# Fire Clay Bricks and Blocks

| | | |
|---|---|---|
| PRODUCT CODE | : | 29105, 529107, 29111 and 29112 |
| QUALITY AND STANDARDS | : | N.A. |
| PRODUCTION CAPACITY | : | Quantity: 550000 Nos. (per annum)<br>Value : Rs. 1, 48, 00, 000 (per annum) |
| MONTH AND YEAR OF PREPARATION | : | March, 2003 |
| PREPARED BY | : | Small Industries Service Institute<br>Rajajinagar Industrial Estate,<br>Bangalore-560 044.<br>Phone Nos.: 080-3351581, 3351582<br>Fax: 080-3351583<br>E-mail: sisibng@bgl.vsnl.net.in |

## Introduction

Fire clay refractories are commonest of all refractories. Fire clay refractories containing less than 40% alumina are classified into: (1) Medium heat duty, and (2) High heat duty fire clay refractories with alumina content of over 30% but below 40%. Fireclay refractories are made into bricks and blocks of various standard sizes and shapes and also as per specific requirement of user industries.

## Market Potential

Fire clay refractory products are used by almost every industry, which has heat processing in the production process Iron and steel, cement, petrochemicals, sugar, non-ferrous metal, glass and ceramic industries are some of the user industries. Iron and Steel industries account for 75% of the consumption of refractories. Thus, the demand for refractories is dependent on the growth of iron and steel industries in the country.

## Basis and Presumptions

*Efficiency:* 75% efficiency of manpower and machinery is considered. It is envisaged that the kiln will run its complete cycle uninterrupted, pressing operations for 3 shifts a day and other operations on a single shift of 8 hours and for 300 days in a year.

*Time Period:* Full capacity utilisation is expected to be achieved within one year from the commencement of production.

*Labour Wages:* The minimum applicable wages are taken into account.

*Interest Rate:* 14% per annum on total investment is taken into account.

*Margin Money:* 25% of the total investment may be brought in by the promoters.

*Pay Back Period:* About 3½ years.

*Land Cost and Construction Cost:*

a) Land Cost: Rs. 200 per sq.mtr.

b) Construction Cost: Office and stores: Rs 2000 per sq.mtr and Working shed: Rs. 1250 per sq.mtr.

## IMPLEMENTATION SCHEDULE

| *Sl. No.* | *Activity* | *Period (in months)* |
|---|---|---|
| 1. | Selection of site<br>Provisional registration from DIC | 2 |
| 2. | Availability of finance<br>Construction of building<br>Procurement of Machinery and Equipment<br>Availability of Electrical Power<br>Erections and Commissioning | 4 |
| 3. | Recruitment of manpower<br>Trial runs and commencement commercial production | 2 |
| | Total implementation period | 8 |

## TECHNICAL ASPECTS

### Process of Manufacture

*Raw Materials:* Fire clays of both plastic and non-plastic varieties, refractory grog (broken fire bricks) and other high alumina minerals like kyanite, sillimanite and bauxite are the raw materials for making fire clay bricks and blocks.

*Processing:* Fire clays, plastic clays, non plastic materials like grog and other high alumina materials are procured in powdered form. Non plastic materials are screened in vibratory screen into various particle sizes, viz., coarse, medium, and fine varieties. The finely ground fire clays and non-plastic materials of various particle sizes are mixed in suitable proportions to form a batch. The batch is added into the Muller mixer. The addition of water is varied to form consistent mixture either for dry or semi dry pressing in the case of standard size fire clay bricks or for pneumatic ramming in the case of fire clay blocks and special shapes.

*Drying:* While dry pressed fire clay bricks are ready for stacking in the kiln for firing with little or no drying time, fire clay blocks and special shapes moulded by pneumatic ramming and hand moulding are loaded into the kiln only after being allowed for sufficient drying.

*Firing:* Likewise any other refractories, pre-determined time-temperature cycle is followed for firing of fire clay bricks and blocks 1350°C–1400°C being the optimum firing temperature.

### Quality Control and Standards

| | |
|---|---|
| IS 1526 | Sizes and shapes for fire clay bricks (230 mm series) |
| IS 5459 | Sizes and shapes for fire clay blocks (300 mm and higher series) |
| IS 6 | Moderate heat duty fire clay refractories, Group-A |
| IS 8 | High heat duty fire clay refractories |
| IS 4041 | Glossary of terms relating to refractory materials. |

### Production Capacity (per annum)

Quantity : Fireclay Bricks and Blocks: 550000 Nos.

Value : Rs. 1480000

Motive Power 50 HP.

### Pollution Control

Cyclonic dust collectors, exhaust and combustion control are required to be installed with the machineries.

