REGIONE AUTONOMA DELLA SARDEGNA
PROVINCIA DI SASSARI
Comuni di:


Buddusò


Pattada

# REALIZZAZIONE DI UN PARCO EOLICO NEI COMUNI DI BUDDUSÒ E PATTADA COSTITUITO DA 12 AEROGENERATORI DI 6,6 MW CIASCUNO E POTENZA COMPLESSIVA PARI A 79,2 MW

## VALUTAZIONE D'IMPATTO AMBIENTALE

TITOLO:

FONDAZIONE GENERATORE TIPO

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# Estimated Foundation Design T135-54A

# SG 6.6-170

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# 1. Purpose

This document presents the estimated foundation design dimensions for SG 6.6-170 T135-54A based on the foundation design loads summarized in [Ref 1]

# 2. Soil properties

| | |
|---|---|
| Phreatic level | NO |
| Backfill soil density [kg/m$^3$] | 1800 |
| Bearing capacity [kg/cm$^2$] | 6 |
| Bearing capacity SF for extreme factored loads | 2 |
| Friction angle [º] | 30 |
| Static elastic module [MPa] | 75 |
| Dynamic elastic module [MPa] | 200 |
| Poisson coefficient | 0.3 |

# 3. Concrete material properties

| | CLEANING CONCRETE | SLAB CONCRETE | PEDESTAL CONCRETE |
|---|---|---|---|
| Concrete type | C20/25 | C35/45 | C50/60 |
| Density [kg/m$^3$] | 2500 | 2500 | 2500 |
| fck [MPa] | 20 | 35 | 50 |
| Arid max. size [mm] | 20 | 20 | 20 |
| Elastic module [MPa] | 29961.95 | 34077.14 | 37277.87 |
| Poisson coefficient | 0.20 | 0.2 | 0.2 |
| Thickness [m] | 0.10 | | |

# 4. Steel material properties

| | |
|---|---|
| Type | B500S |
| Density [kg/m$^3$] | 7850 |
| fyk [MPa] | 500 |
| Elastic module [MPa] | 200000 |
| Covering [mm] | 50 |

# 5. Material safety factors

| | |
|---|---|
| Concrete | 1.5 |
| Steel | 1.15 |

# 6. Foundation pre-dimensioning

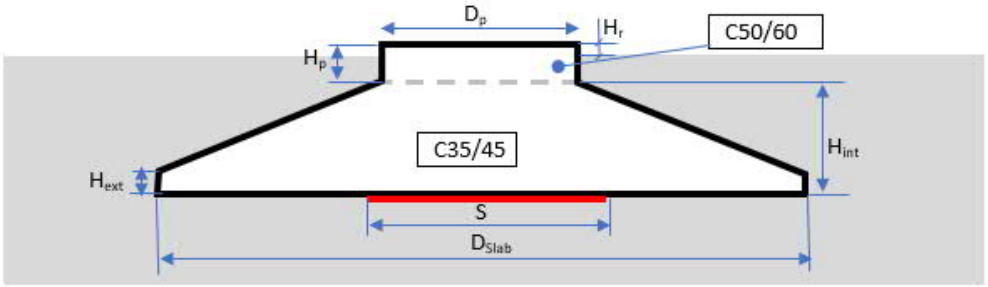
The verifications carried out to establish the pre-dimensioning values of the foundation are:

| Verification | SF | Load type considered |
|---|---|---|
| Overturning | 1.52 | Extreme factored loads |
| Sliding | 10.48 | Extreme factored loads |
| Soil bearing capacity | 1.01 | Extreme factored loads |
| Settlement | 2.26 | Characteristic loads |
| GAP COG | 1.78 | Characteristic loads |
| GAP 100% | 1.00 | Quasi permanent loads |
| Rotational Stiffness | 2.20 | Quasi permanent loads |

* Peak pressure at the bottom of the foundation is 3.33 kg/cm$^2$

# 7. Geometry definition

Main dimensions of the foundation:




| | |
|---|---|
| $D_{slab}$ [m] | 24.3 |
| $H_{ext}$ [m] | 0.5 |
| $H_{int}$ [m] | 3.0 |
| $D_p$ [m] | 6.3 |
| $H_p$ [m] | 0.6 |
| $H_r$ [m] | 0.1 |
| S [m] | 8.5 |

This foundation design needs 3500mm bolts length.

# 8. Bill of materials

Calculating the quantities requires some assumptions as:

- Anchored bolts interface has not been considered. Grout quantity, anchor bolts and templates are not included in the estimation.
- Calculating the reinforcement of anchor bolt interface is preformed according to other previous designs, medium diameter in tower base and bending moment.

| | |
|---|---|
| Concrete [m$^3$] | 763.24 |
| Slab reinforcement steel [kg] | 63589 |
| Interface/pedestal reinforcement steel [kg] | 20820 |
| Total reinforcement steel [kg] | 84408 |
| Excavation [m$^3$] | 2673 |
| Backfill compaction [m$^3$] | 1867 |
| Formwork [m$^2$] | 38.2 |
| Cleaning concrete [m$^3$] | 46.38 |
| Soft soil area (EPS) [m$^2$] | 56.75 |

# 9. Masses & moment of inertia of foundation

| | |
|---|---|
| Mass of Concrete [kg] | 1908093.4 |
| Mass of stabilizing Backfill [kg] | 1553533.3 |
| Foundation Inertia X [kg $m^2$] | 138766597.3 |
| Foundation Inertia Y [kg $m^2$] | 138766597.3 |
| Foundation Inertia Z [kg $m^2$] | 243887177.7 |

# 10. Appendices

| Appendix No | Title |
|---|---|
| [Ref 1] | D2916870_PCD SG 6.6-170 Foundation loads T135-54A |

# 11. Abbreviations and definitions

| Abbreviation | Description |
|---|---|
| $D_{slab}$ | Diameter of the Slab |
| $H_{ext}$ | Outer edge height |
| $H_{int}$ | Inner edge height |
| $D_p$ | Pedestal diameter |
| $H_p$ | Pedestal height |
| $H_r$ | Pedestal height over ground level |
| S | Diameter of soft soil (EPS) |