

TCN 006 – November 2020

Work Instruction: Re-tightening of Slip Base Pole Flange Bolting

Re-Tightening of Bolting Assemblies (bolt, nuts and washers) at Flange Plates of Slip Base Pole Installations (without lifting pole)



1. Scope

This work instruction provides a process for tightening of nuts, at public lighting slip-base pole bolting assemblies (TC-1065D), installed at locations complying to TCG 006: *Guidelines to Street Lighting Design*, during maintenance inspections carried out by a contractor.

Note: **The process steps must only be carried out on one bolt assembly at a time.
The pole does not require to be lifted.**

This work instruction is intended for use during maintenance inspections.

This work instruction also includes a process for tightening the bolts on a TC-1065D pole when that pole is used as a rigid pole behind a barrier.

2. Reference Drawings

(Available at <https://www.vicroads.vic.gov.au/business-and-industry/technical-documents>)

VicRoads Standard Drawing TC-1065D Slip Base Pole Assembly Ground Set Mounted

VicRoads Standard Drawing TC-1066B Transition Base Assembly for Slip Base Pole - P.S Mounted

Note: **These drawings detail the pole base and the installation torque.**




3. Operators: Qualifications and Competencies

A minimum of two operators are required to carry out this work instruction, and at least one operator (employee or contractor) must be qualified and competent in the following skills:

- a) "Safe to touch pole" safe operating procedure – for operational poles, and
- b) Demonstrated competence in the conduct of this work instruction.

4. Tool List

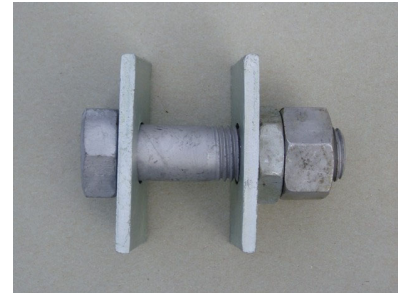
The following information and tools are required to carry out this procedure.

- (a) VicRoads Standard Drawing TC – 1065D (2017) or later version if applicable
 - (b) A copy of, or access to, this Work Instruction TCN 006-2020
 - (c) Traffic management equipment, as appropriate
 - (d) Wind speed meter
 - (e) Voltage tester and independent earth; for example, Special Haycolec Leakage Current Detector (PLCD) Electric Asset Inspection Tester
 - (f) Low voltage mat and low voltage gloves
 - (g) Excavation tools – shovel, crow bar, rake, brush, etc)
 - (h) One 46 mm spanner to fit M30 Grade 4.6 bolt head
 - (i) One 46 mm spanner to fit M30 full nut, for loosening
 - (j) One 46 mm open-ended spanner to fit M30 half nut
 - (k) 46 mm socket drive and load arm to fit M30 property class (PC) 5 nut, to fit torque wrench
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- (l) Torque wrench covering the range of 0 to 200 Nm, with certificate of calibration to ISO 6789-2:2017 - *Assembly tools for screws and nuts -- Hand torque tools -- Part 2: Requirements for calibration and determination of measurement uncertainty*
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- (m) Three G-clamps, each certificated to a minimum SWL of 30 kN, manufactured as a steel forging, and with a swivel loading foot.
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- (n) Personnel protective equipment, including but not limited to: Safety helmet, Safety glasses, Work gloves, High visibility jacket, Steel cap safety boots, Kneeling mat or knee protectors.

5. Components for one slip-base pole bolt assembly

A slip base pole includes three M30 Grade 4.6 bolt assemblies, as detailed on drawings TC-1065D and TC-1066B. Each assembly includes:

- one M30 Grade 4.6 bolt, to AS/NZS 4291.1, and product grade B to AS 1110.1, 120 mm long,
- two flat rectangular 60 x 100 mm Grade 250 steel washers, 8 mm thick with 34.0 mm hole,
- one M30 Grade B half nut, 15 mm high, to AS 1112.4, and
- one M30 Grade C full nut, 26 mm high, to AS 1112.3.



