



# Orind Shashwat Product Catalog



Committed to Global Excellence

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# PRODUCT RANGE

## FIRE CLAY BRICKS

Dense Fireclay bricks for blast furnace application, which can withstand 500 hrs. CO test and minimum crushing strength of 500 kg/cm<sup>2</sup>. COROD-L2 for use in steel ladles and other locations. ORIND SUPER-IH, ORIND-MH, HH used for safety linings in various furnaces and wear lining in cement cyclone pre-heaters.

| Brand          | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E.(O.C) | A.P. (%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | PLC (%) at 1450°C/2 hr | RUL Ta (°C) |
|----------------|------------------------------------|------------------------------------|-------------|----------|--------------|------------------------------|------------------------|-------------|
|                | Min.                               | Max.                               | Min.        | Max.     | Min.         | Min.                         | Max.                   | Min.        |
| ORIND-MH       | 30                                 | 2.0                                | 30          | 25       | 2.00         | 200                          | -                      | 1350        |
| ORIND-HH       | 42                                 | 2.0                                | 32          | 25       | 2.00         | 200                          | -                      | 1400        |
| ORIND SUPER-1  | 42                                 | 2.0                                | 33          | 25       | 2.00         | 250                          | -                      | 1450        |
| ORIND SUPER-1H | 42                                 | 2.0                                | 33          | 20       | 2.00         | 350                          | -                      | 1450        |
| ORIND SUPER-II | 40                                 | 2.0                                | 32          | 24       | 2.00         | 200                          | -                      | 1450        |
| ORINDAL-45     | 45                                 | 2.3                                | 33          | 22       | 2.25         | 350                          | -                      | 1400        |
| COROD-D1/COROD | 40                                 | 1.5                                | 33          | 17       | 2.15         | 400                          | ±0.5                   | 1470        |
| COROD-L2       | 38                                 | 2.0                                | 32          | 18       | 2.15         | 350                          | ±0.5                   | 1400        |
| COROD-L1       | 34                                 | 2.0                                | 31          | 18       | 2.15         | 350                          | ±0.5                   | 1400        |
| COROD-SD       | 42                                 | 1.5                                | 33          | 17       | 2.20         | 500                          | -0.5                   | 1500        |
| COROD-S        | 42                                 | 1.5                                | 33/34       | 15       | 2.2          | 500                          | ±0.2                   | 1520        |
| COROD-B        | 38                                 | 1.5                                | 32/33       | 18       | 2.1          | 400                          | ±0.3                   | 1480        |
| COROD-H        | 40                                 | 1.5                                | 33          | 18       | 2.1          | 500                          | ±0.5                   | 1480        |
| COROD-1H       | 45                                 | 1.1                                | 34          | 15       | 2.3          | 600                          | ±0.3                   | 1550        |
| COROD-C        | 26                                 | 2.5                                | 26          | 15       | 2            | 500                          | ±0.5                   |             |

## HIGH ALUMINA BRICKS

ORIND makes a wide range of High Alumina refractory bricks for various applications. CEMAL-70 is special high alumina bricks for Cement Rotary Kiln. Chemically bonded high alumina bricks are available in ARCAL 70 and ARCAL 80 brands.

| Brand        | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E (O.C) | A.P. (%) | B.D. (gm/cc) | CCS (Kg/cm <sup>2</sup> ) | PLC at 1600°C/ 1 hr.(%) |
|--------------|------------------------------------|------------------------------------|-------------|----------|--------------|---------------------------|-------------------------|
|              | Min.                               | Max.                               | Min.        | Max.     | Min.         | Min.                      | Max.                    |
| ORINDAL-50   | 50                                 | 2.5                                | 34          | 23       | 2.30         | 350                       | +2.0                    |
| ORINDAL-55   | 55                                 | 2.5                                | 35          | 23       | 2.35         | 350                       | +2.5                    |
| ORINDAL-60   | 60                                 | 2.5                                | 35          | 23       | 2.40         | 400                       | +3.0                    |
| ORINDAL-65   | 65                                 | 3.0                                | 36          | 23       | 2.40         | 400                       | +3.0                    |
| ORINDAL-70   | 70                                 | 3.0                                | 37          | 23       | 2.50         | 400                       | +3.5                    |
| ORINDAL-70D  | 70                                 | 2.0                                | 37          | 21       | 2.55         | 500                       | +3.0                    |
| ORINDAL-75   | 75                                 | 3.5                                | 37          | 23       | 2.60         | 400                       | +3.0                    |
| ORINDAL-77AB | 77                                 | 3.5                                | 38          | 23       | 2.60         | 300                       | +3.0                    |
| ORINDAL-80   | 80                                 | 3.0                                | 38          | 23       | 2.60         | 300                       | +3.0                    |
| ORINDAL-80D  | 80                                 | 2.5                                | 38          | 22       | 2.60         | 450                       | +2.0                    |
| ORINDAL-82   | 82                                 | 3.0                                | 38          | 23       | 2.60         | 400                       | +1.5                    |
| ORINDAL-85   | 85                                 | 3.0                                | 38          | 22       | 2.65         | 450                       | +1.5                    |
| ALCOR-80B    | 80                                 | 3.0                                | 38          | 22       | 2.70         | 600                       | ±2.0                    |
| CEMAL-70     | 70                                 | 2.5                                | 37          | 21       | 2.60         | 400                       | ±1.5                    |
| ARCAL-70     | 70                                 | 2.5                                | 36          | 20       | 2.70         | 500                       | +2.5                    |
| ARCAL-80     | 80                                 | 2.0                                | 37          | 20       | 2.80         | 500                       | +2.0                    |
| ALUMEL       | 60                                 |                                    | 38          | 25       | 2.90         | 600                       | ±0.5                    |

## DENSE HIGH ALUMINA BRICKS

Special Dense low iron Alumina bricks for various applications like Sponge Iron Rotary Kilns, fertilizer and petrochemical plants etc. Also used for roof of Electric Arc Furnace manufacturing steel.

