RS MODULAR POLES

High Performance COMPOSITE Utility Poles

Assembly and Installation Guide

RS

RS Technologies Inc.

RSpoles.com

info@RSpoles.com

+1 519 682 1110

U.S. Operations
1586 East Venture Drive
St. George, UT 84790

Canadian Operations
22 Industrial Park Road
Tilbury, ON N0P 2L0

Corporate Office
3553 - 31 Street NW
Calgary, AB T2L 2K7

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1.0 Disclaimer

The instructions and work methods provided within this guide are intended to supplement existing utility pole setting work methods and do not contemplate all possible variations in equipment design and work methods.

Activities including, but not limited to transporting, unloading, assembling, cutting, drilling, framing, lifting and installing RS FRP composite poles are the responsibility of the line crew/operator and should always be conducted by competent employees with the knowledge, training and experience to organize the work. Furthermore, when operating tools and equipment such as lever hoists, slings, drills, etc., it is expected that individuals consult the manufacturers' technical instructions, labels and inspection requirements to ensure proper use.

Should any questions arise that are not addressed within this guide, contact your local RS representative at info@RSpoles.com or +1 519 682 1110.

For additional information about RS Technologies, including access to the RS Technical Binder and various instructional videos, etc., visit the RS website at RSpoles.com.

2.0 Safety

2.1 Personal Protective Equipment (PPE)

- Safety footwear
- Hard hat
- Gloves
- Safety glasses
- Particle mask (when drilling or cutting)
- Long sleeve shirt and pants (when drilling or cutting)

2.2 Handling, Storage and Safety Precautions

- **Pinch Points** - Use caution when positioning RS poles and modules and when assembling slip joints. Keep hands on the outside of the pole set/module and avoid putting fingers into pre-drilled holes and slots.
- RS poles and modules are **slippery when wet**.
- To prevent RS poles and modules from **unintended rolling**:
  - Position nested and partially pre-assembled pole sets with the shipping bolt down (i.e. in the 6 o'clock position); and
  - If using wood dunnage (or similar supports) to store, stage or assemble RS poles or modules, chock each side of the pole set/module by placing wedge-shaped blocks snug between the outer module and the wood dunnage (or similar supports).
- For **safe stacking** and to **prevent scratching** RS poles and modules:
  - Never drag (skid) the pole/module along the ground when moving and/or positioning;
  - Keep the poles/modules off the ground by placing on wood dunnage, pole stands or assembly racks, etc.;
  - If it is necessary to stack RS poles or modules on top of one another, place a layer of wood dunnage (or similar supports) between each row that will allow for either the placement of a sling or lift truck, etc. to access each row;
  - Avoid contact with sharp, hard or abrasive tools and equipment and do not drag equipment, cabling, etc. over/across the surface of the pole/module. If such contact cannot be avoided, use a buffer material of suitable thickness (i.e. rubber, nylon, carpet, etc.) to protect the surface of the pole/module.

- **Center of Gravity** - For information pertaining to the center of gravity (CoG) markings for individual modules, nested pole sets and assembled poles, refer to Section 9.1.
- **Conductivity** – Although RS poles are non-conductive, they are not certified insulators and should be treated as such.

2.3 Material Safety Data Sheet

Contact RS Customer Support to obtain a copy of the Safety Data Sheet (SDS) for RS modular poles.

3.0 Equipment Required For RS Pole Assembly

- ☐ 1 x Jacking bar assembly kit (as detailed in Section 3.1) - For pole assembly;
- ☐ 2 x Lever chain hoists (2-Ton) - For pole assembly;
- ☐ 2 x 8 ft. [244 cm] Chain extensions or slings (6000 lb. [2721 kg] rating) - For pole assembly;
- ☐ 2 x Shackles - To attach chain extensions or slings for pole assembly;
- ☐ Wood dunnage, pole stands or RS assembly racks - To keep poles/modules off the ground;
- ☐ Wipes or rags - To remove debris from the modules;
- ☐ 1 x 9/16 in. [14 mm] Wrench or socket - To install J-bolts;
- ☐ 2 x 1-1/8 in. [29 mm] Wrenches and/or sockets - To remove shipping bolt and install blind nuts;
- ☐ 1 x 3 lb. [1.36 kg] Dead blow mallet - For pole assembly;
- ☐ 1 x Drill with 1/2 in. [13 mm] shank (gas, hydraulic or battery);
- ☐ 1 x 1-1/8 in. [29 mm] Carbide tipped hole saw with arbor - To drill holes for blind nut kits;
- ☐ 1 x 5/16 in. [8 mm] Hex head socket with drill attachment - To install top cap screws;
- ☐ 1 x Tape measure (length of pole);
- ☐ 1 x Pole cant tool with nylon strap, rubber backed - To rotate poles/modules as needed;
- ☐ 1 x Chalk line (with extra chalk) - For axial marking if field drilling;
- ☐ 1 x Circular saw with diamond blade - If cutting the pole/module to length;
- ☐ Carbide tipped hole saws with arbors (sizes as necessary) - If field drilling;
- ☐ Permanent marker (i.e. Sharpie), electrical tape - If field drilling or cutting; and
- ☐ 1 x Small slot screwdriver - If field drilling, to pop plugs out of hole saw.

3.1 Jacking Bar Assembly Kit

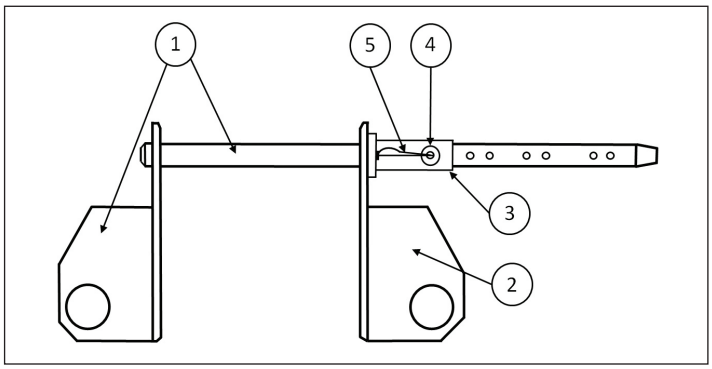
Jacking bar kits are available in two (2) sizes (as detailed below in Table 1). The jacking bar kit required depends on the RS module sizes being assembled.

Note: Each jacking bar kit includes two (2) assemblies as shown in Figure 1.

RS Part No.	Description	Notes
30070	Jacking Bar Assembly Kit, Long (modules 01 to 11), RSK-AB-001.	Longer and heavier kit used to assemble any RS pole that uses module 1 to a module 10/11.
30071	Jacking Bar Assembly Kit, Short (modules 01 to 06), RSK-AB-002.	Shorter and lighter kit used to assemble RS poles that utilize a module 1 up to a module 5/6.

Table 1: Jacking Bar Kit - Ordering Details

3.1.1 Jacking Bar Assembly Components



1. Jacking bar with integrated jacking plate
2. Jacking plate (independent)
3. Retention collar
4. Quick release pin, push button
5. Cable, aircraft, galvanized

Figure 1: One (1) Jacking Bar Assembly

3.1.2 Jacking Bar Inspection

Prior to use, each jacking bar assembly is to be inspected for the following:

- ☐ Bent bars
- ☐ Cracked or broken welds
- ☐ Hair line cracks
- ☐ Broken, rusted or dysfunctional pins
- ☐ Detached aircraft cable holding wire

3.1.3 Jacking Bar Storage

When the jacking bar kit is not in use:

- Assemble the components related to each jacking bar assembly to keep them from being misplaced or damaged.
- Store the jacking bar kit in the case provided and/or in a dry location.

4.0 RS Pole Hardware and Accessory Hardware

4.1 RS Pole Hardware - Included with Every RS Pole

- Top cap kit (one per pole) - Includes one (1) top cap and the required hex head self-tapping screws (with integrated washers);
- Joint kits (one per slip joint) - Each joint kit includes either two (2) blind nut or two (2) lag screw assemblies and five (5) hole plugs to plug the 26 mm [1-1/16 in.] jacking holes;
- Base plate kit (one per pole) - Includes one (1) base plate and four (4) J-bolt assemblies;
- Pole ID tag kit (one per pole) - Fastened to the pole prior to shipping. For details, refer to 'C501 - RS Pole ID Tag';
- Module ID tag kits (one per module) - Fastened to each module prior to shipping; and
- Shipping bolt (one per nested and partially pre-assembled pole) - Installed prior to shipping. Located at the base (large end) of each pole set. To mechanically fasten the modules together.

Note: Do not remove the shipping bolt until the pole has been transported to its final assembly destination and is ready to be unnested.

4.2 Accessory Hardware and Tools - Available from RS Upon Request

When required, RS can supply any structure related and/or accessory hardware. This includes hardware sourced from other Vendors, as well as custom hardware and tooling designed specifically for RS poles.

