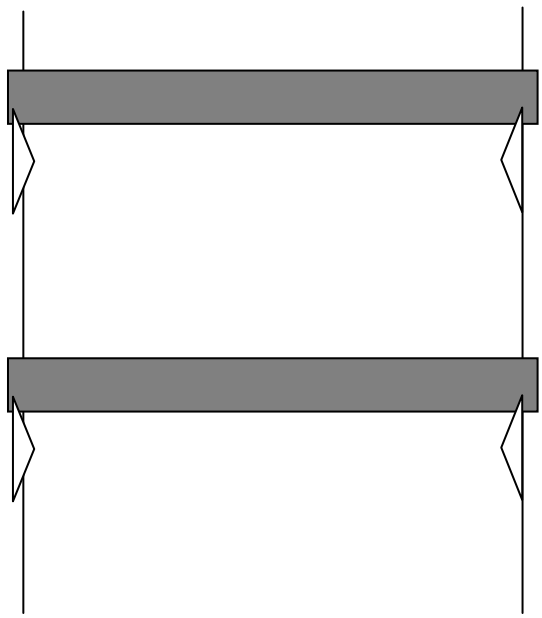
VADEMECUM STOP

BRACING OF COLUMNS WITH POLYESTER RATCHET STRAPS



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ABRUZZO EARTHQUAKE 2009
COORDINATION TEAM FOR TEMPORARY WORKS

WORKING GROUP FOR THE VADEMECUM STOP
under the supervision of Sergio Basti - Central director for emergency and urgent technical rescue manual licensed by note no. EM3064/5001-11 dated 2009-06-15

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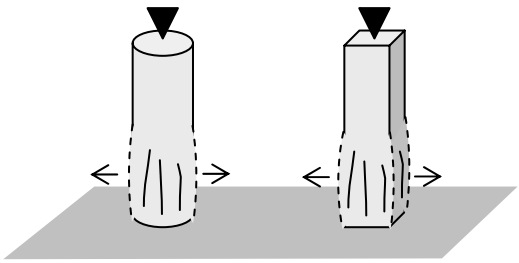
BRACING OF COLUMNS WITH POLYESTER RATCHET STRAPS: general recommendations

