

MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE

1.0. PURPOSE

The purpose of this Exhibit is to define Contractor's responsibility for completing the Work under this Contract and the general procedure and requirements for turnover of (portions of) the Work to OWNER.

2.0. DEFINITIONS

2.1. Turnover System or Area

An individual element of the plant characterized by operating plant process. It may be a building, piping with common medium and pressure, electrical systems or operation elements related to specific "items" of equipment.

The Work may be subdivided in Turnover Systems or Areas each with an individual completion date, in order to enable the turning over of defined systems/areas independently of the status of any remaining Work. The scope of such Turnover Systems or Areas will be defined by OWNER including individual completion date(s) to be achieved. All completion dates for Turnover Systems or Areas will fall within the time for complete performance of all Work under the Contract.

2.2. Precommissioning

Contractor shall provide all necessary non-operating adjustments, alignments, and tests detailed as "Pre Turnover" on the Completion and Turnover checklist.

Precommissioning Work will be performed by the Contractor under OWNER's supervision and with the assistance and witness of OWNER. Electrical and instrumentation systems may be energized.

Examples of precommissioning work include:

- Safety valve & instrument calibration
- Instrument loop checks
- Bump and motor run ins
- Chemical cleaning
- Vessel closures
- Tests of information and communication systems
- Safety audit
- Hydro/Pressure testing

2.3. Mechanical Completion

The facility (plant, unit, system or any part thereof) has been constructed in accordance with the Contract and the applicable drawings, specifications, applicable codes and regulations, including tests and checks necessary for commencement of initial testing and operations by OWNER. Construction debris must have been removed and the construction area cleaned up. All relevant Work as defined on the Completion and Turnover checklist must have been completed by Contractor, except that specifically agreed to on the Punch List items.

In addition to the above, the following shall be deemed completed by Contractor:

- Precommissioning.
- Testing.
- Reinstatement.
- All documentation and certifications as required for commissioning and start-up of the (portion of) Work have been completed and approved. Records of all tests, inspections

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and checkouts have been recorded by Contractor at the time they were carried out and included with the system passport documentation.

- All Operation and Maintenance manuals, with all information necessary for commissioning and start-up have been received by OWNER.

2.4. Punch Lists

A Punch List is a list of outstanding items of Work required for Mechanical Completion. The Punch List is divided into three (3) parts:

Part A: Items of Work which are critical to operations or safety and must be completed before turnover to the OWNER.

Part B: Items of Work for which completion and final turnover may be delayed to permit commissioning and start-up (e.g.: insulation, painting or other minor items of Work). Such items of Work may be required to be performed under strict permit conditions.

Part C: Items of Work that OWNER may request and are deemed to be additional to the contract scope of work but must be completed prior to turnover.

Punch Lists are developed and administrated by OWNER in conjunction with Contractor.

2.5. Turnover

The point at which Care, Custody, and Control of the Work or portion thereof is ready for transfer from Contractor to the OWNER. Turnover normally occurs at the time of Mechanical Completion or at a mutually agreed later date to facilitate completion of Part B and Part C Punch List items.

2.6. Commissioning

Commissioning consists of activities associated with the operation of pieces of equipment or systems in preparation for plant start-up and introduction of feed stock.

Commissioning is performed under the direction of the OWNER with supplemental labor provided by Contractor or vendor representatives provided by OWNER. Commissioning is performed by the OWNER after mechanical completion and turnover, unless specifically provided otherwise in the Contract.

Examples of commissioning work include:

Hydraulic flushing
Catalyst and chemicals loading
Steam blowing
Hot adjustments and alignments
Pre-start up audit

2.7. Performance Testing

Performance testing will be carried out during commissioning, start-up and operations by OWNER, unless specifically provided otherwise in the Contract.

2.8. Start-Up

The process by which the facility has been mechanically completed, pre-commissioned, and commissioned and is ready for the introduction of feed stocks and operation at the required

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process design conditions. Start-up will be performed by the OWNER unless specifically provided otherwise in the Contract.

