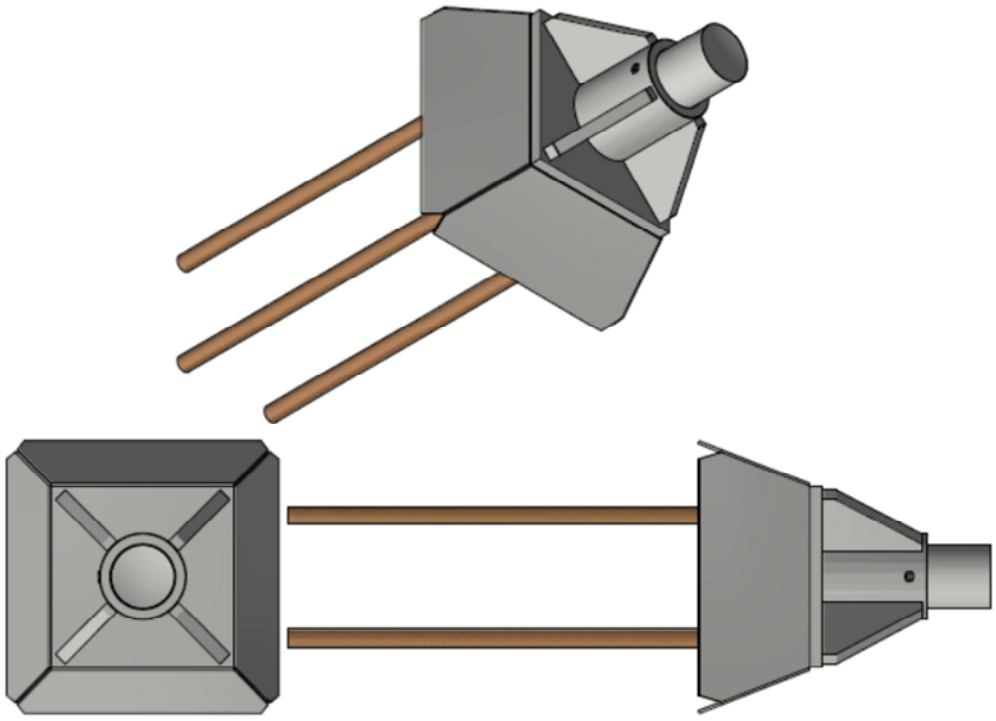
CENTRUM PÆLE A/S
Grønlandsvej 96
DK-7100 Vejle

Tlf. +45 75 83 01 11
Fax +45 75 72 05 46
www.centrumpaele.dk

INSTALLATION & USERGUIDE

CENTRUM ROCK POINT



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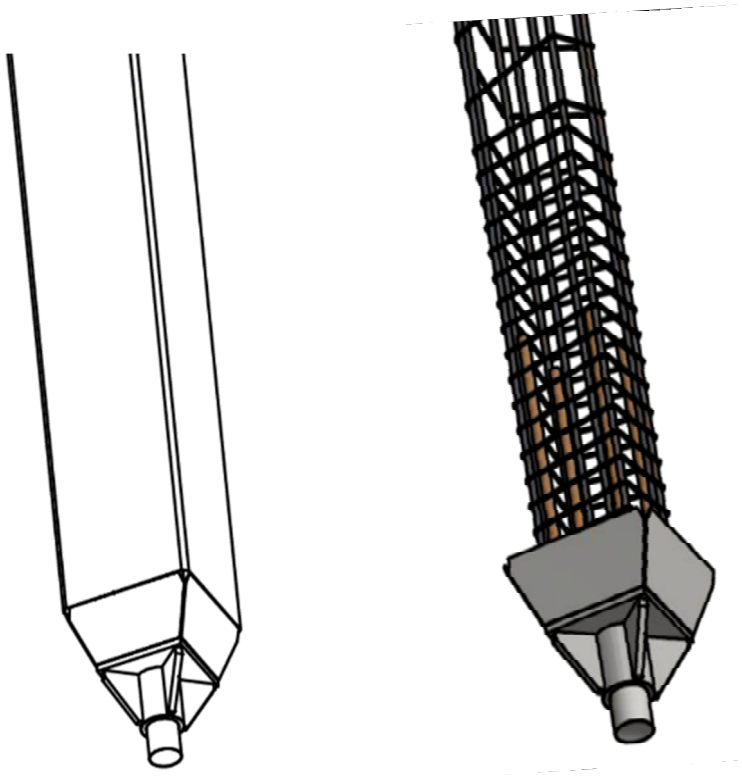
1. Rock point in use

1.1 Application

Centrum rock point is used when driving piles to the bedrock, to prevent piles from sliding off steep inclined bedrock or in soil that contains large boulders or other large objects that could potentially influence the forces on the pile during driving.

