

TECHNICAL SPECIFICATIONS DOCUMENT FOR PURCHASING REFRACTORY BRICKS AND MORTAR MATERIALS FOR GLASSY BORON OXIDE/ANHYDROUS BORAX PLANT –FURNACES- LOCATED IN BANDIRMA BORON AND ACID FACTORIES ESTABLISHMENT

1. SUBJECT OF THE WORK

1.1. Purchasing **Refractory Bricks and Mortar Materials** with the defined characteristics for using in the melting furnaces (3 pieces) in the Glassy Boron Oxide / Anhydrous Borax Plant located in BANDIRMA Boron and Acid Factories Establishment which is an establishment of ETİ Mine Works General Management.

1.2. In this document, the bidding firm is called the “BIDDER”, ETİ Mine Works General Management is called the “ENTITY”, BANDIRMA Boron and Acid Factories Establishment is called the “PLANT MANAGEMENT” and the BIDDER firm which gets the right to sign the contract is called the “CONTRACTOR” hereinafter.

2. QUANTITY

The dimensions and the amounts of the refractory bricks and mortar materials to be purchased are provided in ANNEX 1.

3. OFFER SCOPE AND SPECIFICATIONS OF REFRACTORY BRICKS AND MORTAR MATERIALS

3.1. Characteristics of the Refractory Bricks and Mortar Materials

3 different types Electro melting Refractory Bricks having different chemical composition and various dimensions and also 2 different types of Mortar Materials are going to be used in Glassy Boron Oxide/Anhydrous Borax Plant The chemical compositions, physical properties, dimensions and quantities related with the required bricks and mortar materials are provided in the following tables and the annexes of this specification.

Table – 1 Chemical Compositions of the Required 3 Different Types of Electro melting Refractory Bricks

| TYPE | ZrO₂ % (min) | Al₂O₃ % (max) | SiO₂ % (max) | Na₂O % (max) | Density (kg/m³) |
|-------------|------------------------------------|--|------------------------------------|------------------------------------|-----------------------------------|
| TYPE 1 | 32 | 51,5 | 16 | 1,5 | 3.550 – 3.850 |
| TYPE 2 | 40 | 45,5 | 15 | 1,5 | 3.800 - 4.100 |
| TYPE 3 | 93 | 1 | 5,4 | 0,6 | 5.300 - 5.450 |

Table – 2 Characteristics of Mortar Materials

| TYPE | ZrO₂ % (min) | Al₂O₃ % (min) | Granule Size (mm) | Density (kg/m³) |
|-------------|------------------------------------|--|------------------------------|---------------------------------------|
| MORTAR 1 | 30 | - | 0-6,0 | 2.900-3.200 |
| MORTAR 2 | 30 | - | 0-0,5 | 2.900-3.150 |

Table – 3 Physical Properties of Electro melting Refractory Bricks

| Methods of Physical Analysis | TYPE 1 | TYPE 2 | TYPE 3 |
|--|---------------|---------------|---------------|
| Refractoriness Under Load (°C) | 1700 | 1700 | 1700 |
| Cold Crush Resistance (Strength) (Mpa) | ≥200 | ≥200 | >350 |
| Glass Corrosion at 1550 °C (index Soda-lime glass 1500 °C x 36 h) | 1,6 | 1,3 | 1,7 |

3.2 All of the refractory bricks must be electro melting and must not have casting cavities and cracks on outer surfaces and also in inner parts.

3.3 Every single refractory brick must be produced separately by performing casting operation. Inner and outer surfaces of the cast bricks must not have been cut. Junction areas of the bricks must have been cut properly.

3.4 All of the materials (ZrO₂, Al₂O₃, SiO₂ etc.) which are needed to manufacture the refractory bricks must have never been used before. Every single brick must have manufacture date, manufacturer serial number, type and dimension information which is formed with measured patterns painted on it.

3.5 All mortar materials must be manufactured newly (*at most within three months*). On the packages of mortar materials, manufacture dates must be indicated. Manufacturing mortar materials with used raw materials is strictly prohibited.

3.6 The chemical and physical properties of refractory bricks and mortar materials to be used in the furnaces is provided in Table-1, Table-2 and Table-3. The dimensions and the amounts of the refractory bricks and mortar materials to be used in the furnaces are provided in ANNEX 1. Detailed drawings of the bricks to be produced are given in Annex-2.

