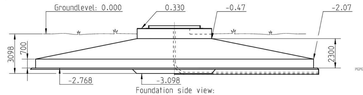
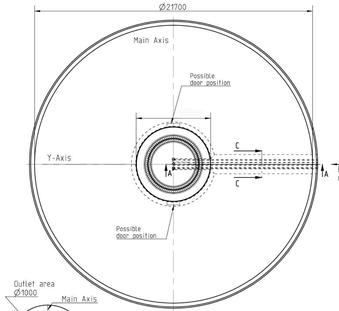
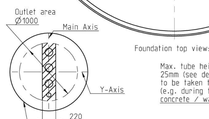
PARTICOLARE DEI SISTEMI DI ANCORAGGIO

(SCALE VARIE)



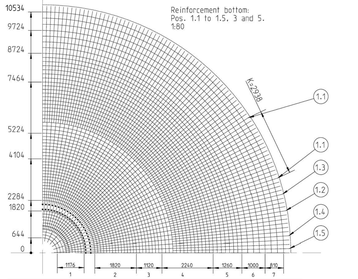




Foundation top view:

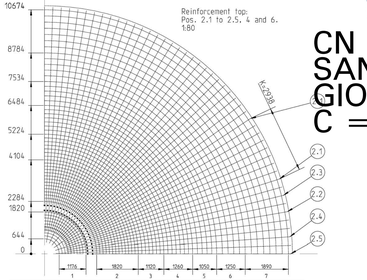
Max. tube height above top of concrete level: 25mm (see description 0017-5653). Precaution to be taken to prevent damage of HV-cables (e.g. during tube cutting) and to prevent concrete / water infrusion into tubes.

Topview: Piping detail at the pedestal. All cable outlets must be aligned with the Main Axis within the outlet area



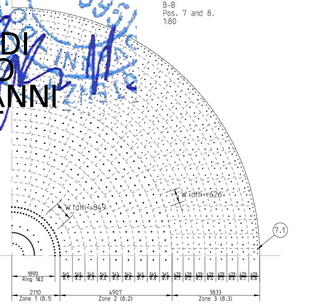
Reinforcement bottom: Pos. 1.1 to 1.5, 3 and 5. 1:80

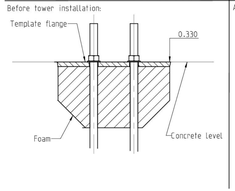
1	2	3	4	5	6	7
Pos. 1.1-1.5:10 @25-50mm	Pos. 1.1-1.5:15 @25-50mm	Pos. 3.1b:3.5 @25-50mm	Pos. 3.2b-3.3:25 @25-50mm	Pos. 3.2b-3.3:7 @25-50mm	Pos. 3.3b-3.4:6 @25-50mm	Pos. 3.4:5-3.4b @25-250mm	Pos. 3.4:5-3.5 @25-250mm

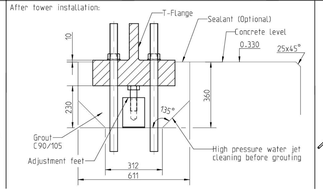


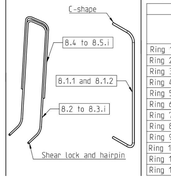
Reinforcement top: Pos. 2.1 to 2.5, 4 and 6. 1:80

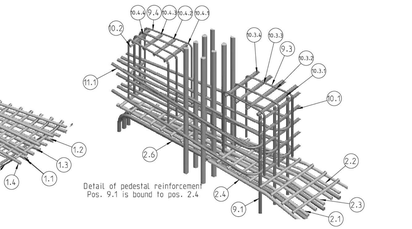
1	2	3	4	5	6	7
Pos. 4.1-4.1b @25-100mm	Pos. 4.1-4.1b @25-100mm	Pos. 4.1-4.1b @25-100mm	Pos. 4.1b-4.2:1 @25-100mm	Pos. 4.2-4.2b @25-100mm	Pos. 4.2b-4.3:8 @25-250mm	Pos. 4.3-4.3b @25-250mm

