# SCHEDULES, PROGRESS REPORTS

## 1. SCHEDULE

.1 Within fifteen (15) days after acceptance of Tender, prepare and submit a bar chart schedule for review to the Engineer.

.2 Schedule shall show dates of commencement and completion of various parts of the Work, ordering and delivery dates of Products, phasing and timing for various subcontracts and all other detailed information to the satisfaction and approval of the Engineer.

.3 All orders for materials shall be placed in ample time for adherence to the schedule.

.4 Make special note of those times when extra work shifts are required to complete the Work.

.5 Prepare definitive schedules for the following specific items:

.1 Product Delivery

.2 Schedule of all shop drawings required

.3 Schedule of all samples and mock-ups required

.4 Schedule of material deliveries

.5 Schedule of construction phases

.6 Requirements for special site instructions, colour schedules, etc.

## 2. MANPOWER/OVERTIME

.1 Cease work at any particular point and transfer workers to other designated points, when so directed, should the Engineer judge it necessary to expedite the Work.

.2 Should the Work fail to progress according to the approved progress schedule, work such additional time (including weekends and holidays), employ additional workers, or both, as may be required to bring the Work back on schedule, at no additional cost to the Owner.

.3 Night work will be permitted only with written permission of the Engineer and in accordance with existing municipal regulations. Provide sufficient lighting to permit night work to be performed safely and satisfactorily.

.4 If this Contractor causes delay to another Contractor, this Contractor shall bear all costs of expediting the Work of such other Contractor.

**END OF SECTION**

# QUALITY CONTROL

## 1. REQUIREMENTS INCLUDED

.1 Inspection and testing, administrative and enforcement requirements.

.2 Testing and mix designs.

.3 Mill tests

.4 Equipment/system adjust and balance

## 2. INSPECTION SERVICES

.1 The Owner and the Engineer shall have access to the Work. If parts of the Work are in preparation at locations other than the Place of the Work, access shall be given to such work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or review by Engineer's instructions, or the law of the Place of the Work.

.3 If the Contractor covers or permits to be covered Work that has been designated for special tests, inspections or reviews before such is made, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work at no extra cost to owner.

.4 The Engineer may order any part of the Work to be examined if such work is suspected to be not in accordance with the Contract Documents. If, upon examination, such work is found not in accordance with the Contract Documents, correct such work and pay the cost of examination and correction. If such Work is found in accordance with the Contract Documents, the Owner shall pay the cost of examination and replacement.

## 3. INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies may be engaged by the Owner for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Owner.

.2 Provide equipment required for executing inspection and testing by the appointed agencies.

.3 Employment of inspection/testing agencies does not relax the responsibility to perform Work in accordance with the Contract Documents.

.4 If defects and/or non-conformances to the contract are revealed during inspection and/or testing, the appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Engineer at no cost to the Owner. Pay costs for retesting and reinspection.

.5 Allow inspection/testing agencies access to the Work, off site manufacturing and fabrication plants.

.6 Cooperate to provide reasonable facilities for such access.

.7 Notify the appropriate agency and Engineer in advance of the requirement for tests, in order that attendance arrangements can be made.

.8 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with responsible promptness and in an orderly sequence so as not to cause delay in the Work.

.9 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

## 4. REJECTED WORK

.1 Remove defective Work, whether the result of poor workmanship, use of defective products or damage and whether incorporated in the Work or not, which has been rejected by the Engineer as failing to conform to the Contract Documents. Replace or re-execute in accordance with the Contract Documents at no extra cost to owner.

.2 Make good other Contractor's work damaged by such removals or replacement promptly.

.3 If in the opinion of the Engineer it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work performed and that called for by the Contract Documents, the amount of which shall be determined by the Engineer.

## 5. TESTS AND MIX DESIGNS

.1 Furnish tests results and mix design as may be requested or specified.

.2 The costs of tests and mix designs beyond those called for in the Contract Documents or beyond those required by the law of the Place of Work shall be appraised by the Engineer and may be authorized as recoverable.

## 6. MILL TESTS

.1 Submit mill tests certificates as required of specification Sections.

