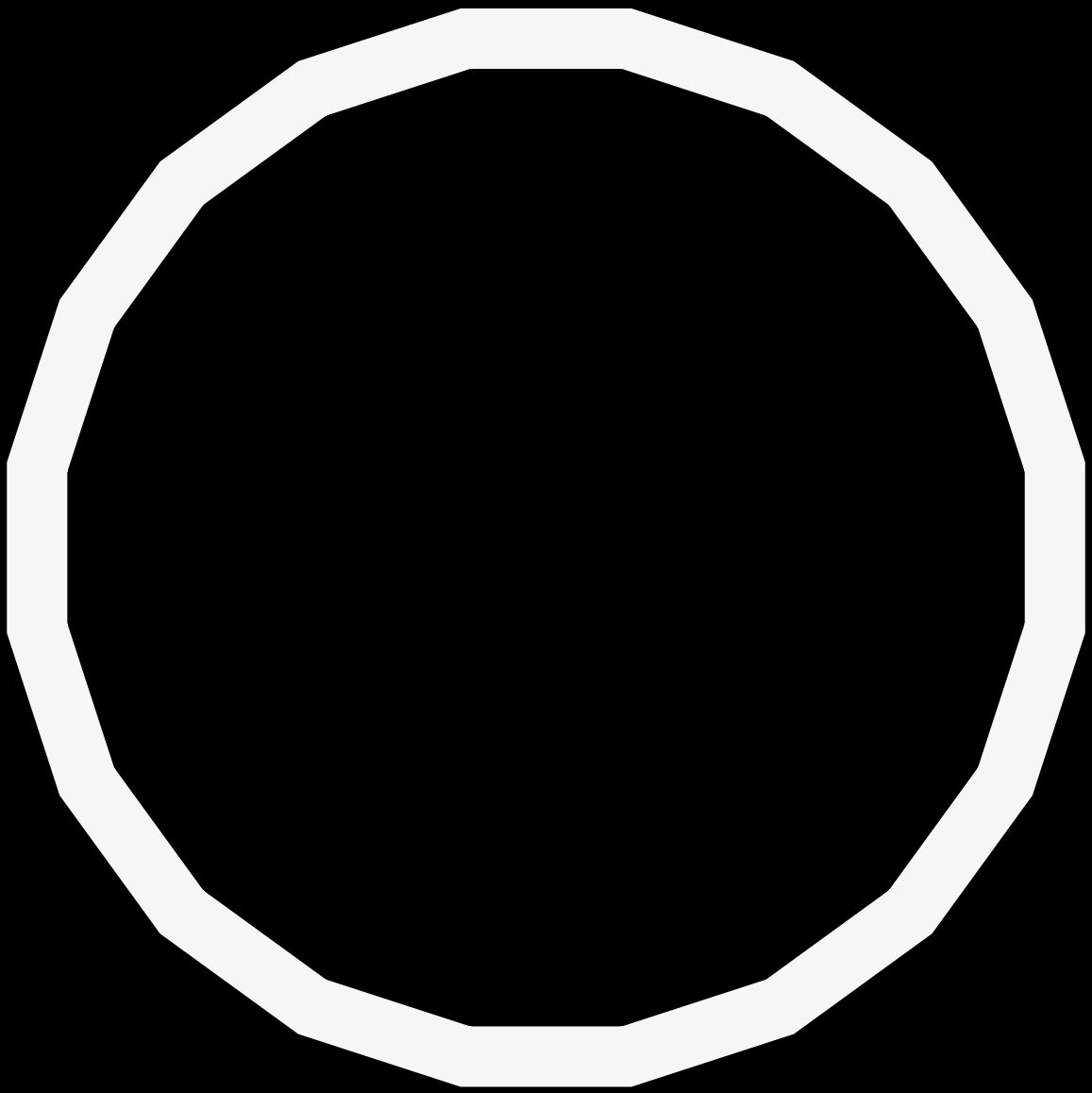
O FELIZ

# STEEL TOWERS

**PLATFORM | CROSS PIECE | MOBILE CROWN**



O FELIZ

# COMPANY

***Where we come from, who we are and what we do.***

Headquartered in Braga and with more than 6 decades of experience in its field, O FELIZ - Metalomecânica is a company specialized in metallic construction, sheet profiling, cutting and bending of sheets, construction of lighting columns and communication towers, metalworking in stainless steel and laser cutting.

A policy of continuous investment in state of the art equipment and a focus on highly qualified and competent staff allows the company to maintain a production capacity and an immediate response to the market's demands and requests, making it a reference in its fields of action.

With a portfolio of well-known projects and clients, the company has the required knowledge and means to serve in the global market, with solutions starting at the conception and elaboration of the project, all the way to the construction and final assembly.

By focusing on the efficiency of the procedures and keeping a strong market orientation, the company has been able to establish itself in an extremely competitive market, conquering its customer's trust due to the quality of the final product and the ability to follow through within the deadlines.

With a growth strategy aimed at internationalization, O FELIZ - Metalomecânica exports to several countries and has an industrial unit in Angola which has production capacity and the ability to offer solutions for the market's needs and requests.

# QUALITY POLICY

***Being successful is being happy.***

Working in an extremely competitive market, where clients are more and more demanding, the Administration of O FELIZ believes that only with a real involvement, a strong market orientation, the optimization of all resources and a reduction of the activities which do not add value, as well as a strict compliance with the legal and statutory requirements applicable to the product, a sustained growth can be possible.

We are committed to this goal, believing that together we will improve the performance of our organization and we will stand as a reference company.

# REGULATORY ASPECTS

## *Legal framework.*

The lighting towers presented in this catalog were analyzed for Ultimate Limit States. Since they are not covered by the standard EN 40, the products mentioned in this catalog were sized in accordance to the European regulations in use, namely:

EN 1991-1-4 Actions on Structures – Wind Actions.
EN 1993-1-1 Design of Steel Structures – General Rules and Rules for Buildings.