Some of the common 'Accessory Hardware and Tools' supplied by RS includes:

- Jacking bar assembly kit (as detailed in Section 3.1)
- Carbide tipped hole saws and arbors
- 2-Ton lever chain hoists
- Pole steps
- Guying tees
- Square curved washers
- Ground wire clips
- Fall arrest/cable system hardware
- Antenna mount hardware
- Lightning protection hardware
- Gin pole kit and accessories
- Hole plugs
- Pole stands or pole assembly racks
- Pole repair kits
- Pole disassembly kit
- Rock anchor

5.0 Planning for Pole Assembly and Framing

Determine where the poles are to be assembled and framed. When doing so, consider the following:

- Installation location:
  - Transportation and Accessibility - Is the location accessible to heavy equipment? Is it possible/preferable to transport fully assembled poles to the installation site?
  - Work Location - For onsite pole assembly, more space, equipment movement and crew movement with relatively flat terrain is required. Assembling the pole along a roadway, public trail, school yard, etc. will require more time, worker movement and space.
- Project Size:
  - For large projects, setting up a dedicated storage and well-planned assembly area using RS pole assembly racks has proven to be an efficient and optimized assembly method.
- Pole Size and Structure Type:
  - Larger poles, multi-pole structures and those with significant hardware requirements (i.e. large communication poles, H-Frame utility structures, etc.) may require assembly at the location.
  - RS poles are configured from standard sized modules. Most likely, the tip module has been cut to achieve a desired length. For more information on RS pole codes and to better understand the characteristics of the pole(s) to be assembled, see Section 13.0 (Appendix B).
- Hardware considerations:
  - All hardware attachments should be smooth-backed and, as best as possible, match the pole radius at the attachment elevation.
  - Avoid sharp edge contact with the pole surface. If required a large square curved washer or a curved bearing plate can be used between the pole and any sharp-edged hardware.
  - Respect RS's hole spacing requirements. See Section 14.0 (Appendix C).
  - Ensure all through bolted connections (i.e. guy wires, crossarms, cross braces, shield wires, etc.) have a sufficient quantity and diameter of through bolts to transfer the vertical load to the pole wall. Contact an RS representative for more information.
  - The through bolt torque specification is 50 ft-lb [68 N-m]. To achieve the correct torque, hand tighten the nut and add an additional 1.5-2.5 turns. A torque specification wrench is recommended.
- Other considerations:
  - Outage planning and/or specialized equipment availability (i.e. helicopter, crane, etc.).

Note: It may be possible for RS to pre-drill and/or pre-assemble the poles at the factory and transport them to the installation site, ready to install. For more information, contact your local RS representative.

6.0 Module Layout

6.1 Place the pole set down on the wood dunnage, pole stands, RS assembly racks, etc. with the shipping bolt at the bottom (i.e. in the 6 o'clock position). Refer to Figure 2.

Figure 2: Nested RS Pole Set with Shipping Bolt

6.2 Chock each side of the pole set with wedge-shaped blocks. Chock blocks are not required when using pole stands or RS assembly racks.

6.3 Remove the shipping bolt using two (2) 1-1/8 in. [29 mm] wrenches.

Note: If any other hardware (in addition to the shipping bolt) has been installed along the length of the pole, DO NOT remove this hardware unless otherwise notified.

6.4 Unnest the modules that comprise each pole set by removing the inner modules one at a time. To prevent scratching the modules, elevate the base of each module before removing it to ensure that only the tip of the module being removed is in contact with the inside surface of the larger module. Refer to Figures 3a and 3b.

Note: Once unnested, keep the modules off the ground using wood dunnage, pole stands or RS assembly racks.

Figures 3a and 3b: A Derrick Boom Truck Lifting Up and Outwards to Unnest Modules and Prevent Scratches

Figures 4a and 4b: Small Modules Being Unnested and Laid Out for Assembly

Caution: While it may be possible for two (2) to four (4) crew members to lift and handle the smaller modules per Figures 4a and 4b, a derrick boom truck, crane or equivalent lifting device will be necessary to safely handle and move the larger modules into position. Refer to Figures 3a and 3b.

6.5 If assembling the pole near the embedment location, arrange the wood dunnage, pole stands, etc. such that the largest module (i.e. base of the pole) is located closest to the embedment location and the smallest module (i.e. tip of the pole) is located farthest away.

6.6 If using wood dunnage to assemble the RS poles:

- Place two (2) parallel rows of wood dunnage down for each module. Refer to Figure 5a. For example, a 45 ft. [13.7 m] 0204 pole includes three (3) modules (modules 2, 3 and 4). This pole will require three (3) sets of wood dunnage (i.e. six (6) rows) in total;
- The first row of dunnage should be located approximately 2 ft. [61 cm] from the base (large end) of each module;
- The second row of dunnage should be located approximately 6 ft. [183 cm] from the tip (small end) of each module (or for larger modules, at least three (3) times the diameter of the module tip). This will allow the slip joint to be assembled without the wood dunnage interfering;
- Chock each module with wedge-shaped blocks. Chock blocks are not required when using pole stands or RS assembly racks; and
- As the pole is assembled, fewer rows of dunnage are required to support it.

6.7 If using pole stands to assemble RS poles, place two (2) pole stands down for each module and position them similar to the wood dunnage noted above. Refer to Figure 5b.

6.8 If using RS pole assembly racks to assemble RS poles, refer to 'C734 - RS Pole Assembly Racks' for instruction.

Figure 5a: An RS Pole on Wood Dunnage

Figure 5b: An RS Pole on Pole Stands

7.0 Slip Joint Assembly

The figures and instructions in this section are for horizontal pole assembly. However, most of the work methods and the forces required to fasten the slip joints apply to BOTH horizontal and vertical pole assembly. For specific instruction pertaining to vertical pole assembly, refer to Section 10.

7.1 Slip Joint Assembly Components and Layout

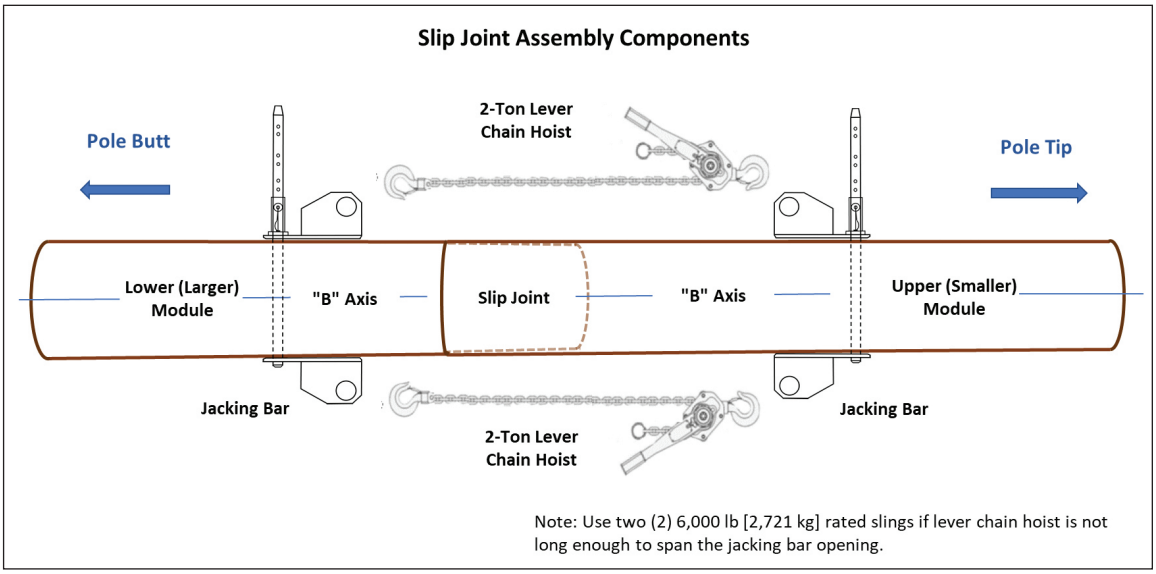


Figure 6: Slip Joint Assembly Components

7.2 Jacking Modules Together

7.2.1 Position the two (2) modules/sections such that they are level with one another.

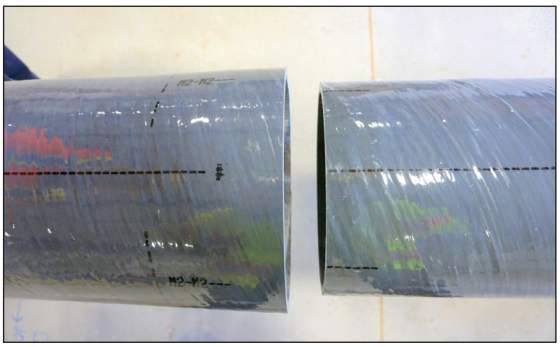
7.2.2 Wipe down the following 'overlap areas' to clear any debris:

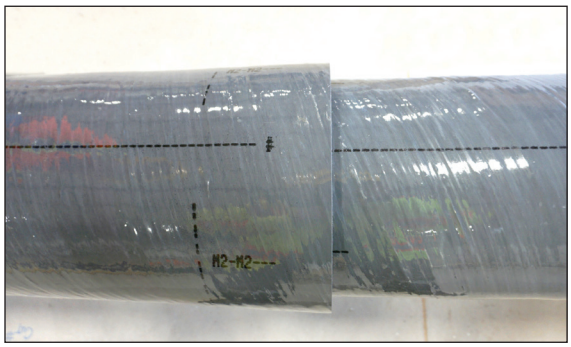
- The inside surface of the upper (smaller) module. Refer to Figure 7a.
- The outside surface of the lower (larger) module. Refer to Figure 7b.

Figures 7a, 7b and 7c: Wiping the Inside Surface of the Upper Module and the Outside Surface of the Lower Module

7.2.3 Align the modules with the B axis facing up. The alignment lines are printed on the B axis along the length of each module. Refer to Figures 8a, 8b and 8c.

