ROCLA

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Concrete Pole Guide

Rocla is South Africa's leading manufacturer of a wide range of precast concrete pipes, culverts, poles and various other precast products. Information on each of these products is available at www.rocla.co.za or from your nearest Rocla sales office to assist in the selection, specification, handling, installation and use of our precast concrete products.

Rocla has 9 factories strategically located throughout South Africa, Botswana and Namibia to service the demand for precast concrete products in Southern Africa and beyond. Every factory has a Quality Assurance Management System and is ISO 9001:2015 certified. All products comply to the relevant SANS specifications and are CMACS approved.

Rocla can design and manufacture products for non-standard applications and to client's specifications. In these cases, the client has the assurance that the product will have the benefit of Rocla's quality management system.

This brochure contains information on Rocla's concrete poles for lighting, electricity, telecommunications and other applications. Similar brochures are available for other Rocla products. Please note that only the Roodepoort factory has the specialised equipment required to manufacture concrete poles. Your local Rocla sales office will advise you on which factory can supply your specific needs most effectively.

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CONRETE POLES

Rocla is a pioneer in the manufacturing of concrete poles in South Africa. The use of pre-cast concrete poles has seen a massive growth across a variety of industries due to the many advantages of concrete poles compared to steel and wooden poles, thus offering a long-term cost effective solution.

Rocla poles fall into two broad categories: **cast poles** which are manufactured in lengths up to 13m and ratings up to 10kN, or higher if required; **spun poles** which are manufactured in single lengths up to 24m, jointed lengths up to 36m and ratings up to 106kN, or higher if required. Double spun poles are also manufactured for applications where single spun poles will not suffice.

All Rocla poles conform to SANS 470 “Concrete poles for telephone, power and lighting purposes”. Rocla has an in-house quality assurance team that will ensure that the requirements of the standard are complied with.

Earthing

Rocla poles’ are manufactured with an earthing system which provides a continuous electrical path through the pole to allow the pole to be effectively earthed. The Council for Scientific and Industrial Research (CSIR) was commissioned by Rocla to independently test the earthing system. A current of 63kA was discharged through the pole, with no damage to the pole.

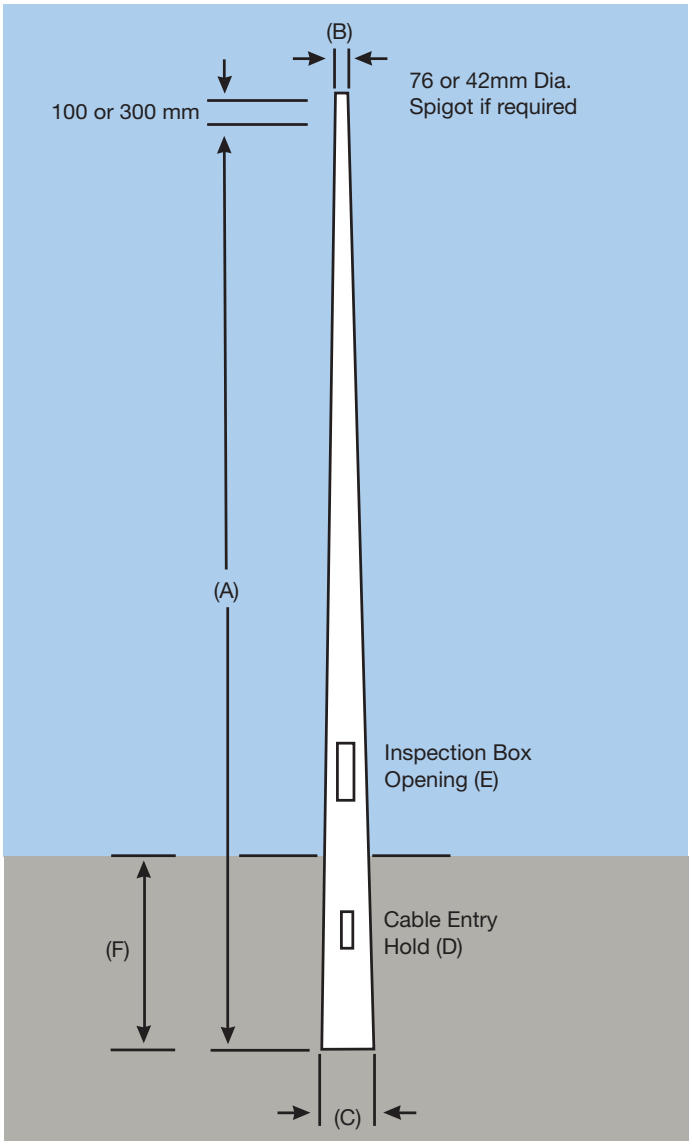
Advantages of Rocla spun and cast poles:

- Minimal maintenance requirements
- Superior fire rating compared to steel and wooden poles
- Resistant to termite or insect attack
- Less susceptible to vandalism as concrete has no scrap value
- Less susceptible to theft due to mass of poles
- Preformed holes to client’s specifications, no drilling required, easy assembly of fittings and neat appearance
- Smooth, aesthetically pleasing finish
- Non-absorbent, markings may be painted on without the need for special primers
- May be manufactured with special extra durable concrete mix for harsh environments
- Easy to stack
- Large spun transmission and distribution poles have smaller servitudes, less expensive foundations and quicker installation compared to alternative systems
- Long-term cost effective solution

Environmental Exposure

Rocla design engineers are available to advise on the most cost effective way of customizing Rocla poles to suit corrosive environments such as marine environments or aggressive soil conditions. Design modifications for these circumstances may include additional cover for the reinforcing, protective coatings or a concrete mix incorporating extenders such as pulverised fly ash, slagment or condensed silica fume.

POLES FOR LIGHTING



Poles for lighting are available in a wide range of heights, load capabilities and fitting requirements for various lighting applications such as street lighting and sports stadium lighting. The elegant appearance of the poles with its smooth finish and continuous taper, makes it very attractive for street lighting.

Rocla's spun poles for street lighting are manufactured in a standard range of lengths from 4,5m to 13.0m. Other strengths and lengths can be designed and manufactured to suit customer requirements.

Streetlight Spun Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [mm]	CABLE ENTRY D [mm]	INSPECTION BOX E [mm]	APPROX MASS [t]	STRENGTH [kN]
4,5	130	198	1,05	150 x 75	465 x 145	0,237	2,5
6,0	160	250	1,20	150 x 75	465 x 145	0,447	5,5
7,0	160	265	1,30	150 x 75	465 x 145	0,551	5,5
8,0	160	280	1,40	150 x 75	465 x 145	0,665	5,5
9,0	160	295	1,50	150 x 75	465 x 145	0,788	5,5
10,0	160	310	1,60	150 x 75	465 x 145	0,920	8,5
11,0	160	325	1,70	150 x 75	465 x 145	1,062	8,5
12,0	160	340	1,80	150 x 75	465 x 145	1,213	8,5
13,0	190	385	1,90	150 x 75	465 x 145	1,591	8,5
14,4	228	444	2,04	150 x 75	465 x 145	2,165	10,0

Different lengths and ratings can be manufactured. Contact Rocla for enquiries

POLES FOR ELECTRICITY

A vision of electricity for all the people of South Africa was well established in Eskom more than four decades ago. Rocla fully subscribed to and supported it. Together we researched and developed concrete poles for use in electrical power transmission and distribution.

The pilot concrete pole project was Orange Farm, a cooperative effort between Eskom, Rocla and other companies. Rocla now provides economical **cast** concrete pole systems to the electrical distribution market.

The technically advanced tall **spun** pole has been used on transmission lines for new development areas such as Richards Bay, Venetia Mine etc.

As detailed on page 2 under concrete poles, provision for earthing is integral to a Rocla pole and the design can be readily customised to suit aggressive environments. Rocla has the technical and manufacturing skills to provide concrete poles for the country's electrical distribution needs far into the future.

CAST POLES FOR ELECTRIFICATION

The electrification of South Africa's townships needs to be done on a cost effective and productive basis. The Rocla cast concrete pole has become a standard for this purpose with many advantages over traditional wooden poles and are used extensively by Eskom and other developers. Some particular advantages are minimal maintenance, superior fire-rating and less susceptibility to vandalism making the Rocla pole a cost effective solution in the long term.