4. STARTING DATE OF EMPLOYMENT, DELIVERY POINT, DELIVERY TIME AND CONDITIONS

4.1. Starting Date Of Employment

Work will start after signing of the contract by the sides.

4.2. Place of Delivery

Domestic delivery point of the refractory bricks and mortar materials is the Spare Parts Warehouse of Bandırma Boron and Acid Factories Establishment. For deliveries from abroad, all of the materials must be delivered as DAP (delivery at place), to the Bandırma Boron and Acid Factories Establishment.

4.3. Delivery Time

The delivery time for all the refractory bricks and mortar materials, in domestic purchases is within **180 (one hundred and eighty)** calendar days (Bandırma Boron and Acid Factories Establishment) starting from just after the date of signing the contract; in overseas purchases is within **180 (one hundred and eighty)** calendar days (DAP Bandırma Boron and Acid Factories Establishment).

5. REQUESTED DOCUMENT, KNOWLEDGE AND SAMPLE

Along with tender offer;

5.1. The dimensions, quantities and characteristics of the refractory bricks and the mortar materials must be in conformity with the requirements specified in the table and the annexes of this specification. The BIDDER must mention the physical and chemical characteristics and manufacturer information for every single type of material which are specified in item 3 of this document in its bid. In case the analysis results of the proposed refractory bricks and mortar materials are outside the specifications required in the technical specifications, the bids shall not be evaluated.

5.2. The BIDDER must provide the thermal conductivities and the temperature profiles of the bricks to ensure that they are not exposed to thermal shock and damage during the startup procedure of the furnaces in its bid.

5.3. The storage conditions and the storage period (shelf life & conditions) for the refractory bricks and the mortar materials must be specified by the BIDDER in the bid.

Before the Delivery;

5.4. The CONTRACTOR must present the certificate which includes the manufacturer and manufacture date information too (*also cold crush resistance (strength), refractoriness under load etc.*) and must also present the analysis reports (*including the parameters certifying the every single parameter in item 3*) obtained from the manufacturer(s) to the ENTITY&PLANT MANAGEMENT.

In case of a difference between the manufacture dates specified on the documents and on the bricks delivered to the ENTITY&PLANT MANAGEMENT, acceptance is not going to occur.

5.5. For domestic purchases, certificates of conformity and analysis reports must be sent by fax to the PLANT MANAGEMENT before the delivery. When the materials are delivered to the PLANT MANAGEMENT printed original copies of the certificates and analysis reports must also be delivered.

For purchases from abroad; certificates of conformity and analysis reports must be sent to the ENTITY and PLANT MANAGEMENT before shipment by fax or e-mail and must be submitted with shipping documents during the shipment process.

6. TENDER OFFER AND TERMS OF PAYMENT

6.1. Tender Offer

Every single part in the scope of this technical specification must be priced and offered separately. Domestic firms are going to give their bids in any currency they would like; TL, USD or EURO and overseas firms will give their bids in USD or EURO.

6.2. Payment

For domestic deliveries, in the case of all the materials are appropriate physically and chemically according to the specification, contract price is going to be paid. In case of any nonconformity, no payment will be made until the appropriate new materials are delivered to the PLANT MANAGEMENT.

After the conformity of the delivered materials is confirmed by the PLANT MANAGEMENT, the CONTRACTOR will arrange an invoice. After the necessary controls completed by PLANT MANAGEMENT/ENTITY, on the fifth day of delivery of the invoice and other related payment documents to Financial Affairs Department Management-ANKARA, the payment will be made.

For deliveries from abroad, before delivery, the CONTRACTOR must send the certificates given by national/international accreditation institutions (*involved in International Accreditation Forum (IAF) Multilateral Recognition Arrangement*) and showing conformity in terms of the chemical and physical characteristics specified under item 3 of this specification by fax to the PLANT MANAGEMENT and ENTITY. A letter of credit will be issued for 100% of the total contract price for all the materials before shipment. 80% of the letter of credit amount is going to be paid upon presentation of the appropriate shipping document to the bank after shipment. And 20% of the letter of credit is going to be paid when analyzes specified in item 3. and item 7. have positive results.