### WIND ZONES

To quantify the wind action, and according to the National Appendix of standard EN 1991-1-4, the national territory can be divided in two areas:

Zone A: $v_{ref}$ = 28 m/s
Zone B: $v_{ref}$ = 31 m/s

Zone A: The entire Portuguese territory, except for Zone B;

Zone B: The Azores and Madeira and the regions of the mainland located in a coastal area of 5 km of width or with altitudes higher than 600 m.

In the design, we also stipulated that the wind action would be defined for a terrain with aerodynamic roughness type II.

The maximum number of projectors mentioned in the service conditions tables is the average number of projectors set, using as reference the following projectors:

In towers with platform: Philips MV024 projector
In towers with a mobile crown: Philips SNF111 projector

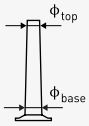
The maximum projector area mentioned in the service conditions tables refers to the sum of the area of wind exposure of all the projectors supported by the tower.

**NOTE:**
If you have any doubts about the conditions for applicability of a product mentioned in this catalog, please contact the Public Lighting Columns Department at O FELIZ.

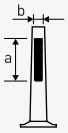
# TECHNICAL SYMBOLS

***Technical symbols used in this document.***


h - nominal height.

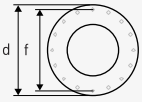



$\Phi_{top}$ - top diameter.
$\Phi_{base}$ - base diameter.

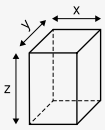



a - door opening height.
b - door opening width.


o - diameter of anchor bolt (metric dimension of the thread).
m - effective length of the anchor bolt.



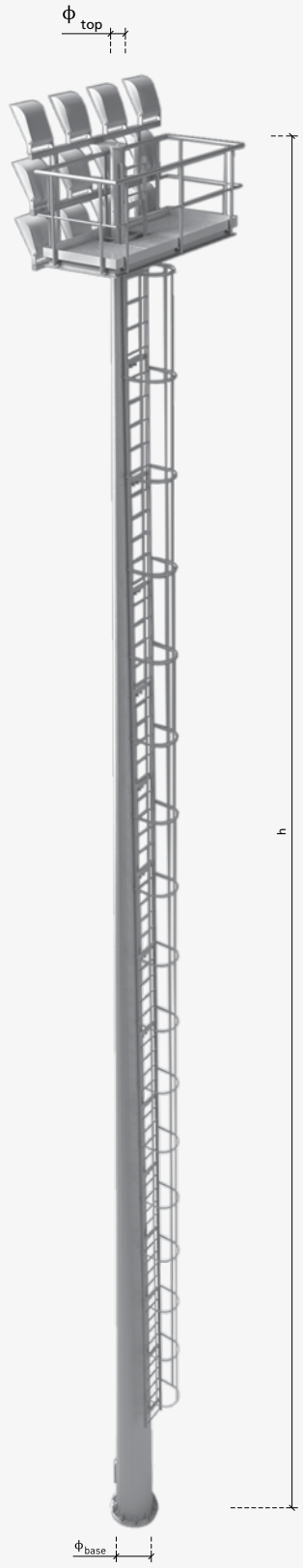

d - flange diameter.
f - anchor bolt inscription diameter.

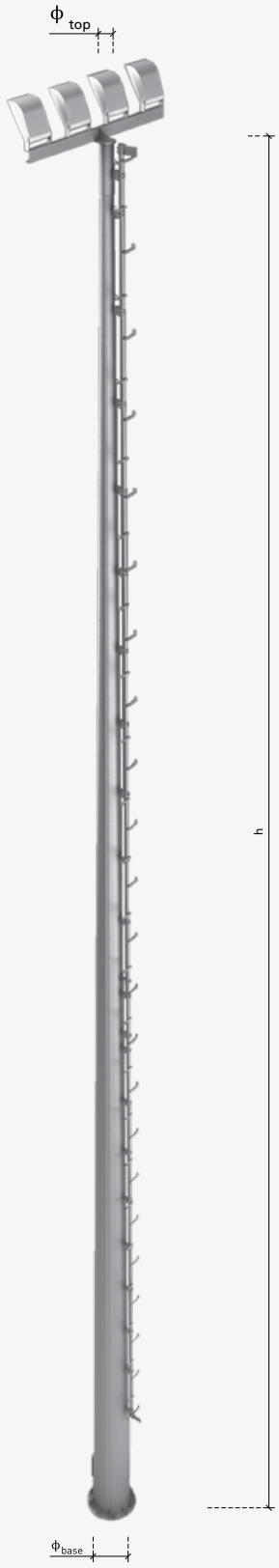


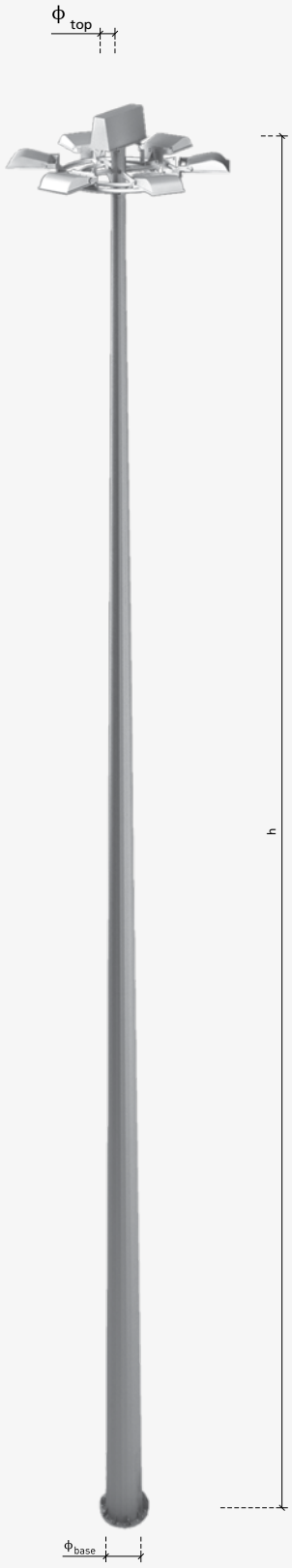

x=y - width of the solid foundations.
z - depth of the solid foundations.