Rocla's concrete poles tackle the challenge of township electrification with a system that has the versatility of above ground installation and an optimised design enabling the use of standardised fittings that aids in productivity of installation.

Cast I-Poles

LENGTH [m]	TIP DIAMETER [mm x mm] A1 x A2		BUTT DIAMETER [mm x mm] B1 x B2		PLANTING DEPTH [m]	APPROXIMATE MASS [t]	STRENGTH [kN]
7,0	100	120	100	225	1,30	0,257	4,0
9,0	100	160	154	295,0	1,50	0,515	7,0
9,3	165	275	220	415	1,50	1,000	17,5
11,0	130	180	196	345	1,70	0,836	8,0
13,0	160	250	238	445	1,90	1,400	10,0

RETICULATION POLES

Reticulation systems for electricity typically refer to the supply of 11kV and 22kV power to farming communities and other outlying facilities. One of the particular advantages of the concrete pole for this purpose is its resistance to veld fires. The cost of replacing damaged wooden poles far outways the cost of a concrete pole. These days it is, in any event, normally more cost effective to install an original concrete system, than a wooden one based on life-cycle costing.

Rocla's concrete poles can be designed with precast holes and the strength to accommodate the customer's conductor span lengths. The standard design suits stand off insulators. With this, the assembled pole is fully maintenance-free and presents a very neat, pleasing appearance.

Single Suspension Spun Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [mm]	APPROX MASS [t]	STRENGTH [kN]
7,0	160	265	1,30	0,572	5,5
9,0	160	295	1,50	0,817	8,5
10,0	160	310	1,60	0,955	8,5
11,0	160	325	1,70	1,102	8,5
11,0	190	355	1,70	1,289	17
12,0	160	340	1,80	1,259	8,5
13.0	190	385	1,90	1,651	8,5
14,0	192	402	2,00	1,864	10
15,6	228	462	2,16	2,533	20

Different lengths and ratings can be manufactured. Contact Rocla for enquiries

TRANSMISSION AND DISTRIBUTION POLES

Rocla's technically advanced **spun** concrete poles are well suited for the exacting requirements of electrical distribution line construction. The durable, maintenance-free poles are not only very strong but are uniformly strong through 360° unlike the normal **cast** concrete poles which have a major and minor load axis. The **spun** pole derives its extra strength properties from the unique centrifugal manufacturing process which gives uniform densely compacted concrete along the whole length of the pole. The last stage of the spinning cycle also removes water that is surplus to cement hydration requirements.

Spun poles are invariably less expensive on an installed basis than alternative systems and because of their long minimal-maintenance life are certainly more cost effective longer term. Part of the cost saving arises from the smaller servitudes, less expensive footings and quicker installation for concrete poles compared with alternative systems. Rocla manufactures its standard range of poles in accordance with Eskom's specifications. However Rocla's engineering resources are able to cater for a client's special needs.

This design drastically reduces the incentive for theft and vandalism. The advantage of small servitude needs is also well appreciated by farmers: particularly those doing intensive farming on high value land.

Distribution structures such as transformer poles, air break switch supports and underground cable terminations can all be replaced cost effectively with Rocla concrete pole systems. The standard systems are Eskom approved and poles are type tested at Eskom's Rosherville Testing Station.

Single Sections Spun Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [m]	APPROX. MASS [t]	STRENGTH [kN]
15,6	228	462	2,16	2,625	15/20/25/30
16,8	228	480	2,28	2,938	18/32
16,8	300	552	2,28	3,893	50
18,0	228	498	2,40	3,269	15/28
18,0	300	570	2,40	4,305	36/50
19,2	300	588	2,52	4,737	25/36/50
19,2	372	660	2,52	5,661	65
21,0	300	615	2,70	5,423	21/32/50
24,0	300	660	3,00	6,668	24/32/40/50/65

Different lengths and ratings can be manufactured.
Contact Rocla for enquiries.

