



## Charge and Grading of Alumina Ball Mill

During wet grinding process, when charge of ball-stone is up to 55% of net volume of ball mill, the best status can be realized, and the weight of ball body within the ball mill can be estimated with formula:

$$G = \pi r^2 d \cdot L \cdot 25\% \div 1000$$

G: Charge of ball-stone(kg);

R: Radius of ball mill (cm);

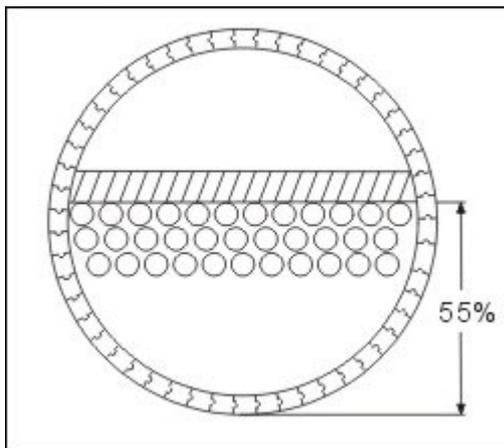
D: Specific gravity of ball-stone (g/cm<sup>3</sup>);

L: Radius of ball mill (cm)

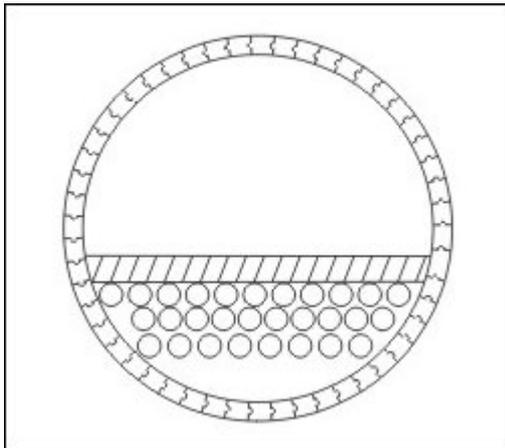
Due to the difference of grinding aids of ball mill, the above formula varies.

Generally speaking, the initial ball-stone grading of ball mill is: Ø30; Ø40; Ø60. In fact, it mainly depends on the granularity of materials to be ground diameter.

And rotary speed of ball mill should also be considered. Wet ball mill smashes materials mainly through grinding instead of shocking, Therefore the amount of ball ball-stone should be properly reduced ,and the amount of intermediate ball-stone and small ball-shone should be increased so as to guarantee fine grinding effect .Load of ball body relies on type of the ball mill and therefore the above rules are not suitable for dry grinding.

