

# The test Result Analysis of the Basic Bricks

## --RHI, MH-90, MH-90-1/2/3

30/6/2016/



We have developed 3 kind of Magnesite-hercynite bricks (MH-90-1, MH-90-2 and MH-90-3) based upon our available brick MH-90 for burning zone of cement rotary kiln. We take a sample brick from RHI in China for comparison evaluation. The test results and relevant analysis are as follows:

### 1. Test Results:

Brick Name	RHI	MH-90	MH-90-1	MH-90-2	MH-90-3
Bulk Density (g/cm <sup>3</sup> )	2.96	2.97	3.00	2.96	2.99
Apparent Porosity (%)	15.8	15.4	15.1	15.7	14.9
Cold Crushing Strength (MPa)	65	105	72	58	56
Refractories Under Load (°C)	1646	1700	1675	1660	1623
Chemical Composition					
MgO (%)	89.41	91.46	89.29	87.95	89.01
Al <sub>2</sub> O <sub>3</sub> (%)	4.87	3.45	5.38	6.11	4.03
Fe <sub>2</sub> O <sub>3</sub> (%)	3.35	3.14	3.48	4.04	4.20
SiO <sub>2</sub> (%)	0.74	0.69	0.87	0.77	1.40
CaO (%)	1.53	1.23	0.96	1.01	1.33

**Note:** All of the data are average values of 3 pcs samples.

## 2. The Evaluation

- 1) Bulk Density & Apparant Porosity  
MH-90 series bricks are superior.
- 2) Strength  
MH-90 & MH-90-1 are stronger than RHI, another 2 are weaker
- 3) Refractories Under Load  
MH-90 & MH-90-1 & MH-90-2 is higher than RHI

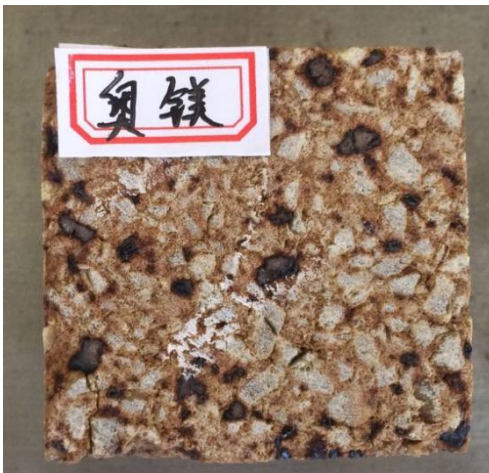
## 3. Thermal Shock Resistance

Heating for 30 minutes(1100℃), then air cooling for 5 minutes with wind pressure 0.075 MPa, then natural cooling for 5 minutes.

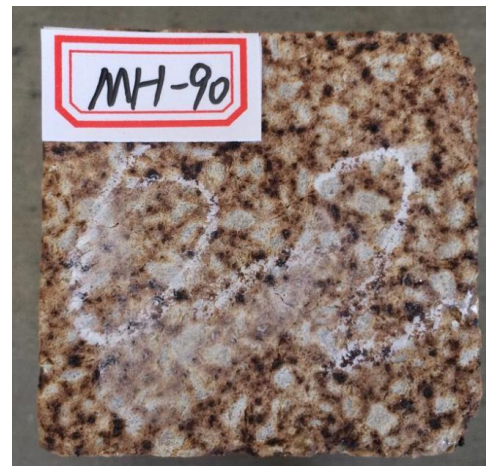
For thermal shock resistance, we check strength reduction and cracks after heating & air cooling process. The Results is below:

### A. Cracks

#### First Time Process



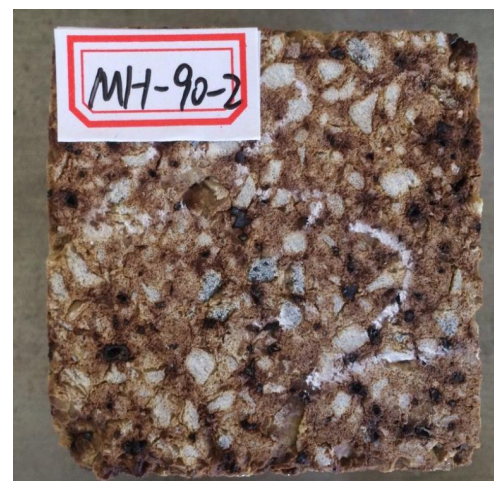
RHI after first time process



MH-90 after first-time process



MH-90-1 after first-time process



MH-90-2 after first-time process

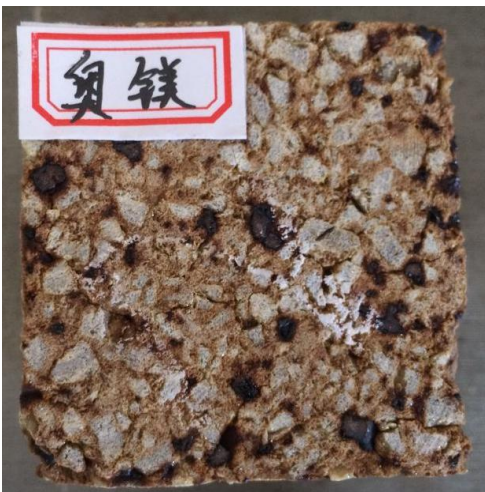




**MH-90 after first-time process**

**Note: Slight Crack is found on MH-90, MH-90-1 & MH-90-3 while no crack on MH-90-2 and RHI.**

### 3-Time Process



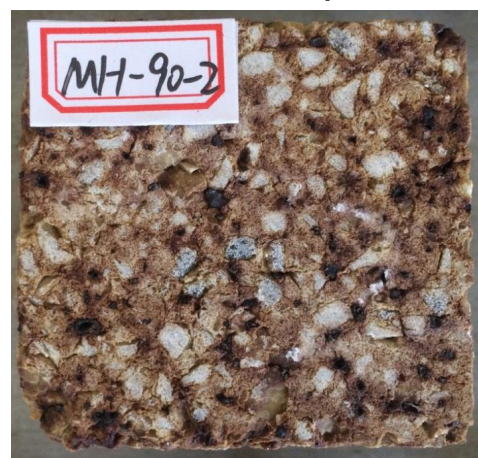
**RHI after 3-time process**



**MH-90 after 3-time process**

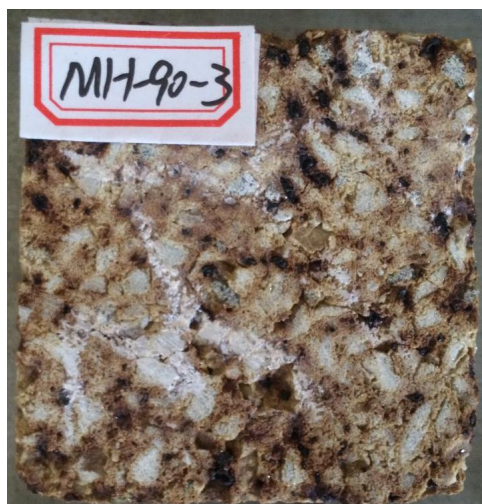


**MH-90-1 after 3-time process**



**MH-90-2 after 3-time process**

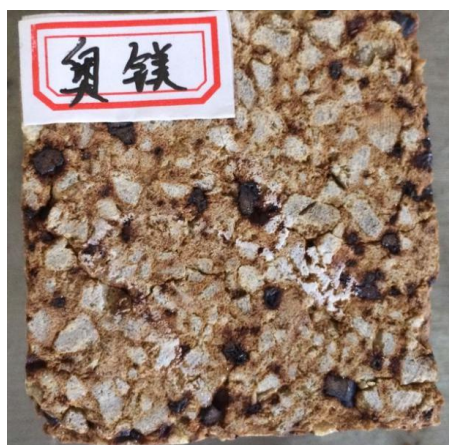




**MH-90-3 after 3-time process**

**Note:** After 3 time process, there is visible crack on RHI and MH-90-2, and the cracks of another 3 become more obvious. Also some spalling is found on MH-90-1 and MH-90-3.

#### 5-Time Process



**RHI after 5-time process**



**MH-90 after 5-time process**



**MH-90-1 after 5-time process**



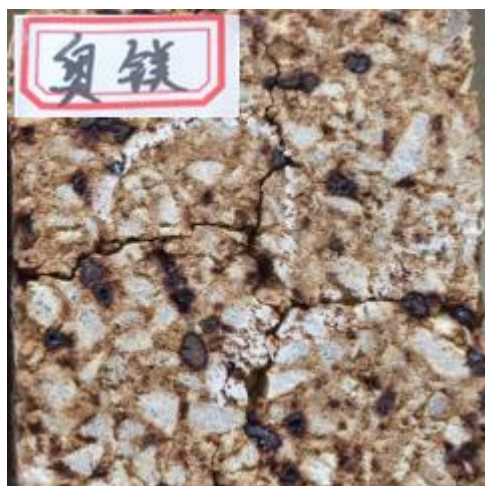
**MH-90-2 after 5-time process**



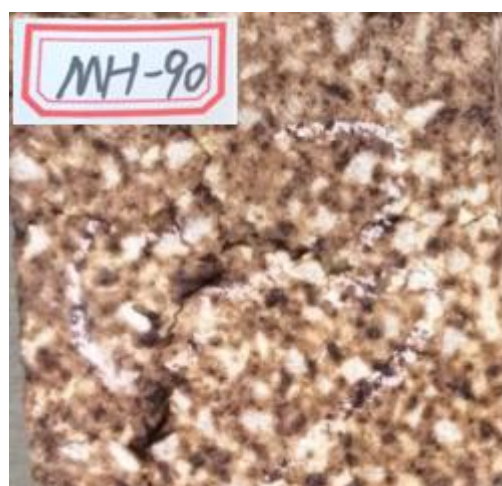
MH-90-3 after 5-time process

Note: The crack of all sample modules become more obvious than before.

