

**TECHNICAL SPECIFICATIONS FOR ZIRCONIA BASED REFRACTORY BRICKS
TO BE PURCHASED FOR USE AT THE MELTING FURNACE AT THE
ANHYDROUS BORAX FACTORY UNIT**

ARTICLE 1: SUBJECT OF WORK

Subject of this technical specification covers supply of refractory bricks to be used at the Anhydrous Borax Works Unit of our Management in conformity with the required characteristics and period, and delivery to the Entity.

The bidding firms will be referred to as the "BIDDER", Eti Mine Works General Management will be referred to as the "ENTITY", Kirka Boron Works will be referred to as the "PLANT MANAGEMENT" and the BIDDER who is awarded the contract will be referred to as the "CONTRACTOR" herein after.

ARTICLE.2- CHARACTERISTICS OF THE REFRACTORY BRICKS AND MORTARS

Zirconia based refractory bricks of different chemical compositions and various dimensions, will be used at the Anhydrous Factory Unit. Chemical compositions related with required bricks, their dimensions and the quantities are provided in the following tables.

Table -1: Chemical Composition of Zirconia based Refractory Bricks

TYPE	ZrO₂+HfO₂ % (min.)	Al₂O₃ % (max.)	SiO₂ % (max)	Other % (max)	Density (mkg/m³) (min.)
TYPE-2	40	46	12	2	3,900

ARTICLE 3: REQUIRED QUANTITIES

Table-2 Supply List for Zirconia Based Refractory Bricks

LIST OF REQUIRED REFRACTORY BRICKS-1			
1	FEEDER WALL		
	Material Type	Dimension (mm)	Qty
	TYPE -2	600x200x200	90
	TYPE -2	440x200x200	17
	TYPE -2	250x200x200	10
TYPE -2	570x540x200	2	

2	FLANK WALL		
	Material Type	Dimension (mm)	Qty
	TYPE -2	800x200x200	12
	TYPE -2	150x500x200	26
	TYPE -2	350x600x200	26
TYPE -2	FIGURE -1	26	

3	SIDE WALL		
	Material Type	Dimension (mm)	Qty
	TYPE -2	500x200x200	90
	TYPE -2	600x250x200	108
	TYPE -2	350x250x200	24
	TYPE -2	350x480x200	8
	TYPE -2	500x480x200	209
	TYPE -2	300x250x200	16
TYPE -2	420x60x200	16	

4	FLANK VAULT		
	Material Type	Dimension (mm)	Qty
TYPE -2	FIGURE -11	4	

5	TANK AREA		
	Material Type	Dimension (mm)	Qty
	TYPE -2	1000x200x350	28
	TYPE -2	830x200x350	16
	TYPE -2	500x200x350	180
TYPE -2	FIGURE -4	12	

	TYPE -2	FIGURE -5	12
	TYPE -2	600x230x200	12
	TYPE -2	200x150x230	32
	TYPE -2	200x528x350	12
	TYPE -2	450x465x140	12
	TYPE -2	465x320x140	12

6	ROOF AREA BRICK		
	Material Type	Description	Set
	TYPE-2	FIGURE -17	3

7	BURNER BRICK		
	Material Type	Description	Qty
	TYPE -2	FIGURE -16	24

8	REPAIR BRICK		
	Material Type	Dimension (mm)	Qty
	TYPE -2	230x114x50	1.000

ARTICLE 4: WORK ENVIRONMENT AND CONDITIONS

4.1. Work Environment: (This article is left blank.)

4.2. Process Description (This article is left blank.)

4.3. Auxiliary Units: (This article is left blank.)

ARTICLE 5: WORK COMMENCEMENT DATE, DELIVERY TERM, DELIVERY PLACE AND CONDITIONS

5.1. Work commencement date:

5.1.1. Inland: Work will be started upon signing of the contract.

5.1.2. Abroad: The work commencement date is the contract signing date.

5.2. Delivery period: Delivery time for all the refractory bricks starting from just after the date of signing the contract, in domestic purchases; is within 240 (two hundred and forty) calendar days (Spare Parts Storehouse of Kirka Boron Works), in overseas purchases; is within 240 (two hundred and forty) calendar days (DAP Kirka Boron Works).

