Pikka Development Project

Export Packing, Preservation, and Handling Plan

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1 Introduction

1.1 Purpose

This document presents the minimum requirements for the Pikka Development preservation scope to be employed for all applicable Project stages.

1.2 Scope

This plan gives the essential requirements for minimum preparation, preservation, and packing of equipment, materials, and supplies to ensure delivery in satisfactory condition, regardless of destination. Unless otherwise approved by Company, all shipments shall comply with these requirements and instructions.

- This plan is applicable to prime suppliers and all sub-suppliers.
- This plan is applicable for all stopover locations (module fabrication yards and site locations).
- In case of conflict, information and specifications stated in the inquiry, material requisition, or purchase order in that ascending order shall take precedence over the requirements set forth herein.

2 Abbreviations

The following abbreviations are used in this document:

Abbreviation	Detail
HAZMAT	Hazardous Material
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IPPC	International Plant Protection Convention
ISO	International Organization for Standardization
ISPM	International Standards for Phytosanitary Measures
KTC	Kuparuk Transportation Company
NDB	Nanushuk Drillsite B
NOP	Nanushuk Operations Pad

Abbreviation	Detail
NPF	Nanushuk Processing Facility
OSA	Oil Search Alaska
OSHA	Occupational Safety and Health Administration
PO	Purchase Order
SDS	Safety Data Sheet
SOC	Shipper's Own Container
STP	Seawater Treatment Plant
TCN	Traffic Control Number
TIP	Tie-in Pad
VPCI	Vapor-phase corrosion inhibitor

3 General

3.1 General / Arctic Conditions

Procedures used for the preservation and protection of equipment and materials during shipping and on-site storage, both interim and long-term, shall be in accordance with requirements of this specification, unless superseded by more stringent Supplier procedures or local laws and regulations.

1. The Fabrication Contractor, which in this document will be referred to as the Contractor, shall be responsible for preservation and protection of all equipment and material during shipping, storage, and construction. Equipment and material shall not be accepted until the required preservation documentation has been completed and verified by the Contractor.
2. Preservation shall be provided to prevent the corrosion and deterioration of equipment and material from the effects of environmental conditions during shipping, storage, and construction. Both internals and externally exposed materials shall be protected.
3. For package units, preservation activities shall be performed at Supplier's shop prior to shipment.
4. The requirements for export packaging are herein specified in order that the materials and equipment to be shipped will endure the rigors of overseas transport, including but not necessarily limited to the following conditions:
    a. Handling, stacking, and transport to the plant laydown yard or construction site.
    b. Outdoor storage for a period of up to twelve months at the marshalling yard or job site. Equipment shall be protected to safeguard against all environmental conditions including humidity, moisture, rain, dust, dirt, sand, snow, mud, salt air, salt spray, seawater, tropical, and arctic conditions.

c. Outdoor weather exposure from the time equipment is uncrated and set on its foundation until plant start-up, which may be as much as one year later.

5. For tropical and arctic conditions, extra waterproofing and desiccants may be added. Waterproof plastic shall be placed not only between the top of the box and the frame but over the cargo as well.

6. Preservation shall be performed per the manufacturer's specification for tropical and arctic conditions.

3.2 Preservation Guidelines

Equipment shall be protected against the effects of climatic conditions such as rain, snow, freezing, high humidity, fresh and saltwater splashing, salt air, sunlight, and mildew. Admission of construction debris (e.g. flushing water, shot blast, etc.) as well as rough handling, jolting, or impact shall be avoided.

1. Equipment to be preserved and protected shall include, but not be limited to, the following items:
   a. Machinery internals, bearings, seals, machined surfaces
   b. Electric motors, switchgear, transformers, cabinets, contractors, junction and splice boxes, batteries
   c. Instruments and associated cabinets, panels, terminal boxes
   d. Valve internals, stems, glands, bodies
   e. Flange faces, metallic gaskets, bolting, pipe threads, pipe support threaded adjusters
   f. Vessel and exchanger internals
   g. Control panels
   h. Chemicals, catalysts, lubricants, etc.
   i. Fire and gas detection
   j. Climate control items
   k. External surfaces subject to corrosion
   l. Gaskets and materials
   m. Firefighting equipment
   n. Lifesaving equipment
   o. Pollution and environmental materials and equipment
   p. Material Required for Operations
   q. All exposed machinery surfaces

2. Supplier or equipment manufacturer shall specify the type and location for recommended preservatives.
3. Supplier or equipment manufacturer shall approve the use of alternate preservatives prior to application.
4. All items that have been internally preserved shall be tagged or marked by Supplier. Tagging shall indicate the type of preservative used (for example, silica gel bags, oil filled, etc.).
5. Tagging or marking shall be affixed to remain in place and be clearly visible throughout the storage and construction period. Tags shall be embossed in stainless steel or engraved plastic and attached to the item using stainless steel straps. Wire, string, paper, or cardboard are not acceptable.
6. Items or equipment susceptible to damage from extreme moisture and vapor shall be packaged in a vapor-proof barrier pack with silica gel or a comparable desiccant type packaging method generally used in the industry. Silica gel, when used as desiccant, shall be of the indicating type (blue-active) and packaged to allow viewing of the material. The approximate volume to be used shall be 2 kg/m^3 (0.12 lb/ft^3). Evacuation of air voids shall be accomplished and followed by heat sealing. Silica-based desiccant should not be allowed to come in direct contact with the packaged item. Bentonite-based desiccants should be used in situations when contact with the item packed is unavoidable.
7. The Contractor shall assure that preservation procedures are initiated immediately as equipment is placed in storage. A visual inspection shall be made and any deficiencies corrected. As preservation procedures are followed for internal components, any irregularities shall be corrected.

   Possible storage locations and responsible inspector:

   a. Supplier storage: First 30 days - Supplier's Inspector
   b. Freight forwarder / logistics providers in transit storage: Freight forwarder / logistics inspector
   c. Fabricator storage: Contractor's assigned preservation inspector
   d. Module land transportation: Freight forwarder / logistics inspector
   e. Project site storage: Contractor's assigned preservation inspector
8. Temporary supports, braces, rotation blocks, etc. required for protection shall be removed by the Contractor when equipment is unboxed to allow the implementation of the preservation procedures (for example, rotation of pumps and motors). If equipment preservation materials are removed during the receiving process, they shall be reinstalled before storage. Some method of tagging / documentation is needed to ensure that the bracing is re-installed prior to additional transport, if required.
9. The Contractor shall assure that all equipment is stored on a level, stabilized surface and blocked, if required, in an area free of water within easy access to each piece of equipment.

10. Preservative oils and greases shall be compatible with process fluids and service lubricants to minimize the need for removal and pre-commissioning cleanup. Preservatives detrimental or incompatible with the process shall not be used. Preservative oils, greases, inhibitors, etc. shall meet project criteria.
11. All unprotected piping material and structural steel shall be abrasive blasted and primed as specified in project specifications.
12. When temporary heaters are specified, the equipment manufacturer shall be consulted on sizing and type.
13. All heaters provided for equipment preservation (motor anti-condensation heaters, electrical and instrument panel and cabinet heaters) shall be promptly energized by the Contractor.
14. Nitrogen blankets, where specified, shall be maintained at a positive pressure per equipment manufacturer recommendations. Nitrogen bottles, related controls, and gauges shall be provided specifically for this purpose by Supplier.
15. All mechanical equipment with parts that move shall have such parts blocked for transit prior to shipment by Supplier.
16. Individual parts, panels, etc. shall be enveloped with polyethylene sheets and sealed or shrink-wrapped by Supplier, where practical.
17. Rotating equipment suppliers / packagers will be responsible for securing and blocking rotating elements and components as part of the rotating equipment specifications and purchase orders (POs).

