

**BANDIRMA BORON AND ACID WORKS PLANT MANAGEMENT
 VITREOUS BORON OXIDE / DEHYDRATED BORAX PRODUCTION PLANT
 REFRACTORY BORAX AND MORTAR MATERIALS SUPPLY
 TECHNICAL SPECIFICATIONS**

ARTICLE 1: SUBJECT OF WORK

1.1. Supply of Refractory Bricks and Mortar Materials with the defined characteristics for use in the melting furnaces (3 units) located at the Vitreous Boron Oxide/Dehydrated Borax Production Plant, which is in operation under Eti Mine Works General Management, Bandırma Boron and Acid Works Plant Management, Boron Oxide Factory Unit.

1.2. Eti Mine Works General Management will be referred as the “ENTITY”, Bandırma Boron and Acid Works Plant Management will be referred as the “PLANT MANAGEMENT”, the bidding firms will be referred to as the “BIDDER” and the successful bidder of the tender will be referred to as the “CONTRACTOR” hereinunder.

ARTICLE 2: REQUIRED QUANTITY

Dimensions and quantities of the refractory bricks and mortar materials to be procured are provided in Annex.1.

ARTICLE 3: BID SCOPE AND CHARACTERISTICS OF THE REFRACTORY BRICKS AND MORTAR

3.1. Characteristics of Refractory Bricks and Mortar Materials

Electromelting Refractory Bricks of 3 different types of chemical composition and various dimensions and Mortar Materials of 2 different types will be used at the Vitreous Boron Oxide/Dehydrated Borax Production Plant. Chemical compositions, physical characteristics, dimensions and quantities of the required bricks and mortar materials are specified in the annexes of the specification.

Table-1 Chemical Composition of Electromelting 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- Mortar Characteristics

TYPE	% ZrO ₂ (min)	% Al ₂ O ₃	Grain Size (mm)	Density (kg/m ³)
MORTAR 1	30	-	0-6.0	2,900-3,200
MORTAR 2	30	-	0-0.5	2,900-3,150

Table - 3 Physical Characteristics of the Electromelting Refractory Bricks

Physical Analysis Methods	TYPE 1	TYPE 2	TYPE 3
Refractory Characteristic Under Load (°C)	1700	1700	1700
Cold Compression Strength (Mpa)	≥200	≥200	>350
Glass Corrosion at 1500°C (index Soda-lime glass 1500 °C x 36 h)	1.6	1.3	1.7

3.2. All refractory bricks will be electromelting and free of casting cavities. The surface and inner sections of all refractory bricks will be free of cracks and casting cavities.

3.3. Each refractory brick will be produced by casting separately. The inner and outer casting surfaces of the cast brick shall be uncut. The joining areas of the will have a clean-cut.

3.4. All materials used in the production of refractory (ZrO₂, Al₂O₃, SiO₂ etc.) will be unused and new production. Every brick piece will have the production date, producer firm's serial number, brick type and dimensions painted on them with templates in a comprehensible manner.

3.5. All mortars will be new production (must be produced in the last 3 months). There will be markings on the mortar packaging indicating the production date of material. Used bricks will not be used strictly in production of the mortars.

3.6. The chemical and physical characteristics of the bricks and mortars to be used in the furnaces are specified in TABLE-1, TABLE-2 and TABLE-3. Dimensions and quantities of the refractory bricks and quantities table for mortar materials to be used in the furnaces are provided in Annex.1. Details drawings of the bricks to be produced are provided in ANNEX-2.

ARTICLE 4- WORK COMMENCEMENT DATE, DELIVERY PLACE AND CONDITIONS

4.1. Work commencement date:

The work will start as of the date of signing of the contract by the Parties.

4.2. Delivery Place:

Inland delivery place of the refractory bricks and mortar materials is Bandırma Boron and Acid Works Plant Management Spare Materials Storehouse. Delivery place from abroad will be DAP Bandırma Boron and Acid Works Plant Management.

4.3. Delivery Period:

Material delivery term: will be 180 (hundred and eighty) calendar days in inland purchases (Boron and Acid Factories Plant Management Spare Materials Storehouse) and 180 (hundred and eighty) calendar days in purchases from abroad (DAP Bandırma Boron and Acid Works Plant Management) as of the date of signing of the contract for all refractory bricks and mortar materials.