Jointed Sections

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [m]	APPROX.MASS [t]	STRENGTH [kN]
26,4	300	696	3,24	8,032	50
28,8	300	732	3,48	9,253	50
31,2	300	768	3,72	10,567	50
33,6	300	804	3,96	11,977	50
36,0	300	804	4,20	13,474	50

Different lengths and ratings can be manufactured.
Contact Rocla for enquiries.

Double Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [m]	APPROX.MASS [t]	STRENGTH [kN]
19,2	300	588	2,52	9,807	156
19,2	372	660	2,52	11,719	206
21,0	300	615	2,70	11,226	156
24,0	300	660	3,00	13,804	156

Different lengths and ratings can be manufactured.
Contact Rocla for enquiries.

The mass of the connecting steel elements is not included in the pole mass as given in the table above

NOTE: Although the above are standard lengths and strengths manufactured by Rocla intermediate length strength can be designed too.

NOTE: Please see D-DT-253 series for more information on Spun Concrete pole designs for 132kV transmission lines.

FIBRE POLES

With the increase in demand for fibre connectivity, Rocla has developed the following fibre poles:

- 7m and 9m 4kN rectangular cast poles for supporting overhead fibre.
- 9m 8.5kN spun pole (9m INT manhole pole) for fibre transition from underground to overhead. The hollow nature of the spun pole ensures that the fibre is protected during the transition.
- 9m 7kN I-Section cast strain pole.
- 11m 8kN I-Section cast pole used at street crossings. These poles are used extensively by the 3 largest cell phone and data providers in South Africa for their fibre network in both urban and rural areas throughout the country.

Cast Rectangular Fibre Poles

LENGTH [m]	TIP DIA A1 x A2 [mm x mm]	BUTT DIA B1 x B2 [mm x mm]	PLANTING DEPTH [m]	APPROX. MASS [t]	STRENGTH [kN]
7,0	120x125	120x230	1,30	0,380	4
9,0	120x125	120x260	1,50	0,530	4

Spun Fibre Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPTH F [m]	APPROX. MASS [t]	STRENGTH [kN]
9,0	160	295	1,50	0,817	8,5

Cast I-Section Fibre Poles

LENGTH [m]	TIP DIA A1 x A2 [mm x mm]	BUTT DIA B1 x B2 [mm x mm]	PLANTING DEPTH [m]	APPROX. MASS [t]	STRENGTH [kN]
9,0	100x160	154x295	1,50	0,515	7
11,0	130x180	196x345	1,70	0,836	8

TELECOM POLES

The recent rapid coverage of the country's main urban areas and connecting roads with tall cellular telephone masts requires solutions with appropriate concern for the environment. Rocla was able to satisfy the need for an environmentally friendly structure with their elegant **spun** concrete pole. Rocla's product is also more cost effective than traditional alternatives, while offering minimal-maintenace and longer lifespan.

The standard design Rocla concrete pole, catering for a pre-determined load and standardised fittings, is extremely cost effective. Whatever telecom cables are involved, whether lightweight or heavy multicore copper, Rocla's engineering department can create appropriately optimised designs to suit the need.

Telecom Poles

LENGTH A [m]	TIP DIA B [mm]	BUTT DIA C [mm]	PLANTING DEPHT [m]	APPROX. MASS [t]	STRENGTH [kN]
21,0	300	615	2,70	5,613	21/50
24,0	300	660	3,00	6,902	24/50
28,8	300	732	3,48	9,253	32/50
31,2	300	768	3,72	10,567	50
33,6	300	804	3,96	11,977	50
36,0	300	804	4,20	13,474	50

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OTHER APPLICATIONS

Other Pole Specifications

Security and Monitoring

In the world of today, Rocla's concrete poles are playing an important role in the particularly strong market growth sectors of security surveillance and intelligent transportation systems (ITS).

Rocla **Spun** poles are ideally suited to provide permanent, low maintenance, vandal proof structures to affix CCTV cameras or monitoring equipment. Rocla poles do not require any stays to prevent movement unlike steel poles.

The pole design allows for the cables to be fed from the ground through the pole, which is hollow, so that tampering or theft of cables is significantly reduced.

We have supplied numerous poles along major routes in Gauteng as well as large security companies who have chosen Rocla poles for the right reasons.

