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POLE FOUNDATION – GENERAL INSTRUCTIONS

General information:
For the design of the foundation the forces and momentum to be withstood must be taken into account. Essentially these are loads that occur through wind and snow, as well as the inherent weight of the light fixture, the pole and the mast arm. Likewise the soil condition at the installation site must be taken into account for the dimensioning. The mathematical, static verification must be executed by a qualified institution and is strictly required for stability.

Dazu geltende Normen:
DIN EN 40-3-1
Lighting columns – Design and verification – Specification for characteristic loads
DIN EN 1992-1
Design of concrete structures – General rules and rules for buildings
DIN EN 1997-1
Geotechnical design

Additional loads:
For objects additionally attached on the pole, e.g. street signs, hanging flower baskets, or tensioning ropes for advertising flags, Christmas lights or similar items, a separate static evaluation of the pole, the floor anchoring and of the foundation must be executed.

Corrosion:
Moreover, during the planning phase the influences arising from environmental conditions that can have a corrosive effect on the light fixture must also be considered, in order to provide the necessary corrosion protection for the pole.

Land/sea or coastal atmospheres can have different influences on corrosion; also a rural region, an urban region or an industrial region can also have different influences on corrosion.

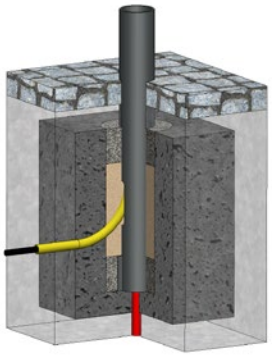
Soil conditions also have a significant influence on corrosion. Aggressive media must not continuously act on the pole. This can result in destruction of the material. Prolonged periods of humidity or the influence of seawater favour and accelerate corrosion. The area that is predominantly affected is the transition zone between soil and atmosphere.

Appropriate measures, such as a sea water resistant finish must be provided. In the ground transition area a thick finishing coat, plastic shrink sleeve or a steel sleeve are customary.

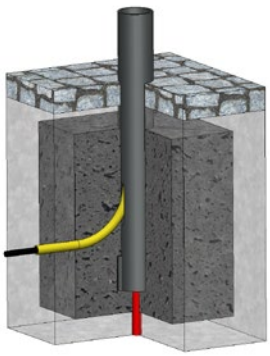
Responsibility:
The owner is responsible for stability and its verification. If there are accidents in the area of the streetlight you must verify whether stability of the streetlight is still ensured. The pole itself must be checked and replaced if necessary. Moreover, you must check whether the structural elements of the anchoring to the foundation have also been affected. Damage that occurs on structural elements (foundation, anchor, flange plate, etc.) must be evaluated by experts.

FOUNDATIONS – VARIANT OVERVIEW

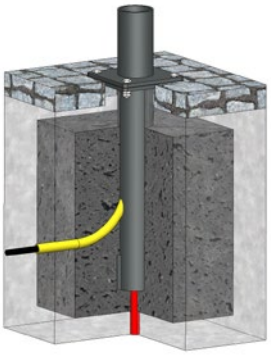
Sleeve foundation



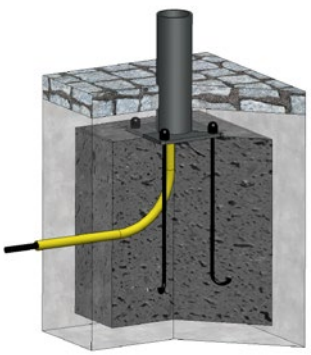
Embedded base on the pole



Embedded base with flange



Flange underground



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FOUNDATIONS – DESCRIPTIONS

Foundations for embedded base on the pole

The embedded base is a direct extension of the lower part of the pole and cannot be unbolted or removed. This embedded base is installed directly in concrete or in sand. At a standardized depth underground there are one or two cable feed openings.

Sleeve foundation

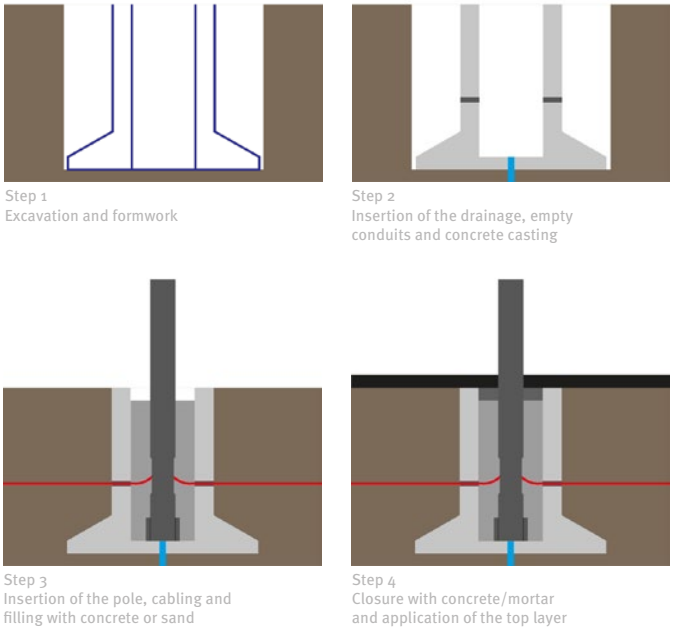
For installing poles with embedded base in concrete or sand.

