

CONSERFLOW S.A. DE C.V.			
	TORQUE INSPECTION FOR FLANGED ASSEMBLIES	CODE	PCC-08
		REVISION	03
		EMISSION	06.MAR.23

SIGNATURE CONTROL		
DEVELOPED	REVISED	AUTHORIZED
Ricardo Ponce Pérez NAME	Areli Roque Cruz NAME	Diego Cruz Martínez NAME
SIGNATURE	SIGNATURE	SIGNATURE
Quality Control Inspector	Quality Control Manager	Managing Director

CHANGE CONTROL		
DESCRIPTION OF THE CHANGE	REVISION	DATE
The translation of this PCC-08 procedure is included in the IMS; the English version is integrated with the same control data as the Spanish document. Modification of associated formats for handling the English-Spanish version.	03	06.MAR.23
The sections of Reference Documents, Definitions, and Responsibilities are integrated	02	13.AUG.22
Procedure update. Change of Format of the PCC-08/f-01 Torque Inspection Report. Integration of the PCC-08/F-02 Format Torque Application Table.	01	07.FEB.22
Issuance of the Procedure.	00	28.JUN.21

PURPOSE OF THE PROCEDURE

Describe the inspection activities on the touch procedure for flanged assemblies to be installed, carried out in the manufacturing workshop and on-site.

SCOPE OF THE PROCEDURE

It applies to all jobs where torque is executed for the final flanged assemblies in the projects and for all personnel involved in said activity.

REFERENCE DOCUMENTS

- ASTM American Society for Testing and Materials
- ASME B16.5 Pipe Flanges and Flanged Fittings
- ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly (BFJA)
- ASME B1.1 Unified Inch Screw Threads (UN, UNR, and UNJ Thread Forms).
- ASTM A193 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications.
- **HYTORC** Simultaneous Torque Operation Manual.
- International Quality Management Systems ISO 9001:2015 Standard

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- International Standard Environmental Management Systems ISO 14001:2015

DEFINITIONS

Torque. Torque is the force applied on a lever to produce a rotational motion in a body; it is a pair of forces of equal magnitude and in the opposite direction.

Packaging. Material or a combination of compressible materials, which, when held between two stationary members, prevent leakage of the medium through those members. The material of the seal selected must be able to seal the mating surfaces, it must be resistant to the medium being sealed, it must be able to withstand the application of temperatures and pressures of the medium being sealed, and it must also be able to withstand the temperatures and pressures of the application.

Flanging. Connection of two components of flanged connection pipe using screwing.

Torqueing. Tightening is applied to the screws or studs of a tie, which must be evenly distributed in all the screws or studs that compose it.

Elongation. Elongation is suffered by a body that is subjected to tensile stresses or temperature effects.

RESPONSIBILITIES

Site Supervisor:

- Supervise and ensure alignment, leveling, and flanging work.
- Inform the Quality Control inspector of the start and end of the process.
- Validate the Torque Inspection Report for flanged assemblies.
- Promote safety at all times and waste management.

Quality Control Inspector.

- Implement this procedure in conjunction with the Construction Supervisor.
- Monitor strict compliance with the established parameters.
- Notify of any deviations found.
- Perform the Torque Inspection Report for flanged assemblies.
- Deliver the necessary documentation to the Quality Control Manager for its integration into the Dossier.



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DESCRIPTION OF THE PROCEDURE

Responsible	Activity	Records
Quality Control	<p>1. INSPECTION EQUIPMENT</p> <p>The following equipment will be used to carry out the torque inspection. The following list is illustrative but not exhaustive.</p> <ul style="list-style-type: none"> • Torque Equipment • Manual Torque Meter • Punch and tail wrenches • Iron and bronze hammer <p>The torque measurement and application equipment must have calibration certificates, valid for no more than one year.</p>	
Quality Control	<p>2. ENTRY INFORMATION</p> <p>Before the work of applying torque to the flanges, the following information must be available:</p> <ol style="list-style-type: none"> a) General arrangement plans, indicating the number and nomenclature of flanges to be applied torque. b) Format <i>Torque Application Table (PCC-08/F-02)</i> filled out and approved by the customer. c) Calibration certificates, valid for no more than one year, of the equipment and instruments to be used during the inspection. 	Torque Application Table (PCC-08/F-02)
Quality Control	<p>A. DETERMINATION OF TORQUE TO USE</p> <p>If the engineering and/or Construction Supervisor does not indicate the torque to be applied, it can be determined as follows.</p> $T = (F \times d \times k) / 12$ <p>Where:</p> <p>T = Torque (ft-lb) d = Nominal Stud Diameter (in) k = Nut Factor (dimensionless). Consider k = 0.16 for lubricant applications and 0.20 for lubricant-free applications. F = Stud Preload Force (lb). This can be determined by the following equation:</p>	
Quality Inspector	$F = C \times Y \times AS$ <p>Where:</p> <p>C = % of material yield safety application. This percentage should not be greater than 70% (0.7) or a material yield of 60,000 psi (as recommended by the manufacturer). For applications of flanges executed in the workshop, it should not be greater than 50% (0.5).</p> <p>Y = Minimum Material Yield (psi)</p>	