2.9. Completion

All Work or a part thereof has been completed without exception according to the requirements of the Contract.

2.10. Acceptance

The stage at which the facility has been successfully started-up and a stable sustained production of "on specification" product is achieved according to the specified design conditions.

3.0. TURNOVER PROCEDURE

3.1. Turnover Stages

When Turnover occurs from Contractor to the OWNER, important milestones must have been reached, namely:

- 3.1.1 Mechanical Completion as per Section 2.3. has been achieved for a defined portion of the Work (turnover system). The Part A Punch List has been completed. A mutually agreed Part B and Part C Punch List may exist.
- 3.1.2 OWNER have checked out the equipment or system(s) and have formally accepted the Work for those systems.
- 3.1.3 OWNER accepts total care, custody and control for the mechanically completed Work. Commissioning and operations may proceed. Thereafter all remaining construction activities will be under operating permit control.

3.2. Steps

3.2.1. Mechanical Completion

If and when Contractor deems to have (mechanical) completed a Turnover system or Area, Contractor will submit a Notice of Completion (see Attachment 1) to OWNER.

3.2.2. Acceptance/Rejection (of Mechanical Completion)

Within 5 (five) calendar days of receipt of a Notice of Completion, OWNER may issue a Notice of Acceptance endorsed by OWNER (see Attachment 2) with a Punch List ('Part B' items) attached; or, OWNER may issue a Notice of Rejection endorsed by OWNER (see Attachment 3) with a list of deficiencies. In the case of a Notice of Acceptance with a Punch List, a schedule for completion of the Punch List items must have been agreed between Contractor and OWNER.

3.2.3 Partial Turnover

Partial turnover may be requested by OWNER for a portion of a system, area, completed unit or facility that is mechanically complete and independent of the status of any remaining Work.

The identification and scope of partial turnovers will be mutually agreed between Contractor and OWNER during performance of the Work.

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Following Mechanical Completion and pre-commissioning of a system, area or part facility, a Partial Turnover Certificate may be initiated with an accompanying punch list of exception items, if appropriate. Partial Turnover shall be subject to the completion of a Punch List as defined in Section 2.4 herein.

3.2.4 Turnover

Upon receipt by Contractor of a Notice of Acceptance from OWNER the accepted (portion of) Work shall pass over into the care, custody and control of OWNER in accordance with Section 3.1.3 above.

3.2.5 Commissioning and Start-Up

Commissioning and start-up activities by OWNER may commence after partial or final turnover. Contractor may be requested to participate in post turnover activities.

3.2.6 Completion of Work

Upon completion of all Work by Contractor including post turnover Work; a Notice of Completion for all Work shall be submitted by Contractor to OWNER and OWNER will respond in accordance with Section 3.2.2. until a Notice of Acceptance is issued for Contractor's Work for all Work.

3.2.7 Contractor Responsibilities

Contractor's responsibilities and participation with respect to completion of the Work and turnover thereof are as indicated in the Mechanical Completion and Turnover Checklist included in this procedure.

4.0 ATTACHMENTS

- 4.1 Notice of Completion
- 4.2 Notice of Acceptance
- 4.3 Notice of Rejection
- 4.4 Mechanical Completion and Turnover Checklist

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ATTACHMENT 1

NOTICE OF COMPLETION

NOTICE OF COMPLETION

MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE

CONTRACT NUMBER CONTRACTOR	: :
<div style="border: 1px solid black; padding: 5px;"> <input type="checkbox"/> This is to certify that all Work for the above referenced Contract was completed on (date) _____ in accordance with the Scope of Work and all drawings, specifications and standards applicable thereto. </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <input type="checkbox"/> This is to certify that all Work for the above referenced Contract was mechanically completed on (date) _____ in accordance with the Scope of Work and all drawings, specifications and standards applicable thereto. </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <input type="checkbox"/> This is to certify that the following turnover systems / areas for the above referenced Contract were completed on (date) _____ in accordance with the Scope of Work and all drawings, specifications and standards applicable thereto. (List turnover systems / areas below) </div> <div style="border: 1px solid black; height: 150px; margin-top: 10px;"></div>	
CONTRACTOR NAME(S) _____ TITLE: _____ SIGNATURE(S) _____ DATE: _____	