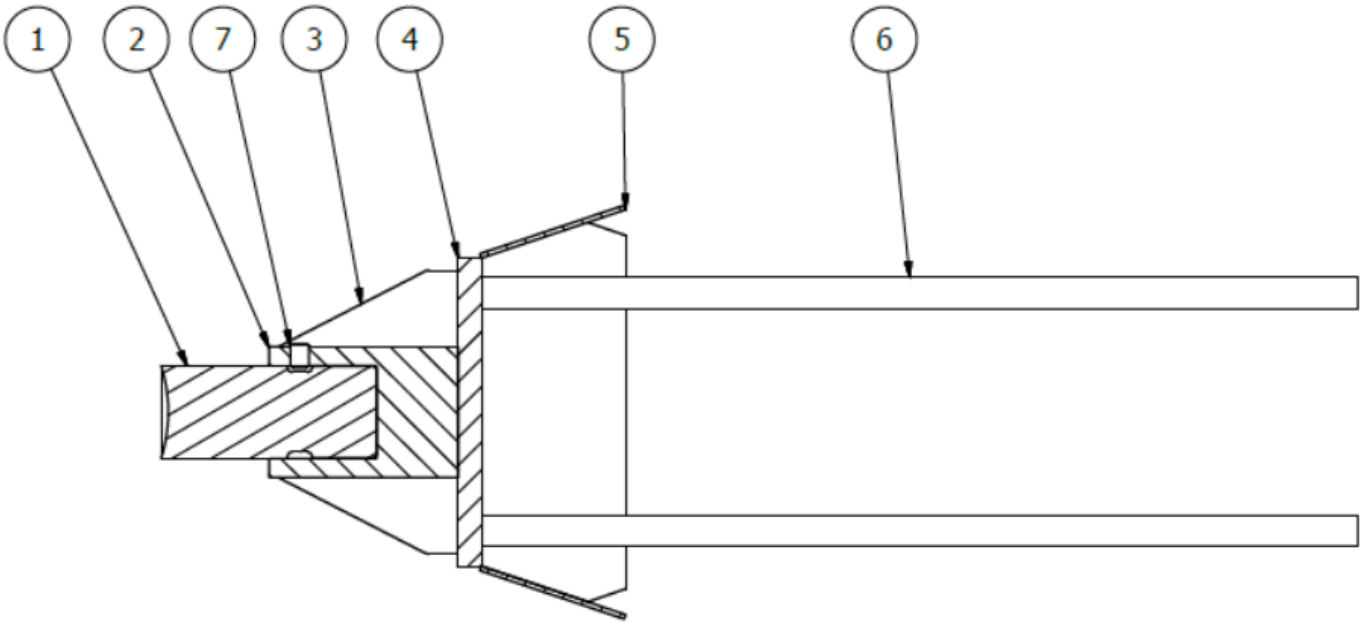
1.2 Function

The Centrum rock point ensures that the force applied to the pile is concentrated in the rock point tip and thus preventing the pile from being damaged when driving it into the bedrock / ground.