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AS = Tension of the effective resistant section of the thread (in²). For force calculation, the area used to determine the tension value is the nominal resistant section of the thread, which is calculated by:

$$AS = (\pi / 4) [(d2 + d1) / 2]^2$$

Where:

d2 = Functional (maximum) diameter of the stud (pitch diameter)

d1 = Minor (minimum) stud diameter (root diameter)

The value obtained must be validated by Engineering and/or Construction and reflected in the *PCC-08/F-02 format*.

The values obtained must be within the minimum and maximum torque parameters recommended by the manufacturer of the packaging used. See Annex 1.

3. FLANGED ASSEMBLY INSPECTION

1. Verify that the information contained in the *Torque Application Table (PCC-08/F-02)* format is consistent with the installed material.
2. Verify that the calibration certificates of the torque equipment are those corresponding to the equipment to be used and are current.
3. Inspect the physical condition of the tools to be used.
4. Verify that the torque to be applied is within the ranges allowed according to the reference documents.
5. Inspect flange faces for debris or damage, i.e., dents, scratches, or mechanical bumps.
6. Verify that the flanged joints are aligned and parallel.
7. Verify that the gaskets do not present damage already installed.
8. Check the application of lubricant on the asparagus (if applicable).
9. Verify that the length of the asparagus is within what is indicated in engineering and that they are evenly distributed. A standard projection of between 2 and 3 jump strings of the nut is considered.
10. the verification of the torque value will be carried out according to the sequence recommended by the ASME. Mark the verified asparagus with chalk or crayon.
11. The verification will be done at 100% of the torque value indicated.
12. If it is necessary to retighten the flanges, they may be executed under the following considerations:
 - a) Install new gaskets. Its reuse is prohibited.
 - b) The asparagus threads should be undamaged and free of dirt, paint, and rust. In case the asparagus has been elongated to 70% or more of the yield value of the material, new asparagus should be used.

Note: The use of the wrench is not accepted as a method of determining final torque. Its use is limited to preliminary tightening or loosening nuts.

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Torque
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Table (PCC-
08/F-02)

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Quality Inspector	<p>Note 2: The use of the Torque Application Table (PCC-08/F-02) format will be used only when requested by the customer.</p>	
	<p>4. EVALUATION CRITERIA</p> <p>The test is considered accepted if 100% of the studs inspected are installed with the torque indicated.</p> <p>The submission of any of the following indications is considered cause for rejection.</p> <ul style="list-style-type: none"> • Flange damage (dent, scratches, mechanical blows) greater than 1.5 mm. • Misalignment of the center of line greater than 1.5 mm. • Lack of parallelism of the bridle greater than 0.8 mm. <p>If the quality inspector finds deviations or some of the aspects do not comply with the requirements, he must immediately notify the verbally or via WhatsApp to the Construction Supervisor / Corporal, if the Quality Control Inspector determines that it is a major deviation, he must make the communication so that the <i>non-conforming exit procedure can be initiated (PCC-14)</i>., where the responsibility for the correction of deviations, the time and the person in charge of executing it must be established.</p>	
Quality Control Inspector		Non-Compliant Output (PCC-14)
Quality Control Inspector	<p>5. DOCUMENTARY RECORD</p> <p>The information obtained in the inspection process must be recorded in the <i>Torque Inspection Report (PCC-01/F-01)</i>. As well as initial data for the development of the inspection, recorded in the <i>Torque Application Table (PCC-01/F-02)</i> only when requested by the customer.</p> <p>The inspection is considered completed when the results and information obtained have been reviewed, accepted, and signed. The Quality Control inspector will be responsible for delivering these documents to the department to be included in the Quality Dossier as part of the receipt in each project.</p>	Torque Inspection Report (PCC-08/F-01)

FORMATS ASSOCIATED WITH THE PROCEDURE			
CODE	REGISTRATION	REVIEW LEVEL	RETENTION TIME
PCC-08/F-01	<i>Torque Inspection Report for Flanged Assemblies</i>	02	1 year in physical / Digital without expiration
PCC-08/F-02	<i>Torque Application Table</i>	01	1 year in physical / Digital without expiration