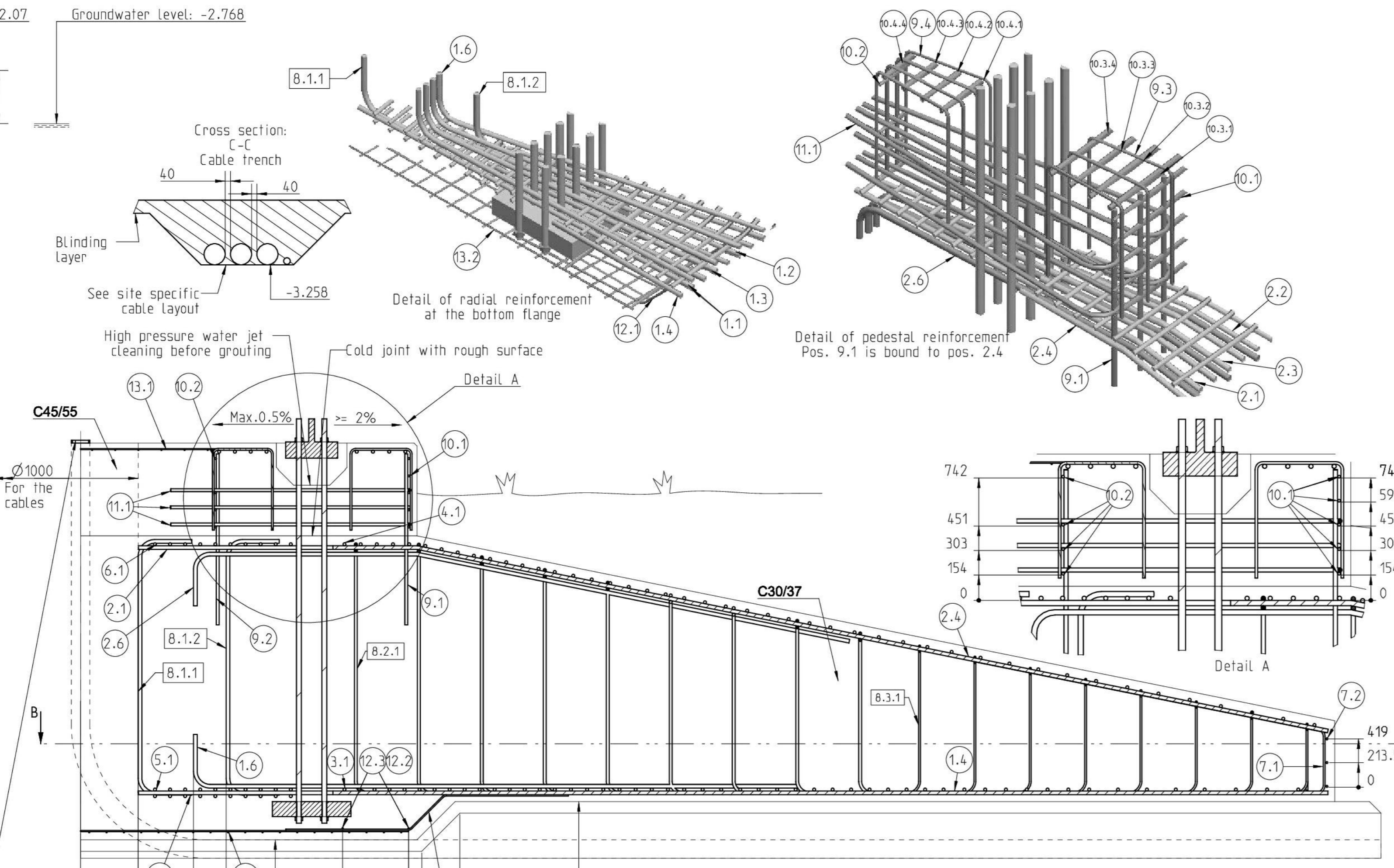
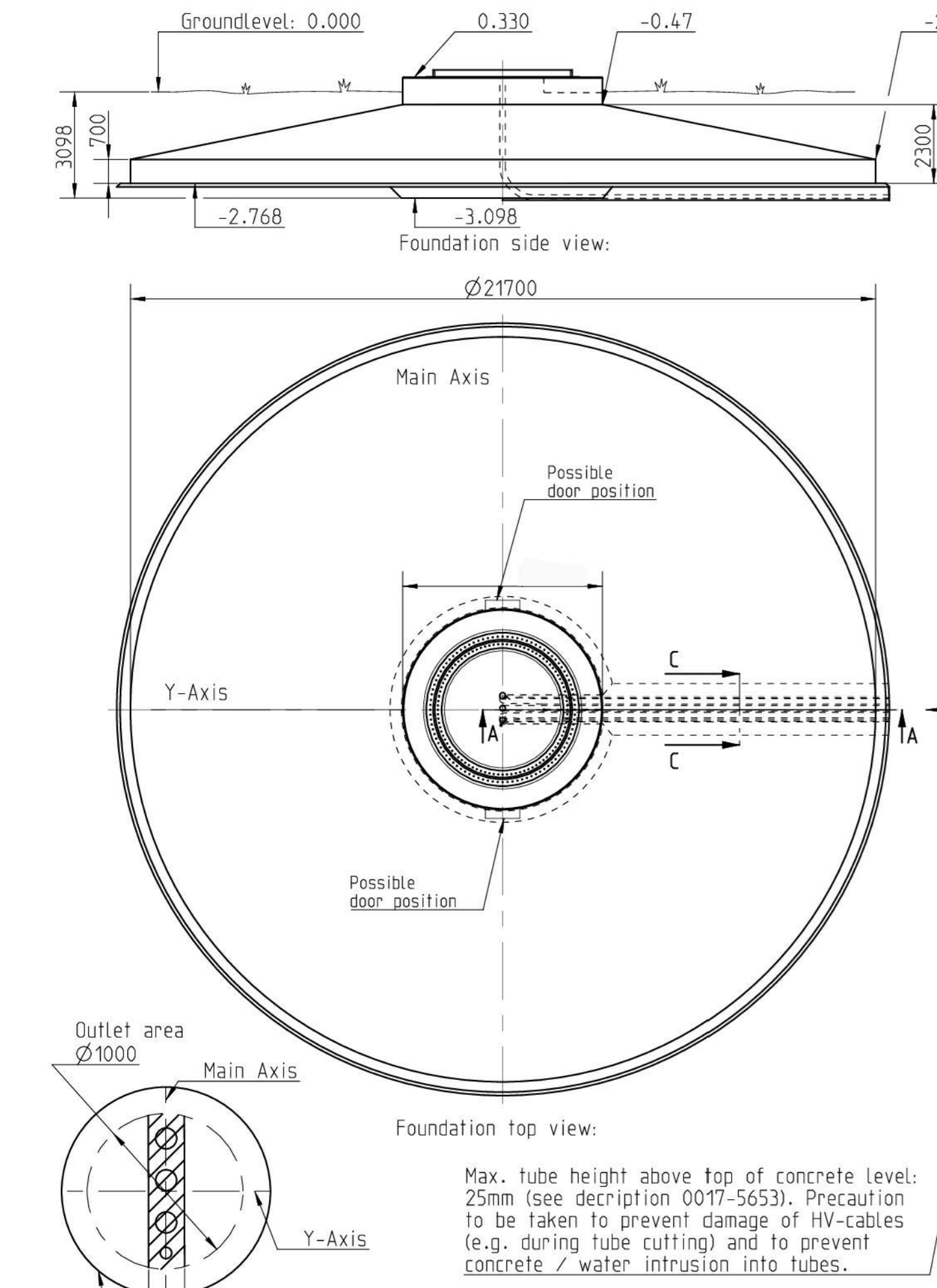


