

# Fasteners & Metals Interlaboratory Testing Program

Summary Report Cycle 1471, 3rd Qtr 2024 (HD)

---

[About the Metals Program](#) [About CTS](#) [Key to Tables and Graphs](#)

<u>Analysis</u>	<u>Test Group</u>
-----------------	-------------------

<b>Hardness / Metallography Tests</b>	
---------------------------------------	--

<a href="#">1301</a>	<a href="#">Rockwell Hardness: C &amp; B Scales</a>
<a href="#">1302</a>	<a href="#">Rockwell Hardness: B Scale</a>
<a href="#">1321</a>	<a href="#">Microhardness: Knoop Indenters (500 gf)</a>
<a href="#">1322</a>	<a href="#">Microhardness: Knoop Indenters (200 gf)</a>
<a href="#">1323</a>	<a href="#">Microhardness: Vickers Indenters (500 gf)</a>
<a href="#">1341</a>	<a href="#">Brinell Hardness</a>

## ABOUT THE FASTENERS & METALS PROGRAM

Collaborative Testing Services operates and maintains the program for Fasteners and Metals as part of a series of Proficiency and Interlaboratory Testing Programs offered by CTS in cooperation with various associations for a wide range of industries. Personnel from the National Institute of Standards and Technology (formerly the National Bureau of Standards), Industrial Fasteners Institute (IFI), and the Naval Shipyard Laboratories provide technical guidance and advice to this program.

The purpose of the program is to give participating laboratories a means to compare periodically the level and uniformity of their testing with that of other laboratories in the industry. It also provides a realistic assessment of the state of fasteners and metals testing proficiency.

In each report, there is a summary of the statistics for the analysis and a graphical representation of the data for each test. Also shown are notes concerning specific laboratory results, as well as significant findings related to instrument types or other testing variations. Refer to the KEY TO TABLES AND GRAPHS for an explanation of terms and guidelines to interpreting the results.

## ABOUT CTS

Founded in 1971, CTS is a privately-owned company that specializes in interlaboratory tests for a wide variety of industries including rubber, plastics, fasteners and metals, containerboard, paper, color, hemp, and wine as well as proficiency tests for forensic laboratories. All of the tests are designed to assist organizations in achieving and maintaining quality control objectives. Labs from the U.S., as well as more than 100 countries, currently participate in the CTS programs.

For further information contact:

**COLLABORATIVE TESTING SERVICES, INC.**  
21331 Gentry Drive  
Sterling, VA 20166

Phone: (571) 434-1925  
FAX: (571)434-1937  
e-mail: [metals@cts-interlab.com](mailto:metals@cts-interlab.com)  
[www.collaborativetesting.com](http://www.collaborativetesting.com)  
Office Hours: 8:00 a.m. - 4:30 p.m. ET

## Key for Fasteners & Metals Program Web Summary Report

- WebCode** - Assigned laboratory identification number(temporary)used to ensure lab confidentiality while permitting a lab to locate its data in the report published on the CTS website.
  
- Lab Mean** - The average of the test results obtained by the participant.
  
- Grand Mean** - The average of the LAB MEANS for all included participants. Laboratories flagged with an X or an M (see DATA FLAG column) are excluded from the GRAND MEAN.
  
- Between-Lab Standard Deviation** - An indication of the precision of measurement between the laboratories. The greater the spread of the LAB MEANS about the GRAND MEAN, the larger the BETWEEN-LAB STANDARD DEVIATION (and vice versa).
  
- Comparative Performance Value (CPV)** - An indication of how well a laboratory's results agree with the other participants. The CPV is a ratio indicating the number of standard deviations from the GRAND MEAN.  $CPV = (LAB\ MEAN - GRAND\ MEAN) / BETWEEN-LAB\ STANDARD\ DEVIATION$ . The closer a laboratory's COMPARATIVE PERFORMANCE VALUE is to zero, the more consistent its results are with the other participants' data (and vice versa).
  
- Instr. Code** - A code indicating the manufacturer of the instrument used to perform the test (see separate INSTRUMENT CODE LIST for each test section).
  
