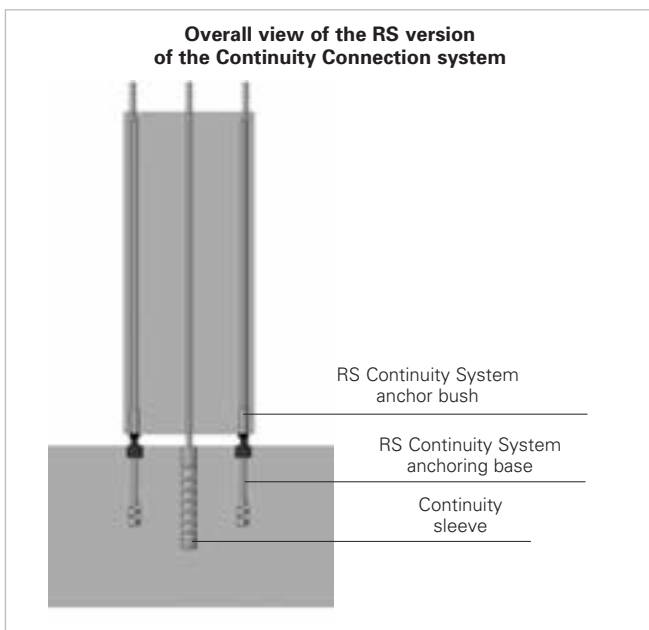


The adjustment foot comes in 2 versions:

- the first (Standard) is a tubular metal element that lets the rebar pass through it. Thanks to continuous threading, the foot allows for millimetre height adjustment and easy control of plumb verticality;
- the second (RS) is a solid metal element with continuous threading on the shaft. This also guarantees millimetre height adjustment and easy control of plumb verticality.

The heart of the system is a metal sleeve that – a world first – has **double concrete adherence (internal and external)**, to prevent it from pulling out. The result is perfect transfer of forces between the sleeve, the concrete and the rebars.

This CONTINUITY CONNECTION system is especially appropriate for vertical connection of precast concrete structural elements (foundation/column, column/column). The system elements are placed in the concrete elements during their production in the factory. Once the elements have been coupled on site, the sleeves simply need to be sealed with a special type of mortar to guarantee perfect structural continuity of the concrete elements.



The innovative features of the new **B.S.Italia ANTI-SEISMIC CONNECTION SYSTEM** overcomes all the limits normally met today when connecting concrete elements, meaning that the crucial objectives to guarantee good structural design are all met:

Superior coupling tolerances

It guarantees **four times the tolerance** of other junction systems currently on the market

Increased ductility

High ductility steel is used

Excellent fire resistance

B.S.Italia Antiseismic Connections are suitably coated and so protected by the concrete in the element

Vertical height adjustment

The system foot allows for fine adjustment of the height and verticality of the element

Foundation anchoring guaranteed by the foundation rebar itself, which continues upwards, towards the column (just as in cast-in-place structures)

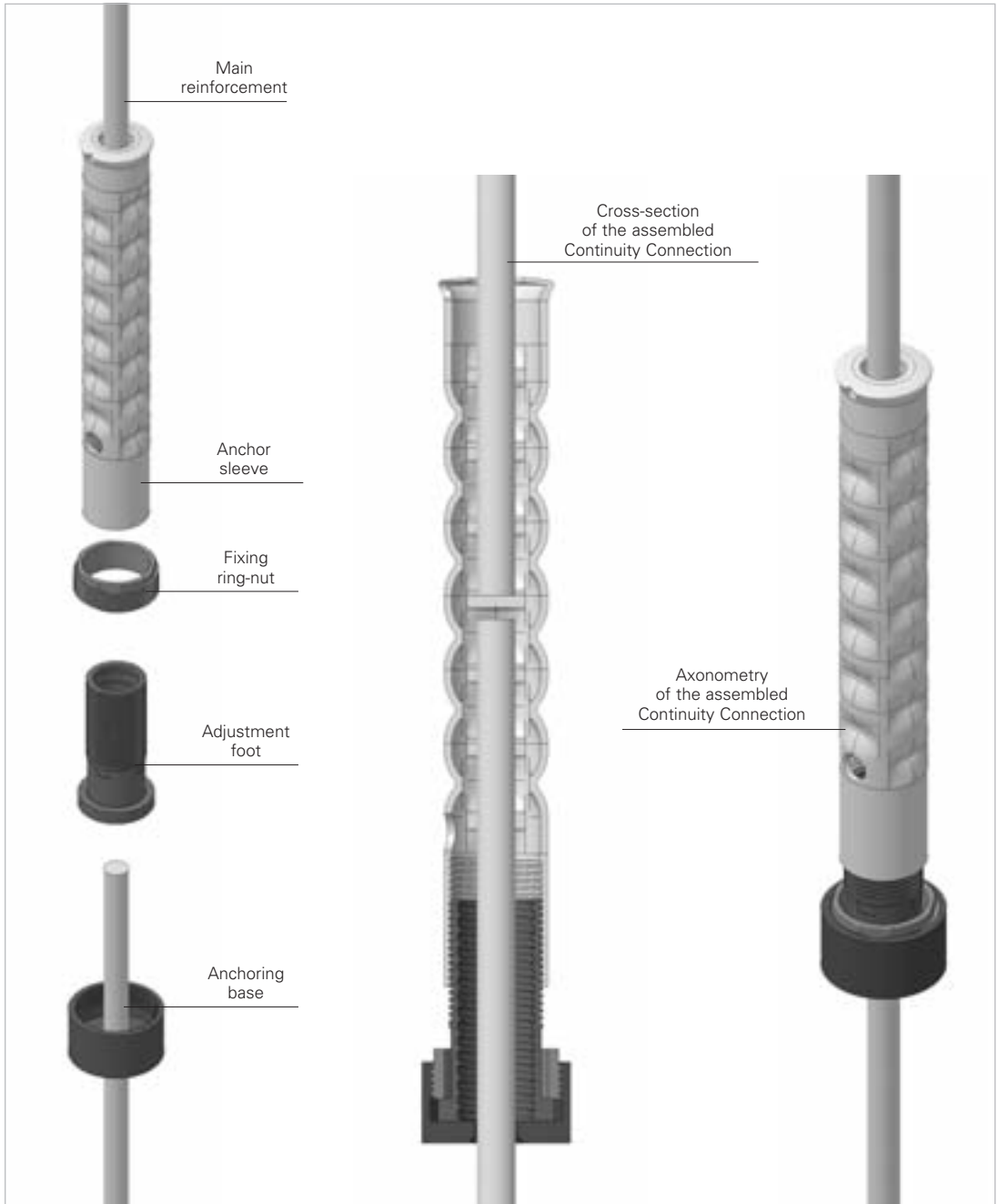
Foundation fixing set

The system comes with special templates for correct installation in the concrete elements

Structural calculation

Not necessary, given the system's perfect emulation of classic cast-in-place solutions. The system guarantees perfect continuity of the reinforcement between the two reinforced concrete elements (e.g. column/foundation).

The connection makes for guaranteed structural continuity and so no other additional calculations are needed.



Anchor sleeve



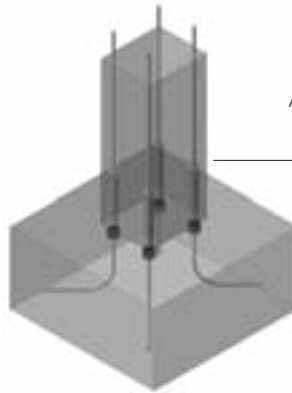
Anchoring base



Fixing ring-nut

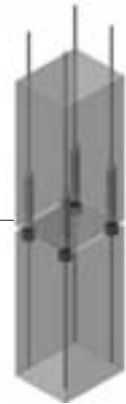


Adjustment foot

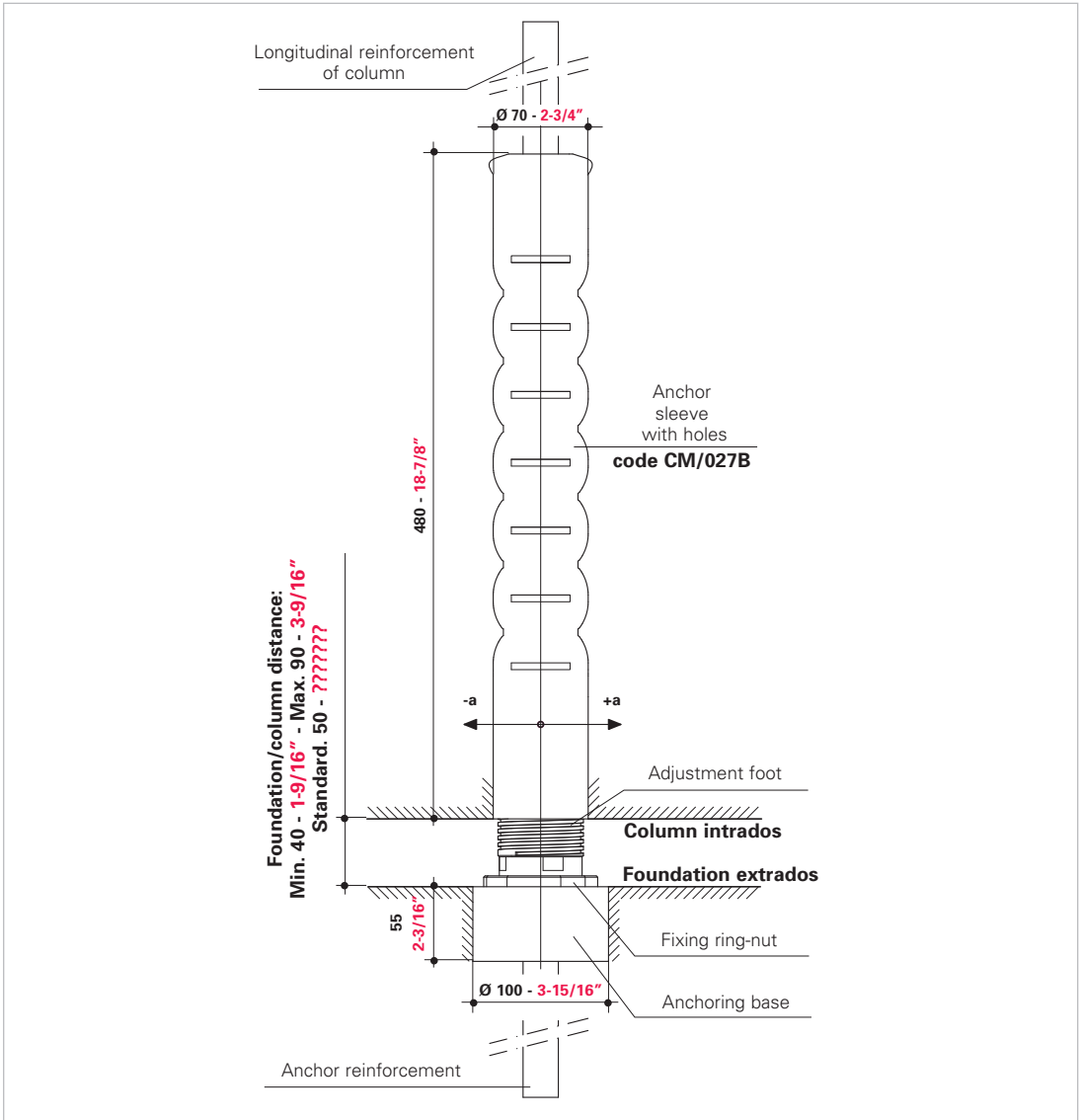


Axonometry of the Continuity Connection system between columns and foundation

Axonometry of the Continuity Connection system between columns and columns

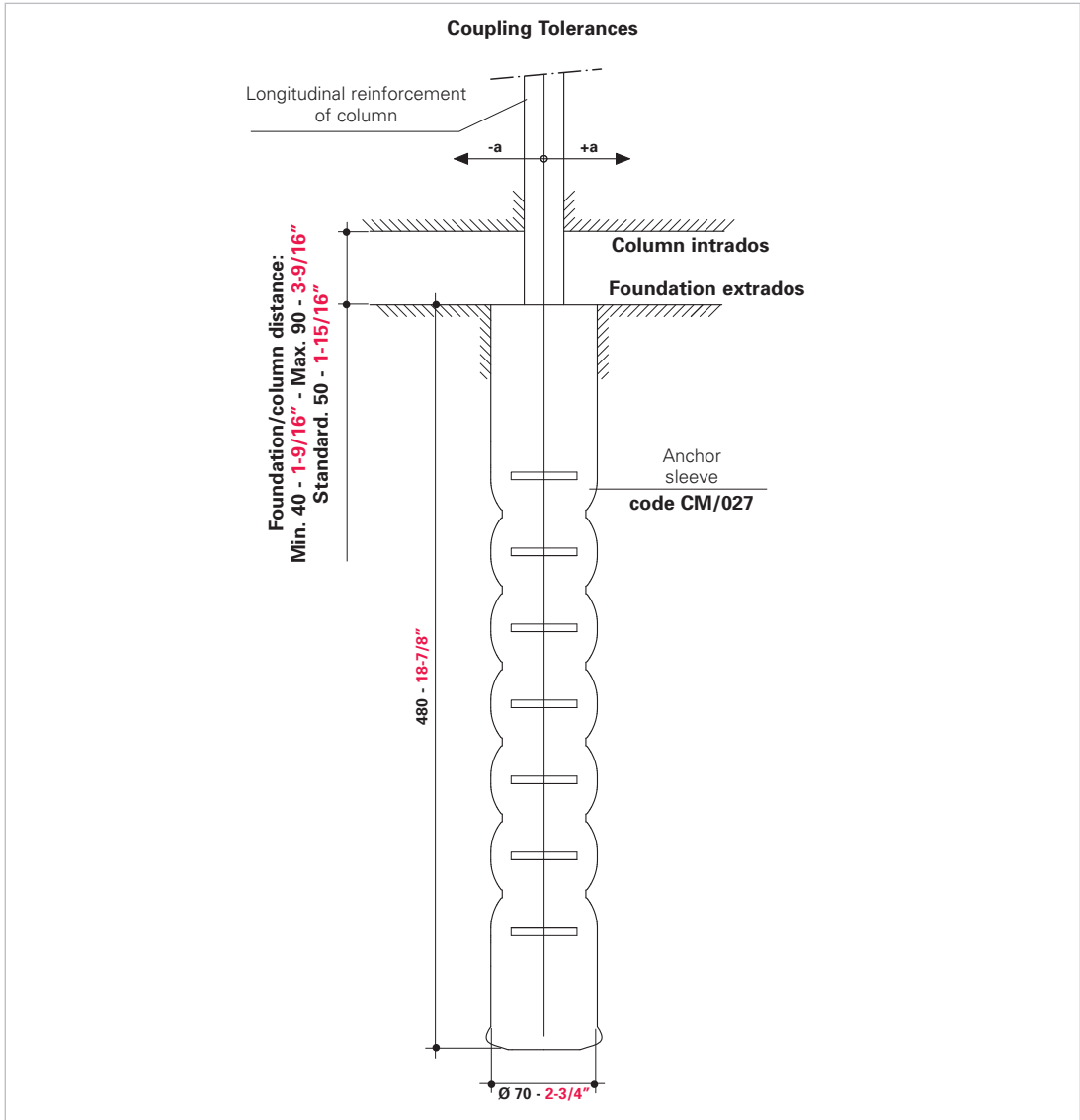


Unbounded view of the Standar Continuity Connection System between column and wall



N.B: in every column there are 4 adjustment feet for "plumb verticality". The other elements, without feet, have to be installed in the foundation. A column template for the correct positioning of the connection systems will be provided to precaster and the in situ constructor.

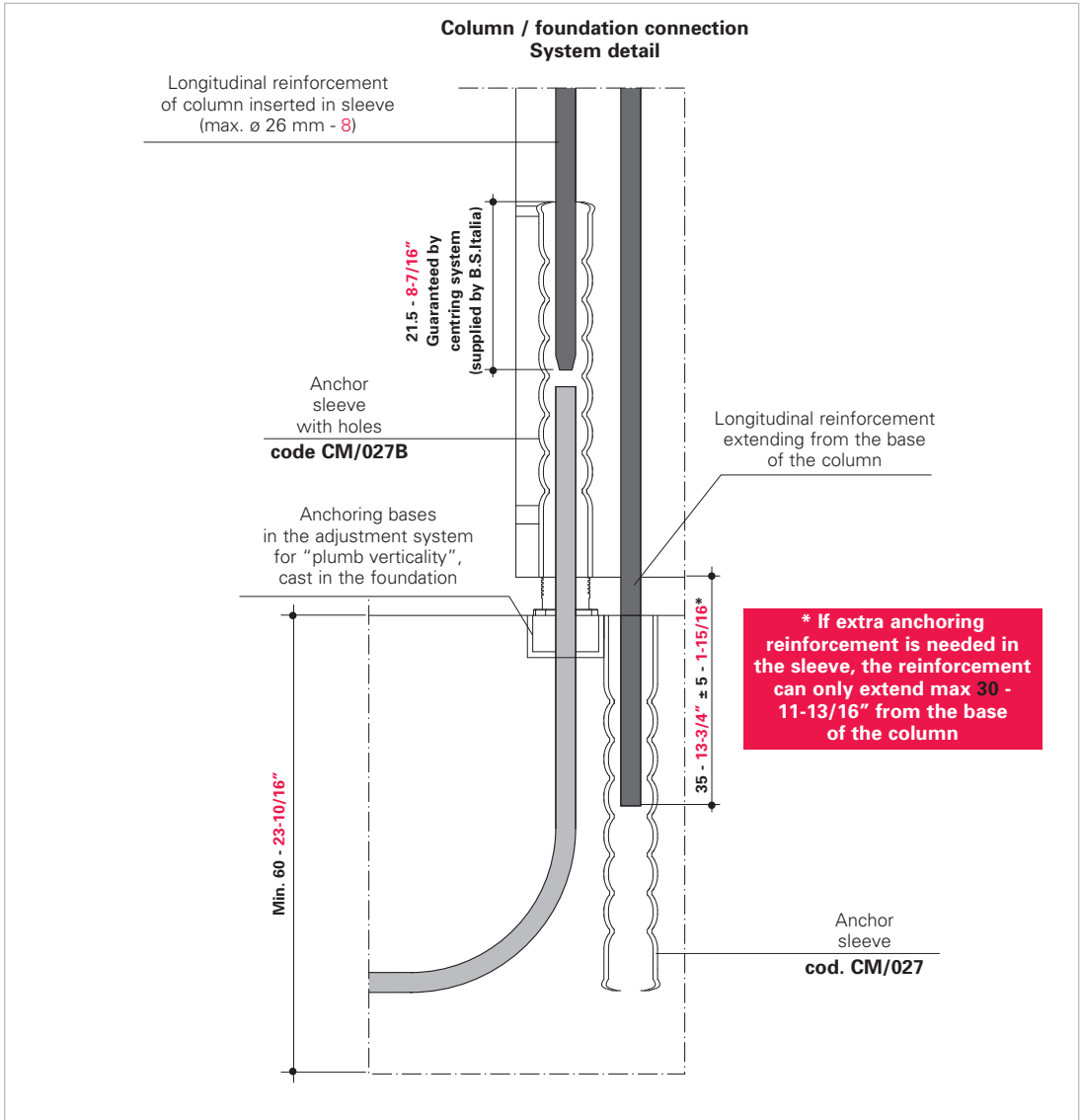
Coupling Tolerances	
Column reinforcement-foundation sleeve	
Horizontal (a)	± 5 - 3/16"
Vertical	Standard 50 - 1-15/16"
	Minimo 40 - 1-9/16"
	Massimo 90 - 3-9/16"



Coupling Tolerances

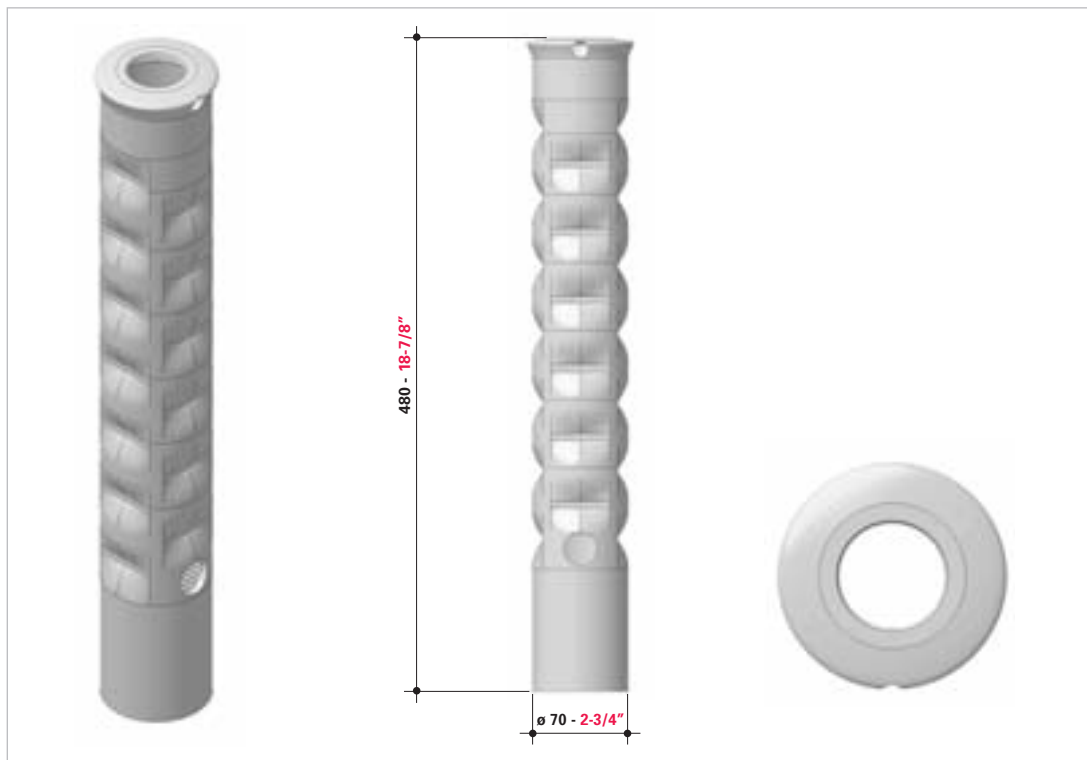
Column reinforcement/foundation sleeve

Horizontal (a)	± 16 - 5/8" with Ø 12 - 4 reinforcement (min) ± 10 - 3/8" with Ø 26 - 8 reinforcement (max)
Vertical	Standard 50 - 1-15/16" Minimum 40 - 1-9/16" Maximum 90 - 3-9/16"



The mechanical strength of the connection is higher than that of the reinforcement used to obtain continuity (max: $\varnothing 26 - 8$ in B450C) equal to 207 kN (U.L.S.Min.Decree 14/01/2008): guaranteed 151% extra strength compared to the conventional yielding value of the reinforcement. During the transitory stages of assembly and "plumb verticality" adjustment, the dry connection (sleeve, adjustment foot, ring-nut and anchoring base) guarantees useful load capacity of $F_{su} > 207$ kN.

