International Construction Consulting, LLC

Inspection and Test Plan

ICC-ITP-M-004

Rotating Equipment

0	5/30/14	Issued for Use	GL		
Rev	**Date**	**Description**	**By**	**Chkd By**	**Appvd**

INSPECTION & TEST PLAN (ITP)

		Work Scope/Application:	Rev.:		Date	
Project No./Title		**Initial Setting of Rotating Equipment or Skid with Rotating Equipment**	Prepared By:			
Plant/Location/Equipment ID			Equip. Criticality:			
MSA/AFE//Work Order/PO No.						

ITEM NO.	ATTRIBUTE / ACTIVITY DESCRIPTION	ACCEPTANCE CRITERIA (CODES, STD., SPEC., DRAWINGS, ETC.)	INSPECTION REQUIREMENTS			
			ICC QC	SIGN	CONTR QA	SIGN
1	Equipment receipt and inspection	• Inspect equipment immediately upon receipt and issue receiving report. Notify • Owners Representative in writing of any shortages or damages. • Ensure received equipment is stored properly and protected against environmental conditions. • Verify nameplate data/equipment tags in accordance with vendor data and specification requirements.	**R**		**H/R**	
2	Equipment Installation	• Verify installation of the mainline pumps and motors included all electrical and instrumentation components furnished with the equipment. • Verify Contractor is ensuring that all equipment is properly lubricated per the manufacturer's instructions. Damage caused by the misapplication or omission of lubricants shall be the responsibility of the Contractor. • Confirm that the Contractor's final installation is in accordance with all construction drawings and specifications before submittal to the Owner's Representative for approval.	**S**		**R**	
3	Foundation ready to accept equipment	• Verify Inspection and Test Plan for foundation was completed. • Verify that the anchor bolt layout matches the baseplate holes. • Verify foundation 28-day compressive strength was met prior to beginning grouting operations • Verify anchor bolts are threaded for full length of protrusion plus 65 mm (2%") to allow for jacking nut and flat washer to be installed under the baseplate. • Verify top surface of the foundation is cleaned and roughened to assure a good bond with the epoxy grout, expose the aggregate and produce a 10 mm (nominal) profile. • Measure and record the profile on inspection records. • Perform a 12-hour moisture test after acceptance of the base profile.	**R**		**R**	

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4	Baseplate setting	• The baseplate shall be positioned to within 3 mm 1/8 inch) horizontally and vertically of the position indicated on the General Arrangement drawings. • Verify Baseplate levelling performed using calibrated levelling devices to 0.002" per foot or less. • Verify Baseplate levelling record sheet completed and approved by Owners Representative. • Initially level the base ensuring the jacking bolts do not extend more than 50mm of free length. • Verify the foundation temperature is constant everywhere during leveling. • Verify Anchor bolts are snug tightened and the leveling measurements rechecked. • Verify the level tolerance has been achieved following anchor bolt snug tightening, but prior to grouting. • Owner's Representative must sign off the leveling record sheets before the start of grouting operations.	**W**		**W**	

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5	Pre-erection preparation	• Verify that grout purchased, stored, mixed and installed in compliance with Grouting Specification with the exception of • modifications noted in Mechanical Equipment Installation Specification. • Verify installed formwork is strong enough to withstand the pressure of the poured grout. • Verify all forms caulked or grouted to prevent any possible leaks. • Verify all form work in contact with the grout coated with wax, an epoxy release agent or duct tape to prevent grout adhesion with the formwork. • Verify the forms are chamfered at 30 degrees to the vertical. Unless otherwise specified, the horizontal distance from the top edge of the chamfer to the baseplate steel shall be 50 mm (2") around the entire perimeter of the baseplate. This dimension shall always be less than or equal to the depth of the grout. • Verify portions of the anchor bolts in the grout area are covered with foam insulation or electrical tape to a thickness of 3 mm (1/8") minimum. • Verify the expansion joint design approved by the Owner's Representative and Grout Manufacturer's representative prior to pouring. • Verify expansion joints incorporated to reduce the possibility of cracking. • Verify expansion joints located at a maximum distance of 1500 mm (60") apart and not be installed near anchor bolts. • Verify Joint material should be from 20 mm thick, closed cell neoprene foam rubber (Ethafoam or approved equivalent). • After the grout has been poured and cured, the joints shall be sealed with elastomeric sealant (Sikaflex 1A or approved equivalent).	**R**		**W**	
6	Grouting	• Refer to Grouting ITP.	**R**		**W**	
7	Field machining	• After all grout has cured (including void fills), the baseplate co-planar and collinear checks to be completed and another baseplate leveling record sheet produced for approval by the Owner's Representative. • Verify minimum field machining of the pump pedestal pads is done if necessary to accomplish the required level tolerance of 0.002 inches per foot. • Verify temperature of the total foundation is allowed to equalize (e.g. any heating or hoarding uniform around the foundation) prior to checking the final baseplate level.	**R**		**W**	