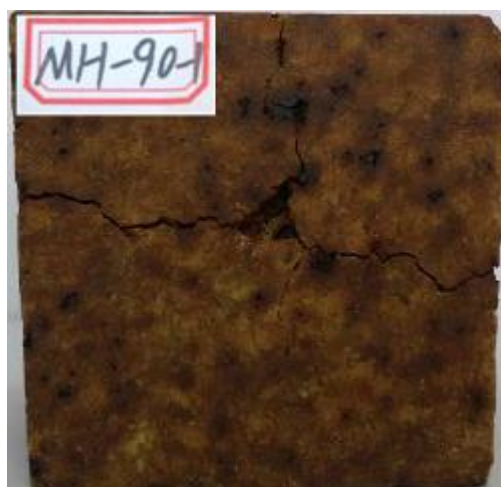
### 20-Time Process



RHI after 20-time process



MH-90 after 20-time process

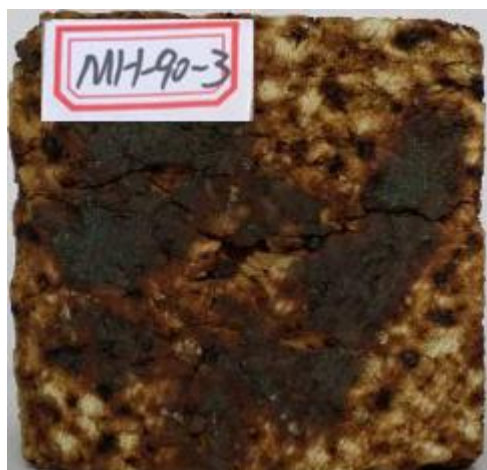


MH-90-1 after 20-time process



MH-90-2 after 20-time process



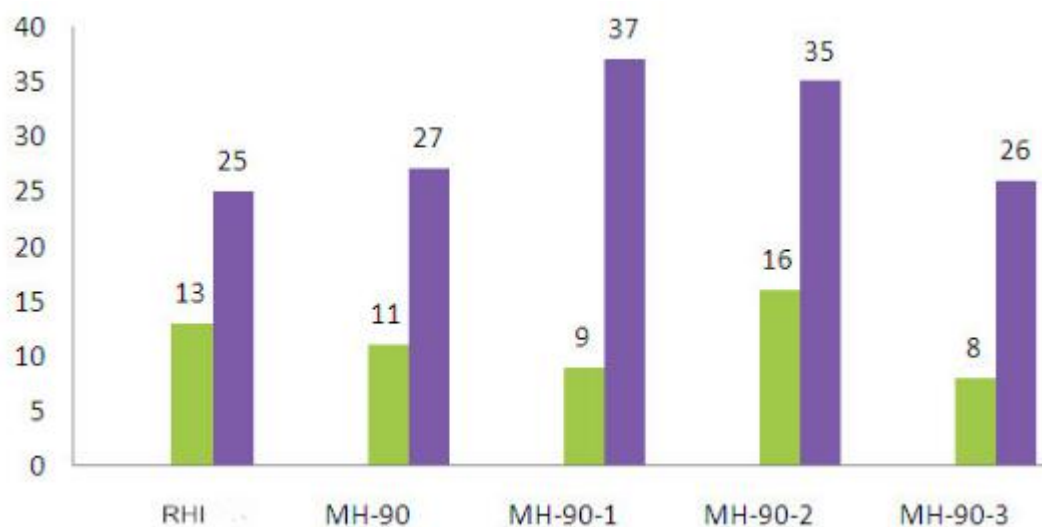


**MH-90-3 after 20-time process**



**Note:**The obvious crack is found on all sample modules after 20-time process.

### B.Reduction Rate of Strength

Brick Name	RHI	MH-90	MH-90-1	MH-90-2	MH-90-3
Cold Crushing Strength (MPa)	64.87	104.70	71.97	58.40	56.47
Cold Crushing Strength (1100℃,Air Cooling, <b>5 Times</b> ) (MPa)	56.22	93.48	65.41	48.88	52.00
Cold Crushing Strength (1100℃,Air Cooling, <b>20 Times</b> ) (MPa)	48.92	76.07	45.28	38.12	41.95
Reduction Rate of Strength after Process 5 times (%)	13.00	11.00	9.00	16.00	8.00
Reduction Rate of Strength after Process 20 times (%)	25.00	27.00	37.00	35.00	26.00



Note:

1.  Reduction Rate of Strength after Process 5 times (%)
2.  Reduction Rate of Strength after Process 20 times (%)

### The Results show:

#### A. Strength

**after 5-time process:** RHI,MH-90 & MH-90-1 are stronger.

**after 20 time process:**RHI,MH-90 & MH-90-1 are stronger.

#### B.Strength Reduction

**after 5 time process:**MH-90,MH-90-1 & MH-90-3 are superior.

**after 20 time process:**MH-90,RHI & MH-90-3 are superior.

In General,**RHI,MH-90 and MH-90-1** show better performance than others in thermal shock resistance.

### 4.Conclusion

Our Magnesia Hercynite Brick MH-90 is close to RHI counter sample in properties.

By the way, the performance of MH-90 has been proved by China Resource in 8,000 tons/day cement production line.

### 5.Our Achievement

	FLSmidth is a leading supplier of equipment and services to the global cement and minerals industries since its foundation in 1882
	CONCH Cement is the largest cement factory in Asia, with 5 super 10,000,000 tons of clinker base and 3 lines of 12,000 t/d
	TCC Cement is the largest cement factory in Taiwan, the production capacity in 2014 is about 60 million tons.
	Sinoma Int. is a major service provider for international cement technology & equipment and engineering market, With 140 cement production lines constructed or under construction in over 70 countries and regions
	China Resources Cement is one important cement factory in China with about 70 production lines.

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