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ATTACHMENT 2

NOTICE OF ACCEPTANCE

MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**NOTICE OF ACCEPTANCE****CONTRACT NUMBER** :**CONTRACTOR** :**NOTICE OF ACCEPTANCE NUMBER** :

NOTICE IS HEREBY GIVEN TO THE ABOVE NAMED CONTRACTOR THAT CONTRACTOR'S NOTICE OF COMPLETION DATED FOR WORK PERFORMED BY CONTRACTOR PURSUANT TO THE ABOVE CONTRACT IS ACCEPTED AS OF THE BELOW STATED DATE FOR AND ONLY FOR, (CHECK APPLICABLE: LINE-OUT INAPPLICABLE):

- ☐ Purposes of ACCEPTANCE of below listed Turnover systems/areas:
- ☐ Purposes of ACCEPTANCE of all of CONTRACTOR'S Work required to be performed under this Contract
- ☐ ACCEPTANCE of CONTRACTOR'S Work is contingent upon CONTRACTOR completing the following incomplete Work by (date) _____. If such Work is not completed by this date, this ACCEPTANCE shall be void.

This Notice of ACCEPTANCE of CONTRACTOR'S Work constitutes assumption of care custody and control for the above mentioned portion of Work.

This Notice shall not relieve CONTRACTOR of any responsibilities under the guarantee provisions of the Contract.

OWNER

NAME(S):

SIGNATURE(S):

DATE:

OWNER

NAME(S):

SIGNATURE(S):

DATE:

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ATTACHMENT 3

NOTICE OF REJECTION

MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**NOTICE OF REJECTION****CONTRACT NUMBER** :**CONTRACTOR** : _____**NOTICE OF REJECTION NUMBER** :

NOTICE is hereby given to the above named CONTRACTOR that CONTRACTOR'S NOTICE OF COMPLETION dated _____ for Work performed by CONTRACTOR pursuant to the above Contract is **REJECTED**.

CONTRACTOR'S Work pursuant to the above Contract is defective as follows:

OWNER

DATE: _____

NAME: _____

SIGNATURE: _____

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ATTACHMENT 4

COMPLETION AND TURNOVER CHECKLIST

MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE

<u>DESCRIPTION</u>	Pre Turnover		Post Turnover	
	Contractor	OWNER	Contractor*	OWNER
1. GENERAL				
1.1 Manufacturer or Vendor Service Assistance				
a) Obtain the assistance of the manufacturer or vendor, when necessary, to install per drawings and specifications.				
b) Obtain the assistance of the manufacturer or vendor, as required, for technical assistance during run-in by the OWNER Operations Organization, for training, or for informational and operating purposes.				
c) Furnish names and telephone numbers, including emergency contacts, of manufacturer's and vendor's technical service representatives for use by OWNER Operations Organization.				
1.2. Permits				
a) Obtain all necessary permits and certifications to be issued in the name of the OWNER for use and operation of the plant.				
b) Obtain all necessary permits to be issued in the name of the Contractor for construction of the plant. (Note: OWNER is responsible for obtaining building permits and environmental permits.)				
1.3. Instructions				
a) Complete and issue vendor instruction file so that information may be readily retrieved through plant commissioning.				
b) Transmit to OWNER's Operations Organization all applicable vendor or manufacturer's instructions and drawings.				
1.4. Removal of Rust Preventatives				
a) Remove all rust preventatives and oils used to protect the equipment during the construction period whenever these protective materials will be detrimental to operation.				
1.5. Lubricants				
a) Provide a list of the recommended lubricants for use in the plant.				

