Rocla®

# Duraspun®
## Poles & Piles

# POLES & PILES

HANDLING & INSTALLATION GUIDE

# CONTENTS

# 1 INTRODUCTION

This guide is intended for electrical contractors and others involved in the transport and installation of Rocla Duraspun® concrete poles and piles.

Since so many authorities now use Duraspun® concrete poles, handling practices vary to some degree between users. Recommendations in this document should therefore be treated as a guide only. Authorities with experience of Duraspun® concrete poles confirm they are as easy to handle and erect as equivalent timber or steel poles.

# 2 TRANSPORT

## 2.1 RAIL TRANSPORT

Where rail transport is employed, arrangement should be made with the rail authority to provide suitable wagons, fitted with timber bearers at appropriate spacing. For second and subsequent layers of poles above the bottom layer, supports such as used car tyres can be used. It is important, however, that car tyres used as supports are placed vertically above the bottom row of timber supports.

The wagons should be fitted with side posts (or panels) of appropriate height. Chains must be used to secure the load. The chains must secure the load at the points where the timber bearers and tyres support the poles.

## 2.2 ROAD TRANSPORT

Unless the vehicle is specifically designed to carry concrete poles, timber bearers not less than 100mm x 75mm should be placed across the tray of the vehicle at the appropriate spacing to ensure no pole overhangs the end bearer by more than 4.5m.

A sufficient number of timbers must be employed to satisfy statutory transport regulations such as the minimum number of chains, pole overhang and maximum axle loads. Timbers and chains should be arranged in such a way as to avoid inducing bending forces in the pole, i.e. prior to tensioning the chains, there must not be any gaps between the timbers and the pole.

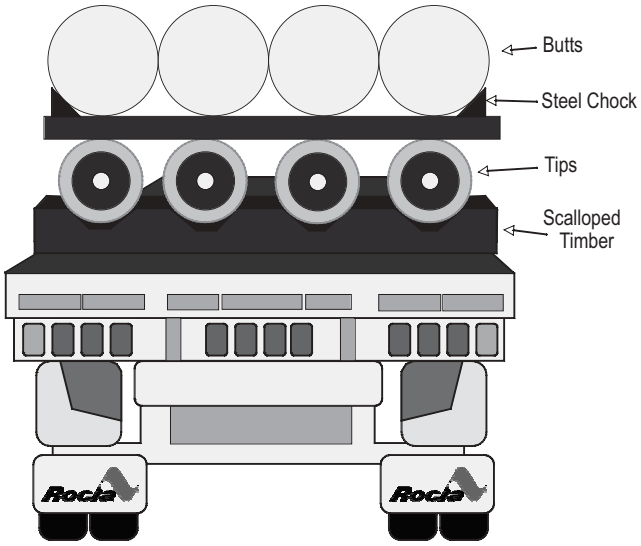
The two outside poles of each layer must have steel chocks in place on the outside of each butt end. The steel chock must have a rubber pad placed over the contact surface to protect the concrete from being damaged by the steel chock.

## 2.3 POLES OF EQUAL SIZE

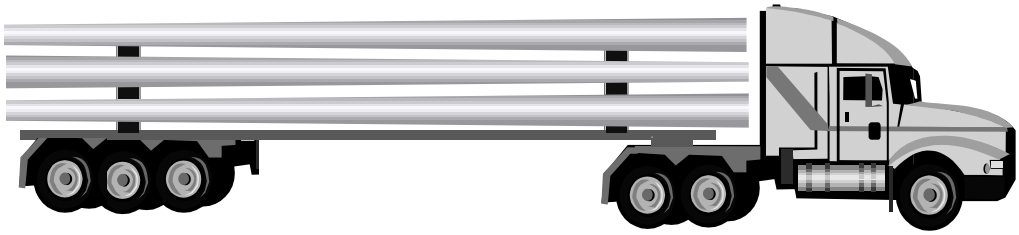
Poles with the same tip diameter should be grouped together and placed in butt-to-butt contact only (see photo). To prevent relative movement between poles in any one layer, the butts should be in contact, without packing material. Loosening or compaction of packing material during transport can lead to movement of the load.

Poles with same tip diameter are placed together butt-to-butt

The tip of each pole should be restrained, on both sides, by tapered wedges or cut-outs in the timber bearer. These cut-out timbers are referred to as "scalloped timbers".



# 2 TRANSPORT



When poles are loaded in more than one layer, timber spacers/bearers not less than 100mm x 75mm should be placed between each layer, vertically above the bottom row supports.

Poles in the second and subsequent layers must have steel chocks placed at the butt ends of the two outside poles, with the tips of the poles resting in scalloped timber bearers.

When there are two or more layers, the poles in the second and subsequent layers should alternate in direction, with the tips above the butts of the preceding layer, to provide the best load sharing between axle. (see illustration above).

The completed load of concrete poles should be fastened down using a minimum of four sets of chains and load binders only. The fastening points should always be over the timber bearers (see photo). All fastening points must have a rubber pad placed between the chains and contact point of the concrete pole, to prevent the chains damaging the external surface of the poles.