7.2.4. For smaller (lighter) modules, manually (and slowly) maneuver the base of the upper (smaller) module over the tip of the stationary lower (larger) module until the joint becomes snug and the two modules begin to align as one unit. While doing so, be careful to maintain the alignment of the B axes.





Figures 8a and 8b: Lining up the B Axes on Both Modules and Initiating the Slip Joint Overlap

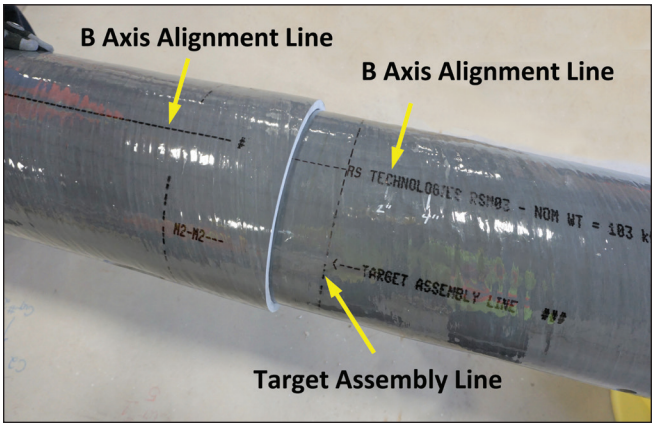


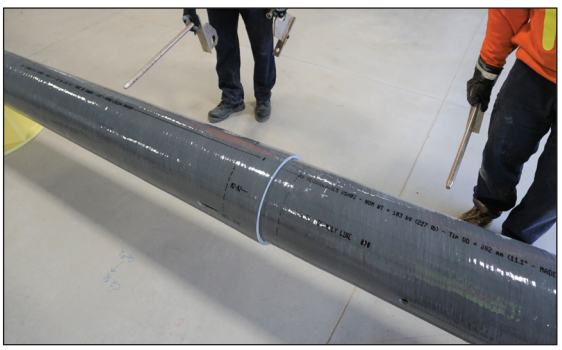
Figure 8c: Slip Joint Overlap

7.2.5. For larger (heavier) modules, use a derrick (boom) truck, crane or similar lifting equipment with a sling positioned at the CoG line, and slowly maneuver the base of the upper (smaller) module over the tip of the stationary lower (larger) module until the joint becomes snug and the two modules begin to align as one unit. While doing so, be careful to maintain the alignment of the B axes.

Note: The center of gravity (CoG) is printed on each module prior to shipping. However, being that the top module of each pole is often cut to length, the CoG marking on pole top modules should be established on site prior to handling.

7.2.6 Insert the two (2) jacking bars into the 26 mm [1-1/16 in.] pre-drilled jacking holes. Refer to Figures 9a and 9b.

7.2.7 Slide an independent jacking plate onto each jacking bar with the flat backing plate against the pole wall. Refer to Figure 9b.



Figures 9a and 9b: Inserting the Jacking Bars and Adding the Jacking Plate

7.2.8 Slide a retention collar onto each jacking bar, with the flanged side of the retention collar oriented towards the pole. Refer to Figure 10a.

7.2.9 Rotate the retention collar around the jacking bar to identify the best suited set of holes that will keep the retention collar tight up against the jacking plate and the jacking plate tight up against the pole wall. Refer to Figures 10b and 10c.

Caution: The jacking plates need to be as tight as possible against the pole wall. If the gap between the pole wall and the back of the jacking plate exceeds 1/8 in. [3 mm], the significant forces applied during slip joint assembly may result in bending one or both jacking bars, making them difficult to remove and reuse again in the future.

7.2.10 Insert the quick release pin. Refer to Figure 10c.

Figures 10a and 10b: Installing the Retention Collar and Determining the Correct Set of Holes for a Tight Fit

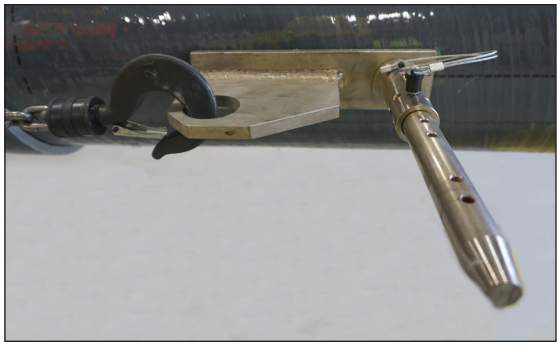
Figure 10c: Inserting the Quick Release Pin With the Retention Collar Tight to the Jacking Plate

7.2.11 Connect the lever chain hoists (and if required, chain extensions or slings) to the jacking plates.

7.2.12 Apply light tension using the lever chain hoists.

7.2.13 If necessary, re-position the jacking plates such that they are all aligned in the direction of the assembly force AND ensure the jacking plates are tight up against the pole wall. Refer to Figures 11a and 11b (next page).

Caution: The jacking plates need to be tight against the pole wall. If the gap between the pole wall and the back of the jacking plate exceeds 1/8 in. [3 mm], the significant forces applied during slip joint assembly may result in bending one or both jacking bars, making them difficult to remove and reuse again in the future.



Figures 11a and 11b: Jacking Plates Aligned in the Direction of the Assembly Force and Tight Against Pole Wall

7.2.14 Begin applying force simultaneously on each side of the pole using the lever chain hoists.

7.2.15 Maintain the module alignment throughout assembly by continuing to apply equal force to each side. Refer to Figure 12.

Figure 12: Equal Assembly Force Being Applied to Both Sides

Figure 13: Alleviating Static Friction Using a Dead Blow Mallet

7.2.16 As the assembly force increases and the slip joint becomes tight:

- Using a dead blow mallet, strike the overlap area just above the base of the upper (smaller) module to alleviate any built-up static friction. Refer to Figure 13.
- Monitor the four (4) jacking holes and **STOP** applying force if any of the holes elongate more than 1/16 in. [2 mm]. A slight amount of elongation is normal and is a sign that an appropriate level of assembly force has been applied.

7.2.17 **Compressing the slip joint is complete when 4,000 lb. [1,814 kg] of force per side has been applied and all static friction has been released by striking the overlap area with a dead blow mallet. The base of the upper module may not reach or may slightly surpass the target assembly line.**

Notes:

- 95% of assembled slip joints will reach to within +/- 1 in. [25 mm] of the target assembly line as marked on the lower (larger) module. Refer to Figures 14 and 15.
- Due to the resin rich surface of RS poles, there are subtle variations in the outside diameters of each module that cause the overlaps to vary from slip joint to slip joint. This results in about 5% of the assembled slip joints exceeding +/- 1 in. [25 mm] from the target assembly line, despite the application of 4,000 lb. [1,814 kg] of force.

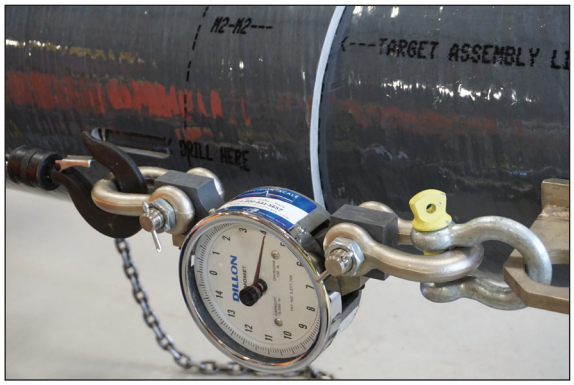


Figure 14: Completed Slip Joint Assembled to 4,000 lb. [1,814 kg] of Force

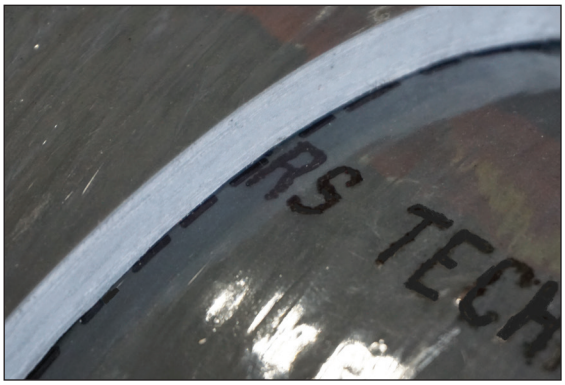


Figure 15: Example of a Slip Joint Assembled to the Circumferential, Pre-Marked Target Assembly Line

7.3 Joint Kit Installation

Each slip joint is to be mechanically fastened using a joint kit (includes either two (2) blind nut or two (2) lag screw assemblies). For blind nut installation, which is the most common, follow the instructions below. If installing lag screw joint kits, refer to 'C606 – Installation of Lag Screw Joint Kit' for instruction.

7.3.1 Locate the pre-drilled slots near the base of the upper (smaller) module.

7.3.2 Drill a hole through the inner module at the base of each slot, immediately adjacent to the 'DRILL HERE' marking, using a 1-1/8 in. [29 mm] carbide tipped hole saw. Refer to Figures 16a, 16b and 16c.

Notes:

- The base of the slot shown in Figure 16a, is located on the right-hand side (toward the base of the pole). However, on the other side of the pole, the base of the slot will be located on the left-hand side (again toward the base of the pole).
- The 1-1/8 in. [29 mm] holes are oversized to allow for the insertion of the blind nut.
- The pre-drilled slot in the outer (upper) module is 7/8 in. [22 mm] wide. This is to accommodate the 3/4 in. [19 mm] diameter blind nut bolt.