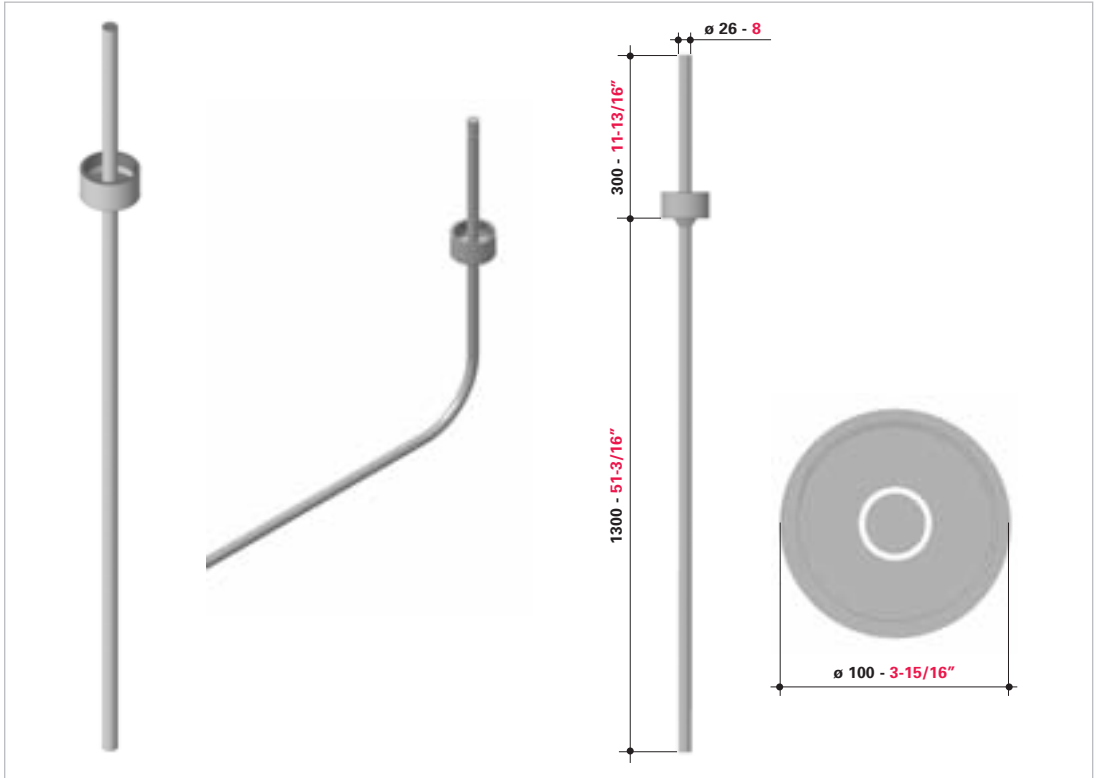
ANCHOR SLEEVE



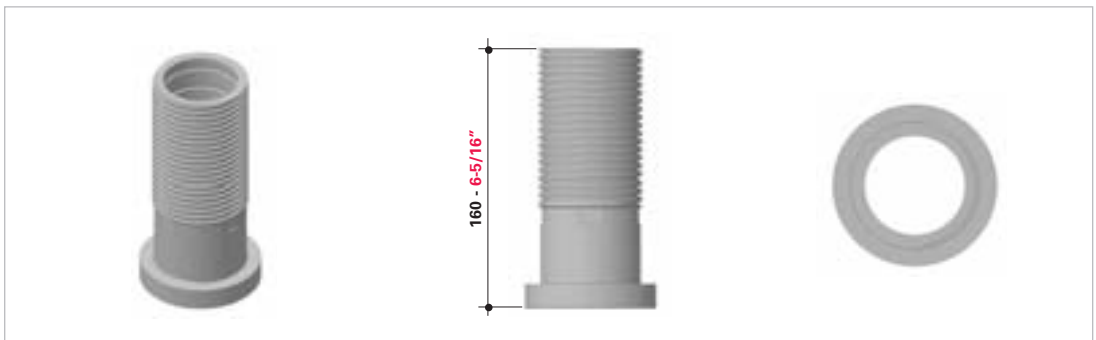
FIXING RING-NUT



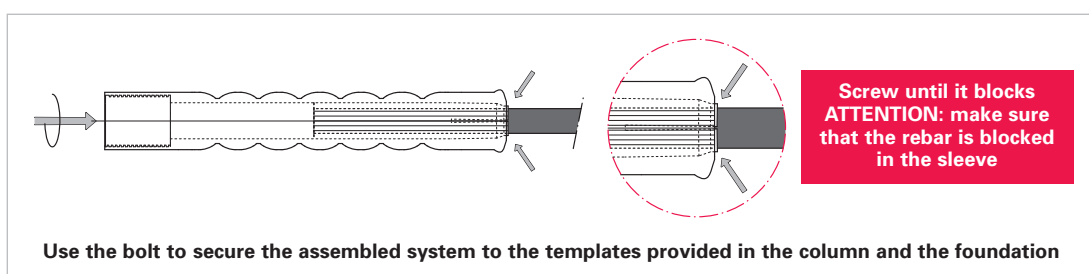
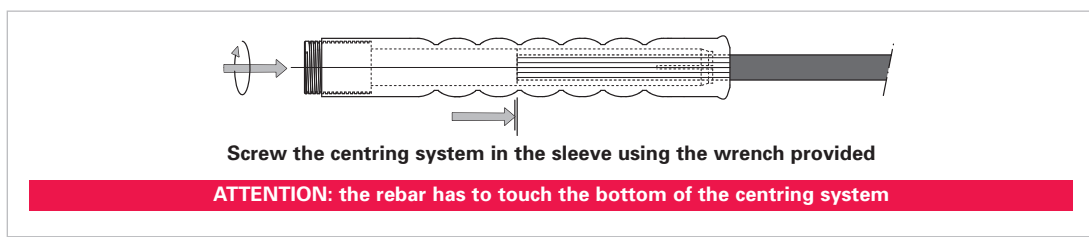
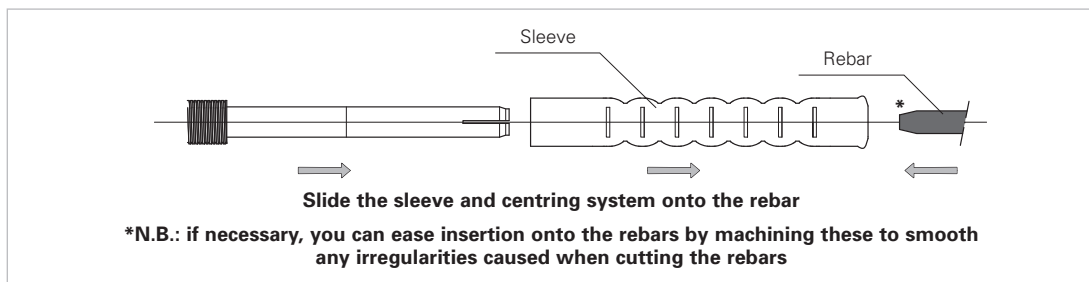
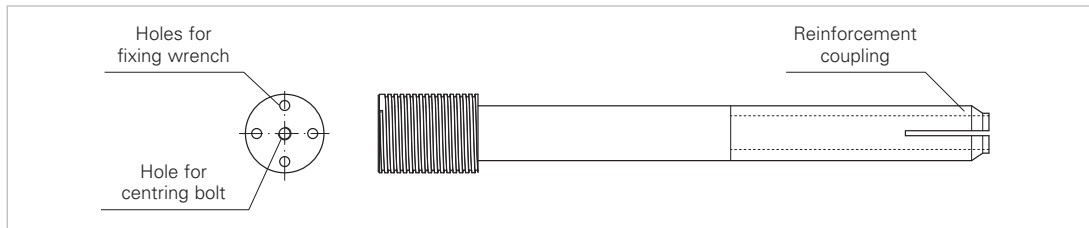
ANCHORING BASE



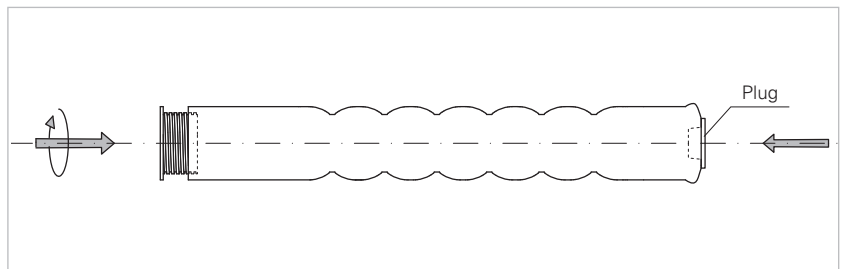
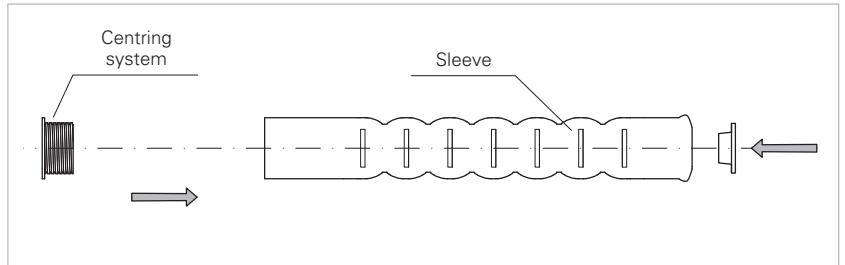
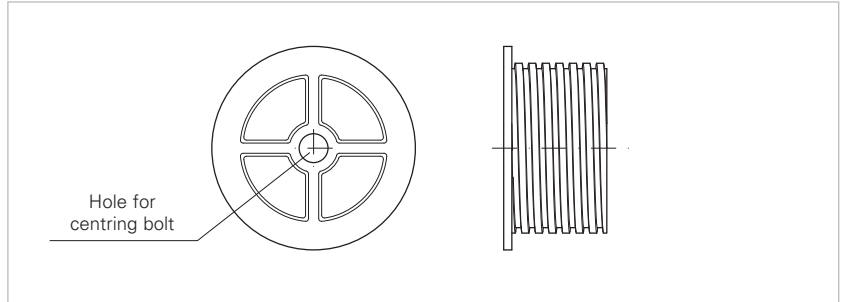
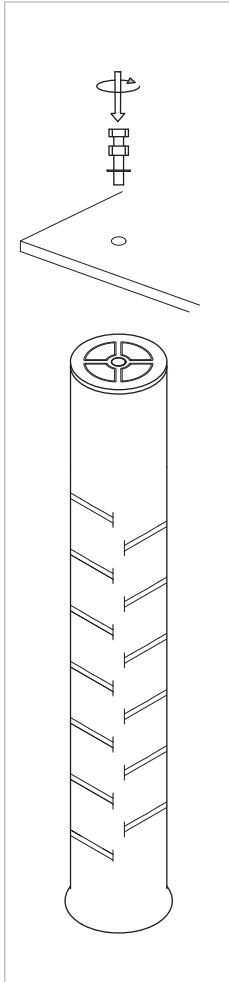
ADJUSTMENT FOOT



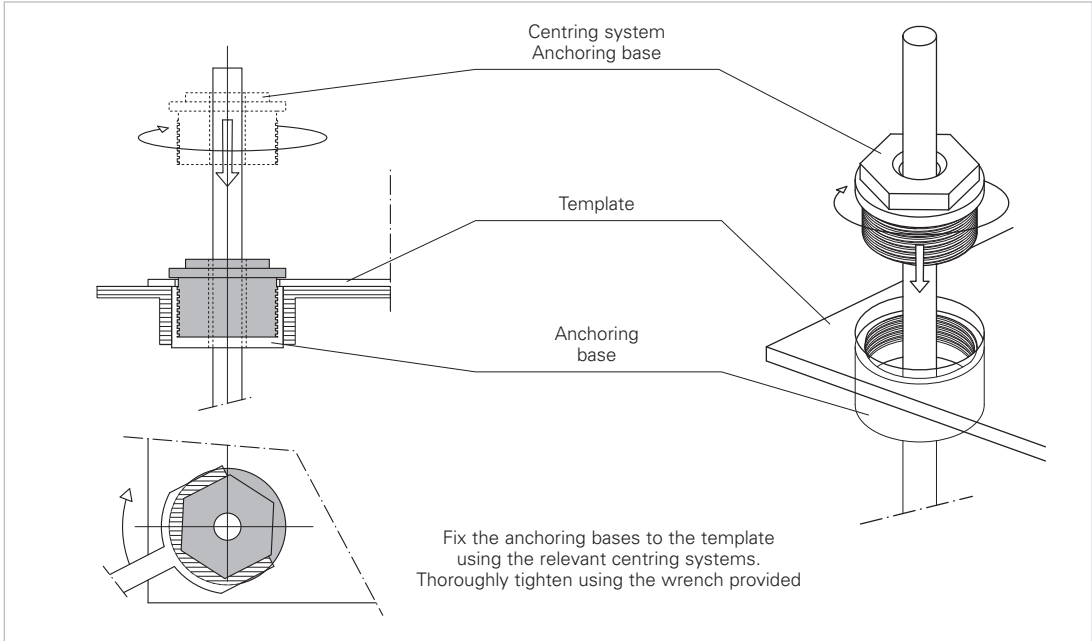
SLEEVE FIXING SET WITH ANCHORING REINFORCEMENT (suitable for both column and foundation)



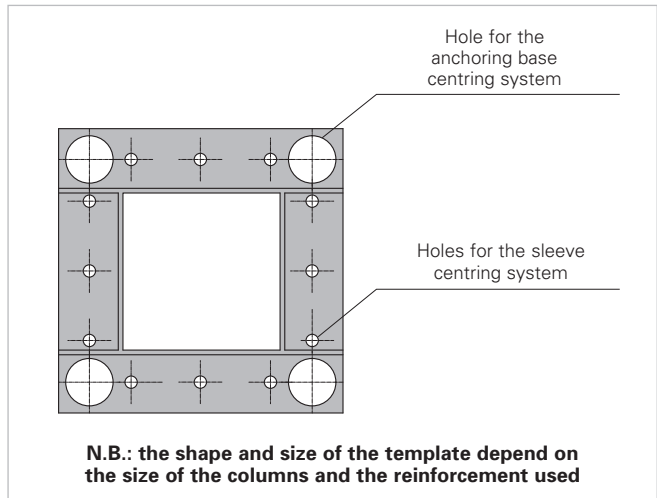
SLEEVE FIXING SET WITHOUT ANCHORING REINFORCEMENT (suitable for both column and foundation)



ANCHORING BASE FIXING SET (foundation)

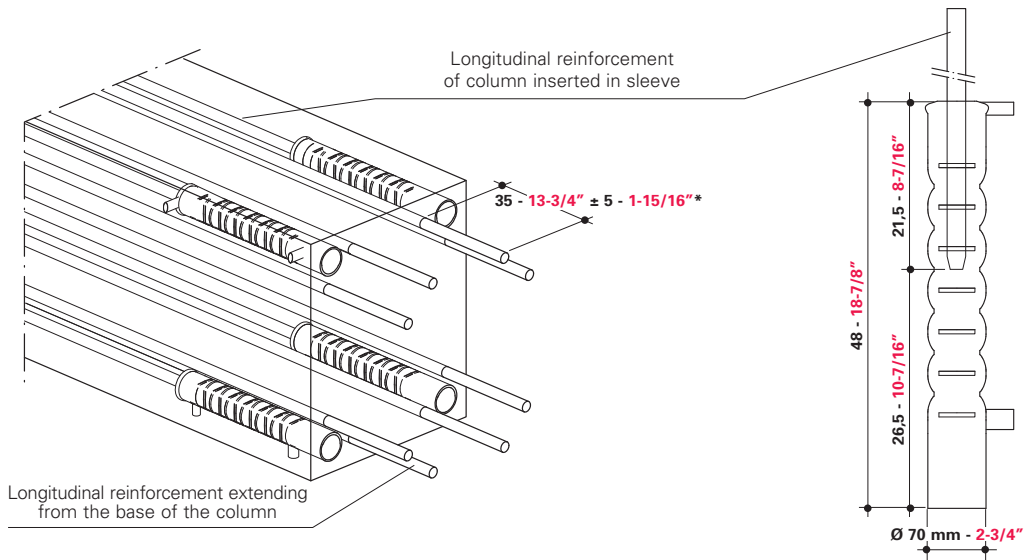


FOUNDATION TEMPLATE



PRECAST COLUMN

End of column after form stripping



*** If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 - 11-13/16" from the base of the column**

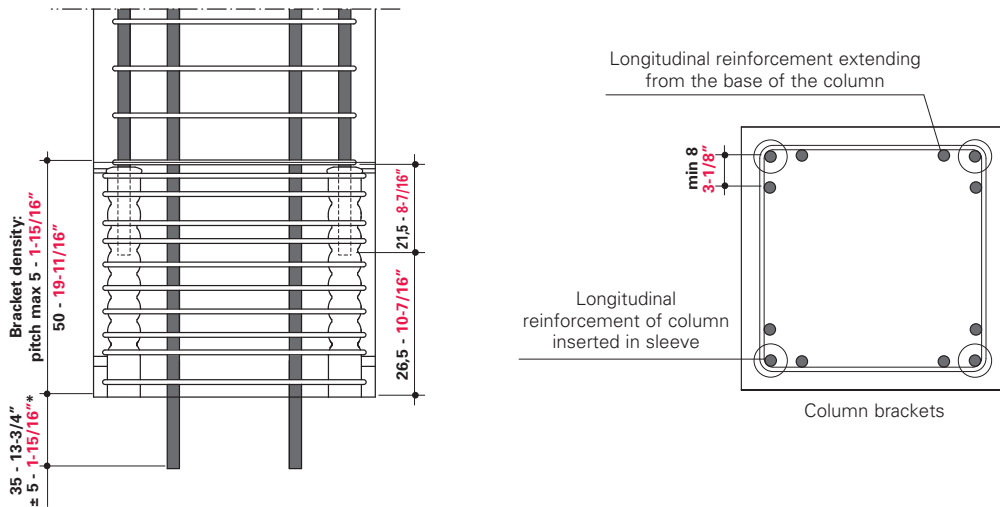
N.B.: we recommend preparing the column reinforcement cages using the B.S. Italia template and relative sleeves to guarantee these values and correct rebar positioning

Rck ≥ 40 MPa - CS ≥ 5700 psi



PRECAST COLUMN

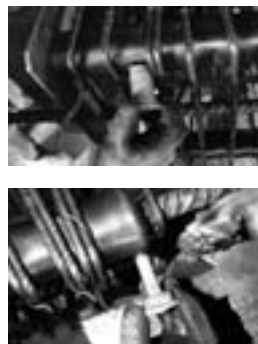
Brackets at bottom of column



* If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 - 11-13/16" from the base of the column

N.B.: l'interasse minimo tra le barre d'armatura dei manufatti deve essere 8 - 3-1/8".

ATTENTION: you must guarantee the min rebar density, even if you need to provide an aperture for a drainpipe



DETAILS OF COLUMN INSERTS

Longitudinal column reinforcement

Column form

Sleeve fixing system

Sleeve fixing bolt

35 - 13-3/4"
± 5 - 1-15/16"*

* If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16" from the base of the column

"Overflow" hole with plug

Hole with plug

Magnetic injection plugs

N.B.: the plugs must be inserted in the holes in the sleeve and must be fixed to the form using the magnet provided. The plugs can be extracted for re-use after stripping.

ATTENTION: before casting verify the holes are well sealed



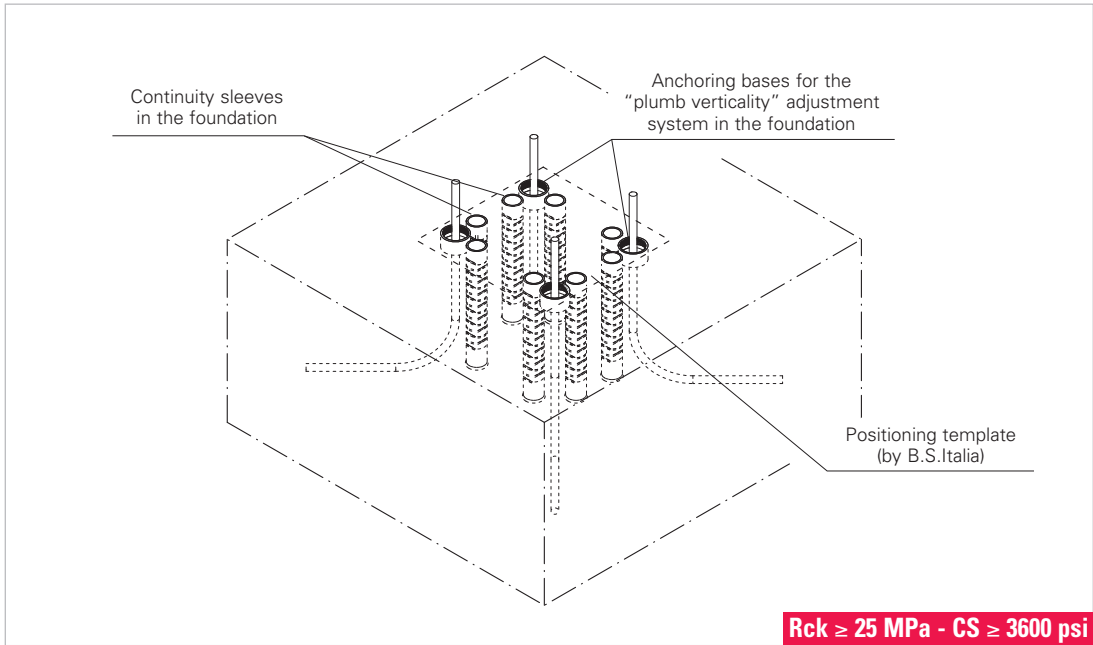
COLUMN TEMPLATE

Holes for fixing rebars extending from the column

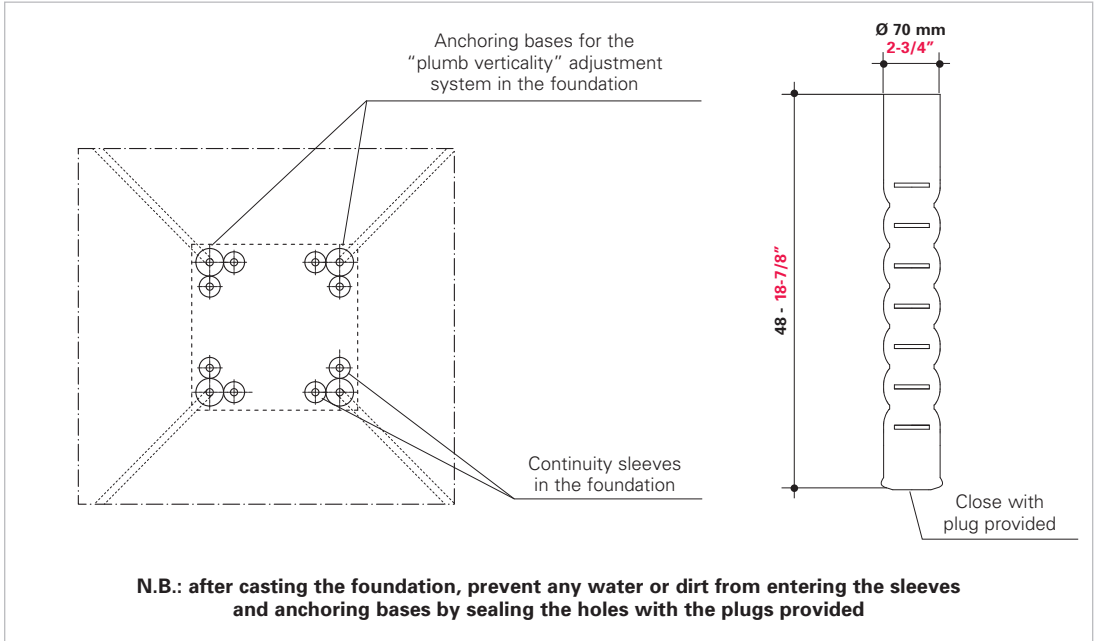
Holes for fixing the sleeve centering systems

N.B.: the column template size and shape vary to suit the size of the columns and their rebars.