- Data Flag** - DATA FLAGS are assigned based on the simultaneous analysis of both samples tested. Refer to the following chart for an explanation of each symbol:

### Data Flags

Data Flag Type	Statistically Included/Excluded	ACTION REQUIRED
*	INCLUDED	<b>CAUTION</b> - review testing procedure and monitor future results. Results fall outside the drawn 95% ellipse but within a 99% ellipse that is calculated but not drawn. Labs flagged with an * do not typically receive a specific note regarding the flag. If this error is repeated in future rounds, however, a lab may need to stop and review its testing procedures. The initial data flag is not cause for alarm.
X	EXCLUDED	<b>STOP</b> - immediate review of data and/or testing procedure is required (all tests except Chemical Analyses). Results fall outside the 99% ellipse. See the specific note following the data for more information on why the data are excluded. For Chemical Analyses see an additional Memo.
M	EXCLUDED	<b>PROCEED</b> - lab was unable to report data for at least one sample. However, a lab receiving two or more M flags for a test may need to stop and review its testing procedures.

**Graph** - For each laboratory, the Lab Mean for the second sample (y-axis) is plotted against the Lab Mean for the first sample (x-axis) with each point representing a laboratory. The horizontal and vertical cross-hairs are the Grand Means for each sample. When 20 or more laboratories are included in the statistics, an ellipse is also drawn so that 95% of the time a randomly selected laboratory will be included inside the ellipse. Plotted data flags are explained above. Labs not receiving a data flag appear as points on the plot.



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1301

3rd Qtr 2024

Rockwell Hardness: C & B Scales

(HD)

ASTM E18

WebCode	Data Flag	Sample N03			Sample N04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
29XXXD		93.24	-0.69	-1.23	94.38	-0.18	-0.31
2H7BEG		94.04	0.11	0.20	94.92	0.36	0.62
2HP8QG		94.94	1.01	1.81	95.46	0.90	1.56
2WP4TF		94.48	0.55	0.99	94.88	0.32	0.55
32ZEKB		93.44	-0.49	-0.87	94.22	-0.34	-0.59
3DUWTN		94.06	0.13	0.24	94.46	-0.10	-0.18
3MHLUH		93.94	0.01	0.02	94.54	-0.02	-0.04
3QWB7E		94.04	0.11	0.20	94.44	-0.12	-0.21
46VPRU		93.86	-0.07	-0.12	94.32	-0.24	-0.42
4LFFQT		94.30	0.37	0.67	95.06	0.50	0.86
4NRVJA		93.98	0.05	0.10	94.28	-0.28	-0.49
4P4RRK		94.16	0.23	0.42	94.48	-0.08	-0.14
64EUMD		94.32	0.39	0.70	94.50	-0.06	-0.11
6C9XW3		93.72	-0.21	-0.37	94.56	0.00	0.00
6JUTX7		93.48	-0.45	-0.80	93.92	-0.64	-1.11
6L2BUG		94.26	0.33	0.60	95.28	0.72	1.24
6TW9HJ		93.30	-0.63	-1.12	94.30	-0.26	-0.45
6UTQFE		92.94	-0.99	-1.77	93.54	-1.02	-1.77
6VGC2A		93.94	0.01	0.02	94.48	-0.08	-0.14
6X94HM		93.38	-0.55	-0.98	94.04	-0.52	-0.90
6XCJW9		94.24	0.31	0.56	94.60	0.04	0.07
74W72C		94.60	0.67	1.20	95.21	0.65	1.12
772V4L	X	13.76	-80.17	-143.47	14.32	-80.24	-139.03
89L339	*	92.90	-1.03	-1.84	94.20	-0.36	-0.63
8CM46Q		94.80	0.87	1.56	95.02	0.46	0.79
8Z9739		93.72	-0.21	-0.37	94.80	0.24	0.41
9GB4ZX		94.34	0.41	0.74	94.88	0.32	0.55
9P3NZ4		93.98	0.05	0.10	94.88	0.32	0.55
9UXHX7		94.32	0.39	0.70	94.82	0.26	0.45
AUT8V8		94.40	0.47	0.85	95.08	0.52	0.90
B8CAQ6		93.35	-0.58	-1.03	94.26	-0.30	-0.52
BMC4CC		94.76	0.83	1.49	95.68	1.12	1.94
BY6K2D		94.51	0.59	1.05	95.00	0.44	0.76
C2LJJZ	*	93.50	-0.43	-0.76	93.48	-1.08	-1.87
C3GVPZ		94.12	0.19	0.35	94.86	0.30	0.52
C3YY4T		94.25	0.33	0.58	94.71	0.15	0.26
CBRC28		94.60	0.67	1.21	94.92	0.36	0.62
CCNMYV		95.00	1.07	1.92	95.80	1.24	2.15
CP9CR7		94.70	0.77	1.38	95.40	0.84	1.45
CRZ46X		94.44	0.51	0.92	94.92	0.36	0.62
D8T3Q6		94.60	0.67	1.21	95.50	0.94	1.63
DDYRAY	*	92.76	-1.17	-2.09	93.92	-0.64	-1.11
DE9Y9K		94.72	0.79	1.42	95.50	0.94	1.63
DJNANA		93.70	-0.23	-0.41	94.68	0.12	0.21
DM4YPX		94.06	0.13	0.24	94.76	0.20	0.34
DNGBN4		93.02	-0.91	-1.62	93.52	-1.04	-1.80
DRBGXY	X	92.08	-1.85	-3.30	91.88	-2.68	-4.65