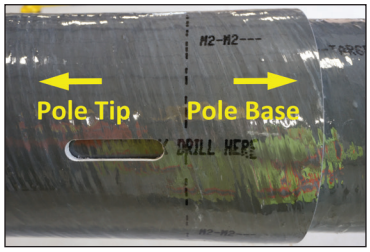


Figure 16a: Undrilled Slip Joint Slot

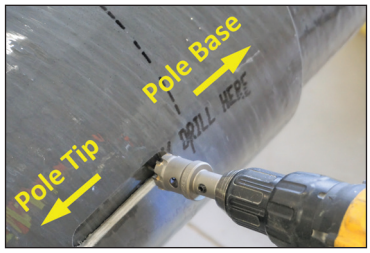


Figure 16b: Drilling Hole for Blind Nut in the Base End of the Slot

Figure 16c: Drilled Blind Nut Hole

7.3.3 While holding onto the retention cable attached to the blind nut, insert the blind nut into the 1-1/8 in. [29 mm] drilled hole. Refer to Figure 17.

7.3.4 Using the retention cable, position the blind nut axially on the inside of the pole (along the length of the pole). To orient the blind nut while the pole is on the ground, pull the retention cable tight at 90° to the ground. Refer to Figure 17.

Caution: If the blind nut is not oriented along the length of the pole, it may damage the inner pole wall.

7.3.5 Keeping the retention cable tight, thread the 3/4 in. [19 mm] bolt into the blind nut by hand, ensuring that the blind nut remains oriented axially along the length of the pole.

7.3.6 Once the bolt is threaded hand tight, use a 1-1/8 in. [29 mm] socket or crescent wrench to tighten. Refer to Figure 17.

7.3.7 Once the bolt is tight, the retention cable may be trimmed. Refer to Figure 17.

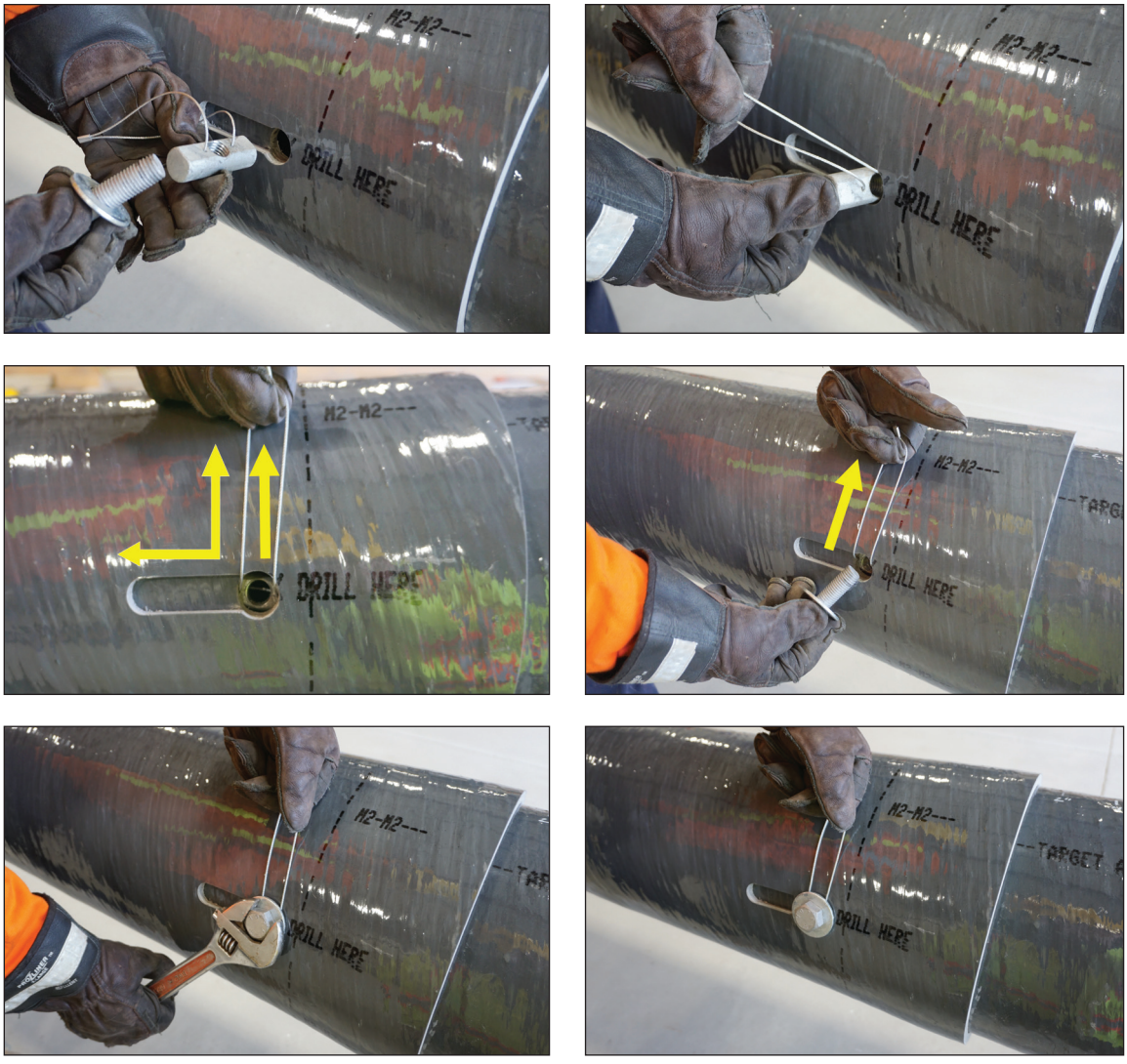


Figure 17: Installing the Blind Nut and Ensuring the Nut is Aligned Axially on the Inside of the Pole by Pulling the Retention Cable Tight at 90° to the Slot

8.0 Base Plate, Top Cap and Hole Plug Installation

8.1 Base Plate Installation

Four (4) J-bolt assemblies are used to secure the base plate to the butt of each RS pole.

J-bolts are installed on the inside of the pole and hook into the two (2) round holes located near the butt of the pole on the B and D axes and the two (2) corresponding slots located on the A and C axes. Refer to Figure 18.

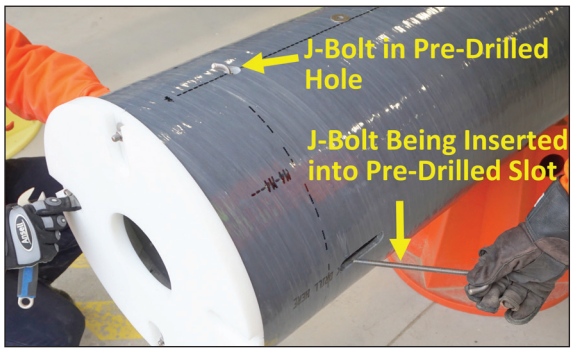


Figure 18: Location of Pre-Drilled J-Bolt Holes and Slots

8.1.1 From the outside of the pole, insert the straight end of the first two (2) J-bolts into the round holes (not the slots) located on the B and D axes, with the J-bolts running down the inside of the pole toward the base. Refer to Figure 19.

8.1.2 Position the base plate with the flush side flat against the butt of the pole and the grooved side facing outwards. The grooves are to accommodate the J-bolt hardware. Refer to Figure 19.

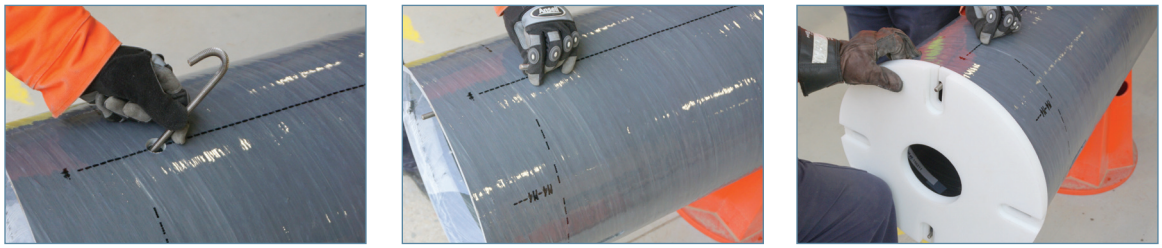


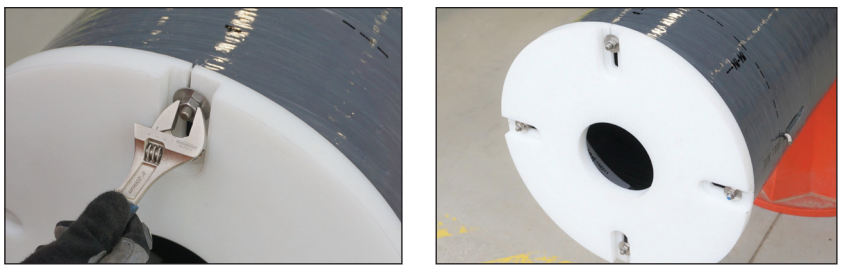
Figure 19a, 19b and 19c: Installing a J-Bolt into the Pre-Drilled Hole and Positioning the Base Plate

8.1.3 Install a flat washer and hand tighten a nut onto each J-bolt.

8.1.4 Install the two (2) remaining J-bolts in the slots located on the A and C axes (90° to the holes referenced above), with the J-bolts running down the inside of the pole toward the base.

8.1.5 Feed the J-bolts through the slots in the base plate, install a flat washer and hand tighten a nut onto each J-bolt.