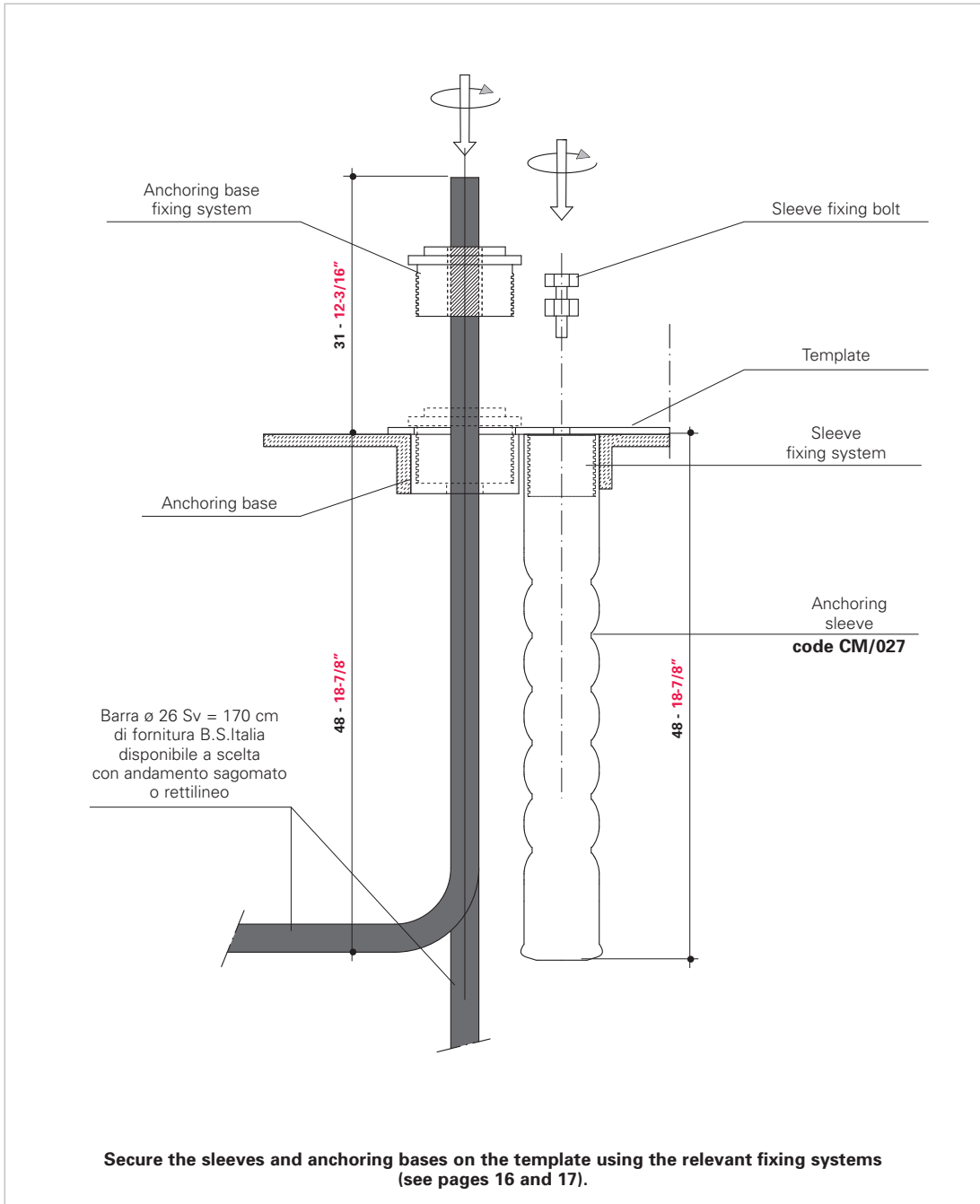
CAST-IN-PLACE FOUNDATION



FOUNDATION LAYOUT

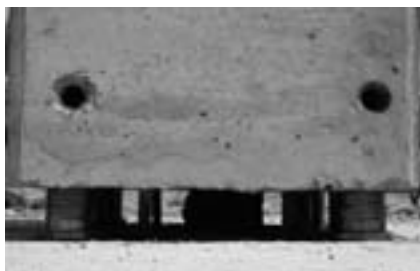
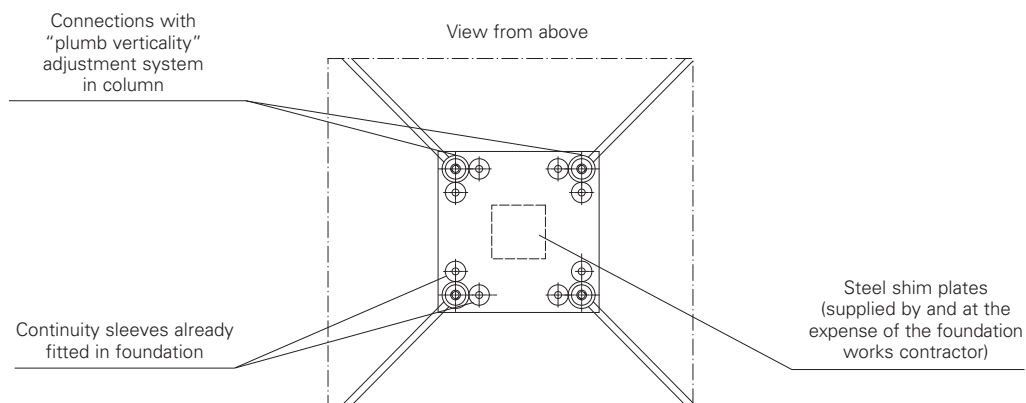
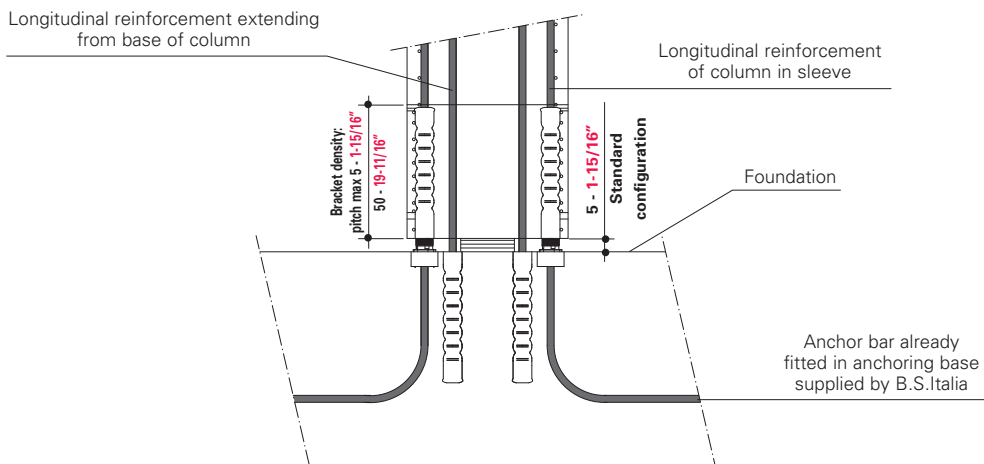


DETAILS OF CAST-IN-PLACE FOUNDATION



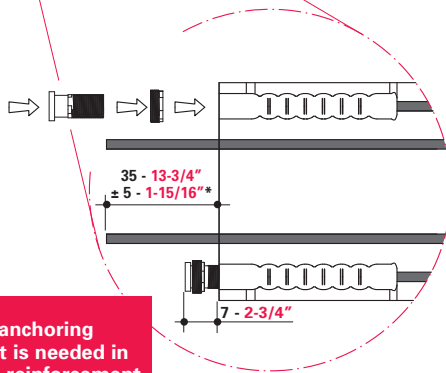
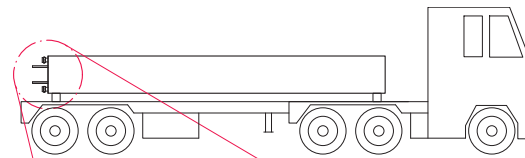
COLUMN/FOUNDATION CONNECTION

General column/foundation coupling diagram

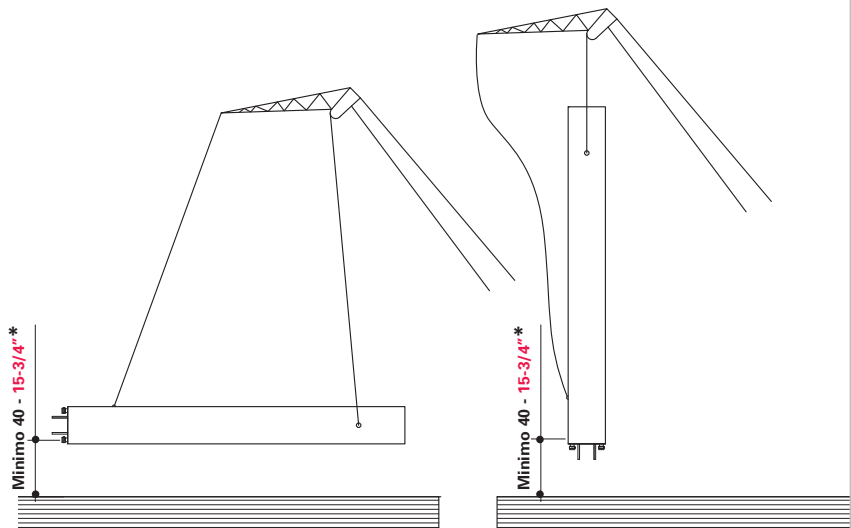


COLUMN/FOUNDATION CONNECTION

Column vertical adjustment sequence



*** If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16" from the base of the column**



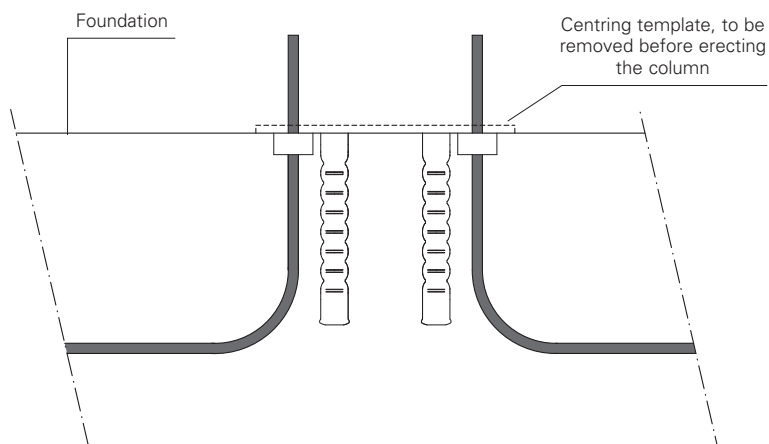
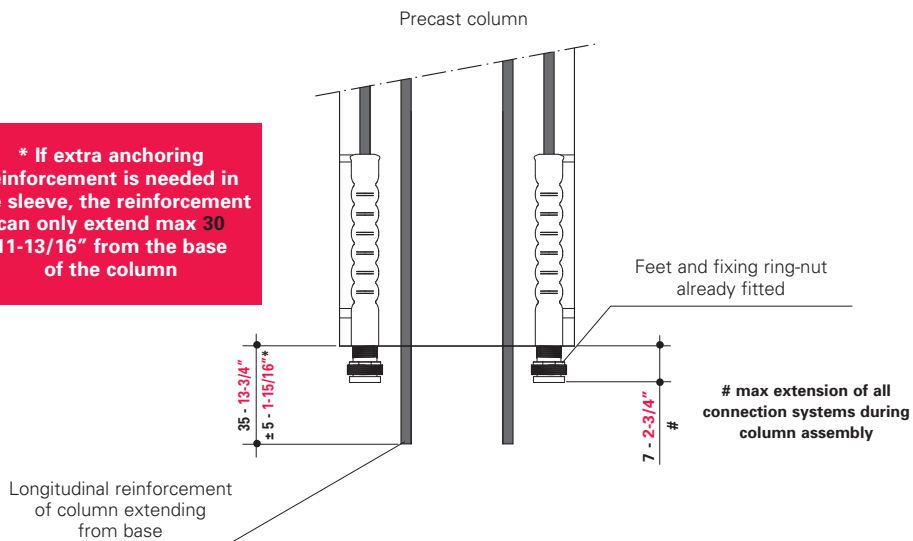
* min height to be guaranteed when tipping column on end

N.B.: when handling the column be careful not to hit the inserts

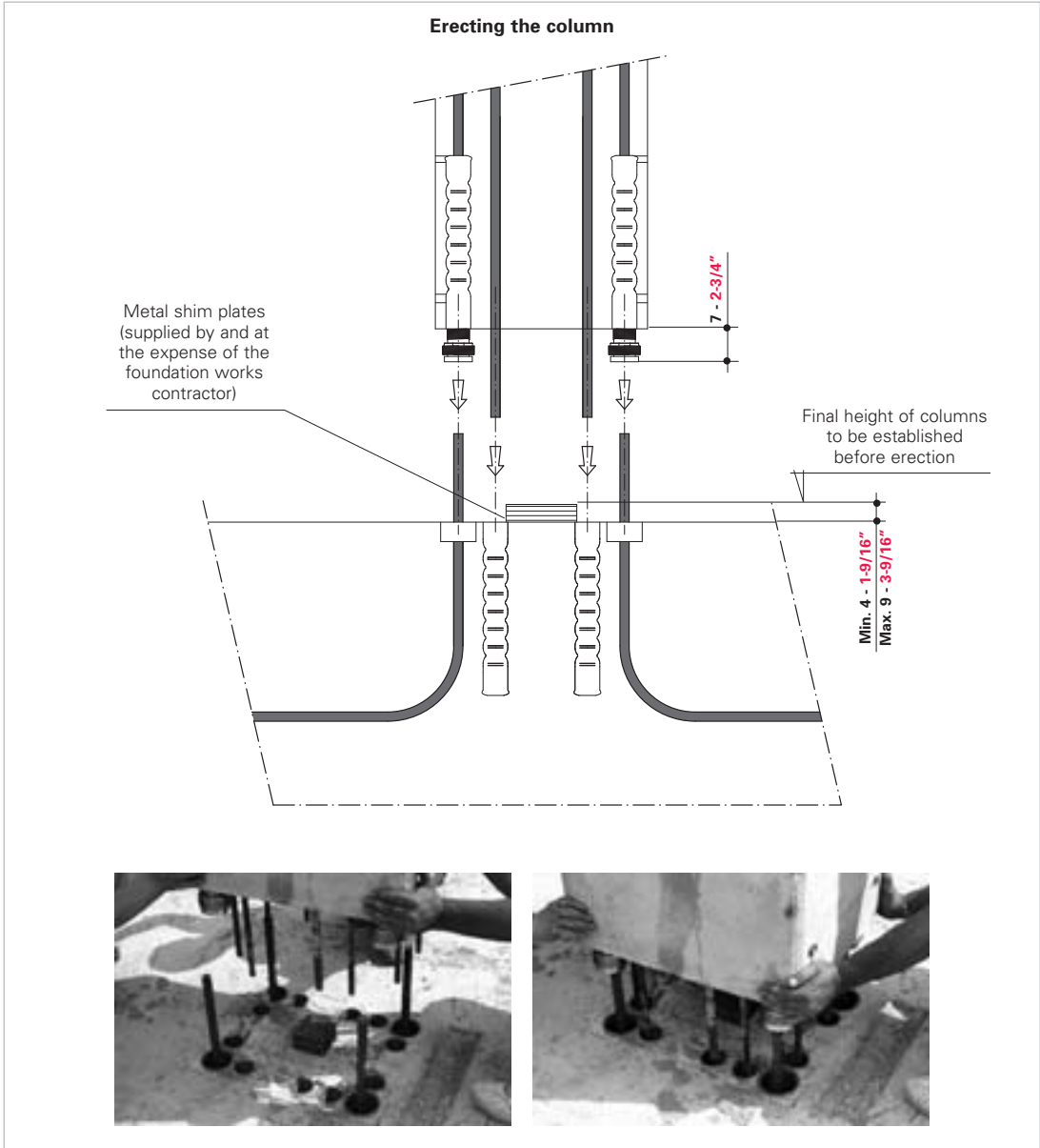
COLUMN/FOUNDATION CONNECTION

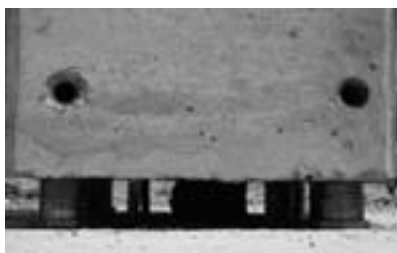
Column assembly sequence

*** If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16" from the base of the column**

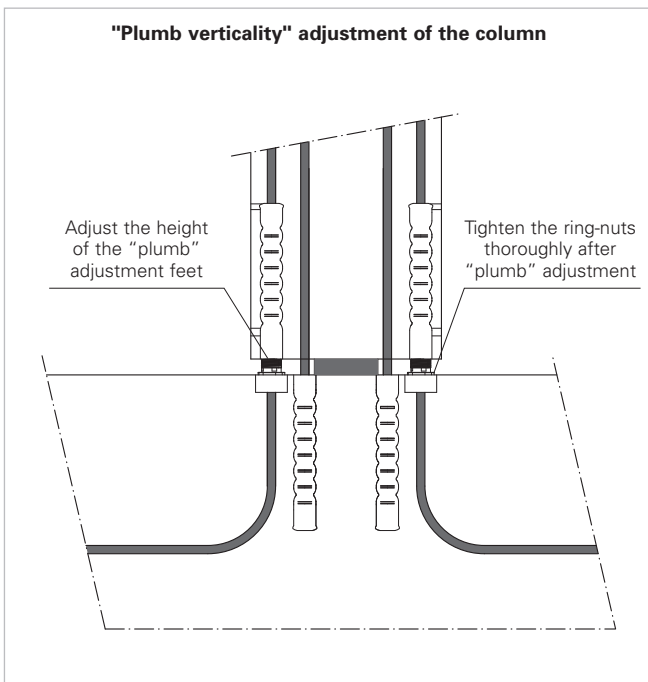


COLUMN/FOUNDATION CONNECTION





COLUMN/FOUNDATION CONNECTION



STEPS:

1. Lower the column until it sits on the metal shim plates.
2. Unscrew the feet until they touch the bottom of the anchoring bases in the foundation.
3. Part-tighten the ring-nuts.
4. Adjust the verticality of the column using all the foot screws at the same time to ensure that the column always rests on the metal shim plates.
5. Secure the feet by thoroughly tightening the fixing ring-nuts.

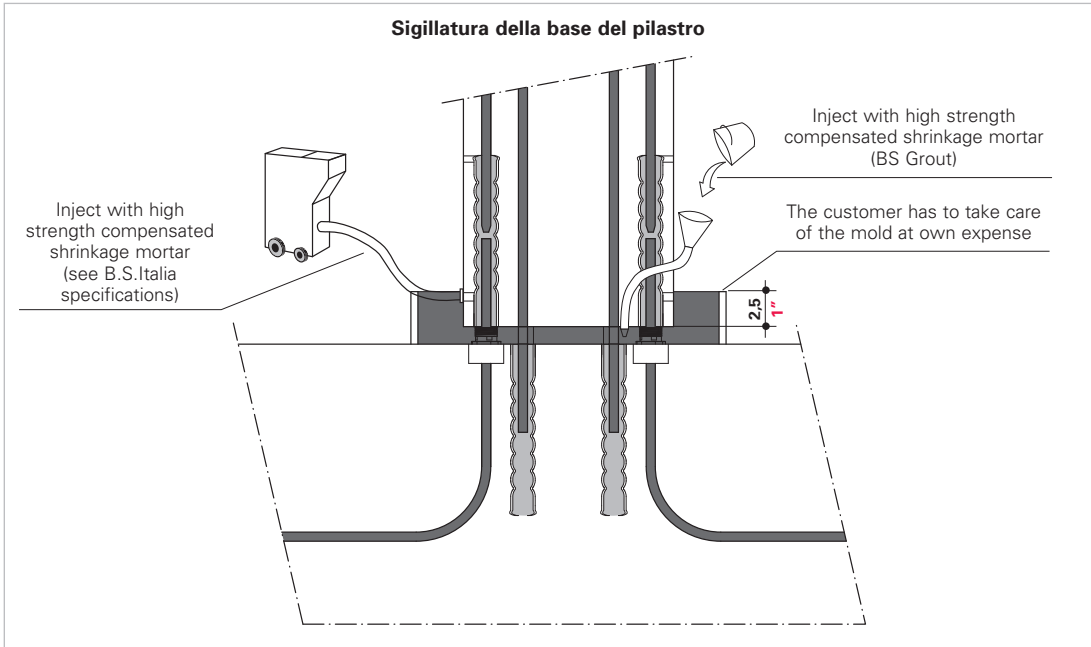
ATTENTION: during all the previous steps the column has to remain hooked to the crane and rested on the metal shim plates. Before releasing the column, make sure the adjustment feet are resting on the anchoring bases and that the fixing ring nuts are tightly screwed.

See page 64 for technical specifications of the mortar

PREPARING THE FOUNDATION

- Clean the concrete and rebars of any dust, rust, traces of old cement, grease, oil, paint or varnish
- Saturate with water

COLUMN/FOUNDATION CONNECTION



APPLYING BS Grout

- Fill the sleeves in the foundation by pouring the fluid mix directly into these.
- Pour the casting mix from one side only into the forms with continuous flow, making sure that any air is allowed to escape. The material used for the forms must not subtract water from the casting mix: we therefore recommend treating the form with a stripping agent.
- Fill the sleeves in the column using a hydraulic pump.
- Place the mouth of the hose against the bottom hole of the continuity sleeve and start pumping.
- Seal both holes in the sleeve with the plugs provided when the mortar starts escaping from the top hole.

