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ENGINEERING DEPARTMENT - SAN FRANCISCO

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SECTION 3 - PERFORMANCE OF WORK

3.01 WORK SPACE AND STORAGE AREA

COMPANY will assign space in the area shown on Drawing GT-A-21430 for CONTRACTOR'S office, work space, and storage area.

COMPANY can make available for the fabrication of the precast stanchions, a work area other than the South Work Area, if CONTRACTOR so desires.

3.02 TEMPORARY CONSTRUCTION FACILITIES

3.021 CONTRACTOR shall supply and install all temporary facilities required for the prosecution of his work including, but not limited to, tool rooms, locker rooms, toilets, office and storehouse. All temporary installations shall be subject to approval by COMPANY prior to installation.

3.022 In addition, CONTRACTOR shall provide as required for completion of the job any temporary equipment and/or material including, but not limited to, shoring, concrete forms, bracing, ladders, scaffolding, staging, drop cloths and tarpaulins.

3.023 CONTRACTOR shall maintain all temporary installations, including the vapor barriers installed by others, in a safe and adequate manner and remove them immediately upon completion of the work.

3.03 SURVEYING

3.031 CONTRACTOR shall perform all surveying necessary from base lines and bench marks established by COMPANY. The accuracy for all grades, elevations, and plumbing of any structures and location of facilities described in this Specification shall be the responsibility of the CONTRACTOR.

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3.032 CONTRACTOR shall preserve all permanent survey monuments and bench marks. In the event CONTRACTOR disturbs any permanent monuments or bench marks, they will be replaced by a Land Surveyor acting under COMPANY'S instructions; replacement cost will be deducted from the sums due or to become due the CONTRACTOR.

3.04 EXCAVATION AND BACKFILL

Earthwork shall be in accordance with applicable paragraphs of Specification EG-581. CONTRACTOR shall haul any excess excavated material to a location designated by COMPANY'S Construction Representative. Such location will be within 5500 feet of the job site, and within Refinery limits.

3.05 GRADING

CONTRACTOR shall return area grades as shown on the drawings. Finish grading shall be as described in Section 4.121 of this Specification.

3.06 MATERIALS HANDLING AND CORRESPONDING PAPER WORK

3.061 CONTRACTOR shall receive from any one of several storage areas located on COMPANY'S premises the material and equipment furnished by COMPANY and required for the work described in Section 1.1 of this Specification. Any material and equipment listed on the Equipment List Drawing GT-D-21601 arriving after CONTRACTOR has commenced work shall be received and unloaded by CONTRACTOR from trucks or rail cars.

3.062 CONTRACTOR'S requests for withdrawal of COMPANY furnished material and equipment shall be based on quantities shown on drawings or Lists of Materials furnished by COMPANY. CONTRACTOR shall obtain approval from COMPANY'S Construction Representative before materials in excess of the quantities shown on the drawings or Lists of Materials will be issued.

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- 3.063 Subject to Section 5.3 of the Terms and Conditions CONTRACTOR shall: (a) be responsible for keeping all material and equipment in good condition until the completed facility is accepted by COMPANY, by (1) taking any necessary steps such as painting, greasing, installation of rust preventive oil, or covering, etc., to protect all equipment externally and internally from mechanical damage or damage from the elements, and (2) protecting all instruments and control panels from corrosion, etc., due to humidity, precipitation, temperature and atmospheric conditions or environment; (b) be held accountable for surplus materials furnished by COMPANY, items received from COMPANY and to be returned, and for shortages or damages to material and equipment furnished by COMPANY. Where necessary CONTRACTOR shall apply code colors for the identification of special alloy materials when they are received, to insure that these alloy materials are properly installed and that correct weld rod is used.
- 3.064 It is contemplated that the items of material and equipment to be furnished by COMPANY pursuant to Paragraph 1.22 herein will be listed on appropriate bills of material or drawings in quantities sufficient to do the work. CONTRACTOR shall promptly check such bills of material or drawings for any errors which would result in shortages and shall, promptly upon discovery, notify COMPANY in writing if there are any such errors or if the material and equipment listed are insufficient to meet his anticipated needs. Delays caused by CONTRACTOR'S failure to discover and promptly report such errors or that the material and equipment listed are insufficient to meet his anticipated needs shall not constitute a basis for reimbursement under Section 3.2 of the Terms and Conditions or for extending the completion date.
- 3.065 Upon completion of the job, CONTRACTOR shall furnish COMPANY an inventory of all remaining material and equipment which were furnished by COMPANY including the quantity, description, and the item number for each item. When directed by COMPANY, CONTRACTOR

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shall transport the remaining material and equipment to such locations on COMPANY'S premises as designated by COMPANY.