2. General structure of Centrum rock point

2.1 Figure A

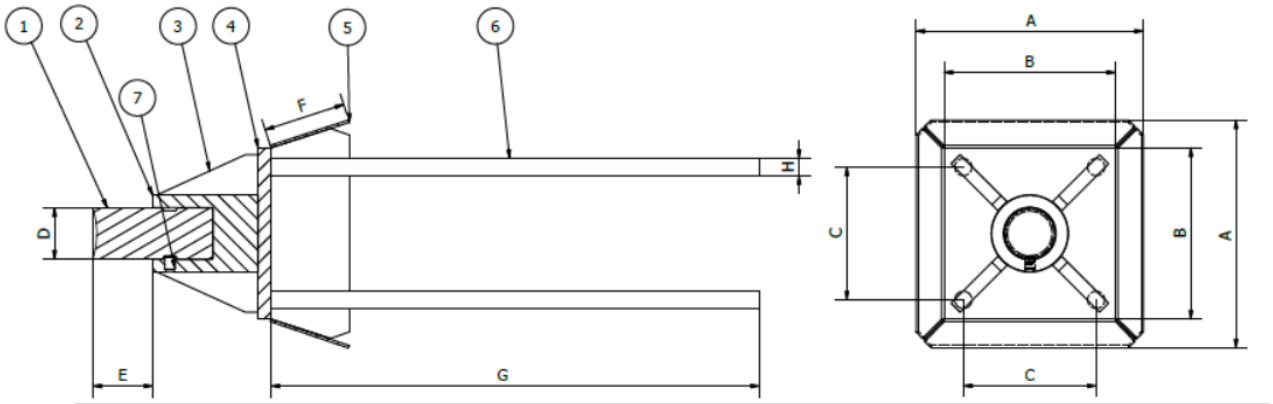


2.2 Part list

Parts List				
Item	Qty	Description	Material	Standard
1	1	Rock point tip	33MnCrB5-2	EN ISO 683-2
2	1	Centerbush	S355J2	EN 10025-2
3	4	Triangle reinforcement	S355J2+N	EN 10025-2
4	1	Base plate	S355J2	EN 10025-2
5	4	Skirt	S355J2+N	EN 10025-2
6	4	Connection rod	B500B	EN 1992-1-1
7	1	Set screw DIN 916 M12 x 16	Steel, Mild	DIN 916

3. Main dimensions Centrum rock point

3.1 Figure B



Main dimensions [mm]									
Pile dim.	Concrete cover	A	B	C	D	E	F	G	H
Tol.: DS/EN 12794	Tol.: DS/EN 12794	Tol.: +0,0 -2,0	Tol.: DS/ISO 2768:m	Tol.: +0,0 -3,0	Tol.: +0,0 -1,0	Tol.: DS/ISO 2768:m	Tol.: DS/ISO 2768:m	Tol.: +100,0 - 0,0	Tol.: EN 10080: 2005
235 x 235	25	230	160	105	60	70	92,7	570	20
235 x 235	50	230	160	70	60	70	92,7	570	20
250 x 250	50	248	160	105	60	70	109	570	20
270 x 270	25	265	200	155	60-70	70	96,2	570	20
270 x 270	50	265	200	105	60-70	70	96,2	570	20
300 x 300	50	295	200	135	60-70	70	124,8	570	20
350 x 350	50	349	280	190	70	70	100	570	20
400 x 400	50	399	280	226	70	70	140	570	20

4. Manufacturing

4.1 Methods

Centrum rock points is manufactured in a controlled production environment using conventional steel processing methods including sawing, turning, laser cutting & MAG welding to ensure optimum quality and minimum environmental impact.

4.2 Production certification

The production is certified to manufacture products according to the following standards:

EN 1090-1
DS/EN ISO 3834-2
DS/EN ISO 9001

5. Quality control

The complete process is supervised by the external certification provider
Dancert
Gregersensvej 4,
2630 Taastrup Denmark
Tlf. +45 72202160,
CVR nr. DK-29512094
www.dancert.dk, info@dancert.dk

6. Manufacturers markings

Centrum rock point are marked with a Works ID (WI) number. Via the WI number, manufacturing data and material data can be traced to the supplier.

In addition to the WI number, the rock points are labelled (figure 3) with type and for identification

Supplier	: Centrum Pæle A/S
Company logo	: CENTRUM
ETA number	: ETA 19/0018
Item designation	: i.e. CP RP-235-25

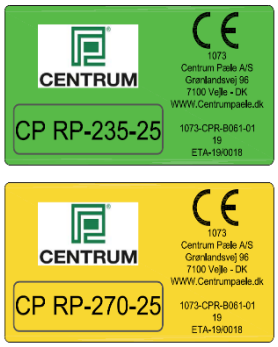


Figure 1. Label examples

7. Centrum rock point static structural bearing capacity

The capacities have been calculated according to Eurocodes with the recommended values of partial factors and may thus have to be adjusted according to the respective national annexes.

7.1 Calculation principles

The calculation of the rock points complies with the following building regulations and assumptions:

EN 1992-1-1	Eurocode 2: Design of concrete structures, Part 1-1: General rules and rules for buildings
EN 1993-1-1	Eurocode 3: Design of steel structures, Part 1-1: General rules and rules for buildings
EN 1993-1-8	Eurocode 3: Design of steel structures; Part 1-8: Design of joints
EN 206-1	Concrete – Part 1: Specification, performance, production, and conformity
EN 12794	Precast concrete products – Foundation piles

Design principles are based on the Swedish Commission on Pile Research (Pålkommissionen) report 96:1 “Common Design Principles for Piles – Load capacity”.

