The Israel Electric Corp. Ltd.
Orot Rabin Power Station
Rutenberg Power Station

Closed Cooling Water (CCW) Coolers

Project Specification
BM-620-P1

Annexure "B"
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SPECIFICATION FOR

Closed Cooling Water (CCW) Coolers

1. **PURCHASER:** The Israel Electric Corporation Limited.

2. **NAME OF PROJECT:** Orot Rabin Power Station, Units 5, 6
   Rutenberg Power Station (Optional)

3. **LOCATION OF PROJECT:** Orot Rabin, Near Hadera
   Rutenberg, Near Ashkelon
   All P.S. on the Mediterranean Sea Shore

4. **SCOPE OF WORK:**

   4.1 **Scope of Engineering and Supply:**
   4.1.1 Design, manufacture, test, preserve, pack and transport four (4) Gasketed Plate Heat Exchangers (PHE) for cooling the closed cooling water in Orot Rabin Power Station— units 5&6 and four (4) Gasketed Plate Heat Exchangers (PHE) for cooling the closed cooling water in Rutenberg Power Station – units 1&2 (optional).

   4.1.2 The Contractor shall be responsible for the complete design, manufacturing and testing with specified performances of the complete CCW Coolers.
   The system shall be supplied complete including but not limited to the following:
   CCW Coolers including equipment, appurtenances and accessories, as specified herein to form complete systems which will achieve and assure safe and reliable operation with best overall performance at all loads and modes of operation.

   4.1.3 **Scope of supply:**
   4.1.3.1 The CCW Coolers shall consist but not limited to Four (4) Gasketed Plate and Frame heat exchangers with titanium heat transfer plates including anchor bolts, washers and nuts.
4.1.3.2 The CCW coolers shall be supplied with frame mounted to concrete foundations.

4.1.4 The Equipment for each Unit shall be supplied complete with appurtenances and accessories as specified herein, to form a complete system which will achieve and assure safe and reliable operation with best overall performance at all loads and modes of operation. All components, appurtenances and accessories shall be of proven design, verified by Power Plant Operation.

4.1.5 Components that are herein specified in regard to manufacturer brand and model or type shall be considered the standard of supply. It is not intended that the Contract be limited solely to such characteristics. The Contractor may make an appropriate substitution, but all substituted Components offered shall be noted as EXCEPTIONS to this Specification and are subject to review, comment, and approval by the Purchaser.

Additionally, while everything else being equal and without derogating from Contractor's responsibilities under the Contract, the Contractor shall endeavor to include in the scope of design and supply, components and accessories manufactured in Israel.

4.1.6 Contractor shall provide, in the required format and form and in a timely manner, all documentation required by this Specification and/or required by applicable Standards and Codes and/or as specifically detailed in the Documentation Submission Schedule (DSS), Annexure "J". A consistent nomenclature shall be used project-wide in naming all component parts within the Scope of Work. This shall apply to all drawings, Instruction Books, Bill of Materials, special instructions, etc. Engineering design shall commence immediately after Contract award. The cost of correcting inconsistent nomenclature shall be borne by the Contractor.

4.1.7 Changes in design already approved by the Purchaser are normally unaccepted. However, should such changes become necessary on an exceptional basis, the
Contractor shall obtain the Purchaser's approval prior to introducing any such change.

4.2 Special Equipment, Tools and Instruments

4.2.1 Contractor shall provide all special equipment, tools and instruments required for safe and secure transport of all components from ex-works to final destination, and for test and maintenance of Equipment provided under this Contract. Said equipment, tools, and instruments should be listed in Contractor's Proposal where it is clearly stated which are provided on a loan basis and which are included in the Contract Price.

4.2.2 The Contractor shall furnish all necessary special tools, instruments and/or test equipment which are required to fulfill the approved test procedure for equipment tested by Purchaser.

4.2.3 Maintenance equipment and tools provided under this specification shall be new and of best quality. They shall be shipped to the job site in a suitable separate box, clearly marked with the name of the equipment they are intended for.