ATTENTION: the minimum recommended resistance of mortar before erecting the structure is 28Mpa (guaranteed after 24 hours at 20°C - 68°F)

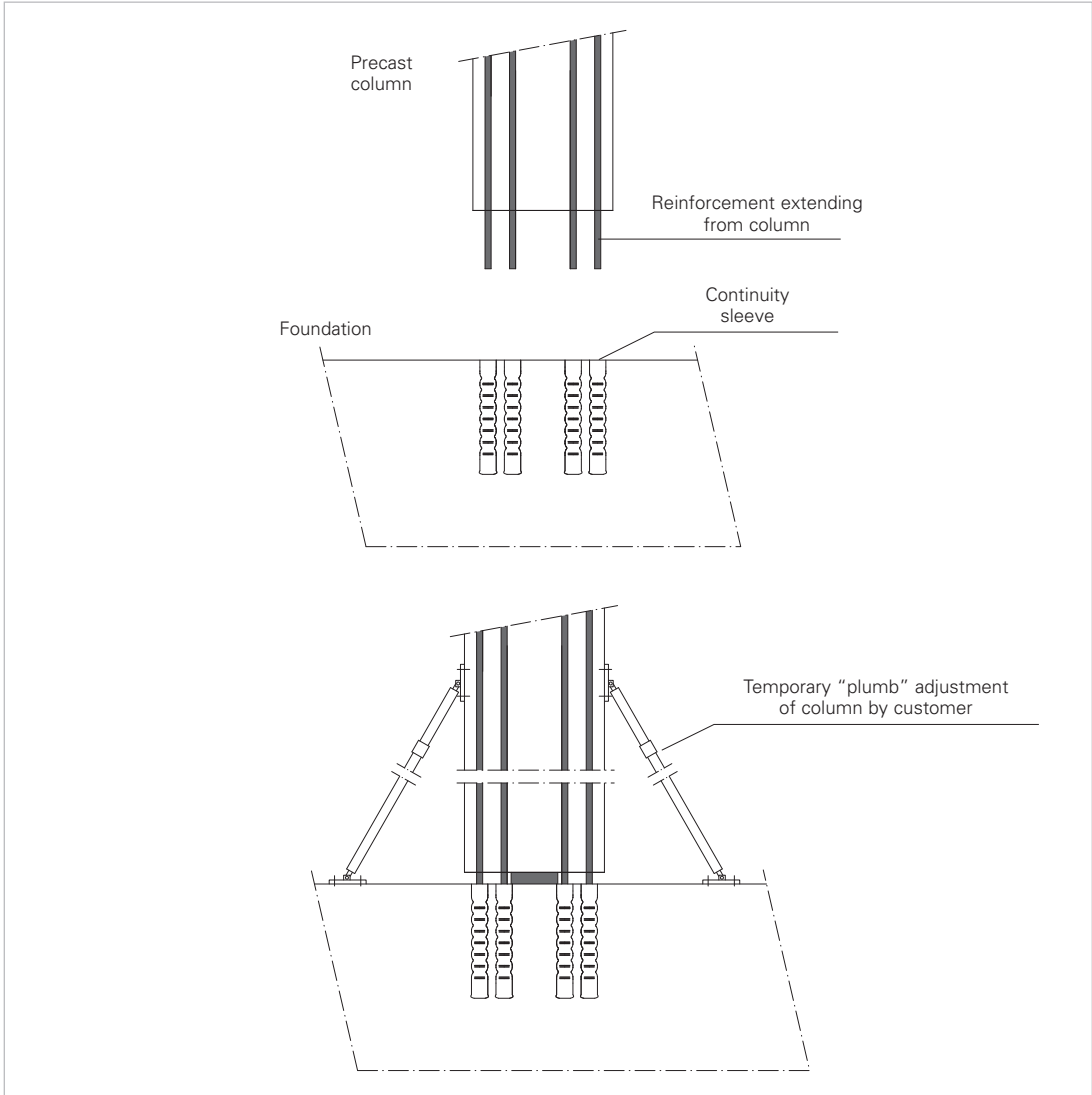
N.B.: no mechanical vibration required

ASSEMBLY INSTRUCTIONS



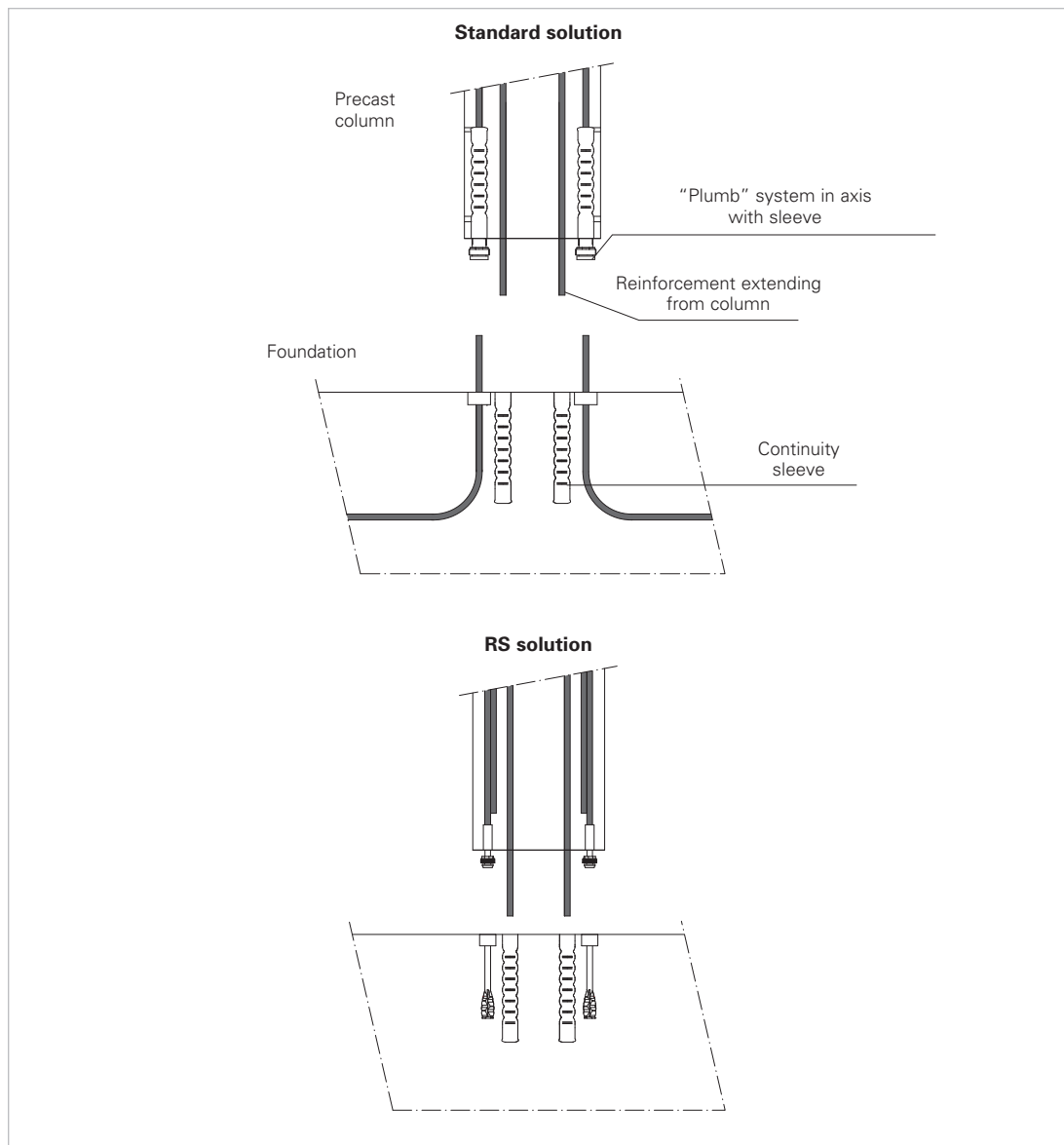
“DRY” PLUMB VERTICALITY SYSTEM

CONNECTION SYSTEM - SHORING



The B.S. Italia CONTINUITY CONNECTION system can be combined with a more conventional “plumb” and support system for the columns using temporary props. These should only be removed once the grout in the sleeves has set.

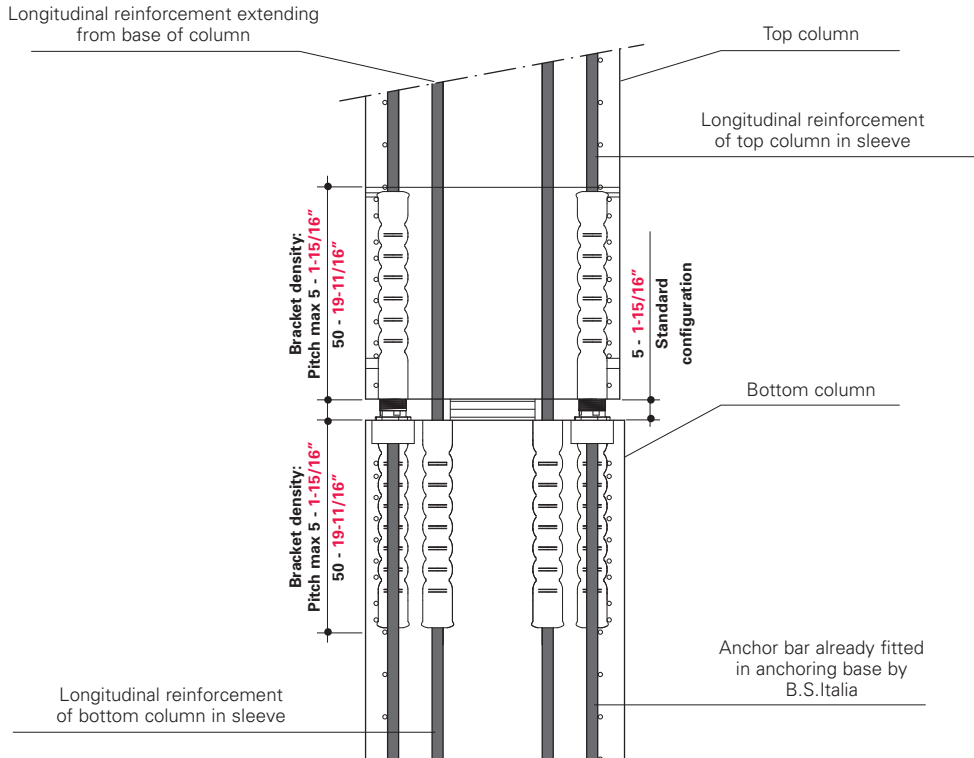
INNOVATIVE B.S. ITALIA SYSTEM “PLUMB” DEVICES COMBINED WITH CONTINUITY CONNECTION SYSTEM



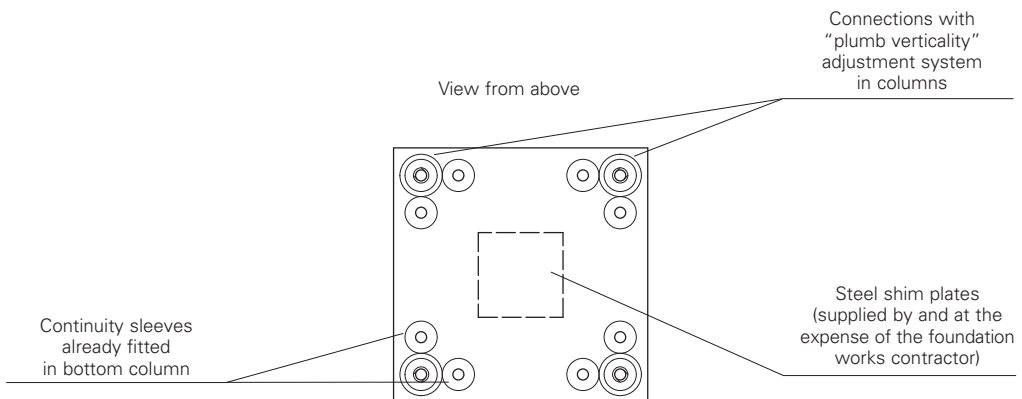
The CONTINUITY CONNECTION system may use 4 adjustment feet (code CM/033) to be screwed to the sleeves in the column. Use these to guarantee the verticality and stability of the column **without** needing to use temporary works (shoring).

COLUMN/COLUMN CONNECTION

General column / column coupling diagram

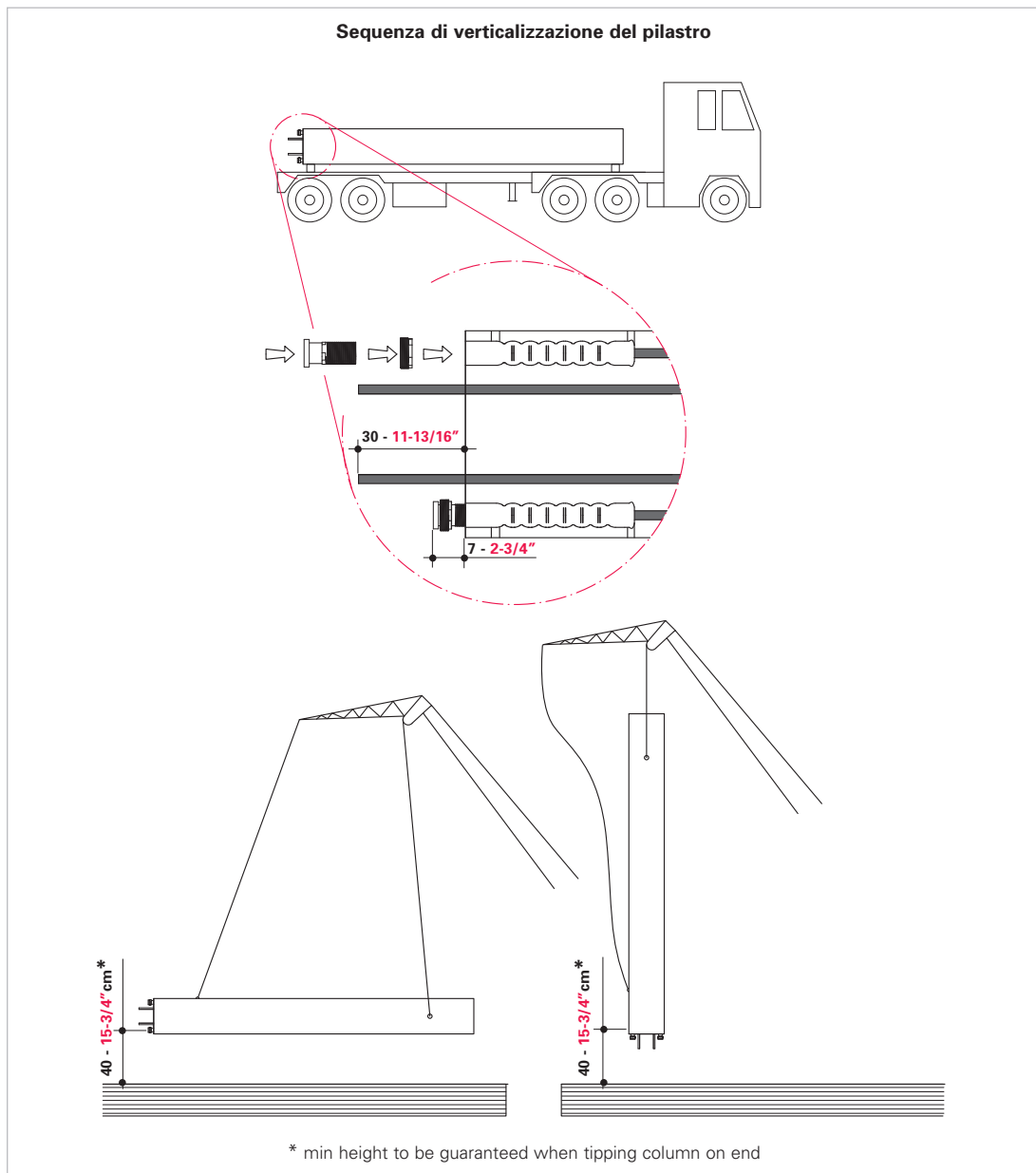


View from above



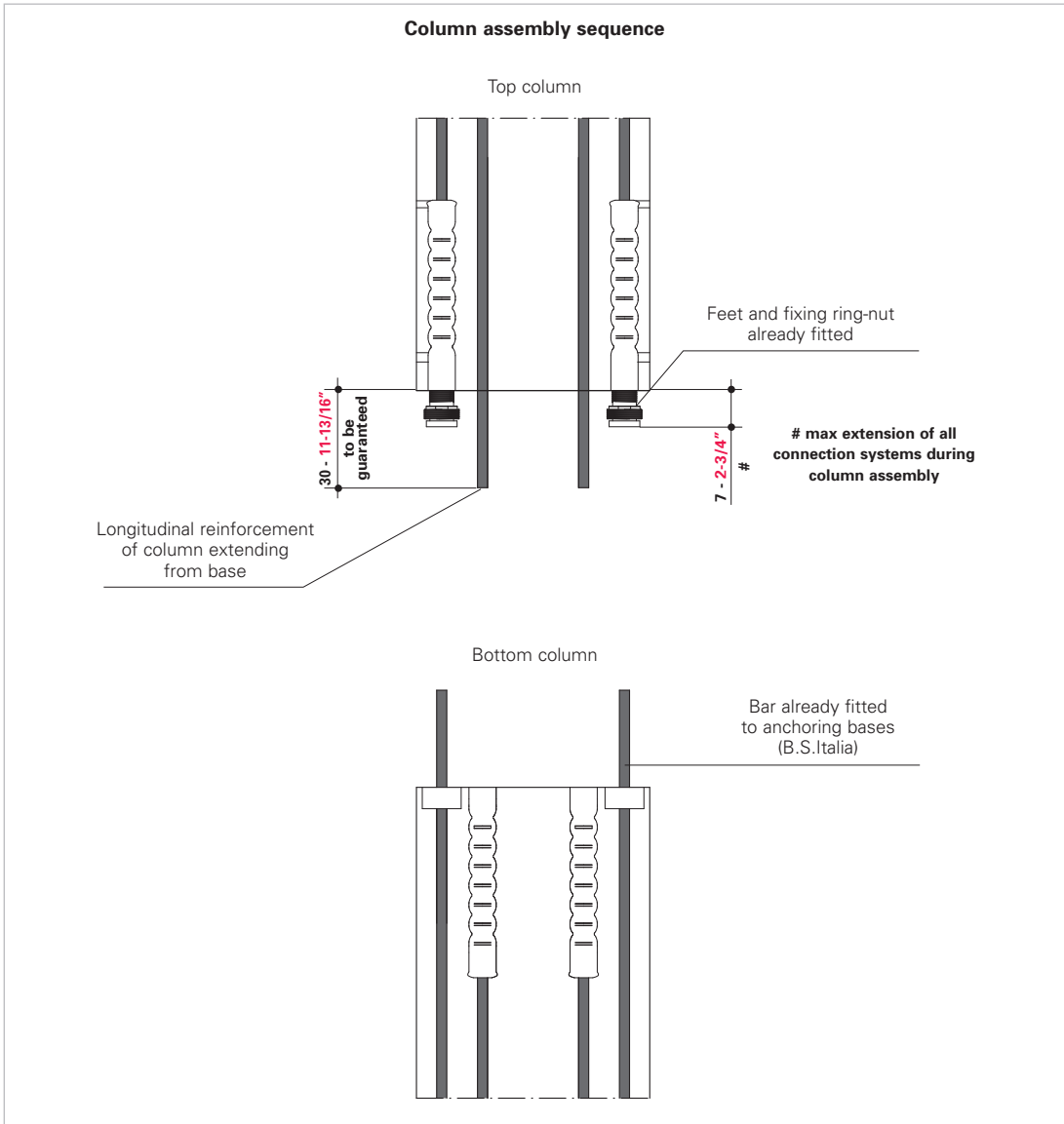
COLUMN/COLUMN CONNECTION

Sequenza di verticalizzazione del pilastro



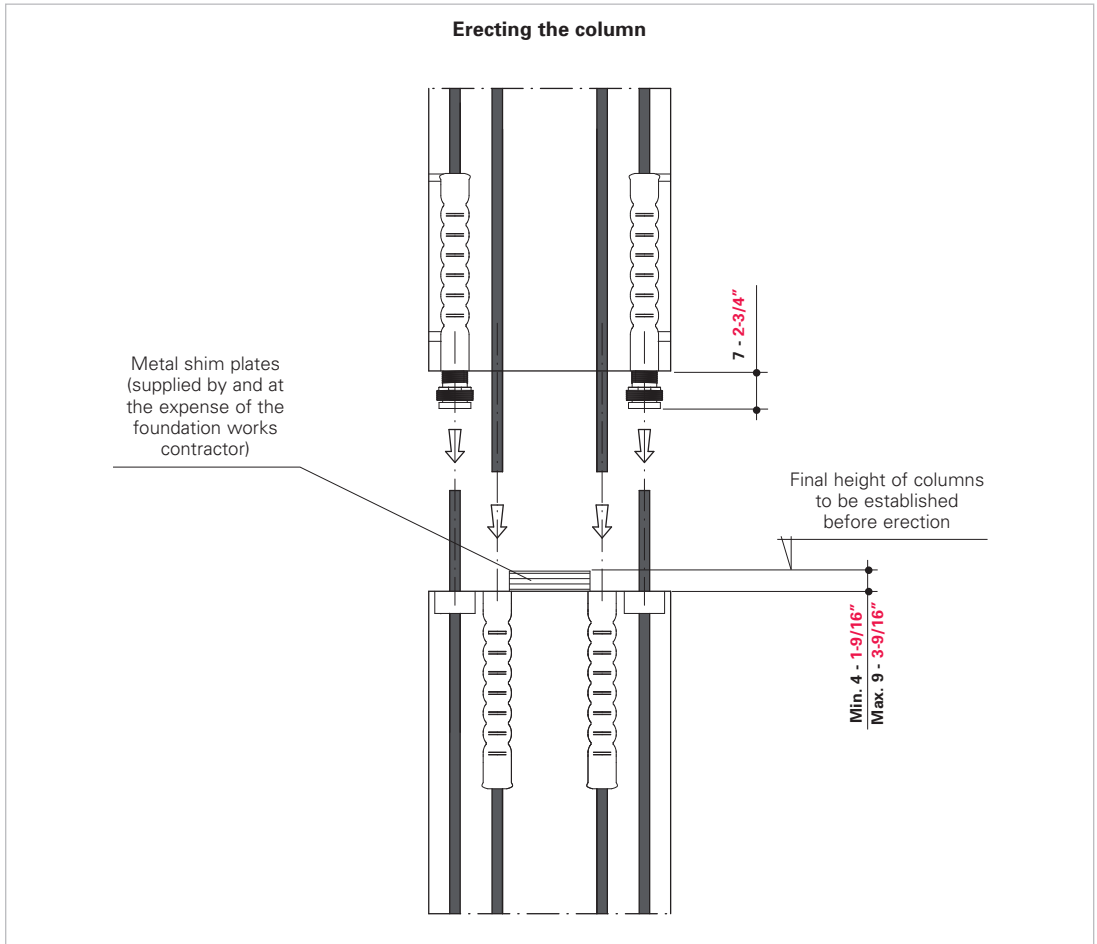
**N.B.: when handling the column be careful
not to hit the inserts in cm**

COLUMN/COLUMN CONNECTION



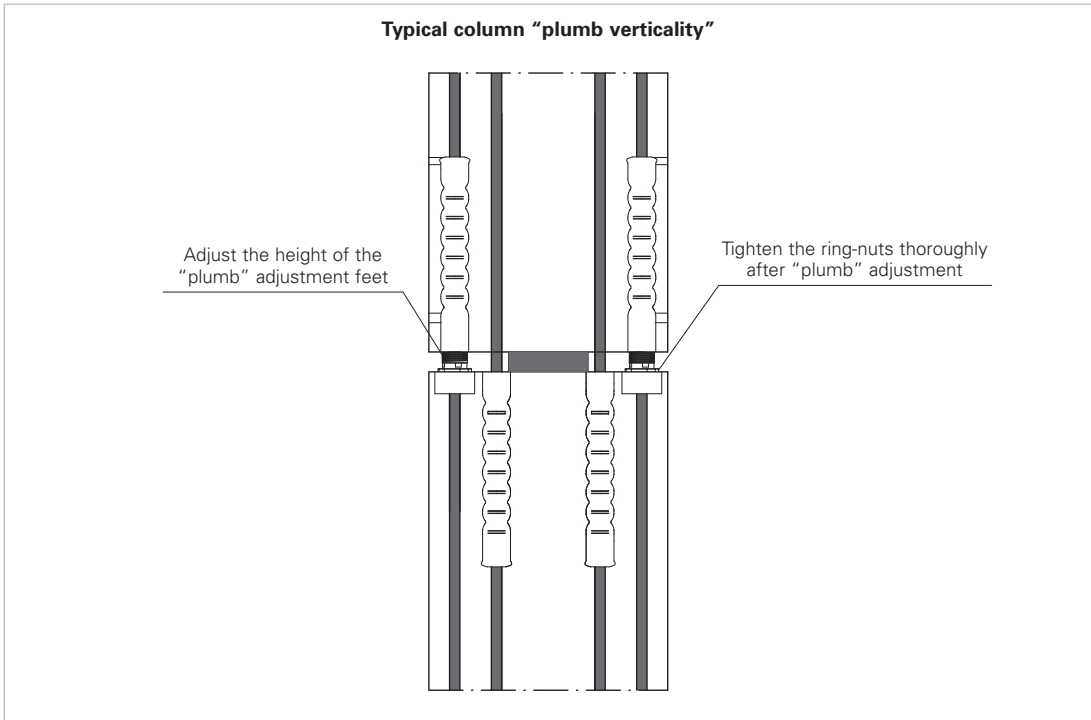
ATTENTION: before proceeding with the erection of the top column, make sure the static connection between the bottom column and the foundation is perfect.