# POLYHEDRAL TOWERS

***Platform | Cross piece | Mobile crown.***




**FOUNDATION**

The size of the foundation was defined using the Sulzeberger method for a ground with an admissible tension of 100 kPa. In its design, we considered class C20/25 concrete and A400NR reinforcement steel frame.

**ANTI-CORROSION PROTECTION**

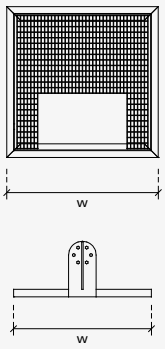
Hot dip galvanizing in accordance with the standard EN ISO 1461. The towers can be delivered with a different painting scheme.

**MATERIALS**

S275JR steel in accordance with the standard EN 10025-2.

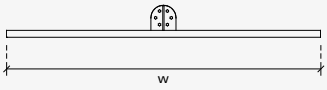
# PLATFORM

| PLATFORM | | |
|---|---|---|
| Reference | Description | w [m] |
| P10 | Top Cross Piece w/ Platform | 1.00 |
| P25 | Top Cross Piece w/ Platform | 2.50 |



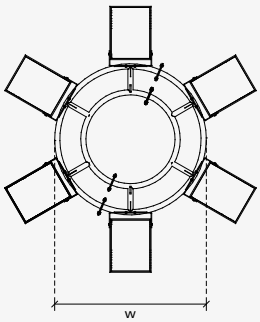

# TOP CROSS PIECE

| TOP CROSS PIECE | | |
|---|---|---|
| Reference | Description | w [m] |
| T10 | Top Cross Piece | 1.00 |
| T20 | Top Cross Piece | 1.50 |
| T25 | Top Cross Piece | 2.50 |



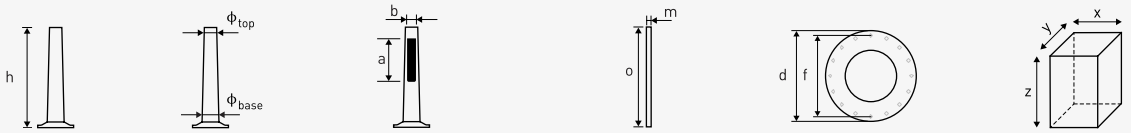

# MOBILE CROWN

| Mobile CROWN | | |
|---|---|---|
| Reference | Description | w [m] |
| CSD | Mobile Crown | 1.50 |



# GENERAL CHARACTERISTICS

***Polyhedral towers. Height up to 35 m. Ø top = 150 mm.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFA112 | 12 | 150 | 421 | 750 | 250 | 20 | M16 | 550 | ø600 | ø520 | 1.25 | 1.50 |
| TIFA114 | 14 | 150 | 466 | 750 | 250 | 20 | M16 | 600 | ø640 | ø550 | 1.25 | 1.60 |
| TIFA115 | 15 | 150 | 489 | 750 | 250 | 20 | M16 | 620 | ø670 | ø580 | 1.25 | 1.60 |
| TIFA118 | 18 | 150 | 557 | 750 | 250 | 20 | M16 | 690 | ø750 | ø660 | 1.25 | 1.80 |
| TIFA120 | 20 | 150 | 602 | 750 | 250 | 20 | M16 | 730 | ø800 | ø700 | 1.50 | 1.70 |
| TIFA125 | 25 | 150 | 715 | 750 | 250 | 20 | M20 | 870 | ø930 | ø840 | 1.50 | 1.90 |
| TIFA130 | 30 | 150 | 828 | 750 | 250 | 20 | M20 | 980 | ø1040 | ø940 | 1.75 | 1.90 |
| TIFA135 | 35 | 150 | 937 | 750 | 250 | 20 | M20 | 1090 | ø1150 | ø1050 | 1.75 | 2.10 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.5 | 2.93 | 11 | 4.45 | 27 | 8.49 |
| 14 | 2.5 | 2.69 | 10 | 4.22 | 26 | 11.70 |
| 15 | 2.5 | 2.6 | 10 | 4.14 | 25 | 13.53 |
| 18 | 2.5 | 2.29 | 9 | 3.90 | 24 | 197.95 |
| 20 | 2.5 | 2.08 | 8 | 3.77 | 23 | 231.51 |
| 25 | 1 | 1.46 | 5 | 3.47 | 21 | 327.35 |
| 30 | 2.5 | 0.21 | - | 3.22 | 20 | 439.75 |
| 35 | - | - | - | 2.09 | 13 | 568.72 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.5 | 1.9 | 7 | 3.55 | 22 | 8.49 |
| 14 | 1 | 1.64 | 6 | 3.38 | 21 | 11.70 |
| 15 | 1 | 1.53 | 6 | 3.30 | 20 | 13.53 |
| 18 | 1 | 1.19 | 4 | 3.10 | 19 | 197.95 |
| 20 | 1 | 0.95 | 3 | 2.99 | 18 | 231.51 |
| 25 | 1 | 0.28 | 1 | 2.73 | 17 | 327.35 |
| 30 | - | - | - | 1.93 | 12 | 439.75 |
| 35 | - | - | - | 0.94 | 5 | 568.72 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Plataform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFA112P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFA114P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFA115P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFA118P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFA120P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFA125P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFA130P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFA135P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFA112P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFA114P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFA115P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFA118P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFA120P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFA125P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFA130P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFA135P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