Load eccentricity on rock point assumed either to 1/4 or 1/10 of the diameter of the rock point tip.

Material reduction factors (μ-factors) are set to 1,0

Static capacities are calculated with corrosion loss on outsides of steel parts assumed to 2,4 mm corresponding to 120 years design life with a corrosion rate of 2 mm per 100 years according to the Swedish Commission on Pile Research (Pålkommissionen) report 98 “Dimensioneringsanvisningar för slagna slanka stålpålar” table 7.7.

7.2 Capacity in ultimate limit state

Product range for Centrum rock point with static compression load bearing capacity in the ultimate limit state (ULS) is listed in table 1.

Table 1

Type of Centrum Pile Rock Point	*Dimension*	*Concrete cover*	*Tip diameter*	*Static compression load bearing capacity*			
				(1) Eccentricity = $\phi_{tip}/4$		*(1) Eccentricity = $\phi_{tip}/10$*	
				C40/50	*C50/60*	*C40/50*	*C50/60*
[-]	*[mmxmm]*	*[mm]*	*[mm]*	*[kN]*	*[kN]*	*[kN]*	*[kN]*
CP-RP 235-25	*235x235*	*25*	*60*	*1269*	*1531*	*1392*	*1685*
CP-RP 235-50	*235x235*	*50*	*60*	*1283*	*1531*	*1406*	*1685*
CP-RP 250-50	*250x250*	*50*	*60*	*1352*	*1585*	*1480*	*1761*
CP-RP 270-25-60	*270x270*	*25*	*60*	*1621*	*1621*	*1822*	*2091*
CP-RP 270-50-60	*270x270*	*50*	*60*	*1621*	*1621*	*1826*	*2091*
CP-RP 270-25-70	*270x270*	*25*	*70*	*1634*	*1964*	*1805*	*2189*
CP-RP 270-50-70	*270x270*	*50*	*70*	*1638*	*1964*	*1809*	*2189*
CP-RP 300-50-60	*300x300*	*50*	*60*	*1621*	*1621*	*1980*	*2091*
CP-RP 300-50-70	*300x300*	*50*	*70*	*1778*	*1964*	*1961*	*2283*
CP-RP 350-50	*350x350*	*50*	*70*	*2326*	*2326*	*2944*	*2952*
CP-RP 400-50	*400x400*	*50*	*70*	*2326*	*2326*	*2952*	*2952*

(1) Eccentricity on rock point is assumed to either 1/4 or 1/10 of the diameter of the rock point tip, ϕ_{tip}, according to Swedish Commission on Pile Research (Pålkommissionen) report 96:1 "Common Design Principles for Piles – Load capacity".

7.3 Capacity in serviceability limit state

Product range for Centrum rock point with static compression load bearing capacity in the serviceability limit state (SLS) is listed in table 2.

Table 2

Type of Centrum Pile Rock Point	*Dimension*	*Concrete cover*	*Tip diameter*	*Static compression load bearing capacity*			
				(1) Eccentricity = $\phi_{tip}/4$		*(1) Eccentricity = $\phi_{tip}/10$*	
				C40/50	*C50/60*	*C40/50*	*C50/60*
[-]	*[mmxmm]*	*[mm]*	*[mm]*	*[kN]*	*[kN]*	*[kN]*	*[kN]*
CP-RP 235-25	*235x235*	*25*	*60*	*1008*	*1008*	*1349*	*1426*
CP-RP 235-50	*235x235*	*50*	*60*	*1008*	*1008*	*1328*	*1426*
CP-RP 250-50	*250x250*	*50*	*60*	*1008*	*1008*	*1426*	*1426*
CP-RP 270-25-60	*270x270*	*25*	*60*	*1008*	*1008*	*1404*	*1404*
CP-RP 270-50-60	*270x270*	*50*	*60*	*1008*	*1008*	*1404*	*1404*