Stadium Lighting

International sport is a significant revenue earner for our country, important for our image abroad and is playing a major role in building a sense of pride and belonging among all our people. Whether at the international facility level or at local recreational level, sports grounds need to be suitable for years of maximum utilisation. Rocla's **spun** concrete poles provide a versatile, aesthetically pleasing, minimal-maintenance and solution for flood-lighting poles that are an investment for decades ahead.

Park and Public Lighting

For people to enjoy the benefits of parks and public areas to the full, the security aspects have to be addressed and be environmentally compatible. Area lighting has an important role to play. Rocla concrete poles will generally be less expensive to install than their steel and fibre glass equivalents, while giving additional benefits of durability, minimal-maintenance and attractive appearance.

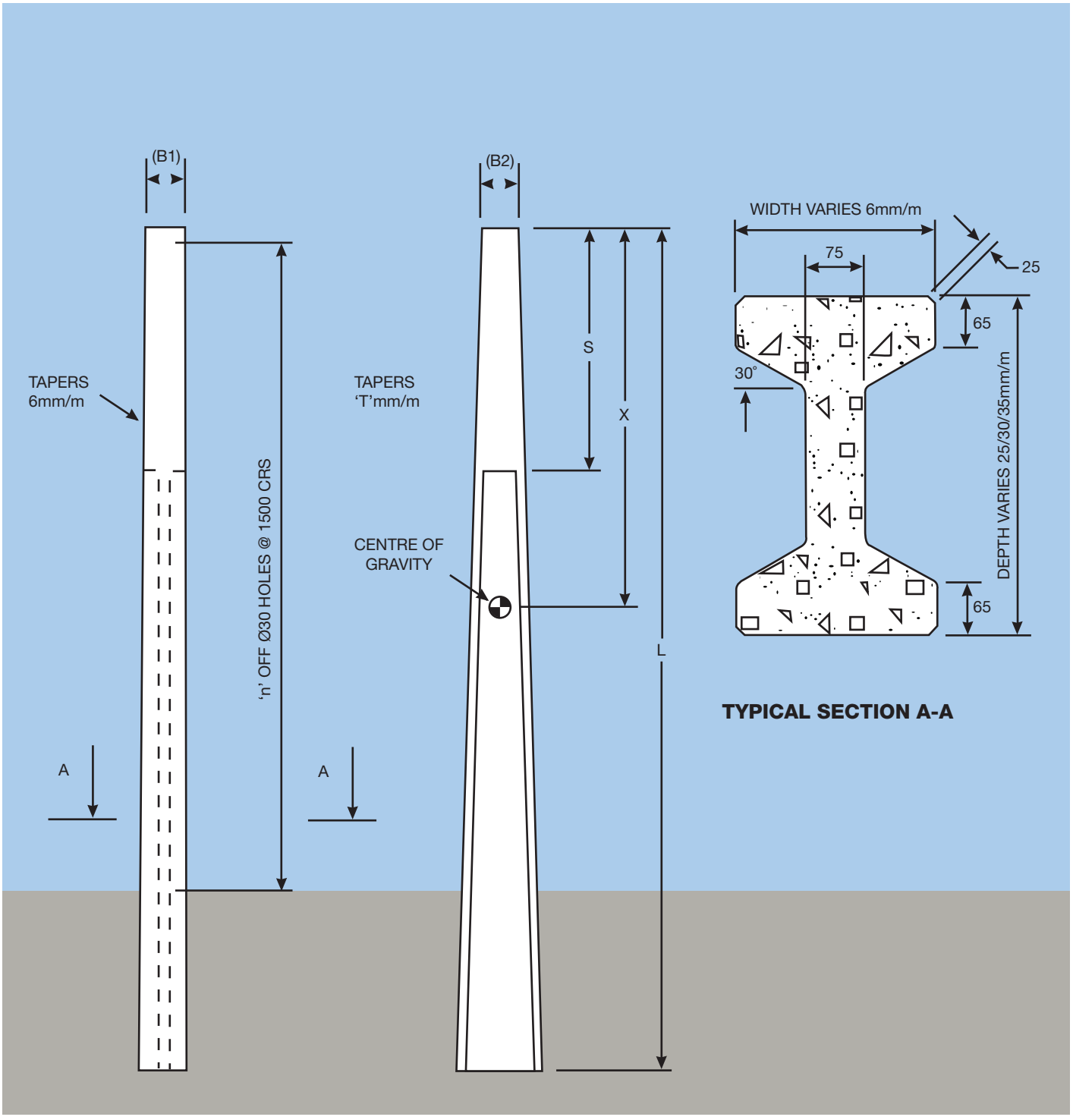
TRACTIONAL MASTS

Tractional Masts

Rocla manufactures concrete electrification masts for the railways used for OHTE (overhead track equipment). These masts come in lengths of 11m, 12m and 13m and are rated at either 64kN.m or 84kN.m strengths.

Concrete masts are ideal for long-term OHTE structures, which are durable, have minimal maintenance requirements and are less susceptible to vandalism.

TRACTIONAL MASTS



LENGTH [m]	TIP [mm] B1 x B2		S [mm]	T [mm]	n [mm]	X [mm]	MASS [t]	
							64 kN.m	84 kN.m
11,0	172	195	1 000	30	10	6060	14,339	14,478
12,0	166	165	2 000	30	11	6 710	15,128	15,278
13,0	160	200	1 700	25	12	7 190	16,708	16,868

MANUFACTURING AND TESTING

Manufacturing Process

Rocla's **spun** poles are manufactured from high quality, durable, partially prestressed or reinforced concrete. Precision formed reinforcement cages are made from circumferential spirals, resistance welded onto longitudinal wires. To ensure correct concrete cover, the cages are positioned in steel moulds using stainless steel spacer studs, concrete is then introduced and the mould is spun. The poles are steam cured before being stripped from the mould. This centrifugal process creates a uniformly dense high strength concrete with a particularly smooth finish.

Rocla's **cast** poles are made in steel moulds from high quality concrete with a mix designed to achieve the strength and durability required by the customer. The mix is vibrated and steam cured before removal from the mould.

Testing

Rocla's manufacturing facilities are all ISO 9001:2008 quality management systems accredited. It is Rocla's policy to test poles to SABS 470 specifications and stamp it with a unique traceability reference.

The scope of the testing procedure covers:

- Inspection
- Test Frequency
- Dimension checks
- Straightness tests
- Proof Load test
- Cover to reinforcing checks
- Torsional test
- Ultimate load test

Rocla's testing policy exceeds the requirements for testing frequency laid down in SABS 470.

HANDLING, STACKING & TRANSPORTING

- Care must be taken when handling, transporting and storing concrete poles. Ensure poles are not overstressed or damaged due dropping poles, knocking them together or subjecting them to point loads. Lack of care can be costly.

- In the case of cast poles, ensure that the poles are handled, transported and stacked with their narrow face upwards.

Handling

- Ensure that poles are not damaged during handling through the use of protective material such as rubber, canvas, jute-bagging or timber “corsets” placed under the lifting chain. Alternatively, use fabric slings.
- Poles should be handled with the assistance of mechanical aid at all times. If poles have to be carried manually due to access restrictions, contact your nearest Rocla office.
- The use of a spreader beam is recommended.

HANDLING, STACKING & TRANSPORTING

Stacking

- Poles should be stored on a hard level surface.
- Poles may be stacked in layers. Alternate pole tips and butts between layers.
- Do not stack more than the lesser of 6 layers or 2.0m high.
- Chock the poles with wooden wedges or similar to ensure the poles are secure and cannot roll.
- Separate pole layers using timber bearers not less than 100mmx80mm in section (width x thickness respectively), placed vertically in a line under one another.
- Provide support points at a maximum distance of 3.0m placed equally along the length of the pole, ensuring that the overhang at the pole ends does not exceed 250mm.
- Ensure that the poles are seated flush with the bearers to avoid any point loads.
- It is good, safe practice to have separate stacks for each length and type of pole. If poles of different lengths are being transported, the longer poles should be placed in the bottom

Transport

- Adhere to the guidelines under “Stacking” when placing poles on the deck of the truck.
- Ensure packing material is placed between poles.
- Ensure that poles are secured on the truck. The sides of the trailer should be fitted with steel hooks spaced at not more than 1m apart to attach holding down straps or chains.
- The transportation of spun concrete poles up to 12m in length requires a trailer with a rigid loading platform and chassis.
- To secure the load to the trailer without damaging the surface of the pole, chains covered with protective rubber, strapping or rope should be used.
- The truck should not be overloaded and the payload capacity must be adhered to.

INSTALLATION

Rocla's responsibility is the manufacture of poles to the required specification. Rocla does not undertake site work or installation. Installation should be done as per the project consulting engineer's details and specification. Below are some general guidelines related to installation of poles;

Planting:

- The recommend planting depth of poles is 10% of the pole length plus 600mm.
- If the required depth cannot be reached due to bedrock, contact the engineer or Rocla.
- A one point lift must be used when lifting the pole to insert it into the ground. The lift point must be 1/3 of the pole length from the top of the pole.

Backfilling:

- Dampen the soil that is to be used to fill in the hole after thoroughly mixing 1-part cement to 10 parts of soil (by volume). Ensure that all the backfilling soil used to plant pole is mixed to the cement soil ratio above.
- If the soil is squeezed in the hand and holds its shape when the hand is opened, then this indicates the right moisture content to ensure good soil compaction.
- Backfill the hole in 150mm layers at a time. Compact each layer with a mechanical compactor or with a hand stamper of at least 25kg in weight. Drop the compactor 400mm per blow and apply 30 blows to each layer of soil around the pole.
- It is important to note that there is no point backfilling the hole completely and then trying to compact the soil. The excavation should be backfilled as described above to natural ground level.

If difficult soils are encountered, the procedure must be modified:

Loose soil that does not compact when wet:

Thoroughly mix 1-part cement with 6 parts of soil (by volume). Ensure that all the backfilling soil used is mixed according to the cement soil ratio. Backfill to be done in 150mm layers at a time as describe previously.

Clayey soil:

A very clayey, wet soil must be replaced altogether by an imported soil. The imported soil should preferably be a well-graded silty soil, thoroughly mixed with cement, moistened, backfilled and compacted as described previously.

Wet soil:

If the hole is water logged, the water must be removed before backfilling with cement stabilized soil.

It is strongly advised that the consulting engineer or Rocla is contacted if such soils are encountered to determine if additional stabilizing measures are required.