In case of any negative results 20% of the letter of credit is not going to be paid until the new suitable materials are delivered to the PLANT MANAGEMENT.

7. PRODUCT ACCEPTANCE PROSESSES

7.1. The date on which the Refractory Bricks are ready to shipping must be reported to the PLANT MANAGEMENT by the CONTRACTOR before 1 month. If required, to examine the Refractory Bricks the PLANT MANAGEMENT can assign two personnel one of which is from the requesting department. Assigned staff will examine the Refractory Brick in place at ENTITY'S own expense. Every single Refractory Brick will be examined physically (casting, cavities cracks, etc..) and approved by the assigned staff and assigned staff will take the minutes. Refractory Bricks which are not approved by the assigned staff won't be shipped.

7.2. The CONTRACTOR will pre-assemble the furnace by using the bricks of which the dimensions and quantities are specified in the technical specification in production site. To confirm that the dimensions and quantities of all bricks are sufficient for building the furnace, if the ENTITY /PLANT MANAGEMENT wish, they may control this pre-assembling of the furnace and the manufacturing/casting process of the refractory bricks on site, at their own expense.

7.3. Sampling and Analysis

7.3.1 Sampling

The PLANT MANAGEMENT has the right to make carry out physical and chemical analyzes which the PLANT MANAGEMENT evaluates as necessary to an independent and accredited institution or laboratory within a period of 30 (thirty) work days , following the delivery of all materials to the PLANT MANAGEMENT, all related costs paid by the PLANT MANAGEMENT. The CONTRACTOR can't object to that. The CONTRACTOR can't put in a claim for that in any way.

Samples are going to be taken randomly from the delivered refractory bricks and mortar materials by the contractor's assigned personnel under control of the PLANT MANAGEMENT. If the contractor does not have personnel, the contractor shall accept the samples chosen by plant management and cannot object to this situation. The cost of the cutting of refractory bricks sample is obligated by CONTRACTOR. The samples should have the dimensions which are specified by the independent and accredited institution and laboratory and at the quantities which the PLANT MANAGEMENT evaluates as appropriate.

7.3.2. Controls And Tests

- a) **Visual inspection:** The refractory bricks are going to be checked for cracks and porosity and they are going to be tested according to all the necessary features specified in item 3 of the Technical Specification.
- b) **Geometric Control:** The conformity of the refractory bricks according to the principles specified in the Brick Measurement and Quantity table attached to the Technical Specification is going to be checked.
- c) **Strength Test:** Refractoriness Under Load, Cold Crush Resistance (strength), Glass Corrosion at 1550 °C tests may be applied to the refractory bricks. The results of these tests –if applied- must be within the limits specified at Table - 3 above.
- d) **Chemical Analysis:** Refractory bricks are going to be subjected suitability analysis based on the chemical properties, according to the item 3 of the specification; Table - 1, Table - 2 and Table – 3 above.
- e) **Weight Control:** The samples are going to be subjected to weight check by the PLANT MANAGEMENT. In this weight check, volumes of the samples are going to be multiplied by the density of that brick type and the calculated weights are going to be checked whether they have the desired weights.
- f) **Container Control:** All the containers seals are checked by contractor's assigned personnel and PLANT MANAGEMENT in Warehouse of the PLANT MANAGEMENT. If the CONTRACTOR doesn't charge a person, it doesn't object to detection of PLANT MANAGEMENT. The containers that is broken, damaged or hasn't producer firm name and number on it will not be accepted.

7.4. It is going to be considered that the results of analyzes and weight checks are representative for all of the materials which are manufactured at the **TYPES** specified in this specification

7.5. If the physical and chemical characteristics conformity analyzes of delivered materials which will be carried out by an independent and accredited institution or laboratory lasts more than 30 (thirty) work days, the sides will wait until analyzes results are taken. In such a case, the CONTRACTOR shall not object and claim any right. **The results of analyzes realized by that independent and accredited institution or laboratory will be accepted by both sides.** The materials which are not in conformity with this specification are not going to be accepted in any way.