PARTICOLARE DEI SISTEMI DI ANCORAGGIO
(SCALE VARIE)



Information for design approval:
Loads: 0074-8846, calculation: 0075-1449, V02

Soil condition to be fulfilled:
Assumed characteristic parameters: friction angle 30° or undrained shear strength 55 kN/m².
Min. density of soil: 8 kN/m³, constant or backfilling 18 / 8 kN/m³.
Weight of backfilling is included in stability and shall not be removed.
Max. groundwater level: 2.768 m under terrain.
No drainage required.

Required rotational stiffness: min. 100 GNm/rad according to load report 0074-8846
Max. allowable tilting of the foundation due to permanent settlements: 3 mm/m
Max. plastic design soil pressure: 193 kN/m², constant over substitute area, with a PSF of 1.35 on wind 0.8 on tower weight and backfilling, 1.0 on foundation weight
Max. elastic soil pressure 223 kN/m² with PSF equal to 1.0 for all loads.
Soil investigations of the site shall be in accordance with EN 1997-1:2004, section 2-4, and must show compliance with the design assumption.

Specifications:
All works carried out acc. to EN 1992-1-1/AC:2010 Design of Concrete Structures, EN 1997-1/AC:2009 Geotechnical Design, general rules, EN 1997-2/AC:2010 Geotechnical Design, investigation and testing. General description: 0005-8491. Design life time: 20 years.

Anchor cage approval drawing 0074-9532.V01:
The anchor cage (incl. adjustment feet) is provided by Vestas as loose parts or assembled. The anchor cage shall be set upon the blinding layer and adjusted to the correct position vertically and horizontally by using the adjustment feet on the lower flange. During casting, which must be done simultaneously inside and outside the cage, great care must be taken to ensure that the cage does not displace and that the lower flange is in full contact with compacted concrete, below and above flange. Max. vertical deviation after concreting +/- 4 mm. Weight of anchor cage, app. 1900 kg total.
Anchors shall be post tensioned according to approval drawing 0074-9532.V01

Concrete:
Concrete works acc. to EN 12607:2009 "Execution of concrete structures".
The concrete must be prepared according to EN 206-1 in the strength class: C30/37 for plate, C45/55 for pedestal. Exposure class: XC4 / XD1 / XF3 / XF4
Maximum aggregate size in the area of the bottom and top reinforcement: 16mm (in other areas max. 32mm)
Blinding layer min. 100 mm and dimension is not represented in the drawing.
Low-creeping and low-shrink concrete for exterior buildings units, low heat of hydration
Min. required density of concrete due to stability: 2308 kg/m³.
Covering: Ccm = 60 mm against form work or blinding layer, Ccm = 110 mm against soil (no formwork). Concrete quality control according to EN 206-1.

Reinforcement:
Steel bars S500 ductility class B or C according to EN 10080 with min Fyk = 500 N/mm².

Grout:
Shrink grout, min. compression strength C90/105
Min. compression strength at time of post tension 64 N/mm² and after 1 day: 10 N/mm²
Post tension force: 228 kN equal to 80% of Fpk for the Ø 16-9 anchors and an elongation of 1.4 to 9.7 mm.

Cable conduits (PVC tubes) - NOT a Vestas delivery:
See general description in "Switchgear installation vs foundation tubes" 0017-5653.
See site specific cable layout for actual number and size of conduits.

Earthing:
See "Vestas Earthing System", esp. description 0019-2575 "Earthing on anchor cage foundation" incl. copper conductors, bolts, nuts and washers delivered with the anchor cage.

Reinforcement Cut and Bending List: 0075-1456.V02

Radial bars, bottom part:
1.1 23 pcs. Ø32 x 10290 mm, through anchors.
1.2 23 pcs. Ø32 x 9911 mm, through anchors.
1.3 48 pcs. Ø32 x 9911 mm, through anchors.
1.4 92 pcs. Ø32 x 8606 mm, outside anchors.
1.5 184 pcs. Ø32 x 5975 mm, outside anchors.
1.6 92 pcs. Ø32 x 5993 mm, above 1.1-1.3.

Radial bars, top part:
2.1 23 pcs. Ø32 x 10488 mm, through anchors.
2.2 23 pcs. Ø32 x 9974 mm, through anchors.
2.3 48 pcs. Ø32 x 1469 mm, through anchors.
2.4 92 pcs. Ø32 x 8764 mm, outside anchors.
2.5 N/A
2.6 92 pcs. Ø32 x 6110 mm, below 2.1-2.3.