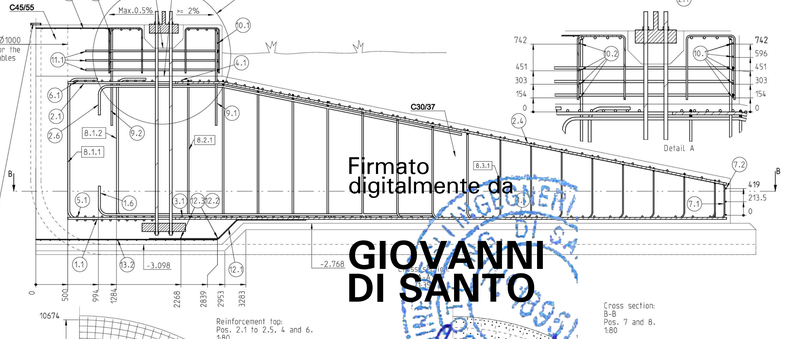












Firmato digitalmente da

GIOVANNI DI SANTO

CN = DI SANTO GIOVANNI
C = IT

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

Soil condition to be fulfilled:
Assumed characteristic soil parameters: friction angle 30° or undrained shear strength 55 KN/m².
Min. density of soil 18 / 8 KN/m³, density of back filling 18 / 8 KN/m³.
Weight of backfilling is included in stability and shall not be removed.
Max. ground water 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. allowable uplift: 0.3 m (square with 195 KN/m² resistant over pubol/footing area, with a PSF of 1.5) or 0.3 m (square with 195 KN/m² resistant over ring/footing area, with a PSF of 1.5) for ultimate weight
Max. elastic soil pressure 225 KN/m² with PSF equal to 1.0 for ultimate 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 at 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. 19600 kg total.
Anchors shall be post tensioned according to approval drawing 0074-9532.V01

Concretes:
Concrete works acc. to EN 13670:2009 "Execution of concrete structures".
The concrete must be composed, mixed and prepared according to EN 206-1 in the strength class C30/37 with the durability classes XC4 (outside) and XC2 (inside) / XD1 / XF1 / XA1 / XA1
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: 2338 kg/m3.
Covering: Cnom = 60 mm against form work or blinding layer; Cnom = 110 mm against soil (no formwork).
Concrete quality control according to EN 206-1.

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

Grouts:
Non-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: 628 KN equal to 56% of Fuk for the Gr 10.9 anchors and an elongation of 7.4 to 9.3 mm.

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

Earthing:
See "Vestas Earthing System", exp. 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 9816 mm, through anchors.
1.3 46 pcs. Ø32 x 9311 mm, through anchors.
1.4 92 pcs. Ø32 x 8608 mm, outside anchors.
1.5 184 pcs. Ø20 x 5079 mm, outside anchors.
1.6 92 pcs. Ø32 x 5090 mm, above 1.1-1.3.

Radial bars, top part:
2.1 23 pcs. Ø32 x 10444 mm, through anchors.
2.2 46 pcs. Ø32 x 9949 mm, through anchors.
2.3 46 pcs. Ø32 x 9469 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 ø25 ring Ø4568, 8 pcs. L:37243 mm, outer ring no. 1.
3.5i ø25 ring Ø21060, 6 pcs. L:11990 mm, outer ring no. 51.
See table in Cut & Bending List.

Concentric bars outside anchors, top part:
4.1 ø25 ring Ø4568, 2 pcs. L:14154 mm, outer ring no. 1.
4.4b ø25 ring Ø21348, 7 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 ø25 ring Ø1888, 2 x 1 / 2 pcs. L:5035 mm, ring no. 1.
5.10 ø25 ring Ø3639, 2 x 2 / 4 pcs. L:6704 mm, ring no. 10.
5.1 ø25 ring Ø1027 + 261 * i, i = 1-10, ring no. i. Total number of rings: 20. See Cut & Bending list.

