

# TENDER DOCUMENT

FOR

## 2 Complete Ultra Pure Water Plants

### S1000 – REC SiTech Extension Project GLOMFJORD PLANT

| Approvals       | Name              | Signature | Date |
|-----------------|-------------------|-----------|------|
| Written by:     | John Egil Isaksen |           |      |
| Project Manager | Tor Neple         |           |      |
| Approved by:    | Tor Arne Fagerli  |           |      |

## 1. INTRODUCTION

This Tender Document covers the purchase of two (2) complete independent Ultra Pure Water Treatment Plants completely installed, tested and approved at REC SiTech Plant in Glomfjord, Norway.

These two Ultra Pure Water Treatment Plants shall each have a capacity of 10 m<sup>3</sup>/h with a water quality > 16 MΩ/cm (0,065 μS/cm). Both plants shall have an independent distribution loop that can if necessary be linked with each other.

The reason for the procurement is extension of production capacity and in-house wafering of monocrystalline blocks.

This tender document shall together with REC SiTech's General Technical Specification ver.4a be the bases to give a quotation for the equipment specified above.

### 1.1 Extent of supply

The scope of supply for the unit shall include, but not be limited to the following:

- Completely installed, tested and approved
- Piping for direct hook up to raw water
- Piping for connection to Compressed Air
- Electrical connections
- Insulation and cladding as required.
- Control system.
- Documentation.
- 2 week test period before SAT
- Training program for operators and technical staff, before FAT and during the 2 weeks test period before SAT.
- List of consumables for daily operation
- Spare parts for 2 years of operation.
- Quotation for service contract
- CE approved

### 1.2 Compliance with requirements

In the event of conflicting requirements in this document or between this document and other contract documents, the Supplier has to make the Buyer aware of the conflicting requirements, and Supplier has to solve these conflicts in co-operation with the Buyer.

No modification/exceptions to this document will be accepted unless prior approval in writing has been obtained from Buyer.

## 2. FUNCTIONAL SPECIFICATION

Supplier shall provide a Functional Specification (FS) with the offer for the equipment. The FS shall specify clearly all aspects of the equipment and their compliance with this document's requirements. The FS approved by Buyer shall be the basis for the execution of the supply.

## 3. PROCESS AND EQUIPMENT DESCRIPTION

### 3.1 Raw water

The supplier of Ultra Pure Water Plant must ensure that he has the right raw water analyses for water distributed by Glomfjord municipal water authorities to design and deliver a plant who can fulfill the quality of Ultra Pure water.

This analyses is based on samples taken at REC ScanWafer in Glomfjord and must be verified by bidder:

|                               |       |       |
|-------------------------------|-------|-------|
| Konduktivitet (ved 25 deg.C)  | 3     | mS/cm |
| pH                            | 7     |       |
| Total hårdhet                 | 0     | ∞H    |
| Sulfater SO <sub>4</sub>      |       | mg/l  |
| Klor Cl                       | 1,4   | mg/l  |
| Amoniakk NH <sub>4</sub>      | 0,005 | mg/l  |
| Total Organic Carbon TOC      | <0,6  | mg/l  |
| Karbondioksyd CO <sub>2</sub> |       | mg/l  |
| Silikater SiO <sub>2</sub>    |       | mg/l  |
| Jern F                        | <0,05 | mg/l  |
| Magnesium Mn                  | 0,42  | mg/l  |
| Kalsium                       | 1,4   | mg/l  |
| Natrium                       | 2,6   | mg/l  |
| Silt Density Index SDI max    | 5     |       |
| Turbiditet                    | >700  | NTU   |