3.3 Closure and Dust Covers

1. Flanged nozzles on vessels and equipment shall be sealed using a 6 mm (¼ in) minimum gasketed steel blind attached with a minimum of four full-size studs. They shall be maintained in place until piping installation. When blinds are removed to make up flanges, dust covers shall be installed.
2. Dust covers, when specified to replace metal blinds during construction, shall be made from metal and be constructed with an integral tab protruding between two bolt holes and beyond the outer circumference of the flange. The total thickness of dust cover and gasket shall be 3 mm (1/8 in) maximum. Dust covers shall be painted orange.
3. Threaded openings in equipment shall be closed with threaded steel pipe plugs or caps (if applicable). Plastic plugs are acceptable for closing electrical connections.
4. Plastic flange caps shall have integrally cast lugs.
5. All plastic or metal closures shall be a distinctive color (red, yellow, orange, or blue).

*The Contractor shall ensure that the right rust preventive is chosen for the required application and that the material is applied as per manufacturer's guidelines.

3.4 Documentation

Supplier shall submit all required preservation documentation for the Contractor Discipline Engineering Lead approval at least four (4) weeks prior to equipment shipment or in accordance with the requisition.

The Contractor's Preservation Coordinator shall prepare a plan for the preservation and protection of all equipment, electrical and instrument items, piping, bulks, commodities, spare parts, etc. Supplier shall confirm that the preservation procedures are adequate. The Contractor shall ensure that where more than one Supplier is selected for a particular category of equipment (e.g. centrifugal pumps), the preservation procedures adopted for this category of equipment are consistent for all Suppliers.

1. The Contractor shall prepare an equipment and material preservation specification to cover equipment and material from the time it leaves Supplier's shop through mechanical completion and commissioning.
2. Requirements for the receiving, storage, inspection and preservation of all equipment and material shall be included with specific instructions on the materials and products to be used. The specification, in turn, shall be included in all installation contracts.
3. The Contractor shall prepare a preservation schedule for equipment and materials using the requirements of this Specification.
4. The schedule shall be used for monitoring and carrying out preservation during storage and construction. The schedule shall be used as a working document by the fabrication and installation contractors to direct and record the preservation actions taken. It shall be available for inspection at any time.
5. The Contractor shall assign personnel to be responsible for scheduled activities and follow-up throughout the job. An organization chart showing specific individuals and responsibilities shall be developed before the work begins.

3.5 Equipment Journey Plan

Equipment preservation and transportation will be divided into two stages:

- In the first stage, equipment will be sent to a construction yard, where module construction and assembly will be performed. For this stage, Supplier shall develop transportation and preservation procedures tailored to fabrication yard conditions. Mechanical completion will be performed at construction yard and modules will be prepared for sail-away to final destination (North Slope).

- For the second stage (North Slope), Supplier shall include readiness procedures and recommendations for equipment seal-away and preservation at destination.

4 Preservation Requirements for Shipping and Storage

Preservation is the protection of materials and/or equipment to prevent rusting, discoloration, corrosion, deterioration, and physical or atmospheric damage before the material and/or equipment is put to its intended or manufactured use.

Preservation for equipment and materials for the Project are to be applied at the seller's facility prior to shipment to the project export packer.

Inspection will be made of all cargo. In the event it is observed that Supplier has not performed the required preservation, the packer will notify Contractor and the preservation will be applied per the manufacturer's specification.

4.1 Instruments

1. Individual instruments shall be preserved by either enclosing the instrument with silica gel bags in a sealed heavy-duty vapor barrier bag or by inserting a silica gel bag within the instrument housing, replacing the housing cover, and sealing the joint with heavy-duty tape.
2. All openings in instrument and electrical equipment shall be plugged or capped. This includes all unused cable entries, process line connections, and pneumatic tubing connections. Plastic plugs are acceptable.
3. All instrument panels, cabinets, or boxes containing electronic components, relays, etc. shall be sealed with heavy-duty vapor barrier after the installation of silica gel bags. The instrument panel front shall be covered with 101.6 mm (4-in) thick foam rubber and a 6 mm (¼-in) thick plywood sheet, attached by straps.
4. Orifice plates shall be sandwiched between suitable materials to prevent physical damage.
5. The gauge glasses on skid or equipment-mounted instruments shall be adequately protected or removed.
6. Instrumentation devices having moving parts under normal operation that would be subject to damage during shipping shall be securely blocked to prevent movement. All items shall be labeled or marked as such.
7. Instrumentation shall be packed with shock-absorbing material.
8. All types of relief valves shall be shipped and stored with the stem in the upright position on pallets so as to avoid damage to the spring, stem, and seats.

4.2 Valves

Valves shall be preserved and protected in accordance with applicable specifications and manufacturer's recommendations. As a minimum, valves shall be preserved and or protected during shipping as follows:

1. Carbon steel or ferritic valves shall be protected internally project criteria.
2. Flanged ends of all valves shall be sealed with plastic caps.
3. Threaded ends of all valves shall be sealed with steel threaded plugs and welded ends with plastic caps.
4. External machined surfaces on valve stems shall be protected by wrapping in preservative-impregnated cloth tape.
5. Non-actuated ball and plug valves shall be shipped in the fully open position. All non-actuated valves of other types (gate, globe, butterfly, etc.) shall be shipped in the closed position.
6. All actuated valves shall be maintained in the de-energized position.
7. Valve actuators shall be internally coated with suitable preservative for protection from condensing moisture.

4.3 Electrical

1. Large electrical equipment such as control panels, switchgear, and motor control centers that have general purpose enclosures suitable only for indoor installation shall be stored in a controlled environment and sealed in heavy weight vapor barrier material. Prior to sealing, silica gel bags shall be placed in the equipment. The number of bags should be noted.
2. Electrical equipment having anti-condensation space heaters shall be provided with electrical connectors accessible from outside of the shipping container. The connectors shall be identified with wattage, voltage, and phase of the heaters. This provision may not be utilized while equipment is being shipped in barge and power may not be available.
3. Unused cable and conduit entries in enclosures and boxes shall be plugged. Plugs shall provide the same degree of protection as that provided by the enclosure.
4. An approved lubricant shall be applied to the joints of explosion-proof enclosures for equipment and devices, and to the joints of explosion-proof boxes required for general wiring.
5. Electrical devices having moving parts that would be subject to damage under normal operation, such as relays and meters, shall be securely blocked to prevent movement.
6. Electronic displays and screen shall be covered to avoid damage.

7. Computers, video units, telecommunications equipment, and other electrical equipment shall be packaged in a vapor barrier pack with desiccant and stored in a controlled environment.
8. Both lead acid and gel type batteries shall be packed in suitable plywood containers or Supplier-recommended containers and labeled according to applicable regulatory requirements for transporting hazardous materials.
    a. Batteries shall be shipped from manufacturers' shop directly to the North Slope and installed in designated locations. Batteries shall not be shipped until charging facilities are available at the storage site.
    b. The manufacturer shall be consulted on battery shelf life, proper storage, and shipping conditions.

4.4 Piping

Care shall be taken when transporting pipe by road transportation, rail car, or water. Rail shipment shall be in accordance with API RP 5L1 and water shipment shall be in accordance with API RP 5LW.

1. All open-ended spooled pipe and tubing shall be sealed with plastic caps.
2. Flanged pipe shall have gasketed metal flange covers.
3. All prepared surfaces, such as butt weld bevels or threaded ends, shall be protected with plastic caps and preservative. At times, plywood covers may be used provided that polyethylene sheet material is inserted between the cover and pipe end to prevent absorption of internal lubricants and preservatives into the plywood.
4. Connectors such as Grayloc shall be protected internally with a suitable preservative. The hub end shall be capped with metal covers and the weld ends capped with plastic.
5. Threaded components, such as pipe threads or pipe support rods, shall be protected with threaded Cap ends.
6. Pickled carbon steel piping shall be held under a nitrogen blanket and maintained at a positive pressure with an indicating device to determine pressure.
7. For dry lay-up storage, coat outside of unpainted pipe stored outdoors with 3 to 4 mils (75 to 100 microns) Class IV VpCI Dry Coating. If multiple applications are needed to achieve the recommended film thickness, allow two (2) hours drying time between coats.

