

A close-up photograph of industrial machinery, likely a compressor or turbine, featuring large yellow flanges and green-painted metal components. The machinery is complex, with various pipes, valves, and bolts visible. The background is a clear blue sky.

IPS ★ ITCS

Industrial Performance Services,

Industrial Tubular Catalyst Services

50% HYDRAULIC TENSIONING COVERAGE PROCEDURE

V:2023.1

50% Hydraulic Tensioning Coverage Procedure

January 2023

1.0 Purpose

- 1.1 To safely tension a flanged connection utilizing 50% hydraulic tensioner coverage.
- 1.2 The requirements contained within this procedure are applicable to IPS★ITCS and affiliates.

2.0 Pre-Job Review

- 2.1 Review job requirements and perform a job walk down with the customer.
- 2.2 Verify with the Customer Contact, conditions are as stated on the Pre-Job Assessment form.
- 2.3 Air requirements
 - 2.3.1 100 cfm and 100 psi air connection
 - 2.3.2 How much air hose will be needed to reach the job site
 - 2.3.3 If the air supply is not within a reasonable distance from the job site, an air compressor may be required so that an adequate amount of air is available to power pneumatic tools
- 2.4 Permits
 - 2.4.1 What types of permit(s) will be required
 - 2.4.2 Who approves, signs, and receives the permit(s)
- 2.5 Decontamination of equipment, if applicable.
 - 2.5.1 Does the customer have a means of decontaminating equipment and tools that may come in contact with chemicals or radioactive material?
 - 2.5.2 If hazardous waste is generated, does the plant have areas for disposal?
- 2.6 Technical Note: In some cases, you may not be able to achieve the customer's desired tensioning residual bolt stress as this stress may exceed the maximum operation pressure of the tensioner. If this situation occurs, Stop and notify the lead tech before continuing.

3.0 Procedure

- 3.1 Verify with the Customer Contact, conditions are as stated on the Pre-Job Assessment.
- 3.2 Complete and review Job Safety Environmental Analysis (JSEA) with all participating employees.
 - 3.2.1 A plant JSEA is acceptable in lieu of the IPS★ITCS JSEA as long as all Safety points are covered.
- 3.3 Determine required tension pump pressure by one of the following methods: Use Manufactures tension data charts. Use a Tension Calculation Worksheet.
- 3.4 Complete an Elongation Calculation Worksheet, (if ultrasonic measurements will be taken) and Follow Ultrasonic Bolt Measurement procedure before proceeding with torquing operations.
- 3.5 Visually check that the flange has been correctly assembled and the correct gasket is in place.
- 3.6 Visually check that the studs have been lubricated correctly.

- 3.7 Secure the bolted joint by tightening all nuts snugly using standard hand wrenches
 - 3.7.1 Be sure that the bolts and nuts have been assembled correctly with extra length of stud (equivalent of one nominal diameter as minimum) protruding through one nut for tensioner attachment.

- 3.8 Determine the number tensioner heads being utilized.
 - 3.8.1 There should be enough tensioner heads to cover 50% of the fasteners.
Note: If there are not enough tensioner heads available to meet this requirement, consult with Tech Support about alternative procedures.
- 3.9 Using an approved marking tool (paint marker, crayon, etc.) begin to letter stud locations on the flange according to the letter of sequences for 50% coverage passes.
 - 3.9.1 Begin the lettering sequence with letter the (A) followed by (B) in a clockwise direction then (A) then (B) and continue in a clockwise direction until all fasteners have been lettered.
- 3.10 Install hydraulic tensioner heads at equally spaced intervals around the bolt circle beginning with fasteners lettered (A).
 - 3.10.1 When mounting the hydraulic tensioner head on the stud extension, it is important that the hydraulic piston is fully collapsed into the tensioner body.
 - 3.10.2 Tensioners shall not be mounted on to studs with a washer on the same side of the stud as the tensioner.
- 3.11 Assemble interconnecting hose harness and connect to pump.
- 3.12 Begin this tensioning sequence by pressurizing the tensioning system to the (A) pressure (as predetermined in the Technical Tensioning Calculation Worksheet for the joint.) or the Tensioner manufactures datasheet.
- 3.13 While holding the predetermined pressure constant, use a tommy bar to screw down the nut to the face of the flange.
- 3.14 Slowly release the oil pressure until the gauge reads zero.
- 3.15 At this point, the tensioner pistons will be partially extended and must be pressed back into the tensioner bodies prior to re-pressurizing the tensioners to the targeted (A) pressure.
 - 3.15.1 Continue to repeat steps 3.12 thru 3.15 three times minimum or until there is no further movement of the nuts.