5.3. Delivery Place and Conditions

5.3.1. Inland: In domestic purchases, the refractory bricks will be delivered to Spare Parts Storehouse of Kirka Boron Works of the Entity. All costs related with transportation and insurance will be borne by the Contractor.

5.3.2. Abroad: Delivery place will be DAP KIRKA BORON WORKS in international purchases.

5.3.3. Subsequent to delivery of all materials to Kırka Boron Works, the physical and chemical examinations will be realized by the Entity/Plant Management within 30 (thirty) workdays. In the event of tests for physical and chemical conformity, carried out by or for the Entity/Plant Management taking a period longer than 30 (thirty) days, the results will be awaited until the analysis results are concluded. Contractor will not be entitled to any objections or claims based on this.

5.4. Battery Limit (This article is left blank.)

5.5. Entity's Responsibility: (This article is left blank.)

5.6. Contractor's Responsibility: (This article is left blank.)

ARTICLE 6: REQUIRED DOCUMENTS, INFORMATION AND SAMPLE

6.1. Bidders will specify the origin (country), supplying company and production factory information of the refractory bricks materials they shall supply **in their bids**.

6.2. The storage period of the refractory bricks **will be specified in the bids** by the Contractor along with the storage conditions.

ARTICLE 7: BID AND PAYMENT CONDITIONS:

7.1. Bid and Payment Conditions:

7.1.1 Domestic Supply: Bids will be presented in Turkish Liras, American Dollars or Euro currency. Payment will be made at once following determination of the fact that all refractory bricks and mortars delivered to the Entity are in conformity with the chemical and physical requirements specified in Article 9 of the Technical Specifications, as a result of the tests

conducted. No advance payment will be made for this work. In the event of any non-conformity being found in the materials delivered to the Contracting Entity, no payments will be made until conforming new materials are delivered by the Contractor to the Entity (These materials will be subjected to the physical and chemical analysis, specified in Article 9 of the technical specifications, also).

7.1.2. Supply from Abroad: Bids will be presented in American Dollars or Euro currency. A letter of credit will be opened for 100% of the total price of the refractory bricks prior to shipment in the scope of the total contract price, and 10% of the total order amount will be paid upon loading and presentation of 100% shipping documents to the bank, free of errors, and 90% will be paid upon achievement of positive results in the analysis to be carried out by the Entity after delivery.

7.2. Partial Bids: Bids will be presented for the complete work.

7.3. Advance Payment: No advance payment will be made for this work.

7.4. Performance Guarantee: No performance guarantee will be taken.

7.5. Elements other than Price: Elements other than price will not be taken into consideration in the bids.

ARTICLE 8: INSTALLATION, TEST, STARTUP AND PERFORMANCE TESTS

(This article is left blank.)

ARTICLE 9: ACCEPTANCE AND ANALYSIS PROCESSES

Materials delivered by the Contractor will be controlled and inspected in the scope of the following conditions.

9.1. Random samples will be taken from the refractory bricks delivered to the Entity under the supervision of the personnel to be assigned by the Contractor under the control of the Entity. If the Contractor does not assigned any personnel, The Contractor will accept the samples

selected by the Entity and will not be able to object this situation. Brick samples will be cut into equal slices of 50 mm X 50 mm X 50 mm in accordance with the analysis procedures. The brick samples to be formed will be prepared by removing the 20 mm thick cover part from the outer edge surfaces of the selected brick, and then dividing into slices in sufficient quantities from the middle parts in the above-mentioned dimensions. Expenses of cutting samples from refractory bricks belong to the Contractor. The samples taken will be subjected to physical and chemical analysis at an accredited laboratory or a university laboratory to be designated by the Entity with the related costs being borne by the Entity. Results of these laboratory analyses will be accepted by both parties.

9.2. Physical Characteristics

Visual Inspection: Crack, porosity and camber, protrusions etc. on the joining surfaces will be controlled on the refractory bricks along with the controls and tests related with all issued required and specified in Article 12 of the technical specifications.