For a sleeve foundation the foundation body can be cast beforehand and the pole can be placed in the sleeve at a later point in time.

The foundation body can be introduced into the ground as a prefabricated element, or it can be cast on-site. Formwork is erected in the ground to produce the sleeve foundation. In some cases the ground itself suffices for the outer formwork (step 1). A concrete pipe as finished part can also be used for the sleeve opening. A blinding layer must be constructed on the floor of the formwork as a support surface for the foundation. A drain element for drainage of the water that accumulates in the embedded base must be routed from the pole through the floor of the foundation to below the blinding layer. The steel reinforcement is inserted. Then the empty conduits for the laterally-introduced cable feed are positioned and the formwork is filled with concrete (step 2).

The pole is placed in the sleeve, aligned and provided with the cable feeds. The intermediate space must be compacted with sand or cast with concrete (step 3). The lower and upper piece of the embedded base is filled with a concrete ring (step 4).

Sleeve foundation



Step 1
Excavation and formwork

Step 2
Insertion of the drainage, empty conduits and concrete casting

Step 3
Insertion of the pole, cabling and filling with concrete or sand

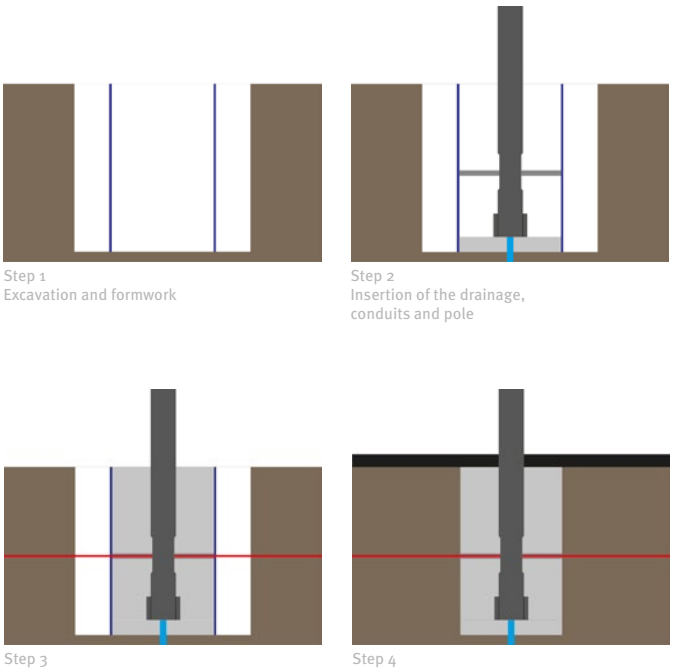
Step 4
Closure with concrete/mortar and application of the top layer

Foundation with pole, placed

To install poles with embedded base on the pole in concrete.

To construct the foundation, formwork is erected in the ground to produce the sleeve foundation, in some cases the ground itself suffices as formwork (step 1). A blinding layer must be constructed on the floor of the formwork as a support surface for the foundation. A drain element for drainage of the accumulating water in the embedded base must be routed from the pole through the floor of the foundation and extend to below the blinding layer (step 2). The steel reinforcement is inserted. Then the pole and empty conduit for the laterally introduced cable feed are positioned. To prevent the pole luminaire from sagging, a seepage plate can be used additionally. The mast arm of the luminaire is aligned and the formwork is filled with concrete (step 3).

Foundation with pole, placed



Step 1
Excavation and formwork

Step 2
Insertion of the drainage, conduits and pole

Step 3
Casting with concrete and cabling

Step 4
Filling with excavated soil and Application of the top layer

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Foundations for a separate embedded base

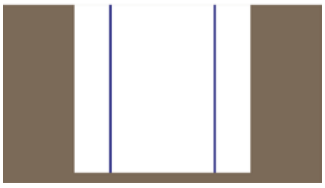
The end of the pole is provided with a welded-on flange plate. The flange plate has bores or slotted holes and is prepared for bolting onto a separate embedded base This separate embedded base also has a flange plate on top and is connected to the pole via bolts. The separate embedded base is installed directly in concrete or in sand. At a standardized depth underground there are one or two cable feed openings.