Concentric bars outside anchors, bottom part:
3.1 #25 ring Ø4568, 3 pcs. L:5743 mm, outer ring no. 1.
3.2 #25 ring Ø2048, 6 pcs. L:11990 mm, outer ring no. 51.
See table in Cut & Bending List.

Concentric bars outside anchors, top part:
4.1 #25 ring Ø4568, 3 pcs. L:5154 mm, outer ring no. 1.
4.2 #25 ring Ø2048, 6 pcs. L:10951 mm, outer ring no. 45.
See table in Cut & Bending List.

Concentric bars inside anchors, bottom part, 1 layer below and 1 layer above pos. 1:
5.1 #25 ring Ø1288, 2 x 1 = 2 pcs. L:5035 mm, ring no. 1.
5.2 #25 ring Ø339, 1 x 2 = 4 pcs. L:3700 mm, ring no. 10.
5.3 #25 ring Ø1027 + 261 + 1, 1 = 1-10, ring no. 1. Total number of rings: 20. See Cut & Bending List.

Concentric bars inside anchors, top part, 1 layer above pos. 2:
6.1 #25 ring Ø1288, 1 x 1 = 1 pcs. L:5458 mm, ring no. 1.
6.2 #25 ring Ø3639, 1 x 3 = 3 pcs. L:5222 mm, ring no. 10.
6.3 #25 ring Ø1027 + 261 + 1, 1 = 1-10, ring no. 1. Total number of rings: 10. See Cut & Bending List.

Vertical bars, at edge:
7.1 368 pcs #16 x 932 mm, vertical bars of outer edge.
7.2 3 rings #16 x Ø21564, 3 x 6 = 18 pcs L:1851 mm, horizontal rings at outer edge (at pos. 7.1).
Shear locks and hair pins - see Cut and Bending list for correct lengths:
8.1 46 pcs #20 x 2846 mm, shear locks inside anchor cage (zone 1) - C-shaped.
8.2 306 pcs #25 x approx. 4671 mm (mean value), shear locks in punching zone (zone 2).
8.3 117 pcs #16 x approx. 2587 mm (mean value), shear locks in shear zone (zone 3).
8.4 306 pcs #25 x approx. 2810 mm (mean value), hair pins for all zone 2.
8.5 717 pcs #16 x approx. 1469 mm (mean value), hair pins for zone 3.

Vertical bars, and bows in pedestal:
9.1 92 pcs #25 x 1474 mm, vertical bar outside anchors.
9.2 23 pcs #25 x 1474 mm, vertical bar inside anchors.
9.3 92 pcs #20 x 1806 mm, outer bows, see Cut & Bending list.
9.4 92 pcs #20 x 1796 mm, inner bows, see Cut & Bending list.

Horizontal rings in pedestal:
10.1 5 rings #20 x Ø3683, 5 x 3 = 15 pcs L:6952 mm, at outer vertical bars pos 9.1.
10.2 4 rings #20 x Ø338, 4 x 1 = 4 pcs L:8346 mm, at inner vertical bars pos 9.2.
10.3 1 ring #25 x Ø5293, 1 x 3 = 3 pcs L:7200 mm, ring 1 under bow pos 9.3.
10.3.2 1 ring #25 x Ø5342, 1 x 3 = 3 pcs L:7008 mm, ring 2 under bow pos 9.3.
10.3.3 1 ring #25 x Ø5692, 1 x 3 = 3 pcs L:6712 mm, ring 3 under bow pos 9.3.
10.3.4 1 ring #25 x Ø5781, 1 x 3 = 3 pcs L:6416 mm, ring 4 under bow pos 9.3.
10.4 1 ring #25 x Ø3219, 1 x 2 = 2 pcs L:6468 mm, ring under bow pos 9.4.
10.4.2 1 ring #25 x Ø2945, 1 x 2 = 2 pcs L:5638 mm, ring 2 under bow pos 9.4.
10.4.3 1 ring #25 x Ø2672, 1 x 2 = 2 pcs L:5008 mm, ring under bow pos 9.4.
10.4.4 1 ring #25 x Ø2398, 1 x 1 = 1 pcs L:4378 mm, ring 4 under bow pos 9.4.

Hooks under grout trench (splitting bars):
11.1 138 pcs #25 x 3989 mm, banded 184.2 deg., see Cut & Bending list.

Z-Bars under the anchor flange:
12.1 92 pcs #12 x 2563 mm, under base flange, see Cut & Bending list for detailed geometry.
12.2 1 ring #12 x Ø5978, 1 x 3 = 3 pcs. L:6366 mm, ring placed on Z-bows pos. 12.1.
12.3 1 ring #12 x Ø4745, 1 x 3 = 3 pcs. L:5411 mm, ring placed on Z-bows pos. 12.1.