Key: √ = Primary Responsibility; W = Witness or inspect; A = Assistance; * = Time Rate portion of Contractor's Work

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
b) Flush systems, furnish lubricants and perform initial lubrication of moving parts per vendor's instructions. Dispose of all flushing oil in accordance with the OWNER's Operations Organization instructions and environmental regulations.				
c) Maintain lubrication after initial charge.				
1.6. Packing and Seals				
a) Install mechanical seals and accessories, as required.				
b) Install permanent packing and accessories, as required.				
c) Adjust and replace mechanical seals, packing and accessories as necessary during commissioning period.				
1.7. Removal of Temporary Bracing				
a) Remove all temporary supports, bracing or other foreign objects that were installed in vessels, ducts, piping, transformers, machinery or other equipment to prevent damage during shipping, storage and erection and repair any damage sustained.				
1.8. Rotation and Alignment				
a) Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting the driver.				
b) Perform cold alignment to the manufacturer's tolerances and record data.				
c) Perform hot alignment.				
d) Perform any doweling required.				
e) Obtain the services of a factory representative where required to witness installation of equipment, as required.				
1.9. Tie-ins at Unit Limits				
a) Prepare all systems for safe tie-ins.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
b) Obtain work permit approval and make the necessary tie-ins at the unit limits, as required by the specifications and as directed by the OWNER's Operations Organization.				
c) Confirm safety of systems, install all hot-taps; block off hot-taps after installation.				
d) Remove blinds and so forth, as required.				
a) Provide any special media for test purposes.				
b) Witness tests.				
c) Dispose of all test media.				
d) Conduct all operational tightness tests.				
1.11. Inspection				
a) Provide inspection of the plant to verify that erected facilities conform to flow diagrams, construction drawings, vendor drawings and specifications.				
b) Perform quality assurance and audit of the Contractor's Work to ensure installations per project quality plan. Provide "hands-on" inspection where specifically required.				
c) Provide for special inspection, such as those required by insurance or governmental agencies.				
1.12. Pressure/Vacuum Safety Relief Devices				
a) Provide the OWNER's Operations Organization with a list of proper pressure settings.				
b) Transfer relief devices to and from testing facility. Bench test, and reinstall relief valves/tail pipes.				
1.13. Flushing and Chemical/Mechanical Cleaning				
a) Except as noted in 1.14, 2.3, and 2.4				
1. Conduct all flushing, blowing and chemical / mechanical cleaning operations where such operations can be accomplished without using permanently installed equipment. Flush piping systems to the extent possible by hydrotesting.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
2. Conduct all flushing and blowing operations where permanently installed equipment must be used to obtain proper line velocities.				
3. Provide any special media for flushing and / or cleaning purposes.				
4. Dispose of all media per environmental regulations.				
b) Turn systems over to the OWNER's Operations Organization free of trash and construction debris.				
1.14. Temporary Screens, Strainers, and Blinds				
a) Provide and install all required temporary strainers.				
b) Clean strainers, as required, during circulation with product.				
c) Remove strainers when system is adequately cleaned.				
d) Provide, install and remove all blinds required for flushing.				
e) Provide, install and remove all blinds required for isolation.				
1.15. Purging/Inerting				
a) Install purge / inerting connections as required per drawings.				
b) Provide purge materials and conduct necessary purge operations.				
c) Provide inerting materials and introduce where specified.				
1.16. Drying Out				
a) Dry out facilities to prevent contamination of catalysts, operating materials and/or product.				
b) Dry out systems, refractories and linings when this drying operation is to be accomplished with temporary facilities.				
c) Dry out systems, refractories and linings when this drying out operation is to be accomplished by means of permanently installed equipment.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