Geometrical Control: Conformity control of refractory bricks to the dimension requirements specified in Table-2 of Article 3 of the Technical Specifications.

9.3. Chemical Characteristics;

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

9.4. Samples taken will be subjected to weight control. During the weight control, the volumes of the samples will be multiplied with the density of the brick type specified in Table-1 and controlled in terms of whether the required value is achieved. It will be accepted that the results of the analyses and weight control will be representative for all materials produced in the scope of the technical specifications.

9.5. If any non-conformities are found during the physical and chemical analyses and the weight controls of the refractory bricks, Contractor will replace the non-conforming materials with new conforming ones with all costs (import and export customs charges, loading, shipping, insurance, packaging) to his account and will replace these with conforming materials, with all costs (excluding VAT to be incurred at import customs, import and export

customs charges, loading, shipping, insurance, packaging, re-analysis costs) to his account, free of charge, within a period of 100 (hundred) calendar days with fine. In this case, the Contractor will not be entitled to any objections or claims based on this.

ARTICLE 10: WARRANTY

10.1. Material Guarantee: Refractory bricks will be under warranty for a period of 1 (one) year for all kinds of material, production and workmanship defects.

ARTICLE 11: FINE

11.1. Domestic Supply :In case the contractor does not deliver the goods on time or in full in accordance with the contract, the contractor is given a penalty period specified in the administrative specification/contract, equal to 0.3% (three per thousand) of the delayed goods price for each day of delay. For the goods/materials delivered by the Contractor within the scope of the contract, the goods/materials determined to be defective or defective as a result of the physical and chemical analyzes or controls made by the Administration and which are decided to be returned partially, are submitted to the contractor for the replacement of the goods/materials in accordance with the technical specifications, for each delayed day. The penalty period specified in the administrative specification/contract is given at the rate of 0.3% (three per thousand) of the price. This penalty period cannot exceed 100 (one hundred) calendar days.

11.2. Supply from Abroad : In case the contractor does not deliver the goods on time or in full in accordance with the contract, the contractor is given a penalty period specified in the administrative specification/contract, at the rate of 0.07% (seven per ten thousand) of the delayed goods price for each day of delay. For the goods/materials delivered by the Contractor within the scope of the contract, the goods/materials determined to be defective or defective as a result of the physical and chemical analyzes or controls made by the Plant Management and which are decided to be returned partially, are submitted to the contractor for the replacement of the goods/materials in accordance with the technical specifications, for each day of delay. The penalty period specified in the administrative specification/contract is given at the rate of 0.07% (seven ten thousandths) of the price. This penalty period cannot exceed 100 (one hundred) calendar days.

11.3. In the event of the refractory bricks to be delivered to the Plant Management not being in conformity based on the results of the analysis and weight control, which the Plant Management will conduct/have conducted, the Contractor will be granted a chance to replace these for 1 (one) time only. The maximum period for replacement will be 100 (hundred) calendar days, with fine, and no additional period under fine will be granted. 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.

11.4. Delay fine will be deducted from the payments due to the contractor without any notices or written notifications made. 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 through legal means. In this case, the Contractor will not be entitled to any objections or any claims.

ARTICLE 12: OTHER ISSUES

12.1. All zirconia based refractory bricks to be supplied will be produced with electromelting molding and will be free of casting cavities.

12.2. Each of the refractory bricks included into the FEEDER WALL, FLANK WALL, SIDE WALL, FLANK VAULT, TANK AREA, ROOF AREA BRICK, BURNER BRICK groups will be produced with separate casting for each one. The inner and outer casting surfaces of the cast brick will not be cut. The joining areas (laying areas) of the bricks will have a clean-cut. There shall be strictly no cambers, protrusions or similar faults at the joining areas and the joint of each brick contacting one another will be balanced and will have a structure that with the complete surface covering one another (balanced).

12.3. The bricks of 230x114x50 mm, required as REPAIR BRICKS, are not required to be cast separately and all surfaces will have a clean-cut so as to ensure that the chemical composition of the bricks of the REPAIR BRICKS are not changed.