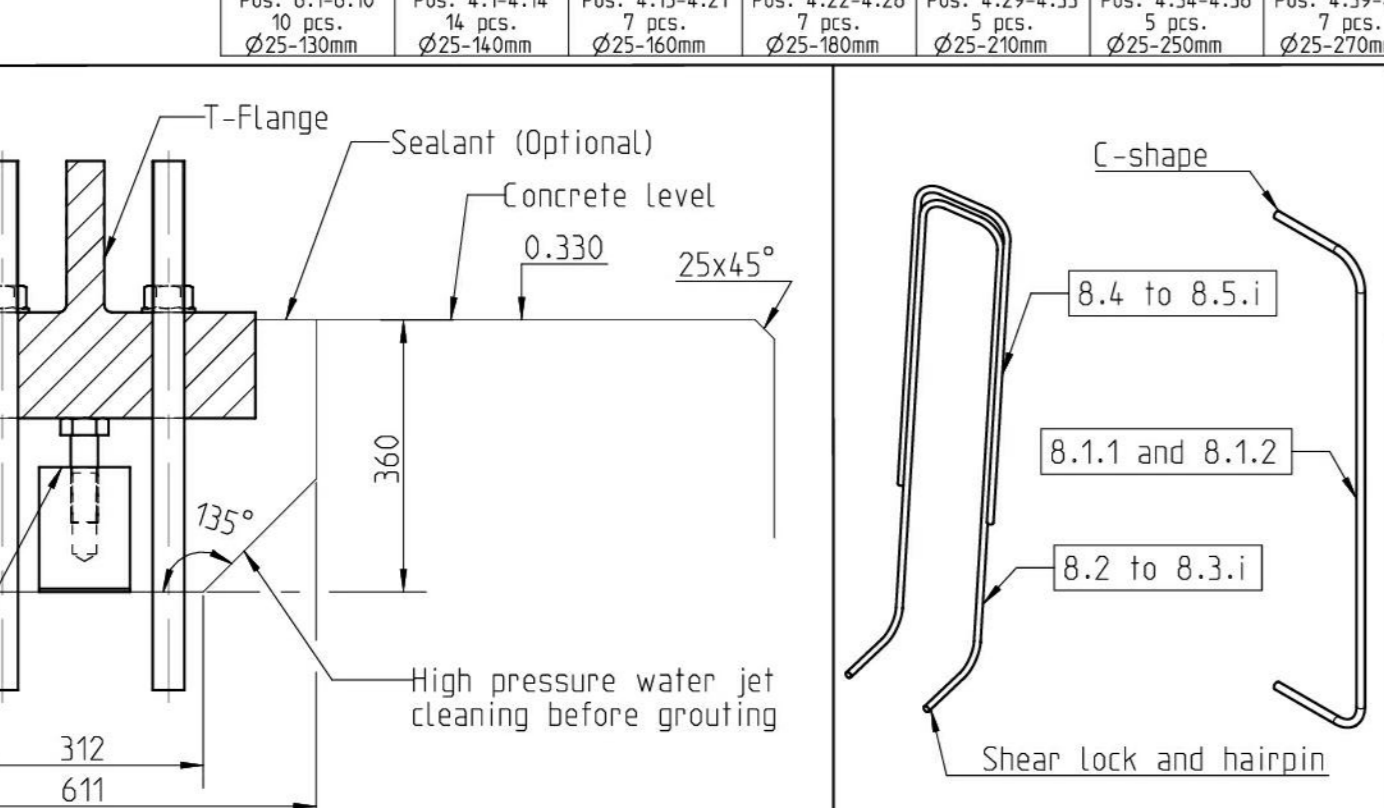
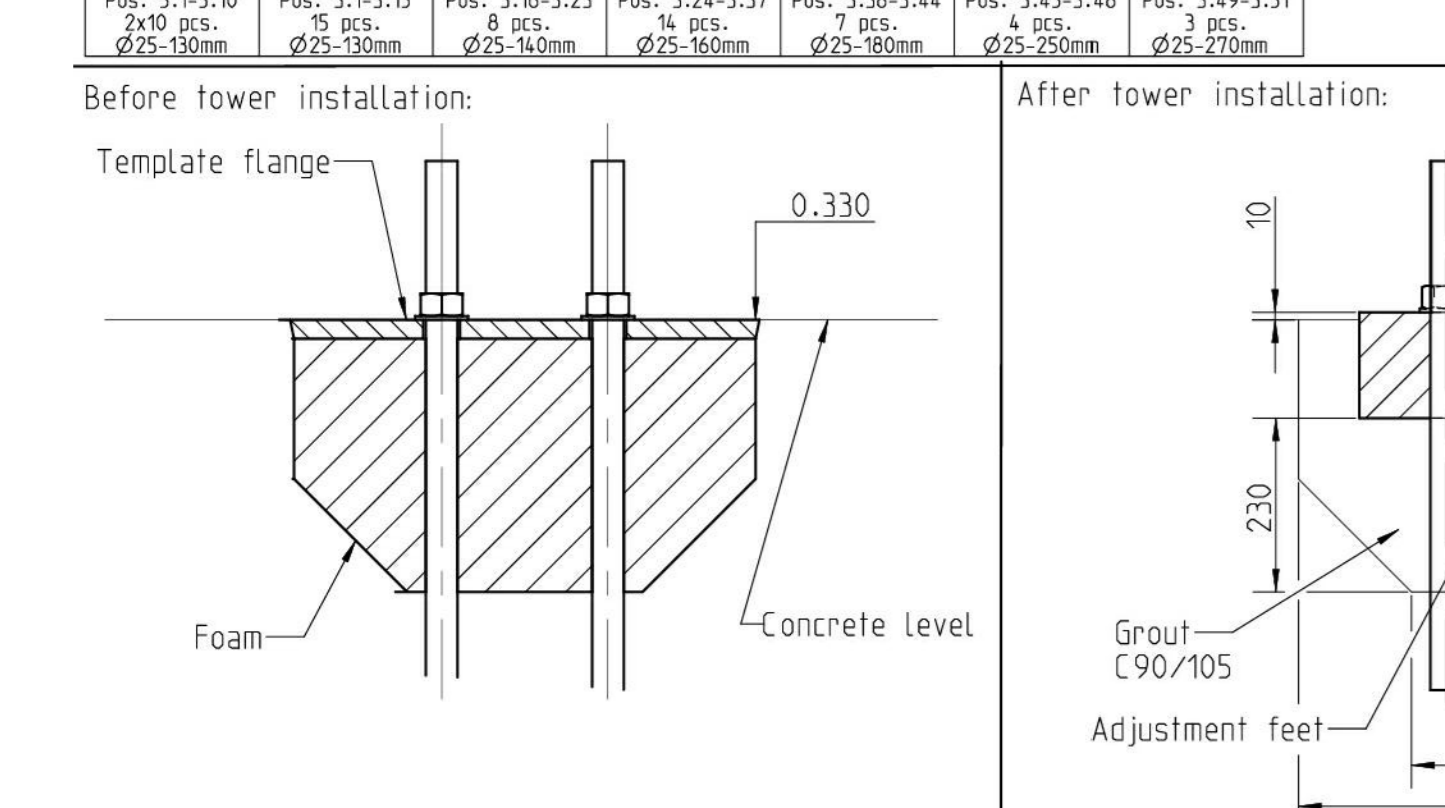
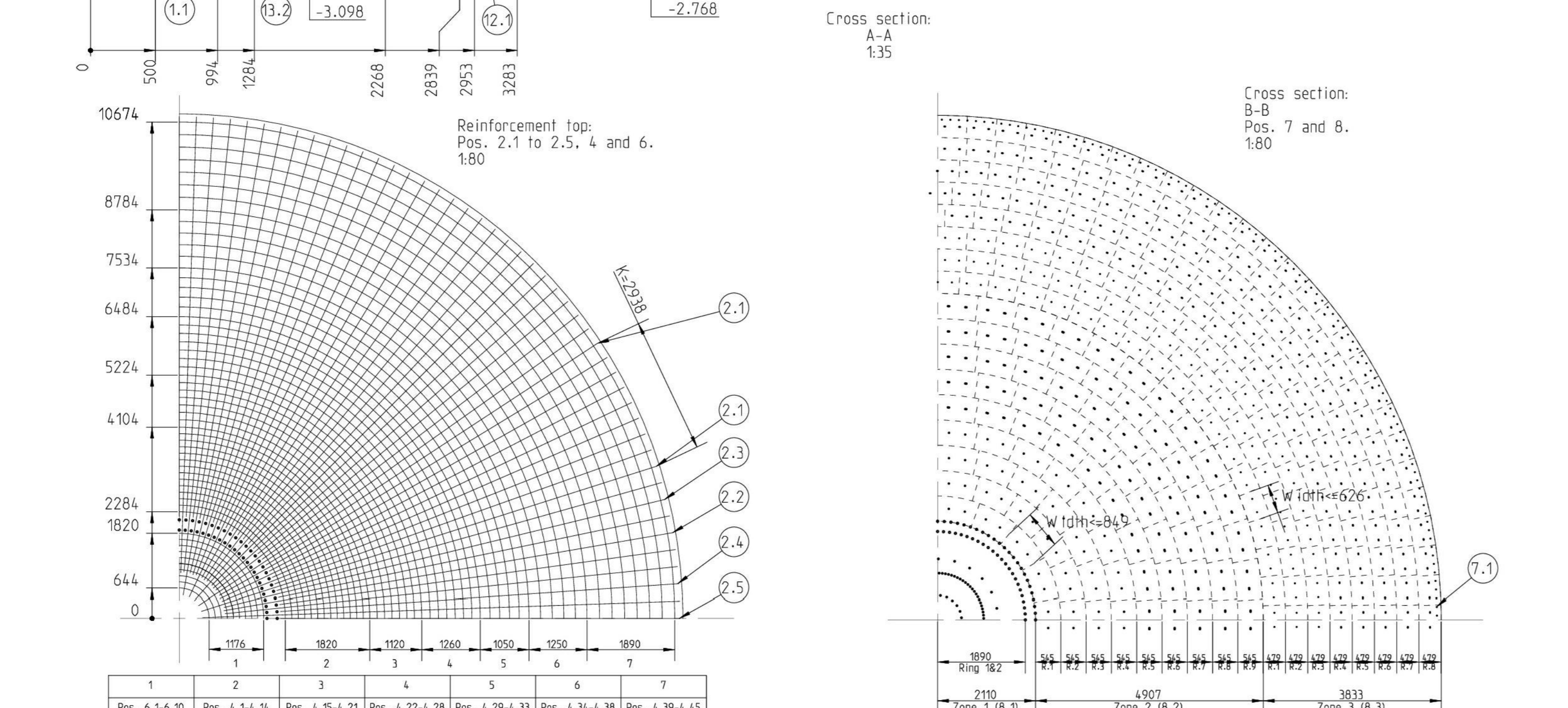
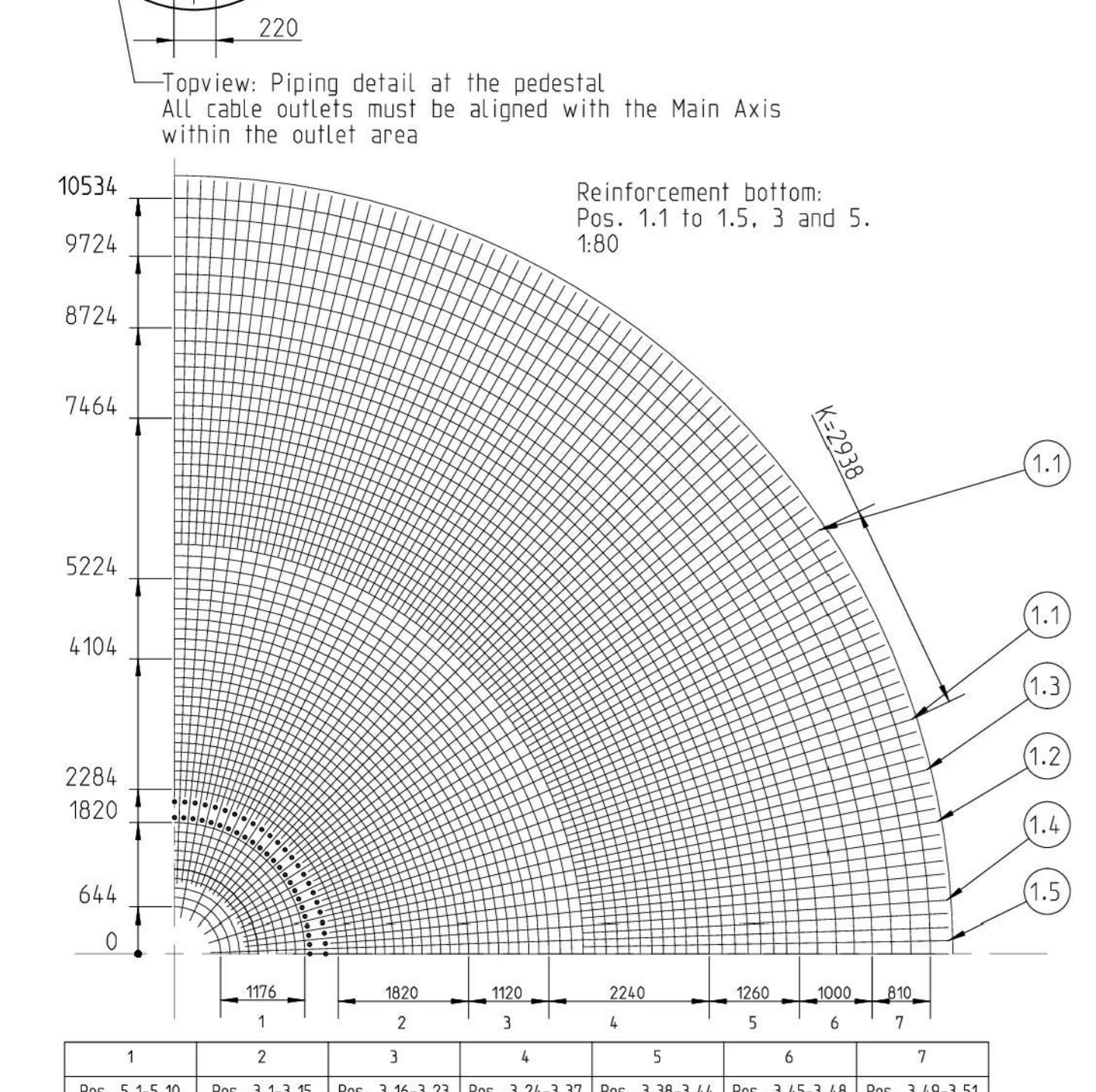
Shrinkage mesh, cut to match cable conduits and adjustment feet:
13.1 #2383 mm top reinforcement mesh ø10 / 150 mm or equivalent with min. 524 mm/m
13.2 #5678 mm bottom reinforcement mesh ø10 / 150 mm or equivalent with min. 524 mm/m