### Energy Conservation

Provided in the estimate for oil fired kiln. It is envisaged that appropriate furnace insulation brick/ceramic fibre curing and fuel efficient combustion system will be incorporated in the kiln.

## FINANCIAL ASPECTS

### A. Fixed Capital

(i) Land and Building

| Particulars | Sq. Metres | Rate (Rs.) | Value (Rs.) |
|---|---|---|---|
| Land | 2500 | 200 | 5,00,000 |
| *Built-up Area* | | | |
| Office and Stores | 100 | 2000 | 2,00,000 |
| Workshed | 600 | 1250 | 7,50,000 |
| | | Total | 14,50,000 |

(ii) Machinery and Equipments

| Description | Imp/ Ind. | Qty. (Nos.) | Rate (Rs.) | Value (Rs.) |
|---|---|---|---|---|
| *a) Production Unit* | | | | |
| Vibrating screen with 3 HP motor and other accessories | Ind. | 1 | 25,000 | 25,000 |
| Double shaft U-Mixer (capacity: 2 tons per shift) with 10 HP motor and other accessories | Ind. | 1 | 75,000 | 75,000 |
| Muller mixer (pan size 6'dia) with 10 HP motor and other accessories | Ind. | 1 | 75,000 | 75,000 |
| Frictional screw press (150 tonnes) with 20 HP motor and other accessories | Ind. | 1 | 5,00,000 | 5,00,000 |
| Oil fired kiln (45-50 cubic meters) complete with chimney, oil storage tank, compressed air and oil supply and pre-heating system and 4-6 burners | Ind. | 1 | 10,00,000 | 10,00,000 |
| Pneumatic rammers | Ind. | 4 | 25,000 | 1,00,000 |
| | | | Total | 17,75,000 |
| *b) Testing Equipment* | | | | |
| CCS testing machine | Ind. | 1 | 35,000 | 35,000 |
| RUL Machine | | | 1,65,000 | 1,65,000 |
| Muffle furnace | Ind. | 1 | 2,00,000 | 2,00,000 |
| Drying oven | Ind. | 1 | 10,000 | 10,000 |
| Shaking equipment Sieve | Ind. | 1 | 20,000 | 20,000 |
| Misc. lab. Items | Ind. | LS | 20,000 | 20,000 |
| | | | Total | 4,50,000 |

| | |
|---|---|
| Electrification and installation charges @ 10% of cost of machinery and equipment | 2,22,500 |
| Total cost of machinery and equipment | 24,47,500 |
| Cost of moulds, tools and other fixtures | 2,00,000 |
| Cost of office equipment/working tables etc. | 2,00,000 |
| (iii) Pre-operative Expenses | 60,000 |
| Total fixed capital | 43,57,500 |

## B. Working Capital (per month)

(i) Personnel (per month)

| Designation | Nos. | Salary (Rs.) | Total (Rs.) |
|---|---|---|---|
| *Administration and Supervisory* | | | |
| Manager | 1 | 8,000 | 8,000 |
| Supervisor | 2 | 5,000 | 10,000 |
| Salesman | 1 | 5,000 | 5,000 |
| Clerk | 2 | 4,000 | 8,000 |
| Watchman | 2 | 2,000 | 4,000 |
| *Technical: Skilled and Semi or Unskilled* | | | |
| Skilled workers | 10 | 2,500 | 25,000 |
| Unskilled workers | 15 | 2,000 | 30,000 |
| Technician (Mechanical) | 1 | 4,000 | 4,000 |
| Total salaries | | | 94,000 |
| *Perquisites @ 15% of salaries* | | | 14,100 |
| | Total | | 1,08,100 |

(ii) Raw Materials

| Particulars | Imp/ Ind. | Qty. | Rate (Rs.) | Value (Rs.) |
|---|---|---|---|---|
| Fire clays | Ind | 150 T | 750/ ton | 1,12,500 |
| High alumina grog | " | 60 T | 1500/ ton | 90,000 |
| Kyanite/ sillimanite | " | 40 T | 6000/ ton | 2,40,000 |
| | | Total | | 4,42,500 |

| (iii) Utilities (per month) | (Rs.) |
|---|---|
| Furnace oil or LDO: 20 kL @ Rs. 14000 per kL | 2,80,000 |
| Power: 2300 kWH @ Rs. 5.00 per kWH | 11,500 |
| Water: 200 KL @ Rs. 25.00 per kL | 5,000 |
| Total | 2,96,500 |

(iv) Other Contingent Expenses (per month)

| Particulars | Value (Rs.) |
|---|---|
| Postage, stationery, telephone, taxes | 4,500 |
| Consumables, repairs and maintenance | 10,000 |
| Transport charges | 5,000 |
| Advertisement and Publicity and sales expenses | 5,000 |
| Misc. expenditure | 4,000 |
| Insurance | 1,500 |
| Total cost of Contingent expenses | 30,000 |
| Total Recurring Expenditure per month | 8,77,100 |
| (v) Total Working Capital (on 3 months basis) | 26,31,300 |

## C. Total Capital Investment

| | |
|---|---|
| Fixed Capital | Rs. 43,57,500 |
| Working Capital | Rs. 26,31,300 |
| Total | Rs. 69,88,800 |

## MACHINERY UTILIZATION

Machinery utilization of 75 percent has been considered in the project.