## 7. EQUIPMENT/SYSTEMS

.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

**END OF SECTION**

**CONSTRUCTION FACILITIES**

## 1. TEMPORARY UTILITIES

### 1.1 Temporary Power and Light

.1 Provide and pay for temporary power required during construction, for temporary lighting and the operating of power tools, which is in addition to the power and lighting currently available at the plant.

.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout the project.

.4 Provide and pay for temporary site lighting for night time hours. Install lamps in suitable locations to obtain unobstructed light over entire area.

.5 Perform daily inspection of temporary lighting and replace burned out and missing lamps. Relocate promptly any lights that become obstructed by new work.

.6 The existing systems in the WWTP may be utilized by the Contractor. Pay for all maintenance of these systems.

### 1.2 Temporary Heating

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside the building must be vented to the outside or be flameless type. Solid fuel salamanders not permitted.

.3 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress, unless indicated otherwise in specifications.

.4 Ventilate heated areas and keep building free of exhaust or combustion gases.

.5 The permanent heating system of the building, or portions thereof, may be used for temporary heating when it is available. Be responsible for damage thereto and ongoing maintenance until work is complete.

.6 Date of Interim Completion and Warranties for heating system do not commence until entire system is in as near original condition as possible and is so certified by the Engineer.

.7 Pay costs for maintaining permanent heating system.

.8 Be responsible for damage to the Work due to failure in providing adequate heat and protection during construction.

### 1.3 Temporary Telephone

.1 Provide and pay for temporary telephones necessary for own use.

### 1.4 Water Supply

.1 Provide a continuous supply of potable water for construction use.

.2 A portable water system does exist in the plant and it may be utilized by the Contractor. The Contractor shall be responsible for all costs to supply (i.e. truck delivery) and maintain the system.

### 1.5 Temporary Sanitary Facilities

.1 Provide sufficient sanitary facilities for all in accordance with local health authorities.

.2 Maintain facilities in clean condition.

.3 Sanitary facilities do exist in the plant and may be utilized by the Contractor. The Contractor shall be responsible for all costs to maintain the system, including trucked sewage removal.

### 1.6 Temporary Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Open fires and burning of rubbish are not permitted on the site.

### 1.7 Dewatering

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

## 2. CONSTRUCTION AIDS

### 2.1 Hoisting

.1 Provide, operate and maintain hoists required for moving of workers, material and equipment.

### 2.2 Ladders, Stairs

.1 Provide and maintain adequate temporary ladders and stairs required for construction.

.2 Secure to structure.

.3 Ladders and stairs are to comply with all requirements of safety authority.

**2.3 Scaffolding**

.1 Provide and maintain scaffolding temporary stairs.

.2 Scaffolding is to be rigid, secure and constructed to ensure adequate safety for workers. Erect and remove without damage to the building or finishes.

**2.4 Temporary Retaining Walls**

.1 Provide temporary sheeting, piling or shoring as required to protect excavations, and trenches from damage caused by rain water, ground water and other soil and weather conditions. Erect in a manner which will not encumber the performance of the Work.

**2.5 Explosives**

.1 Provide for the use of explosives when required. Advise Engineer if explosives are required. When using, conform to the requirements of local governing authorities.

.2 Explosives are to be handled and used only by licensed personnel.

.3 Protect adjacent properties, work in progress and workers from damage or injury when using explosives. Place sufficient and adequate signs around site to warn the public that explosives are being used.

.4 Instruct workers as to the procedures to be taken prior to and during each detonation. Provide ample warning prior to each detonation and ensure all workers fully recognize these warnings.

**2.6 Explosive Actuated Fastening Tools**

.1 Provide for the use of explosive actuated fastening tools when required. When using, conform to the requirements of CAN 3 Z166.1-M85 - "Power Actuated Tools" and local governing authorities.

**2.7 Welding Machines and Air Compressors**

.1 If required for performance of the work these are the responsibility of the respective users. Locate outside of building.

## 3. SECURITY AND PROTECTION

**3.1 Protection for Off-Site & Public Property**

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

## 3.2 Site Storage/Loading

.1 Confine the Work and the operations of employees to limits indicated by the Contract Documents. Do not unreasonably encumber the premises with products.

.2 Do not load or permit to be loaded any part of the Work with a weight or force that will endanger the Work.