Tolerances:
All non specified tolerances: +/- 10 mm

Remarks:
Dimensions in mm. Reinforcement shall be tied with steel wire per 500 mm minimum, no welding permitted.
The anchor cage is rotated to place the door in the right direction.
Basic anchorage length for C30/37: Lb = 35.74 x Ø for good conditions.
Basic anchorage length for C45/55: Lb = 51.08 x Ø for other conditions.
Lap length: Ls = 1.4 x Lb. Bending diameters: 7 x Ø for Ø >= 20 mm, 4 x Ø for Ø < 20 mm.
All over lap of bars shall be staggered.
Banding and overlap lengths, bending diameters:

Size	Anchor	Overlap	Bending Ø	Remark
Ø32	1031	1465	N/A	Bottom radial bar (pos 1)
Ø32	1472	2061	740	Top radial bar (pos 2)
Ø32	882	959	N/A	Bottom concentric ring outside anchors (pos 3)
Ø25	979	1370	N/A	Top concentric ring outside anchors (pos 4)
Ø25	768	N/A	N/A	Bottom concentric ring inside anchors (pos 5)
Ø25	1008	988	N/A	Top concentric ring inside anchors (pos 6)
Ø20	715	1001	N/A	Concentric ring in pedestal (pos 10)
Ø20	191	500	N/A	Rings at foundation edge (pos 7-2)

Blinding layer 40 mm, concrete 553 mm, grout 1.75 m³, reinforcement 68 t, reinforcement ratio 123 kg/m³



Number and height of C-shaped bars, shear locks and hair pins (see also Cut and Bending List)

Zone	C-shape Ø32	Zone 1			Zone 2			Zone 3					
		Number	Pos.	Height	Number	Pos.	Height	Number	Pos.	Height			
Ring 1	23	8.1.1	2212	18	1	2116	1	1476	73	1	1231	1	593
Ring 2	23	8.1.2	2212	22	2	2113	2	1476	78	2	1135	2	593
Ring 3	-	-	-	26	3	2003	3	1476	82	3	1038	3	593
Ring 4	-	-	-	30	4	1893	4	1476	87	4	942	4	593
Ring 5	-	-	-	34	5	1783	5	1476	92	5	845	5	593
Ring 6	-	-	-	38	6	1673	6	1476	97	6	748	6	593
Ring 7	-	-	-	42	7	1563	7	1476	102	7	652	7	593
Ring 8	-	-	-	46	8	1453	8	1405	106	8	555	8	580
Ring 9	-	-	-	50	9	1344	9	1295	0	-	-	-	-
Ring 10	-	-	-	0	-	-	-	0	-	-	-	-	-
Ring 11	-	-	-	0	-	-	-	0	-	-	-	-	-
Ring 12	-	-	-	0	-	-	-	0	-	-	-	-	-

