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HAOYANG MANUFACTURING GRINDING BALLS OF EUROPEAN QUALITY



We Bring Trust to All the World
Manufacturing Grinding Balls of European Quality
Maximize your grinding efficiency



HAOYANG manufacturing grinding balls of European quality

Jinan Haoyang Casting & Forging Co.,Ltd is one of the leading grinding media manufacturer in China .

Our products are designed for grinding of raw materials by cement plants, energy generating companies, ore mining and industrial processing facilities, construction materials plants located in China . Haoyang steel balls manufacturing plant was put into operation since 2001. Today, we deal with continuously growing consumer requirements for operational properties of grinding media, what directly affects ball mill prices and quality, efficiency of equipment and the enterprise in general.

The plant was built using the most advanced Hot rolled and forging equipment. Through the use of modern technologies and cooperation with a number of research organizations, we managed to achieve very high levels of quality in grinding steel balls. Despite its short history, Haoyang managed to become a manufacturer of quality grinding media for ball mills, as well to keep its position on both the domestic and overseas markets .The operational properties of steel balls produced by Haoyang allow to significantly reduce the consumption of grinding balls and power, to increase grinding fineness of raw materials, to decrease the number of mill repairs and, consequently, to increase their productivity.

Manufacturing grinding balls of European quality, we bring trust to all the world Customer and will maximize your grinding efficiency !



The size of grinding media from Ø20mm (3/4") up to Ø160mm (6 1/2") and cover all kinds of mills in the mining industry.

Forged Grinding Balls /03 Page

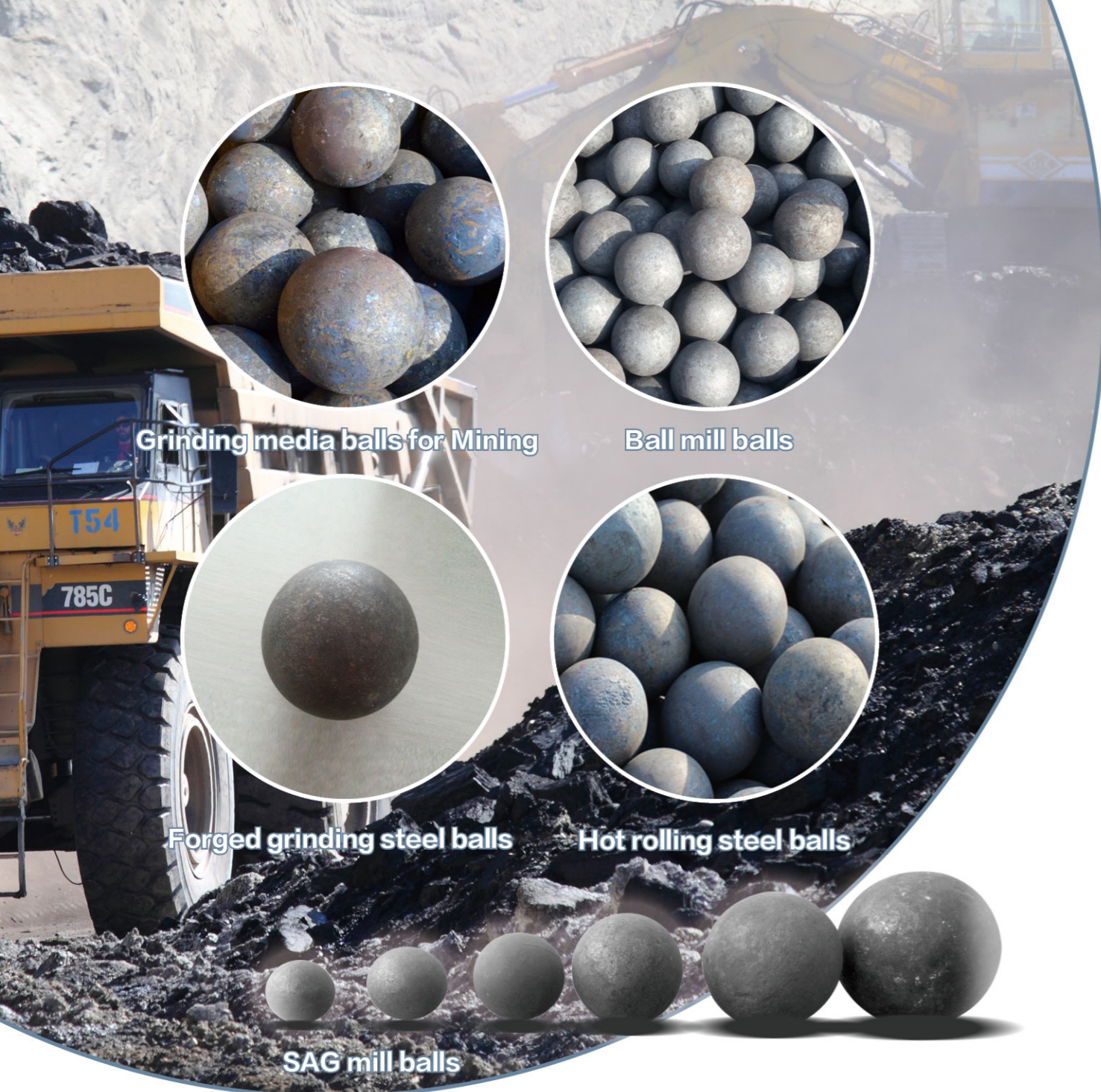
- Grinding media balls for Mining
- Forged grinding steel balls
- Hot rolling steel balls
- Ball mill balls
- SAG mill balls