Align fastening with timber bearers

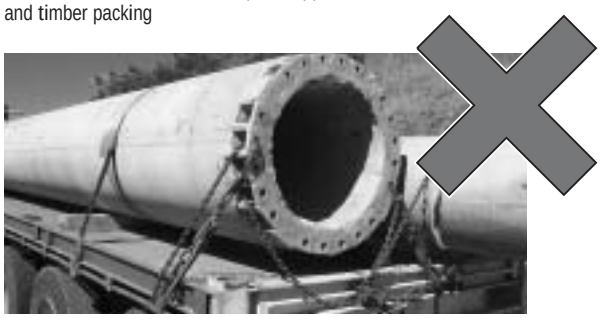
No loads are to be secured with nylon load restraints only. Loads will not be permitted to leave any Rocla Concrete Poles yard unless secured by a minimum of four chains and load binders.

## 2.4 POLES OF DIFFERENT SIZES

Poles of mixed sizes should be arranged to provide the best possible sharing of weight across the tray of the vehicle.

When poles of different diameters are placed in one layer, a short support bearer, in conjunction with packing timbers, can be used to support the overlying bearer (see photo).

Poles of different diameters require support bearers and timber packing



Poles or piles must not be secured via joint lugs

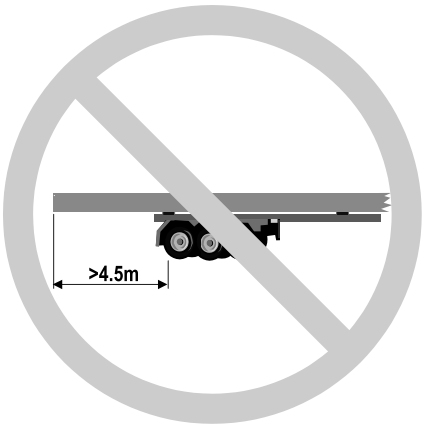
# 2 TRANSPORT

When poles of different lengths need to be carried, the longest poles should be placed on the bottom layer. Shorter poles can be supported on bearers spaced according to the pole length (see photo).

Longer poles should be placed on bottom layer

## 2.5 LONGER POLES

It is recommended that an extendable trailer be used for transporting poles longer than 14m. These poles can be transported using the same techniques described above. However, particular attention must be given to poles overhanging the trailer. No pole should be transported with more than 4.5m overhang from the end bearer.




Use extendable trailer for poles or piles longer than 14m

# 3 HANDLING

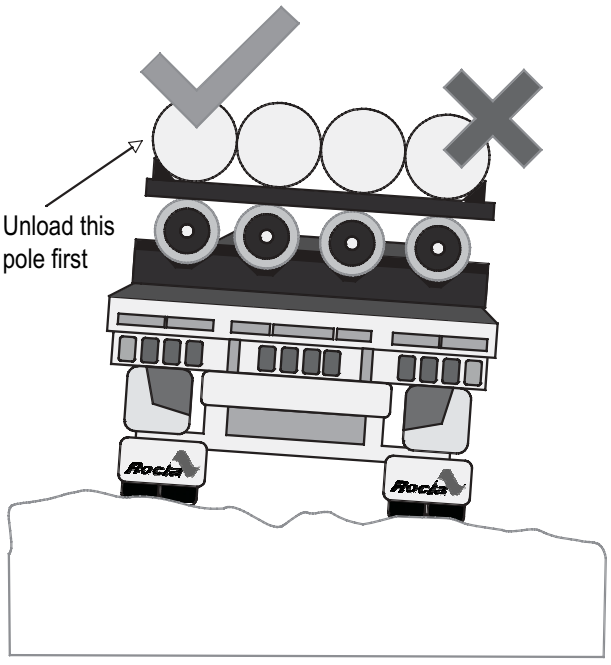
## 3.1 UNLOADING

While unloading, it is paramount that the following guidelines are followed to maintain the integrity of the product and, most importantly, to ensure the highest level of safety.

When unloading, it may be necessary to roll a pole sideways to gain access for fitting a lifting chain or sling. Before removing the chocks, ensure that a second set of chocks is in place, to limit the movement of the pole. Until lifting chains or slings are fitted to a pole and secured, the pole and every other pole remaining on the truck should be chocked on both sides to prevent accidental side movement.

Before unloading the poles, the vehicle must be positioned with a minimum of cross-fall to prevent the load from moving. If the transport operator considers the cross-fall too excessive to allow safe unloading, a more suitable area or positioning of the truck must be sought, at the discretion of the operator.

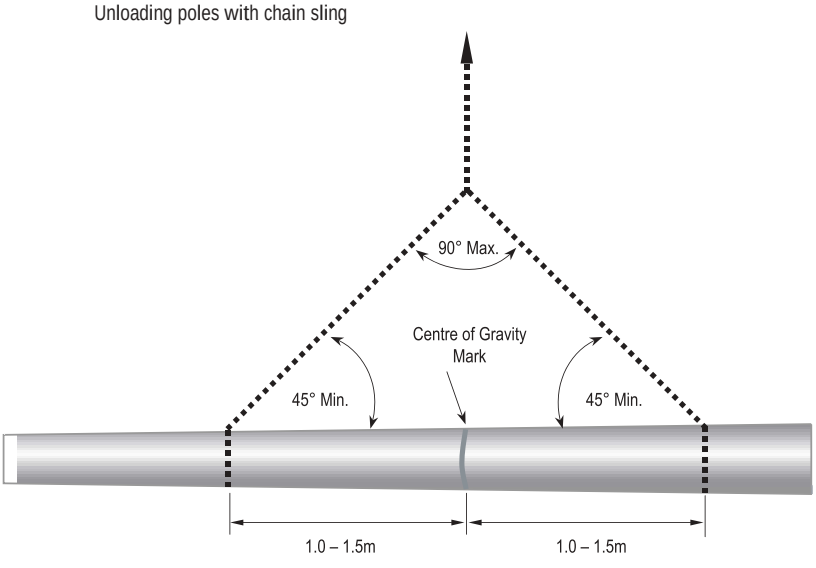
If a cross-fall cannot be avoided, the pole on the higher side must be the first pole of each layer to be unloaded. Even when on level ground, always unload the outer pole first - never take an inner pole.