STOP-**CP**

Forces to constrain: crushing

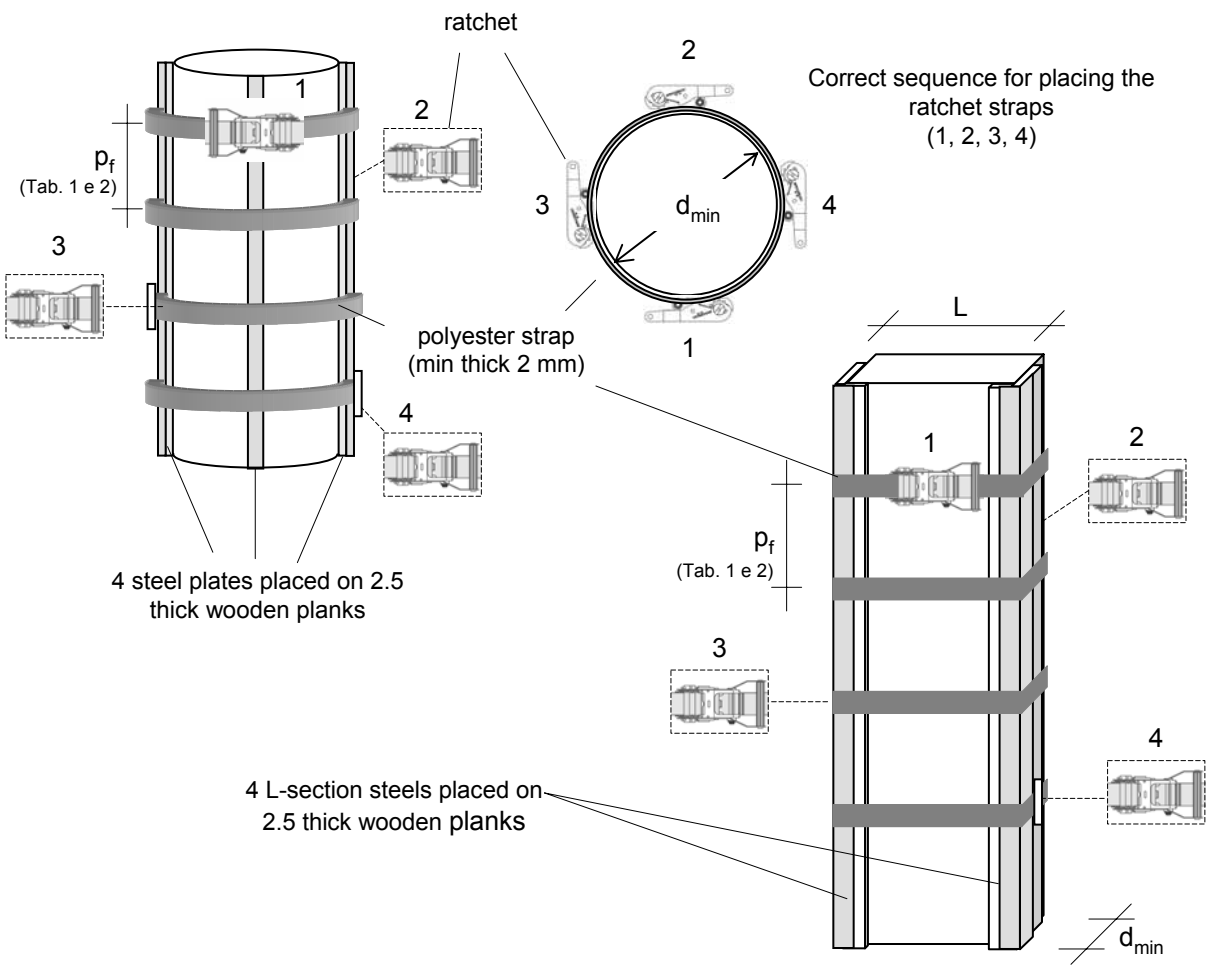


Description
Excessive vertical loads can provoke the buckling of columns with transverse deformations, cracks and expulsion of materials.

Warning
This procedure cannot be used for concrete columns.

Function of the ratchet straps: to contain the transverse deformation of the column improving at the same time the resistance to vertical loads.

CONSTRUCTIONAL DIAGRAMS



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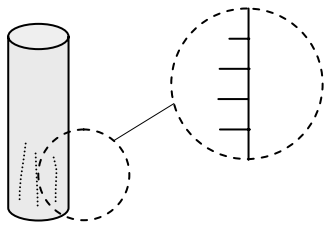
BRACING OF COLUMNS WITH POLYESTER RATCHET STRAPS: sizing recommendations | STOP-**CP**

LEVEL OF DAMAGE

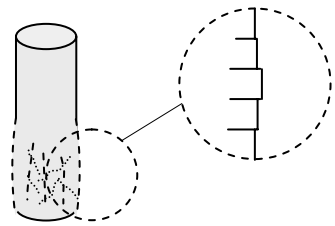
I level



Evidence of vertical cracks

If no perceptible roughness is felt by a hand on the surface of the column

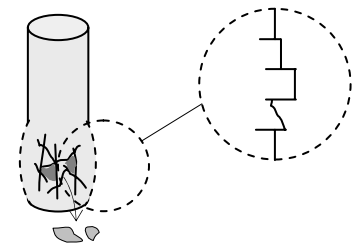
II level



Evidence of vertical and horizontal cracks and displacement of stones

If a perceptible roughness is felt by a hand on the surface of the column (mm)

III level



Evidence of vertical and horizontal cracks and expulsion of stones

Evidence is present on the surface of the expulsion of stones and the roughness is felt (cm). Presence of Stones on the ground

Table 1 –Spacing distance between the straps. Width of the straps: 50 mm

Width of the straps: 50 mm (thickness min.: 2 mm)		
Level of damage	Spacing distance between the straps: p_f (cm) (and maximum dimension of the column: d_{min})	
	d_{min} Circular cross section	L, d_{min} Rectangular cross section $L/d_{min} \leq 2$
I	45 ($d_{min} \leq 90$ cm)	40 ($d_{min} \leq 90$ cm)
II	40 ($d_{min} \leq 90$ cm)	20 ($d_{min} \leq 70$ cm)
III	15 ($d_{min} \leq 70$ cm)	15 ($d_{min} \leq 30$ cm)

Table 2 – Spacing distance between the straps. Width of the straps: 75 mm

Width of the straps: 75 mm (thickness min.: 2 mm)		
Level of damage	Spacing distance between the straps: p_f (cm) (and maximum dimension of the column: d_{min})	
	d_{min} Circular cross section	L, d_{min} Rectangular cross section $L/d_{min} \leq 2$
I	45 ($d_{min} \leq 90$ cm)	40 ($d_{min} \leq 90$ cm)
II	40 ($d_{min} \leq 90$ cm)	25 ($d_{min} \leq 70$ cm)
III	20 ($d_{min} \leq 70$ cm)	15 ($d_{min} \leq 40$ cm)

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BRACING OF COLUMNS WITH POLYESTER STRAPS

Field of application

The use of this procedure is allowed only on masonry rectangular or circular columns that are within the prescribed measurements stated above. (diameter for the circular columns and the narrowest side for the rectangular columns) less than 90 cm and with a ratio between the sides less than 2.

General assumptions

The aim of the intervention is to increase the load bearing resistance of a column by the reduction of its transverse displacements.
Before placing the polyester ratchet straps clean all the surfaces of the columns but don't remove structural elements.
Rounded L-section steel is preferred to avoid cutting the straps. All the L-section steel must be placed on 2.5 cm thick planks to absorb the irregularities of the surfaces.
Light colour antioxidant protective paint for the L-section steel is preferred to reduce the solar heating.
The ratchets must be placed according to the correct sequence as shown on page 1/3.
Tighten the ratchet straps by hand.

Guidance for bracing columns with polyester straps

After evaluating the level of the damage, it is possible to define the maximum spacing between the polyester straps following tables 1 and 2 on page 2/3.
Steel plates are necessary to distribute the transverse loads.
To improve the effectiveness of the system it is possible to use more steels. For rectangular columns, the steels placed on the sides must be thickened.

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