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8	Pump setting	• Verify final grout pour (including void fills) has met curing time. Recommended by the grout manufacturer. • Verify written approval obtained from the Owner's Representative for pump and motor installation. • Verify pump set onto the baseplate and aligned axially with the nozzles aligned transversely to the benchmark lines on the baseplate. • Verify pump and nozzle alignment is within 0.025mm (0.001 "), both horizontally and vertically, of the designated position with less than 0.001 n soft foot. • Verify that when benchmark lines are not provided by the pump manufacturer, they are scribed onto the baseplate in accordance with the vendor dimensional drawing data by the Contractor's millwright. • Verify the hold-down bolts are installed and tightened to the required torque. • Verify that in special cases where drilling and tapping has not been provided by the Pump Vendor, by Contractor. • Verify that check for "Soft Feet" is performed by individually loosen pump hold down bolts. • Verify no more than a 25 µm (0.001 ") feeler can be inserted at any mounting foot as it rests on the supporting surface. • Verify correct size shims added to correct if required and re-torque as required.	**R**		**R**	

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9	Motor setting / preliminary alignment	• Verify motor set onto the motor rails after the pump is positioned. • Verify Stainless steel shims running the full width and length of the motor foot are used on both sides of each motor hold down bolt. • Verify correct shims are supplied by the Contractor and are either laser cut or have all burrs removed. • Verify shims are as thick as practical to minimize the spring effect associated with shim stacking. • Verify that when the motor hold down bolt holes are not already drilled by the Pump manufacturer for preliminary alignment, the motor is set onto the motor rails without shims in place to locate and scribe hold down bolt holes. • Verify shims placed on the motor rails once the motor is re-mounted after drilling and tapping the holes. • Verify the distance between shaft ends is set in accordance with the pump manufacturer's dimensional drawings with the motor on its magnetic center. • Verify motor manufacturer's data is used to determine magnetic center. Note: the distance between the shaft ends is not necessarily the same as the distance between the pump and motor hubs. • Verify motor is given a preliminary alignment to determine the locations of the motor (Contractor supplied) hold down bolts if not already drilled by the Pump Manufacturer. • Verify the motor has sufficient allowance for lateral movement to allow final alignment without overhang of the motor feet. • Verify hold down bolt holes scribed and motor removed for drilling and tapping of these holes. • Verify motor is re-mounted with shims and loosely bolted down until final alignment. • Verify motor hold-down bolts tightened then individually loosen motor hold down bolts to check for "Soft Feet". • Verify no more than a 25 µm (0.001") feeler can be inserted at any mounting foot as it rests on the supporting surface. • Verify shims are added to correct any discrepancy if required.	**R**		**R**	

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10	Piping installation	• Verify Piping to the pump is installed in a manner to ensure that the pump nozzles are unloaded (no significant forces or moments are present) when the piping is bolted to the pump. • Verify accurate measurements are before installation of the unit piping. • Verify all suction/discharge piping from the header to the pump are field welded are required. • Verify the header and unit isolation valves are installed prior to any unit piping. • Verify header is fixed with final supports in place prior to fit up of the unit • piping. • Verify measurements from the unit valve flange face to the pump flange face are performed, noting where field welds are required. • Verify the pump mating flange, reducer and pipe pup (pump mating flange assembly) are welded together prior to final unit piping fit up. • Verify pump unit piping from the unit valve up to, but not including the pump mating flange assembly is fabricated and installed. • Verify extra pipe length for the final trim is included. • Verify supports, strainers, gaskets, are in place and all bolts torque to specification. • Verify piping center is coincident with the center of the pump mating flange assembly within 1.5 mm (0.060") in the vertical and horizontal directions. • Verify pump mating flange assembly length is accurately measured and the associated pump unit piping trimmed with correct trim measurement. • Verify gap between the unit piping and mating flange assembly is uniform all the way around. • Verify mating flange assembly is bolted to the pump flange with gasket in place, and the bolts torque to specification to confirm piping fit-up. • Verify end of the unit piping and the mating flange assembly end is tack welded together with no external force applied to the piping. • Verify flanges are unbolted and entire unit piping spool removed. • Verify pipe to mating flange assembly weld is completed using two welders working 180 degrees apart to minimize distortion. • Verify final unit piping weld is performed at ambient temperature of 10°C (50°F) to balance thermal expansion stresses expected during operation of the system. If site conditions make this requirement impractical, the Contractor shall discuss with the Owner's engineer prior to final installation.	**W**		**W**	

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11	Final alignment	• Verify complete coupling installed and the motor aligned to the pump using laser alignment instrument, taking into account the expected thermal differential growth between pump and motor. • Verify alignment is in accordance with the Manufacturer's instructions including Cold-Offset data (see Specification). • Verify pump doweled to pump pedestal pads. • Verify final alignment readings are recorded for permanent record. • Verify Owner's Representative witnesses the final alignment.	**W**		**W**	
12	Lube & rotation	• Verify bearing housings to the bottom of shaft filled with the manufacturer's recommended oil for pumps with oil lubricated bearings. • Verify oil mist placed on the bearing housings of pumps that are oil mist lubricated (if possible at this time or as soon as possible). • Verify it is clearly visible that the oil housings are full of oil. • Verify all barrier fluid piping and components filled with the manufacturer's recommended fluid.	**R**		**W**	

ICC QC REPRESENTATIVE: _____ **DATE:** _____

CONTRACTOR REPRESENTATIVE: _____ **DATE:** _____

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