ARTICLE 5: REQUIRED DOCUMENTS, INFORMATION AND SAMPLE

At the bidding phase;

5.1. Dimensions, quantities and characteristics of the refractory bricks will be in conformity with the characteristics provided in the tables and annexes of the specifications. *BIDDERS will submit documents obtained from the producer firm, which bear seal and signature of the producer firm, containing physical-chemical characteristics for each type of material specified in Article 3 and information regarding the producer firm along with their bids.* In the event of the analysis results of the refractory bricks and materials offered being outside the specs provided in the Technical Specifications, the bids will not be taken into assessment.

5.2. The BIDDERS will present thermal conductivity, temperature profiles for operation etc. information so as to ensure that the bricks are not subjected to thermal shock and damage during startup, together with the bid.

5.3. The conditions and period of storage for the refractory bricks and mortars (stocking conditions and life) will be provided by the BIDDERS along with the bid.

Prior to Delivery;

5.4. CONTRACTOR will submit the certificate obtained from the producer firm that contains information on the producer firm and production date and the analysis reports (containing analysis information regarding the parameters in Article 3) for the refractory bricks and mortars to the ENTITY/PLANT MANAGEMENT. If it is determined that the production date information on the documents submitted by the CONTRACTOR to the ENTITY/PLANT MANAGEMENT contradicting the production dates on the bricks, acceptance of the materials will not be made.

5.5. Conformity certificate for the materials will be sent to the PLANT MANAGEMENT by fax in inland procurements (together with analysis reports) prior to delivery and will be handed over to the PLANT MANAGEMENT together with the materials at delivery.

In procurement from abroad, it will be sent to the ENTITY and the PLANT MANAGEMENT by fax or e-mail before delivery and will be provided with the shipping documents at shipping stage.

ARTICLE 6: BID AND PAYMENT CONDITIONS:

6.1. Bid:

Each piece in the scope of the technical specifications will be priced and offered separately. Domestic firm intending to participate in the tender may present their bids in TL, USD or EURO currencies and firms from abroad may present their bids in USD or EURO currency.

6.2. Payment:

In local delivery; in the event of the refractory bricks and the mortar materials delivered to the ENTITY being in conformity with the chemical and physical characteristics in Article 3 of the Technical Specifications, payment will be made for the refractory brick-mortar materials on the basis of the price in the contract and in the event of non-conformity, no payments will be made until new materials in conformity are delivered to the CONTRACTOR by the ENTITY.

The CONTRACTOR will issue the invoice after conformity of the materials delivered is confirmed by the PLANT MANAGEMENT. After necessary controls are realized by the PLANT MANAGEMENT/ENTITY, the payment will be realized on the 5th day after transfer of the invoice and other documents related with payment to the Financial Affairs Department.

In delivery from abroad; CONTRACTOR will send certificates evidencing conformity of the materials to the characteristics required in Article 3 of the Technical Specifications, issued by national/international accreditation institutions (*in the scope of International Accreditation Forum Mutual Recognition Agreement*) to the PLANT MANAGEMENT and the ENTITY by fax or e-mail. A letter of credit will be opened for 100% of the total price of all refractory and mortar materials in the scope of the total contract price prior to shipment, and 80% will be paid upon loading and presentation of the shipping documents to the bank, and the remaining 20% of the letter of credit will be paid after conformity specified in Article 7 is achieved in terms of the chemical and physical characteristics required in Article 3 of the technical specifications.

In the event of any non-conformity, the balance of the letter of credit will not be paid until new materials in conformity are delivered by the CONTRACTOR to the PLANT MANAGEMENT.

ARTICLE 7: ACCEPTANCE PROCESSES

7.1. The readiness of the bricks for shipment will be notified 1 month in advance. Plant Management may assign two personnel with one personnel being from the unit requesting the tender for the control of the bricks, if deemed necessary. Assigned personnel will inspect the bricks produced at the location with all costs being to the account of the PLANT MANAGEMENT. All bricks will be examined physically by the control committee (casting

cavities, cracks etc.) and approved and recorded in a protocol by the control committee. Bricks not passing the approval of the control committee will not be shipped.