8.1.6 Center the base plate on the butt of the pole and secure it by tightening the nuts with a 9/16 in. [14 mm] socket or crescent wrench. Refer to Figures 20a and 20b.



Figures 20a and 20b: Securing the Base Plate to the Pole

8.2 Top Cap Installation

The top cap is to be fastened to the tip of the RS pole using the provided hex head self-tapping screws with integrated washers.

8.2.1 Position the top cap on the assembled pole as snug as possible. Refer to Figure 21a.

8.2.2 Install the self-tapping screws evenly around the circumference of the pole tip using a 5/16 in. [8 mm] hex head socket with drill attachments. Refer to Figures 21b and 21c. Depending on the size of the top cap, the number of self-tapping screws and their location in proximity to one another will vary as follows:

- Top caps up to and including 16-1/2 in. [419 mm] require four (4) self-tapping screws, positioned approximately 90° to one another.
- Top caps 17 in. [431 mm] and larger require eight (8) self-tapping screws, positioned approximately 45° to one another.

Caution: Excessive torque will cause the self-tapping screw to pull through the rim of the top cap.

Figures 21a, 21b and 21c: Positioning and Installing the Top Cap

8.3 Hole Plug Installation

Hole plugs are to be installed in every open (unused) hole. This will prevent hornets, bees, birds, etc. from nesting inside the pole and will assist in suppressing flames should the pole be exposed to a wildfire.

Each joint kit includes five (5) hole plugs to plug the 26 mm [1-1/16 in.] jacking holes (unless these holes have been re-purposed for framing and/or pole steps).

8.3.1 Install each hole plug by hand and tap each with the dead blow mallet to ensure a secure fit.

8.3.2 If additional hole plugs are required, contact your local RS Representative for assistance.

Note: Crews that regularly work with RS Poles are encouraged to keep spare hole plugs in a range of sizes on hand.

9.0 Installation and Embedment

The following instructions are meant to supplement existing utility pole setting work methods, specifically those pertaining to pole alignment, embedment, backfill and tamping.

9.1 Center of Gravity

9.1.1 For individual RS modules, the CoG is printed on each module prior to shipping. However, because the top module of each pole is often cut to length, the CoG marking on pole top modules should be established on site prior to handling.

9.1.2 For nested and assembled pole sets, the CoG is not physically marked on nested or assembled poles. However, the CoG for both can be found on the first page of the applicable RS pole drawing and are easily located by an experienced equipment operator.

9.1.3 To move the CoG (and the lifting point) for an assembled pole down toward the base of the pole at the time of installation, a counterweight (i.e. sandbags, concrete bags, etc.) of up to 200 lb. [90 kg] can be secured inside the base of the pole. Care needs to be taken to ensure that the counterweight does not shift during pole lifting and installation.

9.2 Lifting the Pole - Derrick (Boom) Truck

9.2.1 Lifting an RS pole with a boom truck (or similar) requires a properly rated nylon sling or rope winch, rigged in a choker configuration and placed a few feet (a meter) above the CoG.

Figure 22: Temporary Through Bolt to Prevent Sling Slippage

Figure 23: Temporary Rubber Matting to Protect the Pole Surface From the Boom

9.2.2 To ensure the pole does not slip when lifted, the attachment point must be safely secured under a through bolt. Refer to Figure 22.

Note:

- A temporary through bolt can often be installed in the pre-drilled jacking holes. Refer to Figure 22.
- To avoid damaging the pole with the boom. It may be necessary to temporarily wrap the pole with a buffer material of suitable thickness (i.e. rubber, nylon, etc.). Refer to Figure 23.

9.3 Lifting the Pole - Crane or Helicopter - Single Pole Installations

9.3.1 Lifting an RS pole with a crane or helicopter requires one (1) or two (2) properly rated nylon slings, rigged in a choker configuration.

9.3.2 To ensure the pole does not slip when lifted, the attachment point must be safely secured to an appropriately sized through bolt near the top of the pole. Refer to Figures 24a and 24b.

Caution: Ensure that the helicopter pilot/crane operator is consulted when making plans and that they are aware of the structure height(s) and weight(s).


Figures 24a and 24b: Crane With a Choker Sling Installing a 95 ft. [29m] Pole for a 115kV Circuit

9.4 Lifting the Pole - Pole Setter or Grapple Head

9.4.1 To avoid damaging the surface of the RS pole, ensure the contact surface is rubber, nylon or similar and is of a suitable thickness and not worn down. Refer to Figures 25a and 25b.


Figures 25a and 25b: A Pole Setter Setting a Double Circuit 44kV Pole During an Outage

9.4.2 For H-frame, multi-pole and heavy communication structures, consult RS for optimal rigging and attachment points.

9.5 Pole Alignment

9.5.1 RS poles are typically aligned using a plumb bob or line of sight. Refer to Figure 26. For greater accuracy, a construction transit or laser level sighted into one of the primary pre-marked vertical axial lines to ensure a plumb vertical pole is recommended.

Note: RS poles are symmetrical in strength and shape. As such, there is no face or back side.

Figure 26: Using a Plumb Bob to Vertically Align a Pole

Figure 27: RS Poles Can Be Turned Easily Using a Pole Cant

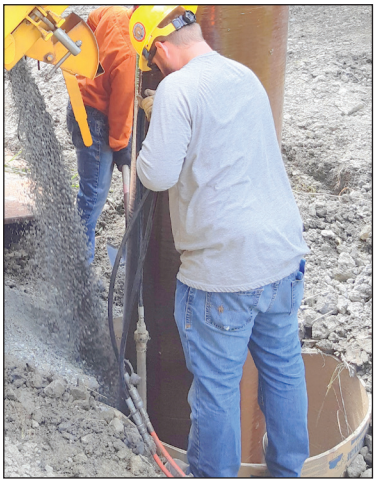
9.5.2 When assembling an RS pole vertically, it's critical that the base module is plumb, as any discrepancy will be magnified when the upper modules are installed.

9.5.3 For radial alignment, RS poles are easy to turn using a pole cant or wrench with a nylon strap. Refer to Figure 27.

9.6 Embedment and Foundation Options

9.6.1 Like other pole types, RS poles can be installed using standard industry practices. The most common approaches include:

- Direct embedment. Refer to Figure 28a and Section 16.1 (Appendix E).
- Sleeved embedment (in plastic, corrugated steel or precast concrete sleeve). Refer to Figure 28b and Section 16.2 (Appendix E).
- Surface mount (concrete, rock mount, pile mount, etc.).



Figures 28a and 28b: Embedment and Backfill Techniques

9.6.2 Embedment depth is to be determined by the end user after a review of structure loading and a geotechnical investigation. Standard embedment depth recommendations include:

- For pole heights greater than 35 ft. [10.7 m]: 10% of the overall pole length plus 24 in. [610 mm].
- For pole heights up to and including 35 ft. [10.7 m]: 10% of the overall pole length plus 30 in. [762 mm].

Note: The RS pole drawing includes the embedment depth as well as the associated pole diameter at ground line.

Caution: While guidance can be given, RS does not provide foundation design or geotechnical engineering services. It is the responsibility of the asset owner to ensure that the foundation requirements are sufficient for the structure and its anticipated loads prior to installation.

9.7 Backfill and Tamping

9.7.1 Common backfill recommendations include:

- Native soil (with sufficient bearing capacity);
- Graded aggregate with 3/4 in. [19 mm] minus particle size;
- Concrete; and
- Pole setting foam.

Figures 29a, 29b, and 29c: Examples of Acceptable and Unacceptable Backfill Options

Caution: Large, sharp and/or jagged rocks must be avoided as they can damage the surface of the pole and create stress concentrations below the ground line. Refer to Figures 29a, 29b, and 29c.

9.7.2 Tamping is required to complete the pole set. Backfill should be compacted in layers of 4-8 in. [100-200 mm].

9.8 Live Line Installations

RS FRP composite poles are non-conductive. However, they are not individually tested, dielectrically stamped or rated insulators.

Caution: When conducting a live line installation, all safety measures, protective barriers and work methods must be followed. Refer to Figures 30a and 30b.

Figures 30a and 30b: Base Module Being Replaced Using Live Line Techniques

10.0 Vertical Pole Assembly

RS poles can be assembled vertically using a derrick (boom) truck, crane, helicopter, using work methods such as “sword and sheath”, or by hand using the RS gin pole kit. See Figures 31a, 31b and 31c.

For vertical assembly, the modules can be staged by placing next to one another on the same dunnage.

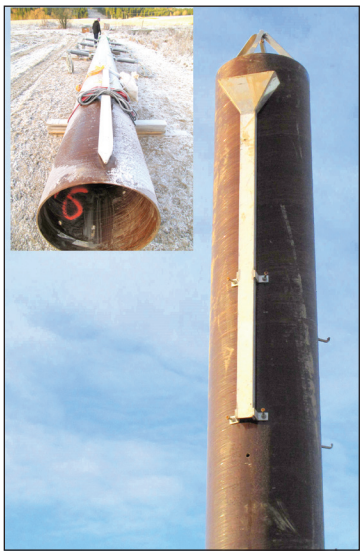


Figure 31a: Sword and Sheath

Figures 31b and 31c: Gin Pole - Method of Vertical Pole Assembly

10.1.1 If using the RS gin pole kit, refer to ‘C608 - Work Instruction - RS Gin Pole - Assembly of an RS Pole’ for instruction. Refer to Figures 31b and 31c.