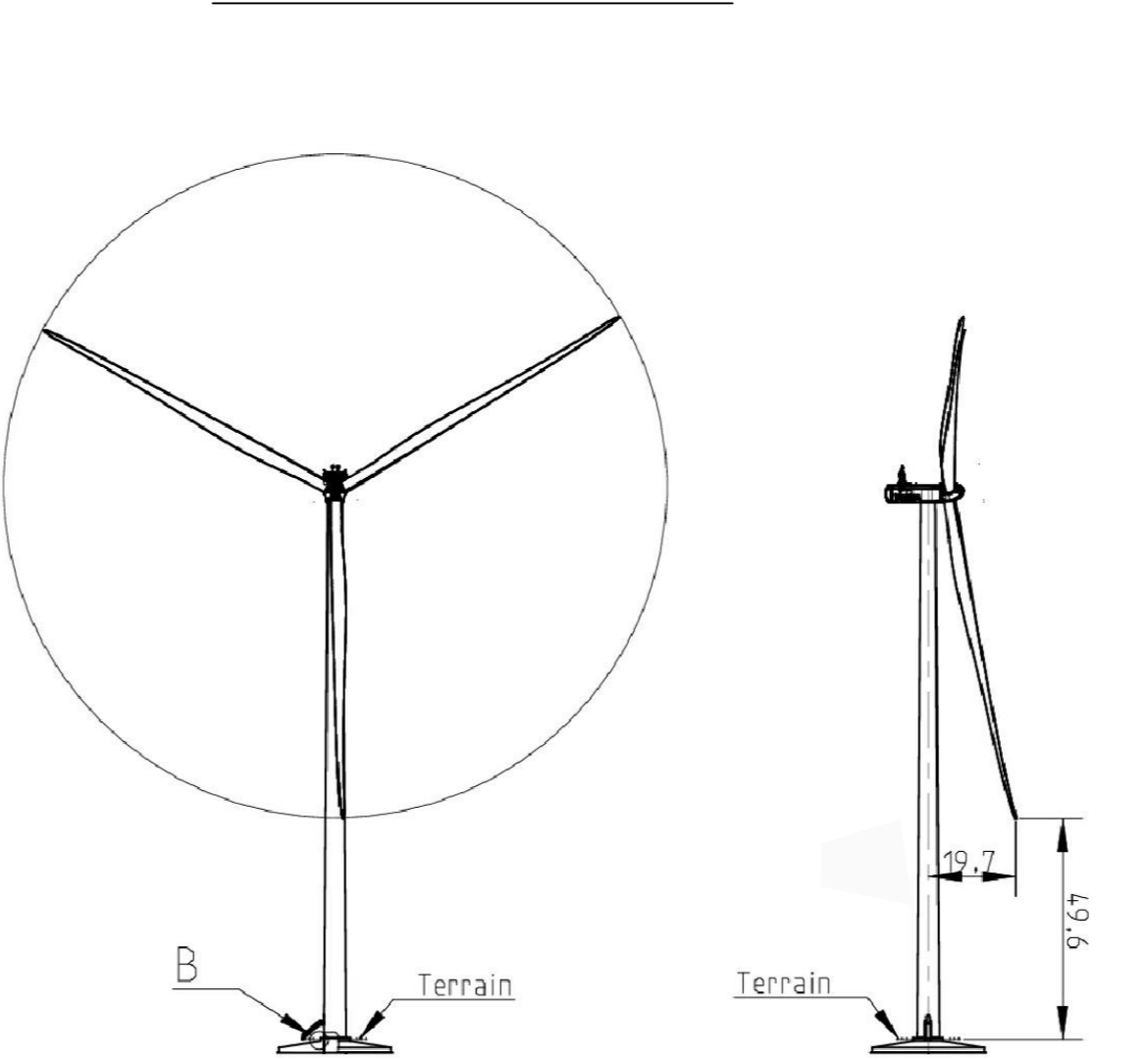
Tutte le dimensioni sono espresse in mm.

PALI DI FONDAZIONE:
per quanto riguarda il pinto di fondazione si rimanda all'elaborato specifico F0533AR08A_A.11 - Relazione preliminare sulle strutture.

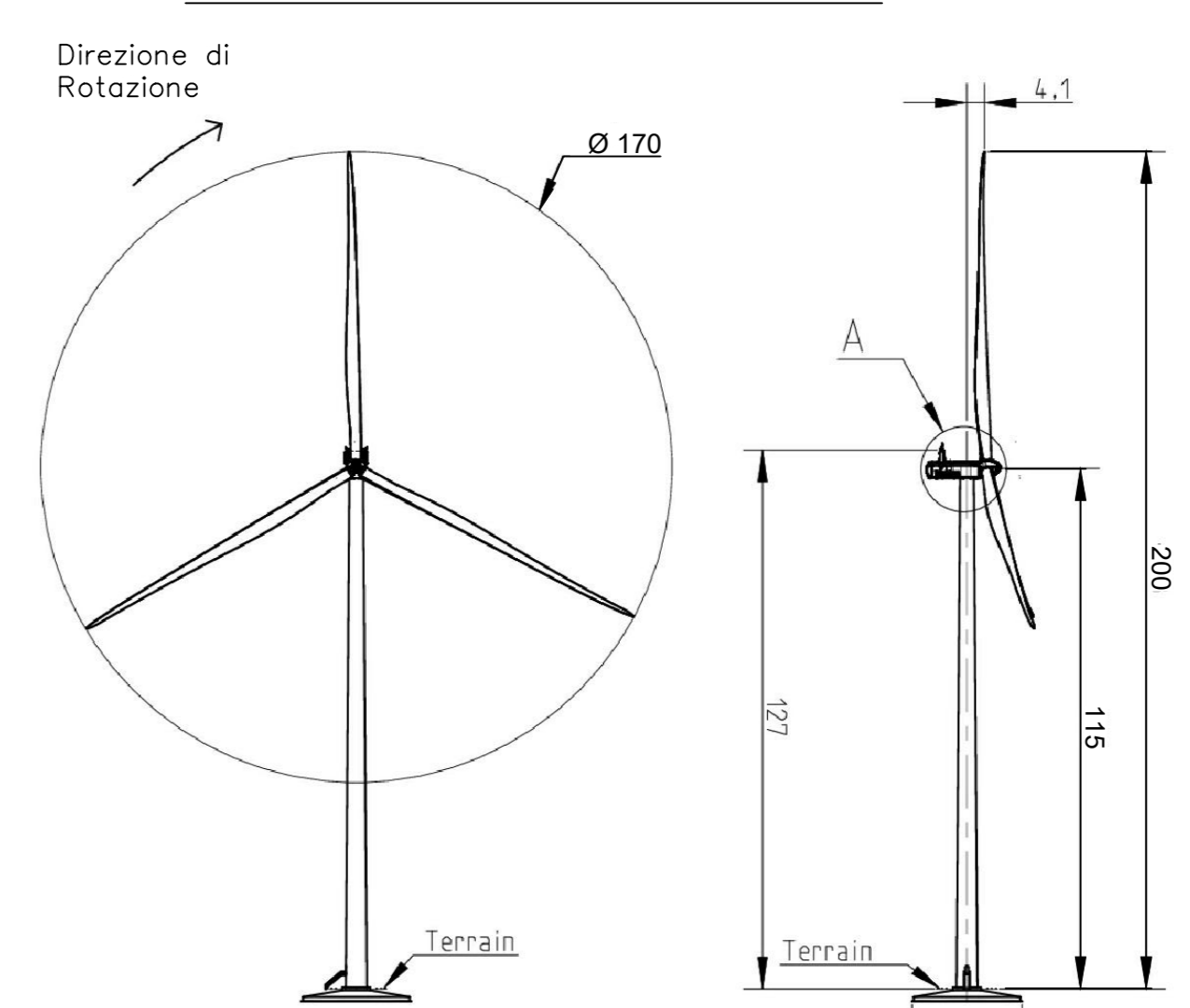
SEZIONE TIPO DEGLI AEROGENERATORI
(SCALE VARIE)