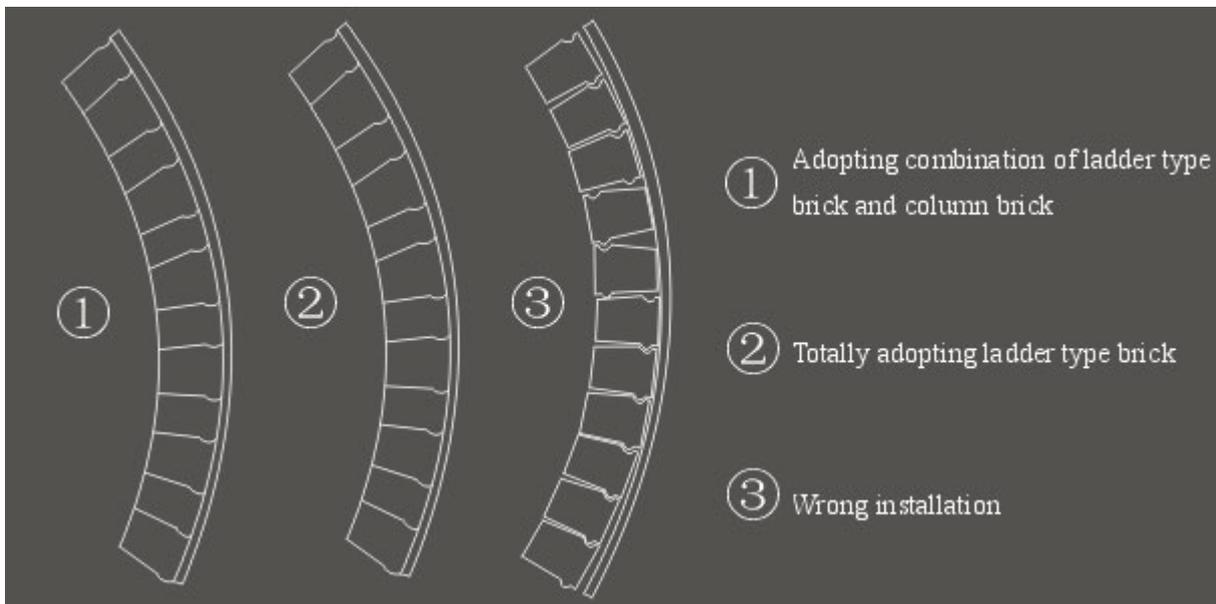


**Correct installation**



**Wrong installation**

**Calculation And Installation of Lining Brick used in ball mill**





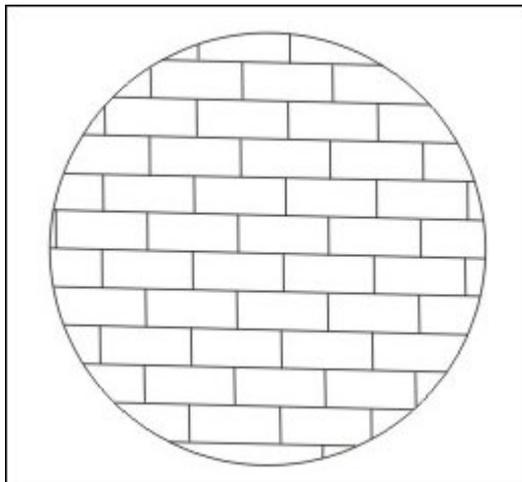
## Correctly Install

Before installation, all the hangovers of bricks and cement on the inner surface should be thoroughly removed, the smooth surface should be made hoarse, iron surface should be amended through welding if it is badly worn.

In installation, small juncture should be about 1mm, cement should be of 425#, a layer of cement should be laid on the inner wall of the end face of ball mill first, begin to place bricks from the plane of the end face, the upper brick should be put on the juncture of the lower two bricks.

On the column-shaped surface of the surface is usually placed with rows of removed rectangle bricks and triangle bricks. Ratio of rectangle bricks and triangle bricks can be seen from the original table.

With the completion of laying the surface of the inner lining should be made clean, it is necessary to water it for 1 to 2 days in order to make cement have fine cohesion and Maximum strength, then fill it with water for solidication for about 10 days.



1, End face:

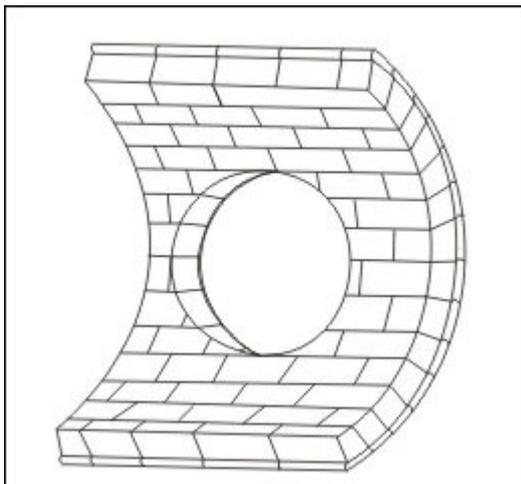
$$Gf = nr^2 d \cdot H \cdot 2 \div 1000$$

Gf: weight of column brick(kg)

r: radius of barrel of ball mill(cm);