### Dense High Alumina Bricks

| Brand                  | Al <sub>2</sub> O <sub>3</sub><br>(%) | Fe <sub>2</sub> O <sub>3</sub><br>(%) | Cr <sub>2</sub> O <sub>3</sub><br>(%) | PCE<br>(O.C) | A.P.<br>(%) | B.D.<br>(gm/cc) | CCS<br>(Kg/cm <sup>2</sup> ) | PLC at<br>1600°C/1 hr (%) | RUL Ta°C |
|------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--------------|-------------|-----------------|------------------------------|---------------------------|----------|
|                        | Min.                                  | Max.                                  | Min.                                  | Min.         | Max.        | Min.            | Min.                         | Max.                      | Min.     |
| ALUMAX-50              | 50                                    | 1.6                                   | -                                     | 35           | 22          | 2.25            | 350                          | ±1.0                      | 1480     |
| ALUMAX-I               | 54                                    | 1.5                                   | -                                     | 35           | 20          | 2.30            | 400                          | ±1.0                      | 1500     |
| ALUMAX-II              | 54                                    | 1.5                                   | -                                     | 35           | 22          | 2.20            | 400                          | ±0.5                      | 1520     |
| ALUMAX-60              | 60                                    | 1.0                                   | -                                     | 36           | 18          | 2.50            | 500                          | ±1.0                      | 1550     |
| ALUMAX-60A             | 60                                    | 1.0                                   | -                                     | 36           | 20          | 2.40            | 400                          | ±0.5                      | 1500     |
| ALUMAX-70              | 70                                    | 0.8                                   | -                                     | 37           | 22          | 2.60            | 600                          | ±1.0                      | 1600     |
| ALUMAX-70A             | 70                                    | 1.0                                   | -                                     | 37           | 21          | 2.45            | 400                          | ±0.5                      | 1550     |
| ALUMAX-75              | 75                                    | 1.0                                   | -                                     | 37           | 23          | 2.60            | 400                          | ±0.8                      | 1600     |
| ALUMAX-80              | 80                                    | 1.0                                   | -                                     | 38           | 22          | 2.60            | 400                          | ±0.5                      | 1620     |
| ALUMAX-80A             | 80                                    | 1.0                                   | -                                     | 38           | 20          | 2.85            | 500                          | ±0.5                      | 1550     |
| ALUMAX-85A             | 85                                    | 1.5                                   | -                                     | 38           | 18          | 2.90            | 500                          | ±1.5                      | 1600     |
| SILLIMAX-I             | 58                                    | 2.0                                   | -                                     | 36           | 22          | 2.40            | 400                          | ±1.0                      | 1520     |
| SILLIMAX-II (BRO-62)   | 60                                    | 1.5                                   | -                                     | 36           | 25          | 2.30            | 350                          | ±1.0                      | 1550     |
| SILLIMAX-III (BRN-62)  | 62                                    | 1.5                                   | -                                     | 36           | 18          | 2.50            | 500                          | ±0.8                      | 1600     |
| SILLIMAX-IV            | 58                                    | 1.5                                   | -                                     | 36           | 23          | 2.30            | 400                          | ±1.0                      | 1550     |
| ORIMUL-I               | 66                                    | 0.5                                   | -                                     | 37           | 15          | 2.50            | 800                          | ±0.5                      | 1550     |
| ORIMUL-II              | 72                                    | 0.5                                   | -                                     | 38           | 21          | 2.50            | 600                          | ±0.2                      | 1650     |
| KOROND-80D             | 80                                    | 0.6                                   | -                                     | 38           | 17          | 3.10            | 800                          | ±0.3                      | 1650     |
| KOROND-90              | 90                                    | 0.8                                   | -                                     | 38           | 18          | 3.10            | 1000                         | ±0.3                      | 1600     |
| KOROND-90D             | 90                                    | 0.3                                   | -                                     | 40           | 19          | 3.20            | 1000                         | ±0.2                      | 1700     |
| KOROND-98              | 98                                    | 0.3                                   | -                                     | 40           | 21          | 3.00            | 800                          | ±0.2                      | 1600     |
| KORONDAL-XD            | 90                                    | 0.5                                   | -                                     | 40           | 18          | 3.00            | 600                          | ±0.2                      | 1700     |
| ORIND SUPER DENSEAL-98 | 98                                    | 0.5                                   | -                                     | 38           | 21          | 3.00            | 800                          | ±0.3                      | 1650     |
| ALCHROME-I             | 68                                    | -                                     | 15                                    | 38           | 21          | 3.10            | 800                          | ±0.5                      | 1700     |
| ALCHROME-II            | 64                                    | -                                     | 15                                    | 38           | 20          | 3.10            | 1000                         | ±1.0                      | 1650     |

# INSULATION & COMPOSITE PRODUCTS

## Super Hot Face Insulating Products

These are products with Alumina content ranging from 68 to 96% and suitable for high temperature applications. Mainly recommended for various reactors, regenerators, reformers, high temperature kilns and similar applications in various industries. Exhibit high refractoriness, high cold crushing strength and low thermal conductivity.

| Brand           | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | PCE (O.C) | B.D. (gm/cc) | A.P. (%) | CCS (Kg/cm <sup>2</sup> ) | PLC (%)             | K/Kcal/ m/hr/°C | Safe Appl. Temp (°C) |
|-----------------|------------------------------------|------------------------------------|-----------|--------------|----------|---------------------------|---------------------|-----------------|----------------------|
| ORINSUL-1850    | 95-96                              | 0.3                                | 40        | 1.4          | 60-65    | 70                        | ±1.0 at 1700°C/2hr. | 0.90            | 1850                 |
| ORINSUL SPECIAL | 85-90                              | 0.8                                | 38        | 2.2          | 35-40    | 200-250                   | ±1.0 at 1600°C/2hr  | 1.00            | 1700                 |
| HITEMLITE-I     | 68-72                              | 0.8                                | 36        | 1.4-1.6      | 40-45    | 120                       | ±0.5 at 1600°C/2hr  | 0.85            | 1700                 |

## Hot Face Insulating Products

Products available with Alumina content ranging from 36 to 58% and suitable for application temperatures upto 1500°C. Major application areas are tunnel kilns, regenerators, boilers, annealing and heat treatment furnaces etc. Exhibit low thermal conductivity.

| Brand         | Al <sub>2</sub> O <sub>3</sub> (%) | PCE (O.C) | B.D. (gm/cc) | A.P. (%) | CCS (Kg/cm <sup>2</sup> ) | PLC (%)               | K/Kcal/ m/hr/°C | Safe Appl. Temp (°C) |
|---------------|------------------------------------|-----------|--------------|----------|---------------------------|-----------------------|-----------------|----------------------|
| HITEMLITE-II  | 55-58                              | 34        | 1.25         | 50       | 80                        | ±1.5 at 1500°C/2 hrs. | 0.80            | 1500                 |
| HITEMLITE-III | 40-45                              | 32        | 1.00         | 50-55    | 40-50                     | ±1.5 at 1450°C/2 hrs. | 0.78            | 1450                 |
| INSUL PB-12   | 36-38                              | 28        | 0.90         | 55-60    | 20                        | ±1.5 at 1250°C/2 hrs. | 0.75            | 1350                 |

## Cold Face Insulating Products

Normal quality products for cold face applications in various furnaces like soaking pits, regenerator walls, annealing furnaces, BF stoves, heat treatment furnaces etc. Special foam insulation products for back up lining of aluminium pot furnaces and similar applications upto 850°C. Exhibits very low thermal conductivity.

| Brand       | Al <sub>2</sub> O <sub>3</sub> (%) | SiO <sub>2</sub> (%) | PCE (O.C) | B.D. (gm/cc) | A.P. (%) | CCS (Kg/cm <sup>2</sup> ) | K/Kcal/ m/hr/°C | Safe Appl. Temp (°C) |
|-------------|------------------------------------|----------------------|-----------|--------------|----------|---------------------------|-----------------|----------------------|
| INSUL PA-8  | 30-35                              | -                    | 26        | 0.8          | 60       | 10-15                     | 0.70            | 1100                 |
| INSUL PA-10 | 36-38                              | -                    | 27        | 0.9-1.0      | 50-55    | 20                        | 0.75            | 1300                 |
| ORIND FOAM  | 10                                 | 75-80                | 11        | 0.50-0.55    | 70-75    | 10-12                     | 0.15            | 850                  |

## Composite Products

Cost saving and energy saving products manufactured through a very special process technique. Serve twin purpose of withstanding the severe operational conditions through a dense and compatible wear face as well as save energy and cost through an insulating/cheaper material in the cold face. Recommended for a wide range of applications in rotary kilns, high temperature furnaces etc.

| Brand                | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | MgO (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | SiC (%) | A.P. (%) | B.D. (gm/cc) | CCS (Kg/cm <sup>2</sup> ) | PCE (O.C) | RUL Ta (°C) | K/K Cal/ m/hr/°C |
|----------------------|------------------------------------|------------------------------------|---------|------------------------------------|---------|----------|--------------|---------------------------|-----------|-------------|------------------|
| <b>DENSUL 40</b>     |                                    |                                    |         |                                    |         |          |              |                           |           |             |                  |
| Wear side            | 40                                 | 2.5                                | -       | -                                  | -       | 24       | 2.1          | 300                       | -         | 1400        | 1.20             |
| Shell side           | 20-35                              | -                                  | -       | -                                  | -       | 45-55    | 1.5-1.6      | 50-80                     | -         | -           | 0.45             |
| <b>DENSUL 70</b>     |                                    |                                    |         |                                    |         |          |              |                           |           |             |                  |
| Wear side            | 70                                 | 3.0                                | -       | -                                  | -       | 24       | 2.6-2.7      | 500                       | -         | 1300        | 1.30             |
| Shell side           | 20-35                              | -                                  | -       | -                                  | -       | 45-55    | 1.3-1.4      | 35-50                     | -         | -           | 0.45             |
| <b>COMBINOR SF</b>   |                                    |                                    |         |                                    |         |          |              |                           |           |             |                  |
| Wear side            | -                                  | -                                  | -       | -                                  | 85      | 18-20    | 2.4          | 600                       | 36        | 1540        | -                |
| Shell side           | 42                                 | -                                  | -       | -                                  | -       | 22       | 2.2          | 250                       | 33        | 1400        | -                |
| <b>COMBINOR MC-A</b> |                                    |                                    |         |                                    |         |          |              |                           |           |             |                  |
| Wear side            | -                                  | -                                  | 65      | 12                                 | -       | 20-22    | 2.9          | 300-400                   | -         | 1600        | 3.0/600°C        |
| Shell side           | 45                                 | -                                  | 50      | -                                  | -       | 35-40    | 2.0          | 100-150                   | -         | -           | 1.2/600°C        |
| <b>COMBINOR MA</b>   |                                    |                                    |         |                                    |         |          |              |                           |           |             |                  |
| Wear side            | 10                                 | -                                  | 85      | -                                  | -       | 18-20    | 2.9          | 300-400                   | -         | 1650        | 2.0/600°C        |
| Shell side           | 50                                 | -                                  | 45      | -                                  | -       | 35-40    | 1.8-2.0      | 100-150                   | -         | -           | 1.1/600°C        |