6. Re-tightening process (for standard slip-base pole)

The following process does not require the pole to be lifted. At each slip-base pole:

- Step 1. Confirm the identity and location of the pole;
- Step 2. Establish appropriate traffic management controls for the work site.
- Step 3. Complete the Safe Work Method Statement (SWMS) form for the pole, including verifying that wind speed is within the safe operating procedure requirements.
- Step 4. Carry out a de-energized asset test using the Leakage Current Detector. If the pole is safe to touch, continue the procedure at Step 5. If the pole is not safe to touch, report on SWMS form, notify supervisor, then go to Step 22.
- Step 5. Inspect the pole for the presence of three bolt assemblies complying with Drawing TC – 1065D.
- Step 6. Ensure clearance of bolts from soil and vegetation, using excavation tools as appropriate to remove soil; and debris. A minimum clearance of 50 mm below the lower base plate is required to fit the spanner to the bolt head.
- Step 7. Clamp the pole flange plates using the three G-clamps (as specified in the Tool list). Each clamp is to be located centrally between adjacent bolts, and at the same pitch circle diameter of the bolts. The clamps must be tightened to the full force exerted by a person, tightened so that the clamp is not dislodged by knocking or during the work, but **not** excessively tightened with large spanners. This step is required to simulate the clamping force that is slightly less than that applied when the bolt assembly is tightened to 90 Nm.
- Step 8. Select one bolt assembly for re-tightening. (Each bolt is to be loosened and re-tightened individually)



Loosening of nuts:

- Step 9. Fit the open-ended spanner to the half nut, and
- Step 10. Fit the spanner to the M30 full nut, and
- Step 11. Fit the spanner to the M30 Grade 4.6 bolt head, and hold the bolt head spanner firm while loosening the nuts.
- Step 12. Hold the M30 half nut firm and loosen the M30 full nut, and remove the full nut from the bolt.

Step 13. Fit the spanner to the M30 half nut, loosen the half nut, and undo the half nut at least two full turns. Remove the half nut.

Step 14. Check that the nut threads are not damaged, and that the washers are flat (Both nuts should run freely on the bolt thread. Washer out-of-flatness not to exceed 0.5 mm over length. Discard any defective nuts and washers.)



Tightening the half nut:

Step 15. Hold the spanner firm on the bolt head while applying the required torque to the half nut.

Step 16. Tighten the half nut as follows:

- Ensure that the washers are centred over the opening of the flange, and
- Run the half nut down the thread until it contacts the washer.
- Ensure that the torque wrench is set to the correct torque (90 Nm).
- Fit the socket of the torque wrench to the half nut.
- Apply the appropriate torque, 90 Nm, +5, 0 Nm, to the half nut.
- Cease applying the torque when the torque wrench trip indicator operates.



Do not exceed the maximum permitted torque value of 95 Nm for the half nut.

Tightening the full nut (locking nut):

Step 17. Hold the spanner firm on the bolt head while applying the required torque to the full nut.

Step 18. Tighten the full nut as follows (with second operator):

- Run the full nut down the thread until it contacts the half nut.
- Fit the open-ended spanner to the half nut, hold this spanner firm without movement until the tightening is complete.
- Ensure that the torque wrench is set to the correct torque (90 Nm).
- Fit the socket of the torque wrench to the full nut.
- Apply the appropriate torque, 90 Nm, +5, 0 Nm, to the full nut.
- Cease applying the torque when the torque wrench trip indicator operates.
- The bolt and half nut must not move during this tightening.



Do not exceed the maximum permitted torque value of 95 Nm for the full nut.

Completion:

- Step 19. Repeat Steps 8 to 18 at each bolt position (three in total) on the pole.
- Step 20. Where it is suspected that the bolt assembly may be over-tightened or under-tightened, carry out full re-tightening of the assembly in accordance with this Work Instruction.
- Step 21. The clamps may be removed after tightening of all bolts is completed.
- Step 22. Complete SWMS / quality standard requirements.
- Step 23. Re-instate work site, clean up and pack away tools and equipment.
- Step 24. Remove traffic management as required and move to next location (end of process).
- Step 25. If a hazard is identified and for any reason the procedure has not been carried out or the work has not been completed, notify supervisor through normal reporting processes.