H: thickness of lining brick(cm);

d: specific density of lining brick(g/cm<sup>3</sup>)



2, column-shaped:

$$G_c = n \cdot D \cdot L \cdot H \cdot d \div 1000$$

G<sub>c</sub>: weight of column brick and ladder type brick(kg)

D: diameter of barrel of ball mill(cm);

L: length of ball mill(cm);

d: density of lining brick (g/cm<sup>3</sup>);

H: thickness of lining brick(cm);

**Table of dosage of product**

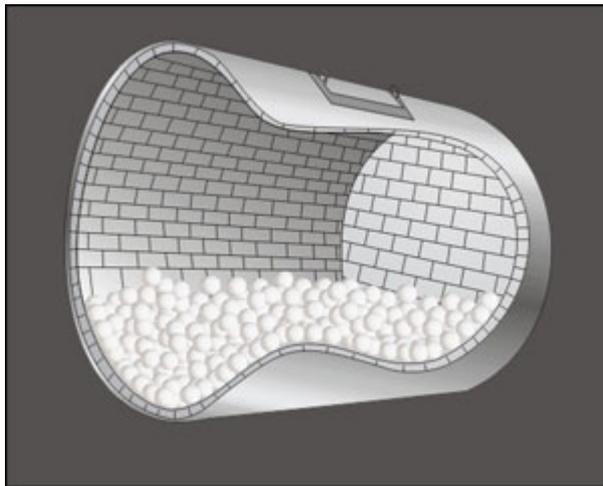
Variety Specification of ball mill(cm) Weight(kg)	Thickness of inner lining brick			Column-shaped (rectangle bricks and triangle bricks)
	5cm	6cm	7cm	
Ø95 x L: 102(0.3kg)	760	867	1015	1:3
Ø130 x L: 150(0.5kg)	1450	1763	3045	1:3
Ø150 x L: 180(1kg)	2050	2378	2758	1:2
Ø180 x L: 200(1.5kg)	2873	3420	3935	1:1
Ø200 x L: 260(3kg)	3876	4670	5370	2:1
Ø245 x L: 300(5kg)	5628	6700	7705	3:1
Ø285 x L: 400(8kg)	8400	10150	11731	4:1

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### **Operational Principle of Ball Mill**

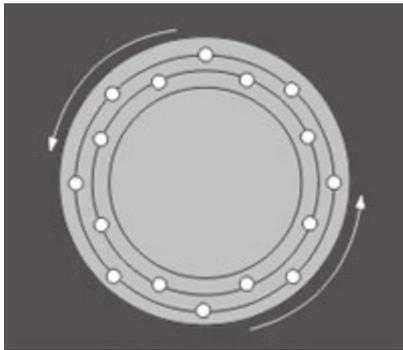
Generally speaking ceramics factories adopt intermittent ball mill. Within the inner tube of the ball mill loaded are some ceramic balls, materials to be ground and a proper amount of water which are properly matched according to process requirement. When the inner tube turns around under the effect of motor, the grinding body will turn around and upward closely to get her with the inner wall and body of the inner tube with the effect of centrifugal force .The grinding body will be shot off with the effect of gravitation when it is brought to a certain height, and will drop at a certain speed. During the above process, the materials within the inner tube will be crushed up with the dual effect of shock of grinding body and grinding.



Rotary speed of ball mill plays an important role in ball grinding efficiency .If the ball mill rotates at the speed of critical or higher; there will not be any smashing effect. Both theory and practice have proven that the critic al speed of ball mill is:

$$V_{\text{临}} = \frac{32}{\sqrt{D}}$$

D: Diameter of ball mill(m),operating speed  $V = V_{\text{critical}} \times (11-12) \text{r/min}$  For big tonnage ball mill, lower limit should be taken, and for small tonnage ball mill, upper limit should be taken.



Ball mill rotary speed is too high



Ball mill rotary speed is normal



Ball mill rotary speed is too low