## 3.3 Protection of Building Finishes & Equipment

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, hoardings as required.

.3 Be responsible for damage incurred during construction.

## 3.4 Existing Services

.1 Maintain existing services in operation at all times during construction.

.2 Protect all existing services from damage. Repair services damaged by construction at no additional cost to the Owner.

.3 If service interruptions are necessary, such interruptions shall be made only at times approved by the Engineer.

.4 When breaking into or connecting to existing services or utilities, carry out work at times directed by local governing authorities, with a minimum of disturbance to the Work and pedestrian and vehicular traffic.

.5 Protect, relocate or maintain existing active services as required. When inactive services are encountered, cap off in a manner approved by local governing authorities having jurisdiction.

## 3.5 Warning and Traffic Signs

.1 When Work is performed within public areas, provide and erect adequate warning and traffic signs as necessary to give the public proper warning. Place signs significantly in advance to enable the public to respond to directions.

.2 Warning and traffic signs shall be illuminating type, visible to the public and traffic during night time hours.

## 4. ACCESS ROADS AND PARKING

### 4.1 Access to Site

.1 Provide and maintain access roads, ramps and construction runways as required for access to and on site. Conform to requirements of local governing authorities when required. Locate these traffic facilities where they are least disruptive to normal street traffic.

### 4.2 Public Traffic Flow

.1 Provide and maintain flagpersons, traffic signals, barricades and flares/lights/lanterns as required to perform the Work and protect the public. Make arrangements with local governing authorities when these facilities will disrupt the normal flow of public traffic.

### 4.3 Construction Parking

.1 Parking will be permitted on site provided it does not disrupt the performance of Work.

.2 Do not allow parking on if disruptive to public traffic flow or access to site.

## 5. TEMPORARY CONTROLS

### 5.1 Weather Enclosures

.1 Provide weather tight closures to unfinished door and window openings, and other openings in floors and roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

### 5.2 Dust Tight Screens

.1 Provide dust tight screens or partitions to localize dust generating activities, and for the protection of workers, finished areas of Work and the public.

.2 Maintain and relocate protection until such work is complete.

### 5.3 Project Cleanliness

.1 Maintain the Work in tidy condition, free from accumulation of waste products and debris, other than that caused by the Owner or other Contractors.

.2 Remove waste material and debris from the site and deposit in waste container at the end of each working day.

.3 Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

### 5.4 Snow Removal

.1 Remove snow and ice from access roads, parking areas, offices and storage areas.

.2 Remove snow and ice from building surfaces as necessary for construction.

## 6. OFFICES AND SHEDS

### 6.1 Offices

.1 Provide and maintain in clean condition during progress of Work, adequately lighted, heated and ventilated Contractor's office with space for filing and layout of Contract Documents and Contractor's normal site office staff. Provide within office space a table and chairs to accommodate progress meetings.

.2 Provide adequate required First Aid facilities.

.3 SubContractors may provide their own offices as necessary. Direct the location of these offices.

### 6.2 Equipment/Tool/Materials Storage

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause the least interference with work activities.

## 7. INSTALLATION/REMOVAL

.1 Provide construction facilities, temporary facilities, controls and signs in order to execute the Work expeditiously.

.2 Remove from site after use.

**END OF SECTION**

# 1. PRODUCTS

## 1.1 Quality of Products

.1 Provide new materials, equipment and articles incorporated in the Work, not damaged or defective and of the best quality (compatible with specifications) for the purpose intended. If requested furnish evidence as to type, source and quality of products provided.

.2 Defective materials, equipment and articles whenever found may be rejected regardless of previous inspection. Inspection by the Engineer or an inspector does not relieve the Contractor of his responsibility but is merely a precaution against oversight or error. Remove and replace defective materials at own expense and be responsible for all delays and expenses caused by rejection.

.3 Should any dispute arise as to the quality or fitness of materials, equipment or articles, the decision rests strictly with the Engineer based upon the requirements of the Contract Documents.

.4 Unless otherwise indicated in the specifications, maintain uniformity of manufacturer for any particular or like item throughout the building.

.5 Permanent labels, trademarks and nameplates on materials, equipment and articles are not acceptable in prominent locations except where required for operating instructions and when located in mechanical or electrical rooms.