## Special Quality Basic Monolithic

These are products with Alumina content ranging from 68 to 96% and suitable for high temperature applications. Mainly recommended for various reactors, regenerators, reformers, high temperature kilns and similar applications in various industries. Exhibit high refractoriness, high cold crushing strength and low thermal conductivity.

| Brand           | MgO (%) | SiO <sub>2</sub> (%) | CaO (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | ZrO <sub>2</sub> (%) | C (%) |
|-----------------|---------|----------------------|---------|------------------------------------|----------------------|-------|
|                 | Min.    | Max.                 | Max.    | Min.                               | Min.                 | Min.  |
| LD TAPHOLE MIX  | 94      | 1.5                  | 1.0     | 1.0                                | -                    | -     |
| ORINITMG-I      | 94      | 0.6                  | -       | 2.0                                | -                    | -     |
| ORIFILL SG (C)  | 50      | 1.5                  | -       | -                                  | -                    | -     |
| ORIFILL SG (Z)  | -       | -                    | -       | -                                  | 60                   | -     |
| ORIFILL SG (ZC) | -       | -                    | -       | -                                  | 50                   | 8     |
| ORIFIL TTF-100  | 90      | 6                    | -       | -                                  | -                    | -     |

## Special Basic Ramming Mixes for Induction Furnace

These are products with Alumina content ranging from 68 to 96% and suitable for high temperature applications. Mainly recommended for various reactors, regenerators, reformers, high temperature kilns and similar applications in various industries. Exhibit high refractoriness, high cold crushing strength and low thermal conductivity.

| Brand       | MgO (%) | Al <sub>2</sub> O <sub>3</sub> (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | F.C. (%) | Sintering Temp (°C) |
|-------------|---------|------------------------------------|------------------------------------|----------|---------------------|
|             | Min.    | Min.                               | Min.                               | Min.     | Max.                |
| INDUCTRAM   | 70      | -                                  | 6                                  | -        | 1300                |
| MAGALRAM-I  | 65      | 28                                 | -                                  | -        | 1500                |
| MAGALRAM-II | 80      | 14                                 | -                                  | -        | 1500                |

## Low Cement, High Alumina Castable

Dencast AL-94, 98 are used in AOD Hoods, Channel Induction Furnaces for melting steel and iron, nose rings and lifters of Rotary Kiln. Dencast AL-60 is used for replacing bricks, plastics and other castables in iron and steel foundries. Dencast AL-45 is used for feed ends and chain zones of cement and lime rotary kilns. Also used for heat treatment and reheating furnace repairs and car decks in forge shops and lining doors and jambs.

| Brand             | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | Dry Density (gm/cc) | Water reqd. (% by vol.) | Max Service Temp (°C) | C.C.S. (Kg/cm <sup>2</sup> ) |        |              | P.L.C. (%) |        |            |
|-------------------|------------------------------------|------------------------------------|---------------------|-------------------------|-----------------------|------------------------------|--------|--------------|------------|--------|------------|
|                   | Min.                               | Max.                               | Min.                |                         |                       | 110°C                        | 1000°C | 1550°C       | 110°C      | 1000°C | 1550°C     |
| DENCAST-98        | 96                                 | 0.1                                | 3.05                | 4-5                     | 1800                  | 350                          | 350    | 400          | nil        | 0.1    | 0.2        |
| DENCAST-94        | 92.5                               | 0.3                                | 3                   | 3-4                     | 1750                  | 700                          | 800    | 900          | nil        | 0.1    | 0.2        |
| DENCAST-90        | 88                                 | 0.9                                | 2.5                 | 3.5-4.5                 | 1700                  | 800                          | 900    | 1000         | nil        | 0.1    | 0.3        |
| DENCAST-80        | 82                                 | 1.5                                | 2.8                 | 5-6                     | 1650                  | 700                          | 800    | 1000         | nil        | 0.1    | 0.6        |
| DENCAST-70A       | 70                                 | 1.5                                | 2.7                 | 5.5-6.5                 | 1600                  | 650                          | 750    | 900          | -          | 0.1    | 0.5        |
| DENCAST-70        | 70                                 | 0.7                                | 2.75                | 4-5.5                   | 1650                  | 750                          | 850    | 1000         | -          | 0.2    | 0.5        |
|                   |                                    |                                    |                     |                         |                       |                              |        | 1500°C/3hr   |            |        | 1500°C/3hr |
| DENCAST-60        | 60                                 | 1.5                                | 2.55                | 6-7                     | 1550                  | 600                          | 700    | 900          | nil        | 0.2    | 0.5        |
| DENCAST-45        | 44                                 | 1.5                                | 2.2                 | 6-7                     | 1500                  | 550                          | 650    | 750          | nil        | 0.2    | 1          |
| ROTOCAST-60       | 58                                 | 1.5                                | SiC=39%             | 5-6                     | 1500                  | 500                          | 700    | 900          | -          | 0.2    | -          |
| ROTOCAST-40       | 38                                 | 1.5                                | SiC=60%             | 6-7                     | 1400                  | 500                          | 500    | 600          | -          | -      | -          |
|                   |                                    |                                    |                     |                         |                       |                              |        | (1400°C/3hr) |            |        |            |
|                   |                                    | SiC                                | F.C.                |                         | Grading               |                              |        |              |            |        |            |
| BF TROUGH CAST-I  | 72(On loss free basis)             | 14                                 | 4                   | 4-5                     | 0-8                   | 300                          | 400    | 450          | nil        | -      | 0.2        |
| BF TROUGH CAST-II | 68(On loss free basis)             | 20                                 | 3                   | 4-5                     | 0-8                   | 300                          | 350    | 500          | nil        | -      | 0.3        |

Grading: All low cement castables are supplied with grading of (0-5) mm.  
Min.95% passes through specified grading.