Concentric bars inside anchors, top part, 1 layer above pos 2:
6.1 ø25 ring Ø1888, 3 x 1 / 3 pcs. L:5458 mm, ring no. 1.
6.10 ø25 ring Ø3639, 1 x 3 / 3 pcs. L:5222 mm, ring no. 10.
6.1 ø25 ring Ø1027 + 261 * i, i = 1-10, ring no. i. Total number of rings: 10. See Cut & Bending list.

Vertical bars at edge
7.1 368 pcs ø16 x 932 mm, vertical bars at outer edge.
7.2 3 rings ø16 x Ø21564, 3 x 6 = 18 pcs L:11851 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 x32 x 2966 mm, shear locks inside anchor cage (zone 1) - C-shaped.
8.2 306 pcs x25 x approx. 4671 mm (mean value), shear locks in punching zone (zone 2).
8.3 717 pcs ø16 x approx. 2697 mm (mean value), shear locks in shear zone (zone 3).
8.4 306 pcs x25 x approx. 2910 mm (mean value), hair pins for all zone 2.
8.5 717 pcs ø16 x approx. 1469 mm (mean value), hair pins for zone 3.

Vertical bars and boxes in pedestal
9.1 92 pcs x25 x 1474 mm, vertical bar outside anchors.
9.2 23 pcs x25 x 1474 mm, vertical bar inside anchors.
9.3 92 pcs x20 x 1806 mm, outer bows, see Cut & Bending list.
9.4 92 pcs x20 x 1798 mm, inner bows, see Cut & Bending list.

Horizontal rings in pedestal
10.1 3 rings x20 x Ø5683, 3 x 3 = 15 pcs L:6552 mm, at outer vertical bars pos 9.1.
10.2 4 rings x20 x Ø2338, 4 x 1 = 4 pcs L:8346 mm, at inner vertical bars pos 9.2.
10.3.1 1 ring x25 x Ø3623, 1 x 3 = 3 pcs L:17000 mm, ring 1 under bow pos 9.3.
10.3.2 1 ring x25 x Ø3342, 1 x 3 = 3 pcs L:15606 mm, ring 2 under bow pos 9.3.
10.3.3 1 ring x25 x Ø3061, 1 x 3 = 3 pcs L:14212 mm, ring 3 under bow pos 9.3.
10.3.4 1 ring x25 x Ø2781, 1 x 3 = 3 pcs L:12818 mm, ring 4 under bow pos 9.3.
10.4.1 1 ring x25 x Ø3219, 1 x 2 = 2 pcs L:14468 mm, ring 1 under bow pos 9.4.
10.4.2 1 ring x25 x Ø2945, 1 x 2 = 2 pcs L:13038 mm, ring 2 under bow pos 9.4.
10.4.3 1 ring x25 x Ø2672, 1 x 2 = 2 pcs L:11608 mm, ring 3 under bow pos 9.4.
10.4.4 1 ring x25 x Ø2398, 1 x 1 = 1 pcs L:10945 mm, ring 4 under bow pos 9.4.

Hooks under grout trench (splitting bars)
11.1 138 pcs x25 x 3989 mm, bended (R4.2 deg., see Cut & Bending list.

Z-Bars under the anchor flange
12.1 92 pcs x12 x 2561 mm, under base flange, see Cut & Bending list for detailed geometry.
12.2 1 ring x12 x Ø5678, 1 x 3 = 3 pcs. L:4366mm, ring placed on 2-bows pos. 12.1.
12.3 1 ring x12 x Ø4166, 1 x 3 = 3 pcs. L:3411mm, ring placed on 2-bows pos. 12.1.

Shrinkage mesh, cut to match cable conduits and adjustment feet
13.1 ø2383 mm top reinforcement mesh ø10 / 150 mm or equivalent with min. 524 mm²/m
13.2 ø5678 mm bottom reinforcement mesh ø10 / 150 mm or equivalent with min 524 mm²/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 position.
Anchor cage, approval drawing 0074-9532.V01 is the binding conditions.
Basic anchorage length for C30/37: la = 51.0d x Ø for other conditions.
Lap length: Ls = 1.4 x la. Bending diameters: 7 x Ø for Ø >= 20 mm, 4 x Ø for Ø < 20 mm.
All overlap of bars shall be staggered.