4.5 Pumps, Gearboxes

1. Pumps shall have all internal surfaces protected with a suitable preservative.
2. All unpainted external surfaces shall be coated with the following:

a. Sliding surfaces

b. Static surfaces

c. Pump seals are expensive and easily damaged. Pump seal manufacturer instructions shall be followed for lay-up and preservation requirements.

d. Alternatively, pump shafts may be wrapped with preservative impregnated cloth tape.

e. All threaded openings shall be sealed with steel pipe plugs or caps.

3. Pump nozzles shall be covered with gasketed steel blinds, which shall be maintained in place until piping installation. When removed for piping installation, gasketed dust covers shall be inserted at all nozzles.

4. If the coupling has been dismantled, coat parts with preservative, wrap in grease-proof paper and place in a cloth bag attached securely to the unit.

5. For dry lay-up storage, apply preservation per manufacturer instructions.

4.6 Vessels, Heat Exchangers

1. The internals of vessels and heat exchangers shall be drained and dried by circulating warm air, then internally coated with a Contractor-approved preservative. Where internal coating is not possible, e.g. heat exchangers, the use of a dry powder preservative is permitted.

2. All flanged nozzles shall be sealed using gasketed steel blinds. Steel pipe plugs or caps shall be used for all threaded connections.

3. External machined surfaces including plate cooler threaded rods shall be coated with preservative or wrapped with a preservative impregnated cloth tape.

4. For dry lay-up storage, apply preservation per manufacturer instructions.

4.7 Compressors

1. Crankcases for reciprocating compressors shall have internal surfaces coated with preservative, or as recommended by the manufacturer.

2. External unpainted surfaces shall be protected with preservative, or preservative-impregnated cloth tape.

3. Gas compressors shall be protected internally with a suitable preservative such as preservative, or as recommended by the manufacturer. A nitrogen blanket may be used consistent with the gas seals and compressor manufacturer's recommended lay-up protocols.

4. Compressor nozzles shall be blanked off using gasketed steel blinds or plastic flange caps with integrally cast lugs, which shall remain in place until piping is assembled. Dust covers shall be installed when blinds are removed.
5. For dry lay-up storage, apply preservation per manufacturer instructions.

4.8 Power Turbines, Gas Generators, Diesel Engines

For this specialized equipment, the equipment manufacturer's recommended preservation procedures shall be followed.

4.9 Pipe and Tubular Goods

For the handling, storage, and shipping of Oil Country Tubular Goods, the requirements of manufacturer shall be the guide used for preservation.

4.10 Cranes, Hoists, Skid-Mounted Equipment

1. Components of cranes, hoists, skid-mounted equipment items, etc. shall be protected.
2. Wire rope shall be coated with preservative.

4.11 Buildings and Furnishings

1. Building openings and accesses shall be protected for shipping with coverings approved by Purchaser.
2. Contents of living quarters and other equipment intended for indoor use shall be stored in a controlled environment by the Contractor.

4.12 Environmental and Safety Equipment

For this specialized equipment, the Manufacturer's recommended preservation procedures shall be followed.

4.13 Removal of Preservation

Preservation shall be maintained through mechanical completion and removed only prior to installation and commissioning for service.

1. Should it be necessary to remove any preservative to allow the testing or inspection of an item, preservatives shall be re-applied upon completion.
2. Provision shall be made for the proper disposal of oils, greases, solvents, protective coverings, etc. to prevent pollution and other hazards.

4.14 Spare Parts and Tools

Spare parts and tools must be packed separately showing the reference of the main equipment.

Unless otherwise agreed, spare parts must be shipped at the same time as the main equipment. Pictures to be taken of spares in crate prior to closing crate and all spares requiring lubricate to be properly coating for long term storage.

Spare parts shall be marked in a clearly visible place according with the following types:

"START UP, PRE-COMMISSIONING AND COMMISSIONING SPARE PARTS"

"OPERATIONAL SPARE PARTS"

"CAPITAL SPARE PARTS"

All spare parts will have labels with the identification number corresponding to the explosion drawing, the number of the explosion drawing, and the PO.

In case the whole supply of an order is packed in one single box, Supplier shall be allowed to include the spare parts in separate box or boxes inside the main box, clearly marked as per above mentioned instructions.

Tools shall be treated the same, showing the reference of the main equipment. Tools shall be marked in a clearly visible place with the following label: "TOOLS".

Section II: Preservation Requirements During Shipping

5 General Packaging / Packing Requirements

5.1 Material and Workmanship

Packaging materials selected shall be of generally accepted industry brands, grades, and types which shall conform to standards generally used in the industry. Workmanship shall be in accordance with best commercial practices.

5.2 Consolidation

Box pallets, bundles, or skids shall contain equipment for only one (1) Buyer PO. Whenever practical, quantities of identical items supplied under the same PO and destined for use on the same Project Number and destination shall be packed in one exterior shipping container as specified herein.

Consolidation of like PO items, nesting, stacking, and minor disassembly shall be accomplished to reduce volume to the least possible cubic displacement of each shipping container, pallet, bundle, or skid.

5.3 Moisture Damage

Materials that are subject to being damaged by moisture shall be shrouded inside the export box using 0.10 mm (4 mil) polyethylene, being careful not to completely seal, so as to avoid condensation or entrapment of water inside the shroud. Waterproof case liners shall be used to protect material tops.

Because many waterproof barriers contain asphalt, an additional paper liner may be necessary to prevent the asphalt material from bleeding into the materials to be shipped.

All equipment to be shipped with enclosed dehydrating materials shall be conspicuously marked with a large red warning tag reading:

"CAUTION: DESICCANT MATERIALS ARE ENCLOSED IN THIS EQUIPMENT. DO NOT OPERATE BEFORE REMOVING. SHOULD THE INTEGRITY OF THE ENCLOSURE BE BROKEN BEFORE OPERATION, THE DESICCANT MUST BE REPLACED AND THE ENCLOSURE RESEALED FOR CONTINUED STORAGE."

5.4 Fragile Items

Fragile articles shall be packaged in a manner to assure no damage of critical surfaces or damage of the critical characteristics of the article. Cushioning, bracing, blocking, or other methods of protecting each item will be utilized. The materials used in preservation, packaging, and packing must not be of chemical or physical properties, which may harm the object.

5.5 Rigging

All lifting gear will have current certifications on file at the handling location.

5.6 Cushioning

Cushioning is the protection of objects or items to eliminate damage by item to item contact, shock, or related load forces. Such items shall be protected by the application of cushioning between surfaces, banding, braces, and contact surfaces, or other generally used practices of holding object in position.

5.7 Dunnage

Water-resistant dunnage shall be applied where voids exist and are required in any area of a container left unsupported. Appropriate materials to prevent damage or movement during shipment shall be used.

5.8 Quantity Per Export Box

Consolidation of like items, physical characteristics, weight, size limitations, pallet load limits, box load capabilities, and other restrictions and considerations shall dictate shipping container content quantities.

5.9 Wood Container Dimensions

Dimensions of wood shall be considered nominal - either metric or imperial.

The shipping box base shall be so constructed that it provides a substantial skid type base. Either lumber or exterior grade plywood may be used for exterior material. Structural members of the base and exterior materials shall be selected from Table 1.

There shall be no more than 48 inches between skid members. The ends of the skid members will be cut at a 45° angle at the bottom to permit the entry of lifting slings.

Table 1: Wood Container Dimensions

Net Load (Pounds)	Minimum Skid Size (Nominal Inches)	Floor (Nominal Inches)	Top and Sides (Nominal Inches)
Up to 1,000	4 x 4	1 x 6	1/2
1,001 to 6,000	4 x 4	1 x 12	1/2
6,001 to 15,000	4 x 6	2 x 10	1/2
15,001 to 25,000	6 x 6	2 x 10	1/2
25,001 to 35,000	6 x 8	2 x 12	1/2
35,001 to 50,000	8 x 8	2 x 12	1/2
Above 50,000	8 x 8	2 x 12	1/2

5.9.1 Floor

A header made of the same size lumber as that used on the skid runners will be used at both ends of the skid base. It may not, under any circumstances, be less than 4-in x 4-in lumber. When load-bearing members are required due to the unequal weight distribution or size of the equipment, they will be at least the same size lumber as used in the skid runners. All headers and load-bearing members are to be bolted through the skid runners with at least two ½-in carriage bolts per skid runner.