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1301

3rd Qtr 2024

Rockwell Hardness: C & B Scales

(HD)

ASTM E18

WebCode	Data Flag	Sample N03			Sample N04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
DU7T4Z		94.82	0.89	1.60	95.46	0.90	1.56
EB3TBQ		94.10	0.17	0.31	94.20	-0.36	-0.63
EHPNAA	*	95.52	1.59	2.85	96.26	1.70	2.94
EMGXDF	*	92.39	-1.54	-2.76	92.93	-1.64	-2.83
EQ2M2Y		93.52	-0.41	-0.73	94.06	-0.50	-0.87
EUH3CQ		94.32	0.39	0.70	95.04	0.48	0.83
F2X37U		93.84	-0.09	-0.15	94.78	0.22	0.38
FBJ7EU		94.32	0.39	0.70	94.74	0.18	0.31
FD7VRE	X	93.56	-0.37	-0.66	92.94	-1.62	-2.81
GBEGGA		94.34	0.41	0.74	94.64	0.08	0.14
GFTUL4		92.84	-1.09	-1.95	93.71	-0.85	-1.47
GN3FAX		93.18	-0.75	-1.34	93.80	-0.76	-1.32
H98DA6		93.76	-0.17	-0.30	94.86	0.30	0.52
HDLT3H		93.76	-0.17	-0.30	94.76	0.20	0.34
HNX68Y		94.12	0.19	0.35	94.76	0.20	0.34
HVK4NZ		93.66	-0.27	-0.48	94.30	-0.26	-0.45
HX3CMY		94.10	0.17	0.31	94.24	-0.32	-0.56
J7DRET		93.36	-0.57	-1.01	94.06	-0.50	-0.87
KCXG4V		93.88	-0.05	-0.08	94.94	0.38	0.66
L393NW		93.74	-0.19	-0.33	94.56	0.00	0.00
L9FNFZ		93.88	-0.05	-0.08	94.68	0.12	0.21
LCUZVN		94.06	0.13	0.24	94.54	-0.02	-0.04
LK6LKJ		93.86	-0.07	-0.12	94.68	0.12	0.21
LTGUVT		93.62	-0.31	-0.55	94.20	-0.36	-0.63
M4J6AV		93.10	-0.83	-1.48	94.06	-0.50	-0.87
MNL9RW		93.46	-0.47	-0.83	93.94	-0.62	-1.08
NBENPV		93.00	-0.93	-1.66	93.90	-0.66	-1.15
NEAD9N	*	94.62	0.69	1.24	94.54	-0.02	-0.04
NU6V2R		93.98	0.05	0.10	94.30	-0.26	-0.45
NYW8V4		93.20	-0.73	-1.30	94.00	-0.56	-0.97
PEN7DQ		93.51	-0.41	-0.74	94.04	-0.52	-0.90
PFKPFR		94.58	0.66	1.17	95.46	0.90	1.56
PLR4AA		93.62	-0.31	-0.55	93.92	-0.64	-1.11
PQL6A3		93.38	-0.55	-0.99	93.86	-0.71	-1.22
QFEKNL		93.64	-0.29	-0.51	93.88	-0.68	-1.18
QFY9ZN		94.32	0.39	0.70	94.60	0.04	0.07
QKTKJR		94.28	0.35	0.63	94.52	-0.04	-0.07
QP8V3M		93.84	-0.09	-0.15	94.66	0.10	0.17
QXYBMK		93.86	-0.07	-0.12	94.34	-0.22	-0.38
RR9F3T		94.18	0.25	0.45	94.54	-0.02	-0.04
RXTJ44		94.46	0.53	0.95	95.04	0.48	0.83
TFRQ6M		93.35	-0.58	-1.04	94.20	-0.37	-0.63
TRJKAP		93.18	-0.75	-1.34	93.60	-0.96	-1.67
TRY4UM		93.68	-0.24	-0.44	94.22	-0.34	-0.58
TRZL9K		93.76	-0.17	-0.30	94.38	-0.18	-0.31
UCPEGL		94.78	0.85	1.53	95.40	0.84	1.45
UFNNRN		93.70	-0.23	-0.41	94.18	-0.38	-0.66