# POLYHEDRAL TOWER

***Mobile crown.***

| Tower Reference | Description | Nominal Height [m] | Mobile Crown |
|---|---|---|---|
| TIFA112CSD | Polyhedral Tower 12 m Mobile Crown | 12 | ■ |
| TIFA114CSD | Polyhedral Tower 14 m Mobile Crown | 14 | ■ |
| TIFA115CSD | Polyhedral Tower 15 m Mobile Crown | 15 | ■ |
| TIFA118CSD | Polyhedral Tower 18 m Mobile Crown | 18 | ■ |
| TIFA120CSD | Polyhedral Tower 20 m Mobile Crown | 20 | ■ |
| TIFA125CSD | Polyhedral Tower 25 m Mobile Crown | 25 | ■ |
| TIFA130CSD | Polyhedral Tower 30 m Mobile Crown | 30 | ■ |
| TIFA135CSD | Polyhedral Tower 35 m Mobile Crown | 35 | ■ |

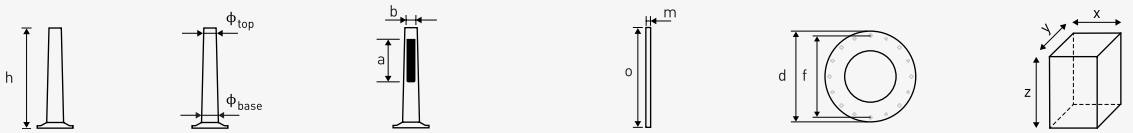
# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFA112T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFA114T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFA115T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFA118T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFA120T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFA125T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFA130T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFA135T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFA112T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFA114T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFA115T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFA118T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFA120T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFA125T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFA130T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFA135T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFA112T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFA114T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFA115T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFA118T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFA120T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFA125T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFA130T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFA135T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

# GENERAL CHARACTERISTICS

***Polyhedral towers. Height up to 35 m. Ø top = 200 mm.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFB112 | 12 | 200 | 486 | 750 | 250 | 20 | M16 | 620 | ø670 | ø580 | 1.25 | 1.60 |
| TIFB114 | 14 | 200 | 536 | 750 | 250 | 20 | M16 | 670 | ø700 | ø640 | 1.25 | 1.70 |
| TIFB115 | 15 | 200 | 560 | 750 | 250 | 20 | M16 | 690 | ø750 | ø660 | 1.25 | 1.80 |
| TIFB118 | 18 | 200 | 632 | 750 | 250 | 20 | M16 | 760 | ø800 | ø720 | 1.50 | 1.80 |
| TIFB120 | 20 | 200 | 680 | 750 | 250 | 20 | M20 | 830 | ø890 | ø790 | 1.50 | 1.80 |
| TIFB125 | 25 | 200 | 800 | 750 | 250 | 20 | M20 | 950 | ø1000 | ø900 | 1.75 | 1.90 |
| TIFB130 | 30 | 200 | 920 | 750 | 250 | 20 | M20 | 1070 | ø1130 | ø1030 | 1.75 | 2.00 |
| TIFB135 | 35 | 200 | 1040 | 750 | 250 | 20 | M24 | 1210 | ø1280 | ø1160 | 2.00 | 2.10 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.5 | 4.68 | 18 | 6.62 | 41 | 150.34 |
| 14 | 2.5 | 4.27 | 17 | 6.30 | 39 | 183.19 |
| 15 | 2.5 | 4.12 | 16 | 6.16 | 38 | 200.10 |
| 18 | 2.5 | 3.67 | 14 | 5.76 | 36 | 255.34 |
| 20 | 2.5 | 3.38 | 13 | 5.61 | 35 | 295.89 |
| 25 | 2.5 | 2.11 | 8 | 4.97 | 31 | 410.36 |
| 30 | 1 | 0.49 | 1 | 3.59 | 22 | 543.50 |
| 35 | - | - | - | 2.25 | 14 | 695.31 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.5 | 3.28 | 13 | 5.28 | 33 | 150.34 |
| 14 | 2.5 | 2.89 | 11 | 5.01 | 31 | 183.19 |
| 15 | 2.5 | 2.73 | 10 | 4.90 | 30 | 200.10 |
| 18 | 2.5 | 2.24 | 8 | 4.59 | 28 | 255.34 |
| 20 | 2.5 | 1.93 | 7 | 4.42 | 27 | 295.89 |
| 25 | 1 | 0.68 | 2 | 3.55 | 22 | 410.36 |
| 30 | 1 | - | - | 2.23 | 13 | 543.50 |
| 35 | - | - | - | 0.94 | 5 | 695.31 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Platform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFB112P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFB114P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFB115P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFB118P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFB120P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFB125P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFB130P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFB135P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFB112P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFB114P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFB115P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFB118P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFB120P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFB125P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFB130P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFB135P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

# POLYHEDRAL TOWER

***Mobile crown.***

| Tower Reference | Description | Nominal Height [m] | Mobile Crown |
|---|---|---|---|
| TIFB112CSD | Polyhedral Tower 12 m Mobile Crown | 12 | ■ |
| TIFB114CSD | Polyhedral Tower 14 m Mobile Crown | 14 | ■ |
| TIFB115CSD | Polyhedral Tower 15 m Mobile Crown | 15 | ■ |
| TIFB118CSD | Polyhedral Tower 18 m Mobile Crown | 18 | ■ |
| TIFB120CSD | Polyhedral Tower 20 m Mobile Crown | 20 | ■ |
| TIFB125CSD | Polyhedral Tower 25 m Mobile Crown | 25 | ■ |
| TIFB130CSD | Polyhedral Tower 30 m Mobile Crown | 30 | ■ |
| TIFB135CSD | Polyhedral Tower 35 m Mobile Crown | 35 | ■ |