Chrome Casting Grinding Balls /07 Page

- Low chrome casting grinding balls
- Medium chrome casting grinding balls
- High chrome casting grinding balls

Grinding Cylpebs /09 Page

Grinding Rods /10 Page



FORGED GRINDING BALLS

Technical Specification

| Brand | Remarks | Chemical Composition (%) of Raw Material | | | | | | |
|-------|----------------|--|----------|-----------|----------|----------|-----------|----------------|
| | | C | Mn | Cr | S | P | Si | Hardness (HRC) |
| HY-1 | 45# Steel | 0.42-0.50 | 0.7-0.8 | ≤ 0.25 | Max0.035 | Max0.035 | 0.17-0.37 | 48-56 |
| HY-2 | 50Mn | 0.48-0.56 | 0.70-1.0 | ≤ 0.25 | Max0.035 | Max0.035 | 0.17-0.37 | 50-56 |
| HY-3 | 60Mn | 0.57-0.65 | 0.7-1.0 | ≤ 0.25 | Max0.030 | Max0.030 | 0.17-0.37 | 58-60 |
| HY-4 | 65Mn | 0.60-0.70 | 0.90-1.2 | ≤ 0.25 | Max0.030 | Max0.030 | 0.17-0.37 | 58-65 |
| HY-5 | 75Mn | 0.72-0.92 | 0.90-1.2 | ≤ 0.25 | Max0.030 | Max0.030 | 0.17-0.37 | 55-65 |
| HY-6 | B2 (75MnCr) | 0.72-0.85 | 0.7-1.2 | 0.42-0.85 | Max0.030 | Max0.030 | 0.17-0.37 | 60-65 |
| HY-7 | B3 | 0.5-0.65 | 0.4-1.0 | 0.77-1.10 | Max0.030 | Max0.030 | 1.4-1.8 | 60-65 |

Mechanical properties:

| Brand | Remarks | Material | Impact Test Ak _j /cm ² | Breakage Rate | Endurance Test times (5m) | Hardness (HRC) | | | | | |
|-------|------------------|-----------|--|---------------|---------------------------|----------------|------|--------------------|------|-----------------|------|
| | | | | | | Φ25-50 (1"-2") | | Φ60-90 (2.5"-3.5") | | Φ100-150(4"-6") | |
| | | | | | | Surface | Core | Surface | Core | Surface | Core |
| HY | HY-Grinding Ball | 45# Steel | ≥ 12 | <1% | ≥ 10000 | ≥ 55 | ≥ 38 | ≥ 54 | ≥ 35 | ≥ 52 | ≥ 30 |
| | | 50Mn | ≥ 12 | <2% | ≥ 10000 | ≥ 56 | ≥ 40 | ≥ 56 | ≥ 36 | ≥ 55 | ≥ 32 |
| | | 60Mn | ≥ 12 | <3% | ≥ 10000 | ≥ 58 | ≥ 45 | ≥ 58 | ≥ 38 | ≥ 55 | ≥ 35 |
| | | 65Mn | ≥ 12 | <4% | ≥ 10000 | ≥ 60 | ≥ 52 | ≥ 60 | ≥ 42 | ≥ 56 | ≥ 36 |
| | | B2 | ≥ 12 | <1% | ≥ 12000 | ≥ 60 | ≥ 60 | ≥ 60 | ≥ 54 | ≥ 58 | ≥ 50 |
| | | B3 | ≥ 12 | <1% | ≥ 12000 | ≥ 60 | ≥ 60 | ≥ 60 | ≥ 54 | ≥ 60 | ≥ 55 |

Dimension Series

| Inch | Size | T Weight | Tolerance (mm) | Material | Surface Hardness (HRC) | Volume Hardness (HRC) |
|-----------------|-----------|---------------|----------------|----------|------------------------|-----------------------|
| 3/4" | Dia 20MM | 0.037 ± 0.005 | 2 ± 1 | B2 | 63-66 | 63-66 |
| 1" | Dia 25MM | 0.072 ± 0.01 | 2 ± 1 | B2 | 63-66 | 63-66 |
| 1¼" | Dia 30MM | 0.13 ± 0.02 | 2 ± 1 | B2 | 63-66 | 63-66 |
| 1½" | Dia 40MM | 0.30 ± 0.04 | 2 ± 1 | B2 | 62-66 | 62-66 |
| 2" | Dia 50MM | 0.6 ± 0.05 | 2 ± 1 | B2 | 62-65 | 61-64 |
| 2½" | Dia 60MM | 1.0 ± 0.05 | 2 ± 1.5 | B2 | 62-65 | 60-62 |
| 2½" | Dia 65MM | 1.3 ± 0.05 | 2 ± 1.5 | B3 | 61-64 | 60-62 |
| 2½" | Dia 65MM | 1.3 ± 0.05 | 2 ± 1.5 | B3 | 61-63 | 60-62 |
| 3" | Dia 75MM | 2.0 ± 0.06 | 3 ± 2 | B3 | 61-63 | 60-62 |
| 3" (Hot rolled) | Dia 80MM | 2.0 ± 0.06 | 3 ± 2 | B3 | 60-63 | 60-62 |
| 3" (Forged) | Dia 80MM | 2.1 ± 0.06 | 3 ± 2 | B3 | 60-62 | 53-57 |
| 3½" | Dia 90MM | 3.0 ± 0.07 | 3 ± 2 | B3 | 60-63 | 59-62 |
| 4" | Dia 100MM | 4.1 ± 0.15 | 3 ± 2 | B3 | 60-63 | 59-62 |
| 4.5" | Dia 115MM | 6.3 ± 0.15 | 3 ± 2 | B3 | 60-63 | 57-60 |
| 5" | Dia 125MM | 8.1 ± 0.15 | 3 ± 2 | B3 | 59-62 | 58-60 |

CHROME CASTING GRINDING BALLS



LOW CHROME CASTING GRINDING BALLS



MEDIUM CHROME CASTING GRINDING BALLS



HIGH CHROME CASTING GRINDING BALLS

1. High Chrome Casting Grinding Balls:

In high chrome casting grinding ball, chrome concentration is $\geq 10\% - 14\%$, hardness $\geq \text{HRC}58$. High chrome casting grinding ball is one of the wearable steel ball with better performance-price-ratio, and its extensive usage has won itself a high share in the market.