1.17. Vessel Packing and Fixed Beds				
a) Install initial charge of inert materials such as sand, gravel, balls, rings, and saddles for packing of vessels and drums.				
b) Install initial charge of non-production materials such as chemicals, resins, desiccants, transformer oil and the like.				
c) Inspect the vessel interior before and during loading to ensure proper installations.				
d) Install initial charge of catalyst.				
1.18. Housekeeping				
a) At completion of construction, remove excess materials, temporary facilities and scaffolding; rough sweep or rake the area and pick up trash. Perform washing or further cleanup, as required.				
b) After completion of construction, maintain adequate housekeeping practices, as required for safe operation.				
1.19. Maintenance, Spare Parts, and Special Tools				
a) Protect equipment from normal weather conditions, corrosion, or damage.				
b) After mechanical completion, provide adequate maintenance for equipment, including the cleaning of strainers and the repairing of steam traps.				
c) After mechanical completion, maintain adequate spare parts and supplies.				
1.20. Noise Survey				
a) Conduct individual equipment noise surveys, as required by regulatory authorities and specifications.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
2. SPECIFIC PROCEDURES				
2.1. Vessels				
a) Open the vessel after erection and install any internals requiring field installation. These internals will be inspected before and after installation. Conduct tray leakage and other tests as specified.				
b) Pressure test, clean, and dry out after test, as required.				
c) Clean, internally inspect, and close after proper inspection.				
2.2. Shell and Tube Exchangers and Air Coolers				
a) Perform field inspection, if required, of exchangers.				
b) Apply pressure tests, (if required), clean, dry, and close after tests.				
c) Check fans of air coolers for direction of rotation, proper clearance and specified blade pitch and establish that vibration is within specified limits. Check for header movement clearance and removal of shipping clips.				
2.3. Fired Heaters				
a) Perform the pressure test in accordance with the applicable codes, specifications, and instructions as required (in general, to be done in vendor's shop).				
b) Provide all non-operating prefiring checks in accordance with the manufacturer's instructions.				
c) Blow fuel lines, check them for cleanliness and reconnect burner piping.				
d) Check control and operation of registers and dampers and verify position of indicators.				
e) Check control and operation of air preheaters, blowers and soot blowers.				
f) Dry refractories during initial firing by following the manufacturer's temperature cycles.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
g) Conduct boilout, chemical cleaning and flushing operations, as required. Dispose of wastes and cleaning media in accordance with instructions and environmental regulations.				
h) Obtain and charge liquid heat transfer media, if required.				
i) Conduct burner ignition, drying and purging operations.				
j) Obtain the assistance of a vendor service engineer for technical advice during installation or start up, if required.				
2.4. Pumps, Compressors and Drivers				
a) Level baseplates and soleplates and grout all bearing surfaces.				
b) Alleviate excess piping stresses that may be imposed on pumps, compressors and drivers.				
c) After drivers and pumps or compressors are grouted, align and couple up.				
d) Confirm by barring over or otherwise free rotation of each machine.				
e) Set, check-out and adjust the alarm and shutdown systems to the extent possible without power application.				
f) Adjust tension of all springs and all compression washers on compressor discharge bottles and all compressor piping per drawings and specifications.				
g) Chemically clean any completed lube and seal oil system, when specified. Dispose of wastes and cleaning media in accordance with the instructions of OWNER's Operations Organization and environmental regulations.				
h) Charge the lube oil and lube oil cooling systems with flushing oil and circulate for cleaning purposes. Dispose of any flushing oil in accordance with the instructions of OWNER's Operations Organization and environmental regulations.				