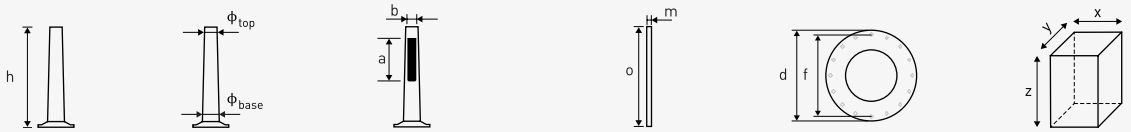
# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFB112T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFB114T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFB115T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFB118T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFB120T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFB125T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFB130T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFB135T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFB112T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFB114T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFB115T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFB118T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFB120T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFB125T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFB130T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFB135T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFB112T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFB114T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFB115T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFB118T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFB120T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFB125T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFB130T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFB135T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

# GENERAL CHARACTERISTICS

***Polyhedral towers. Height up to 35 m. Ø top = 200 mm.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFB212 | 12 | 200 | 486 | 750 | 250 | 20 | M16 | 620 | ø670 | ø580 | 1.25 | 1.60 |
| TIFB214 | 14 | 200 | 536 | 750 | 250 | 20 | M16 | 670 | ø700 | ø640 | 1.25 | 1.70 |
| TIFB215 | 15 | 200 | 560 | 750 | 250 | 20 | M16 | 690 | ø750 | ø690 | 1.25 | 1.80 |
| TIFB218 | 18 | 200 | 632 | 750 | 250 | 20 | M16 | 760 | ø800 | ø740 | 1.50 | 1.80 |
| TIFB220 | 20 | 200 | 680 | 750 | 250 | 20 | M20 | 830 | ø890 | ø790 | 1.50 | 1.80 |
| TIFB225 | 25 | 200 | 800 | 750 | 250 | 20 | M24 | 970 | ø1040 | ø900 | 1.75 | 2.30 |
| TIFB230 | 30 | 200 | 920 | 750 | 250 | 20 | M24 | 1090 | ø1160 | ø1040 | 1.75 | 2.50 |
| TIFB235 | 35 | 200 | 1040 | 750 | 250 | 20 | M24 | 1210 | ø1280 | ø1095 | 2.00 | 2.50 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | - | - | - | - | - | - |
| 14 | - | - | - | - | - | - |
| 15 | - | - | - | - | - | - |
| 18 | - | - | - | - | - | - |
| 20 | - | - | - | - | - | - |
| 25 | 2.50 | 3.22 | 12 | 4.37 | 27 | 545.09 |
| 30 | 2.50 | 2.87 | 11 | 4.02 | 25 | 722.29 |
| 35 | 2.50 | 2.60 | 10 | 3.73 | 23 | 924.40 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | - | - | - | - | - | - |
| 14 | - | - | - | - | - | - |
| 15 | - | - | - | - | - | - |
| 18 | - | - | - | - | - | - |
| 20 | - | - | - | - | - | - |
| 25 | 2.50 | 2.09 | 8 | 3.24 | 20 | 545.09 |
| 30 | 2.50 | 1.80 | 7 | 2.95 | 18 | 722.29 |
| 35 | 1.00 | 1.54 | 6 | 2.67 | 16 | 924.40 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Platform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFB212P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFB214P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFB215P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFB218P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFB220P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFB225P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFB230P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFB235P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFB212P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFB214P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFB215P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFB218P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFB220P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFB225P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFB230P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFB235P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

# POLYHEDRAL TOWER

***Mobile crown.***

| Tower Reference | Description | Nominal Height [m] | Mobile Crown |
|---|---|---|---|
| TIFB212CSD | Polyhedral Tower 12 m Mobile Crown | 12 | ■ |
| TIFB214CSD | Polyhedral Tower 14 m Mobile Crown | 14 | ■ |
| TIFB215CSD | Polyhedral Tower 15 m Mobile Crown | 15 | ■ |
| TIFB218CSD | Polyhedral Tower 18 m Mobile Crown | 18 | ■ |
| TIFB220CSD | Polyhedral Tower 20 m Mobile Crown | 20 | ■ |
| TIFB225CSD | Polyhedral Tower 25 m Mobile Crown | 25 | ■ |
| TIFB230CSD | Polyhedral Tower 30 m Mobile Crown | 30 | ■ |
| TIFB235CSD | Polyhedral Tower 35 m Mobile Crown | 35 | ■ |

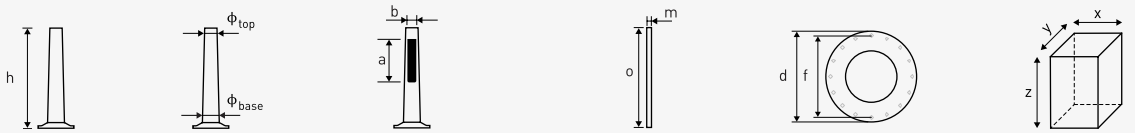
# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFB212T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFB214T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFB215T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFB218T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFB220T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFB225T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFB230T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFB235T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFB212T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFB214T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFB215T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFB218T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFB220T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFB225T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFB230T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFB235T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFB212T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFB214T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFB215T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFB218T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFB220T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFB225T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFB230T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFB235T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