Flange with separate embedded base above ground level

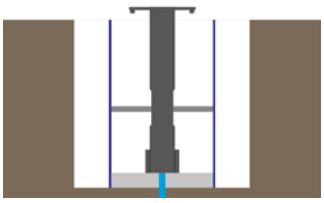
To construct the anchoring of the embedded base formwork is constructed in the ground for the foundation, in some cases the ground itself suffices as formwork (step 1). A small amount of concrete is filled into the formwork in order to introduce the drainage. This layer of concrete also serves as the contact area of the luminaire and consequently must be dimensioned so that it is sufficiently strong.

Then the embedded base is positioned in such a manner that the flange plate seals flush with the planned surface. At the same time the conduits are positioned (step 2). To prevent the embedded base from sagging a seepage plate can be used. Then the embedded base is aligned and fixed in place on the formwork. Thereafter the formwork is topped up with concrete (step 3). Prior to mounting the pole the setting time of the concrete must be complied with. The threaded connections must always be provided with a lock nut (step 4).

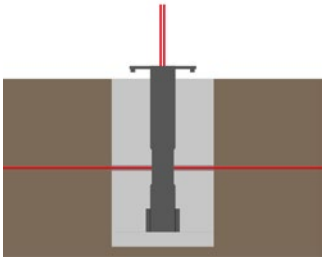
Flange with separate embedded base above ground level



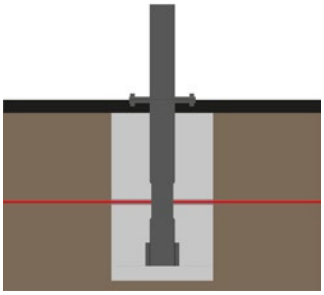
Step 1
Excavation and formwork



Step 2
Insertion of the drainage, conduit and embedded base



Step 3
Insertion of concrete, cabling and filling the hole with excavated material

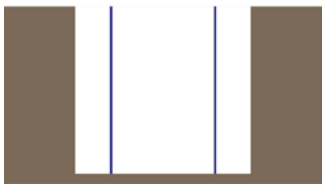


Step 4
Application of the top layer

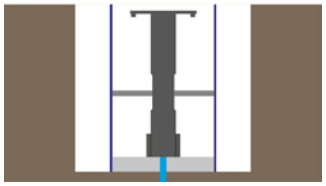
Flange with separate embedded base underground

The procedure is the same as that described above. Only the embedded base is positioned in such a manner that it seals flush with the foundation so that the ground covering can cover the flange plate.

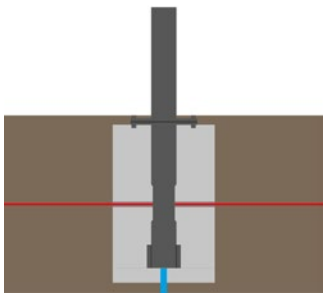
Flange with separate embedded base underground



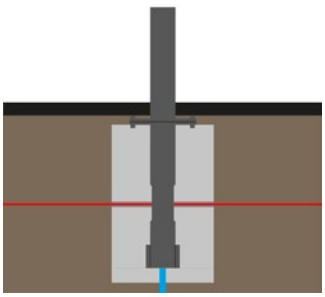
Step 1
Excavation and formwork



Step 2
Insertion of the drainage, conduit and embedded base



Step 3
Insertion of the concrete, cabling and filling the hole with excavated material



Step 4
Application of the top layer

Flange plate underground with anchor cage

The end of the pole is provided with a welded-on flange plate. The anchor cage has bores or slotted holes and is prepared for a ground threaded fitting, preferably via anchor cage. The cable is fed to the pole centred from below.

The depth at which the pole flange is introduced underground is not prescribed, but rather results from the local conditions of the construction measure. The standard pole with a height of LPH X is usually not extended. At a greater depth underground the LPH above ground is reduced. Also the dimension to the lower edge of the inspection door, usually 600 mm above ground, is reduced. If the depth underground is excessive, this can be compensated with an extension on the pole. This must be taken into account in the planning. In this case we recommend an extension of the pole into the ground of 200 mm.

Flange plate with anchor cage

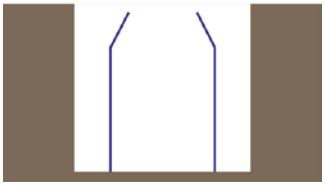
For an anchor cage the foundation body can be cast beforehand and the pole can be set on the anchor cage at a later point in time.

The foundation body can be introduced into the ground as a prefabricated element, or it can be cast on-site. To construct the foundation, formwork is erected in the ground, in some cases the ground itself suffices for the formwork (step 1). A blinding layer must be constructed on the floor of the formwork as a support surface for the foundation. The steel reinforcement is inserted. The customer-provided anchor cage must be positioned and anchored with the reinforcement. The steel plate of the anchor cage must seal horizontally and flush with the foundation. It keeps the support surface of the pole flange level and clean and keeps the anchor rods in the correct spacing and in position within the dimension tolerances. Then the empty conduits for the cable feed introduced from below are positioned and the formwork is filled with concrete (step 2).