Zone 1 – C-shape Ø32 / Zone 2 Ø25 / Zone 3 Ø16

	Zone 1 Number	Zone 1 Pos.	Zone 1 C-shape Height	Zone 2 Number	i	Zone 2 Shear locks Height Pos. 8.2.i	Zone 2 Hairpins Height Pos. 8.4.i	Zone 3 Number	i	Zone 3 Shear locks Height Pos. 8.3.i	Zone 3 Hairpins Height Pos. 8.5.i
Ring 1	23	8.1.1	2212	18	1	2116	1476	73	1	1231	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	-	-	- -

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

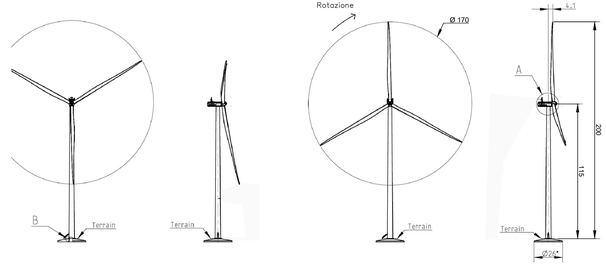
Tutte le dimensioni sono espresse in mm.

PALI DI FONDAZIONE:
al di sotto del plinto è prevista la realizzazione di n. 12 pali trivellati in c.a. (cls tipo C25/30, acciaio tipo B450C), di diametro pari a 0.80 m e lunghezza 20.00 m; essi saranno disposti in maniera circolare (un palo ogni 30°), la distanza tra l'asse dei pali ed il bordo esterno del plinto sarà pari a 1.00 m.
La gabbia di armatura sarà composta da n. 12F20, spirale F8/20 cm.

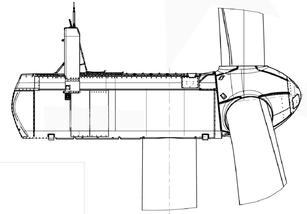
SEZIONE TIPO DEGLI AEROGENERATORI

(SCALE 1:1500)

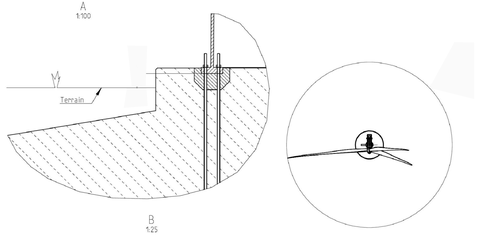
Tutte le dimensioni sono espresse in metri.



Pala in Posizione Orizzontale



A
1:100



B
1:25

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

REGIONE SICILIA
PROVINCIA DI TRAPANI
COMUNE DI TRAPANI

AUTORIZZAZIONE UNICA ex d.lgs. 387/03

Progetto definitivo per la realizzazione del parco eolico "GUARINE FARDELLA" e relative opere connesse nel comune di TRAPANI (Tp)

Titolo elaborato

RS06EPD0013A0-Sezioni tipo aerogeneratori e particolari fondazioni

Codice elaborato			
COMMESSA	FASE	ELABORATO	REV.
F0429	B	T14	A

Riproduzione o consegna a terzi solo dietro specifica autorizzazione

Scala: —

DATA	DESCRIZIONE	REDATTO	VERIFICATO	APPROVATO
Novembre 2021	Prima emissione	FTR	GZIS	GMA

Proponente

Wind Guarine Fardella srl
Via Durini, 9
20122 Milano (MI)

Progettazione

F4 Ingegneria srl
Via Di Giura - Centro direzionale, 85100 Potenza
Tel: +39 0971 1944797 - Fax: +39 0971 55452
www.f4ingegneria.it - f4ingegneria@pec.it

Il Direttore Tecnico
(Ing. Giovanni DI SANTO)

Società certificata secondo la norma UNI-EN ISO 9001:2015 per l'erogazione di servizi di ingegneria nei settori: civile, idraulica, acustica, energia, ambiente (settore IAF: 34).