# GENERAL CHARACTERISTICS

***Polyhedral towers. Height up to 35 m. Ø top = 200 mm.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFB312 | 12 | 200 | 486 | 750 | 250 | 20 | M16 | 620 | ø670 | ø580 | 1.50 | 2.70 |
| TIFB314 | 14 | 200 | 536 | 750 | 250 | 20 | M20 | 690 | ø750 | ø670 | 1.50 | 2.90 |
| TIFB315 | 15 | 200 | 560 | 750 | 250 | 20 | M20 | 710 | ø770 | ø670 | 1.50 | 3.00 |
| TIFB318 | 18 | 200 | 632 | 750 | 250 | 20 | M20 | 780 | ø840 | ø740 | 1.75 | 3.00 |
| TIFB320 | 20 | 200 | 680 | 750 | 250 | 20 | M20 | 830 | ø890 | ø790 | 1.75 | 3.10 |
| TIFB325 | 25 | 200 | 800 | 750 | 250 | 20 | M24 | 970 | ø1040 | ø900 | 2.00 | 3.20 |
| TIFB330 | 30 | 200 | 920 | 750 | 250 | 20 | M24 | 1090 | ø1160 | ø1040 | 2.00 | 3.50 |
| TIFB335 | 35 | 200 | 1040 | 750 | 250 | 20 | M24 | 1210 | ø1280 | ø1095 | 2.00 | 3.70 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 7.38 | 29 | 9.08 | 56 | 199.21 |
| 14 | 2.50 | 6.97 | 27 | 8.64 | 53 | 242.88 |
| 15 | 2.50 | 6.79 | 27 | 8.44 | 52 | 265.37 |
| 18 | 2.50 | 6.30 | 25 | 8.00 | 50 | 338.83 |
| 20 | 2.50 | 6.00 | 24 | 7.71 | 48 | 392.78 |
| 25 | 2.50 | 5.39 | 21 | 7.17 | 44 | 545.09 |
| 30 | 2.50 | 4.89 | 19 | 6.73 | 42 | 722.29 |
| 35 | 2.50 | 3.66 | 14 | 6.39 | 30 | 924.40 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | | | |
|---|---|---|---|---|---|---|
| | PLATFORM | | | MOBILE CROWN | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 5.53 | 22 | 7.32 | 45 | 199.21 |
| 14 | 2.50 | 5.15 | 20 | 6.98 | 43 | 242.88 |
| 15 | 2.50 | 4.98 | 19 | 6.83 | 42 | 265.37 |
| 18 | 2.50 | 4.57 | 18 | 6.44 | 40 | 338.83 |
| 20 | 2.50 | 4.27 | 17 | 6.20 | 38 | 392.78 |
| 25 | 2.50 | 3.60 | 14 | 5.71 | 35 | 545.09 |
| 30 | 2.50 | 2.84 | 11 | 5.37 | 33 | 722.29 |
| 35 | 2.50 | 1.52 | 6 | 4.93 | 30 | 924.40 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Platform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFB312P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFB314P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFB315P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFB318P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFB320P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFB325P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFB330P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFB335P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFB312P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFB314P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFB315P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFB318P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFB320P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFB325P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFB330P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFB335P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

# POLYHEDRAL TOWER

***Mobile crown.***

| Tower Reference | Description | Nominal Height [m] | Mobile Crown |
|---|---|---|---|
| TIFB312CSD | Polyhedral Tower 12 m Mobile Crown | 12 | ■ |
| TIFB314CSD | Polyhedral Tower 14 m Mobile Crown | 14 | ■ |
| TIFB315CSD | Polyhedral Tower 15 m Mobile Crown | 15 | ■ |
| TIFB318CSD | Polyhedral Tower 18 m Mobile Crown | 18 | ■ |
| TIFB320CSD | Polyhedral Tower 20 m Mobile Crown | 20 | ■ |
| TIFB325CSD | Polyhedral Tower 25 m Mobile Crown | 25 | ■ |
| TIFB330CSD | Polyhedral Tower 30 m Mobile Crown | 30 | ■ |
| TIFB335CSD | Polyhedral Tower 35 m Mobile Crown | 35 | ■ |

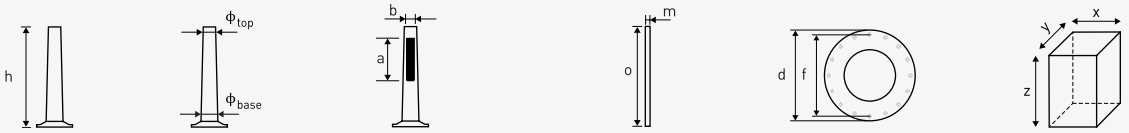
# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFB312T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFB314T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFB315T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFB318T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFB320T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFB325T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFB330T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFB335T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFB312T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFB314T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFB315T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFB318T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFB320T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFB325T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFB330T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFB335T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFB312T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFB314T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFB315T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFB318T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFB320T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFB325T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFB330T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFB335T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