Specification of High Chrome Casting Grinding Balls:

| Item Description | Chemical Composition (%) | | | | | | | | | |
|---|--------------------------|-----------|-------------|-----------|-----------------------|--------------|-------------|--------|------|-------|
| | C | Si | Mn | Cr | P | S | Mo | Cu | Ni | |
| High Chrome Casting Grinding Balls | HY-Cr13 | 2.0-3.0 | ≤ 0.10 | 0.5-1.5 | 10-14 | ≤ 0.10 | ≤ 0.10 | 1.0MAX | 2MAX | 0-1.5 |
| | HY-Cr17 | 2.0-3.0 | ≤ 0.10 | 0.5-1.5 | 14-17 | ≤ 0.10 | ≤ 0.10 | 3.0MAX | 1MAX | 0-1.5 |
| | HY-Cr20 | 2.0-2.8 | ≤ 0.10 | 0.5-1.5 | 18-22 | ≤ 0.10 | ≤ 0.08 | 2.5MAX | 1MAX | 0-1.5 |
| | HY-Cr26 | 2.0-2.8 | ≤ 0.10 | 0.5-1.5 | 22-28 | ≤ 0.10 | ≤ 0.08 | 3.0MAX | 2MAX | 0-1.5 |
| Mechanical Property of High Chrome Casting Grinding balls | | | | | | | | | | |
| Items | Surface Hardness (HRC) | | | | Endurance Impact Test | | | | | |
| | Quenched | | Unquenched | | Times | | | | | |
| High chrome Casting Grinding balls | | ≥ 60 | | ≥ 50 | | ≥ 12000 | | | | |

2. Middle Chrome Grinding Balls:

In middle chrome grinding balls chrome concentration is $\geq 7-10\%$, hardness $\geq \text{HRC} 48$, Middle chrome grinding ball have a better performance than complex alloy ball.

Specification of Middle Chrome Casting Grinding Balls:

| Item Description | Brand | C | Si | Mn | Cr | P | S | Mo | Cu | Ni |
|---|------------------------|---------|------------|-----------|-----------------------|-------------|-------------|-------|-------|-------|
| Middle Chrome Casting Grinding Balls | HY-Cr7 | 2.1-3.2 | 0.5-2.2 | 0.5-1.5 | 6-10 | ≤ 0.10 | ≤ 0.10 | 0-1.0 | 0-0.8 | 0-1.5 |
| Mechanical Property of Middle Chrome Casting Grinding balls | | | | | | | | | | |
| Items | Surface Hardness (HRC) | | | | Endurance Impact Test | | | | | |
| | Quenched | | Unquenched | | Times | | | | | |
| Middle chrome Casting Grinding balls | | X | | ≥ 55 | | ≥ 8000 | | | | |

3. Low Chrome Grinding Ball:

In low chrome grinding balls chrome concentration is $\geq 1-3\%$, hardness $\geq \text{HRC} 45$, This wearable steel ball is called low chrome grinding balls, which is made by smelting in intermediate frequency electric furnace, metal mould or sand casting process. It applies to metallurgic mines and slag industries where no high grinding accuracy or wearability is required.

Specification of Low Chrome Casting Grinding Balls:

| Item Description | Brand | C | Si | Mn | Cr | P | S | Mo | Cu | Ni |
|--|------------------------|---------|------------|-----------|-----------------------|-------------|-------------|-------|-------|----|
| Low Chrome Casting Grinding Balls | HY-Cr2 | 2.2-3.6 | ≤ 1.2 | 0.5-1.5 | 1.0-3.0 | ≤ 0.10 | ≤ 0.10 | 0-1.0 | 0-0.8 | x |
| Mechanical Property of Low Chrome Casting Grinding balls | | | | | | | | | | |
| Items | Surface Hardness (HRC) | | | | Endurance Impact Test | | | | | |
| | Quenched | | Unquenched | | Times | | | | | |
| Low chrome Casting Grinding balls | | X | | ≥ 48 | | ≥ 8000 | | | | |



GRINDING CYLPEBS

HY- Chemical Elements of Grinding cylpebs

| Name | Chemical Elements (%) | | | | | | | |
|-------------------|-----------------------|-------|---------|-------|-----|-------|-------|--------|
| | C | Si | Mn | Cr | Mo | Cu | P | S |
| Low Cr Cylpebs | 2.1-3.6 | 0-1.5 | 0.3-1.5 | 1-3 | 0-1 | ≤ 0.8 | ≤ 0.1 | ≤ 0.1 |
| Middle Cr Cylpebs | 2.0-3.3 | 0-1.2 | 0.3-1.5 | 3-6 | 0-1 | ≤ 1.2 | ≤ 0.1 | ≤ 0.06 |
| High Cr Cylpebs | 2.0-3.3 | 0-1.2 | 0.3-1.5 | 10-13 | 0-3 | ≤ 1.2 | ≤ 0.1 | ≤ 0.06 |