8. WARRANTY

Refractory bricks and mortar materials must be under warranty of the CONTRACTOR against all kinds of material, manufacturing and labor defects for a period of 1 (one) year after delivery to the PLANT MANAGEMENT.

9. PENALTY

9.1. If the CONTRACTOR does not deliver the materials (refractory bricks and/or mortar materials) on time according to the contract, 60 (sixty) calendar days of penalized period will be granted. During that penalized period, for domestic delivery 0.3% (three per thousand) and for abroad delivery 0.07% (seven per ten thousand) at the rate of delayed materials is going to be applied for each single delayed calendar day.

For domestic delivery, delay penalty is going to be deducted from the payments to be made to the CONTRACTOR without any warning and written notice. If this penalty can't be covered from the payment and performance bond and supplementary performance bond (if there is), it is going to be charged separately.

9.2. The materials determined by plant management which are not in conformity with the article 7.5. in the specification are going to be reported by fax/e-mail to the CONTRACTOR and the CONTRACTOR will replace the materials which are reported as unsuitable with the suitable ones in **100 (one hundred) calendar days** with a penalty of **0,3 % (three per thousand)** of the price of unsuitable material for domestic purchases and with a penalty of 0,07 % (seven per ten thousand) of price of unsuitable material for abroad purchases **for each calendar day of delay** which is started to count by the date of the report fax/e-mail of the PLANT MANAGEMENT.

In the event of physical and chemical analyzes (which are going to be realized by an independent and accredited institution) results of delivered materials not being in conformity with the specified values in the item 3 of this specification , the CONTRACTOR shall have a chance for replacement only once.

After the determination of the nonconformity, the replacement of the material must be completed by the CONTRACTOR within the given penalty of delay. In the contrary case the ENTITY has the right to terminate the contract unilaterally. The CONTRACTOR can't object to this situation and can't claim any rights.

Regarding the conformity of the materials delivered to the PLANT MANAGEMENT by replacement, the 7. And 8. items of this specification are going to be taken as basis. If the

materials replaced do not conform to the technical specification; the materials are not going to be accepted and the cancellation item of the contract shall be applied.

9.3. All materials that are damaged during shipment and/or transportation (*broken refractory bricks, damaged mortar material bags etc.*) must be replaced with new ones AS free of charge by the CONTRACTOR in 100 calendar day with a penalty of 0.3% (three per thousand) for domestic delivery and with a penalty of 0,07% (seven per ten thousand) for abroad delivery

9.4 In the event that The CONTRACTOR cannot deliver the materials specified in the technical specifications at the end of the penalty periods mentioned in 9.1, 9.2 and 9.3 articles, an additional appropriate penalty period agreed with the CONTRACTOR is given. Within this second penalty period, The CONTRACTOR must cover the PLANT damages to be incurred (such as loss of production due to deficiency of the materials, failure to meet production orders, etc.) due to failure of supplying the materials specified in this technical specification. This fine amount for the damages shall not exceed 20% of the contract price. In the event that no agreement can be reached with the CONTRACTOR or in case the CONTRACTOR is unable to deliver the materials within second penalty period, the termination clause of the contract is applied.

10. OTHER ISSUES

10.1. PACKING

10.1.1. Each type of refractory bricks which are specified in the quantity table must be packaged separately. Each package must have a list of materials showing the contents of the package.

10.1.2. All necessary storage and shipping precautions must be taken by the CONTRACTOR to prevent any probable damages to the Refractory Bricks and the Mortar Materials during transportation. The materials must be delivered to the PLANT MANAGEMENT as palletized. There must be manufacturer emblem on **every single pallet** which is used in delivery certainly.

10.1.3. Refractory Bricks and the Mortar Materials which will be dispatched shall be loaded in containers and shall forwarded to PLANT MANAGEMENT in this containers which are locked with private seal that producer firm name and container number is written on it. In 3 work days at the latest after the-dispatch, The CONTRACTOR shall send the detailed list including the sequence numbers of containers, numbers of refractory bricks and mortar materials pallets, and which properties and number of bricks and mortars are in which pallets.

11. ANNEXES

- a) Annex 1: Refractory / Mortar Material Quantity Table
- b) Annex 2: Brick Detail Drawings (ING)

12. This technical specification, together with this item, consists of a total of 12 (twelve) items.