7.2. For the bricks, of which the dimensions and quantities are given in the specifications, the CONTRACTOR will pre-assemble the furnace at the production place of the refractory bricks and if deemed necessary the PLANT MANAGEMENT/ENTITY will be entitled to inspect this pre-assembly and the brick casting process to confirm conformity of the dimensions and quantities of all bricks for assembly of the furnace, with all costs to the account of the PLANT MANAGEMENT/ENTITY.

7.3. Sampling and Analysis

7.3.1. Sampling

The PLANT MANAGEMENT is entitled to have analyses deemed necessary in required quantities out of the physical and chemical analyses specified in Article 3, realized by an accredited independent establishment in with all costs to its account within 30 (thirty) work days as of the date of delivery of the materials to the PLANT MANAGEMENT. In this case, the firm will not be entitled to any objections or any claims.

Samples will be taken by random sampling from the refractory bricks and mortar materials delivered under the control of the PLANT MANAGEMENT and supervision of the personnel assigned by the CONTRACTOR. In the event of the CONTRACTOR not assigning personnel, it shall accept the samples selected by the PLANT MANAGEMENT and will not be entitled to any objections. The costs of the cutting samples from the bricks will be borne by the CONTRACTOR. Samples to be taken will be in dimensions to be specified by the accredited independent laboratory and in quantities required by the PLANT MANAGEMENT.

7.3.2. Control and Tests

a) Visual Inspection: Crack and porosity controls will be conducted on the refractory bricks along with the controls and tests specified and required in Article 3 of the Technical Specifications.

b) Geometrical Control: The refractory bricks will be subjected to controls to ensure conformity to the requirements specified in the Brick Dimensions and Quantities table given in the Technical Specifications.

c) Strength Control: Refractory Characteristic under Load, Cold Compression Strength, Glass Corrosion Tests at 1550 °C may be carried out on the refractory bricks. The analysis results of these tests will be in conformity of the requirements specified in Table 3.

d) Chemical Analysis: Refractory bricks will be subjected to conformity analysis in terms of chemical composition analysis requirements specified in Table-1, Table 2, Table 3 of Article 3 of the Technical Specifications.

e) Weight Control: Samples taken will be subjected to weight control by the ENTITY. During the weight control, the volumes of the samples will be multiplied with the density of the brick type and controlled in terms of whether the required value is achieved.

f) **Control of Containers:** All container seals will be controlled at the PLANT MANAGEMENT's storehouse under the supervision of a personnel assigned by the CONTRACTOR and the PLANT MANAGEMENT. If the CONTRACTOR does not assign a personnel, it will not be entitled to any objections. Broken, damaged containers or those that do not have the firm's name and number on them will not be accepted.

7.4. It will be construed that the results of the analyses and weight control of the samples taken will be representative for all materials produced in the scope of the technical specifications.

7.5. In the event of tests for physical and chemical conformity, carried out by an accredited independent establishment, taking a period longer than 30 (thirty) work days, the conclusion of analysis results will be awaited. CONTRACTOR will not be entitled to any objections or claims based on this. Results of these laboratory analyses will be accepted by both parties. Refractory bricks and mortar materials, which are determined as not being in conformity with the technical specifications as a result of this control, will not be accepted.

ARTICLE 8: WARRANTY

Refractory bricks and mortars will be under warranty for a period of 1 (one) year for all kinds of material, production and workmanship defects as of the date of delivery to the ENTITY.

ARTICLE 9 – FINE

9.1. In the event of failure of the CONTRACTOR in delivering the refractory bricks and/or mortar materials in the required period in conformity with the contract, a **period of 60 (sixty) calendar days** will be given under fine. During the period under fine, a fine will be applied over the price of the delayed goods for each day at a rate of 0.3% (three per thousand) for inland delivery and 0.07% (seven per ten thousand) for delivery from abroad.

Delay fine will be deducted from the payments due to the CONTRACTOR without any notices or written notifications made, in inland delivery. In the event of said fine amount not being recoverable from the payments and performance bonds and supplementary performance bonds, if any, these will be collected separately from the CONTRACTOR.