Physical Property & Microstructure of Grinding cylpebs

| Name | HRC | Microstructure |
|-------------------|------|----------------|
| Low Cr cylpebs | ≥ 45 | P+C |
| Middle Cr cylpebs | ≥ 48 | P+C |
| High Cr cylpebs | ≥ 58 | P+M+A |

Size of Grinding cylpebs

| Size(mm) | Φ 10 series | Φ 12 series | Φ 14 series | Φ 16 series | Φ 18 series | Φ 20 series |
|----------|-------------|-------------|-------------|-------------|-------------|-------------|
| | | Φ 25 series | Φ 30 series | Φ 35 series | Φ 40 series | Φ 45 series |

GRINDING RODS



1. Production Process

Raw Material Inspection – Blanking – Burr Grinding – Intermediate Frequency Furnace Heating – Straightening – Quenching Treatment – Tempering Treatment – Inspection – Packaging.

2. Specifications:

- 1) Size: Dia. 40 – 140mm, Length 3000-6000mm
- 2) Hardness: HRC 45-55
- 3) Chemical elements(%):
C: 0.48-0.85, Si: 0.15-0.37, Mn: 0.7-1.0, P: 0.035 MAX, S: 0.035 MAX

3. Mechanical Properties Table (HRC)

| Diameter (mm) | Surface Hardness | Impact Test (Ak) | Tensile Strength (MPa/mm ²) |
|---------------|------------------|------------------|---|
| φ40-140 | 45-55 | ≥12 | ≥1000 |

WHY

CHOOSE
HAOYANG ?

**YOUR QUALIFIED
FACTORY
AND PARTNER !**



FACTORY DIRECT PRICES

We Offer Competitive Prices as the direct factory



ON-TIME DISPATCH

We Ship Within 15 Days Of Payment.



PRE-SHIPMENT (OPTIONAL)

Choice Of 3rd Party Pre-Shipment Inspection At Loading Port Or At Factory



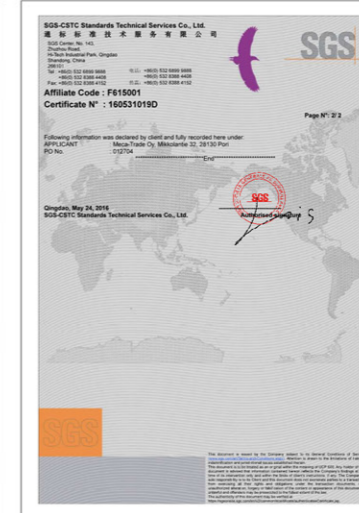
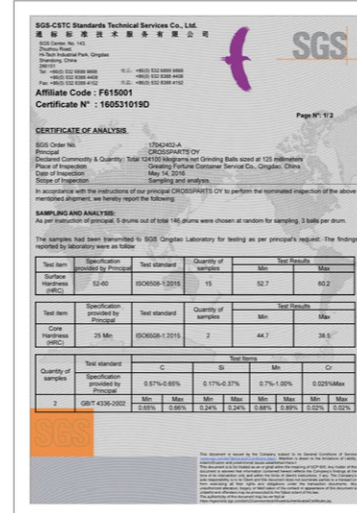
COMPREHENSIVE LOGISTICS

Instant Freight Rates With Optional Door To Door Delivery



ISO CERTIFIED FACTORIES

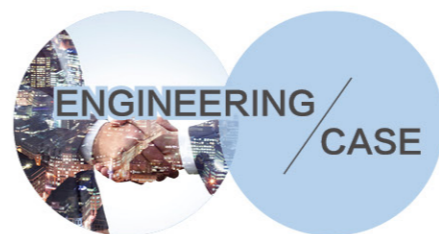
We Ensure Consistent Quality By Sourcing & Auditing ISO Certified Supplier



Haoyang have agent in Europe and providing grinding balls solutions for Gold mining . All the goods will be inspected in factory and then inspected in Loading Port of china by SGS before loading on board . If unqualified , all the containers Will be returned back to factory ! And we accept the claims caused by any problem of the steel .