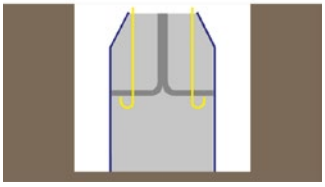
Before the pole can be mounted, the setting time of the concrete must be complied with. The pole must be mounted directly on the foundation (step 3). The support surface of the flange plate to the concrete is not classified as „sealed“, so that the water can run off here. However, through this measure moisture ingress is also possible. Naturally this can be countered with sealant or a bitumen coating at this point. If this is the case, drainage must be provided prior to installation so that moisture flow-off can be ensured.

Alignment of the pole through adjusting nuts under the flange plate is not intended. The flange plate of the pole must not be elevated on the bolt points. Nevertheless, if this form of installation is used, the free space between foundation and flange plate must be filled out with a suitable, low-shrinkage concrete, in order to ensure the transmission of force on the foundation into the ground. To reduce corrosion on the anchor bolt fittings, the use of corrosion protection caps is recommended.

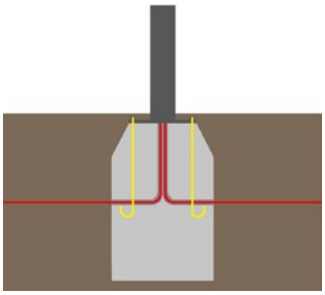
Flange plate with anchor cage



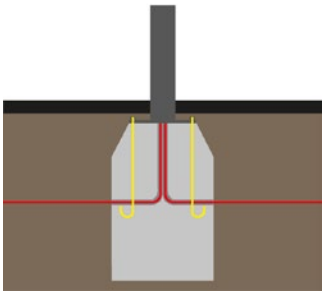
Step 1
Excavation and formwork



Step 2
Partial filling with concrete, insertion of the ground anchors and empty conduits, final casting with concrete



Step 3
Cabling, pole installation and filling the hole with excavated material



Step 4
Application of the top layer

Foundation with a low install height, e.g. for underground parking garages

For the bolting on of poles with flange plate

The end of the pole is provided with a welded-on flange plate. The anchor cage has bores or slotted holes and is prepared for a ground threaded fitting, preferably via anchor cage. The cable is fed to the pole centred from below. The foundation body can be introduced into the ground as a prefabricated element, or it can be cast on-site. The foundation is only permissible on concrete floors without water buoyancy.

To produce the foundation a formwork is constructed and the empty conduits for the cable feed introduced from below, are positioned. In some cases the ground itself suffices for the formwork. In this regard adequate drainage must be planned (step 1). The steel reinforcement is inserted. The customer-provided anchor cage must be positioned and anchored with the reinforcement. The steel plate of the anchor cage must seal horizontally and flush with the foundation. It keeps the support surface of the pole flange level and clean and keeps the anchor rods in the correct spacing and in position within the dimension tolerances (step 2). Then the formwork is filled with concrete (step 3).

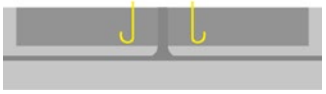
Before the pole can be mounted, the setting time of the concrete must be complied with. The pole must be mounted directly on the foundation (step 4). The support surface of the flange plate to the concrete is not classified as „sealed“, so that the water can run off here. However, through this measure moisture ingress is also possible. Naturally this can be countered with sealant or a bitumen coating at this point. If this is the case, additional drainage must be provided prior to installation so that moisture flow off can be ensured.

Alignment of the pole through adjusting nuts under the flange plate is not intended. The flange plate of the pole must not be elevated on the bolt points. Nevertheless, if this form of installation is used, the free space between foundation and flange plate must be filled out with a suitable, low-shrinkage concrete, in order to ensure the transmission of force on the foundation into the ground. To reduce corrosion on the anchor bolt fittings, the use of corrosion protection caps is recommended.

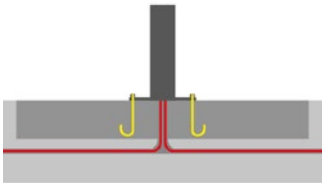
Foundation with a low install height

Step 1
Formwork, insertion of the conduit

Step 2
Insertion of the ground anchors and steel reinforcement



Step 3
Casting with concrete



Step 4
Laying out the cabling and pole installation

Final instructions:

The installation must be executed in accordance with national standards and directives and can deviate from our recommendations. All information provided in this information data sheet is provided with no guarantee of correctness and completeness. Illustrations provide only a schematic presentation for visualisation and are no substitute for static calculations.