5.9.2 Top, sides, ends

1. The top, sides, and ends shall have 2-in x 4-in members running horizontally and vertically to form the frames for the exterior panels.
2. Side and end panels will have a minimum of one full diagonal member made of at least 2-in x 4-in lumber. Where the side panels are of a height or length requiring full X- or K-type brace construction, they will be constructed with a minimum of 2-in x 4-in lumber.
3. Maximum spacing of the roof joists will be 24-in on centers.
4. All nailing into frame members will be done in a staggered pattern. Only cement coated or chemically etched nails will be used.
5. Boxes with a gross weight of 200 lb or over will be provided with rub strips of sufficient size to protect the exterior panels of the box from damage due to handling or transport.
6. Reinforced waterproof paper shall be installed on all container interior surfaces using waterproof glue.

6 Construction of Crates, Skids, and Boxes

6.1 Weight Limitations

The net content weight of crates, skid, or box should not be more than 2,500 kg (5,511 lb), unless the physical weight of a single piece will not allow.

6.2 Dimensional Limitations

1. The exterior dimensions of any crate, skid, or box shall not be greater than the following overall dimensions, unless the physical dimensions of a piece will not allow:
   a. Length 12.19 m (40 ft)
   b. Width 2.44 m (8 ft)
   c. Height 2.62 m (8.5 ft)

2. Crates, skids, or boxes exceeding the above dimensions will require special design and prior written approval by Contractor.

6.3 Clearance

A clearance of not less than 25 mm (1-in) shall be allowed between the items packed and the closest member of the sides, ends, and top of the crates, and boxes. Fragile items shall be protected for shock mounted items. Protruding parts at the top may be allowed to extend between joists and spacing of joists may be adjusted slightly to accommodate projections.

7 Wood Materials

7.1 Lumber Materials

Lumber used shall be new, sound, and well-seasoned, and free from loose knots and decay. Moisture content shall be neither more than 20% nor less than 10% when tested in accordance with commercial standards, and of a standard grade of No. 4 pine or better. Knots in excess of 1/3 the width of the board are not permitted. Knots and knot clusters located so as to weaken boards or so located as to interfere with nailing or result in structural weaknesses will not be allowed.

International Standards **f**or Phytosanitary Measures (ISPM) 15 rules and guidelines apply for all international ocean freight shipments to and from U.S. ports. ISPM 15 requires that all international ocean freight shipment using any species of raw wood packaging must be fumigated or heat treated to kill insects or fungus and stamped with the approved stamp, before international ocean freight is allowed entry or crossing through a participating country.

7.2 Plywood

Minimum 13 mm (½-in) thickness exterior grade CDX plywood will be used as determined by type of load, weight of contents, and estimated worse condition to which the material will be subjected. Blocking and bracing should be of at least 38 mm x 89 mm (2-in x 4-in nominal) lumber or greater, depending on the weight and nature of items or objects being packed.

7.3 Screws, Nails, Staples

1. Galvanized screws must be used to attach all crate tops and sides to the export box's frame members to allow disassembly and inspection without damaging the crates.
2. Nails and staples must not be used to attach plywood or boards to the export box's frame.
    a. For crates up to 10,000 lb
        - To attach plywood to 2-in frame lumber– 1-½ inch screws

- To attach frame to frame lumber – 3-in screws.

b. For crates heavier than 10,000 lb
   - To attach plywood to the frame lumber 1-½ inch screws
   - To attach frame to frame lumber 3-½ inch screws.

3. The following special marking must be used for all crates:

   "Screws have been used to assemble export boxes; remove screws to disassemble and reassemble."

7.4 Bases (Skid Type)

Skid-type bases shall consist of longitudinal skids and rubbing strips, headers, load-bearing floorboards, and/or flooring. Bases shall be designed to support the weight of the crated article only when the sides and ends are fastened in place.

7.5 Skids

1. Skidding will be used, as applicable, to provide a foundation for heavy items that are not protected by other methods of packing. The base of the material or equipment being skidded shall be bolted through the skids (runners) to provide support and protection for multiple handling. If the object skidded is so constructed to support weight stacked atop the skidded unit and needs no protection to eliminate damage, then this object needs no further upper crating. If the object skidded can be damaged by freight stacked atop the unit or is irregular in shape which does not lend itself to stacking, then open crate framing should enclose the unit assuring vertical and horizontal timber are part of the open crate construction for support.
2. Skid members shall be joined by headers of the same dimension lumber and shall be floored by lumber not less than 38 mm (2-in nominal) in thickness and not less than 89 mm (4-in nominal) in width. Each header shall be bolted to each skid member. Headers of less than 125 mm (5-in) width require only one bolt, and those of 125 mm (5-in) width or more must have two bolts through each skid fastening.

7.6 Rubbing Strip for Skids

Rubbing strips shall be provided in 38 mm (2-in nominal) lumber of the same width as the skids and shall be attached to the skids with two staggered rows of 12-penny nails spaced 300 mm (12-in) apart in each row. The strips shall be beveled full-depth at an angle of 45° at sling and forklift-truck openings. Openings in the rubbing strips for forklift-truck access shall be a minimum of 300 mm (12-in) in length.

7.7 Upper and Lower Frame Members

Except where vertical supports are required, the upper and lower frame members for crates over 850 mm (34-in) shall be 38 mm (2-in nominal) thick.

7.8 Vertical Struts

Vertical struts shall be continuous from the lower frame member to the upper frame member.

7.9 Diagonals

Diagonals are not required for plywood sheathed crates.

7.10 Liners

No liners are required for plywood sheathed crates, unless specified by Contractor.

7.11 Sheathing

Plywood sheathing shall be 13 mm (½-in) thick and shall be applied so that the face grain is vertical. Face grain may be horizontal for crates of 1.22 m (4 ft) or less in height. Vertical joints in plywood sheathing shall be made over the center of a strut. All horizontal joints shall be made over the center of a horizontal brace.

7.12 Fabrication Nailing

Nailing or stapling plywood sheathing to frame members shall be spaced not more than 76 mm (3-in) with two rows on 89 mm (4-in nominal) lumber, and three rows on lumber wider than 89 mm (4-in nominal).

8 Bundling

Before bundling, materials must be segregated into common lengths and sizes. The practice of bundling shall be limited to such items as structural steel, pipe, steel bars, tubing, etc. When applicable, any bundled load should be limited to 1,590 kg (3,500 lb). Spacing between bands shall not be more than 1.5 m (60-in). Steel banding of 32 mm x 1 mm (1¼-in x 0.039-in) or 50 mm x 1.25 mm (2-in x 0.049-in) is required on all bundled steel pipe.

9 Palletizing

Items that could be palletized include steel drums, heavy-duty fiberboard drums, bagged material, etc. The steel drums, as well as the fiber board drums, will be secured to a hardwood wing-type pallet and a wood cap inverted on top, secured by banding with heavy-duty 32 mm (1¼-in) bands. Bagged materials will be palletized.

9.1 Pallet Design

1. The preferred pallet is a 120 x 120 cm (48 x 48 inches) two-way entry, double-deck, non-reversible type.
2. If the material's dimensions are such that it cannot be securely loaded onto the preferred size of pallet, the pallet dimensions may be increased. However, in order to avoid unnecessary cube / freight charges, the pallet size must be adjusted nearest to the load dimensions, to a maximum of 140 x 160 cm (55 x 63 inches).

9.2 Pallet Construction

1. Lumber must be new, sound, and well-seasoned, with a moisture content between 12% and 20%. Knots must be sound, and not in excess of one-third of the width of the board, nor causing any nailing interference. Where possible, nails must be driven into side grain of lumber.
2. Fasteners to be twisted or spirally grooved nails, of adequate size and quantity.

9.3 General Load Configuration

1. No overhang is allowable.
2. Total pack height must not exceed 110 cm (42-in).
3. Total weight must not exceed 1,375 kg (3,000 lb).