4.3 Contractor Services

The Contractor shall provide the services listed in the following sub-articles as part of the basic Scope of Work or as Purchaser’s option, at the per diem or lump sum rates, all as stated in the Summary of Prices and Delivery Schedule, Annexure “C1”. Field personnel provided by the Contractor shall be capable and qualified to perform the required duties to the satisfaction of the Purchaser. They shall be vested with authority to make decisions that could affect the status of the Equipment and which are binding on the Contractor.

4.3.1 Erection Services:

4.3.1.1 The Contractor shall provide detailed instructions, drawings and erection diagrams to permit the Purchaser to organize the erection of all supplied Equipment.
4.3.1.2 The Contractor shall furnish detailed instructions to maintain and keep safe every part of the Equipment during erection until unit start-up.

4.3.2 **Commissioning and Start-Up Services:**
The contractor shall be responsible for the first successful commissioning of the CCW coolers. The Contractor shall provide the services of competent start-up engineer(s) to be responsible for starting and placing into successful service the equipment provided under this Contract.

4.3.3 **Training:**
Contractor's personnel shall conduct a thorough training course pertaining to the equipment furnished under this Specification, for Purchaser's personnel, covering, without limitation, correct start-up, safe operation at all modes of operation, safe shutdown and maintenance. The Contractor shall verify that the trainees are completely familiar with all phases of such procedures and are capable of operating and maintaining the equipment successfully.

4.3.4 **Field Performance Test**
Contractor shall delegate at its own cost, qualified test engineer(s), to witness Equipment field performance tests necessary to establish compliance with this Specification, and to satisfy that the Equipment fulfills the performance guarantees, and other Contract requirements.

Field performance tests shall be carried out by the Purchaser, using procedures provided by the Contractor and approved by the Purchaser according to ASME PTC and EPA codes, all as further detailed in Annexure "D" – Equipment Performance Guarantees.

4.4 **Work by Others (Facilities and Services to be provided by the Purchaser)**
In performing its duties the Contractor shall not be required to provide facilities, services and equipment as detailed below [further details with respect to Purchaser's undertaking regarding qualifications, quality, quantities and scheduling should be stated in Contractor's proposal]:

Page 6 of 24
4.5 **Documentation**

4.5.1 Engineering design shall commence immediately after Contract award, regardless of the shipping date.

4.5.2 The Contractor shall provide all documentation required by this Specification and by applicable Standards and Codes, in the required format and form, and on a schedule as required herein. For further details on required documentation and its submitted schedule refer to paragraph 10 below.

4.6 **Terminal Connections**

Contractor shall terminate the supply of the equipment provided under this Specification at the location indicated below. Contractor shall include in the Proposal a definition for terminal connections not specified in this paragraph:

<table>
<thead>
<tr>
<th>Point</th>
<th>Pipe Size (Inch)</th>
<th>Flange Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea water inlet line</td>
<td>14&quot;</td>
<td>150</td>
</tr>
<tr>
<td>Sea water outlet line</td>
<td>14&quot;</td>
<td>150</td>
</tr>
<tr>
<td>CCW Inlet</td>
<td>12&quot;</td>
<td>150</td>
</tr>
<tr>
<td>CCW Outlet</td>
<td>12&quot;</td>
<td>150</td>
</tr>
</tbody>
</table>

4.7 **Guaranteed Performances and Testing**

The performances of the Equipment shall be verified by a site test in accordance with the provisions set forth in Annexure “D” to the Contract – Equipment Performance Guarantees.

5. **SUPPLEMENTS**

The following supplements are attached hereto and their requirements form an integral part of this specification - to the extent they are consistent and conform with the requirements specifically set forth herein. In the event of a variance between the requirements of the Supplements and the particular requirements...
set forth in the Specification, the requirements specifically set forth in the Specification shall take precedence.