12.4. Figures for the refractory bricks for which the quantities are given in Table-2 (Figure-1,4,5,7,11,16,17) are given in the annex of the technical specifications.

12.5. One set of roof (arch) area refractory bricks, specified in Table-2, will be produced in the dimensions and shapes shown in Figure-17. Each roof brick (refractory brick block, constituting the roof area; composed of 10 (ten) layers of skewback group of a total of 20 (twenty) with 2 (two) in each layer and the 10 layers of the arch bricks group of total 90

(ninety) with 9 (nine) in each layer) will be a refractory brick that are not deformed with smooth cutting surfaces, divided into pieces. Arch block, divided into segments, will be free of deformation, static weakness and disjointedness with other segments.

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

12.7. All materials (raw materials) used in the production of refractory bricks (ZrO_2 , Al_2O_3 , SiO_2 etc.) will be new and previously unused materials and each brick will have the production date written on it , and none of the bricks will be previously used bricks.

12.8. Dimensions and characteristics of all refractory bricks will be in conformity with dimensions and characteristics provided in the tables.

12.9. Each group specified in Table-2 will be packed separately. A list of materials will be provided on each package, containing the package contents and quantities.

12.10. Each piece in the scope of the technical specifications will be priced and offered separately. Partial delivery will not be accepted.

12.11. Contractor will be required to submit all kinds of information and documents, specified in the specifications of the refractory bricks to be delivered, to the Entity.

12.12. Physical and chemical analysis certificate (ISO 17025), issued by a laboratory or establishment with international accreditation, will be presented along with the shipping documents to evidence conformity of the material at the time of shipment for shipments from abroad and at the time of delivery for inland shipments. **certificate/information submitted will not be binding upon receipt in any way.** These will be only for preliminary information purposes.

12.13. The subject zirconia based refractory bricks in Table-2 **must be resistant against 1700°C temperature and abrasion.**

12.14. Contractor will present certificates to Entity at the time of delivery evidencing conformity of the materials to the characteristics required in Article 9 of the technical specifications, issued by national/international accreditation institutions (in the scope of International Accreditation Forum Mutual Recognition Agreement).

12.15. After the production of the Roof Area bricks expressed in Figure-17, each set whose quantities are specified in Table-2 will be pre-installed separately, photographed separately in detail and video shot and presented to the Entity digitally (USB, CD, DVD) before delivery.

12.16. If the Entity requires, it will be able to pre-control the production facility to examine the issues specified in this technical specifications. This pre-control does not replace or eliminate the acceptance and inspection conditions in this technical specifications.

ARTICLE 13: PACKING

13.1. All refractory bricks will be packed in wooden cases of minimum 8 mm in thickness. The covers of the wooden cases will be minimum 10 mm in thickness.

13.2. The wooden pallets on which the refractory bricks will have four sides and will provide for easy placement of forklift blades in all four sides. Pallets will be capable of carrying minimum two times the weight of the load on them.

13.3. Figure-16 Burner bricks group will be packed separately on their own and will not be together with other groups.

13.4. Figure-11 Anhydrous Borax Melting Furnace Flank Vault group will be packed separately on their own and will not be together with other groups.

13.5. Brick types and dimensions will be specified comprehensively by painting templates on each brick.

13.6. Sets to be used for each furnace in Figure-17 Roof Area Bricks group will be numbered with different colors from one another. Each color group will be packed together on their own. Figure-17 Roof Area Bricks group will be packed together on their own.

13.7. All materials will be packed in a suitable manner which will not fall apart during handling and stowing. Contractor will be responsible for taking all necessary measures on this issue. In case of occurrence of all kinds of breaking, falling apart etc. events causing damaging of the materials as a result of non-conforming packaging, the damaged materials will be replaced by Contractor unconditionally, free of charge on one to one basis with new and unused ones.

ARTICLE 14: ARTICLES OF THE TECHNICAL SPECIFICATIONS

This technical specification consists of 14 (fourteen) articles, including this article.

ANNEXES

Annex-1: Figure-1, Figure-4, Figure-5

Annex-2: Figure-17

Annex-3: Figure-11

Annex-4: Figure-16

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