# GENERAL CHARACTERISTICS

***Polyhedral towers. Height up to 35 m. Ø top = 200 mm.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFB412 | 12 | 200 | 486 | 750 | 250 | 20 | M20 | 640 | ø700 | ø600 | 1.50 | 2.90 |
| TIFB414 | 14 | 200 | 536 | 750 | 250 | 20 | M20 | 690 | ø750 | ø670 | 1.50 | 3.10 |
| TIFB415 | 15 | 200 | 560 | 750 | 250 | 20 | M20 | 710 | ø770 | ø670 | 1.50 | 3.20 |
| TIFB418 | 18 | 200 | 632 | 750 | 250 | 20 | M20 | 790 | ø850 | ø750 | 1.75 | 3.20 |
| TIFB420 | 20 | 200 | 680 | 750 | 250 | 20 | M24 | 850 | ø930 | ø810 | 1.75 | 3.30 |
| TIFB425 | 25 | 200 | 800 | 750 | 250 | 20 | M24 | 970 | ø1040 | ø920 | 2.00 | 3.40 |
| TIFB430 | 30 | 200 | 920 | 750 | 250 | 20 | M27 | 1110 | ø1190 | ø1060 | 2.00 | 3.70 |
| TIFB435 | 35 | 200 | 1040 | 750 | 250 | 20 | M27 | 1230 | ø1310 | ø1180 | 2.00 | 4.00 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | |
|---|---|---|---|---|
| | PLATFORM | | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 9.56 | 38 | 247.47 |
| 14 | 2.50 | 9.03 | 36 | 301.89 |
| 15 | 2.50 | 8.83 | 35 | 329.93 |
| 18 | 2.50 | 8.25 | 32 | 421.51 |
| 20 | 2.50 | 7.91 | 31 | 488.80 |
| 25 | 2.50 | 7.17 | 28 | 678.79 |
| 30 | 2.50 | 6.64 | 26 | 899.91 |
| 35 | 2.50 | 6.60 | 26 | 1152.16 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | |
|---|---|---|---|---|
| | PLATFORM | | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 7.32 | 29 | 247.47 |
| 14 | 2.50 | 6.88 | 27 | 301.89 |
| 15 | 2.50 | 6.73 | 26 | 329.93 |
| 18 | 2.50 | 6.25 | 24 | 421.51 |
| 20 | 2.50 | 5.95 | 23 | 488.80 |
| 25 | 2.50 | 5.32 | 21 | 678.79 |
| 30 | 2.50 | 4.83 | 19 | 899.91 |
| 35 | 2.50 | 4.39 | 17 | 1152.16 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Platform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFB412P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFB414P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFB415P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFB418P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFB420P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFB425P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFB430P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFB435P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFB412P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFB414P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFB415P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFB418P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFB420P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFB425P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFB430P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFB435P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

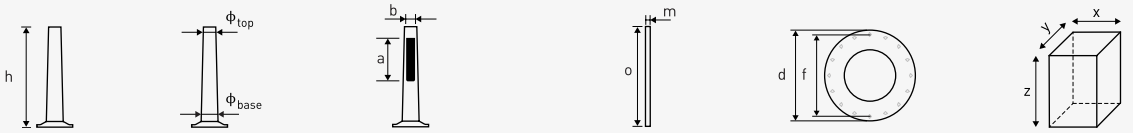
# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFB412T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFB414T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFB415T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFB418T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFB420T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFB425T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFB430T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFB435T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFB412T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFB414T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFB415T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFB418T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFB420T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFB425T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFB430T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFB435T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFB412T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFB414T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFB415T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFB418T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFB420T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFB425T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFB430T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFB435T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

# GENERAL CHARACTERISTICS

***Polyhedral towers. Setting by flange.***




| Shaft Reference | Nominal Dimensions | | | Door Opening | | Anchor Bolts | | | Flange | | Foundation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | h | $\phi_{top}$ | $\phi_{base}$ | a | b | Qt. | m | o | d | f | x=y | z |
| | [m] | [mm] | [mm] | [mm] | [mm] | | [mm] | [mm] | [mm] | [mm] | [m] | [m] |
| TIFB512 | 12 | 200 | 486 | 750 | 250 | 20 | M10 | 640 | ø700 | ø600 | 1.50 | 3.10 |
| TIFB514 | 14 | 200 | 536 | 750 | 250 | 20 | M20 | 690 | ø750 | ø670 | 1.50 | 3.30 |
| TIFB515 | 15 | 200 | 560 | 750 | 250 | 20 | M24 | 740 | ø810 | ø690 | 1.75 | 3.10 |
| TIFB518 | 18 | 200 | 632 | 750 | 250 | 20 | M24 | 810 | ø880 | ø760 | 1.75 | 3.30 |
| TIFB520 | 20 | 200 | 680 | 750 | 250 | 20 | M24 | 850 | ø930 | ø810 | 1.75 | 3.50 |
| TIFB525 | 25 | 200 | 800 | 750 | 250 | 20 | M27 | 990 | ø1070 | ø940 | 2.00 | 3.60 |
| TIFB530 | 30 | 200 | 920 | 750 | 250 | 20 | M27 | 1110 | ø1190 | ø1060 | 2.00 | 3.90 |
| TIFB535 | 35 | 200 | 1040 | 750 | 250 | 20 | M30 | 1250 | ø1340 | ø1190 | 2.50 | 3.70 |

# SERVICE CONDITIONS

***Load tables. Maximum wind exposure area of the projectors [m²].***

| Nominal Height [m] | Zone A \| Roughness Type II | | | |
|---|---|---|---|---|
| | PLATFORM | | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 12.20 | 48 | 295.12 |
| 14 | 2.50 | 11.57 | 46 | 360.22 |
| 15 | 2.50 | 11.27 | 45 | 393.78 |
| 18 | 2.50 | 10.59 | 42 | 503.40 |
| 20 | 2.50 | 10.20 | 40 | 583.95 |
| 25 | 2.50 | 9.37 | 37 | 811.48 |
| 30 | 2.50 | 8.69 | 34 | 1076.36 |
| 35 | 2.50 | 8.20 | 32 | 1378.59 |

| Nominal Height [m] | Zone B \| Roughness Type II | | | |
|---|---|---|---|---|
| | PLATFORM | | | M [kN.m] |
| | Width [m] | Maximum Projector Area [m²] | Maximum Number of Projectors | |
| 12 | 2.50 | 9.56 | 38 | 295.12 |
| 14 | 2.50 | 9.03 | 36 | 360.22 |
| 15 | 2.50 | 8.78 | 35 | 393.78 |
| 18 | 2.50 | 8.20 | 32 | 503.40 |
| 20 | 2.50 | 7.86 | 31 | 583.95 |
| 25 | 2.50 | 7.17 | 28 | 811.48 |
| 30 | 2.50 | 6.64 | 26 | 1076.36 |
| 35 | 2.50 | 6.15 | 24 | 1378.59 |