<table>
<thead>
<tr>
<th>No.</th>
<th>Document ID</th>
<th>Document Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>BM5/11-M62-DS0003-CW</td>
<td>Plate heat exchanger data sheet</td>
</tr>
<tr>
<td>5.2</td>
<td></td>
<td>Seawater composition Table</td>
</tr>
<tr>
<td>5.3</td>
<td>CL-716/1600/99</td>
<td>Specification for Painting on Galvanized Surfaces by Wet or Electrostatic Powder Painting.</td>
</tr>
<tr>
<td>5.4</td>
<td>Standard 01-1E</td>
<td>Standard Specification for Contractor's Drawing and Data Transmittal</td>
</tr>
<tr>
<td>5.5</td>
<td>Q-APP-02-PR</td>
<td>Quality Requirements</td>
</tr>
</tbody>
</table>

6. **STANDARDS AND CODES**

6.1 Standards and Codes referenced in this Specification and in the Supplements to this specification, form an integral part of this Specification - to the extent their requirements are consistent and conform with the requirements specifically set forth herein. All such Standards and Codes are to the issue, including all amendments, supplements, etc., current as of the date of the Contract, unless indicated otherwise. In the event of a variance between the requirements of the Standards and Codes and the particular requirements set forth in the Specification, the requirements specifically set forth in the Specification shall take precedence.

6.2 The Equipment to be provided under this Specification, including all appurtenances and accessories, shall be designed, fabricated, inspected, tested, stamped and preserved to the extent indicated in said referenced Standards and Codes. Where this Specification does not include such reference, The Equipment, or any of its components, shall be designed, fabricated, inspected, tested and preserved, as applicable, to comply with currently recognized International and/or Contractor's Standards, whichever are tighter and more restrictive.
6.3 The Contractor may propose Standards and Codes as alternates for, or additions to those specified herein. A copy of each proposed Standard and code, if any, shall be submitted (in English) for Purchaser's approval. In case Purchaser's approval is granted, the Contractor shall remain responsible for the compatibility of the design and the physical interfaces between the supplied Equipment and the equipment supplied by others.

6.4 The Purchaser shall assist Contractor in identification of Israeli codes and standards applicable to the Work. In all cases Contractor shall adhere to and comply with the requirements of Israeli official standards found to be more restrictive than those specified herein.

6.5 Subject to the provisions stated above, the equipment shall be designed, manufactured, erected, tested, operated and maintained in accordance with the standards, regulations, directives and publications of the following agencies and organizations:

- ANSI: American National Standards Institute, Inc.
- ASME: American Society of Mechanical Engineers.

6.6 The use of other equivalent Standards requires the purchaser agreement.

7. QUALITY ASSURANCE AND QUALITY CONTROL

7.1 Without derogating from the provisions of the General Conditions, Contractor's quality system shall meet the requirements of Purchaser's Standard Q-APP-02-PR, "Quality Requirements".
7.2 The Contractor and the subcontractors shall be certified to ISO-9001-2000 by a certification body qualified to EN-45004 levels A or C or otherwise as may be acceptable to the Purchaser.

7.3 The Contractor shall submit upon request a copy of its Quality Assurance Manual including Quality Procedures.

7.4 The choice of subcontractors shall be subject to Purchaser's approval and the Contractor shall be responsible for assuring that their quality assurance/quality control programs, including their organizations, procedures, personnel qualifications, etc., meet Purchaser’s quality requirements. Contractor [also Suppliers at the first stage of proposal evaluation] may propose additional possible sub-suppliers by submitting to the Purchaser a formal request for approval with sufficient details for evaluation including country of origin for design and manufacturing, proven experience with respect to equipment of the same size and functionality, quality assurance, catalogues, functional parameters and technical data.

7.5 **Obligation to meet Israeli Standard SI 4295 (if applicable)**

Before shipment and as a condition precedent for delivery, the Contractor shall supply Purchaser with the certification of the Israeli Standards Institute that its Equipment conforms to Israeli Standard 4295. [Tender participants should include in their proposals a written undertaking to comply with SI 4295].

7.6 **Materials Validation Testing**

a. All materials certificates to be used for the equipment shall be submitted prior to manufacturing to Purchaser Materials Laboratory for approval.

b. The Purchaser shall have the right, at its discretion, to perform validation testing of materials, assemblies and fabrications, either at the Contractor's premises, sub-contractor's premises or in other locations.

c. Validation testing will be used to confirm that materials supplied to the Contractor's shops are of the appropriate quality, to verify welds, thermal
treatments and any other measurable property deemed necessary to be validated by the Purchaser.

d. The validation testing shall be performed either by the Purchaser's own personnel or by designated persons, acting on behalf of the purchaser.

e. The Contractor shall allow access to the materials and work to be inspected and shall facilitate the testing.

8. SHIPMENT AND HANDLING OF GOODS AND DOCUMENTATION

The Contractor shall comply with the requirements for Shipment and Handling of Equipment set forth in Annexure "R" to the Contract and additionally with the following supplementary requirements:

8.1 All components or accessories shipped detached for field mounting or field assembly shall be suitably tagged to allow easy identification. Tags shall be stamped with cross reference data such as Manufacturer's Name, Contract No., Power Station, Unit No., reference drawing and Equipment Designation, and shall be exceptionally durable and securely tied to items by wire or other methods approved by Purchaser.

8.2 Unless specially designated, all Equipment and other items shall be packaged for outdoor storage until erection. Where required by the nature of the Equipment, the Contractor shall furnish and install necessary covers to protect the Equipment from sand, rain, hail, wind, dust and salt spray. Equipment shall be adequately sealed and protected during shipment to prevent corrosion and entrance of foreign matter. All exposed machined surfaces shall be protected where required with a suitable antirust compound or covers before shipment, for shipment and storage until erection.

8.3 All temporary supports, lifting lugs and other temporary parts shall be painted in yellow.
8.4 The equipment components shall be supplied as large as possible to reduce field welds and erection time.

9. SAFETY, ENVIRONMENT AND LOADING REQUIREMENTS

9.1 Safety
The Equipment supplied under this Specification shall meet the U.S. "OCCUPATION, SAFETY, AND HAZARD ADMINISTRATION" (OSHA) requirements or equivalent.

9.2 Wind Load
The calculation of wind loads in Israel is governed by the provisions of the Israeli Standard 414 (latest edition at contract signing) “Characteristic Loads in building: Wind Load”. The calculation shall be accomplished using the basic design wind velocity.

9.3 Earthquake Loads
9.3.1 General

According to this Standard, the seismicity of the site is expressed by the expected horizontal ground acceleration coefficient Z.

The expected horizontal ground acceleration coefficient Z expressed as:

$$ Z = \frac{ah,\text{max}}{g} $$

The maximum expected ground acceleration $ah,\text{max}$ has the meaning of peak horizontal ground acceleration, expressed in m/sec$^2$, with a 90% probability not to be exceeded over a 50 years period. The gravity acceleration $g = 9.81$ m/sec$^2$. 

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The expected horizontal ground acceleration coefficient (Z), per provisions of the Amendment 3 (2009) to the Israeli Standard 413 is 0.11 for Orot Rabin Power Station and 0.09 for Rutenberg Power Station.

9.4 Load Combination
Design wind and design earthquake shall not be considered to act at the same time and their respective effects on the buildings and structures shall not be combined.

10. TECHNICAL DOCUMENTATION
The Contractor shall submit technical documentation in accordance with the provisions of Annexure "J" – Documentation Submission Schedule.

11. SPARE AND RENEWAL PARTS
The Contractor shall provide upon purchaser's request as purchaser's option spare parts at their itemized prices, subject to the applicable terms and conditions, all as further detailed in Annexure "C1" - Summary of Prices and Delivery Schedule.

12. POWER STATION DESCRIPTION
The Orot Rabin Power Station comprises two 575MW and four 360MW coal fired Units. Rutenberg Power Station comprises of two 575MW (Units 1,2) and two 550MW (Units 3,4) coal fired Units. All power station units are located alongside the Mediterranean Sea.