10 Lagging

Lagging will be cut to fit the outside width of reels and will be nailed to the external edge of the flange of the reels in a manner to enclose the circumference of the reel with 38 mm (2-in nominal) lumber pieces, with two (2) each 32 mm x 1 mm (1¼-in x 0.035-in) or equal steel strapping bands applied over the lagging. If the reels are constructed of steel, the 38 mm (2-in nominal) lumber pieces shall fit against the face of the contents of the reel, and banding applied as noted above. The banding should be stapled to the lumber at intervals to assure stability and permanence of banding.

11 Banding (Reinforcing Straps)

11.1 General Requirements

All boxes will be securely strapped with a minimum of four flat steel straps, as shown in Figure 1. Strapping shall be installed around the sides and the ends and must be spaced 24-in on center. Machinery that is securely bolted to the skid base members does not require the use of steel strapping.

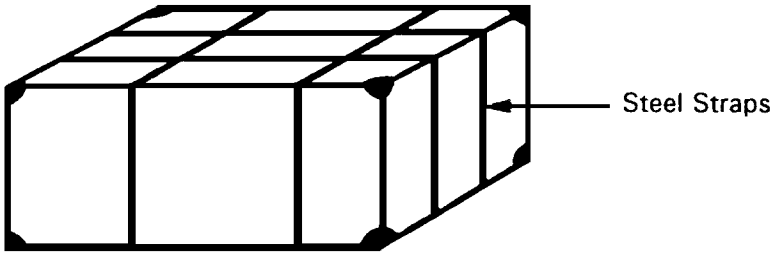

Figure 1: Banding with Reinforced (Steel) Straps

1. Banding shall be applied perpendicular to the edges of the surface over which they pass. They shall be straight and drawn tight, so as to sink into the wood at the edges. Only flat steel (hardened) industry brands and grades will be used.
2. The crate shall be strapped with 25 mm x 0.6 mm (1-in x 0.025-in) bands for net contents weighing under 4,545 kg (10,000 lb), 32 mm x 0.8 mm (1¼-in x 0.031-in) bands for net contents weighing over 4,545 kg (10,000 lb) and under 9,090 kg (20,000 lb), and 50 mm x 1 mm (2-in x 0.042-in) for net contents weighing over 9,090 kg (20,000 lb).

11.2 Structural Steel, Fabricated Piping

1. Structural steel, fabricated piping, and other material exceeding the length of standard pallets shall be strapped together and fastened to skids for handling by truck forklifts. All straps shall be adequately tensioned, fastened, and softened at strap break over points. Support dunnage shall be strapped to the bundle at each strap.
2. The dunnage 4-in x 6-in lumber is to be placed to provide 6-in forklift clearance.

12 Ocean Shipping Containers

12.1 Container Quality

For cargo integrity and safety purposes, only operational steel shipping containers shall be accepted for the loading of Project materials. The containers shall be inspected both inside and out before loading. The container's interior floor and roof shall be checked for evidence of leaks and cleanliness. The doors and locking handles shall operate freely, and the doors' waterproof gaskets shall be complete and functional.

12.2 Loading

1. The loading of a shipping container must be planned before loading commences. Packages of uniform size and strength shall be selected to maximize the loading space and limit excessive blocking and bracing requirements.
2. Cargo shall be loaded into shipping containers to the maximum cube available within the container.

3. The planned container load of cargo shall not exceed the container's rated weight capacity. The relevant limitations on highway or road axle weight in the country of loading and/or transit shall not be exceeded.

12.3 Securing

1. It is essential that the cargo stowed in the container is prevented from shifting and movement during transit by any reasonable cause and therefore, all cargo shall be blocked and braced tightly against adjacent goods and/or surfaces.
2. Cargo weight shall be distributed evenly over the floor of the container.
3. Plywood "slip sheets" shall be used between layers of stacked cargo to prevent damage and to distribute the weight of the over-stowed cargo.
4. Heavy cargo items shall be loaded on the bottom layers of cargo, with the lighter items placed on top. The center of gravity shall be below the half-height of the load.
5. Blocking and bracing the cargo at the container entrance shall be used to prevent cargo from tumbling when the container is opened.

13 Marking and Identification

13.1 Marking General

1. Only those shipping instructions / marks required by the Project packing, marking, and consignment instructions, plus any cautionary markings or special handling symbols, shall appear. Under no circumstance shall Supplier's advertising, symbols indicating contents, or other extraneous information appear.
2. Markings shall be stenciled on each container, pallet, and unit of shipment with black waterproof paint and on two (2) opposing sides of the container at angles to the skid. When the surface to be marked is dark, a coat of flat, zinc white paint shall be applied and allowed to fully dry before applying the markings. On bundles, the markings are to be embossed on a metal, plywood or similar surface, and securely strapped to the bundle. All marking shall be stenciled in black waterproof ink, with not less than ½-in (13 mm) to 1-in (25 mm) high lettering on two opposite sides of the packaged item(s).
3. Prior to shipment, Buyer will transmit the Authorization to Ship to Seller. The Authorization to Ship will contain the Traffic Control Number (TCN), which must be used for marking all boxes / packages / bundles in the shipment.
4. The following are the minimum markings required:

   Project Name BOX ___ OF _____

P.O. #: TCN #
DESTINATION:
Dims L X W X H in inches
GROSS WT: LB
NET WT: LB
Total Cubic Feet

Note: As applicable, the marking shall require additional markings of gross, net, size, and volume of containers identified in units of inches for length, pounds for weight, and cubic feet for volume. Sequential numbering of boxes, bundles, and/or units shall be shown as 1 of___, 2 of___, 3 of___, etc. In cases where a container, bundle, or other packaged item does not lend itself to marking, a plywood board shall be securely affixed to the item for identification purposes.

13.2 Marks and Symbols

1. Various material handling messages such as "Center of Gravity, "Sling Here," "Use No Hooks," and cautionary marks, arrows, "This Side Up," "Handle With Care," and "Fragile" shall be required as applicable to specific loads or containers. When applied, these markings should be not less than 1-inch (25-mm) high stencil and applied in the best position to assure safe handling, slinging, or general movement.
2. Cautionary stencils should be in the languages of both the Origin and Destination countries.
3. The seven international symbols depicted in Figure 2 have been accepted by the International Organization for Standardization (ISO). The three U.S. Standards symbols depicted at the bottom of Figure 2 are additional markings which have been accepted by the American National Standards Institute, but are not yet included as an international standard.

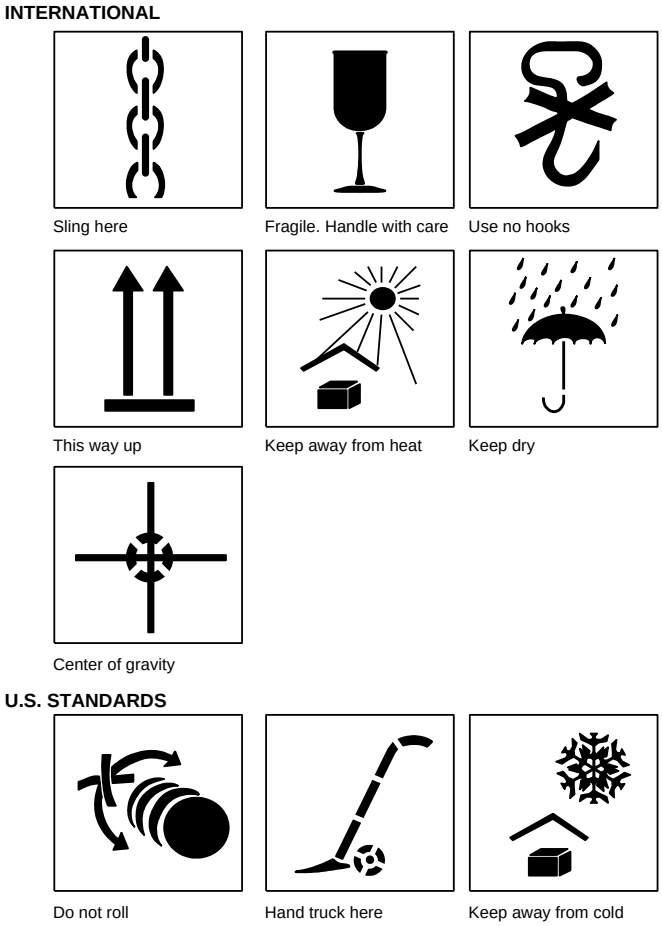

Figure 2: Accepted Symbols

14 Hazardous Material

14.1 Transportation of Hazardous Material

The transportation of hazardous materials (HAZMATs) includes, but is not limited to, acids, chemicals, paints, solvents, explosives, blasting caps, dangerous projectiles, and radioactive materials. A detailed list of HAZMATs may be located in the code of Federal Regulations (CFR) Title 49 Chapter 1, Subpart B - Table of Hazardous Materials and Special Provisions §172.101 Hazardous Materials Table. Mode of transportation guidelines, regulations, and conventions are addressed in Sections 14.2 through 14.5, below, in this document.