## Non-Basic Ramming Masses

These are products with Alumina content ranging from 68 to 96% and suitable for high temperature applications. Mainly recommended for various reactors, regenerators, reformers, high temperature kilns and similar applications in various industries. Exhibit high refractoriness, high cold crushing strength and low thermal conductivity.

|                | Al <sub>2</sub> O <sub>3</sub> (%)     | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. Orton Cone | B.D. (gm/cc) | CCS (Kg/cm <sup>2</sup> ) |           | Grading (mm) | Max. Safe Appl. Temp in °C |
|----------------|--|------------------------------------|-------------------|--------------|---------------------------|-----------|--------------|----------------------------|
|                | Min.                                   | Max.                               | Min.              |              | at 110°C                  | at 1000°C |              |                            |
| ALCOR-50       | 50                                     | 2.5                                | 34                | 2.25         | 250                       | 300       | 0-4          | 1600                       |
| ALCOR-60       | 60                                     | 2.5                                | 35                | 2.40         | 250                       | 300       | 0-4          | 1600                       |
| ALCOR-70       | 70                                     | 3.0                                | 36                | 2.70         | 350                       | 400       | 0-4          | 1700                       |
| ALCOR-80       | 80                                     | 3.5                                | 37                | 2.80         | 400                       | 450       | 0-4          | 1650                       |
| ALCOR-80AL     | 80                                     | -                                  | 37                | -            | -                         | -         | 0-5          | 1500                       |
| STEMOL         | 80                                     | -                                  | 38                | -            | -                         | -         | 0-4          | 1700                       |
| ALCOR-90       | 88                                     | 1.0                                | 38                | 2.85         | 400                       | 450       | 0-4          | 1750                       |
| MULLITERAM     | 70                                     | 0.5                                | 38                | 2.40         | 250                       | 300       | 0-4          | -                          |
| ALCOR-85       | 85                                     | 3.5                                | 37                | 2.80         | 350                       | -         | 0-5          | 1650                       |
| ALCOR-85 (SPL) | 83                                     | 1.5                                | 37                | 2.80         | 400                       | 450       | 0-4          | 1700                       |
| SILICARMASS    | SiO <sub>2</sub> =98 Min               | 0.5                                | 31                | -            | -                         | -         | 0-5          | 1650                       |
| ZIRCONRAM-I    | ZrO <sub>2</sub> =60/62                | -                                  | 36/37             | 3.00         | 300                       | 350/450   | 0-4          | 1600                       |
| ZIRCONRAM-II   | ZrO <sub>2</sub> =62/64                | -                                  | 38                | 3.00         | 300                       | 350/450   | 0-0.2        | 1600                       |
| ZIRCON PATCH   | ZrO <sub>2</sub> =60 Min               | -                                  | 36/37             | -            | -                         | -         | 0-1          | 1600                       |
| ZIRMUL PATCH   | ZrO <sub>2</sub> =18 Min               | -                                  | 38                | -            | -                         | -         | 0-1          | 1600                       |
|                | Al <sub>2</sub> O <sub>3</sub> =50 Min |                                    |                   |              |                           |           |              |                            |
| ORISWAN        | SiO <sub>2</sub> =97 Min               | -                                  | 31                | -            | -                         | -         | 0-4          | 1650                       |
| CUPOLMIX       | SiO <sub>2</sub> =92 Min               | -                                  | 30                | -            | -                         | -         | 0-4          | 1600                       |
| SILICAR RAM    | SiC = 90 Min                           | -                                  | 38                | -            | -                         | -         | 0-3          | 1500                       |
| ORISSET-50     | 50                                     | -                                  | 34                | -            | -                         | -         | 0-1.5        | 1600                       |
| ORINDAL-65K    | 65                                     | -                                  | 35                | -            | -                         | -         | 0-4          | 1600                       |
| ALCARB RAM     | 65                                     | C=5% Min                           | 36                | -            | -                         | -         | 0-4          | 1750                       |
| BF TROUGH MIX  | 60                                     | C=4% Min                           | 34                | -            | -                         | -         | 0-5          | 1550                       |
| ORINDAL-50     | 50                                     | -                                  | 34                | -            | -                         | -         | 0-4          | 1600                       |
| ORINDAL-60     | 60                                     | -                                  | 35                | -            | -                         | -         | 0-4          | 1600                       |
| ORINDAL-70     | 70                                     | -                                  | 35                | -            | -                         | -         | 0-4          | 1650                       |
| ORINDAL-80     | 80                                     | -                                  | 37                | -            | -                         | -         | 0-4          | 1700                       |
| KORONDRAM      | 86                                     | 0.3                                | 38                | 2.6          | 250                       | 300       | 0-4          | SiO <sub>2</sub> =10Max    |
| ZLT RAM        | 40                                     | 1.5                                | 31                | 2            | -                         | -         | 0-4          | SiO <sub>2</sub> =55Max    |

## ORIND Fireclay Mortars

| Brand           | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. (O.C) | Grain Size (mm) | Type of Setting |
|-----------------|------------------------------------|------------------------------------|--------------|-----------------|-----------------|
| Min.            | Max.                               | Min.                               |              |                 |                 |
| FIRECLAY MORTAR | 40                                 | 2.5                                | 32           | 0-0.5           | Air setting     |
| HIALCO BOND     | 40                                 | 1.5                                | 32           | 0-0.5           | Air setting     |
| SUPERHIALCOBOND | 44                                 | 2.0                                | 33           | 0-0.5           | Air setting     |
| AF MORTAR       | 43                                 | 1.8                                | 35           | 0-0.5           | Air setting     |
| HHBOND          | 38                                 | 2.0                                | 31           | 0-0.5           | Air setting     |
| C-II MORTAR     | 38                                 | 2.0                                | 31           | 0-0.5           | Air setting     |
| MHBOND          | 30                                 | 2.0                                | 29           | 0-0.5           | Air setting     |
| EXPOBOND-35     | 35                                 | 1.5                                | 30           | 0-0.5           | Chemical        |
| EXPOBOND-55     | 55                                 | 2.0                                | 35           | 0-0.5           | Chemical        |

## ORIND High Alumina Mortars

Orind High Alumina Mortars are used for laying fireclay bricks and High Alumina bricks. Aeroset and Heatset series used for obtaining tight joints when laying bricks.

| Brand         | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. (O.C) | Grain Size (mm) | Type of Setting |
|---------------|------------------------------------|------------------------------------|--------------|-----------------|-----------------|
|               | Min.                               | Max.                               | Min.         |                 |                 |
| AEROSET-50    | 50                                 | 2.5                                | 33           | 0-0.5           | Air setting     |
| AEROSET-60    | 60                                 | 2.5                                | 35           | 0-0.5           | Air setting     |
| AEROSET-70    | 70                                 | 3.0                                | 37           | 0-0.5           | Air setting     |
| AEROSET-80    | 80                                 | 3.5                                | 38           | 0-0.5           | Air setting     |
| AEROSET-90    | 90                                 | 3.5                                | 38           | 0-0.5           | Air setting     |
| ORISSET-50(F) | 50                                 | 2.5                                | 33/34        | 0-0.5           | Air setting     |
| HEATSET-40    | 40                                 | 2.0                                | 32           | 0-0.5           | Ceramic         |
| HEATSET-50    | 50                                 | 2.5                                | 34           | 0-0.5           | Ceramic         |
| HEATSET-60    | 60                                 | 2.5                                | 35           | 0-0.5           | Ceramic         |
| HEATSET-70    | 70                                 | 2.5                                | 37           | 0-0.5           | Ceramic         |
| HEATSET-80    | 80                                 | 3.0                                | 38           | 0-0.5           | Ceramic         |
| HEATSET-90    | 90                                 | 0.5                                | 38           | 0-0.5           | Ceramic         |

Grading: Min.95% passes through specified grading above.

## ORIND Special Mortars

| Brand              | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. (O.C) | Grain Size (mm) | Type of Setting |
|--------------------|------------------------------------|------------------------------------|--------------|-----------------|-----------------|
|                    | Min.                               | Max.                               | Min.         |                 |                 |
| SILLIMANITE MORTAR | 55                                 | 1                                  | 33/34        | 0-0.5           | Chemical        |
| MULLITE MORTAR     | 66                                 | 1                                  | 37           | 0-0.5           | Chemical        |
| MASTIC             | 97                                 | 0.1                                | 38           | 0-0.5           | Chemical        |
| KXD MORTAR         | 98                                 | 1                                  | 38           | 0-0.5           | Chemical        |
| ALUMAX MORTAR      | 55                                 | 2.2                                | 34           | 0-1             | Chemical        |
| ZIRMUL MORTAR      | 55                                 | 15                                 | 37           | 0-0.5           | Chemical        |
| ZIRCON MORTAR      | 5                                  | ZrO <sub>2</sub> = 50%             | 37           | 0-0.5           | Chemical        |
| SILICA MORTAR      | 4.5                                | SiO <sub>2</sub> = 90%             | 29           | 0-0.5           | Chemical        |
| MAGNESITE MORTAR   | MgO=85-90                          | SiO <sub>2</sub> =6.5%             | 38           | 0-0.5           | Chemical        |