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<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
i) After cleaning and flushing, charge the lube oil, seal oil and oil cooling systems with the operating oil recommended by the manufacturer.				
j) Operate equipment and make vibration, trip, governor and safety device checks and any operating tests and adjustments, as required.				
k) Obtain the assistance of a vendor service engineer for technical advice during installation or start up, if desired				
2.5. Tanks				
a) After erection and installation, install any internals, which require field installation.				
b) Test tank and internals, as required. Strap tanks and perform settlement test.				
c) Close after cleaning and proper inspection.				
2.6. Electrical Power and Lighting Systems				
a) Using a megohmmeter, make insulation tests on all wiring and cabling except lighting wiring.				
b) Using a megohmmeter, make insulation tests on motors, switchgear buses and transformer windings from phase to phase and phase to ground.				
c) Perform a dc high voltage test on installed power cable rated above 1 KV in accordance with the specification covering electrical work.				
d) Measure dielectric strength of insulating liquid in power transformers, circuit breakers and disconnect switches.				
e) Check operation of automatic transfer provisions under simulated fault and under-voltage conditions.				
f) Set and check all alarm, shutdown, timer and sequential operation systems for proper operability, simulating actual operations where necessary.				
g) Measure insulation resistance of windings of all motors 5 HP or larger.				

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	Contractor	OWNER	Contractor*	OWNER
h) Set and test all fault pressure relays and transformer taps.				
i) Install lamps (incandescent bulbs, fluorescent tubes, etc.) required to fill the fixtures and verify all lights burn and light switches operate properly. Test photocells for proper operation.				
j) Conduct any tests required to determine illumination level.				
k) Check operating functions of any emergency and/or standby power system and battery chargers including the uninterruptible power supply systems.				
l) Uncouple motors to be run in, run per vendor's design requirements, and recouple upon completion of that operation.				
m) Check spare circuit breakers for fit and interchangeability.				
n) Make grounding system tests to determine the continuity of connections and the value of resistance to ground.				
o) Perform trials and adjustments on all switchgear, motor control equipment and generators. Check phase to phase and phase to ground insulation resistance to all motor control buses.				
p) Test and set switchgear and circuit breaker relays for proper operation.				
p1) Check earth leakage protection switches.				
p2) Check on completeness of inventory in electrical rooms.				
p3) Check on all fuse ratings.				
q) Obtain local inspector's approval, where required.				
r) Energize all sub-stations with approval of OWNER's Operations Organization after completion of all tests.				
s) Energize and de-energize all temporary electrical facilities (in the case permanent power is utilized, coordinate with OWNER's Operations Organization).				

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	Contractor	OWNER	Contractor*	OWNER
t) Check phase sequence, polarity and motor rotation.				
t1) Check on functionality of remote control units, safety switches and disconnecting switches in power, lighting and tracing installations.				
t2) Check on functionality of interposing systems, up to IRC and MCC.				
u) Check installation of emergency power and lighting systems.				
u1) Check/measure cable tray isolation from supporting steel.				
v) Check operability of communication system.				
w) Check on tracing for installation, functionality and temperature control.				
w1) Check cable connections and glands for tightness.				
x) Check cover tiles in u/g cable trenches.				
y) Check cable markers and cable cut-out ring for all u/g cables.				
z) Check all materials for damage.				
z1) Check presence and text of all nameplates and stickers including proper mounting.				
z2) Check on painting, protective coatings and galvanized installation parts.				
2.7. Piping Systems				
a) Hydrostatically or pneumatically test all piping, as required by codes, and specifications.				
b) Witness field pressure tests.				
c) Flush and drain system and install orifice plates. Orifice plates shall not be installed before flushing (see 2.8. for the removal or isolation of other inline components).				

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	Contractor	OWNER	Contractor*	OWNER
d) Prior to testing, remove any control valves, orifice plates, and like items which might be damaged in testing and reinstall after testing is completed as required by the specification.				
e) Install line vents and drains, temporary strainers, spectacle blinds, temporary blinds, and start-up bypasses in accordance with the drawings and specifications.				
f) Conduct chemical/mechanical cleaning operations as required by drawings / specifications where such operations can be done without using permanently installed equipment.				
g) Drain system, remove blinds.				
h) Insulate flanges, after the specified testing of each system has been completed, unless instructed otherwise by OWNER's Operations Organization.				
i) All welded joints (longitudinal, girth and nozzle) in underground piping that have not been shop tested shall be left exposed (free of paint, dope and wrap) until the specified testing has been completed. After final testing of these joints, backfill the system (all testing documentation must be in place before backfilling otherwise system will not be accepted as complete).				
j) Check pipehangers, supports, guides, expansion joints and other pipe specialties for the removal of all shipping and erection stops and for the correctness of cold settings for the design service. Also, provide the OWNER Operations Organization with instructions for hot settings.				
k) Check pipehangers, supports, guides, expansion joints and other pipe specialties for hot settings and make minor adjustments, as necessary.				
l) Install permanent filter elements, as required.				
m) Verify, that specified valve packing has been provided in valves installed in the plant.				
n) Install car seals on valves, where necessary.				
o) Check and record the positions of all car sealed valves; paint or identify valves, as required.				