## 1.2 Availability of Products

.1 Immediately upon signing the Contract, review Product requirements and anticipate foreseeable delivery delays in any items. If delays in deliveries of materials, equipment or articles are foreseeable, propose substitutions or other remedial action in ample time to prevent delay in performance of the Work.

.2 If such proposal is not given to the Engineer, the Engineer reserves the right to substitute more readily available Products later in order to prevent delays at no additional cost to the Owner.

.3 No substitution of any item will be permitted unless the item cannot be delivered to the job site in time to comply with the Schedule.

.4 To receive approval, proposed substitutes must equal or exceed the quality, finish and performance of those specified and/or shown, and must not exceed the space requirements allotted on the drawings.

.5 Provide documentary proof of equality, difference in price (if any) and delivery dates in the form of certified quotations from suppliers of both specified items and proposed substitutions.

**1.3 Storage, Handling and Protection of Products**

.1 Also see Section 01601 – Material and Equipment Salvage

.2 Handle and store products in a manner to prevent damage, contamination, deterioration and soiling and in accordance with manufacturer's recommendations when applicable.

.3 Store packaged or bundled products in original and undamaged condition with manufacturers' seals and labels intact. Do not remove packaging or bundling until required in the Work.

.4 Products subject to damage from weather are to be stored in weatherproof enclosures.

.5 Store cementitious materials clear of earth on concrete floors and away from walls.

.6 When used for grout or mortar materials, keep sand clean and dry. Store and on polyethylene and cover with waterproof tarpaulins during inclement weather.

.7 Store sheet metal and lumber on flat, solid supports and keep clear of ground.

.8 Store and mix paints in a room assigned for this purpose. Keep room under lock and key at all times. Remove oily rags and any other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

**1.4 Manufacturers' Directions**

.1 Unless otherwise specified, install or erect all products in accordance with manufacturers' recommendations. Do not rely on labels or enclosures provided with products. Obtain instructions directly from manufacturers.

.2 Notify the Engineer, in writing, of any conflicts between the specifications and manufacturers' instructions so that the Engineer may establish the course of action.

.3 Improper installation or erection of products due to failure in complying with these requirements authorizes the Engineer to require any removal and re-installation that may be considered necessary, at no increase in Contract Price.

**1.5 Transportation Costs of Products**

.1 Pay all costs for transportation of products required for the Work.

**2. WORKMANSHIP**

**2.1 General Requirements**

.1 Workmanship is to be of the best quality executed by workers fully experienced and skilled in their respective trades.

.2 At all times enforce discipline and good order among workers. Do not employ any unfit person or anyone unskilled in the duties assigned to him. The Engineer reserves the right to require the removal from site of workers deemed incompetent, careless, insubordinate or otherwise objectionable.

.3 Decisions as to the quality of or fitness of workmanship in cases of any dispute rests solely with the Engineer whose decision is final.

**2.2 Co-ordination**

.1 Co-ordinate the work of all Subcontractors.

.2 Ensure that all Subcontractors examine the drawings and specifications for other parts of the Work which may affect the performance of their work.

.3 Ensure that sleeves, openings and miscellaneous foundations are provided as required for the Work.

.4 Ensure that items to be built in are supplied when required with all necessary templates, measurements and shop drawings.

**2.3 Concealment**

.1 In finished areas conceal all pipes, ducts and wiring except where indicated otherwise on drawings or in specifications.

.2 Before installation inform the Engineer if there is a contradictory situation. Install as directed.

**2.4 Location of Fixtures**

.1 Consider the location of fixtures, outlets, and other mechanical and electrical items indicated on drawings as approximate. The actual location of these items is to be as required or directed to site conditions at the time of installation and as is reasonable.

.2 Before installation inform the Engineer if there is a contradictory situation. Install as directed.

**2.5 Cutting and Remedial Work**

.1 Perform all cutting and remedial work that may be required to make the several parts of the Work come together properly. Coordinate and schedule the Work to ensure that cutting and remedial work are kept to a minimum.

.2 Should the Owner or anyone employed by him be responsible for ill-timed work necessitating cutting and/or remedial work to be performed, the cost of such work will be valued as per the General Conditions.