Where we will buy the steel – Just directly from China Famous steel company or whose qualified distributors.



- HY-1 40MM/100MM /125mm balls for Finland MECA company in gold mining
- HY-2 90MM/125mm balls for ETS COMPANY in west Africa-Niger
- HY-3 40MM/90MM/100MM for Chile Mining Company via Chinese Trading Agent
- HY-4 80MM balls for YD Global in electric power station of Korea
- HY-5 120MM grinding media balls for TOYO CO.Japan
- HY-6 40MM/60MM/80MM balls for INDIA Sneh Iron & Engineering PVT
- HY-7 80MM/125MM Ball mill balls for Peru Elope Trading



**OUR
PRODUCTION
LINE**

Quality Production System Grinding Media P/O number , Batch and Date Recordings

1.Pre-production Checks :

Steel bars (Diameter,Length of Cut bars, Heating Numbers signature) Equipment includes Air hammer Forging hammer , cooling time and Quenching time and etc.. Temperature Control :-Quenching start Temperature and Quenching End temperature . (Produce 10 balls and then Stop production)

2.Surface hardness measurement

Ball 1 ~~~ Ball 10 HRC Recordings

Surface Hardness Target

Materials : 60Mn

| | | |
|----------|--------|-----|
| 25-50mm | >62 | HRC |
| 50-80 mm | >60 | HRC |
| 90-125mm | 56~~59 | HRC |

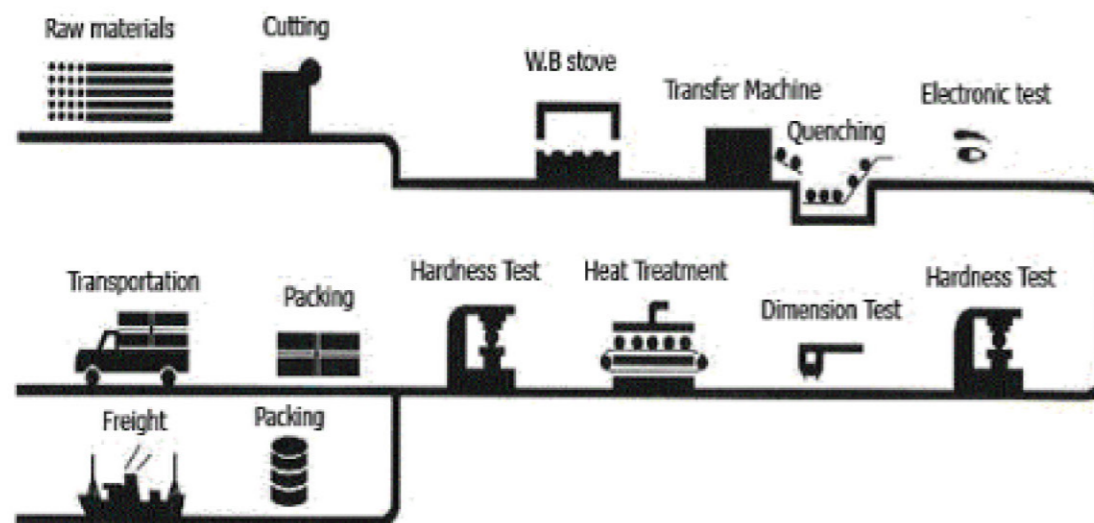
Material : B2

| | | |
|-----------|--------|-----|
| 40-70mm | >62 | HRC |
| 80-100mm | 56~~60 | HRC |
| 110-140mm | 52~~56 | HRC |

3.Core Hardness Test Store the 2 cut balls for further inspection

4.Heat Treatment before packing (Record Heat batch , Temperature)

5.Final Hardness Test before dispatch Mark the hardness result in the grinding balls



100% Guaranteed Qualified grinding balls will be shipped on board



**MARKETING
NETWORK**