Note: *This is done by inserting the tommy bar into each threaded insert and tightening onto the stud until each piston is fully collapsed.*

- 3.16 Re-position the tensioner heads at equally spaced intervals around the bolt circle beginning with fasteners lettered (B).
- 3.17 Begin this tensioning sequence by pressurizing the tensioning system to the (B) pressure (as predetermined in the Technical Tensioning Calculation Worksheet for the joint.) or the tensioner manufactures datasheet.
- 3.18 While holding the predetermined pressure constant, use a tommy bar to screw down the nut to the face of the flange.
- 3.19 Slowly release the oil pressure until the gauge reads zero.
- 3.20 At this point, the tensioner pistons will be partially extended and must be pressed back into the tensioner bodies prior to re-pressurizing the tensioners to the targeted (B) pressure.
 - 3.20.1 Continue to repeat steps 3.17 thru 3.19 a minimum of three times or until there is no further movement of the nuts.
- 3.21 Re-position the tensioner heads at equally spaced intervals around the bolt circle beginning with fasteners lettered (A).
- 3.22 Repeat steps 3.20 and continue until there is no further movement of the nuts.
 - 3.22.1 3.25.1 If no rotation of the nuts occurs during step 3.22 remove equipment and move to step 3.23.
- 3.23 Record all information on Flange Make-Up Data Sheet.

3.24 Ensure work area is left in a clean and safe condition and all permits and LO/TO has been signed off.

Competency Assessment

No.	Questionnaire	C/NYC
Q1		
A1		
Q2		
A2		
Q3		
A3		
Q4		
A4		
Q5		
A5		

Enclosed Attachments	
Risk Assessment	<input checked="" type="checkbox"/>
Environmental Aspect and Impact	<input checked="" type="checkbox"/>
Training and Competency	<input checked="" type="checkbox"/>
Measure and Evaluation Tools	<input checked="" type="checkbox"/>

Competency Checklist

To be filled out by Trainer and signed by Employee, Assessor and Supervisor before being returned to the HSEQT Manager for recording purposes.

Procedure	Competency	Date	Competent YES / NO	Employee Signature

(Please tick appropriate box)

This employee is competent in performing the job.

This employee has not attained the competency level.

*

* *If the employee has not attained all competency levels, the General Manager must assess the action to be taken, provide an extension of training or alternative action as listed below.*

Alternate action to be taken: _____

Signed By	Employee:	_____	Date:	_____
	Trainer:	_____	Date:	_____
	Assessor:	_____	Date:	_____
	Regional Manager:	_____	Date:	_____

Environmental Aspects and Impacts

Identified Environmental Aspects and Impacts

The following table is a summary of the likely environmental aspects and impacts that may be identified during site inspections. The significance of each impact needs to be assessed using the Risk Assessment Model.

Activity	Aspect	Impact
Purchasing & Administrative Work	Consumption of goods	Conservation of natural resources
	Consumption of energy (eg. Electrical equipment and facilities)	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of waste (eg. Paper)	Consumption of space for waste disposal; Habitat loss
Climate Control	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of noise	Disturbance to community; Habitat loss
Cleaning of – offices / vehicles	Storage, use and release of chemicals	Contamination of air, water or soil; Risk to human health
Transport (Fleet vehicles / staff travel)	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Loss of habitat at all stages of generation; Light pollution
	Consumption of goods (eg. Oil)	Consumption of natural resources; Generation of waste; Habitat loss; Biodiversity impacts
	Generation of waste (eg. Oil)	Consumption of space for waste disposal; Potential contamination of water or soil; Habitat loss
	Exhaust emission	Release of greenhouse gases and atmospheric pollution
	Use of dangerous goods (eg. Batteries)	Potential contamination of air, water or soil; Risk to human health
	Generation of noise	Disturbance to community; Habitat degradation
Operations		

Sample only.
To be filled in

Risk Assessment

Risk Assessment // insert name here

Step No: Logical sequence	Sequence of Basic Job Steps documented in the Procedure, Work Instruction and project plans. Break down Job into steps. Each step should be logical and accomplish a major task.	Potential Safety & Environmental Hazards/Impacts at the site of the Job Identify the actual and potential health and safety hazards and the environmental impacts associated with each step of the job.	Risk Rating Refer to the risk matrix or HSEQT.PRO. Risk Mgt	Recommended Corrective Action or Procedure <i>Determine the corrective actions necessary to reduce the risk to as low as reasonably practical (ALARP) refer to HSEQ.PRO.Risk Mgt. The risk must be reduced or controlled to ALARP before work commences.</i> Document who is responsible for implementing the controls to manage each hazard identified.	Risk Rating refer to the risk matrix or HSEQT.PRO.Risk Mgt
1.					
2.					
3.					
4.					
5.					

Audit



Process: insert// Procedure: Insert //		Date:		Audited by:	
		Location of Audit:		Area Mgr/Supervisor:	
Item	Question	Evidence Sited	Comments		Conformance Score 0,3,5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
AUDITOR'S SIGNATURE:		CONFORMANCE SCORE: / 25		0 – Non-Conformance	
SAFETY REP'S SIGNATURE:		CONFORMANCE %:		3 – Continuous Improvement Opportunity	
				5 – Total Conformance	