## Insulating Castable

| Brand            | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. (O.C) | B.D. at 110°C (gm/cc) | C.C.S at 110°C (Kg/cm <sup>2</sup> ) | Grading (mm) | Max.Safe Appl. Temp in °C |
|------------------|------------------------------------|------------------------------------|--------------|-----------------------|--------------------------------------|--------------|---------------------------|
|                  | Min.                               | Max.                               | Min.         | Min.                  | Min.                                 |              |                           |
| CASTINSUL-1800   | 93                                 | 0.2                                | 40           | 1.50                  | 70                                   | 0-4          | 1800                      |
| CASTINSUL-1700   | 85                                 | -                                  | 37           | 1.80                  | 120                                  | 0-4          | 1700                      |
| CASTINSUL-1600   | 70                                 | -                                  | 33           | 1.60                  | 80                                   | 0-4          | 1600                      |
| CASTINSUL-1500   | 60                                 | -                                  | 32           | 1.50                  | 60                                   | 0-4          | 1500                      |
| CASTINSUL-1350   | 35-40                              | 3-4                                | 18           | 1.30                  | 30                                   | 0-4          | 1350                      |
| CASTINSUL-1300   | 45-50                              | 0.7                                | -            | 1.00                  | 15                                   | 0-4          | 1300                      |
| CASTINSUL-1100   | 36                                 | 4.0                                | -            | 0.90                  | 14                                   | 0-4          | 1100                      |
| CASTINSUL-1100-A | 32                                 | 4.0                                | -            | 1.45                  | 80                                   | 0-4          | 1100                      |
| CASTINSUL-1300-A | 35                                 | -                                  | -            | 1.35                  | 50                                   | 0-4          | 1300                      |
| CASTINSUL-1350-A | 42                                 | 2.0                                | 18           | 1.60                  | 120                                  | 0-4          | 1350                      |
| CASTINSUL-1350-B | 42                                 | 2.0                                | -            | 1.45                  | 120                                  | 0-4          | 1350                      |
| CASTINSUL-1100-B | 45                                 | 3.5                                | -            | 0.85                  | 40                                   | 0-4          | 1100                      |
| CASTINSUL-1700-A | 88                                 | 0.2                                | -            | 1.25                  | 125                                  | 0-4          | 1700                      |
| CASTINSUL-1000   | 32                                 | -                                  | -            | 0.80                  | 12                                   | 0-4          | 950                       |

Grading: Min.95% passes through specified grading above.

## BASIC & SPECIAL BASIC BRICKS

Magnesite Bricks are used for lining of various furnaces, safety lining of BOF converters / Ladles, working lining of hot metal mixers. Magne-G are dense Magnesite bricks with high RUL. Super Magne-B are low iron magnesite bricks for glass tank regenerator checkers and EAF below slag lines, safety lining of LD converter. Magal is Magnesia alumina bricks specially developed for burning zone of white cement Rotary kiln and vacuum induction furnaces. Conventional Magnesite and Magchrome bricks for EAF sidewall and other general applications. Magnecem, a special product for burning zone of cement rotary kiln. ORINKRAL, an import substitute and superior performer for cement kiln burning zone.

### Basic Bricks

| BRAND         | MgO (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | SiO <sub>2</sub> (%) | P.C.E. Orton Cone | A.P (%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | R.U.L. Ta (°C) |
|---------------|---------|------------------------------------|----------------------|-------------------|---------|--------------|------------------------------|----------------|
|               | Min.    | Min.                               | Max.                 | Min.              | Max.    | Min.         | Min.                         | Min.           |
| MAGNE-B-I     | 91      | -                                  | 4.0                  | 38                | 18      | 2.85         | 600                          | 1600           |
| MAGNE-B-II    | 85      | -                                  | 5.5                  | 38                | 22      | 2.80         | 350                          | 1550           |
| MAGNE-B-III   | 62      | -                                  | 30.0                 | 38                | 20      | 2.70         | 400                          | 1560           |
| MAGNE-C       | 85      | -                                  | 5.5                  | 38                | 14      | 2.85         | 400                          | 1550           |
| MAGNECHROME-B | 60      | 15                                 | -                    | 38                | 25      | 2.95         | 200                          | 1550           |
| MAGNECHROME-C | 60      | 15                                 | -                    | 38                | 15      | 3.00         | 400                          | 1530           |
| CHROMEMAGNE-B | 35      | 25                                 | -                    | 38                | 25      | 2.95         | 200                          | 1600           |
| CHROMEMAGNE-C | 35      | 25                                 | -                    | 38                | 15      | 3.00         | 350                          | 1550           |
| CHROMEL-D     | -       | 45                                 | -                    | 38                | 20      | 3.35         | 500                          | 1550           |

### Special Basic Bricks

| Brand        | MgO (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | SiO <sub>2</sub> (%) | CaO (%) | Al <sub>2</sub> O <sub>3</sub> (%) | P.C.E. Orton Cone | A.P. (%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | R.U.L. Ta (°C) | PLC (%) 1600°C/ 2 hrs |
|--------------|---------|------------------------------------|------------------------------------|----------------------|---------|------------------------------------|-------------------|----------|--------------|------------------------------|----------------|-----------------------|
|              | Min.    | Max.                               | Min.                               | Max.                 | Max.    | Max                                | Min.              | Max.     | Min.         | Min.                         | Min.           | Max.                  |
| MAGNE-G      | 90      | 1.0                                | -                                  | 3.0                  | 1.0     | -                                  | 38                | 22       | 2.85         | 400                          | 1600           | ±1.5                  |
| SUPERMAGNE-B | 95      | 0.8                                | -                                  | 1.0                  | 2.5     | -                                  | 38                | 20       | 2.90         | 450                          | 1650           | ±0.8                  |
| SUPERMAGNE-G | 97      | 0.5                                | -                                  | 1.0                  | 2.0     | -                                  | 42                | 18       | 2.95         | 600                          | 1700           | ±0.5                  |
| MAGAL-I      | 85      | 1.0                                | -                                  | -                    | -       | 6.0                                | 38                | 22       | 2.85         | 500                          | 1650           | ±1.0                  |
| MAGAL-II     | 80      | -                                  | -                                  | -                    | -       | 10.0                               | 38                | 22       | 2.85         | 400                          | 1650           | ±1.5                  |
| MAGAL-III    | 90      | -                                  | -                                  | -                    | -       | 4.0                                | 38                | 20       | 2.90         | 500                          | 1650           | ±1.0                  |
| MAGAL-IV     | 70      | 2.5                                | -                                  | -                    | -       | 12.0                               | 38                | 23       | 2.85         | 350                          | 1600           | ±2.5                  |
| MAGNECEM     | 67      | -                                  | 10                                 | 4.0                  | -       | -                                  | 38                | 23       | 2.80         | 350                          | 1550           | -2.0                  |
| ORINKRAL     | 80      | -                                  | 9                                  | 1.0                  | -       | -                                  | 38                | 21       | -            | 400                          | 1600           | -                     |
| ZIRMAG       | 75      | 0.8                                | ZrO <sub>2</sub> =<br>13% Min.     | -                    | -       | 0.3                                | -                 | 18       | 3.00         | 700                          | 1550           | -                     |

## DIRECT BONDED & DENSE MAGNESIA CHROME BRICKS

Direct Bonded Magnesia Chrome & Dense Mag-chrome; high strength refractories ensure longer campaign life. Supreme D, E, 60, 70 and 80 for burning zone of Rotary kiln, secondary steel making vessel applications, platinum, nickel and copper converters. Special dense magnesite chrome bricks for secondary steel making ladles and other applications.