7. Alternative re-tightening process (for pole behind barrier)

This process applies when a slip-base pole is located behind a barrier and the bolting is tightened so that the pole functions as a rigid street lighting pole (RSLP).

Typical installation locations include:

Behind WRSB or guard fence



Adjacent to protected column



Behind concrete barrier



Process:

Step 26. Follow the instructions of Section 6, Steps 1 to 14, above. Then:

Tightening the half nut:

- Step 27. Hold the spanner firm on the bolt head while applying the required torque to the half nut.
- Step 28. Tighten the half nut as follows:

- Ensure that the washers are centred over the opening of the flange, and
- Run the half nut down the thread until it contacts the washer.
- Ensure that the torque wrench is set to the correct torque (150 Nm).
- Fit the socket of the torque wrench to the half nut.
- Apply the appropriate torque, 150 Nm, +5, 0 Nm, to the half nut.
- Cease applying the torque when the torque wrench trip indicator operates.



Do not exceed the maximum permitted torque value of 155 Nm for the half nut.

Tightening the full nut (locking nut):

Step 29. Hold the spanner firm on the bolt head while applying the required torque to the full nut.

Step 30. Tighten the full nut as follows (with second operator):

- Run the full nut down the thread until it contacts the half nut.
- Fit the open-ended spanner to the half nut, hold this spanner firm without movement until the tightening is complete.
- Ensure that the torque wrench is set to the correct torque (200 Nm).
- Fit the socket of the torque wrench to the full nut.
- Apply the appropriate torque, 200 Nm, +5, 0 Nm, to the full nut.
- Cease applying the torque when the torque wrench trip indicator operates.
- The bolt and half nut must not move during this tightening.



Do not exceed the maximum permitted torque value of 200 Nm for the full nut.

Completion:

Step 31. Repeat Steps 8 to 14, and then Steps 27 to 30 at each bolt position (three in total) on the pole.

Step 32. Attach an easily visible permanent label, for example: BOLTS TORQUED TO 200 NM, to the pole to indicate this pole is to be treated as a rigid pole.

Step 33. Complete Steps 20 to 25 to finalise the site work.

8. Torque maintenance intervals

The bolting in these street light applications is in the snug tight range and requires inspection and re-tightening at intervals to manage tightness. The appropriate torque maintenance intervals are:

Slip-base pole location	Torque applied	Torque maintenance interval
Standard TCG-006 frangible pole	90 Nm	730 days (2 years)
Pole behind barrier	200 Nm	1460 days (4 years)

9. Reporting

- (a) Location and identification of the pole, and date and time of tightening or re-tightening, and
- (b) Statement that tightening or re-tightening was carried out in accordance with this procedure TCN 006-2020, torque value applied to the full nut, and that all records are linked to the contractor job worksheet identification.

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VicRoads ITS Technical Notice - Revision Summary

TCN 006 - Work Instruction: Re-tightening of Slip Base Pole Flange Bolting

Date	Clause	Description of Revision	Authorised by
November 2020	CI 2 & 5 CI 5 CI 6, Step 16 CI 7 (new) CI 8 (new) CI 9	Change to TC-1066B, added AS 1110.1 for dimensions and tolerance Change torque values to 90 Nm and maximum to 95 Nm New text for slip-base pole acting as a rigid pole. Torque maintenance intervals added Report applied torque	
September 2018	Title CI 2 CI 4(l) CI 6 Step 4 CI 6 Steps 11, 12, 13 CI 6 Step 16 CI 6 Step 18 End	change to ...Bolting Assemblies (bolts, ... change to TC-1065D, and TC-1066A, and reference at CI 5 Add requirements for calibration of torque wrench, then go to Step 22 Added requirements for loosening of nuts Added new Dot 2 Change Dot 3 toset to the correct torque (45 Nm). Change Dot 4 to 45 Nm, and add tolerance +5, 0 Nm Change last line to : Do not exceed the maximum permitted torque value of 50 Nm for the half nut. Added new Dot 1 Change (now) Dot 5 to add tolerance +5, 0 Nm Change last line to : Do not exceed the maximum permitted torque value of 95 Nm for the full nut. Add Revision Summary	
August 2016	Re-issue	Full re-issue	