The vehicle must not be moved while any part of the load is unsecured. If the vehicle is required to move only a short distance and the speed does not exceed 8 km/h on smooth and level ground, the poles can be secured with a single chain and chocks on the two outside poles on each layer.

When unloading by crane on site, a dual-point lift using double-legged chain slings must be used. The balance point is marked on the pole or pile (at approximately 0.4 x length) from the butt of a tapered pole or at the midpoint of a parallel-sided pile. A chain sling is normally used, but a fabric sling can be used as an alternative (see photo).

Unloading poles with chain sling




Dual-point lift

# 3 HANDLING

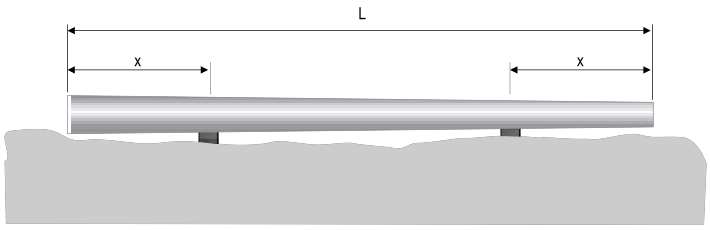
All poles and piles have their cartage mass stamped on the name plate so the appropriately rated safe working load (SWL) for chains and slings can be selected to safely lift the products.

The use of forklifts for loading or unloading concrete poles or piles is considered unsafe and is not recommended.

## 3.2 STORAGE

### 3.2.1 Long term storage

If poles or piles are to be stored on site for an extended period of time, they should be laid on timbers at spacings shown in the diagram below.




Store poles on two bearers placed 0.2 x pole length from ends

**Example:**

18.5m/24kN Concrete Pole

L = 18.5m

X = 0.2 x 18.5 = 3.7m

Bearers are placed 3.7m from each end of the pole

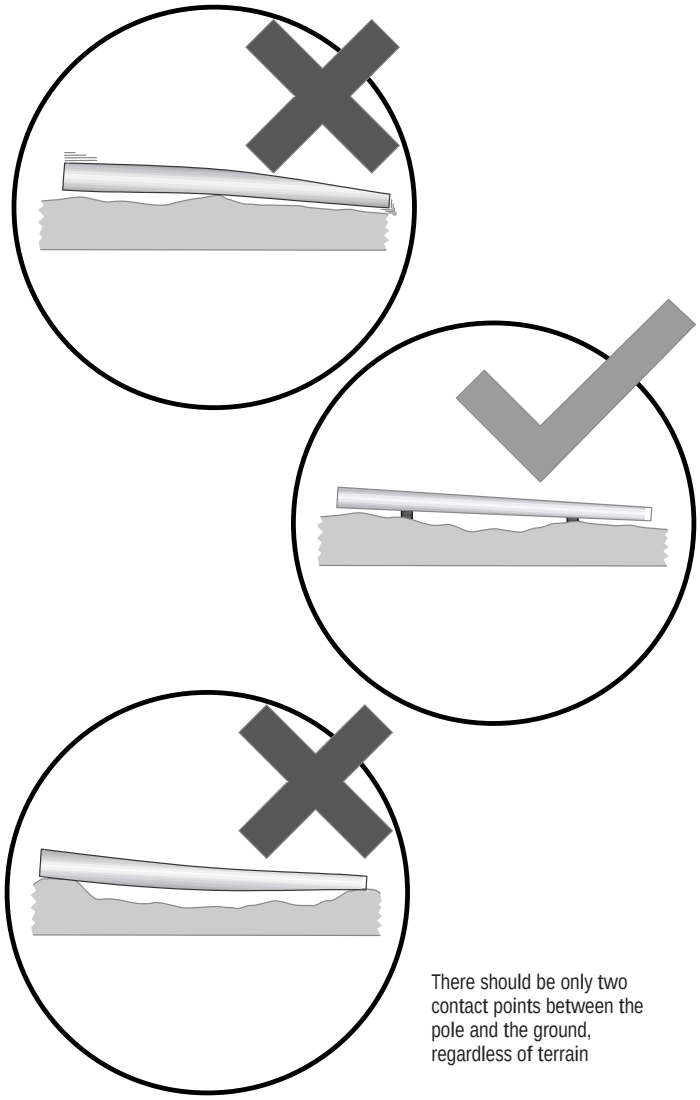
***Note:***

*Regardless of the terrain, there should only ever be two (2) contact points between the pole and the ground.*

### 3.2.2 Short term storage

If the poles are to be stored at peg sites, the following instructions should be followed to eliminate any potential damage to poles before they are erected.