.3 Employ specialists familiar with the materials affected in performing cutting and remedial work. Perform in a manner to neither damage nor endanger any portion of the work.

.4 Do not cut, drill or sleeve any load-bearing members without written approval of the Engineer.

**2.6 Fastenings**

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent material unless otherwise specified.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive, non-staining fasteners and anchors for securing exterior work unless otherwise specified.

.4 Space anchors within their load limit or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs are not acceptable.

.5 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

**2.7 Protection of Work in Progress**

.1 Adequately protect all work completed and in progress. Repair or replace all damaged work.

.2 Prevent overloading of any part of the Work.

**2.8 Cleaning**

.1 Remove waste materials and debris from the site at regular intervals. Do not burn waste materials and debris on site.

## 3. MEASUREMENT

**3.1 Metric Project**

.1 Unless otherwise noted, this Project has been designed and is to be constructed in the S.I. metric system of measurements.

.2 Where specified metric elements will not be available when required, submit with Tender proposals for alternative products in accordance with the "Alternatives/Equals" clause of the Instructions to Bidders.

.3 During construction, when specified metric elements are unattainable at the time they are required to meet the Construction Schedule, the contractor shall notify the Engineer in writing and suggest alternative substitutions. Costs due to these substitutions shall be borne by the Contractor.

**END OF SECTION**

# MATERIAL AND EQUIPMENT SALVAGE

## 1. GENERAL

### 1.1 Description

.1 This section covers the dismantling, removal and salvage of equipment and materials.

.2 Requirements specified in Division 1 are to be taken into account in planning the Work. These may include the sequencing scheduling requirements relative to process operation, keeping process systems operational and shutdown requirements.

### 1.2 Related Sections

.1 Section 01016 – Work Sequence and Tie-ins

.2 Section 01600 – Material and Equipment

.3 Section 01650 – Equipment Installation

## 2. PRODUCTS

.1 Not Required

## 3. EXECUTION

### 3.1 General

.1 Remove existing equipment, piping, valves and appurtenances and dispose or replace with new, in accordance with the drawings and as outlined hereunder.

### 3.2 Preparation

.1 Schedule all work in such a manner as not to remove items that are a necessary part of the operational function of the existing system before the replacement part of the system is operational.

.2 Before commencing the Work of this Section, verify with the Engineer all objects to be removed and all objects to be preserved.

### 3.3 Removal

.1 Remove all items designated, after all connections to these items are properly capped, plugged or disconnected.

.2 Refinish and make good all concrete surfaces, walls and floors after removal of affected equipment.

.3 Salvageable items are to be handed over to the Owner. All other components and debris are to be removed from the site.

**3.4 Protection**

.1 Use all means necessary to protect existing objects designated to remain and, in the event of damage, make all repairs and replacements necessary at no change in the Contract Price.

**3.5 Damaged Equipment**

.1 Existing equipment that is proved to be damaged and / or unsuitable due to others, shall be replaced. Replacement costs shall be on an as receipted basis, standard contract mark-up and negotiated installation cost if necessary.

.2 The Contractor will not be compensated for existing equipment that is damaged due to his actions and/or equipment that is not properly dismantled, removed, handled, stored and reinstalled.

## 4. EQUIPMENT TO BE REMOVED

**4.1 Equipment Salvaged For Re-Use**

.1 All materials and equipment designated for re-use within the plant shall be removed, protected and reinstalled.

.2 Equipment and materials as per the drawings and specification.

**4.2 Equipment Salvaged for Owner**

.1 All materials and equipment designated as being salvaged for the Owner's purposes (i.e. not to be re-used within the plant) shall be removed, protected and delivered to the Owner's designated location within the City of Iqaluit.

.2 Equipment to be salvaged for the Owner is as follows:

.1 All valves, actuators and associated equipment, not re-used in new plant design.

**4.3 Equipment Not Being Used**

.1 All remaining equipment (i.e all equipment not being re-used or salvaged for Owner) shall become the property and responsibility of the Contractor and shall be removed and disposed of.

.2 The Contractor is encouraged to seek compensation for any materials that are his responsibility and reflect monetary compensation in his tender price.