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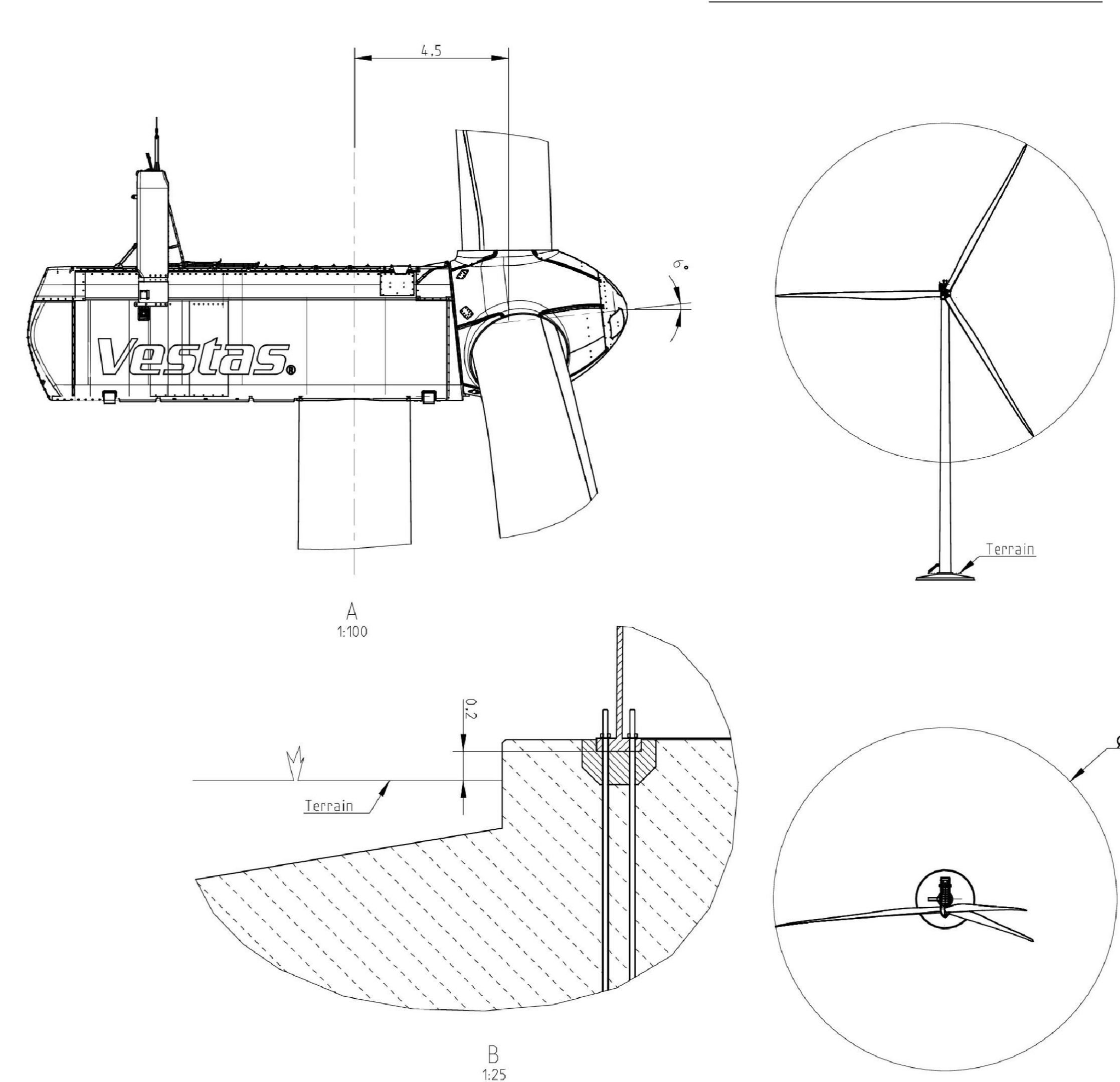
Pala in Posizione Y



Pala in Posizione Y inversa



Pala in Posizione Orizzontale



Il diametro della fondazione è indicativo e dipende dalle effettive condizioni del sito.

REGIONE BASILICATA **COMUNE DI MATERA** **PROVINCIA DI MATERA**

PROGETTO DEFINITIVO

Impianto di produzione di energia elettrica da fonte eolica "Serra Brizzolina" di potenza nominale pari a 47.6 MW

Titolo elaborato: **A.16.b.2 / A.16.b.3 / A.16.b.8 - Sezione tipo degli aerogeneratori, disegni architettonici e particolari di ancoraggio**

Codice elaborato: **F0533AT11A**

SCALE VARIE

Progettazione

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Arch. Gala TELESICA
Ing. Daniele GERARDI
Dott. Fede FRANCESCA NEGRO

Il Direttore Tecnico
(Ing. Giovanni DI SANTO)

Consulenza specialistica

ALNOR
Società certificata secondo le norme UNI-EN ISO 9001:2015 e UNI-EN ISO 14001:2015 per l'attività di servizi di ingegneria nei settori: civile, idraulica, acustica, energia, ambiente (settore INF. 34).

Committente

APOLLO Wind srl
Via della Stazione 7 39100 Bolzano (BZ)

Data	Descrizione	Redatto	Verificato	Approvato
Giugno 2023	Prima emissione	DGE	LZU	GDS

File sorgente: F0533AT11A - A.16.b.2 - A.16.b.3 - A.16.b.8 - Sezione tipo degli aerogeneratori, disegni architettonici e particolari di ancoraggio.dwg