Two timber supports should always be used to temporarily support poles or piles on site. It is important to ensure the timber bearers are the only contact points supporting the pole. The bearers must be positioned such that the pole or pile does not make contact with the ground at any point. Permanent deflections in the pole or pile can result if they are stored for an extended period of time in an inappropriate manner.



There should be only two contact points between the pole and the ground, regardless of terrain

# 3 HANDLING

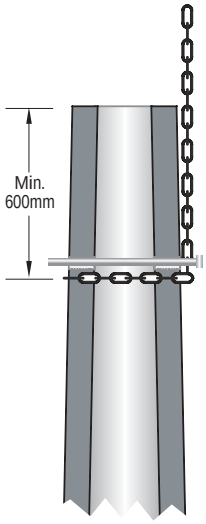
## 3.3 MOVING POLES TO DIFFICULT PLACES

Rocla Duraspun® concrete poles can easily be used in difficult terrain or other situations where access may be restricted. They can be unloaded from trucks in small stockpiles near the final positions in the line, then transported to their final position by two methods, using a 4-wheel drive vehicle.

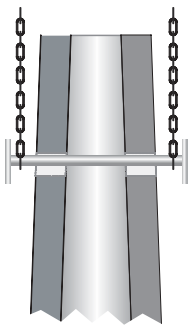
In the first method, the tip of the pole is attached to the vehicle and dolly wheels are placed at about one-third the distance from the butt of the pole.

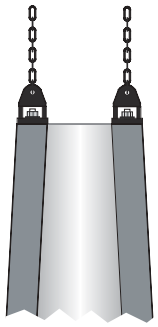
The second method, which eliminates the dolly wheels, can be used when the ground is soft or sandy. The pole is simply dragged by the tip to its final position.

These two methods are intended to be carried out with care to protect the integrity of the entire pole. The poles should not be handled in an unduly rough manner; for example, dragging the poles over rocky outcrops or through washouts and gullies.



Choke chain (or sling)


Lifting bar


Lifting lug

## 3.4 LIFTING FOR FINAL PLACEMENT

Three different methods can be used to lift Duraspun® poles and piles, depending on the type of section to be lifted and the specific application. They are:

- Choke chain (or sling)
- Lifting bar
- Lifting lug

### 3.4.1 Choke chain or sling

For smaller size Duraspun® concrete poles, such as the power distribution and lighting pole ranges, the quickest and easiest method of lifting the pole for installation is by using a choke chain or sling. This can be achieved by wrapping a chain or sling around the pole at least 600mm from the tip of the pole. Most power distribution and lighting poles include a through-tube in this area that can be used to secure a bolt above the chain or sling to prevent slip.


Poles or piles must not be lifted via joint lugs

# 3 HANDLING

### 3.4.2 Lifting bar or lifting lug

For larger poles, or where more precise placement is required, pole sections can be lifted either using a solid lifting bar or via the joint studs using special lifting lugs. The lower sections of jointed poles have joint studs protruding from the concrete that can be used to pitch the section and lower it into the footing. Rocla's special lifting lug attachment is bolted on to diametrically opposite studs to provide secure lifting points for installation.

Lifting lugs

**Minimum Lifting Bar Diameter**

| SWL (t) | Minimum Lifting Bar Diameter | | |
|---|---|---|---|
| | Grade 300 Round Bar | Grade 400 Round Bar | Grade 4.6 Bolt |
| *2.0* | *39* | *36* | *36* |
| *3.0* | *45* | *42* | *42* |
| *4.0* | *50* | *45* | *48* |
| *5.0* | *56* | *50* | *56* |
| *6.0* | *60* | *56* | *56* |
| *7.0* | *65* | *56* | *56* |
| *8.0* | *65* | *60* | *64* |
| *9.0* | *70* | *65* | *64* |
| *10.0* | *70* | *65* | *64* |

## 3.5 POLE DRESSING

Duraspun® poles can be supplied with all necessary tubes, ferrules and earth points precast into the pole to enable rapid dressing on site. It is usual practice to dress as many fittings as possible on to the pole while it is on the ground. To facilitate this, a pole cradle may be used (see photo). Even complicated substation or communication poles can be fully dressed on the ground, with all the brackets needed to mount specific equipment.

In the case of twin pole transmission lines, fittings such as step irons can be added before erection. To avoid the use of cross-bracing, poles are usually lifted separately. Steel cross-arms, with insulators already attached, can then be lifted to the pole head and connected.

Installing fittings before erection

Installing fittings on a pole cradle

# 4 INSTALLATION

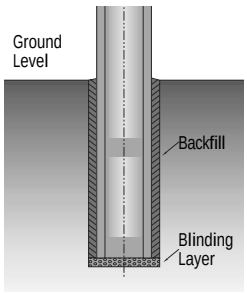
## 4.1 GENERAL

This section provides details of the various methods that can be employed to install Rocla Duraspun® concrete poles.

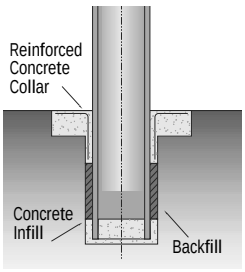
These guidelines are intended for general information only. Footing design is a specialist field requiring geotechnical and structural engineering expertise and is not addressed in this guide. Specific aspects of footing design (such as embedment depth, pad footing size and steel design) are the responsibility of the foundation designer.