# POLYHEDRAL TOWER

***Platform.***

| Tower Reference | Description | Nominal Height [m] | Platform [m] | |
|---|---|---|---|---|
| | | | 1.00 | 2.50 |
| TIFB512P10 | Polyhedral Tower 12 m Platform | 12 | ■ | |
| TIFB514P10 | Polyhedral Tower 14 m Platform | 14 | ■ | |
| TIFB515P10 | Polyhedral Tower 15 m Platform | 15 | ■ | |
| TIFB518P10 | Polyhedral Tower 18 m Platform | 18 | ■ | |
| TIFB520P10 | Polyhedral Tower 20 m Platform | 20 | ■ | |
| TIFB525P10 | Polyhedral Tower 25 m Platform | 25 | ■ | |
| TIFB530P10 | Polyhedral Tower 30 m Platform | 30 | ■ | |
| TIFB535P10 | Polyhedral Tower 35 m Platform | 35 | ■ | |
| TIFB512P25 | Polyhedral Tower 12 m Platform | 12 | | ■ |
| TIFB514P25 | Polyhedral Tower 14 m Platform | 14 | | ■ |
| TIFB515P25 | Polyhedral Tower 15 m Platform | 15 | | ■ |
| TIFB518P25 | Polyhedral Tower 18 m Platform | 18 | | ■ |
| TIFB520P25 | Polyhedral Tower 20 m Platform | 20 | | ■ |
| TIFB525P25 | Polyhedral Tower 25 m Platform | 25 | | ■ |
| TIFB530P25 | Polyhedral Tower 30 m Platform | 30 | | ■ |
| TIFB535P25 | Polyhedral Tower 35 m Platform | 35 | | ■ |

# POLYHEDRAL TOWER

***Top cross piece.***

| Tower Reference | Description | Nominal Height [m] | Top Cross Piece [m] | | |
|---|---|---|---|---|---|
| | | | 1.00 | 1.50 | 2.00 |
| TIFB512T10 | Polyhedral Tower 12 m Top Cross Piece | 12 | ■ | | |
| TIFB514T10 | Polyhedral Tower 14 m Top Cross Piece | 14 | ■ | | |
| TIFB515T10 | Polyhedral Tower 14 m Top Cross Piece | 15 | ■ | | |
| TIFB518T10 | Polyhedral Tower 18 m Top Cross Piece | 18 | ■ | | |
| TIFB520T10 | Polyhedral Tower 20 m Top Cross Piece | 20 | ■ | | |
| TIFB525T10 | Polyhedral Tower 25 m Top Cross Piece | 25 | ■ | | |
| TIFB530T10 | Polyhedral Tower 30 m Top Cross Piece | 30 | ■ | | |
| TIFB535T10 | Polyhedral Tower 35 m Top Cross Piece | 35 | ■ | | |
| TIFB512T15 | Polyhedral Tower 12 m Top Cross Piece | 12 | | ■ | |
| TIFB514T15 | Polyhedral Tower 14 m Top Cross Piece | 14 | | ■ | |
| TIFB515T15 | Polyhedral Tower 14 m Top Cross Piece | 15 | | ■ | |
| TIFB518T15 | Polyhedral Tower 18 m Top Cross Piece | 18 | | ■ | |
| TIFB520T15 | Polyhedral Tower 20 m Top Cross Piece | 20 | | ■ | |
| TIFB525T15 | Polyhedral Tower 25 m Top Cross Piece | 25 | | ■ | |
| TIFB530T15 | Polyhedral Tower 30 m Top Cross Piece | 30 | | ■ | |
| TIFB535T15 | Polyhedral Tower 35 m Top Cross Piece | 35 | | ■ | |
| TIFB512T20 | Polyhedral Tower 12 m Top Cross Piece | 12 | | | ■ |
| TIFB514T20 | Polyhedral Tower 14 m Top Cross Piece | 14 | | | ■ |
| TIFB515T20 | Polyhedral Tower 14 m Top Cross Piece | 15 | | | ■ |
| TIFB518T20 | Polyhedral Tower 18 m Top Cross Piece | 18 | | | ■ |
| TIFB520T20 | Polyhedral Tower 20 m Top Cross Piece | 20 | | | ■ |
| TIFB525T20 | Polyhedral Tower 25 m Top Cross Piece | 25 | | | ■ |
| TIFB530T20 | Polyhedral Tower 30 m Top Cross Piece | 30 | | | ■ |
| TIFB535T20 | Polyhedral Tower 35 m Top Cross Piece | 35 | | | ■ |

O NOVO NORTE
PROGRAMA OPERACIONAL REGIONAL DO NORTE

QUADRO DE REFERÊNCIA ESTRATÉGICO NACIONAL
PORTUGAL 2007.2013

UNIÃO EUROPEIA
Fundo Europeu de Desenvolvimento Regional

**PORTUGAL**

AVENIDA DE S, LOURENÇO, 41 - CELEIRÓS
APARTADO 2100
4705-444 BRAGA - PORTUGAL

**T** +351 253 305 600
**F** +351 253 672 756
GERAL@OFELIZ.PT
WWW.OFELIZ.PT

**ANGOLA**

E.N. LUANDA-CATETE Km 47
LUANDA-ANGOLA

**T** +244 933 686 816
INFO@OFELIZANGOLA.COM
WWW.OFELIZANGOLA.COM

**MOZAMBIQUE**

AVENIDA DA MARGINAL Nº 3987
MAPUTO-MOÇAMBIQUE

**T** +258 848 994 806
INFO@OFELIZMOCAMBIQUE.COM
WWW.OFELIZMOCAMBIQUE.COM