10.1.2 Set the base module first. Ensure that the base module is vertically plumb, as any discrepancy will be magnified when the upper modules are installed, and that the backfill is properly tamped.

10.1.3 Depending on work methods and site conditions, the upper modules can either be lifted into place and assembled one at a time or assembled on the ground and lifted as a single pre-framed unit.

Note: Despite having been vertically assembled, each slip joint must be compressed and mechanically fastened as detailed in Section 7.0 – Slip Joint Assembly.

10.1.4 For additional information and planning support pertaining to vertical assembly, contact your local RS representative for assistance.

11.0 Additional Support

11.1 RS Technical Services (Field Support)

RS Technologies is committed to providing Customers with industry leading technical support and training to assist with the integration of RS poles and to ensure that field crews and field technicians are trained in the correct work methods pertaining to the handling, assembly and installation of RS poles. These services can be conducted onsite in the form of classroom and/or field training or, if necessary, via e-services (i.e. phone, email, web conferencing, etc.).

For more information about RS Technical Services and/or to schedule a training session, please contact your local RS representative for assistance.

11.2 RS Website

Visit RSpoles.com to access a variety of tools and resources, including but not limited to, the RS Technical Binder, various instructional videos, work methods, as well as the RS pole selector tool and photo and video libraries, etc.

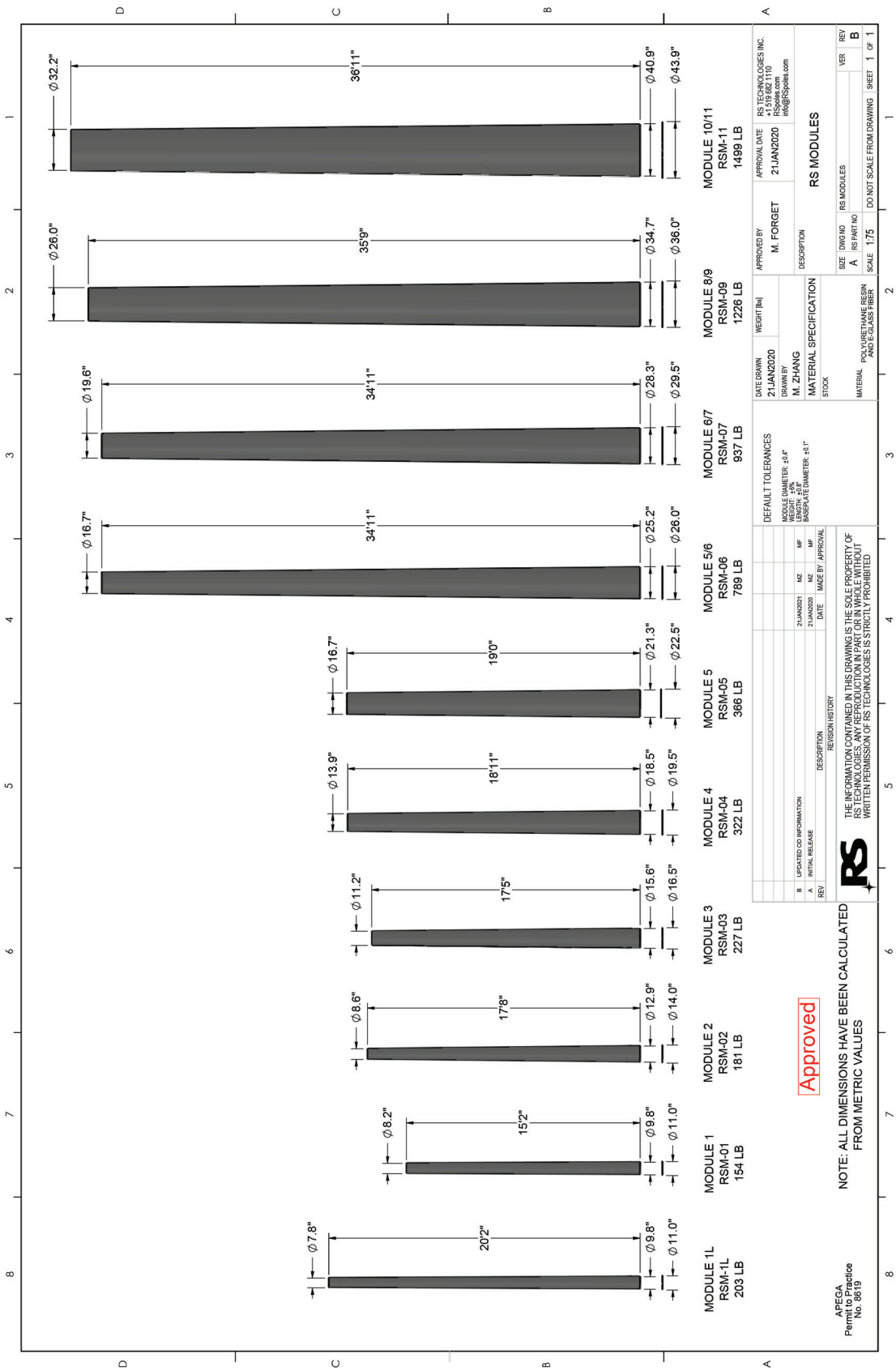
11.3 RS Work Instructions

Listed below are various supporting documents and detailed work instructions that are meant to assist the front-line workers in performing specific tasks in a knowledgeable, safe and efficient manner. For more information and/or to access any of these, contact your local RS representative for assistance.

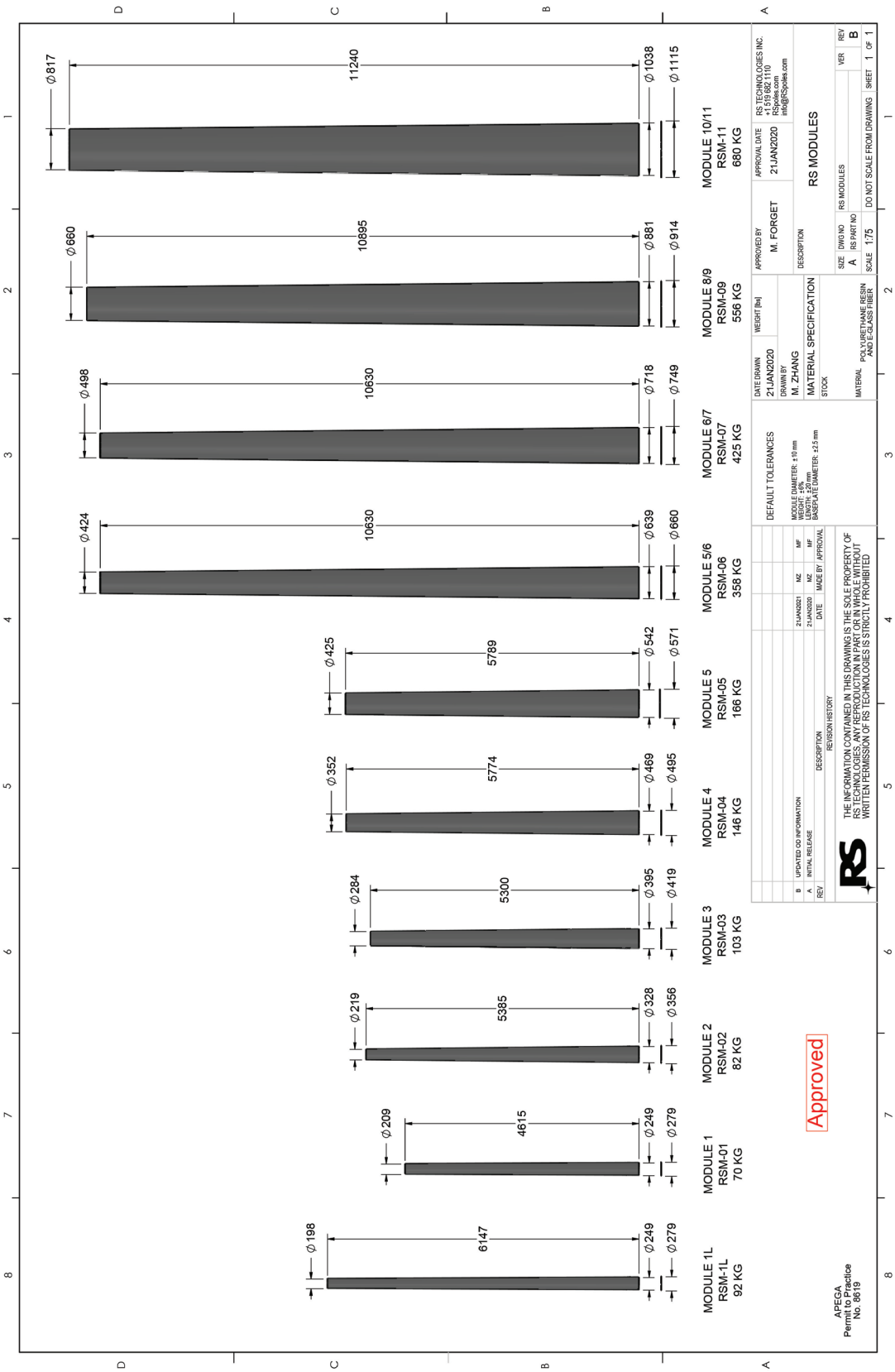
- C607 – SDS of Modular Poles
- C610 – Drilling and Cutting RS Poles
- C501 – RS Pole ID Tag
- C734 – RS Pole Assembly Racks
- C608 – Gin Pole Assembly of an RS Pole
- C606 – Installation of a Lag Screw Joint Kit
- C602 – RS Pole Disassembly Kit
- C611 – Disassembly with Gin Pole
- C702 – RS Pole Inspection and Maintenance Guide
- C712 – Damage Evaluation and Repair of an RS Pole
- C609 – 16-007 Torque Requirements for Through Bolt Connections
- C720 – 12-002 – Bonding and Grounding of Hardware on RS Utility Poles
- C726 – 14-003 – Method of Attaching Down Ground Wire to RS Poles