## 4.2 INSTALLATION METHODS

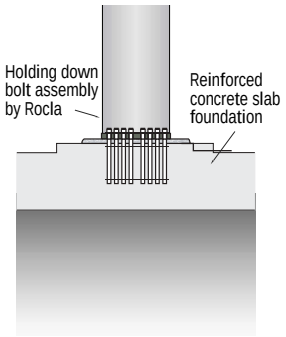
Duraspun® concrete poles can be installed using four different methods. The most economical method of installation will depend on the sub-soil conditions, access to site for plant and equipment and the design criteria applicable to the pole. For example, the antennas mounted on communication poles can be sensitive to even slight rotation of the pole and footing and therefore require a more rigid installation than a typical transmission pole.



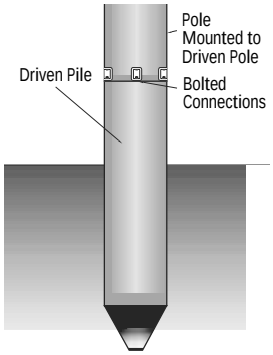

Direct embedment




Collared footing




Pad footing




Driven pile footing

### 4.2.1 Direct embedment

A hole for the concrete poles is augered to the required depth. Nominal setting depths for Duraspun® power poles, communications poles and lighting poles are specified in the relevant product brochure. Nominal setting depths quoted are based on a standard set of soil strength parameters and hole diameters. Care should be taken to determine whether the site conditions meet the minimum requirements applicable to the specified embedment depth.

Augering the hole

The auger size should allow sufficient room to either adequately place and ram solid the backfill, or pour and vibrate the concrete backfill. As a rule of thumb, the hole diameter should be a minimum of the pole butt diameter plus 200mm, rounded up to the nearest standard auger diameter (typically in increments of 150mm, i.e. 300, 450, 600, 750, 900, 1050, 1200, 1350, 1500, etc).

The concrete pole is placed in the hole and lined up using either a plumb bob or spirit level that compensates for the taper of the pole (15mm per metre reduction in diameter). When the pole is in position, the void between the pole and the hole can be backfilled.

# 4 INSTALLATION

Placing the pole

Typically, the cuttings generated from augering the hole are considered satisfactory backfill material. It is regarded as good practice to use a concrete backfill at the base of the pole for at least 300mm. This increases the bearing area, provides a consolidated bearing material and ensures that design load capability will be achieved.

Backfilling with concrete

Dry bagged pre-mixed concrete is a convenient way to backfill the hole. As the backfill concrete strength is not critical, it can have water added on site, be poured down dry and then have water poured in. In wet conditions there may be no need for any added water at all. In all cases some compaction is necessary.

Any backfill material that has significant clay content or that may form a slurry when wet should be avoided even if that requires the provision of crushed rock or gravel.

# 4 INSTALLATION

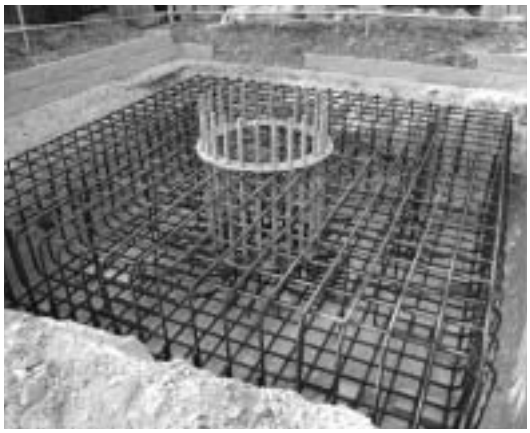
### 4.2.2 Collared installation

This is an adaptation of the direct embedment installation to suit situations where either the required embedment depth cannot be achieved (because of unexpected rock) or where added restraint on rotation is required at ground level. The method of installation is similar to the direct embedment method in that a hole is bored to the desired or maximum depth practical and then a typically square excavation is made around the top of the hole to provide additional lateral resistance to overturning.

Square excavation around bored hole for collared footing

### 4.2.3 Pad footing

The pad footing option is typically used in rock, where augering is considered impossible or impractical. Typically, it is easier to excavate rock using an excavator equipped with a rock breaker than to auger or core the rock using a pier-boring machine. Rocla Concrete Poles can provide custom hold-down bolt assemblies to suit any Duraspun® concrete pole that can be used in conjunction with a pad footing. Contact Rocla Concrete Poles to find out more about the footing design service.



Concrete pad footing for installation on rock

# 4 INSTALLATION

### 4.2.4 Piled footing (pole-pile)

A piled footing for Duraspun® concrete poles is available to allow poles to be installed in situations of very low soil strength. The pole-pile method involves driving a hollow-spun concrete pile into the ground, leaving the head of the pile approximately 1.5m above ground level. The pole top is then jointed to the pile in the same way as a pad footing.

Piled footing for soft ground

# 5 JOINTING

## 5.1 STANDARD JOINT (LUG JOINT)

Suitable for bolting together jointed pole sections which use "joint lugs". Refer to Drawing 89228 at the back of this guide for lug assembly details.

### 5.1.2 Coating joint interface

On one of the surfaces to be jointed, apply an even coating of Megapoxy P1 epoxy. This is a two-part epoxy that should be mixed thoroughly in even proportions of Part A and Part B. It is important that the joint surfaces are free of dust and loose material and are completely dry. The epoxy should be applied in a layer approximately 10mm thick.

### 5.1.3 Nut tightening

It is recommended that the pole sections be jointed in the vertical plane. Special care is necessary when bringing the sections together to prevent damage to the threaded studs as they pass through the lugs.

After the pole sections are brought together, place a flat and spring washer over each stud. Using the special extension spanner (Drawing 8383) apply an initial torque of 340Nm to all nuts. Reset the torque wrench and apply a final torque of 540Nm to each nut.

Nuts should be tightened in a diametrically opposite sequence until all nuts have been tightened. Recheck the first nuts tightened to ensure that all joints have the same final tension. This sequence must be completed before the epoxy starts to set (approximately 1 hour at 25 degrees Celsius).



Standard lug joint

# 5 JOINTING

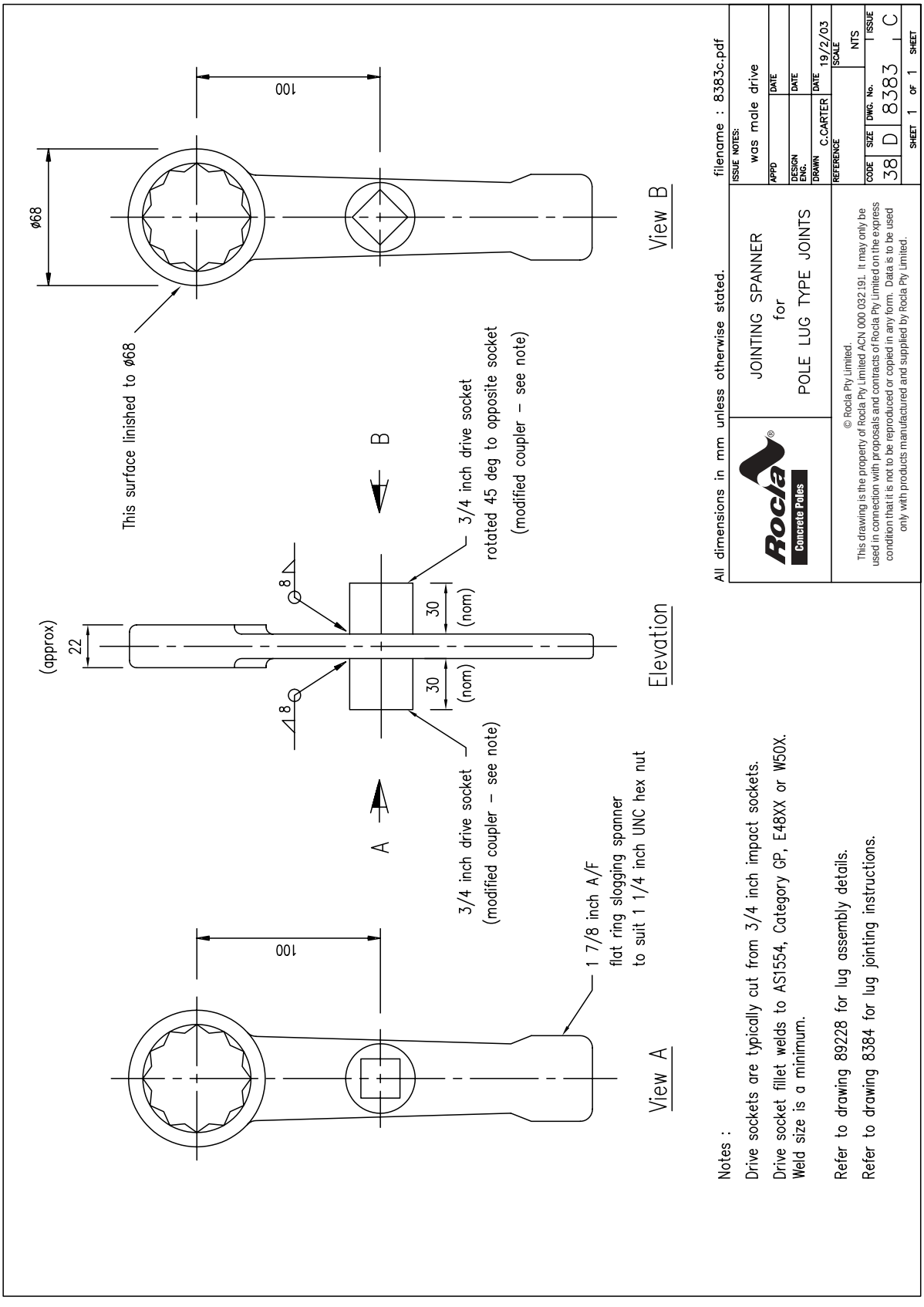
## 5.2 HIGH STRENGTH JOINT

The Rocla® high strength joint is used in specialist applications to provide a higher capacity mechanical joint between pole sections. Both concrete sections to be jointed have protruding joint studs. The method of attachment is via a fabricated steel connecting ring (pictured). Usually this ring will be connected to one side of the joint in the factory so that jointing on site can be carried out in the same manner as described above for the standard lug joint.

Note that the high strength joint uses 1.5-inch joint studs instead of the smaller 1.25-inch joint studs.

High strength joint

# 6 DRAWINGS


100
ø68
This surface linished to ø68
View B
B
3/4 inch drive socket
rotated 45 deg to opposite socket
(modified coupler – see note)
8
30
(nom)
(approx)
22
8
30
(nom)
3/4 inch drive socket
(modified coupler – see note)
Elevation
A
A
100
1 7/8 inch A/F
flat ring slogging spanner
to suit 1 1/4 inch UNC hex nut
View A
Notes :
Drive sockets are typically cut from 3/4 inch impact sockets.
Drive socket fillet welds to AS1554, Category GP, E48XX or W50X.
Weld size is a minimum.
Refer to drawing 89228 for lug assembly details.
Refer to drawing 8384 for lug jointing instructions.
All dimensions in mm unless otherwise stated.
filename : 8383c.pdf
Rocla
Concrete Poles
JOINTING SPANNER
for
POLE LUG TYPE JOINTS
ISSUE NOTES:
was male drive
APPD
DESIGN
ENG.
DRAWN C.CARTER
DATE 19/2/03
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SCALE NTS
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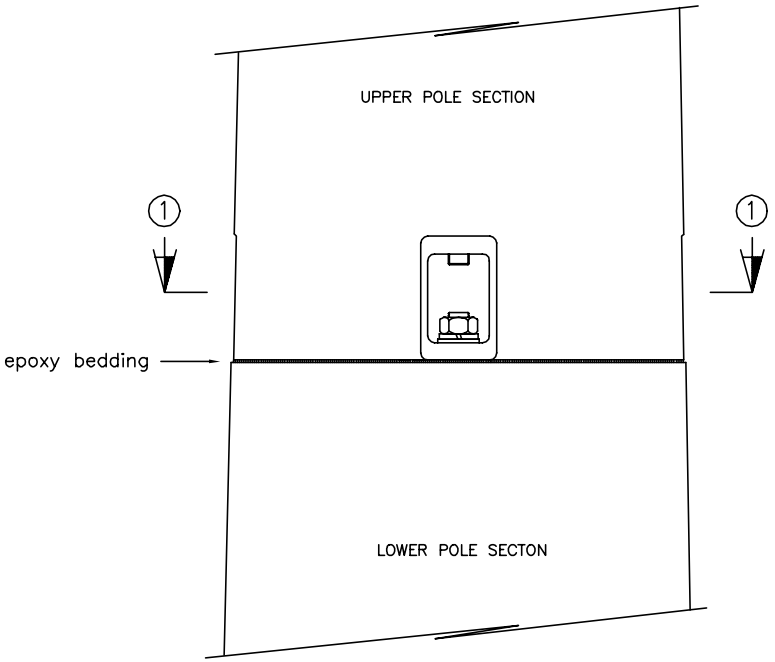
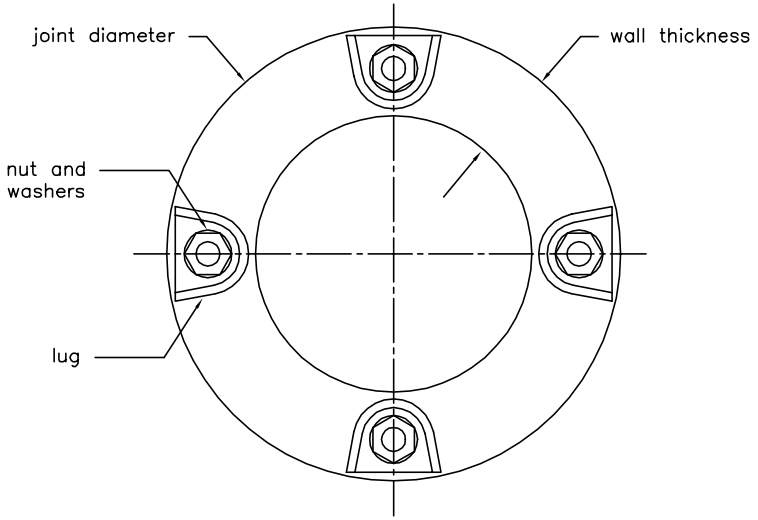
CODE 38 SIZE D DWG. No. 8383 ISSUE C
SHEET 1 OF 1 SHEET




View A

Typical 'lug' joint in a Duraspun® concrete pole.

The pole shown here has 4No equi–spaced joining lugs.




Section 1–1

A

A

Notes :

Refer to drawing number 8384 for jointing instructions.
The number of lugs at a joint is design dependent.
Lug joints can be used in both RC and prestressed concrete poles.

Refer to Sheet 2 for lug details.

All dimensions in mm unless otherwise stated. filename : 89228d1.pdf

Rocla® Concrete Poles

DURASPUN®
LUG JOINTED POLES
– GENERAL ARRANGEMENT

ISSUE NOTES: revised, added sheet

| | |
|---|---|
| APPD | DATE |
| DESIGN ENG. | DATE |
| DRAWN C.CARTER | DATE 12/2/03 |
| REFERENCE | SCALE NTS |



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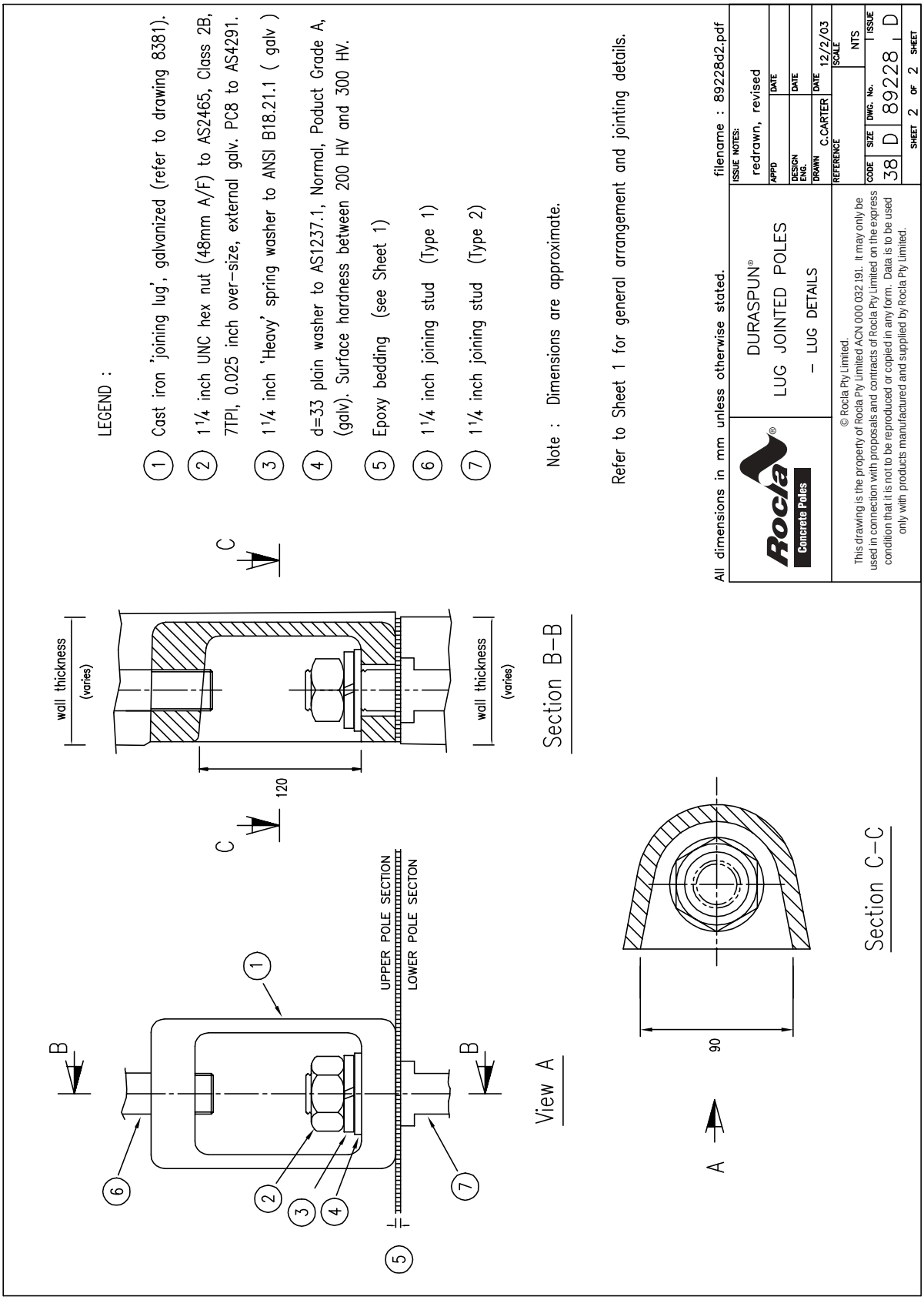
| 38 | D | 89228 | D |

SHEET 1 OF 2 SHEET

# 6 DRAWINGS


LEGEND :
1 Cast iron 'joining lug', galvanized (refer to drawing 8381).
2 1¼ inch UNC hex nut (48mm A/F) to AS2465, Class 2B, 7TPI, 0.025 inch over-size, external galv. PC8 to AS4291.
3 1¼ inch 'Heavy' spring washer to ANSI B18.21.1 ( galv )
4 d=33 plain washer to AS1237.1, Normal, Poduct Grade A, (galv). Surface hardness between 200 HV and 300 HV.
5 Epoxy bedding (see Sheet 1)
6 1¼ inch joining stud (Type 1)
7 1¼ inch joining stud (Type 2)
Note : Dimensions are approximate.
Refer to Sheet 1 for general arrangement and jointing details.
All dimensions in mm unless otherwise stated.
filename : 89228d2.pdf
ISSUE NOTES:
redrawn, revised
DURASPUN®
LUG JOINTED POLES
– LUG DETAILS
Rocla®
Concrete Poles
APPD
DESIGN ENG.
DRAWN C.CARTER
DATE 12/2/03
REFERENCE
SCALE NTS
CODE 38 SIZE D DWG. No. 89228 ISSUE D
SHEET 2 OF 2 SHEET
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wall thickness
(varies)
120
C
B
UPPER POLE SECTION
LOWER POLE SECTON
Section B-B
View A
Section C-C
90
A

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Concrete Poles

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# Poles & Piles

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