CP-RP 270-25-70	*270x270*	*25*	*70*	*1242*	*1242*	*1713*	*1908*
CP-RP 270-50-70	*270x270*	*50*	*70*	*1242*	*1242*	*1684*	*1933*
CP-RP 300-50-60	*300x300*	*50*	*60*	*1008*	*1008*	*1670*	*1670*
CP-RP 300-50-70	*300x300*	*50*	*70*	*1242*	*1242*	*1933*	*1933*
CP-RP 350-50	*350x350*	*50*	*70*	*1421*	*1421*	*2363*	*2363*
CP-RP 400-50	*400x400*	*50*	*70*	*1421*	*1421*	*2363*	*2363*

(1) Eccentricity on rock point is assumed to either 1/4 or 1/10 of the diameter of the rock point tip, ϕ_{tip}, according to Swedish Commission on Pile Research (Pålkommissionen) report 96:1 "Common Design Principles for Piles – Load capacity".

7.4 Requirements for obtaining capacities

Compression capacities in table 1 and 2 require correct installation of the rock point according to section 8.

Required lap length between rock point reinforcement and main reinforcement of the pile is ensured by ensuring that the distance between the end of pile reinforcement and the base plate is not greater than 40 mm.

Additional transverse reinforcement for obtaining static capacities are given in table 3. Table 3 applies for transverse reinforcement with $f_y \geq 390$ MPa.

Table 3

Type of Centrum Pile Rock Point	*Section area of transverse reinforcement A_{sv}*		*Distribution length from the end of pile reinforcement*
	C40/50	*C50/60*	
[-]	*[mm²]*	*[mm²]*	*[mm]*
CP-RP 235-25	*109*	*136*	*235*
CP-RP 235-50			
CP-RP 250-50	*131*	*163*	*250*
CP-RP 270-25-60	*128*	*161*	*270*
CP-RP 270-50-60			
CP-RP 270-25-70	*127*	*159*	*270*
CP-RP 270-50-70			
CP-RP 300-50-60	*184*	*230*	*300*
CP-RP 300-50-70	*182*	*227*	*300*
CP-RP 350-50	*181*	*226*	*350*
CP-RP 400-50	*312*	*377*	*400*

8. Working with the Centrum rock point

When handling the rock point, it is important to have health and safety in mind. As the rock point can be quite heavy, lifting equipment etc. to aid the operator might be necessary in the process.

8.1 Transportation & logistics

Rock points are delivered on pallets. For easy handling and optimum logistics. the rock points are secured to the pallets by means of strapping, PE-foil or similar.

When handling and un-packing the rock points, take care to ensure the stability of the stacked rock points during operation. Please note that lifting equipment can be necessary when handling the rock points.

8.2 Preliminary check

Before installation be sure to check that the correct model of rock point, pile cage/reinforcement etc. according to specifications is used, and that rock point tip is fitted properly with set screw tightened.

8.3 installing the rock point in the cage:

Joining the pile cage/reinforcement and the rock point, can be done in connection with the cage manufacturing or in the casting mold. If the rock point is installed in the cage, outside the casting mold, the rock point should be secured in the cage to prevent it from being dislodged during handling.

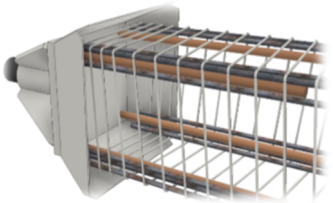


Figure A

Approximate weights for the Centrum rock point is listed in table 4.

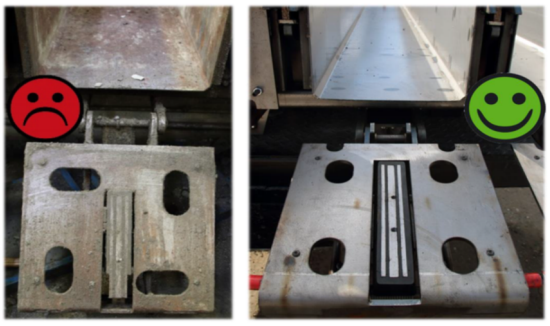
Table 4

Dimension	Weight in kg (approx.)
235	17,5
250	17,7
270	23,5
300	24,5
350	47
400	48

8.4 Preparing the mould for setting up.

8.4.1 Cleaning

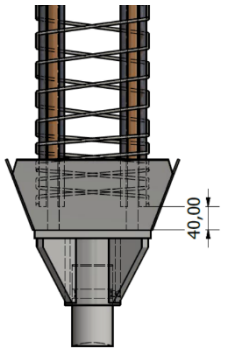
Before the cage and rock point is fitted in the casting mould, the mould and the mould hatch/fixture magnets must be checked to ensure they are clean, with no debris or remaining concrete etc. The rockpiont itself must be clean to ensure correct bond to concrete.