12.0 Appendix A - RS Module Sizes

12.1 Imperial Module Sizes



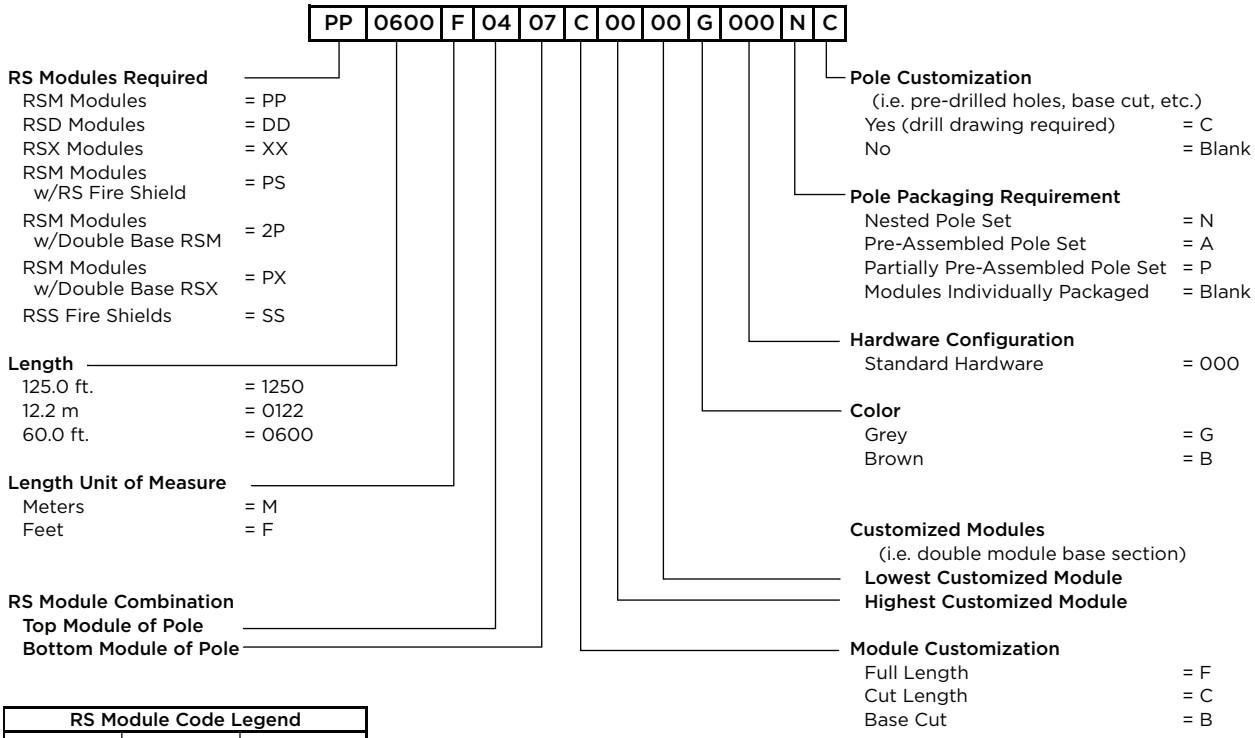
12.2 Metric Module Sizes



13.0 Appendix B - RS Pole and Module Code Legend

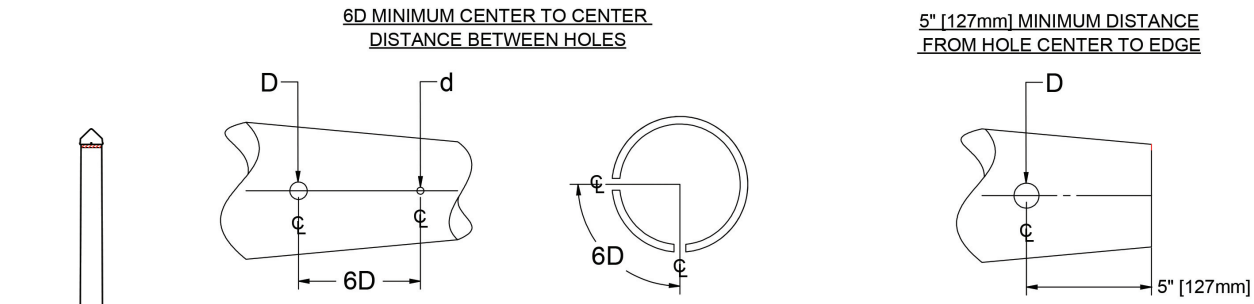
Refer to the following illustration outlining the various elements captured within the RS pole part number.

The below example shows a 60 ft. [18.3 m] grey pole with an 0407 module combination (includes modules 4, 5 and 6/7). The top (module 4) will be cut to length to achieve the 60 ft. [18.3 m] overall pole height.

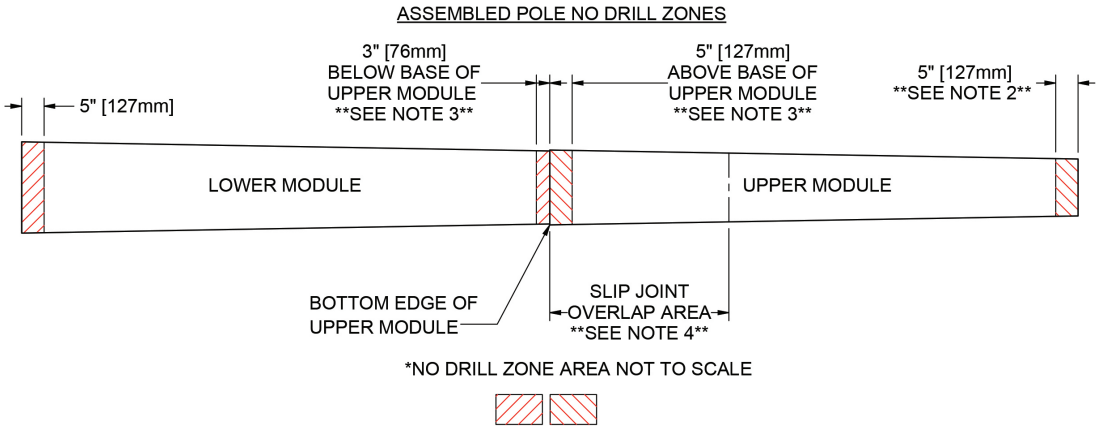


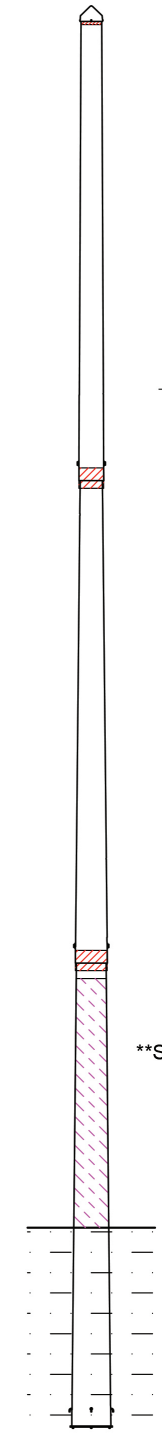
RS Module Code Legend		
Part Number	**Module Size**	**Pole Code Reference**
RSM-1L	1L	1L
RSM-01	1	01
RSM-02	2	02
RSM-03	3	03
RSM-04	4	04
RSM-05	5	05
RSM-06	5/6	06
RSM-07	6/7	07
RSM-09	8/9	09
RSM-11	10/11	11

14.0 Appendix C - Hole Spacing Requirements



SEE NOTE 1





ELEVATION VIEW

BOLT SIZE	HOLE SIZE	6D HOLE SPACING
1/2"	9/16"	3-3/8"
5/8"	11/16"	4-1/8"
3/4"	13/16"	4-7/8"
7/8"	1"	6"
1"	1-1/8"	6-3/4"

Notes

Unless otherwise approved by RS and the asset owner, hole drilling (spacing, size, location, etc.) must comply with the following requirements:

1. Minimum center to center distance between any two holes is 6x the diameter (6D) of the largest hole.
2. Minimum distance from module tip to hole center is 5" [127mm]. Contact RS to resolve any top bolt spacing questions (i.e. ridge pin, sky wire, etc.).
3. The slip joint NO DRILL ZONE (NDZ) is measured from the bottom edge of the upper module. The upper NDZ is measured up 5" [127 mm] from the upper module bottom edge. The lower NDZ is measured down 3" [76 mm] from the upper module bottom edge. No hardware shall encroach the lower NDZ from below.
4. Pre-drill holes in the base of the upper module of the slip joint overlap area may require field drilling/chasing after slip joint assembly if tip of lower module blocks pre-drilled hole(s) after assembly.
5. Hole diameter not to exceed 1.25" [32 mm].
6. Holes shall not be drilled within 98" [2500 mm] of the ground line without RS approval.
7. Contact RS to resolve any hole spacing or pole assembly questions.