9.2. Materials, which are determined as not being in conformity with the technical specifications according to the results of the analysis specified in Article 7.5, will be replaced by the CONTRACTOR with new ones, free of charge. This situation will be notified to the CONTRACTOR by fax/e-mail. CONTRACTOR will be given a period of **100 (hundred) calendar days**, which shall start upon notification, for replacement of the non-conforming materials with new ones. During the period under fine, a fine will be applied over the price of the non-conforming goods for each calendar day at a rate of 0.3% (three per thousand) for inland delivery and 0.07% (seven per ten thousand) for delivery from abroad. All costs incurred in said replacement process (customs charges, shipment, insurance etc. during the import/export processes etc.) will be borne by the CONTRACTOR.

In the event of the results of the physical and chemical analysis made at an accredited independent establishment for the refractory bricks and mortar materials not being in conformity

with the values specified in Article 3 of the Technical Specifications, the CONTRACTOR will be given the chance for **replacement maximum 1 (one) time only**.

Following determination of the non-conformity, the material replacement will be made by the CONTRACTOR within the period under fine. Otherwise, the ENTITY will be entitled to terminate the contract unilaterally. In this case, the firm will not be entitled to any objections or any claims.

Articles 7 and 8 of the Technical Specifications will be taken as the basis regarding conformity of the replaced refractory bricks and mortar materials, which are delivered to the PLANT MANAGEMENT. In the event of the replaced refractory bricks and mortar materials not being in conformity with the technical specifications, the materials will not be accepted, and the termination article of the contract will be applied.

9.3. All materials damaged during delivery will be replaced by the material CONTRACTOR with new ones, free of charge, within a period pursuant of 100 calendar days subject to a fine over the price of the damaged part (*refractory brick breaks, burst mortar material bags etc.*) per calendar day at a rate of 0.3% (three per thousand) for inland delivery and 0.07 (seven per ten thousand) for delivery from abroad. All costs incurred in said replacement process (customs charges, shipment, insurance etc. during the import/export processes etc.) will be borne by the CONTRACTOR.

9.4. In the event of failure of the CONTRACTOR in delivery in products in conformity with the requirements listed in the technical specifications at the end of the periods under fine, as stipulated in Articles 9.1 and 9.3, another suitable period agreed with the CONTRACTOR will be given. The operation losses resulting of the PLANT MANAGEMENT from supply of materials that are not in conformity with the technical specifications in this second period under fine (production loss, failure in fulfilment of the orders due to missing materials etc.) will be covered by the CONTRACTOR. This fine amount cannot exceed 20% of the contract price. In the event of an agreement not being reached with the CONTRACTOR or failure of the CONTRACTOR in delivering the product in conformity with the specified characteristics within the period under fine the termination article of the contract will be applied.

ARTICLE 10: OTHER ISSUES

10.1. PACKING

10.1.1. Each type of refractory brick specified in the Brick Quantity Table will be packed separately. A list of materials will be provided on each package, containing the package contents.

10.1.2. Necessary packaging and shipping measures will be taken by the CONTRACTOR to prevent damaging of the Refractory Bricks and Mortar Materials during shipment. Materials will be shipped on pallets. Each pallet used in shipment of the refractory bricks and mortar materials to the ENTITY must definitely have the emblem of the producer firm.

10.1.3. Refractory bricks and mortars ready for shipment will be placed in containers, made of steel interior materials and bearing the name of the firm and the container number, which are locked with special container seals and shipped to the plant management. Within a period of maximum 3 work days as of the shipment process, the CONTRACTOR will send a detailed list

indicating the order numbers of the containers sent, the numbers of the refractory bricks and mortar pallet inside and the characteristics and quantities of bricks and mortars on each pallet, to the PLANT MANAGEMENT.

ARTICLE 11: ANNEXES

- a) Annex 1: Brick and Mortar Quantity Table
- b) Annex 2: Brick Detail Drawings

12. This Technical Specification consists of 12 (twelve) articles including this article

TECHNICAL SPECIFICATION PREPARED BY (Date: 12/10/2020)

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