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	Contractor	OWNER	Contractor*	OWNER
p) Correct support, vibration and thermal expansion problems detected during commissioning.				
q) Retorque all hot and cold service bolting during commissioning and start up, as required				
2.8. Instrument Systems				
a) Conduct any non-operating checks to ensure instrument operability, that is, remove all shipping stops; check pointer travels; and verify instrument capability to measure, operate and stroke in the direction and manner required by the process application.				
b) Bench or field calibrate instrument with standard test equipment and make all required adjustments and control point settings.				
c) Clean all transmission and control tubing by blowing with cooled and filtered clean air before connecting to instrument components.				
d) Clean all air supply headers by blowing with clean air and check them for tightness.				
e) Leak test pneumatic control circuits.				
f) Check piping from instruments to process piping for tightness.				
g) Install and connect all system components and verify their conformance to specifications and design criteria for function and range using dummy transmission signals, as needed.				
h) Check all electrical signals and alarm wiring for continuity, correct source of power and polarity.				
i) Check thermocouples for proper joining of wires, position of elements in wells, proper polarity and continuity of receiving instruments.				
j) "Stroke" control valves and adjust the valve movement and positioner action as required. Also check for proper direction of movement upon air failure and proper flow direction through the body.				

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MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**COMPLETION AND TURNOVER CHECKLIST**

<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
k) Check instrument “loops” for continuity, completeness and identification, applying simulated signals when practical.				
l) Test annunciator and individual alarms by simulating alarm conditions or, when this is not possible, by mechanically operating the contacts.				
m) Check, test, and adjust when necessary, instruments and instrument systems furnished as part of a vendor’s “package” supply.				
n) Identify orifice plates by tagging.				
o) Check and record bores of orifice plates and edge condition and install after completion of flushing operations.				
p) Isolate or remove, if necessary, inline components such as control valves, positive displacement meters, and turbine meters for pressure testing. Reinstall these items after testing the system with the components removed or isolated.				
q) Isolate or remove components for flushing operations and reinstall them on the completion of these operations.				
r) Fully pressurize and energize the transmitting and control and safeguarding signal systems by opening process connections at primary sensors and final regulators and by making control mode settings for automatic operation of equipment as the process unit is charged and brought on stream with a product or a flushing medium.				
s) Final integral functional testing of safeguarding and control system, where possible, by simulating the process with non-hazardous material.				
t) “Stroke” ESD/ESD valves and check if “stroke” time is correct. Also check for proper direction of flow in connection with TSO function. Perform IBIS stroke testing.				

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MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**COMPLETION AND TURNOVER CHECKLIST**

<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
2.9 Boilers				
a) Make a non-operating boiler pressure test in accordance with applicable codes, specifications (by vendor in shop).				
b) Inspect the boiler for completeness and correctness of installation and make other non-operating pre-firing checks.				
c) Check operation of air preheaters, dampers, soot blowers and other equipment for proper positioning and travel.				
d) Dry out, cure, or otherwise treat as specified any liners where damage may occur if action is deferred or where such action is requisite to other work which must be completed before mechanical completion.				
e) Dry refractories during initial firing by following the manufacturer's temperature cycles.				
f) Purge, flush and drain steam mains, as necessary.				
g) Charge treated water for boilout and initial operation.				
h) Commission auxiliaries as detailed elsewhere under the appropriate equipment type.				
i) Conduct boilout, chemical cleaning and flushing operations, as required. Dispose of wastes and cleaning media in accordance with the instructions of the OWNER Operations Organization and environmental regulations.				
j) Conduct initial light off, making the associated checks and adjustments.				
k) Obtain the assistance of a vendor service engineer for technical advice during installation or start up, if desired.				
l) Conduct all operating tests and obtain the required certification.				
m) Check and set pressure relief valves.				