15.0 Appendix D - Bolt And Recommended Hole Sizes

Imperial		
Bolt Size [in.]	Hole Size [in.]	6D* Hole Spacing (in.)
1/2	9/16	3-3/8
9/16	5/8	3-3/4
5/8	11/16	4-1/8
3/4	13/16	4-7/8
7/8	1	6
1	1-1/8	6-3/4

Metric		
Bolt Size	Hole Size [mm]	6D* Hole Spacing (mm)
M12	14	84
M14	16	96
M16	18	108
M18	20	120
M20	22	132
M22	25	150
M24	27	162
M27	30	180

*Minimum center to center distance between any two holes is six times (6X) the diameter of the largest hole.

Requirements for Hole Spacing, Size and Location

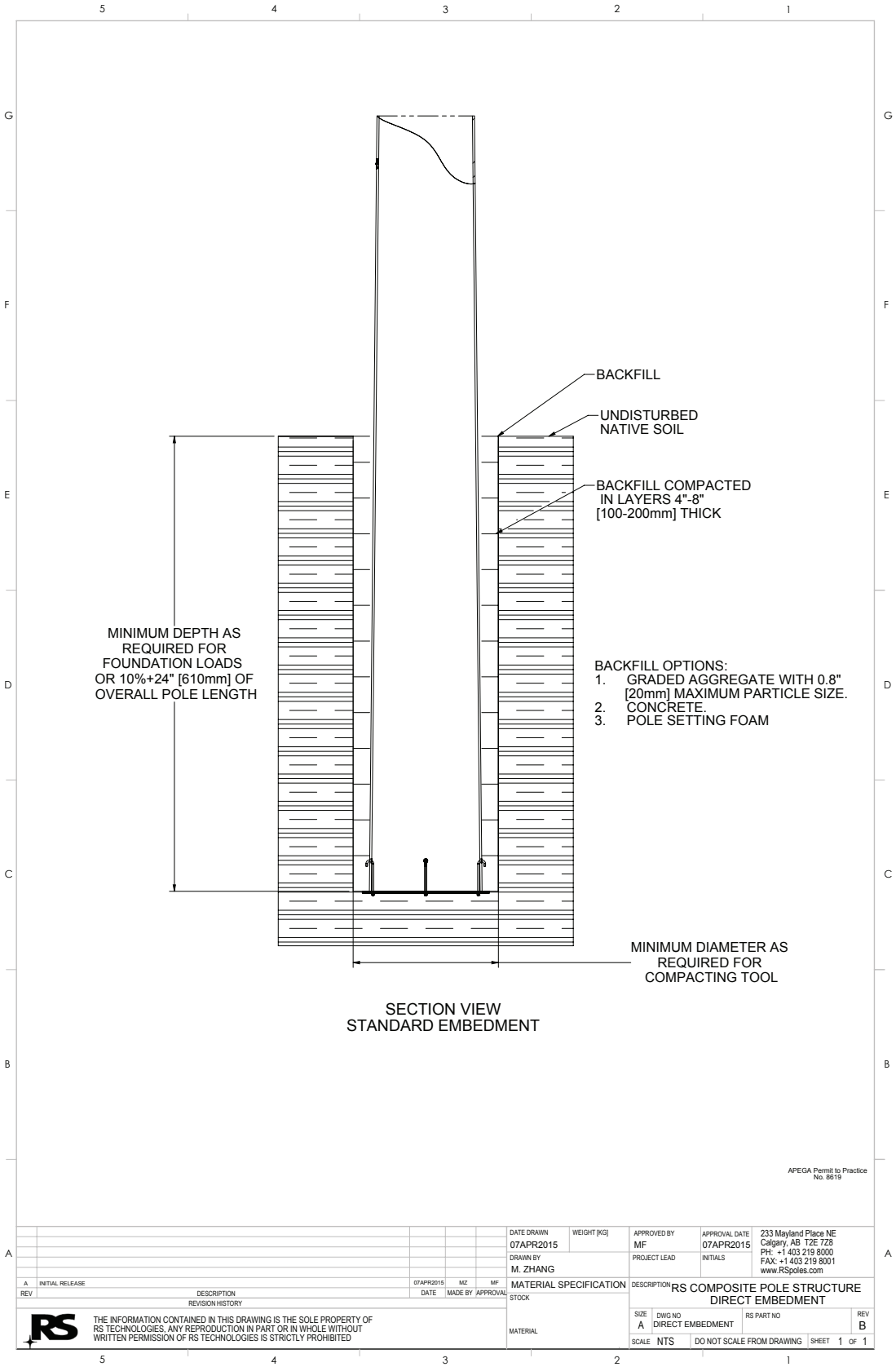
- The minimum distance from the pole tip to the hole center is 5 in. [127mm]. Contact RS to resolve any top bolt spacing questions (i.e. ridge pin, sky wire, etc.).
- Hole diameter not to exceed 1.25 in. [32mm].
- Hole drilling within 98 in. [2500mm] of the ground line requires RS approval.

Bolt Torque

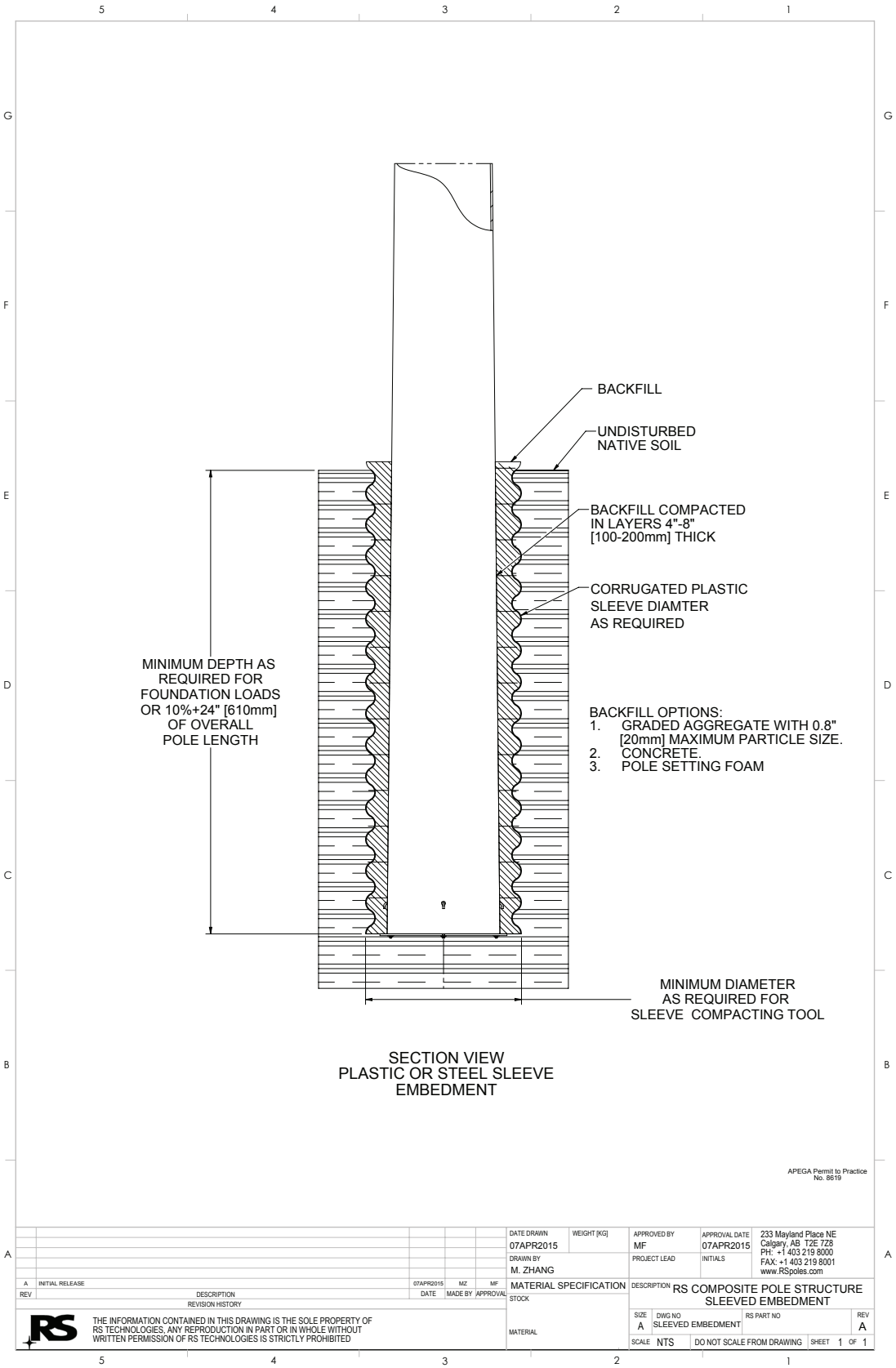
- The through bolt torque specification is 50 ft-lb [68 N-m]. To achieve the correct torque, hand tighten the nut and add an additional 1.5-2.5 turns. A torque specification wrench is recommended.

16.0 Appendix E - Common Embedment Methods

16.1 Direct Embedment (Rev B)



16.2 Sleeved Embedment (Rev A)



RSpoles.com
info@RSpoles.com
+1 519 682 1110

U.S. Operations
1586 East Venture Drive
St. George, UT 84790

Canadian Operations
22 Industrial Park Road
Tilbury, ON N0P 2L0

Corporate Office
3553 - 31 Street NW
Calgary, AB T2L 2K7

For more information contact: