

Internal Quality Assurance Report: Volumetric Hardness (HRC)

Document Ref	: QA – HRC – 2026 – 11102226
Date of Testing	: 20/04/2026
Testing Standard	: ASTM E18 (Standard Test Methods for Rockwell Hardness)

1. Batch & Material Specifications

Product Type	: Forged Steel Balls
Alloy Formulation	: B2 – 1 High Carbon Manganese Alloy
Target Diameter	: 35 MM
Heat/Batch Number	: 11102226
Quench Temp	: 850 °C
Temper Temp:	: 215 °C

2. Testing Methodology

Destructive sample testing protocol: Samples from the designated batch are selected at random, mechanically sectioned (halved) using a metallurgical wet saw to prevent heat distortion, and polished for accurate Rockwell C (HRC) indentation reading.

3. Volumetric Hardness Data Log

Target HRC Range: 62 – 65 HRC

Sample #	Surface	1/4 Radius	1/2 Radius	3/4 Radius	Core	Average HRC	Volumetric Variance (Δ)	Status
01	63.4	63.4	63	62.8	62.5	63.02	0.9	Pass
02	63.7	63.6	63.2	63	62.6	63.22	1.1	Pass
03	63	63	62.5	62.3	62	62.56	1	Pass
04	63	62.7	62.7	62	62	62.48	1	Pass
05	63.2	63	62.7	62.2	62	62.62	1.2	Pass

Average Batch Hardness Profile:

Avg Surface	: 63.26 HRC
Avg Core	: 62.78 HRC
Total Batch Variance	: 1.7 HRC

4. Batch Disposition & Traceability

Final Status: APPROVED: Batch meets the strict 62 – 65 HRC volumetric tolerances.
Proceed to packaging and assign data sheet.

Lead QA Technician: Zhang Wei

张伟

Plant Metallurgist: Zhao Tiejun

赵铁军

TEST REPORT

No. : QDIN2411066662ML01_EN

Date : 2026-04-20

Page: 1 of 3

CUSTOMER NAME : KHAIR AL DELKY MANUFACTURING CO.,LTD
ADDRESS: PUJI TOWN, ZHANGQIU CITY, JINAN, SHANDONG PROVINCE,
P.R.CHINA

Sample Name : FORGED GRINDING BALL
Product Specification : 35MM
Manufacturer : KHAIR AL DELKY MANUFACTURING CO.,LTD
Material and Mark : B2-1

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Test Required : Chemical Composition Analysis,Rockwell Hardness Test
Date of Receipt : 2026-04-15
Testing Period : 2026-04-15 ~ 2026-04-20
Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services (Qingdao) Co., Ltd..



Rose Wang
Authorized signatory



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TEST REPORT

No. : QDIN2411066662ML01_EN

Date : 2026-04-20

Page: 2 of 3

1. Chemical Composition Analysis

Element	Test Method	Result 001 (%)
C	GB/T 4336-2016+XG1-2017	0.74
Mn	GB/T 4336-2016+XG1-2017	0.84
P	GB/T 4336-2016+XG1-2017	0.015
Si	GB/T 4336-2016+XG1-2017	0.56
Cr	GB/T 4336-2016+XG1-2017	0.76

2. Rockwell Hardness Test

Test Method:GB/T 230.1-2018

Test item	Sample	Test position	Result		
HRC	001	Surface	64.0	64.0	64.0
		Core	63.2	63.5	63.5



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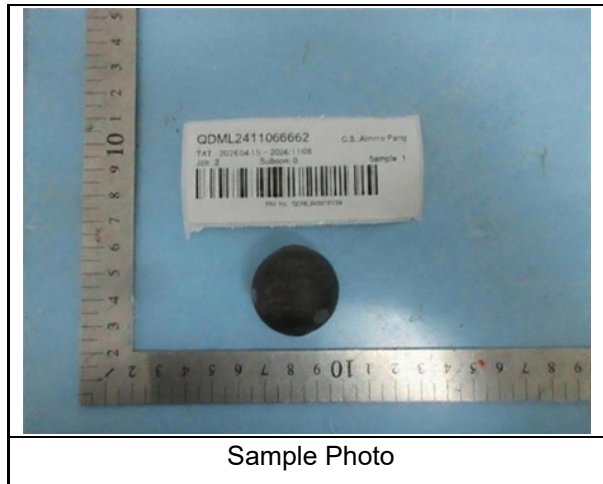
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TEST REPORT

No. : QDIN2411066662ML01_EN

Date : 2026-04-20

Page: 3 of 3



Sample Photo

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凯尔德尔基制造有限公司 (Khair Al Delky Manufacturing Co., Ltd.)

光谱检测 (Spectrometer Test)

检测时间 (Test Time): 2026. 4. 20 材质 (Material): B2-1 样品名称 (Sample Name): 钢球 (Steel Ball) 直径 (Diameter): 35 MM

Sample	Fe	C	Si	Mn	P	S	Cr	Mo
1	97.2	0.744	0.571	0.844	0.0157	0.005	0.76	0.0079
2	97.2	0.745	0.521	0.851	0.0163	0.006	0.777	0.0084
Ave	97.2	0.7445	0.546	0.8475	0.016	0.005	0.769	0.0082

Sample	Ni	Al	Co	Cu	Nb	Ti	V	W
1	0.0245	0.0125	0.0152	0.013	0.0057	0.0038	0.0058	0.0693
2	0.0277	0.0116	0.0159	0.0122	0.0062	0.004	0.0057	0.0622
Ave	0.0261	0.012	0.0156	0.013	0.0060	0.0039	0.0058	0.0658

Sample	Pb	Sn	B	Ca	Zr	Zn	Bi	As
1	0.0223	< 0.0010	0.0007	< 0.0005	0.0031	0.0088	< 0.0075	0.0134
2	0.0208	< 0.0010	0.0009	< 0.0005	0.0032	0.0092	< 0.0075	0.0126
Ave	0.022	< 0.0010	0.0008	< 0.0005	0.00315	0.009	< 0.0075	0.013

Lead QA Technician: Zhang Wei

张伟

Plant Metallurgist: Zhao Tiejun

赵铁军

Internal Quality Assurance Report: Volumetric Hardness (HRC)

Document Ref	: QA – HRC – 2026 – 11103026
Date of Testing	: 20/04/2026
Testing Standard	: ASTM E18 (Standard Test Methods for Rockwell Hardness)

1. Batch & Material Specifications

Product Type	: Forged Steel Balls
Alloy Formulation	: B2 – 1 High Carbon Manganese Alloy
Target Diameter	: 40 MM
Heat/Batch Number	: 11103026
Quench Temp	: 855 °C
Temper Temp:	: 210 °C

2. Testing Methodology

Destructive sample testing protocol: Samples from the designated batch are selected at random, mechanically sectioned (halved) using a metallurgical wet saw to prevent heat distortion, and polished for accurate Rockwell C (HRC) indentation reading.

3. Volumetric Hardness Data Log

Target HRC Range: 62 – 65 HRC

Sample #	Surface	1/4 Radius	1/2 Radius	3/4 Radius	Core	Average HRC	Volumetric Variance (Δ)	Status
01	64	63.8	63.8	63.5	63	63.62	1	Pass
02	63.7	63.3	63	62.8	62.2	63	1.5	Pass
03	63	63	62.7	62.3	62	62.6	1	Pass
04	63.4	63	63	62.8	62.5	62.94	0.9	Pass
05	63.2	63	62.7	62.1	61.8	62.56	1.4	Pass

Average Batch Hardness Profile:

Avg Surface	: 63.46 HRC
Avg Core	: 62.94 HRC
Total Batch Variance	: 2.2 HRC

4. Batch Disposition & Traceability

Final Status: APPROVED: Batch meets the strict 62 – 65 HRC volumetric tolerances.
Proceed to packaging and assign data sheet.

Lead QA Technician: Zhang Wei

张伟

Plant Metallurgist: Zhao Tiejun

赵铁军

TEST REPORT

No. : QDIN2308001972ML01_EN

Date : 2026-04-20

Page: 1 of 3

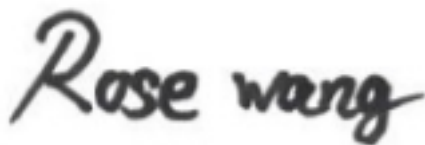
CUSTOMER NAME. : KHAIR AL DELKY MANUFACTURING CO.,LTD
ADDRESS: PUJI TOWN, ZHANGQIU CITY, JINAN, SHANDONG PROVINCE,
P.R.CHINA

Sample Name : FORGED GRINDING BALL
Product Specification : 40MM
Manufacturer : KHAIR AL DELKY MANUFACTURING CO.,LTD
Material and Mark : B2-1

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Test Required : Chemical Composition Analysis,Rockwell Hardness Test
Date of Receipt : 2026-04-15
Testing Period : 2026-04-15 ~ 2026-04-20
Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services (Qingdao) Co., Ltd..



Rose Wang
Authorized signatory



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TEST REPORT

No. : QDIN2308001972ML01_EN

Date : 2026-04-20

Page: 2 of 3

1. Chemical Composition Analysis

Element	Test Method	Result 001 (%)
C	GB/T 4336-2016+XG1-2017	0.73
Mn	GB/T 4336-2016+XG1-2017	0.87
P	GB/T 4336-2016+XG1-2017	0.010
Si	GB/T 4336-2016+XG1-2017	0.50
Cr	GB/T 4336-2016+XG1-2017	0.59

2. Rockwell Hardness Test

Test Method:GB/T 230.1-2018

Test item	Sample	Test position	Result		
HRC	001	Surface	63.6	64.0	64.0
		Core	62.8	63.0	62.7



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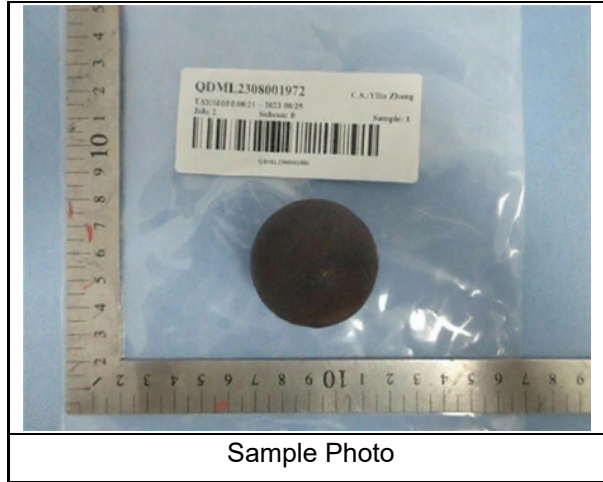
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TEST REPORT

No. : QDIN2308001972ML01_EN

Date : 2026-04-20

Page: 3 of 3



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凯尔德尔基制造有限公司 (Khair Al Delky Manufacturing Co., Ltd.)

光谱检测 (Spectrometer Test)

检测时间 (Test Time): 2026. 4. 20 材质 (Material): B2-1 样品名称 (Sample Name): 钢球 (Steel Ball) 直径 (Diameter): 40 MM

Sample	Fe	C	Si	Mn	P	S	Cr	Mo
1	97.4	0.726	0.526	0.867	0.0147	0.0046	0.59	0.005
2	97.4	0.718	0.452	0.855	0.0172	0.0051	0.585	0.0034
Ave	97.4	0.722	0.489	0.861	0.016	0.00485	0.5875	0.0042

Sample	Ni	Al	Co	Cu	Nb	Ti	V	W
1	0.0134	0.0159	0.0064	0.013	0.0057	0.006	0.0045	0.0693
2	0.0157	0.015	0.0056	0.0137	0.0062	0.0062	0.0057	0.0622
Ave	0.0145	0.0154	0.006	0.01335	0.00595	0.0061	0.0051	0.0658

Sample	Pb	Sn	B	Ca	Zr	Zn	Bi	As
1	0.0223	< 0.0010	0.0007	< 0.0005	0.0031	0.0088	< 0.0075	0.0116
2	0.0181	< 0.0010	0.0009	< 0.0005	0.0032	0.0092	< 0.0075	0.0131
Ave	0.0202	< 0.0010	0.0008	< 0.0005	0.00315	0.009	< 0.0075	0.0124

Lead QA Technician: Zhang Wei

张伟

Plant Metallurgist: Zhao Tiejun

赵铁军

AL HOTY-STANGER**Khair Al Delky Manufacturing Co.**

Shandong, China

HARDNESS TEST REPORT

Report No.: KHMET26304

Receipt Date: 16 Apr. 2026

Test Date: 20 Apr. 2026

Report Date: 20 Apr. 2026

Page No.: 1 of 2

A. LAB REFERENCE NUMBER : KH/MET/26/0329**B. SAMPLE DETAILS IDENTIFIED BY THE CUSTOMER:**

Sampled By : KD Grinding Media
 Sample Condition : Good
 Sample Description : 30mmØ Grinding Ball
 Material Specification : Sample Not Provided
 Test Method : ASTM E18 - 2022

C. EQUIPMENT DETAILS:

Make / Model	Equipment Serial No.	Calibration date	Calibration Due date
INDENTEC	144792	20-Apr-26	20-Apr-27

D. TEST RESULTS :

Sr. No.	Sample No.	Requirement as per Customer / specification	Measured Value (HRC)	Remarks
1	A-1	-	63.2	**
2			63.4	
3			64.0	
4			63.8	
5			64.3	
Average		-	63.74	

**** Note:** Material Specification / Hardness Test Requirement was Not Provided by the Customer.

Tested By: **Carlo Leviste**

Reviewed By :

Mohammed Usman Khan
 Operations Technical Manager
 Met-Lab Department

Approved By :

Nagarajan Mani
 Department Manager (A)
 Met-Lab Department

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Shandong, China

HARDNESS TEST REPORT

Report No.: KHMET26304

Receipt Date: 16 Apr.2026

Test Date: 20 Apr. 2026

Report Date: 20 Apr. 2026

Page No.: 2 of 2

A. LAB REFERENCE NUMBER : KH/MET/26/0329**B. SAMPLE DETAILS IDENTIFIED BY THE CUSTOMER:**

Sampled By : KD Grinding Media
 Sample Condition : Good
 Sample Description : 30mmØ Grinding Ball Sample
 Material Specification : Not Provided
 Test Method : ASTM E18 - 2022

C. EQUIPMENT DETAILS:

Make / Model	Equipment Serial No.	Calibration date	Calibration Due date
INDENTEC	144792	20-Apr-26	20-Apr-27

D. TEST RESULTS :

Sr. No.	Sample No.	Requirement as per Customer / specification	Measured Value (HRC)	Remarks
1	B-1	-	63.0	**
2			63.0	
3			63.0	
4			63.6	
5			63.5	
Average		-	63.22	

**** Note:** Material Specification / Hardness Test Requirement was Not Provided by the Customer.

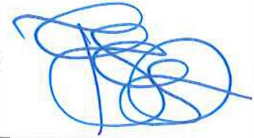
Tested By: Carlo Leviste

Reviewed By :


Mohammed Usman Khan
 Operations Technical Manager
 Met-Lab Department



Approved By :


Nagarajan Mani
 Department Manager (A)
 Met-Lab Department

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