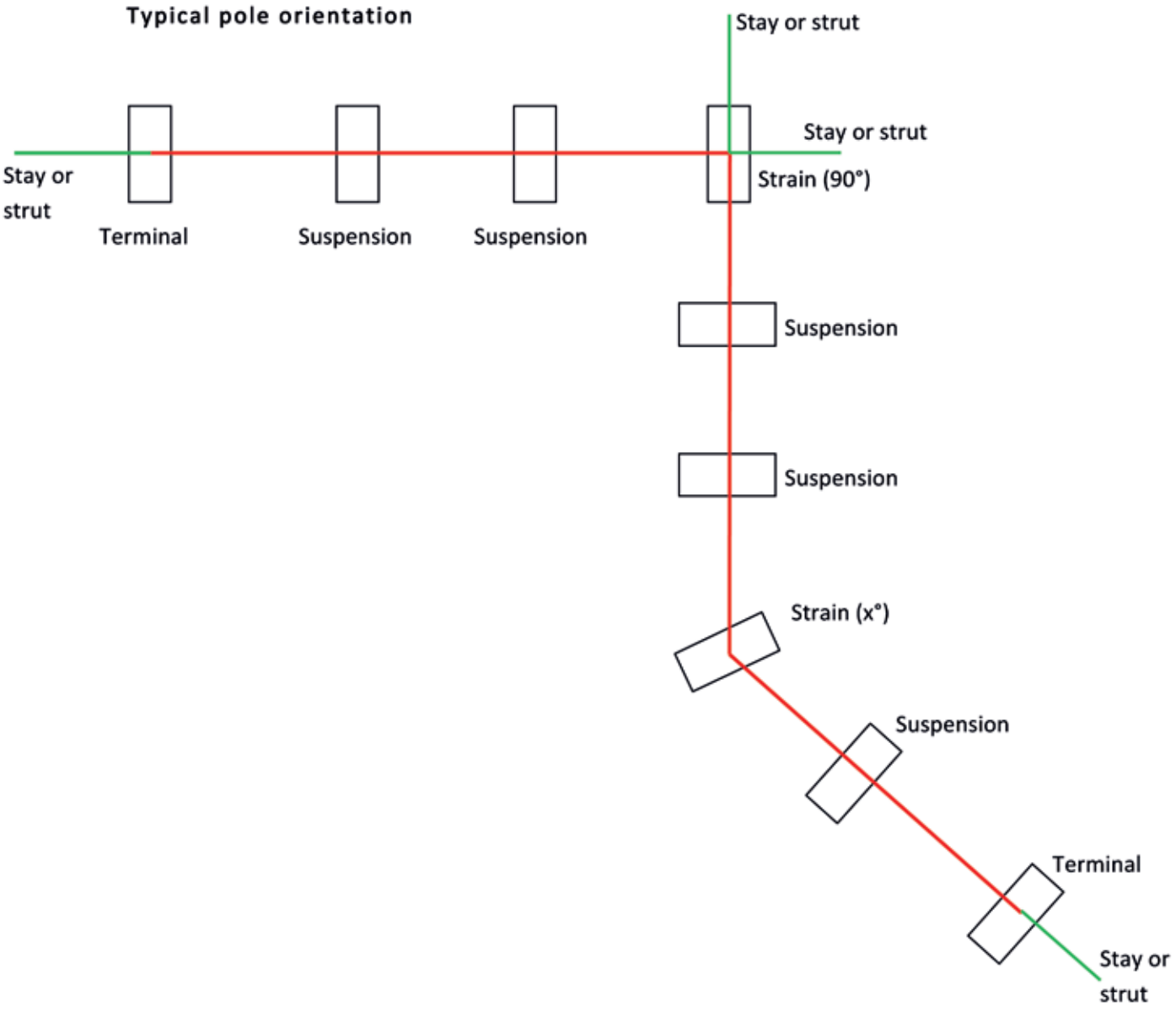
- To limit crane costs on site, the pole can be chocked into position allowing he crane to move to the next hole, whilst the annulus between the pole and the excavation can be filled with the specified sand/cement mix at a later stage.
- For larger poles, the use of manholes as sleeves is a practical solution to limit crane costs:
  - Place concrete sleeves in the excavation and backfill around the sleeves as described above
  - Chock the pole into position and fill the annulus between the pole and the sleeve with a flowable grout having a recommended 28day strength of 20MPa

General

- After completion of pole erection, allow the foundation to cure for a minimum of 3 days before the application of any load on the pole.
- Visually inspect the pole for any defects after erection.
- A cherry picker should preferably be used to connect conductors/ equipment to the pole after the pole is planted and the foundation is cured. If a ladder is used, ensure that the ladder is secured.

Pole orientation

- Suspension poles: Orient pole such that bending ocurs about its stronger axis when wind force acts perpendicular to conductor direction (not applicable to spun poles).
- Strain poles: The use of stays or struts may be required if the pole does not have sufficient capacity to support the resultant load.
- Terminal poles: These poles usually have a net tension force applied to them which should be taken up by the use of stays or struts. If stays or struts cannot be used, the pole strength and foundation detail should be adequate to safely support the unbalanced force.






ROCLA NATIONWIDE

Rocla has 9 factories strategically located throughout South Africa, Botswana and Namibia to service the demand for precast concrete products in Southern Africa and beyond. Every factory has a Quality Assurance Management System and is ISO 9001:2015 certified. All products comply to the relevant SANS specifications and are CMACS approved.

- **Blackheath:** Tel: (021) 905 1270, Fax: (021) 905 2913
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- **Port Elizabeth:** Tel: (041) 486 1462, Fax: (041) 486 2835
- **Roodepoort:** Tel: (011) 670 7600, Fax: (011) 672 2464
- **Stilfontein Depot:** Tel: (018) 484 6234, Fax: (018) 484 2983
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ISG
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