**END OF SECTION**

# EQUIPMENT INSTALLATION

## 1. INTENT

.1 This Section describes general requirements for all equipment supplied and / or reinstalled under the Contract relating to equipment delivery, equipment installation training, equipment installation, equipment performance testing and process performance testing.

.2 At least 30 days prior to commencing equipment performance testing and process performance testing, the Contractor shall submit a detailed start-up plan to indicate the schedule and sequence of equipment installation checks and tests required for the Engineer's review and input. No testing work can commence until this plan has been discussed by all parties involved and accepted by the Engineer.

## 2. DEFINITIONS

.1 Equipment supplier's Representative: An equipment supplier's Representative is a trained serviceman empowered by the equipment supplier to provide:

.1 Installation training

.2 Witnessing of equipment installation

.3 Assistance in equipment performance testing

.4 Assistance in process performance testing

.5 Assistance in guaranteed performance testing, where specified.

.2 Major Equipment: for the purposes of this section, major equipment shall include but is not limited to equipment supplied under the Equipment Supply Contracts, fermenters, DAF mechanisms, Salsnes filter, clarifier mechanisms and the belt filter press.

.3 Refer to technical specification for specific equipment.

## 3. EXPERTISE AND RESPONSIBILITY

.1 The Engineer recognizes the expertise of the Contractor.

.2 Should the Engineer issue an Addendum, Notice of Proposed Change, Field Order or Change Order to change the Work which would, in the opinion of the Contractor, compromise the success or safety of the Work, then it shall be incumbent on the Contractor to notify in writing the Engineer to this effect within two (2) days upon receipt.

## 4. EXISTING EQUIPMENT DELIVERY

.1 Upon award of contract, the Contractor shall review and inspect all equipment to be re-incorporated into the new plant. Written acceptance of receipt, by the Contractor shall constitute "Delivery to Site" under this Contract. A representative from each of the following groups will be in attendance at the time of delivery.

.1 The Contractor

.2 The Engineer

.2 When the Contractor is satisfied that the equipment has been delivered in its entirety without damage, they shall complete the **"Certificate of Equipment Delivery" (Form 100)** attached to this specification. The completed form shall be delivered to the Engineer. The Contractor is not responsible for defects that can only be discovered during systems demonstration.

.3 Removal, storage and protection of the equipment at the job site will be the responsibility of the Contractor.

.4 The Contractor shall arrange for heated and covered storage at the job site as required by the Supplier for sensitive items of equipment.

.5 The equipment may have to be stored on the site for an extended period of time before installation and equipment performance testing. The Contractor shall be responsible for removing any protective coatings prior to installation and equipment performance testing in accordance with the Supplier's written instructions.

## 5. INSTALLATION ASSISTANCE

.1 Before commencing installation of all major pieces of equipment, the Contractor shall arrange for the attendance of the Supplier's Representative to provide instructions to the Contractor in the methods, techniques, precautions, and any other information relevant to the successful installation of the equipment.

.2 For all major pieces of equipment including existing equipment, the Contractor shall inform the Engineer, in writing, that he has contacted the supplier representative and received all necessary instruction for the installation and operation of the equipment.

.3 Installation of the equipment shall not commence until the Engineer has advised that he has accepted the completed **Form 101 "Certificate of Equipment Installation"**.

.4 One copy of **Form 101** shall be used for each major piece of equipment.

## 6. INSTALLATION

.1 If necessary, or if so directed by the Engineer during the course of installation, the Contractor shall contact the supplier to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in an appropriate manner.

.2 If it is found necessary, or if so directed by the Engineer, the Contractor shall arrange for the Supplier's Representative of Contractor supplied equipment to visit the site to provide assistance to the Contractor during installation, all at no cost to the Owner of Contractor supplied equipment.

.3 Prior to completing installation, the Contractor shall inform the Supplier and arrange for the attendance at the site of the Supplier's Representative to verify successful installation.

.4 Any outstanding deficiencies shall be rectified by the Contractor and the Supplier's Representative will be required to re-inspect the installation, at no cost to the Owner.

.5 When the Supplier's Representative accepts the installation, he and the Contractor shall certify the installation by completing the **"Certificate of Satisfactory Equipment Installation" (Form 102)**, attached to this specification.