3.07 DRAWINGS AND DIMENSIONS

- 3.071 COMPANY will furnish to CONTRACTOR four copies of all pertinent standard drawings, standard specifications, reference drawings, and construction drawings. Two copies of Vendor's drawings will be furnished for all equipment that COMPANY supplies.
- 3.072 CONTRACTOR shall receipt for all drawings received and except for one Contract set shall return all drawings to COMPANY upon completion of job or when superseded by revised issues. CONTRACTOR shall maintain at all times in his field office a complete up-to-date file of all drawings furnished him.
- 3.073 Upon completion of construction, CONTRACTOR shall mark a print of each major drawing to indicate any changes or deviations made in the actual installation. However, minor construction drawings such as structural details and small foundations need not be so marked.
- 3.074 CONTRACTOR shall prepare any detail sketches or models he may require. Detail drawings will not be prepared by COMPANY to show exact routing, for example, of conduits between underground duct banks and stub-ups in building floor.
- 3.075 CONTRACTOR shall be responsible for verifying all dimensions of and for proper fitting up of tie-ins to existing facilities or facilities to be constructed by others as shown on the design drawings furnished by COMPANY. CONTRACTOR shall submit any proposed change or deviation from drawings to COMPANY for written approval before fabrication or installation.

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3.08 INSPECTION AND TESTING

3.0801

General

CONTRACTOR shall be solely responsible for thorough craft inspection during construction and for the quality of the work. COMPANY will make such inspection as COMPANY may desire in order to check the progress and quality of the work, to see that CONTRACTOR'S employees are properly qualified in their respective crafts, that workmanship is of an acceptable grade, and that all requirements of this Specification are being met. Such inspection or any other inspection or testing by COMPANY shall not relieve CONTRACTOR of full responsibility for the work hereunder.

3.0802

Welding Inspection

3.08021 CONTRACTOR shall arrange for welding qualification tests at his expense in accordance with Engineering Instruction EP-310. Welders shall be required to pass qualification tests before performing any operation during construction of the project. COMPANY reserves the right to require additional qualification tests during construction if it has any doubt about the competence of welders. COMPANY shall be allowed to witness tests and to examine test coupons. If additional tests are required and passed by welders, cost of retesting will be borne by COMPANY; if failed, cost of retesting shall be borne by CONTRACTOR.

3.08022 COMPANY will perform radiography of welds, as specified in the piping standards, in accordance

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with Section 7.0 of Specification No. EG-2505 to verify that the overall quality of workmanship is in accordance with COMPANY standards (Specification No. EG-2505). Welds so inspected shall be repaired or replaced by CONTRACTOR at his own expense if the weld fails to meet said standards of acceptability. All of COMPANY'S radiographs will be available to CONTRACTOR for his review and use to the extent he desires to verify that all requirements of Section 3.0801 above are met.

3.0803

Hydrostatic Testing

- (1) Equipment and Piping - CONTRACTOR shall perform hydrostatic tests in accordance with Engineering Instruction R-300, on all equipment and lines after erection, but before any insulation or backfill, and with all welded, screwed or flanged joints exposed. Before performing any hydrostatic test, CONTRACTOR shall notify COMPANY'S Construction Representative sufficiently in advance so that all hydrostatic tests may be witnessed by COMPANY inspector. CONTRACTOR shall furnish all equipment needed for use in hydrostatic testing.
- (2) Drain Lines - Each section of drain line shall be tested by CONTRACTOR before placement of any area paving over the lines.

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3.0804

Electrical Inspection and Testing

CONTRACTOR shall inspect wiring, cables, motors, controllers, and lighting and test grounding, all in accordance with Specification Nos. EG-894 and EG-1675.

3.0805

Instrument Testing

CONTRACTOR shall inspect and make all necessary tests and such additional tests as COMPANY may request to insure that instruments are installed correctly and will function properly in accordance with Specification No. EG-1586, except that:

- (1) Any pressure gages that are damaged shall be returned by CONTRACTOR to COMPANY. COMPANY will repair, test and adjust such pressure gages and release them to CONTRACTOR with a tag attached to each gage identifying the gage and showing that it is in satisfactory condition.
- (2) All relief valves shall be returned by CONTRACTOR to COMPANY. COMPANY will check and, if necessary, adjust relief valve settings and release the valves to CONTRACTOR with a tag attached to each valve identifying the valve, showing that it is in satisfactory condition, and noting the set pressure.

3.0806

Columns, Vessels, and Furnace

CONTRACTOR shall prepare all pressure vessels, columns, and the furnace for final inspection, including opening of all internal and external manways and handholes, providing proper gaskets for all openings and removal of debris. When CONTRACTOR has proceeded with his work to the point

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where a column, vessel, or the furnace is ready for a COMPANY check, he shall advise COMPANY. When COMPANY has had reasonable opportunity to complete its inspection and COMPANY'S Construction Representative is satisfied that no further action is required before final heading up of the column, vessel, or the furnace, he will give CONTRACTOR written notice releasing it for final heading up.

3.0807

Valve and Pump Packing

CONTRACTOR shall repack in the field the shafts of all pumps. CONTRACTOR shall check all valves in piping classifications M3, R1, S, W1, W2, and W3 to see that sufficient packing has been installed. CONTRACTOR also shall check at least 10% of each type of valve to verify that the proper type of packing has been installed, in the presence of COMPANY inspector.

3.0808

Mechanical Equipment

3.08081 CONTRACTOR shall align the shafts of all drivers (motors, turbines) and connected driven equipment (pumps and compressors). CONTRACTOR shall notify COMPANY'S Construction Representative sufficiently in advance prior to bolting up couplings so that COMPANY may inspect and approve alignments. CONTRACTOR shall be responsible for equipment alignment until correct alignment has been demonstrated at operating temperature. Pumps, drivers, gears, etc., mounted on baseplates or soleplates shall be doweled to preserve alignment while operating and to restore alignment when equipment is removed for maintenance.

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3.08082 CONTRACTOR shall check rotation of motors, set turbine overspeed trips, turn over compressor, etc., in the presence of COMPANY inspector.

3.0809 Concrete Samples

COMPANY may perform compression and slump tests on concrete. CONTRACTOR shall furnish samples taken in accordance with ASTM Specifications as may be requested for the following tests and inspections:

- (1) Compression Tests: One set of three cylinders from each 50 cu. yd. of structural concrete placed each day.
- (2) Slump Tests: Periodic samples daily during the pouring of concrete.

3.09 EQUIPMENT LUBRICATION

COMPANY will furnish all lubricants, and CONTRACTOR shall lubricate all equipment including couplings in accordance with the lubrication schedule. CONTRACTOR shall notify COMPANY'S Construction Representative sufficiently in advance so that all lubrication may be witnessed by COMPANY inspector.

3.10 BOLTING-UP PRACTICE

The bolting-up of flanged joints shall be in accordance with Engineering Practice R-800.

All bolts in piping classifications M3, N, N1, N2, R1, W1, W2, and W3 shall be lubricated with a high temperature lubricant - approved by COMPANY - before assembly of joints.

In addition, the following procedure shall be used for spiral-wound gasketed flanged joints:

- (1) A programmed bolting sequence of uniform loads, i.e., start with the flange bolt in the 12 o'clock

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position, then transfer successively to the 6 o'clock, 9 o'clock, 3 o'clock, etc., bolt positions, increasing the bolt load uniformly each time the sequence is completed.

(2) Tighten the bolts until the flanges are uniformly seated on the gasket centering ring. Lubrication with graphite paste of the gasketed surface is required.

COMPANY will provide, for piping and vessel manhole covers, extra long bolts for future use with Biach bolt tensioner, for bolt sizes 1-1/2" diameter and larger. CONTRACTOR shall install bolts so that full extra length protrudes on free side of flange, and install extra nut to cover exposed threads.

3.11 ERECTION AND RIGGING PLANS

Rigging - CONTRACTOR shall submit Rigging Diagrams for all "Heavy Lifts" including the main pipeway stanchions to COMPANY Construction Representative for review at least 3 weeks prior to performing the work, except that Rigging Diagrams for erection of the reactor shall be submitted 5 weeks prior to erection of the reactor. "Heavy Lifts" are defined as any lift involving gin poles, guy derricks, multiple cranes, or any arrangement other than a single crane lift within the operating limitations of the equipment used. The Rigging Diagram shall completely define the rigging plan and shall include such information as location layout; location of guys and deadmen; details of connections at equipment, poles and deadmen; calculations of stresses in cables and safe loads on all rigging components, etc.