COLUMN/COLUMN CONNECTION



**ATTENTION : the above column has to release its weight
on the metal shim plates**

COLUMN/COLUMN CONNECTION

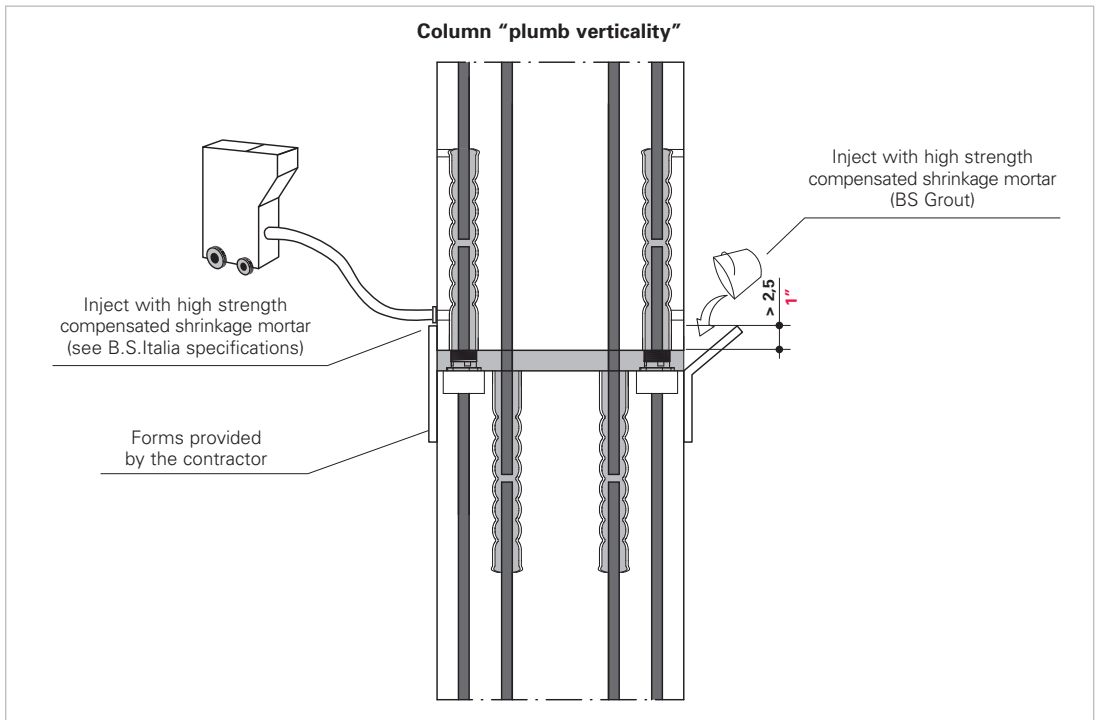


STEPS:

1. Lower the top column until it sits on the metal shim plates.
2. Unscrew the feet until they touch the bottom of the anchoring bases in the bottom column.
3. Part-tighten the ring-nuts.
4. Adjust the verticality of the column using all the foot screws at the same time to ensure that the column always rests on the metal shim plates.
5. Secure the feet by thoroughly tightening the fixing ring-nuts.

ATTENTION: during all the previous steps the column has to remain hooked to the crane and rested on the metal shim plates. Before releasing the column, make sure the adjustment feet are resting on the anchoring bases and that the fixing ring nuts are tightly screwed.

COLUMN/COLUMN CONNECTION



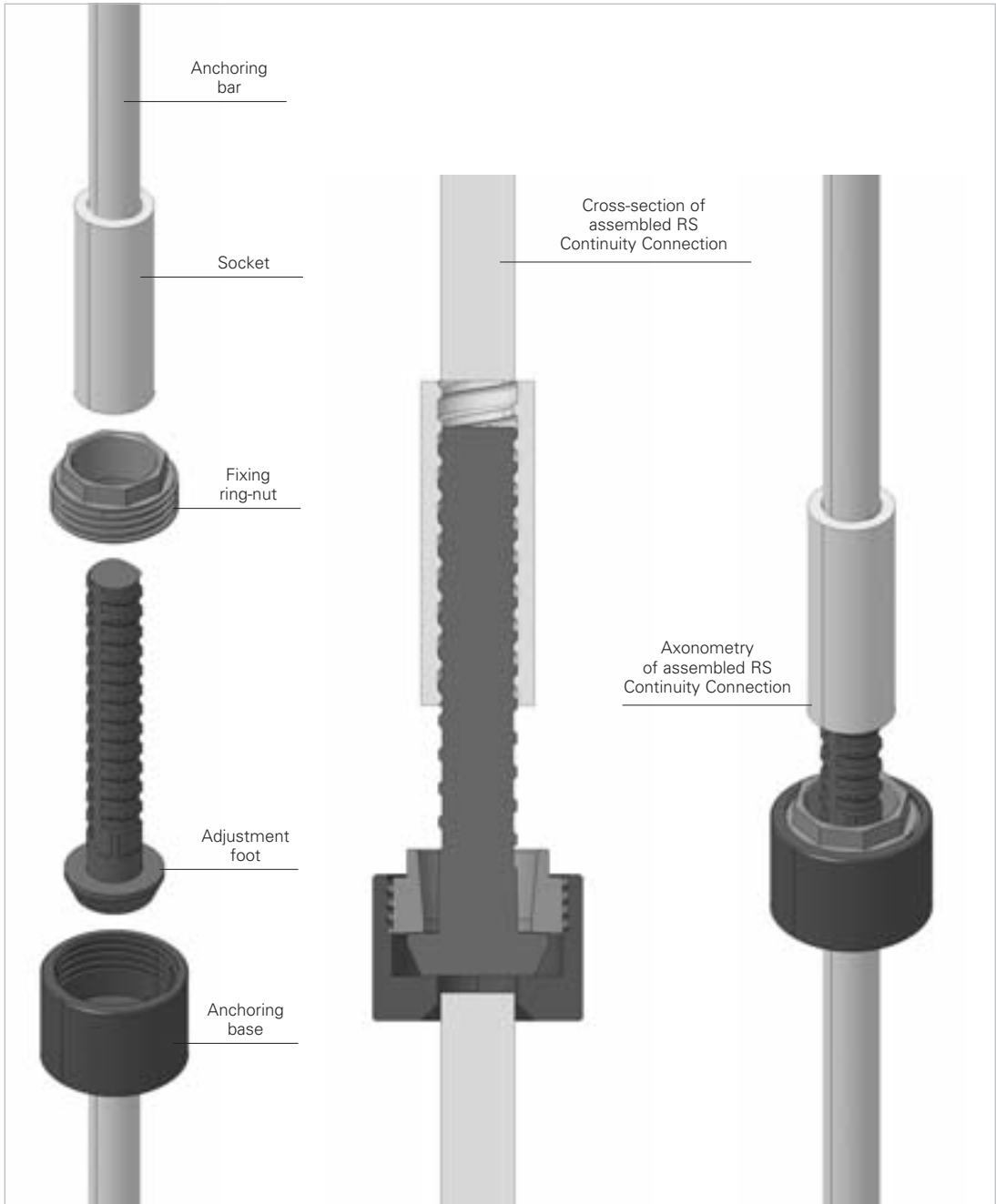
APPLYING BS Grout

- Fill the base of the column with high strength compensated shrinkage mortar (B.S.Italia specifications), making sure that the sleeves in the bottom column are filled completely.
- Pressure inject the sleeves in the column with high strength compensated shrinkage mortar (B.S.Italia specifications).

ATTENTION: the minimum recommended resistance of mortar before erecting the structure is 28Mpa (guaranteed after 24 hours at 20°C - 68°F)

N.B.: no mechanical vibration required

THE RS SYSTEM



Anchoring base



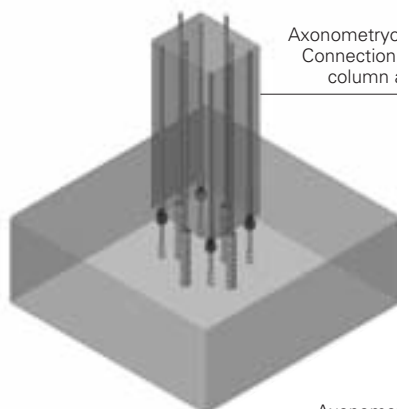
Socket



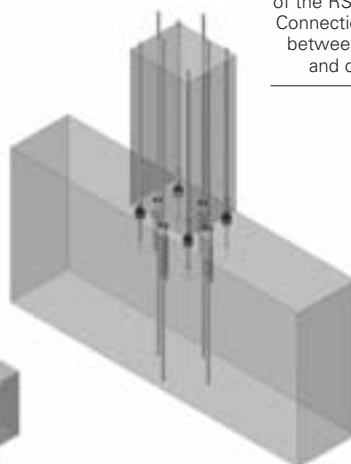
Fixing ring-nut



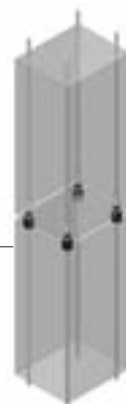
Adjustment foot



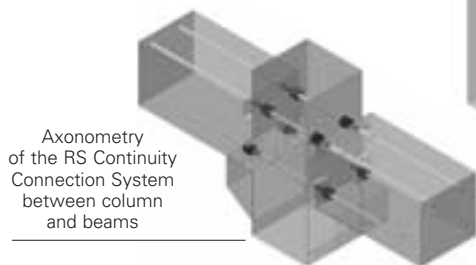
Axonometry of the RS Continuity Connection System between column and foundation



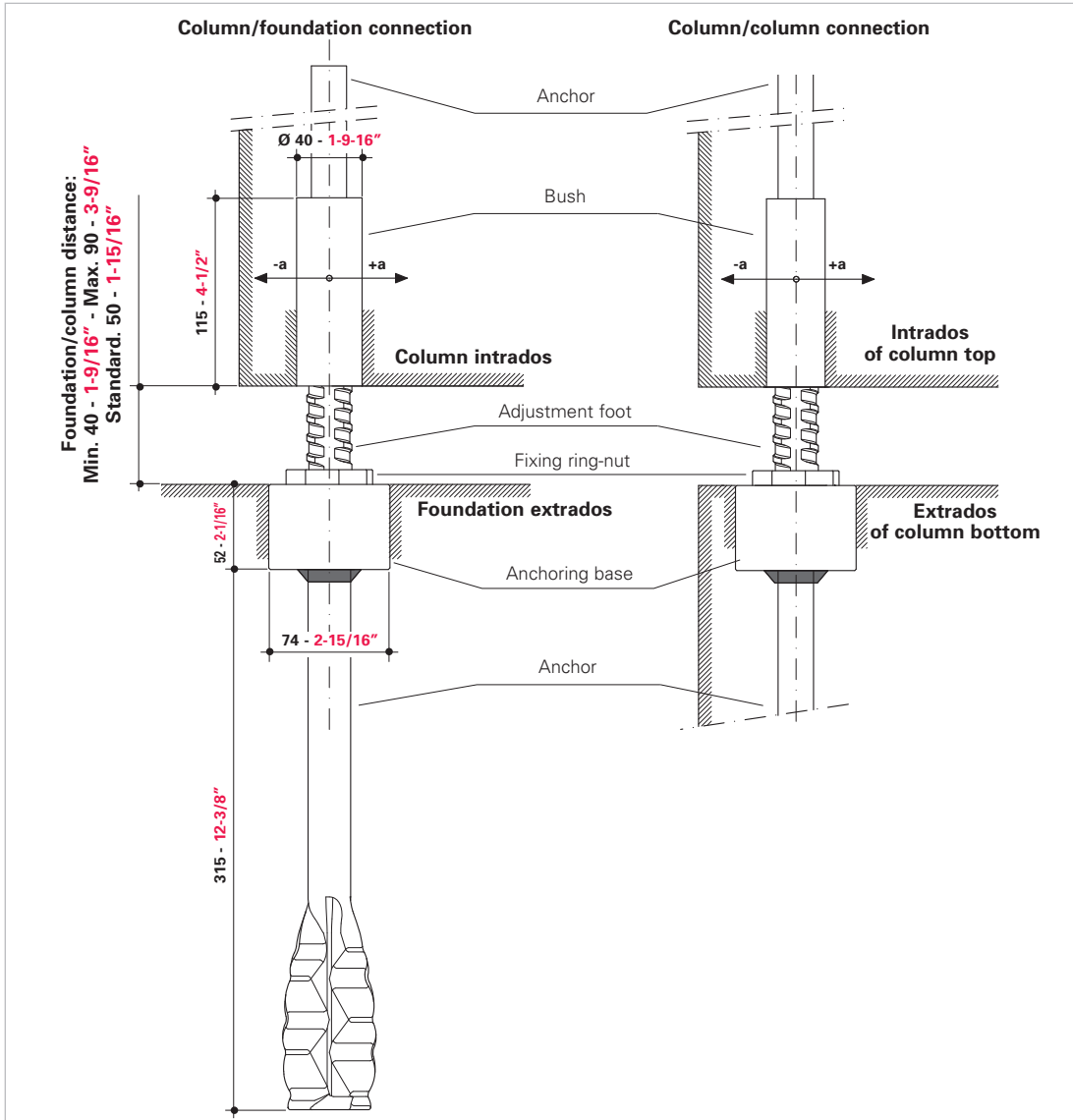
Axonometry of the RS Continuity Connection System between column and wall



Unbounded view of the RS Continuity Connection System between column and wall



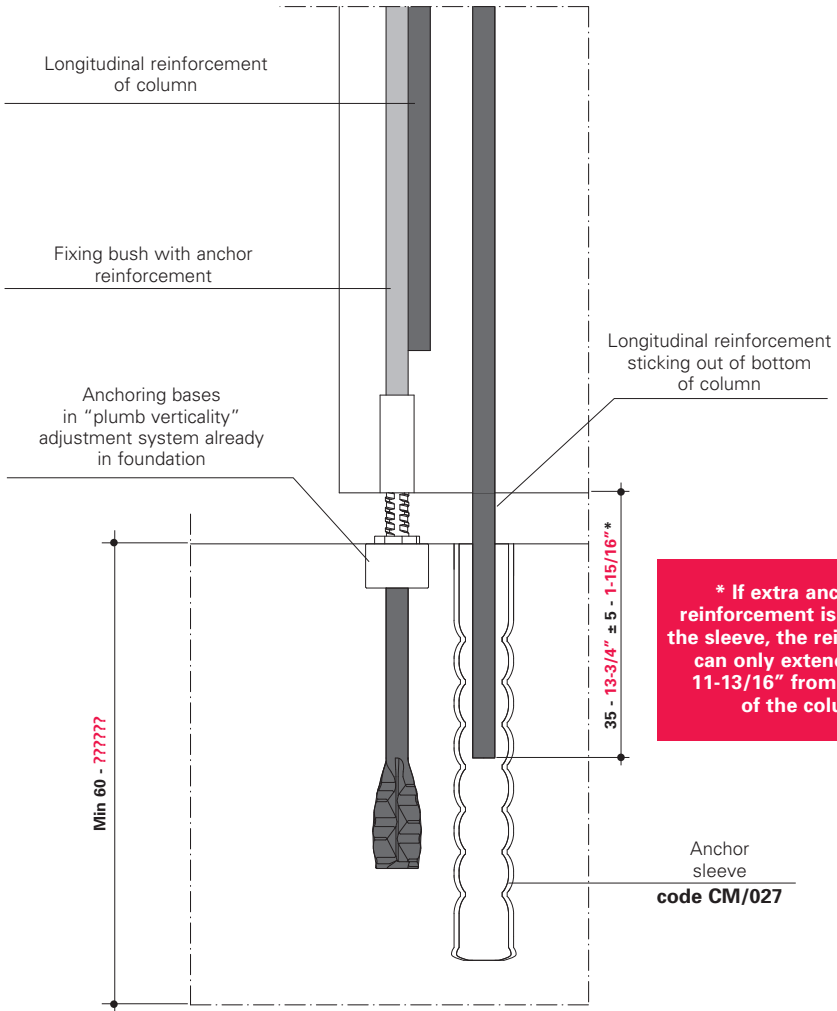
Axonometry of the RS Continuity Connection System between column and beams



N.B: in every column there are 4 adjustment feet for "plumb verticality". The other elements, without feet, have to be installed in the foundation. A column template for the correct positioning of the connection systems will be provided to precaster and the in situ constructor.

Coupling Tolerances	
Column reinforcement-foundation sleeve	
Horizontal (a)	± 5 - 3/16"
Vertical	Standard 50 - 1-15/16" Minimum 40 - 1-9/16" Maximum 90 - 3-9/16"

Column/foundation connection System details



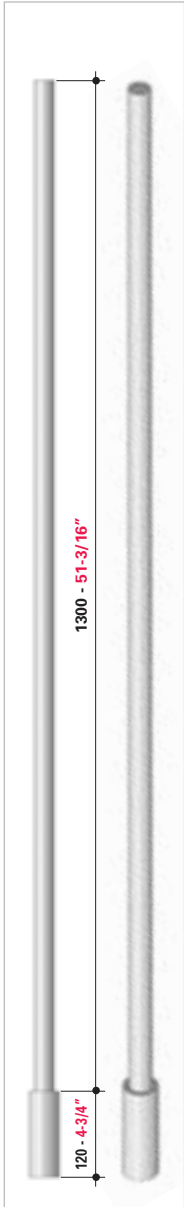
*** If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16" from the base of the column**

GEOMETRIC AND MECHANICAL CHARACTERISTICS - RS SYSTEM

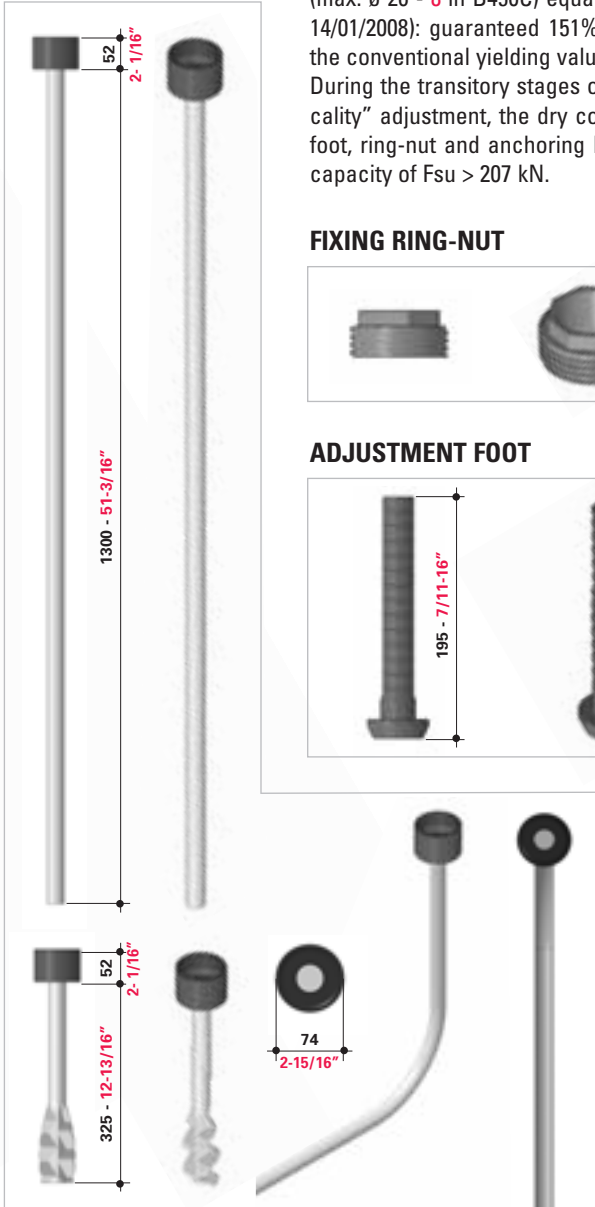
Dimensions in mm
Dimensions in inches

See pages 17 for the fixing sets

FIXING BUSH



ANCHORING BASE

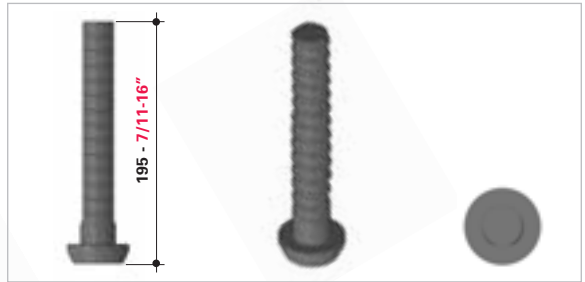


The **mechanical strength** of the connection is higher than that of the reinforcement used to obtain continuity (max: \varnothing 26 - 8 in B450C) equal to 207 kN (U.L.S.Min.Decree 14/01/2008); guaranteed 151% extra strength compared to the conventional yielding value of the reinforcement. During the transitory stages of assembly and "plumb verticality" adjustment, the dry connection (sleeve, adjustment foot, ring-nut and anchoring base) guarantees useful load capacity of $F_{su} > 207$ kN.