Safety Data Sheets (SDSs) must accompany all HAZMAT materials.

14.2 Domestic (USA)

Manufacturers of HAZMATs must comply with the regulations of that country. In the United States, the Department of Transportation regulations will govern. Packaging specifications can be found in the Code

of Federal Regulations Title 49 Part 178 - Specifications for Packaging (49 CFR Chapter 1, Subtitle B, Part 178).

14.3 Air Cargo – International

The International Civil Aviation Organization (ICAO) has responsibility for regulations affecting air transportation of hazardous materials. The regulation of these air shipments in reference to packaging, marking, and labeling are in accordance with the International Air Transport Association (IATA) Dangerous Goods Regulation. Certain airlines have additional restrictions to those imposed by IATA.

14.4 Ocean Cargo - International

1. International Maritime Organization (IMO) bears responsibility for publication of regulations governing packaging, marking, and labeling of hazardous goods for ocean transport. Its conventions are described in the International Maritime Dangerous Goods (IMDG) code.
2. A Container Packing Certificate is required for each container transporting hazardous materials. This certificate must be signed by the person responsible for packaging the container. A failure to provide this certificate could result in delays, with cargo being retained at the dock of origin or at a trans-shipment point until this certificate has been supplied.

14.5 Domestic Ports - U.S.

The United States Coast Guard is a source of regulations concerning the handling of hazardous materials. In addition, each individual Port Authority may impose its own regulations. Strict adherence to IMDG regulations will avoid problems.

15 Packing List Requirements

1. Each package must have two (2) copies of a detailed packing list in waterproof packages. One (1) packing list copy shall be placed inside each package, and one (1) packing list copy on the outside of each package.
2. Ocean shipping containers shall have two (2) copies of detailed load lists in waterproof packages listing the contents of the container. One (1) load list shall be secured on the inside of the container door, and one (1) load list attached to the outside of the door.

Section III: On-Site Preservation and Protection Requirements

16 Preservation and Protection Requirements During Construction and Long-Term Storage

16.1 General

1. For items sealed in packaging and not readily identifiable visually, photos of package contents taken by Supplier and/or inspector during final packaging shall be printed and affixed to the package in order to accompany the packing list in helping to identify the contents and prevent unnecessary opening of such packages.

16.2 Machinery

1. After installation at their final service location, engines, centrifugal fans, gear unit cases, centrifugal pumps, and compressors shall be protected as follows:
    a. Clean shaft couplings and exposed machined surfaces and coat them with exterior preservative.
    b. Cover the suction and discharge nozzles of pumps with leak tight metal closures (or blinds), which shall remain in place until hydrostatic testing, and flushing of connecting piping is completed. These closures shall be provided with identification tabs that protrude from the holding pipe flange.
    c. Spare rotating elements shall be stored indoors and per the manufacturer's recommendations.
    d. Moving or rotating parts shall be exercised by “barring” in accordance with manufacturer’s required schedule.
2. After installation at their final service location, reciprocating pumps, reciprocating compressors, and internal combustion engines shall be protected as follows:
    a. Coat exposed rods, eccentrics, plungers, and machined surfaces with exterior preservative.
    b. Flush drive mechanisms of proportioning and metering pumps with solvent until clean. Fill with lubricant-compatible preservative until all internal surfaces are coated. The internal surfaces shall be recoated at one-month intervals.
    c. If a compressor or engine requires field assembly, remove the protective coatings from cylinders, rods, etc., and clean all parts (including crankcase) with solvent. Assemble using lubricant-compatible preservative freely on cylinder walls, rods, bearings, and rubbing parts. Do not install carbon piston rings, rod packing, or the valves until the compressor is serviced for initial operation. This work should be done under the supervision of manufacturer's erector, if available.

d. A small amount of lubricant-compatible preservative shall be sprayed and fogged into each compressor cylinder through valve openings on a periodic basis. Additional preservative shall be sprayed into the cylinders each time the crankshaft is rotated, in accordance with the manufacturer's recommended schedule.

3. Internal combustion engines shall also be protected as follows:

   a. Electrical accessories such as magnetos, which can be damaged by moisture, shall be stored in a dry, warm place where condensation of humidity will not occur.

   b. Spark plugs and fuel injection nozzles shall be removed, and the openings in the cylinders plugged. A small amount of lubricant-compatible preservative shall be sprayed and fogged into each cylinder, through the spark plug or injection nozzle openings on a periodic basis.

   c. Additional preservative shall be sprayed and fogged into the cylinders each time the crankshaft is rotated, in accordance with the manufacturer's recommended schedule.

4. Other mechanical equipment not specifically covered herein shall be protected as follows:

   a. Flush oil lubricated bearing brackets and gear unit cases with solvent until clean. Fill the units with lubricant-compatible preservative until all internal surfaces are coated.

   b. Apply a coating of exterior preservative to all shafts, couplings, and exposed machined surfaces.

   c. Remove all exposed chains. Clean chains with solvent, coat with storage-type preservative, and wrap them in Kraft paper. Label each wrapped chain to provide the proper identification, and store with accessories.

16.3 Motors and Generators

1. Indoor storage is required for all motors and generators except those specifically designed for outdoor use (generally TEFC, XP TEAAC, and TEWAC motors), which may be stored outdoors without protective covering provided that ample ventilation is supplied.

2. For motors and electric motor-operated valve actuators stored outdoors without protective covering, the following shall be observed:

   a. All enclosure openings not intended to be open during operation of the equipment, such as cable penetrations in terminal boxes, shall be closed with watertight plugs. Temporary shipping plugs shall be replaced with permanent storage plugs.

   b. All motors and valve actuators shall be stored in their normal operating position, e.g., vertical motors in an upright position with shaft extending downward.

3. If space heaters are furnished within the units, they shall be connected to a continuous supply of power of the proper rating.

4. Insulation resistance values of each winding shall be measured and recorded. This shall be done as soon as possible after a unit arrives at the work site.
5. Brushes shall be removed from brush holders and stored in a dry, warm place where condensation will not occur.
6. After installation at the final service location, motors with oil-lubricated bearings and motors / generators with collector rings shall be protected as follows:
    a. Oil-lubricated bearings: Coat all internal surfaces of bearing housing with lubricant-compatible preservative. Vent and drain connections shall be plugged, capped, or blinded as applicable, using steel fittings. The internal surfaces shall be recoated (by filling, filling and draining, slushing, spraying, or rotating as appropriate) at one-month intervals.
    b. Collector rings: Applied protective coatings shall be examined and renewed if not intact.
7. Every three (3) months, measure and record insulation resistance values of each winding of units rated 2300 volts and higher. Record temperature and weather conditions at time of reading. If resistance is low and cables have been connected, disconnect the cables and repeat the measurements. If resistance of winding insulation only is low, dry out leads in unit's terminal box by removing the cover and exposing to dry, clear weather, or by placing an electric lamp or heater in the terminal box. If this does not result in acceptable insulation resistance values, dry out the windings by an approved method until acceptable values are obtained.
8. Six (6) weeks before commissioning, measure and record the insulation resistance value of each winding for all units. Record temperature and weather conditions at time of reading. If resistance is low, proceed per paragraph 7.
9. If grease lubricated units are at work site more than one year from the date of shipment from the factory without having been operated, inspect the bearing grease. If there has been any visible deterioration of the lubricating properties of the grease, clean it out and repack the bearings per manufacturer's recommendations.
10. Immediately before commissioning, perform the following:
    a. Measure and record insulation values of all units with cables connected. If readings are low, dry out before starting.
    b. Clean protective coatings from collector ring surfaces.
    c. Clean surfaces of commutators per manufacturer's instructions.