### Direct Bonded Magnesia Chrome Bricks

| BRAND       | MgO (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | A.P. (%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | R.U.L. Ta (°C) | PLC at 1700°C/ 2hr. (%) | HMOR at 1400°C/ 1 hr. (Kg/cm <sup>2</sup> ) |
|-------------|---------|------------------------------------|----------|--------------|------------------------------|----------------|-------------------------|---|
|             | Min.    | Min.                               | Max.     | Min.         | Min.                         | Min.           | Max.                    | Min.  |
| SUPREME-D   | 58      | 18                                 | 18       | 3.00         | 500                          | 1680           | 0.5                     | 55  |
| SUPREME-E   | 62      | 15                                 | 20       | 2.95         | 450                          | 1640           | 0.8                     | 30  |
| SUPREME-60  | 62      | 15                                 | 18       | 3.00         | 500                          | 1680           | 0.5                     | 45  |
| SUPREME-70  | 74      | 10                                 | 19       | 3.00         | 450                          | 1600           | 0.5                     | -   |
| SUPREME-80  | 83      | 7.5                                | 19       | 2.95         | 450                          | 1650           | 0.5(at 1600°C/2hrs)     | -   |
| SUPREME-156 | 62      | 18                                 | 18       | 3.10         | 400                          | 1700           | +0.3(at 1600°C/2hrs)    | -   |
| SUPREME-155 | 45      | 25                                 | 18       | 3.15         | 350                          | 1700           | +0.3(at 1600°C/2hrs)    | -   |
| OFSMK-16B   | 62      | 14                                 | 19       | 3.05         | 400                          | 1750           | +0.3(at 1600°C/2hrs)    | -   |

### Dense Magnesia Chrome Bricks

| Brand            | MgO (%) | Cr <sub>2</sub> O <sub>3</sub> (%) | P.C.E. Orton Cone | A.P.(%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | R.U.L. Ta (°C) | PLC at 1600°C /2 hrs |
|------------------|---------|------------------------------------|-------------------|---------|--------------|------------------------------|----------------|----------------------|
|                  | Min.    | Min.                               | Min.              | Max.    | Min.         | Min.                         | Min.           | Max.                 |
| DENMAGCHROME-I   | 65      | 13                                 | 38                | 20      | 2.90         | 400                          | 1620           | 0.5                  |
| DENMAGCHROME-II  | 72      | 9                                  | 38                | 19      | 2.95         | 450                          | 1620           | 0.5                  |
| DENMAGCHROME-III | 78      | 7                                  | 38                | 18      | 2.95         | 500                          | 1620           | 0.5                  |

## SLEEVES, NOZZLES AND WELL BLOCKS

Refractory products in High Alumina, Zircon and Magnesite qualities for Sleeves, Nozzles and Well blocks.

| Brand       | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | ZrO <sub>2</sub> (%) | MgO(%) | A.P.(%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | P.L.C. at 1500°C (%) |
|-------------|------------------------------------|------------------------------------|----------------------|--------|---------|--------------|------------------------------|----------------------|
|             | Min.                               | Max.                               | Min.                 | Min.   | Max.    | Min.         | Min.                         | Max.                 |
| ORINDAL-50  | 50                                 | 2.5                                | -                    | -      | 22-25   | 2.30         | 350                          | +2.0                 |
| ORINDAL-60  | 60                                 | 3.0                                | -                    | -      | 22-25   | 2.45         | 350                          | +2.5                 |
| ORINDAL-70  | 70                                 | 3.5                                | -                    | -      | 22-25   | 2.50         | 350                          | +2.5                 |
| KORONDAL-XD | 90                                 | 0.5                                | -                    | -      | 22-25   | 2.80         | 500                          | ±0.3                 |
| ZIRCON      | -                                  | -                                  | 63                   | -      | 22-25   | 3.50         | -                            | -                    |
| MAGNE-C     | -                                  | -                                  | -                    | 85     | 20-23   | 2.80         | 250                          | ±1.0 at 1600°C       |

## GLASS PLANT REFRACTORIES

Products for Glass tank bottom, sidewalls and feeder expendables. These products exhibit high corrosion resistance to glass melt.

### Zircon Products

| Brand     | ZrO <sub>2</sub> (%) | Al <sub>2</sub> O <sub>3</sub> (%) | SiO <sub>2</sub> (%) | P.C.E. Orton Cone | A.P.(%) | B.D. (gm/cc) | C.C.S. (Kg/cm <sup>2</sup> ) | P.L.C. at 1500°C/ 1 hr | R.U.L. Ta (°C) |
|-----------|----------------------|------------------------------------|----------------------|-------------------|---------|--------------|------------------------------|------------------------|----------------|
|           | Min.                 | Min.                               | Max.                 | Min.              | Max.    | Min.         | Min.                         | Max.                   | Min.           |
| ZIRCON-I  | 61±2                 | -                                  | 34                   | 38                | 23      | 3.3          | 600                          | -                      | 1550           |
| ZIRCON-II | 42                   | -                                  | 40                   | 31                | 23      | 3.0          | 500                          | 0.5                    | -              |
| ZIRMUL    | 18                   | 70±2                               | -                    | 31                | 23      | 3.1          | 400                          | -                      | 1600           |

### Special Quality Castables & Feeder Refractories for Glass Industry

| Brand               | Al <sub>2</sub> O <sub>3</sub> (%) | Fe <sub>2</sub> O <sub>3</sub> (%) | P.C.E. Orton Cone | A.P. (%) | B.D. (gm/cc)   | C.C.S. (Kg/cm <sup>2</sup> ) | PLC (%) at 1600°C/ 2hr. |
|---------------------|------------------------------------|------------------------------------|-------------------|----------|--|------------------------------|-------------------------|
|                     | Min.                               | Max.                               | Min.              | Max.     | Min.   | Min.                         | Max.                    |
| MULLCAST-I          | 62                                 | 0.5                                | 38                | 20       | 2.55   | 600                          | 0.2                     |
| MULLCAST SPECIAL-II | 76                                 | 0.5                                | 38                | 16       | 2.65   | 1000                         | 0.2                     |
| SILLCAST            | 56±2                               | 1.2                                | 35                | 21       | 2.40   | 400                          | -                       |
| SUPERCAST           | 36±2                               | 1.2                                | 32                | 22       | 2.20   | 250                          | -                       |
| ORIFEEDMULL         | 66                                 | 0.5                                | 37                | 20       | Used for plungers, tubes, orifice ring, stirrer, rotary segment feeder |                              |                         |
| ORIFEEDSILL         | 56±2                               | 1.2                                | 35                | 23       | 2.20   | -                            | -                       |
| ORIFEEDZIRMUL       | 66                                 | ZrO <sub>2</sub> =17-20            | 31                | 20-23    | 3.00   | -                            | -                       |
| SILMAX              | 52                                 | 1.3                                | 34                | 22       | 2.30   | 400                          | -                       |
| SILLCAST-62         | 62                                 | 1.2                                | 36                | 21       | 2.40   | 450                          | Used for Glass Tank     |
| ZIRALCAST           | 56                                 | ZrO <sub>2</sub> =18%              | 31                | 17       | 3.00   | 1000                         | ±0.2                    |

## IMPORTANT NOTES

- The data (for bricks) given in this catalog pertains to standard machine pressed shapes.
- For pneumatic rammed shapes, it is subject to reasonable variation in AP, BD & CCS.
- Size Tolerance:  
 For standard machine pressed shapes, size tolerance is + 1.0% or 1.5 mm whichever is greater.  
 The critical thickness is + 0.5 mm.  
 For pneumatic rammed shapes, size tolerance is + 1.5% or 2 mm whichever is greater
- The specifications provided in this catalog are our standard products. We manufacture tailor made products as per the specification provided by the user.

All the test results are as per the Chinese Standard Testing Method: GB/T (National Standard Practice). The equivalent of ISO Standard Testing Method is mentioned as below:

- AP, BD, CAP (Coked AP): GB/T 2997-2000 equivalent to ISO 5017:1998
- CCS: GB/T 5072.2-2004 equivalent to ISO 10059-1: 1992
- HMOR: GB/T 3002-1982 equivalent to ISO 5013:1985
- MgO % : GB/T 5069.11-2001 equivalent to ISO 10060:1993
- Residual Carbon: GB/T 13245 – 1991 equivalent to ISO 10060:1993.

All the products of Orind Refractories Limited, China can be manufactured in Orind, India.

We also offer other refractory materials for continuous casting, carbon hearth for blast furnace, fused cast block for re-heating furnace, glass tank furnace, coke oven etc. We offer these materials from our sister concern- ORIND FAR EAST LIMITED.