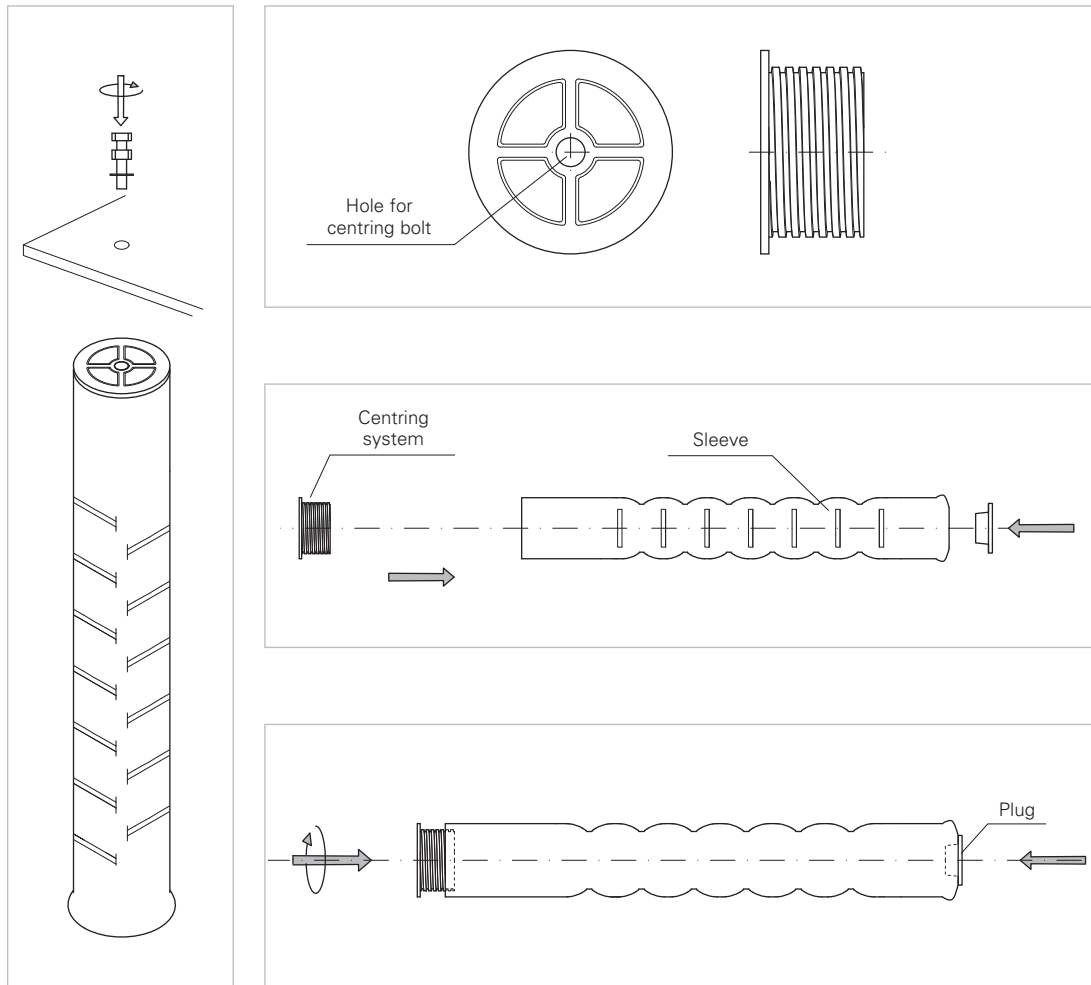
FIXING RING-NUT



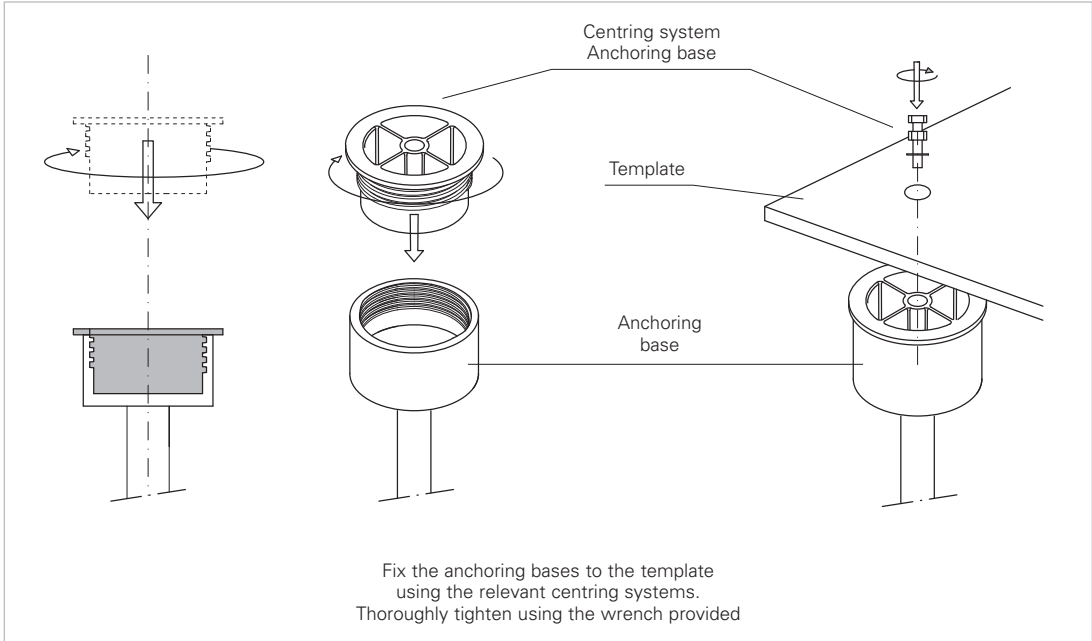
ADJUSTMENT FOOT



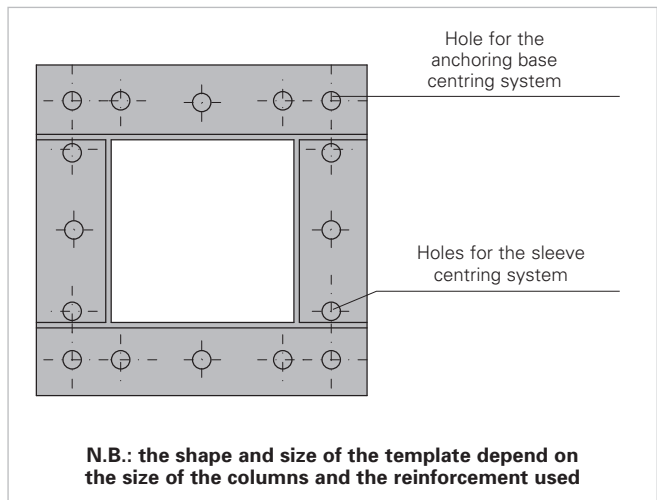
SLEEVE FIXING SET WITHOUT ANCHORING REINFORCEMENT (suitable for both column and foundation)



ANCHORING BASE FIXING SET (foundation)

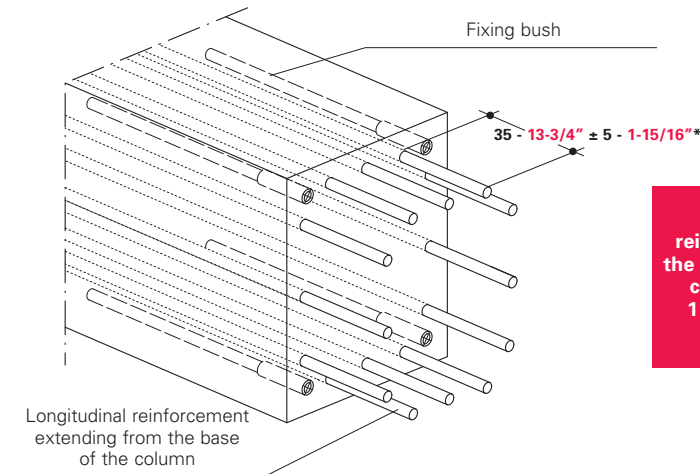


FOUNDATION TEMPLATE



PRECAST COLUMN

End of column after form stripping

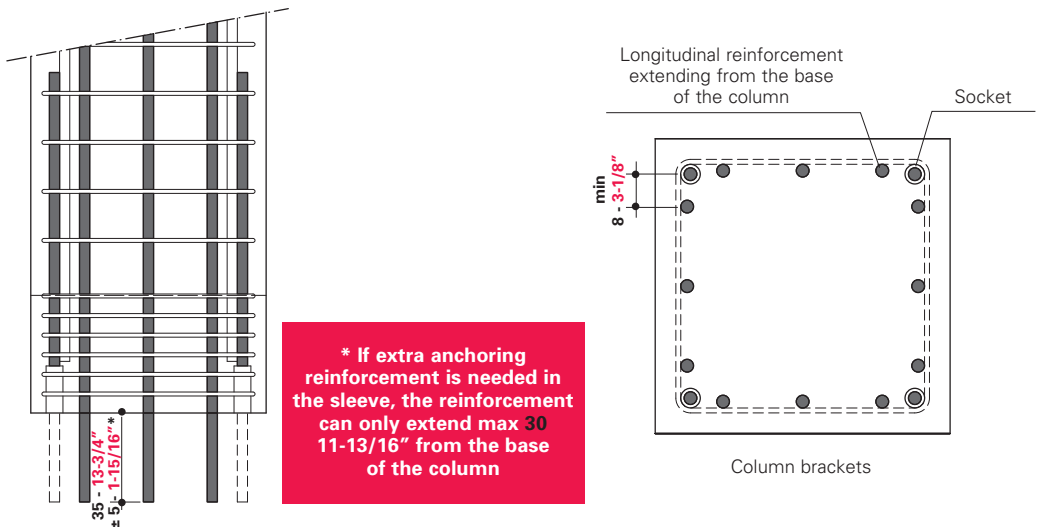


* If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16\"/>

N.B.: we recommend preparing the column reinforcement cages using the B.S. Italia template and relative sleeves to guarantee these values and correct rebar positioning

Rck ≥ 40 MPa

Brackets at bottom of column



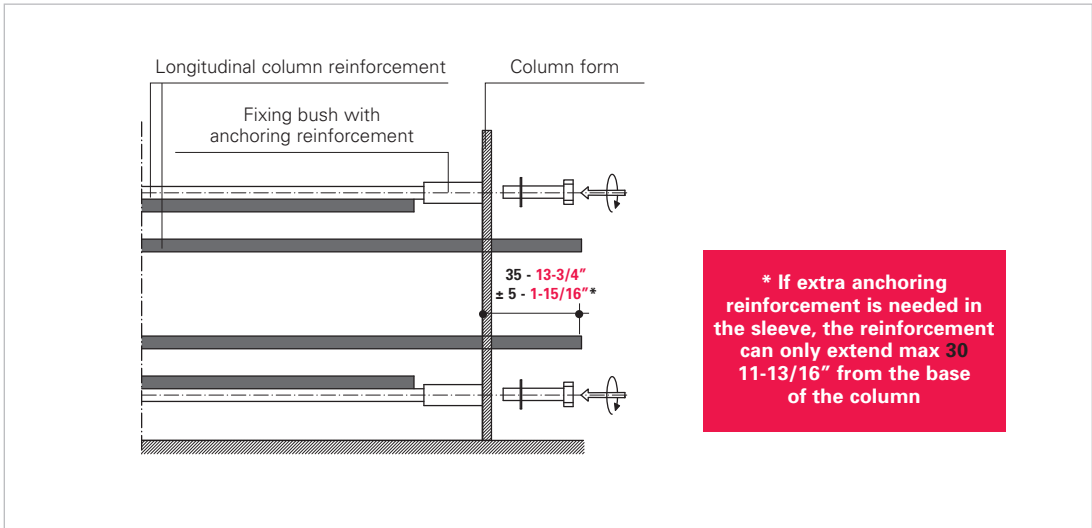
* If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16\"/>

N.B.: the min distance between the centres of the rebars must be 8 - 3-1/8\"/>

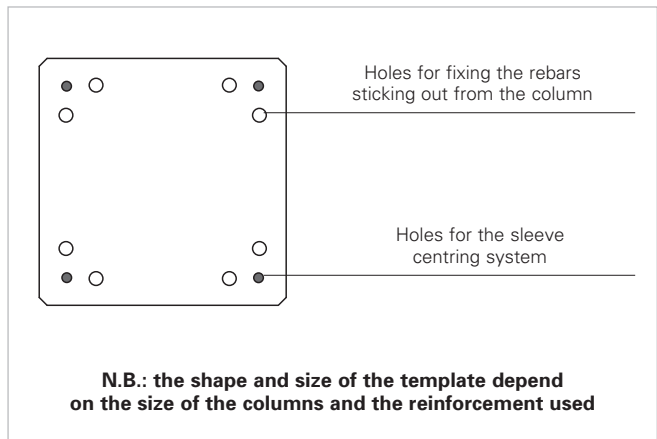
ATTENTION: you must guarantee the min rebar density, even if you need to provide an aperture for a drainpipe

POSITIONING IN THE FORM - RS SYSTEM

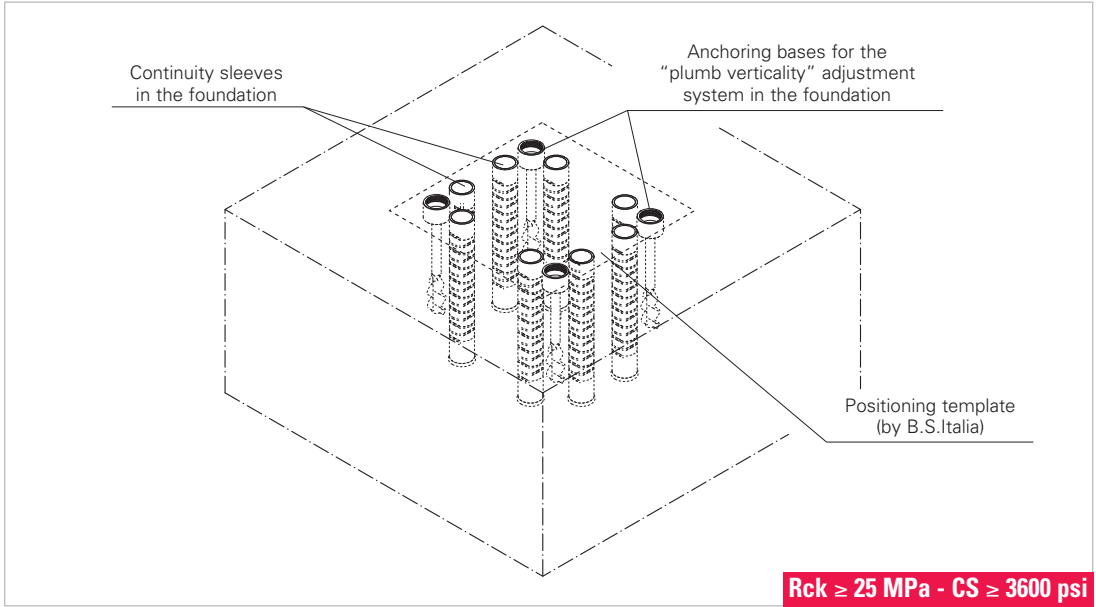
COLUMN INSERT DETAILS



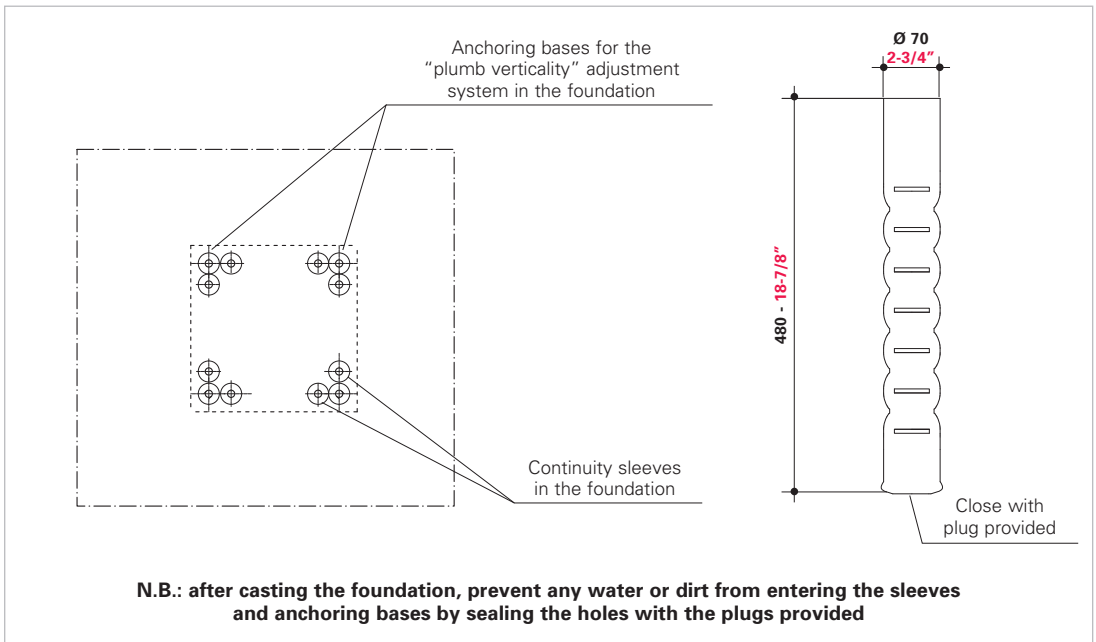
COLUMN TEMPLATES



CAST-IN-PLACE FOUNDATION



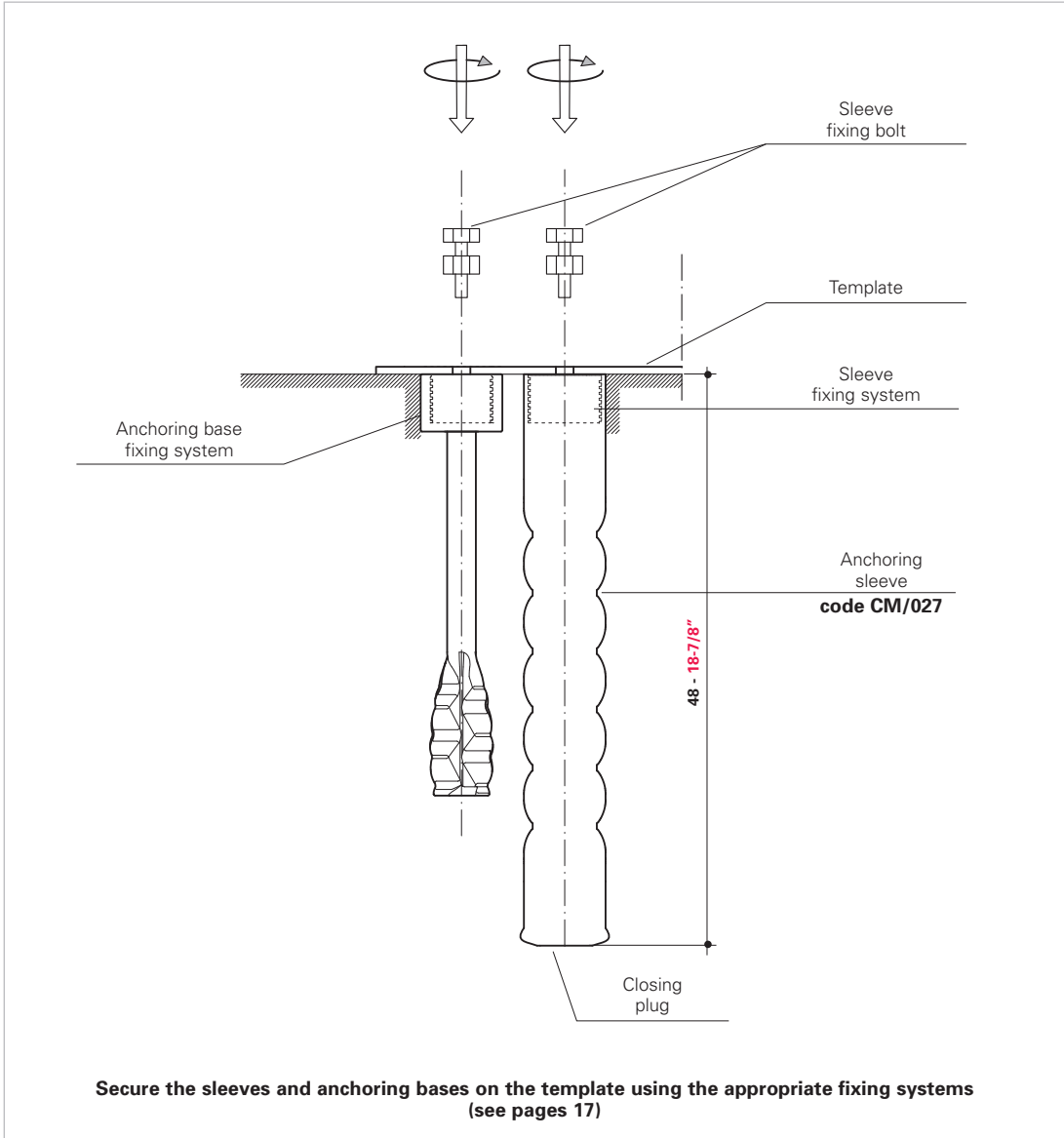
FOUNDATION LAYOUT



POSITIONING IN THE FOUNDATION - RS SYSTEM

Dimensions in cm
Dimensions in inches

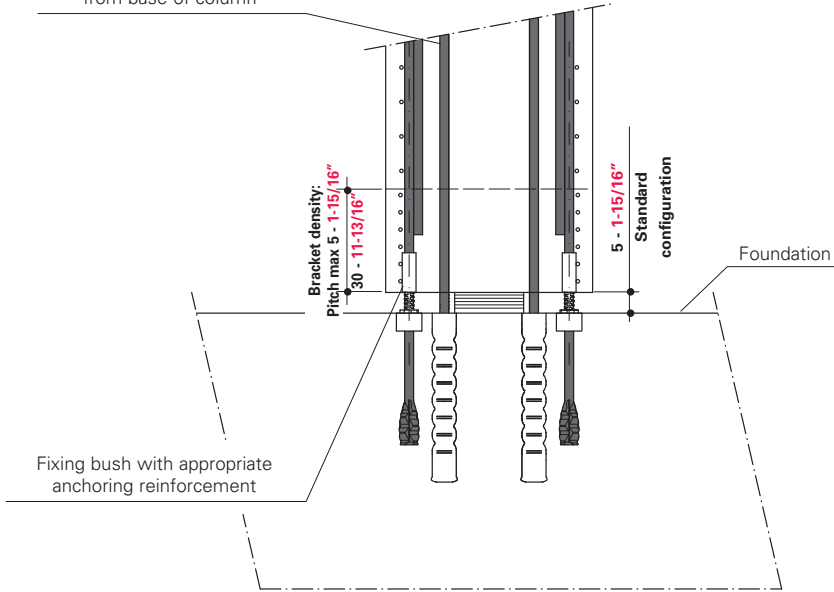
DETAILS OF CAST-IN-PLACE FOUNDATION



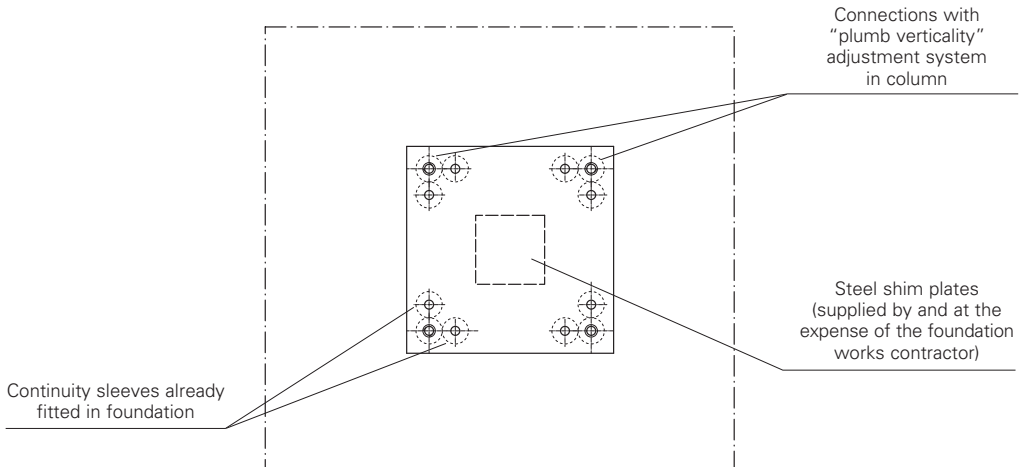
COLUMN/FOUNDATION CONNECTION

General column/foundation coupling diagram

Longitudinal reinforcement extending from base of column

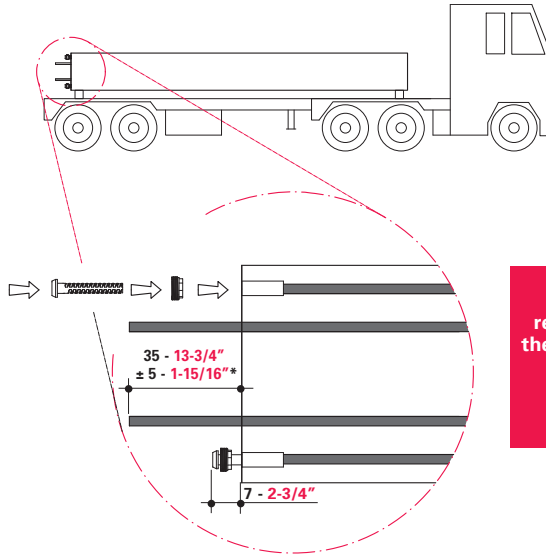


View from above

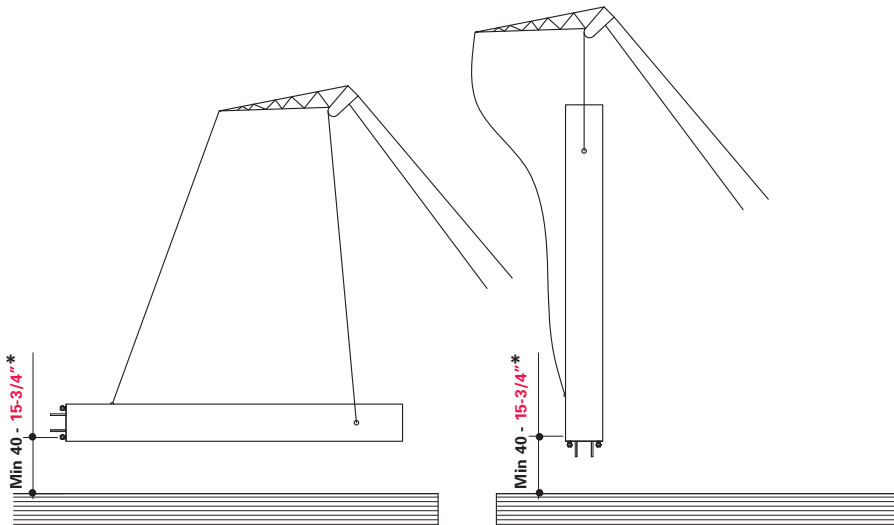


COLUMN/FOUNDATION CONNECTION

Column vertical adjustment sequence



* If extra anchoring reinforcement is needed in the sleeve, the reinforcement can only extend max 30 11-13/16" from the base of the column