## FINANCIAL ANALYSIS

(1) Cost of Production (per year)

| Description | Value (Rs.) |
|---|---|
| Total recurring cost | 1,05,25,200 |
| Depreciation on building @ 5% | 47,500 |
| Depreciation on kiln @ 20% | 2,00,000 |
| Depreciation on moulds and tools @ 25% | 50,000 |
| Depreciation on Machinery and Equipment @ 10% | 1,77,500 |
| Depreciation on testing equipment and office equipment at 20% | 1,30,000 |
| Interest on capital investment at 14% | 9,78,432 |
| Total | 1,21,08,632 |

(2) Sales Turnover (per year)

| Item | Qty. | Rate (Rs.) | Value (Rs.) |
|---|---|---|---|
| Medium Heat Duty Fireclay Refractories | 1200 tons | | |
| Fireclay Bricks | 1,50,000 Nos. | 16 | 24,00,000 |
| Fireclay Blocks | 1,00,000 Nos. | 35 | 35,00,000 |
| High Heat Duty Fireclay Refractories | 1600 tons | | |
| Fireclay Bricks | 2,00,000 Nos. | 22 | 44,00,000 |
| Fireclay Blocks | 1,00,000 Nos. | 45 | 45,00,000 |
| | Total | | 1,48,00,000 |

(3) Net Profit (per year)

Rs. 1,48,00,000 – 1,21,08,632

= Rs. 26,91,368

(4) Net Profit Ratio

$$= \frac{\text{Net Profit per year} \times 100}{\text{Sales Turnover per year}}$$

$$= \frac{26,91,368 \times 100}{1,48,00,000}$$

= 18%

(5) Rate of Return

$$= \frac{\text{Net Profit per year} \times 100}{\text{Total Capital investment}}$$

$$= \frac{26,91,368 \times 100}{69,88,800}$$

= 38%

(6) Break-even Point (% of Total Production Envisaged)

(i) Fixed Cost (per year)

| Description | Value (Rs.) |
|---|---|
| Total Depreciations | 6,05,000 |
| Interest on total investment | 9,78,432 |
| Insurance | 18,000 |
| 40% of salaries and wages | 5,18,880 |
| 40% of other contingent expenses (excluding insurance) | 1,36,800 |
| Total | 22,57,112 |

(ii) Net profit (per year) 26,91,368

$$\text{B.E.P.} = \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Net Profit}}$$

$$= \frac{22,57,112 \times 100}{22,57,112+26,91,368}$$

$$= \frac{22,57,112 \times 100}{49,48,480}$$

= 45%

## Addresses of Machinery and Equipment Suppliers

1. M/s. Amic Industries (P) Ltd.
   10, BT Road,
   Kolkata-700 036.
2. M/s. Hindustan Engineering Co.
   1 and 3/7, Gopalal Tagore Road,
   Kolkata-700 035.

3. M/s. Keshab Machinery (Pvt.) Ltd.
   Bose Park, Sukchar,
   24 Parganas,
   (West Bengal)
4. M/s. Simplicity Engineers (Pvt.) Ltd.
   LB-99, Mayapuri,
   New Delhi-110 064.
5. M/s. Wesman Thermal Engg. Process Pvt. Ltd.
   269, 18th Main Road,
   RMV Extension,
   Bangalore-560 080.
6. M/s. Cerakiln Consultants
   No. 1, 9th Main,
   30th Cross,
   BSK II Stage,
   Bangalore-560 050.

Raw Material Suppliers

1. M/s. Mysore Minerals Ltd.
   39, M G Road,
   Bangalore-560 001.
2. M/s. Maruthi Enterprises
   LF 13/9, 4th Main,
   BTM Layout, II Stage,
   Bangalore-560 076.
3. M/s. Industrial Minerals and Refractors
   No. 17, Nissen House,
   2nd Cross Road, Austin Town,
   Bangalore-560 047.
4. M/s. Mineral Processing Industry
   Plot No. 180, III Phase, 11th Main,
   Peanya Indl. Area,
   Bangalore-562 140.
5. M/s. Southern Enterprises
   C-265, Peanya Indl. Estate,
   I Stage, Bangalore-560 058.