Figur B Clean magnets for correct installation before

8.5 Placing cage & rock point in the mould.

8.5.1 Positioning cage and rock point



The cage and rock point are fitted in the mould and positioned so that the distance between the rock point baseplate and the end of the cage /reinforcement is maximum 40mm. See figure C for clarification

This will ensure the correct lap distance between cage and rock point connection rods

8.5.2 Aligning the rock point in the mould.

To assist when aligning the rock point in the mould, a “rock point fixture” plate with centric fixating ring, is used. The plate is attached to the magnetic mould hatch or on a magnetic divider box to ensure that the tip of the rock point is positioned correctly. An example on a fixating plate is shown in figure D

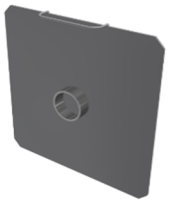


Figure D

Perpendicularity and angular deviation, according to EN 12794.

8.5.3 Aligning the cage in the mould.

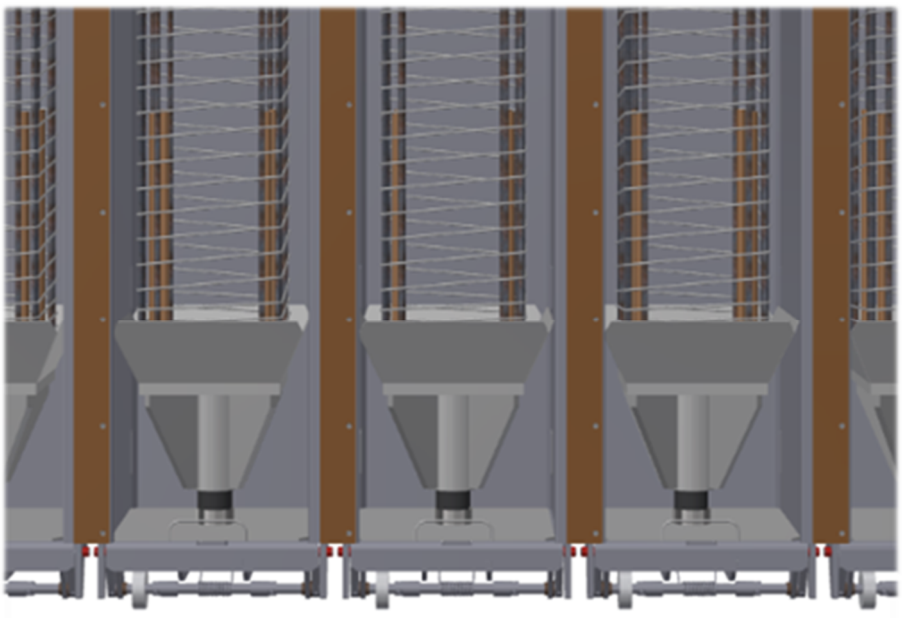
The cage should be aligned and fixed in the mould to ensure that the correct concrete cover is achived on all surfaces. Use appropriate spacers along the full cage length to secure the cage in the mould.

8.6 Cage ready to cast.

When cage / reinforcement, rock point and other inserts (pile splice, etc.) is inserted into the mould, aligned and fixed in place the mould can be closed. After a final check the mould is ready to be cast.

Figure E shows an example of a mould ready to cast.

Figure E



9. Final inspection

It is recommended to check alignment to pile axis (fig 9) and concentricity (figure 10)

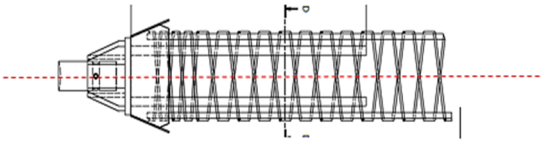


Figure 2 alignment to pile axis

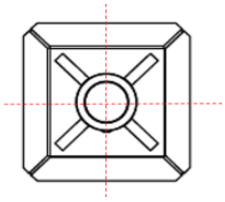


Figure 3 Concentricity

The robustness of combined rockpoint and pile depends on correct concrete praxis, concrete quality and strength of concrete. Thus, important to check and monitor these important parameters too.