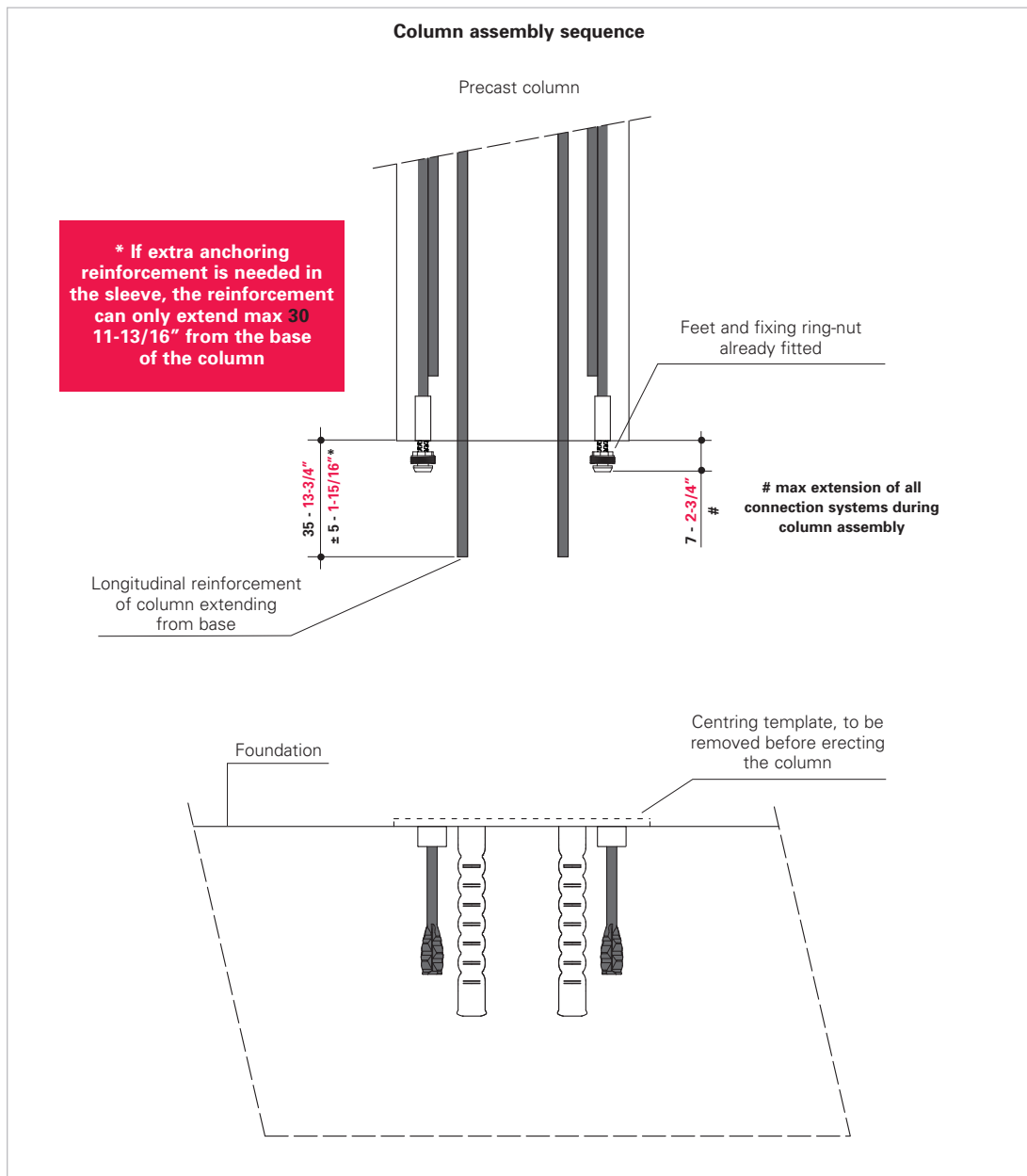


* min height to be guaranteed when tipping column on end

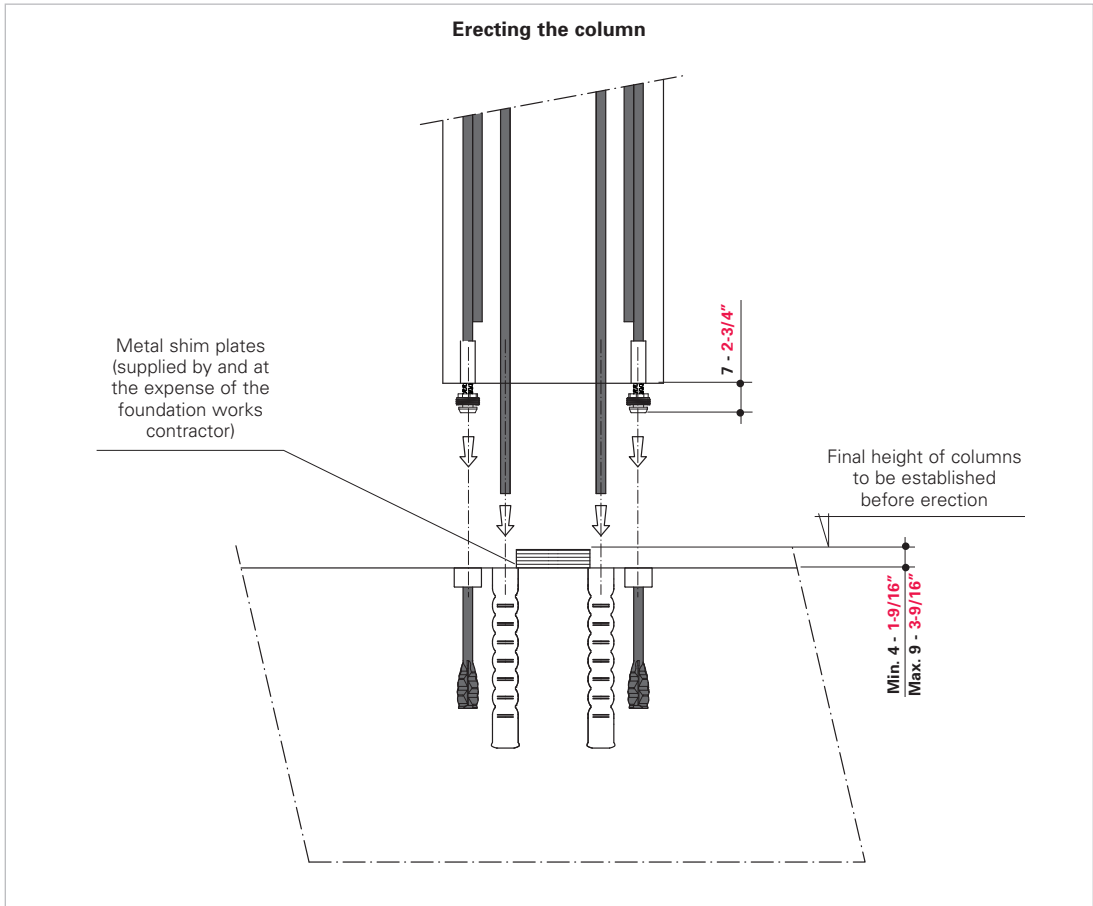
N.B.: when handling the column be careful not to hit the inserts

COLUMN/FOUNDATION CONNECTION

Column assembly sequence

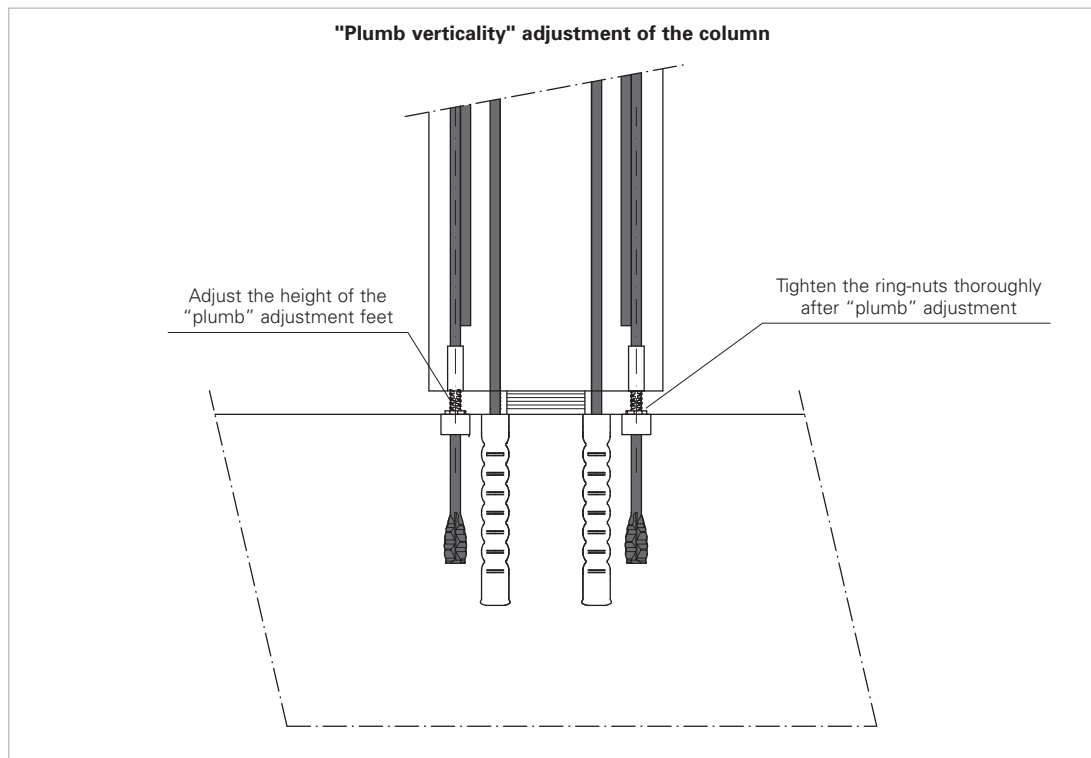


COLUMN/FOUNDATION CONNECTION



ATTENTION: the column has to release its weight on the metal shim plates

COLUMN/FOUNDATION CONNECTION



STEPS:

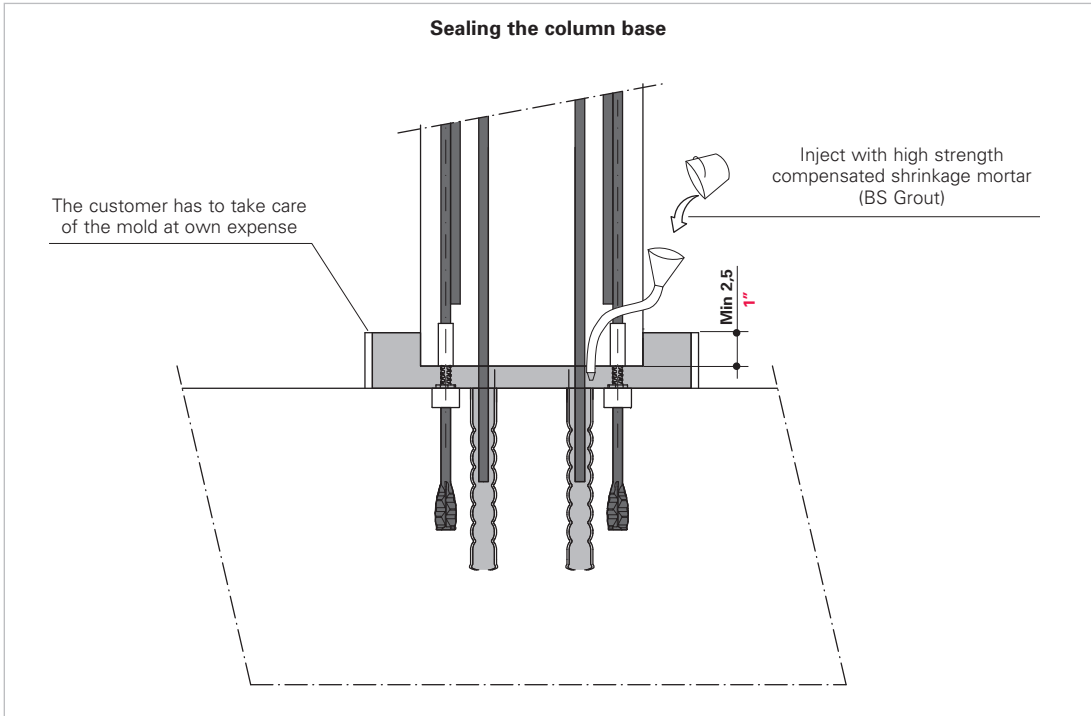
1. Lower the column until it sits on the metal shim plates.
2. Unscrew the feet until they touch the bottom of the anchoring bases in the foundation.
3. Part-tighten the ring-nuts.
4. Adjust the verticality of the column using all the foot screws at the same time to ensure that the column always rests on the metal shim plates. NB: clockwise threading for bush/foot system
5. Secure the feet by thoroughly tightening the fixing ring-nuts.

ATTENTION: during all the previous steps the column has to remain hooked to the crane and rested on the metal shim plates. Before releasing the column, make sure the adjustment feet are resting on the anchoring bases and that the fixing ring nuts are tightly screwed.

See page 64 for technical specifications of the mortar

COLUMN/FOUNDATION CONNECTION PREPARING THE FOUNDATION

- Clean the concrete and rebars of any dust, rust, traces of old cement, grease, oil, paint or varnish
- Saturate with water



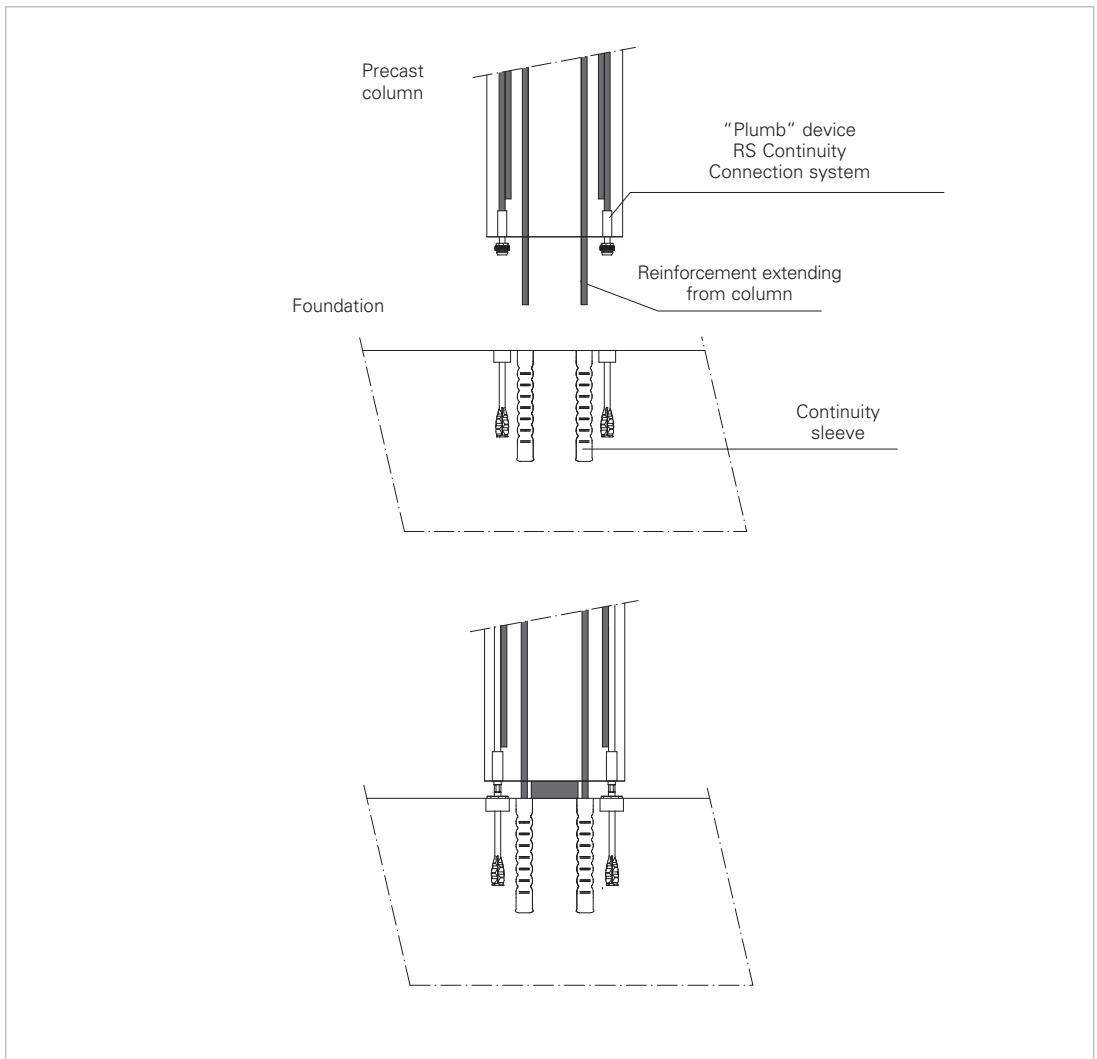
APPLYING BS Grout

- Fill the sleeves in the foundation by pouring the fluid mix directly into these.
- Pour the casting mix from one side only into the forms with continuous flow, making sure that any air is allowed to escape. The material used for the forms must not subtract water from the casting mix: we therefore recommend treating the form with a stripping agent.

ATTENTION: the minimum recommended resistance of mortar before erecting the structure is 28Mpa (guaranteed after 24 hours at 20°C - 68°F)

N.B.: no mechanical vibration required

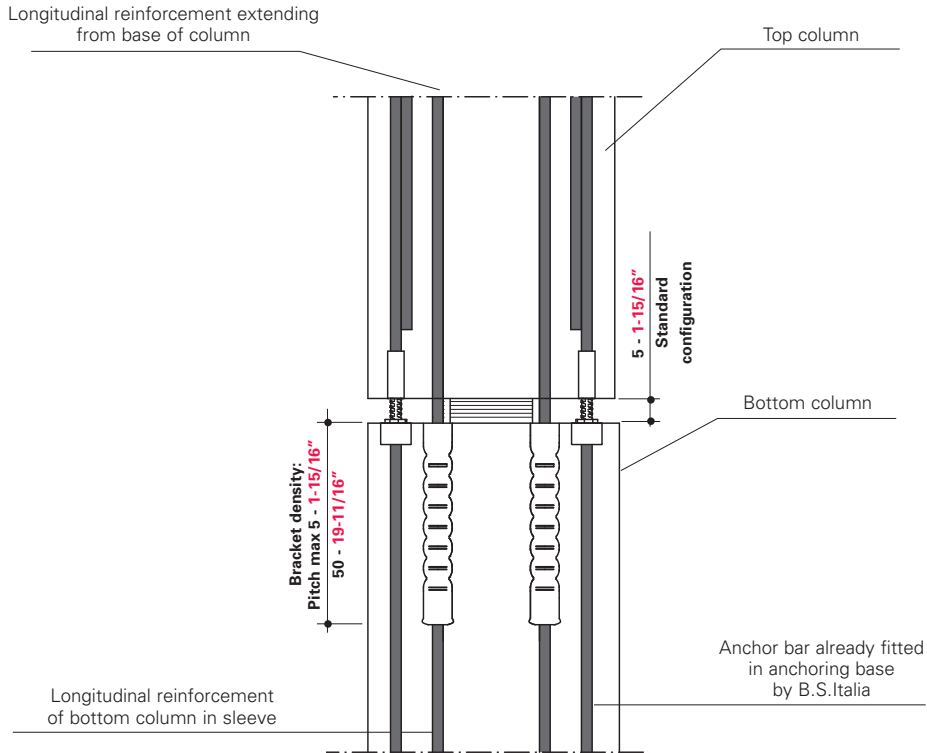
INNOVATIVE B.S. ITALIA SYSTEM "PLUMB" DEVICES COMBINED WITH RS CONTINUITY CONNECTION SYSTEM



The RS CONTINUITY CONNECTION system may use 4 adjustment feet (code CM/059) to guarantee the verticality and stability of the column **without** needing to use temporary works (shoring).