13. PROJECT DESCRIPTION
The CCW system is designed to provide cooling water to power station consumers. The Plate heat exchangers shall be designed to cool the Closed Cooling Water circuit (CCW) by using Seawater as the primary cooler.
14. **MECHANICAL TECHNICAL REQUIREMENTS**

The Plate Heat Exchangers (PHE) shall be designed according to the attached PHE data sheet (suppl. #5.1) with the following clarifications and additions:

14.1 **Design and operating conditions**

14.1.1 **Required parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Sea Water</th>
<th>Demin. Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Rate</td>
<td>m³/hr</td>
<td>479</td>
<td>440</td>
</tr>
<tr>
<td>Inlet Temperature</td>
<td>°C</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>Outlet Temperature</td>
<td>°C</td>
<td>41.8</td>
<td>38</td>
</tr>
<tr>
<td>Density</td>
<td>kg/m³</td>
<td>1024</td>
<td>1000</td>
</tr>
<tr>
<td>Specific Heat</td>
<td>kJ/kg·K</td>
<td>3.850</td>
<td>4.187</td>
</tr>
<tr>
<td>Inlet Pressure</td>
<td>Bar</td>
<td>2.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

14.1.2 For seawater composition refer to supplement 5.2

14.1.3 **Maximum allowable pressure drop for the hot and cold sides shall be 0.5 bar.**

14.1.4 The heat transfer media shall flow through the PHE in a counter current flow.

14.1.4.1 The PHE flow shall be a single pass arrangement of **U type**. All four ports shall be located on the fixed plate (frame plate).

14.1.5 In order to avoid poor distribution of the fluid across the plate width, the minimum length / width ratio is 1.8.
14.1.6 The PHE shall be designed to allow equally distributed fluid over the full width of the plates.

14.1.7 The PHE shall be designed with self cleaning capability.

14.2 **Construction Requirements**

The construction of the PHE shall meet the following design requirements (refer to supplement 5.1 – Plate heat exchanger data sheet):

14.2.1 **General**

14.2.1.1 The PHE shall be designed, constructed, and tested in accordance with ASME Section VIII, and / or according to the API standard 662 for plate heat exchangers for general refinery services.

14.2.1.2 The PHE shall comply with the relevant international and local standards and regulations.

14.2.1.3 The PHE shall be suitable for power plant service and shall be capable of withstanding vibrations and pulsation due to polluted and marine atmosphere environment (90% moisture).

14.2.1.4 The contractor is responsible for the complete mechanical design of the plate heat exchangers in accordance with the requirements of the code and this specification.

14.2.1.5 The PHE **design pressure and temperature** shall be according to the following table and in accordance with ASME Code.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>CC Water</th>
<th>Seawater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Pressure</td>
<td>barg</td>
<td>12.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>
14.2.1.6 For the plate heat exchangers, the Maximum Allowable Working Pressure (MAWP) shall be design pressure at design temperature and shall be stamped on the name plate.

14.2.1.7 The fouling factor for the heat exchangers shall be 0.09 (m²·K/ kW).

14.2.1.8 In case of stop or trip of the PHE - the heat exchangers shall be fully drained.

14.2.1.9 The PHE shall be designed to perform the capacities, the pressures, and the temperatures as shown on this specification.

14.2.1.10 The PHE design shall be based on heat transfer-limited and not be based on differential pressure.

14.2.1.11 Nominal plate gap shall be 50% larger then the particles size (Debris filter will be provided by IEC with mesh size of 2mm x 2mm.)

14.2.1.12 All pressure containing parts of carbon steel plate shall be manufactured of fully killed fine-grained steel (e.g. ASTM A516) unless otherwise approved by the purchaser.

14.2.1.13 Non-pressure-containing parts (such as lifting lugs – if used, clips and supports) that are welded directly to pressure parts shall be of RST37-2 or EN235JRГ2 carbon steel.

14.2.2 Frame

14.2.2.1 The frame parts Material of Construction shall be according to the following table:

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Plate (Movable Plate)</td>
<td>Carbon Steel ASTM A516-70</td>
</tr>
<tr>
<td>Frame Plate (Fixed Plate)</td>
<td></td>
</tr>
<tr>
<td>Support Column</td>
<td></td>
</tr>
<tr>
<td>Upper Carrying Bar</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>
14.2.2.2 Connection between different types of steel materials shall be done with suitable dielectric separator to prevent corrosion.

14.2.2.3 The fixed and movable covers shall be of sufficient thickness for the design pressure and code requirements and shall have no welded reinforcements or stiffeners.