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MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**COMPLETION AND TURNOVER CHECKLIST**

<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
2.10. Water Treatment Plants				
a) Inspect for completeness and correctness of installations and make any non-operating checks that may be required.				
b) Install the initial charge of ion exchange resins and inert bed material.				
c) Provide all water treatment chemicals.				
d) Make the necessary operating tests and adjustments to water treatment systems.				
e) Obtain the services of a water consultant to advise and monitor the water treatment operation.				
2.11. Cooling Tower, Fire Water Systems, Fire and Safety Equipment				
a) Inspect for completeness and correctness of installations and make any non-operating checks that may be required.				
b) Clean the cooling tower basin and install screens in the suction pit before water circulation.				
c) Flush, drain and clean the cooling tower basin.				
d) Clean intake screens.				
e) Adjust cooling tower fans to obtain specified tip clearance and test.				
f) Operate fire pumps to check performance of systems.				
g) Head up reservoirs, vessels, tanks and other water system equipment, as required. Fill with water, check for leaks and flush to clean.				
h) Obtain and install as required fire fighting chemicals and portable equipment, such as hoses, fire extinguisher and related equipment.				
i) Test and adjust, when necessary, all safety devices.				
j) Test and calibrate gas detectors, ionization detectors, and fire control panels.				

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MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**COMPLETION AND TURNOVER CHECKLIST**

<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
k) Test gas fire extinguisher system (CO ₂ or Halon) and replace discharged cylinders with full cylinders. Test and recharge dry-type extinguisher system.				
l) Furnish full cylinders of fire extinguisher gas.				
m) Establish the water treatment program.				
n) Obtain the services of a water consultant to advise and monitor the water treatment.				
2.12. Waste Disposal, Drainage and Sewer Systems				
a) Inspect facilities for completeness and correctness of installation and make any non-operating checks to ensure their conformance to specifications.				
b) Operate all equipment and supply all chemicals and agents related to waste treatment.				
c) Obtain the services of a waste treatment consultant to advise and monitor the system operation.				
2.13. Buildings and Accessories				
a) Check installation of buildings and accessories, including all heating, ventilating and air conditioning equipment, communication equipment and network to ensure their completeness and conformance to specifications.				
b) As required, obtain certification that all plumbing, electrical, fire protection, elevator and special materials handling installations comply with local government regulations.				
c) Install furniture described on the drawings including laboratory benches and personnel lockers.				
d) Operate heating, ventilating, air conditioning units, communication equipment, and network and make all performance tests.				
e) Obtain certificate for occupancy and use, if required.				

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MECHANICAL COMPLETION / TURNOVER COORDINATION PROCEDURE**COMPLETION AND TURNOVER CHECKLIST**

<u>DESCRIPTION</u>	Pre Turnover		Post turnover	
	Contractor	OWNER	Contractor*	OWNER
2.14. Miscellaneous Equipment (Agitators, Mixers, Weigh Scales and Materials Handling Equipment)				
a) Level and calibrate weigh scales with the assistance of the manufacturer's representative and set tare weights whenever possible.				
b) Manually check materials handling equipment.				
c) Check clearances on materials handling equipment.				
d) Make all final adjustments during run in and conduct any required performance tests.				
e) Obtain a vendor service engineer for technical assistance during installation or start up.				
f) As required, obtain certification that all lifting and materials handling installations and other items of equipment comply with government regulations.				
2.15. Information Systems				
a) Install and connect systems and system components and verify their conformance to specifications.				
b) Install and connect all communication links between systems and verify their conformance to specifications.				
c) Install all operating and application systems software and verify their conformance to specifications.				
d) Connect a representative selection of peripherals (e.g. terminals, workstations, printers, plotters, video copiers) and demonstrate their functioning to specifications.				
e) Perform initial load and performance tests during Mechanical Completion and pre-commissioning.				
f) Perform full load and performance tests during commissioning.				
g) Perform continuous load test during 30 days of non-interrupted system operation.				
2.16. Electrical Installations				
a) Test all electrical equipment according to the specified procedures.				

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