### Conversion Table: I

| Temperature Conversion Table |     |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| °C >                         | °F  | °C > | °F   | °C > | °F   | °C > | °F   | °C > | °F   | °C > | °F   | °C > | °F   |
| 0                            | 32  | 280  | 536  | 560  | 1040 | 840  | 1544 | 1190 | 2174 | 1470 | 2678 | 1750 | 3128 |
| 10                           | 50  | 290  | 554  | 570  | 1058 | 850  | 1562 | 1200 | 2192 | 1480 | 2696 | 1760 | 3200 |
| 20                           | 68  | 300  | 572  | 580  | 1076 | 860  | 1580 | 1210 | 2210 | 1490 | 2714 | 1770 | 3218 |
| 30                           | 86  | 310  | 590  | 590  | 1094 | 870  | 1598 | 1220 | 2228 | 1500 | 2732 | 1780 | 3236 |
| 40                           | 104 | 320  | 608  | 600  | 1112 | 880  | 1616 | 1230 | 2246 | 1510 | 2750 | 1790 | 3254 |
| 50                           | 122 | 330  | 626  | 610  | 1130 | 890  | 1634 | 1240 | 2264 | 1520 | 2768 | 1800 | 3272 |
| 60                           | 140 | 340  | 644  | 620  | 1148 | 900  | 1652 | 1250 | 2282 | 1530 | 2786 | 1810 | 3290 |
| 70                           | 158 | 350  | 662  | 630  | 1166 | 910  | 1670 | 1260 | 2300 | 1540 | 2804 | 1820 | 3308 |
| 80                           | 176 | 360  | 680  | 640  | 1184 | 920  | 1688 | 1270 | 2318 | 1550 | 2822 | 1830 | 3326 |
| 90                           | 194 | 370  | 698  | 650  | 1202 | 930  | 1706 | 1280 | 2336 | 1560 | 2840 | 1840 | 3344 |
| 100                          | 212 | 380  | 716  | 660  | 1220 | 940  | 1724 | 1290 | 2354 | 1570 | 2858 | 1850 | 3362 |
| 110                          | 230 | 390  | 734  | 670  | 1238 | 950  | 1742 | 1300 | 2372 | 1580 | 2876 | 1860 | 3380 |
| 120                          | 248 | 400  | 752  | 680  | 1256 | 960  | 1760 | 1310 | 2390 | 1590 | 2894 | 1870 | 3398 |
| 130                          | 266 | 410  | 770  | 690  | 1274 | 970  | 1778 | 1320 | 2408 | 1600 | 2912 | 1880 | 3416 |
| 140                          | 284 | 420  | 788  | 700  | 1292 | 980  | 1796 | 1330 | 2426 | 1610 | 2930 | 1890 | 3434 |
| 150                          | 302 | 430  | 806  | 710  | 1310 | 990  | 1814 | 1340 | 2444 | 1620 | 2948 | 1900 | 3452 |
| 160                          | 320 | 440  | 824  | 720  | 1328 | 1000 | 1842 | 1350 | 2462 | 1630 | 2966 | 1910 | 3470 |
| 170                          | 338 | 450  | 842  | 730  | 1346 | 1010 | 1850 | 1360 | 2480 | 1640 | 2984 | 1920 | 3488 |
| 180                          | 356 | 460  | 860  | 740  | 1364 | 1020 | 1868 | 1370 | 2498 | 1650 | 3002 | 1930 | 3506 |
| 190                          | 374 | 470  | 878  | 750  | 1382 | 1030 | 1886 | 1380 | 2516 | 1660 | 3020 | 1940 | 3524 |
| 200                          | 392 | 480  | 896  | 760  | 1400 | 1040 | 1904 | 1390 | 2534 | 1670 | 3038 | 1950 | 3542 |
| 210                          | 410 | 490  | 914  | 770  | 1418 | 1050 | 1922 | 1400 | 2552 | 1680 | 3056 | 1960 | 3560 |
| 220                          | 428 | 500  | 932  | 780  | 1436 | 1060 | 1940 | 1410 | 2570 | 1690 | 3074 | 1970 | 3578 |
| 230                          | 446 | 510  | 950  | 790  | 1454 | 1070 | 1958 | 1420 | 2588 | 1700 | 3092 | 1980 | 3596 |
| 240                          | 464 | 520  | 968  | 800  | 1472 | 1080 | 1976 | 1430 | 2606 | 1710 | 3110 | 1990 | 3614 |
| 250                          | 482 | 530  | 986  | 810  | 1490 | 1090 | 1994 | 1440 | 2624 | 1720 | 3128 | 2000 | 3632 |
| 260                          | 500 | 540  | 1004 | 820  | 1508 | 1100 | 2012 | 1450 | 2642 | 1730 | 3146 | 2010 | 3650 |
| 270                          | 518 | 550  | 1022 | 830  | 1526 | 1110 | 2030 | 1460 | 2660 | 1740 | 3164 | 2020 | 3668 |