16.4 Transformers

Indoor storage is required for all transformers except the following:

1. Transformers intended for outdoor installation may be stored outdoors without protective covering.
2. Large indoor units may be stored outdoors if raised above grade to prevent any damage from surface water and if a shed roof and tarpaulin sidings (or equivalent) are provided.
3. Drums of insulating liquid stored outdoors shall be laid on their side with the large bung downwards. Drums shall be placed so that the large bung is at about a 45° angle from the bottom center position.
4. If a transformer is shipped with its main tank filled with insulating liquid (except for expansion space), measure and record the level of the liquid and the ambient temperature when the unit arrives at work site and every month thereafter. If the level falls, repair leaks and add insulating liquid to keep the level within tolerances.
5. If a transformer is shipped with its main tank filled with insulating liquid and blanketed with gas under pressure, or filled with gas under pressure-measure, record the gas pressure and the ambient temperature when the unit arrives at work site and every month thereafter. If the pressure falls, repair leaks and add gas to keep the pressure within tolerances.
6. Primary disconnect switches shall be handled per the requirements for switchgear, starters, and control equipment.

16.5 Switchgear, Starters, Control Equipment

Equipment shall be stored indoors in a dry, warm place where condensation of humidity cannot occur, and as follows:

1. There shall be good ventilation of the shelter.
2. If high relative humidity or large, rapid changes in temperature are experienced, heaters shall be used to maintain the temperature at a level approximately 6°C (10°F) above minimum daily temperature.
3. In humid locations such as in the tropics, it may be necessary to remove the equipment from shipping cases to permit adequate ventilation, and to avoid mildew.
4. If space heaters are furnished within the equipment, they shall be connected to a continuous source of power of the proper rating.
5. Free-standing metal enclosed equipment shall be stored in an upright position.
6. Oil-immersed starters, circuit breakers, and similar items which are shipped dry shall be stored indoors or shall be filled with insulating liquid as soon as they are received at work site. Units filled with liquid may be stored outdoors if raised above grade to prevent any damage from surface water and if a shed roof and tarpaulin sidings (or equivalent) are provided.

7. Insulation resistance values of such parts as operating coils shall be spot checked every six (6) weeks. If any readings are low, the affected parts shall be dried out before they are placed in operation.

16.6 Cables

1. Reels of paper insulated lead sheathed cable shall be rotated 90° every two (2) weeks.
2. Low-pressure gas-filled cable shall be handled as follows:
    a. Gas pressure shall be measured and recorded when the cable is received at work site, and every month thereafter. The pressure should be between 35 and 90 kPag (5 and 13 psig). If falling pressure indicates a leak in the cable, connect a cylinder of dry nitrogen to the cable to maintain pressure until the leak is located and sealed.
    b. Nitrogen used to maintain pressure during storage, if required, shall be per ASTM D1933, Type I, II or III (Type III is preferred, if available). Manufacturer's recommendations shall be followed during installation and operation of any nitrogen cylinders.

16.7 Battery Storage

1. All batteries shall be stored indoors, in a dry place.
2. Batteries that have been shipped dry and sealed shall have the seals inspected when they are received at work site. Any seals which are damaged shall be renewed per manufacturer instructions.
3. Lead-acid batteries that have been shipped wet shall be handled as follows:
    a. Electrolyte level shall be inspected when batteries are received at work site. Electrolyte shall be added to the proper level, if any has been lost.
    b. Three months after date of shipment from the factory, and every three (3) months thereafter, batteries shall be given a freshening charge to restore the voltage to 2.15 volts per cell and the specific gravity to 1.21 at 25°C (77°F). The charging rate shall not exceed the manufacturer's recommended value; batteries shall not be overcharged.
    c. Other types of batteries that have been shipped wet shall be handled per the manufacturer's instructions.

16.8 Instruments

1. All measuring elements, transmitters, control and automatic on-off valves, safety valves, gauges, local and remote control panels, control systems, vibration and temperature monitoring systems, and fire and gas detection systems shall be stored indoors in an environmentally controlled area that includes humidity control.

2. Prefabricated control panels, control racks and cabinets, and instrument junction boxes shall be left in their shipping cases until moved into the control houses or final field locations.
3. Potentiometers shall never be exposed to temperatures below 0°C (32°F) or above 52°C (125°F).
4. Instruments including control valve and motor actuators installed at outdoor locations shall be protected from the weather and mechanical damage. Wood covers over glass fronts may be used.
5. Control valve bodies, top-works, and brackets shall be protected the same as valves. Automatic control and on-off valves that have attached electronic or electrical accessories such as positioners and solenoid valves shall be stored indoors.
6. Motor actuators shall be protected the same as motors.

16.9 Valves

1. Indoor storage shall be provided for all valves, with the following exceptions:
    a. Manually operated valves size 6-inch or larger may be stored outdoors on a paved area, with the valve stem upright.
    b. Large automatic control valves such as slide valves and motor-operated valves may be stored outdoors on a paved area, or on pallets, if a shed roof and tarpaulin siding (or equivalent) are provided. Actuators on control valves and motor-operated valves shall be protected against mechanical damage. Actuators shall be stroked routinely per manufacturer recommendations.
    c. Valves shall be stored per manufacturer storage / preservation procedures and visually inspected for preservation status at monthly intervals.

16.10 Welding Electrodes

1. Coated welding electrodes shall be stored in an area free of dust and oil.
2. All low hydrogen coated electrodes which are received in damaged cans shall be baked at 260°C (500°F) for two (2) hours, or 316°C (600°F) for one (1) hour, prior to use. Storage of electrodes after baking as well as storage of electrodes after opening cans shall be at a temperature between 121°C and 149°C (250°F and 300°F).
    a. Cellulose coated electrodes shall not be stored at temperatures higher than 93°C (200°F).
    b. If electrodes are packaged in cardboard or plastic containers, they shall be removed from this packaging prior to heating.

16.11 Stainless Steel

1. Stainless steel (alloys containing more than 10% chromium) equipment, components, and materials shall be protected as follows:
    a. Storage under cover. Protective coatings are acceptable alternatives to covered storage.
    b. Not in contact with the soil or with porous supports such as raw wood.
2. Austenitic stainless steels shall not be exposed to salt water or salt spray.

17 Inspection and Maintenance Requirements

Material or equipment from Manufacturers often must be stored before being placed in service. This section outlines procedures for protecting new and reconditioned material and equipment from corrosion, mechanical damage, dirt, and insects during the storage period.

When equipment is stored over long periods, regular inspections must be scheduled to ensure that protection has not deteriorated. Manufacturer shall provide recommendations for maintenance of long-term protection applications. Consideration should also be given to atmospheric conditions and the length of storage time. Some protective measures may be provided by the Manufacturer before shipment. If protection must be removed for inspection of an item, identical or equivalent protection shall be restored to the item per manufacturer instructions.

1. All vapor-phase corrosion inhibitor (VPCI) emitters shall be inspected on a routine basis and replaced as necessary. Bags within tightly sealed units, i.e. junction boxes, d/p cells, control cabinets, etc. shall be inspected for external seal damage only. If the seal is damaged, silica bags shall be replaced and the unit resealed. Inspection frequency shall be increased during periods when construction activities could affect the seal.
2. For externally mounted explosion-proof enclosures and boxes, care shall be exercised on the machined surfaces at the joints. Surfaces shall be protected with an approved lubricant, or wrapped with VPCI plastic wrap using water-resistant tape, with VPCI emitters inserted in the box.
3. All silica gel bags shall be inspected on a routine basis and replaced as necessary. Bags within tightly sealed units, i.e. junction boxes, d/p cells, control cabinets, etc. shall be inspected for external seal damage only. If the seal is damaged, silica bags shall be replaced and the unit resealed. Inspection frequency shall be increased during periods when construction activities could affect the seal.
4. All external unpainted machined surfaces (stems, threads, glands, etc.) shall be preserved.
5. Valves shall be left fully open or closed and not cycled. When rising stem valves are opened for the first time to allow pipe flushing and hydrotesting, the exposed portion of the stem shall be wrapped in preservative-impregnated cloth tape and the valve shall be left fully open.