14.2.2.4 The carrying and guide bars shall be designed to allow for expansion of at least 30%.

14.2.2.5 Entire frame shall be bolted together to allow unit to be field assembled to permit rigging into place. Welding of the frame components is not permitted.

14.2.2.6 Plate and upper carrying bar design shall permit the removal or access to any plate in the plate pack without the need to remove any other plate.

14.2.2.7 The frame shall be designed properly to ensure that no failure of the supporting structure due to vibration, impact loads, fatigue, and so on.

14.2.2.8 The frame shall be designed to stand severe duty operation (extreme pressures and temperatures) and high number of pressure and temperature cycles during the design life.

14.2.2.9 The fixed plate and the support column shall be connected with anchor bolts, washers and nuts to concrete foundations and will allow the expansion due to thermal stresses.

14.2.2.10 The upper carrying bar shall be provided with a steel roller bearing which will allow the movable plate to be moved without additional rigging or handling equipment.

<table>
<thead>
<tr>
<th>Part</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Guiding Bar</td>
<td>316L</td>
</tr>
</tbody>
</table>
14.2.2.11 The bearing / roller surface shall permit easy sliding of the plates and movable cover along the entire length of the upper carrying bar.

14.2.2.12 The carrying bar shall be designed to support at least 1.5 times the total mass of the movable cover and plate pack with the maximum number of plates filled with water (or the process fluid if its density is greater than that of water).

14.2.2.13 The PHE shall have a support column located at the movable cover end. A minimum of two mounting feet shall be provided at the fixed cover. The contractor shall design the supports for the external loads specified in the equipment data sheet or requisition documents.

14.2.2.14 Fixed and movable plates shall include Lifting holes to allow lifting of the entire unit's flooded weight.

14.2.2.15 Using of welded lifting lugs is prohibited unless written approval has been issued by purchaser.

14.2.2.16 Lifting holes diameter shall be sufficient to allow shackles to clear insulation.

14.2.2.17 The plate pack shall be covered with aluminum shroud or other recommended material under the purchaser approval in accordance with OSHA and to protect against spray leaks.

14.2.2.18 Corrosion allowance shall apply to connections only and shall be not less than 1.6mm.

14.2.2.19 Connections shall be of the flanged design as per ANSI B16.5 standard. Incase of choosing other flange standards, the contractor shall provide end welded neck counter flanges as per ANSI B16.25.
14.2.2.20 The PHE shall be self-draining and self-venting through the connections for all pass arrangements.

14.2.2.21 The projection of flanged connections shall be of sufficient length to allow installation and removal of the flange bolts from either side of the flange.

14.2.2.22 All bolt holes for flanged connections shall straddle centerlines.

14.2.2.23 Connections shall be designed to withstand suitable loads and moments induced by the piping according to API 610 including Appendix F.

14.2.3 Compression Bolts
14.2.3.1 Compression bolt material shall be carbon steel.

14.2.3.2 The bolting system shall be designed so the compression bolts can be removed from the side in addition to front / back removal.

14.2.3.3 Compression bolts shall not require special tools and shall be equipped with lock washers at the movable cover (pressure plate) to facilitate opening and closing of the unit from the fixed cover (frame plate).

14.2.3.4 Compression bolts shall be equipped with captive nuts at the fixed cover and threaded nuts at the movable cover. Welding of the nut to the closure bolt is prohibited.

14.2.3.5 Each tie bolt shall be supplied greased and with a plastic sleeve to protect it from the environment or will be hot dip and galvanized.

14.2.3.6 Tie bolts shall not be less than 16 mm (5/8 inch) nominal diameter, in accordance with the pressure design code.

14.2.4 Plates
14.2.4.1 The plates Material shall be made out of Titanium ASTM-B-265-03-Grade 2.
14.2.4.2 The minimum plate thickness before being pressed shall be 0.6mm.