### 3.2 Pure Water Quality

The supplier of Ultra Pure Water Plant must ensure that he can deliver Ultra Pure Water according to this demand:

|   |           |       |
|---|-----------|-------|
| Utseende                                      | Klart     |       |
| Farge   | Fargeløst |       |
| Lukt/ smak                                    | Ingen     |       |
| pH  |           |       |
| Ledningsevne/ konduktivitet etter anlegget    | >16       | MΩ/cm |
| Ledningsevne/ konduktivitet på distr. sløyfen | >12       | MΩ/cm |
| TDS   |           | ppm   |
| Total Organic Carbon TOC                      | 50        | ppb C |
| Copper  | 1         | ppm   |
| Nickel  | 1         | ppm   |
| Chloride                                      | 1         | ppm   |
| Phospathe                                     | 1         | ppm   |
| Sodium  | 1         | ppm   |
| Sulfate                                       | 1         | ppm   |
| Turbiditet                                    | >0,4      | NTU   |

### 3.3 Equipment Description

The plants shall as a minimum consist of:

- Heat exchanger for pre heating of feed water
- Ultra Filtration (UF) Unit
- Reverse Osmosis (RO) Unit
- RO Holding tank
- CIP tank with pump
- Electric Deioniser Unit (EDI)
- Ultra Pure Water (UPW) tank
- Distribution pump
- Circulation pump
- Valves and fittings
- Necessary instruments for a safe and reliable operation

See attachment 1 for principal sketch.

The centre must be fully automatic.

The centre will be installed in a technical room beneath production environment with ambient temperature between 18 - 24° C and a humidity of 40 - 80% (w/o condensation).

### 3.2 Machine Function

☐ The feed water is supplied from the municipal water network operated by Yara AS. Water is entered from two sides (north and south) into the site.

## 4. PERFORMANCE

**4.1 General**

The function and performance of this equipment shall not add risk of any associated systems, processes or critical environment.

**4.2 Performance criteria's**

The water treatment plant must be able to operate at:

- 24h/day, 7 days/week/year
- Have a capacity of 2x10m3/h
- Automatic cleaning/ back washing programme

Consumption:

- All consumptions to be given by supplier.

Quality:

Quality of >16 MOhm or <0,065 micro Siemens/cm at 25 degrees C

Overall equipment efficiency:

- Total Yield: > 75%
- Machine uptime > 99%

**5. UTILITIES**

Consumption to be filled in by supplier:

| Type of utility  | Capacity | Pressure | Temperature | Connection |
|------------------|----------|----------|-------------|------------|
| Water supply     |          |          |             |            |
| Rejected water   |          |          |             |            |
| Compressed air   |          |          |             |            |
| Electrical power |          |          |             |            |
|                  |          |          |             |            |
|                  |          |          |             |            |

All utilities are supplied from floor level (basement).

All technical information must be given in SI units(metric units)

**6. SPARE PARTS**

Supplier shall present a list of spare part, including part number, price and lead time, (recommended spare parts for 2 years) to REC SiTech and give a separate quotation for these, together with the quotation for the bloc centres. The spare parts able to be refurbished must be identified.

**7. CONSUMABLES**

A list of consumables and quantities needed for 24h 7 d a Week operation must be issued together with the quotation for the block centres.

#### **8. MAINTENANCE**

Supplier shall provide a proposed service contract/ agreement for yearly maintenance, identifying the service department contract details, stating maintenance schedule, activities and price together with quotation.

#### **9. TRAINING**

Seller must provide proper training program for operators and maintenance personnel. Detailed agenda and program for training must be sent to Buyer no later than two (2) months before FAT.

Training courses shall be structured and documented as required. Supplier shall recommend the extent of training based on experience with the offered equipment. All Buyer's personnel participating in the training course shall obtain a training certificate showing the extent of the training received.

#### **10. ADDRESSES**

The complete quote together with a Gant chart for the suppliers activities to meet the contract delivery dates shall be send to following addresses within two (2) weeks after receiving this tender document:

1 copy to: Mr. Tor Arne Fagerli  
REC SiTech AS  
Ørnesveien 3  
N-8160 Glomfjord  
Norway

1 copy to: Mr. John Egil Isaksen  
IndustriPlan AS  
Hagaløkkveien 13  
N-1383 Asker  
Norway

Attachment 1