## Conversion Table: 2

| Conversion Table   |                                  |  |                    |                      |                               |   |                    |
|--------------------|----------------------------------|--|--------------------|----------------------|-------------------------------|---|--------------------|
| Multiply by Factor | From >>>> To <<<<                | >>>> To <<<< From                            | Multiply by Factor | Multiply by Factor   | From >>>> To <<<<             | >>>> To <<<< From                           | Multiply by Factor |
| <b>LENGTH</b>      |                                  |  |                    | <b>VOLUME</b>        |                               |   |                    |
| 1.094              | Yard (yd)                        | Meter (m)                                    | 0.914              | 0.061                | Cubic inch (in <sup>3</sup> ) | Cubic centimeters(cm <sup>3</sup> )         | 16.4               |
| 3.281              | Feet (ft)                        | Meter (m)                                    | 0.3048             | 0.160                | Cubic Feet (ft <sup>3</sup> ) | Gallons (imp)                               | 6.23               |
| 0.0394             | Inch (in)                        | Millimeter (mm)                              | 25.4               | 0.134                | Cubic Feet (ft <sup>3</sup> ) | Gallons (US)                                | 7.48               |
| 0.394              | Inch (in)                        | Centimeter (cm)                              | 2.54               | 0.016                | Cubic Feet (ft <sup>3</sup> ) | Pound of Water, 62°F                        | 62.3               |
| 0.1                | Centimeter (cm)                  | Millimeter (mm)                              | 10                 | 16                   | Cubic Feet / pound            | Cubic meter / kilogram                      | 0.0624             |
| 0.001              | Millimeter (mm)                  | Micron                                       | 1000               | 8                    | Pint(imp)                     | Gallons (imp)                               | 0.125              |
| 0.0001             | Micron (1u)                      | Angstrom (A)                                 | 10000              | <b>MASS</b>          |                               |   |                    |
| 0.621              | Mile                             | Kilometer (km)                               | 1.61               | 454                  | Gram (g)                      | Pound (lb)                                  | 0.0022             |
| <b>AREA</b>        |                                  |  |                    | 0.0353               | Gram (g)                      | Ounce (oz)                                  | 28.349             |
| 1.2                | Square yard (yd <sup>2</sup> )   | Square meter (m <sup>2</sup> )               | 0.836              | 2.205                | Pound (lb)                    | Kilogram (kg)                               | 0.454              |
| 10.76              | Square feet (ft <sup>2</sup> )   | Square meter (m <sup>2</sup> )               | 0.093              | 100                  | Pound (lb)                    | Hundred Weight(cwt)                         | 0.01               |
| 0.155              | Square inches (in <sup>2</sup> ) | Sq. centimeter (cm <sup>2</sup> )            | 6.452              | 0.05                 | Ton (long)                    | Hundred Weight(cwt)                         | 20                 |
| 645.16             | Square inches (in <sup>2</sup> ) | Sq. millimeters (mm <sup>2</sup> )           | 0.00155            | 0.000446             | Ton (long)                    | Pound (lb)                                  | 2240               |
| 0.00694            | Square feet (ft <sup>2</sup> )   | Square inches (in <sup>2</sup> )             | 144                | 0.0005               | Ton (metric) (t)              | Pound (lb)                                  | 2000               |
| 9                  | Square feet (ft <sup>2</sup> )   | Square yard (yd <sup>2</sup> )               | 0.111              | <b>DENSITY</b>       |                               |   |                    |
| 0.386              | Square miles                     | Sq. kilometer (km <sup>2</sup> )             | 2.59               | 0.016                | Pound / cubic feet            | Kilogram/cubic meters (kg/m <sup>3</sup> )  | 62.43              |
| 0.00156            | Square miles                     | Acre   | 640                | 62.43                | Pound / cubic feet            | Gram/cubic centimeters (g/cm <sup>3</sup> ) | 0.016              |
| 4840               | Square yard (yd <sup>2</sup> )   | Acre   | 0.00021            | 0.03613              | Pound / cubic inches          | Gram/cubic centimeters (g/cm <sup>3</sup> ) | 27.68              |
| 2.47               | Acre                             | Hectare                                      | 0.405              | <b>THERMAL UNITS</b> |                               |   |                    |
| <b>AREA</b>        |                                  |  |                    | 3.97                 | Brit. Thermal Unit (B.T.U)    | Kilocalories (K cal)                        | 0.252              |
| 61.024             | Litre (l)                        | Cubic inches (in <sup>3</sup> )              | 0.0162             | 1.8                  | Btu/Lb                        | Kcal/Kg                                     | 0.556              |
| 0.00058            | Cubic Feet (ft <sup>3</sup> )    | Cubic inches (in <sup>3</sup> )              | 1728               | 0.00001              | Btu                           | Therm                                       | 100000             |
| 35.32              | Cubic Feet (ft <sup>3</sup> )    | Cubic inches (in <sup>3</sup> )              | 0.0283             | 0.948                | Btu                           | Kilojoules (Kj)                             | 1.055              |
| <b>PRESSURE</b>    |                                  |  |                    | 0.00134              | Horse Power(HP)               | Watt  | 746                |
| 70.307             | Pound / Sq Inches                | Gm / Sq cm                                   | 0.014              | 0.02777              | Kilowatt Hour (kwh)           | Mega joules (Mj)                            | 3.6                |
| 14.233             | Pound / Sq Inches                | Kilogram / Sq cm                             | 0.070              | <b>FORCE</b>         |                               |   |                    |
| 4.882              | Pound / Sq Feet                  | Kilogram/Sq. meters                          | 0.204              | 1                    | Newton                        | = 0.102 kp                                  | =0.01 J/cm         |
| 14.695             | Pound / Sq Inches                | Atmosphere                                   | 0.0680             | 1                    | Kilopound (kp)                | = 0.0981 J/cm                               | = 9.81 N           |
| 0.433              | Pound / Sq Inches                | Feet Head Water                              | 2.31               | 1                    | Joule per cm                  | = 1 J/cm                                    | =100 N             |
| 0.49               | Pound / Sq Inches                | Inch head of Mercury                         | 2.04               |                      |                               |   |                    |
| 10.2               | Kilopound / Sq. Centimeters      | Newton / Sq. meters (N/m <sup>2</sup> )      | 0.098              |                      |                               |   |                    |
| 0.102              | Kilopound / Sq. Millimeters      | Mega Newton/Sq. meters ( MN/m <sup>2</sup> ) | 9.81               |                      |                               |   |                    |
| 6.895X 1000        | Pound /Sq. Inches                | Mega Newton/Sq. meters ( MN/m <sup>2</sup> ) | 0.00014            |                      |                               |   |                    |

## Conversion Table: 3

| Cold Crushing Strength |       |       |       |       |       |       |       |        |        |        |
|------------------------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Kg/cm <sup>2</sup>     | 100   | 200   | 300   | 400   | 500   | 600   | 700   | 800    | 900    | 1000   |
| Lb/in <sup>2</sup>     | 1.422 | 2.844 | 4.266 | 5.688 | 7.100 | 8.532 | 9.954 | 11.376 | 12.798 | 14.220 |

| Thermal Conductivity                         |      |        |         |         |         |
|--|------|--------|---------|---------|---------|
| K.Cal/cm/cm <sup>2</sup> /sec <sup>o</sup> C | 1    | 0.5    | 0.00139 | 0.00278 | 0.00834 |
| K.Cal/M/cm <sup>2</sup> /h <sup>o</sup> C    | 360  | 180    | 0.5     | 1       | 3       |
| B.T.U./in.hr <sup>o</sup> F                  | 2903 | 1451.5 | 4.032   | 8.064   | 24.192  |

| Density             |         |         |        |         |         |          |         |         |         |  |
|---------------------|---------|---------|--------|---------|---------|----------|---------|---------|---------|--|
| Gms/cm <sup>3</sup> | 1.9     | 2.1     | 2.3    | 2.5     | 2.7     | 2.9      | 3.1     | 3.3     | 3.5     |  |
| Lb/ft <sup>3</sup>  | 119     | 131     | 144    | 156     | 169     | 181      | 194     | 206     | 219     |  |
| Lb/in <sup>3</sup>  | 0.06865 | 0.07587 | 0.0831 | 0.09033 | 0.09755 | 0.010478 | 0.01200 | 0.11923 | 0.12646 |  |

| Volume of Some Common Brick Size: |                           |                 |                           |
|-----------------------------------|---------------------------|-----------------|---------------------------|
| Size in mm                        | Volume in dm <sup>3</sup> | Size in mm      | Volume in dm <sup>3</sup> |
| 230x113x75                        | 1.950                     | 300x150x65/55   | 2.700                     |
| 230x113x65                        | 1.690                     | 300x125x75      | 2.813                     |
| 230x113x40                        | 1.040                     | 345x113x75      | 2.924                     |
| 230x113x75/65                     | 1.819                     | 345x113x65      | 2.534                     |
| 230x113x75/55                     | 1.689                     | 345x113x75/65   | 2.729                     |
| 230x113x65/55                     | 1.560                     | 345x113x65/55   | 2.339                     |
| 230x113x65/55                     | 1.430                     | 345x150x75      | 3.881                     |
| 230x150x75                        | 2.588                     | 345x150x75/65   | 3.623                     |
| 230x150x65                        | 2.243                     | 350x150x100     | 5.250                     |
| 230x171x75                        | 2.950                     | 400x400x100     | 16.000                    |
| 230x171x65                        | 2.556                     | 400x150x100     | 6.000                     |
| 230x230x75                        | 2.968                     | 400x150x75/70   | 4.350                     |
| 250x123x75                        | 2.306                     | 450x150x100     | 6.750                     |
| 250x123x65                        | 1.999                     | 460x150x100     | 5.175                     |
| 250x123x75/65                     | 2.153                     | 460x230x113     | 11.955                    |
| 230x123x65/55                     | 1.845                     | 460x230/175x115 | 10.712                    |
| 250x150x90/65                     | 2.906                     | 460x230/150x115 | 10.051                    |
| 250/236x100x80                    | 1.944                     | 500x125x75      | 4.688                     |
| 250x140/135x65                    | 2.234                     | 500x150x100     | 7.500                     |
| 250/232x150x80                    | 2.892                     | 500x150x75/70   | 5.438                     |
| 300x150x80                        | 3.600                     | 500x500x100     | 25.000                    |
| 300x150x65                        | 2.925                     | 550x200x150     | 16.500                    |
| 300x150x100                       | 4.500                     | 600x150x100     | 9.000                     |
| SU 430                            | 2.030                     | SU 745          | 3.510                     |
| SU 445                            | 2.060                     | SU 760          | 3.570                     |
| SU 530                            | 2.500                     | SU 830          | 3.780                     |
| SU 545                            | 2.550                     | SU 845          | 3.980                     |
| SU 560                            | 2.580                     | SU 860          | 3.990                     |
| SU 630                            | 2.960                     | SU 930          | 4.200                     |
| SU 645                            | 3.040                     | SU 945          | 4.400                     |
| SU 660                            | 3.080                     | SU 960          | 4.530                     |
| SU 730                            | 3.400                     |                 |                           |