14.2.4.3 The minimum spacing between the heat transfer plates shall be 2.5mm.

14.2.4.4 Additional 5% of plate's quantity shall be provided above the designed No. of plates.

14.2.4.5 Each heat transfer plate shall be designed to allow maximum heat transfer with a minimum pressure loses.

14.2.4.6 Each heat transfer plate shall have built-in self aligning to accurately locate the plates in the frame assembly and prevent lateral plate movement and maintain maximum gasket contact under pressure.

14.2.4.7 All heat transfer plates shall have permanently identification stamped for proper assembly.

14.2.4.8 End heat transfer plates shall be furnished at the fixed and movable covers.

14.2.5 **Gaskets**

14.2.5.1 Gaskets shall be positioned in a groove around the heat transfer surface and around the port holes of the plate. Gaskets shall be secured to the plate by glue or by mechanical means.

14.2.5.2 All Heat Transfer Plates of 0.2m² heat transfer area and bigger will be equipped with glued gaskets.

14.2.5.3 Each sealing gasket shall be one integral piece.

14.2.5.4 Through-flow port areas of the plates shall be double-gasketed and vented to the atmosphere in such a manner that cross-contamination of fluids cannot occur without readily detectable external evidence.
14.2.5.5 Gaskets shall have relieving grooves to prevent intermixing of fluids and cause leak to flow to outside of unit.

14.2.5.6 The gaskets shall be made out of NBR (P), EPDM(P) – Peroxide cured or other recommended material under the purchaser approval.

14.2.5.7 The gasket shall be tested according to the following ISO Test Standards (Compression set / 815): ISO/188, 37, 48, 1817.

14.2.5.8 The gaskets shall fit around both the heat transfer area and the port holes to prevent leakage to the surrounding atmosphere and from the channels.

14.2.5.9 The gaskets cross section shall be square or other recommended section under the purchaser approval.

14.2.5.10 The gaskets shall have long life expectancy and high durability including opening and closing of the heat transfer plates.

14.2.5.11 If glue is provided, it shall be per the manufacturer recommendation and it shall be suitable for the conditions stated in this specification.
14.3 **Hydrostatic Testing**

14.3.1.1 Hydrostatic test shall be in accordance with ASME, Section VIII, Div.1, paragraph UG-99.

14.3.1.2 For each hydrostatic test, two indicating gauges (or one indicating gauge and one recording gauge) shall be attached to the PHE.

14.3.1.3 The equipment shall be inspected by Israel standard institute. An inspection certificate shall be furnished to the purchaser.

14.4 **Nameplates and Stamping**

14.4.1 A nameplate shall be permanently attached to the PHE and shall include the following:

- Manufacturer’s name and plate heat exchanger serial number.
- Capacity (kW).
- User’s Tag number.
- Manufacturing Date.
- Pressure design code and if required, code stamping.
- Design temperature and minimum design metal temperature if applicable.
- Maximum allowable working pressure and Temperature.
- Hydrostatic test pressure.

14.4.2 Any limitations on lifting shall be clearly marked on the PHE.

14.4.3 Nameplates shall be provided in each of the connection ports, indicating the fluid type, size, class, material, design flow, temperature and pressure and all other information as required by TEMA and IEC Tag. No.

14.4.4 Nameplates shall be of austenitic stainless steel.

14.5 **Shipment preparation**

14.5.1 The PHE shall be cleaned and all openings sealed before shipment. Any specific requirements for drying will be specified by the purchaser.

14.5.2 Tie bolt threads shall be coated with an anti-seizing lubricant.

14.5.3 Exposed machined carbon steel surfaces, including threads extending beyond the nuts, shall be protected with an easily removable rust-preventive coating.

14.5.4 Exposed flanged connections shall be protected.

14.6 **Maintenance**

14.6.1.1 The PHE shall be designed to be easily opened for inspection, mechanical cleaning, gasket replacement, extension or reduction the number of plates, or other modifications of the duties.

14.6.1.2 The contractor shall specify the required clearance around the PHE for maintenance.
15. **PAINTING REQUIREMENTS**
Without derogating from the above, all Carbon Steel equipment shall be supplied hot dipped or electrolytically galvanized and painted according to Supplement #5.3 "Specification for Painting On Galvanized Surfaces by Wet or Electrostatic Powder Painting".