COLUMN/COLUMN CONNECTION

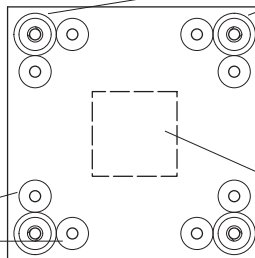
General column / column coupling diagram



View from above

Connections with "plumb verticality" adjustment system in columns

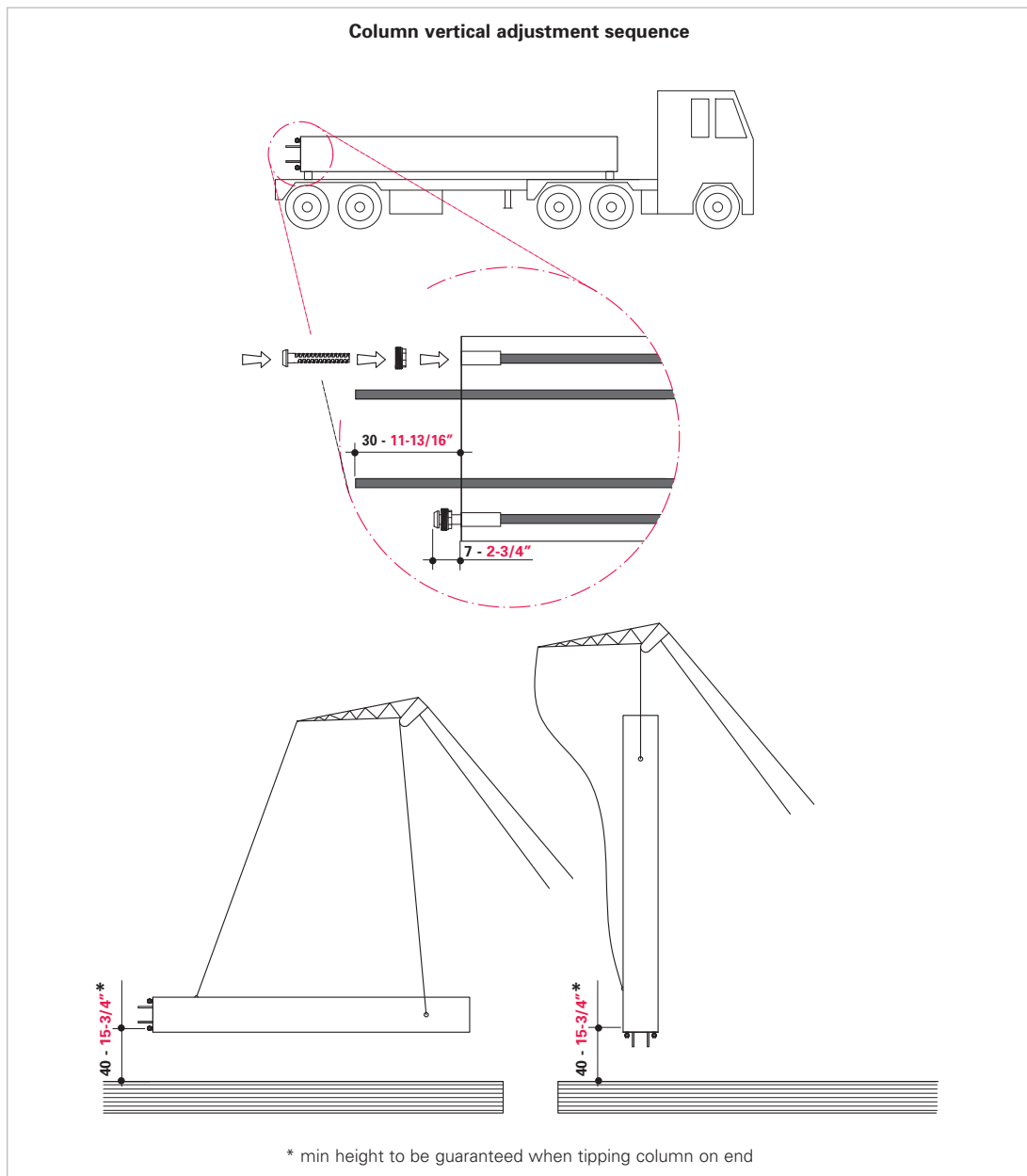
Continuity sleeves already fitted in bottom column



Steel shim plates (supplied by and at the expense of the foundation works contractor)

COLUMN/COLUMN CONNECTION

Column vertical adjustment sequence

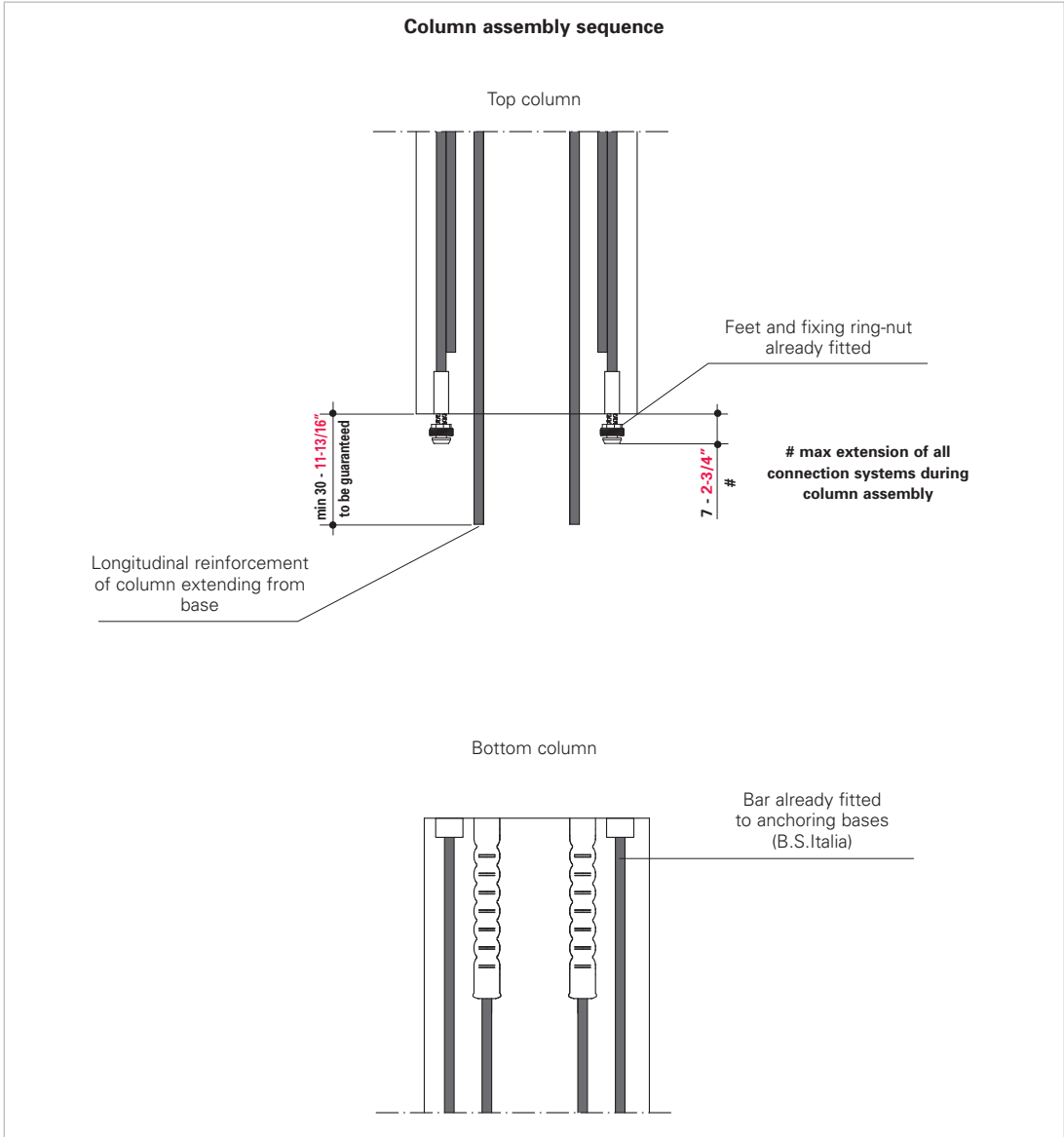


**N.B.: when handling the column
be careful not to hit the inserts**

ASSEMBLY INSTRUCTIONS - RS SYSTEM

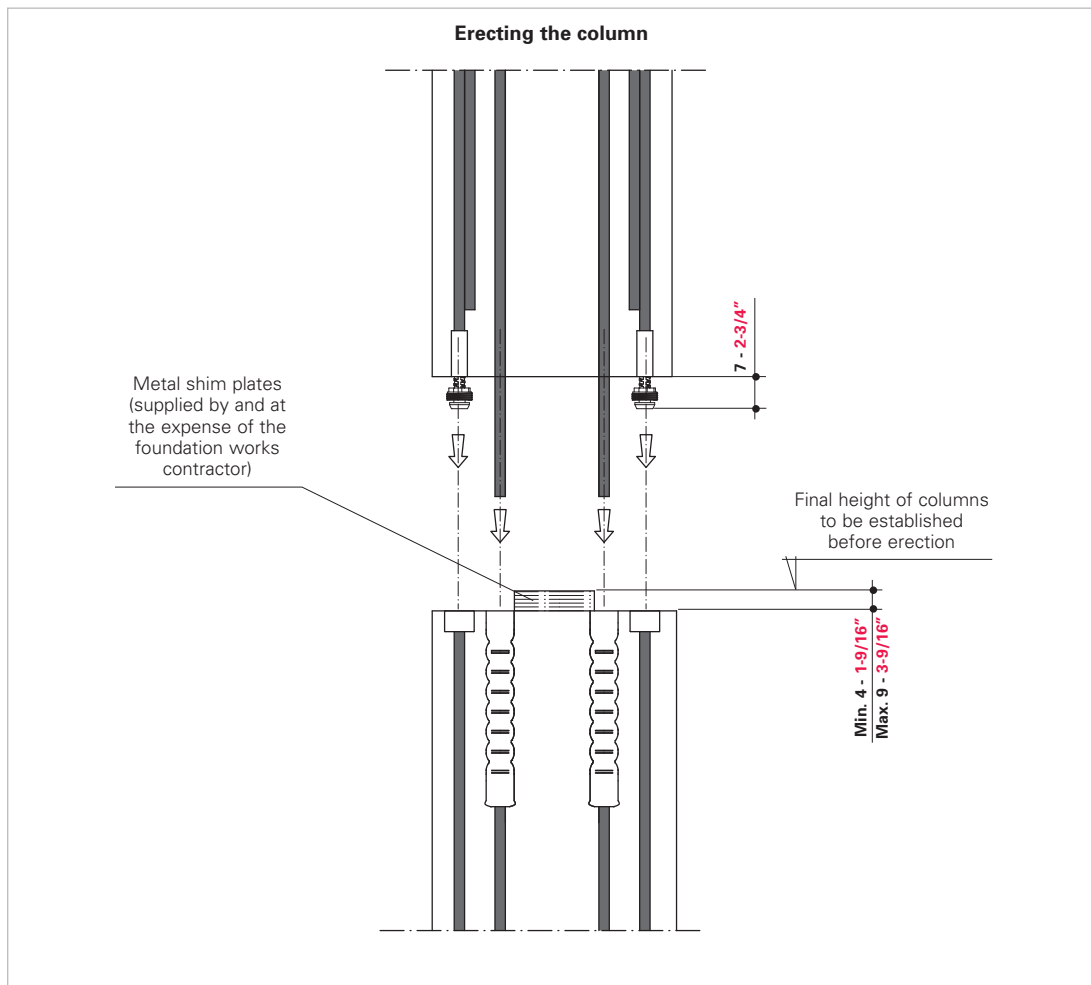
Dimensions in cm
Dimensions in inches

COLUMN/COLUMN CONNECTION



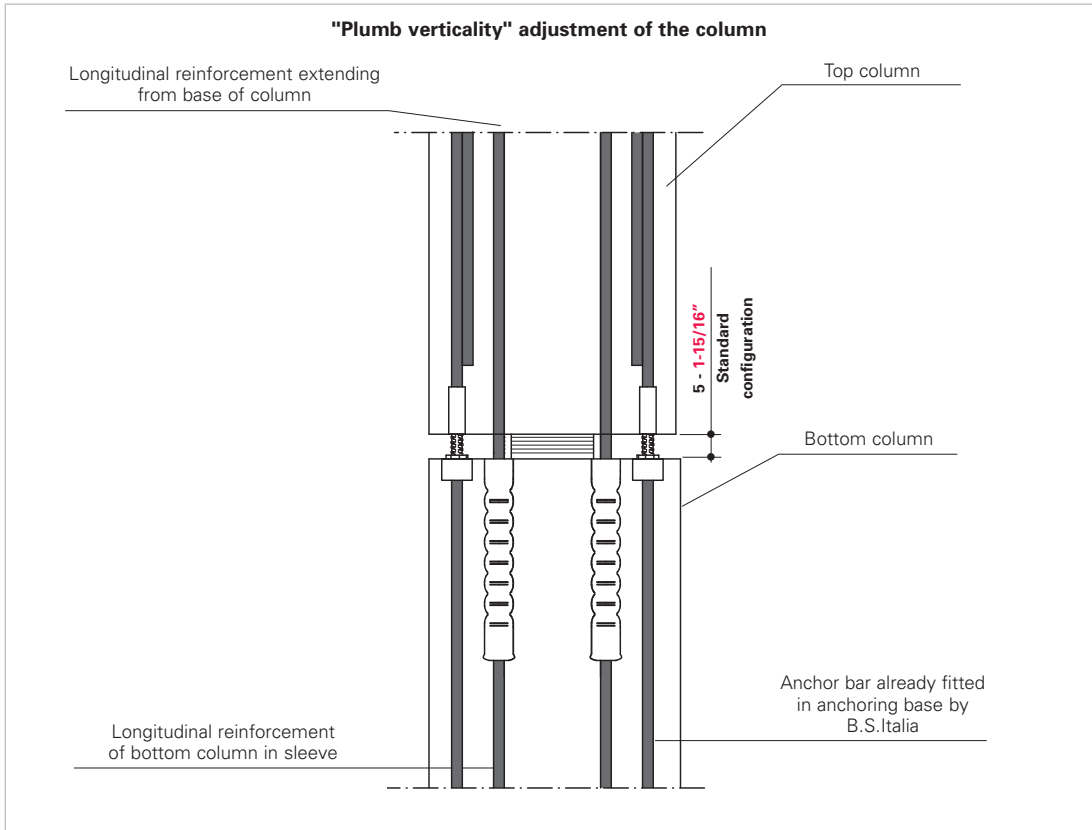
ATTENTION: before proceeding with the erection of the top column, make sure the static connection between the bottom column and the foundation is perfect.

COLUMN/COLUMN CONNECTION



ATTENTION : the above column has to release its weight on the metal shim plates

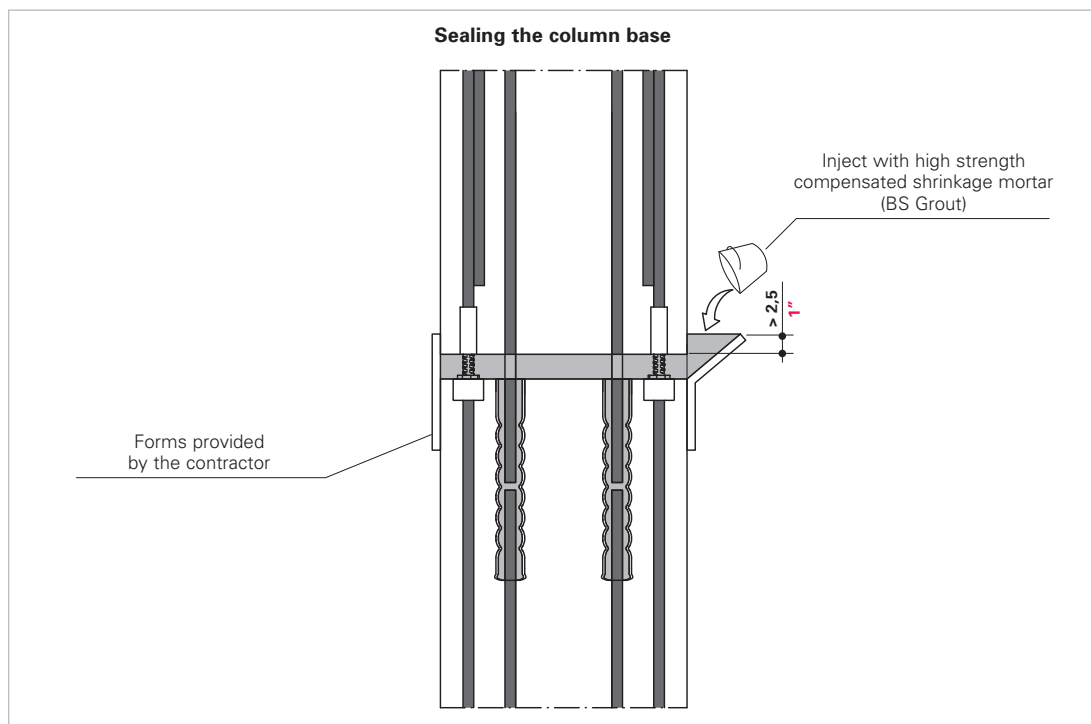
COLUMN/COLUMN CONNECTION



STEPS:

1. Lower the top column until it sits on the metal shim plates.
2. Unscrew the feet until they touch the bottom of the anchoring bases in the bottom column.
3. Part-tighten the ring-nuts.
4. Adjust the verticality of the column using all the foot screws at the same time to ensure that the column always rests on the metal shim plates. NB: foot/bush system has clockwise threading.
5. Secure the feet by thoroughly tightening the fixing ring-nuts.

ATTENTION: during all the previous steps the column has to remain hooked to the crane and rested on the metal shim plates. Before releasing the column, make sure the adjustment feet are resting on the anchoring bases and that the fixing ring nuts are tightly screwed.



APPLYING BS Grout

- Fill the sleeves in the foundation by pouring the fluid mix directly into these.
- Pour the casting mix from one side only into the forms with continuous flow, making sure that any air is allowed to escape. The material used for the forms must not subtract water from the casting mix: we therefore recommend treating the form with a stripping agent.

ATTENTION: the minimum recommended resistance of mortar before erecting the structure is 28Mpa (guaranteed after 24 hours at 20°C - 68°F)

N.B. No mechanical vibration needed

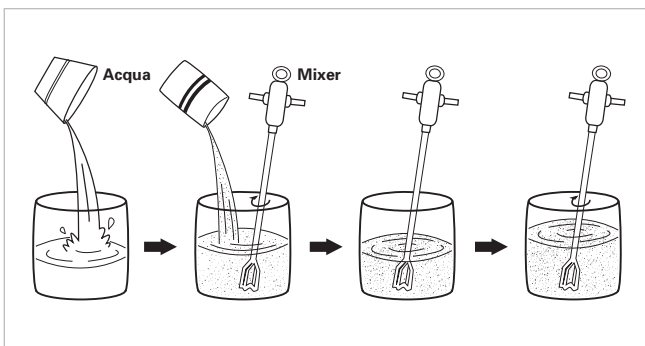
MORTAR CHARACTERISTICS - "BS GROUT"

TECHNICAL DATA

The BS Grout mortar to be injected into the assembled connections in order to finish the CONTINUITY CONNECTION must have the following characteristics:

- **Max aggregate size:** 2,5 mm - 1/8"
- **Apparent volume mass:** 1300 (kg/m³) - 81.156 pcf
- **Solid residue:** 100%
- **Mix ratio** 1 x 25 kg - 55.11464 pounds sack of injecting mortar with 3.0 - 3.4 i water
- **Mortar flow rate as per EN 13395-2:** > 45 cm - 17-11/16"
- **Mix volume mass:** 2.350 (kg/m³) - 146.705.pcf
- **Mix PH:** > 12
- **Application temperature range:** from + 5°C - 41°F to + 35°C - 95°F
- **Mechanical characteristics (as per EN 12190 - 12.5% mix water) at 20°C - 68°F**
 - Compressive strength:
 - after 1 day > 36 N/mm² - 5220 psi
 - after 7 days > 63 N/mm² - 9140 psi
 - after 28 days > 84 N/mm² - 12180 psi
 - Flexural strength:
 - after 1 day : 7 N/mm² - 1000 psi
 - after 7 days : 10.5 N/mm² - 1500 psi
 - after 28 days : 12 N/mm² - 1740 psi
- **Adherence to support (as per EN 1542):**
after 28 days > 3 N/mm² - 430 psi
- **Frost resistance with de-icing salts (EN 13687-1) adhesion after cycles > 3 N/mm² - 430 psi**
- **Penetration of water as per EN 12390/8:** < 5 mm - 3/16"

PREPARING THE MORTAR



- Pour 3.0-3.4 litres - 0,8-0,9 gallons water into a clean container
- Slowly add the contents of a sack of mixture (25 kg - 55.11464 pounds)
- Mix with a stirrer attachment for 1-2 minutes, ensuring no lumps/powder stick to the sides of the container
- Mix again for 2-3 minutes until smooth and free of lumps
- Do not incorporate excessive air

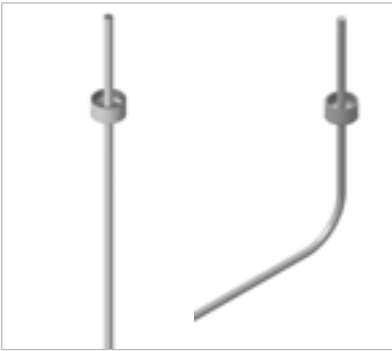
N.B.: the mortar remains workable for an hour at 20°C - 68°F



Description	Code
Continuity Connection System Sleeve	
Sleeve	CM/027
Sleeve with holes	CM/027B



Continuity Connection System plug	
for sleeve without hole	CM/068



Continuity Connection System anchoring base	
With straight rebar (for foundation)	CM/031R
With curved rebar (for foundation)	CM/031C



Continuity Connection System adjustment foot	
Adjustment foot	CM/033



Continuity Connection System fixing ring-nut	
Fixing ring-nut	CM/032



Description	Code
RS Continuity Connection System adjustment foot	
Adjustment foot	CM/059



RS Continuity Connection System fixing ring-nut	
Fixing ring-nut	CM/023



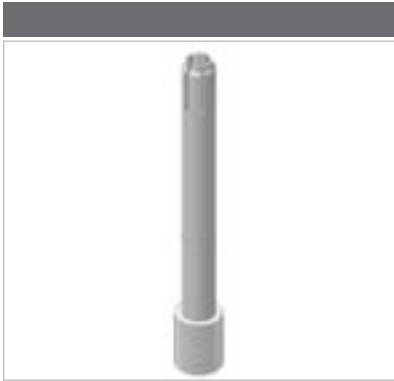
RS Continuity Connection System anchoring base	
With straight rebar	CM/049
With curved rebar	CM/049P
With plunger	CM/026



RS Continuity Connection System bush	
Bush	CM/072A



RS Continuity Connection System bush fixing bolt	
Bush fixing bolt	CM/066



Description	Code
Column sleeve fixing set	
ø 12 - ø 18	
ø 20 - ø 26	CM/040



Screws for fixing set	
Nut - Bolt - Washer	CM/048
RS bush fixing bolt	CM/066



Base fixing set	
Base	CM/034



Base fixing set	
Base RS	CM/065



Template	
Foundation template	to suit specific job
Column template	to suit specific job

Wrench	
CH 80 - 59 (Std)	CM/047
CH 24 - 50 (RS)	CM/074



Description	Code
Protection plugs	
Sleeve	CM/052
BASE std-s	CM/053
BASE RS	CM/056



Injection plugs (with magnet - reusable)	
Bottom	CM/044
Top	CM/043



End injection plugs	
Small	CM/045
Large	CM/046



Mortar BS Grout	
Mortar BS Grout	Mortar



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