CONTRACTOR may use the Reactor top nozzle for lifting purposes. CONTRACTOR shall design and fabricate the lifting head; the distance between centerline of pin in lifting head and face of top nozzle shall not exceed 12 inches. CONTRACTOR shall take special care to protect nozzle cladding and ring joint groove.

3.12 MANUFACTURER'S DIRECTIONS

All manufactured articles, materials and equipment shall be applied, installed, connected, erected, cleaned, conditioned, and tested in accordance with manufacturer's

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printed directions and specifications unless otherwise specified herein.

3.13 P&ID CHECK

CONTRACTOR shall make a complete and detailed physical inspection to verify that all completed piping systems and instrument installations are in accordance with the final Piping and Instrument Diagrams, Instrument Schedules, and Instrument Installation Details. CONTRACTOR shall also verify that all materials conform to the Piping Material Classification Sheets and Instrument Drawings. Discrepancies discovered in this check shall be corrected by CONTRACTOR except that any discrepancies wherein piping drawings do not agree with diagrams and schedules shall be referred to COMPANY for resolution.

3.14 CORRECTION OF DEFECTS

CONTRACTOR shall perform all necessary repair work to correct all defects and any damage caused thereby. When repair work is necessary due to faulty workmanship of CONTRACTOR or due to defective or unsatisfactory material furnished by CONTRACTOR, the cost of such repair work shall be borne by CONTRACTOR in the manner provided by Section 4.2 of the Terms and Conditions. Where a defect is due to defective material furnished by COMPANY, the correction of the defect and any damage caused thereby shall be performed by CONTRACTOR and the contract price shall be adjusted in accordance with the "Exhibit -- Change in the Work" for such correction work.

3.15 CLEANING UP

During the course of the work, the CONTRACTOR shall keep a reasonable degree of order by disposing of accumulated rubbish and waste material and, at the completion of the work, the site shall be cleared of all debris, left-over materials, tools, and equipment which may have accumulated in the execution of the work. All temporary shops, storehouses, offices, toilets, etc., erected by CONTRACTOR shall be removed. Where the CONTRACTOR, after due notice, fails to keep the area of his work reasonably clean and safe, or fails to clean this area at the completion of

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the work, the COMPANY may perform this work and deduct the cost from the sums due or to become due the CONTRACTOR.

3.16 COMPLETION

The work will be considered "complete" when CONTRACTOR has performed all work specifically stated or manifestly implied in this Specification. The following illustrate the type of work items which must have been satisfactorily accomplished before the work will be considered complete:

- 3.161 Completion of all required tests.
- 3.162 Completion of all required inspections including P&ID check.
- 3.163 Pumps, machinery and drivers checked for alignment after final tightening of connecting piping, bearings flushed and lubricated.
- 3.164 Instruments, alarms, and controls cleaned, lubricated, and checked.
- 3.165 Piping washed or blown clean with air. All strainers in place and cleaned.
- 3.166 Electrical circuits tested for grounds or shorts, motors checked for rotation and run a minimum of two hours. All lights cleaned and operating, and all control circuits checked.
- 3.167 All nameplates, identification stencils, etc., installed.

3.17 ACCEPTANCE

3.171 Custody of Plant for Initial Operation

When the Plant is tested and completed in accordance with the requirements of this Specification (except for finishing work not essential for the operation of such Plant which COMPANY and CONTRACTOR agree can be completed while the Plant is in the custody of COMPANY, such as painting,) CONTRACTOR shall

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so notify COMPANY in writing. After receipt of such notice, COMPANY may then take custody of such Plant to begin initial operation to verify that the Plant conforms with requirements of this Specification. Such custody of such Plant shall not be construed as Acceptance pursuant to Paragraph 3.172 below. Any additional work required to be performed by CONTRACTOR in such Plant after COMPANY has taken custody shall be performed on a work permit basis.

3.172 Acceptance

CONTRACTOR'S work hereunder shall be considered accepted on the date COMPANY gives written notice to CONTRACTOR that it is satisfied all work has been completed in accordance with the requirements of this Specification. Acceptance by COMPANY shall in no way relieve CONTRACTOR of his obligation or liabilities under the Contract.

THIS PAGE ENDS SECTION 3.

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