.6 Deliver the completed **Form 102** to the Engineer prior to departure of the Supplier's Representative from the site.

.7 Tag the equipment with a 100mm by 200mm card stating "Equipment Checked. Do Not Run." stenciled in large black letters. Sign and date each card.

.8 One copy of **Form 102** shall be used for each major piece of equipment.

## 7. OPERATION AND PERFORMANCE VERIFICATION

.1 Equipment will be subjected to a demonstration, running test, and performance tests after the installation has been verified and any identified deficiencies have been remedied.

.2 The Contractor shall inform the Engineer at least fourteen (14) days in advance of conducting the tests and arrange for the attendance of the Supplier's Representative. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Contractor and the Engineer.

.3 The Contractor shall contact the Supplier's Representative to conduct all necessary checks to the equipment and if necessary, advise the Contractor of any further work needed prior to confirming the equipment is ready to run.

.4 The Contractor shall then notify the Engineer of his readiness to demonstrate the operation of the equipment. The Engineer shall attend, as expeditiously as possible.

.5 The Contractor shall obtain the assistance of the Supplier's Representative to demonstrate that the Contractor supplied equipment is properly installed. Alignment, piping connections, electrical connections, sample product, etc. will be checked and if appropriate, code certifications provided.

.6 The equipment shall then be run for one (1) hour. Local controls shall be satisfactorily verified by cycling the equipment through several start-stop operations, modulating its output, or some combination. Operating parameters such as temperature, pressure, voltage, vibration, etc., will be checked to ensure that they are within the specified or Supplier's recommended limits, whichever is more stringent.

.7 On satisfactory completion of the one (1) hour demonstration, the equipment will be stopped and the Contractor shall recheck all critical parameters such as alignment.

.8 The equipment will be restarted and run continuously for three (3) days. During this period, as practicable, conditions will be simulated which represent maximum or most severe, average, and minimum or least severe conditions. These conditions will be mutually agreed by the Supplier, the Contractor and the Engineer on the basis of the information contained in the Contract Documents, as well as the methods utilized to create the simulated conditions and the time periods allotted to each.

.9 Performance tests will be conducted either concurrent with or subsequent to the running test, as practicable and agreed between the Engineer, the Supplier and the Contractor.

.10 Performance tests shall be as dictated in the technical specifications for each item of equipment or as reasonably required by the Engineer to prove adherence to the requirements listed in the specifications.

.11 The Contractor shall submit the results of the performance tests to the Engineer, documented and summarized in a format acceptable to the Engineer. The Engineer reserves the right to request additional testing. No equipment shall be accepted and handed over to the Owner prior to the satisfactory completion of the Equipment Performance Test(s) and acceptance of the test reports by the Engineer.

.12 All water, chemicals, temporary power, heating, or any other ancillary services required to complete the initial demonstration, running test and performance tests are the responsibility of the Contractor.

.13 Provide the initial charges of oil, grease, and all materials necessary for the initial demonstration, running test and performance tests not provided under the Supply contracts and this contract, all to the satisfaction of the equipment manufacturer.

.14 Should the initial demonstration, running test or performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, running tests, and / or performance tests shall be repeated to the satisfaction of the Engineer. Additional costs incurred by the Contractor, the Engineer, or the Owner, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor.

.15 On successful completion of the demonstration, running test, and performance tests, the **"Certificate of Satisfactory Equipment Performance" (Form 103)** attached to this specification will be signed by the Supplier's Representative, the Contractor, the Engineer and the Owner.

.16 Process performance testing can commence as soon as the **"Certificate of Satisfactory Equipment Performance" (Form 103)** is completed and the relevant portion of the Distributed Control System has been installed and Commissioned.

.17 One copy of **Form 103** shall be used for each major piece of equipment.

## CERTIFICATE OF EQUIPMENT DELIVERY
## FORM 100

We certify that the equipment listed below has been delivered into the care of the Contractor. The equipment has been found to be in satisfactory condition. No defects in the equipment were found.

**PROJECT:** _____

**ITEM OF EQUIPMENT:** _____

_____

**TAG NO:** _____

**REFERENCE SPECIFICATION:** _____

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Engineer) Date