6. Motor insulation resistance shall be measured upon motor receipt and again during installation.

17.1 Daily

1. All anti-condensation heaters shall be energized continuously throughout storage and construction and checked daily.
2. For controlled environment storage of delicate instrumentation and telecommunications equipment, the climatic conditions shall be checked daily to ensure they are within defined ranges.
3. For equipment protected by a nitrogen blanket, pressure shall be checked daily.

17.2 Weekly

All items shall be externally inspected weekly for visible signs of damage or deterioration and repaired as necessary.

1. Temporary seals and protective coverings shall be inspected weekly and replaced or repaired as necessary.
2. Pickled piping shall be maintained under pressure and inspected weekly to determine that the pressure is maintained. Pipe seals shall not be broken for inspection. A nitrogen seal shall be used for long-term storage or marine environment exposure for stainless steel and other critical service vessels and heat exchangers.
3. Vessels and heat exchangers shall be inspected externally weekly and any necessary preservation applied.
4. Pump shafts shall be rotated 2.25 turns weekly and oil level in bearing housings shall be checked weekly.
5. Compressor shafts shall be rotated 2.25 turns weekly.

17.3 Monthly

1. Motor insulation resistance shall be measured and recorded monthly or quarterly.
2. Flange facings, other gasket surfaces, fittings, and threaded adjusters (e.g. spring supports, strainers, hoses, gaskets, nuts, bolts, etc.) shall be inspected monthly. Preservative shall be applied as required.

17.4 Six Months

1. Vessels shall be inspected internally every six (6) months while in storage and every three (3) months once nozzle blinds have been removed for pipe installation.

2. Pump and gearbox internals shall be inspected every six (6) months. Preservative shall be re-applied as required.
3. Compressors internally protected with a thin oil film and/or nitrogen blanket shall be visually checked internally, through the nozzles, once every six (6) months. Preservative, nitrogen blanket, etc. shall be re-applied as required.

17.5 Beyond Six Months

Refer to equipment and or manufacture preservation requirements.

18 Removal of Preservation

Preservation shall be maintained through mechanical completion and removed only during commissioning.

1. Should it be necessary to remove any preservative to allow the testing or inspection of an item, preservatives shall be re-applied upon completion.
2. Provision shall be made for the proper disposal of oils, greases, solvents, protective coverings, etc. to prevent pollution and other hazards.

19 Shipping

19.1 General

Prior to shipment, Supplier is obliged to send required shipping documents to OSA or its representative. This requirement does not alleviate Supplier of its obligation to provide documentation as required by law or regulations.

The means of transport shall be communicated to OSA or its representative, once effective date as per PO is in place. Supplier shall comply with all the obligations as per Incoterms agreed on the PO.

Supplier will take the necessary precautions to assure that the arrival of goods permits them to be unloaded in the designated warehouse in business hours (to be defined in each case).

19.2 Shipping Documents

The following documents shall be sent to OSA or its representative for each consignment prior to the shipment in English language:

- Shipping advice.
- Packing list.
- Transportation sketch in case of heavy and/or oversize equipment.

- SDS in case of chemical and/or hazardous materials.
- Certificate of origin and/or any other certification and information needed to comply with the export and/or import regulations, if applicable.
- Clearly visible photos of the shipping marks of the Project on the packed cargo.

19.3 Shipping Advisement

Three (3) working days prior to shipment to destination, a shipping advisement notice shall be sent, providing as minimum but not limited to:

- OSA PO number.
- Number of packages, indicating if total or partial shipment.
- Identification of each package, including net and gross weight and dimensions.
- Table of contents for each package, with item / tag numbers.
- Copy of the shipping marks of the Project on the packed cargo.
- Forwarder.
- Carrier's name.
- Scheduled date of dispatch.

19.4 Packing List

Supplier will submit a preliminary packing list and commercial invoice to OSA and its representative fifteen (15) days prior to the actual delivery date.

The packing list must always include, at minimum, the following data:

- Consignee.
- Project name.
- OSA PO number.
- Supplier's name.
- Supplier reference number.
- Forwarder.
- Type of each package (box, crate, pallets, bundle, skid / saddle…).
- Package number and total package number.
- Net and gross weights per package.

- Dimensions (in cm) and volume (in m^3) per package.
- Description of contents: clear and detailed list of all contents of each package and number of units identified by the items / tags according to the PO.
- Assembly match marking identification – where applicable.
- Spare parts and/or tools must specifically be mentioned with a detailed description of items and quantities.

The packing list in general and the description of contents must be written in English language.

Consignments without packing list shall not be accepted and shall be returned to Supplier at his own cost.

The packing list distribution shall be as minimum but not limited to:

- One (1) copy in an envelope within the package.
- One (1) copy in a waterproof envelope securely fastened to the outside of each package, together with any special handling instructions and/or preservation requirements.
- One (1) copy shall be sent to the contact person of OSA or its representative mentioned in the PO.
- Each loose part not mentioned on the packing list will be considered as not delivered.
- Dependent upon the contents of the package, the following auxiliary marks are to be stenciled in red on the package: “THIS END UP”, KEEP DRY”, “SLING HERE”, “CENTER OF GRAVITY”, “FRAGILE”, “HANDLE WITH CARE”, “HEAVY END”, “DO NOT WELD TO THIS VESSEL”, “DO NOT WELD NEAR THIS VESSEL”, “DESICCANT INSIDE”, etc.

19.5 Safety Data Sheets

Chemical products and/or HAZMATs must be identified by the SDS.

Supplier shall submit the SDS to OSA within one month after PO date in order to apply for the licenses or import permits for the entry of the material.

The SDS shall follow international standard OSHA 3514 and contain, at minimum, the following data:

- Product name / composition and information on ingredients.
- Hazard identification / accidental release measures / handling and storage.
- Exposure controls / personal protection.
- Physical and chemical properties.
- Toxicological and ecological information.

- Transport information: UN code, secondary risks (if any) and packing group according to IATA / IMDG / IMO regulations.

Chemical products and/or hazardous materials shall be identified on a separate packing list than non-hazardous materials.

Supplier is responsible for ensuring that any hazardous material is packed safely. Supplier shall be responsible to supply information on handling and marking of the material in accordance with the applicable laws of the country of origin and with the shipping agency requirements to transport the material, whether by road, sea, rail, or air.

If a special packing is required for air shipments, the expenses of the repacking will be covered by Supplier.

19.6 Other Documents

All shipments of machinery shall include a copy of the equipment manual and assembly drawings, in waterproof envelopes or boxes and firmly fixed to the machine, without affecting the copies that must be provided by Supplier under the terms of the Contract.

Supplier shall maintain preservation records from initial preservation implementation until equipment custody transfer occur to either client or its delegate or fabricator. Supplier shall provide the required intervals that the preservation on each equipment is to be checked. Each individual equipment shall have pictures and marked up drawing of where preservation items are secured and to be removed prior to pre-commissioning.

Supplier will also provide any special handling requirements and appropriate preservation of the equipment for all site conditions.

20 Appendices

The following appendices are included with this document:

- Appendix 1: Typical Preservation Forms

Appendix 1: Typical Preservation Forms

Preservation Procedure Record

Sheet ___ of ___					
Preservation Procedure Record					
Equip. No.	Description	Procedure	Freq.	By	Date
Signed copy to Buyer			Preservation Completed Date:		
ATTN:			Contractor's Signature_____		

Monthly Preservation Report

Equip. No.	Tag	Description	Period Code				Remarks

Copy sent to Maintenance monthly	Period Code	Time Interval	Preservation Maintained
			Date:
			Contractor's Signature: _____