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1301

3rd Qtr 2024

Rockwell Hardness: C & B Scales  
ASTM E18

(HD)

WebCode	Data Flag	Sample N03			Sample N04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
UHB8TL		93.80	-0.13	-0.23	94.00	-0.56	-0.97
UHV42E	*	92.78	-1.15	-2.05	93.00	-1.56	-2.71
UQ9VQD		93.64	-0.29	-0.51	94.50	-0.06	-0.11
V7J2FG		94.60	0.67	1.21	95.23	0.67	1.16
VERU8N		94.32	0.39	0.70	94.58	0.02	0.03
VL9DLW		94.40	0.47	0.85	95.24	0.68	1.18
VMJ9AA		94.70	0.77	1.38	95.16	0.60	1.04
W2FPU2		94.36	0.43	0.78	94.68	0.12	0.21
W2WZBL		93.98	0.05	0.10	94.90	0.34	0.59
WA92PU	X	94.66	0.73	1.31	93.80	-0.76	-1.32
WTLLEX		94.32	0.39	0.70	95.26	0.70	1.21
WXYKZC		94.02	0.09	0.17	94.98	0.42	0.73
X299NE	*	93.73	-0.19	-0.34	95.23	0.67	1.15
X6ULXH		94.08	0.15	0.27	95.02	0.46	0.79
XDNUGM		93.54	-0.39	-0.69	93.78	-0.78	-1.35
YRLFZN		93.80	-0.13	-0.23	94.00	-0.56	-0.97
ZGHECH		94.12	0.20	0.35	95.06	0.50	0.86
ZKGY69		93.16	-0.77	-1.37	94.06	-0.50	-0.87
ZRHXXJ		93.62	-0.31	-0.55	94.18	-0.38	-0.66
ZUNGZL		93.60	-0.33	-0.58	94.32	-0.24	-0.42
ZZV6F9		93.60	-0.33	-0.58	94.90	0.34	0.59

### Summary Statistics

	Sample N03		Sample N04	
<b>Grand Means</b>	93.93	HRB	94.56	HRB
<b>Std Dev Btwn Labs</b>	0.56	HRB	0.58	HRB

Samples N03, N04 : Steel, Steel

Statistics based on 111 of 115 reporting participants

### Comments on Assigned Data Flags for Test #1301

- 772V4L (X) - Extreme data.
- DRBGXY (X) - Data for both samples are low. Possible Systematic Error.
- FD7VRE (X) - Data for sample N04 are low.
- WA92PU (X) - Inconsistent in testing between samples.



# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1301

Rockwell Hardness: C & B Scales  
ASTM E18

Cycle 1471

3rd Qtr 2024

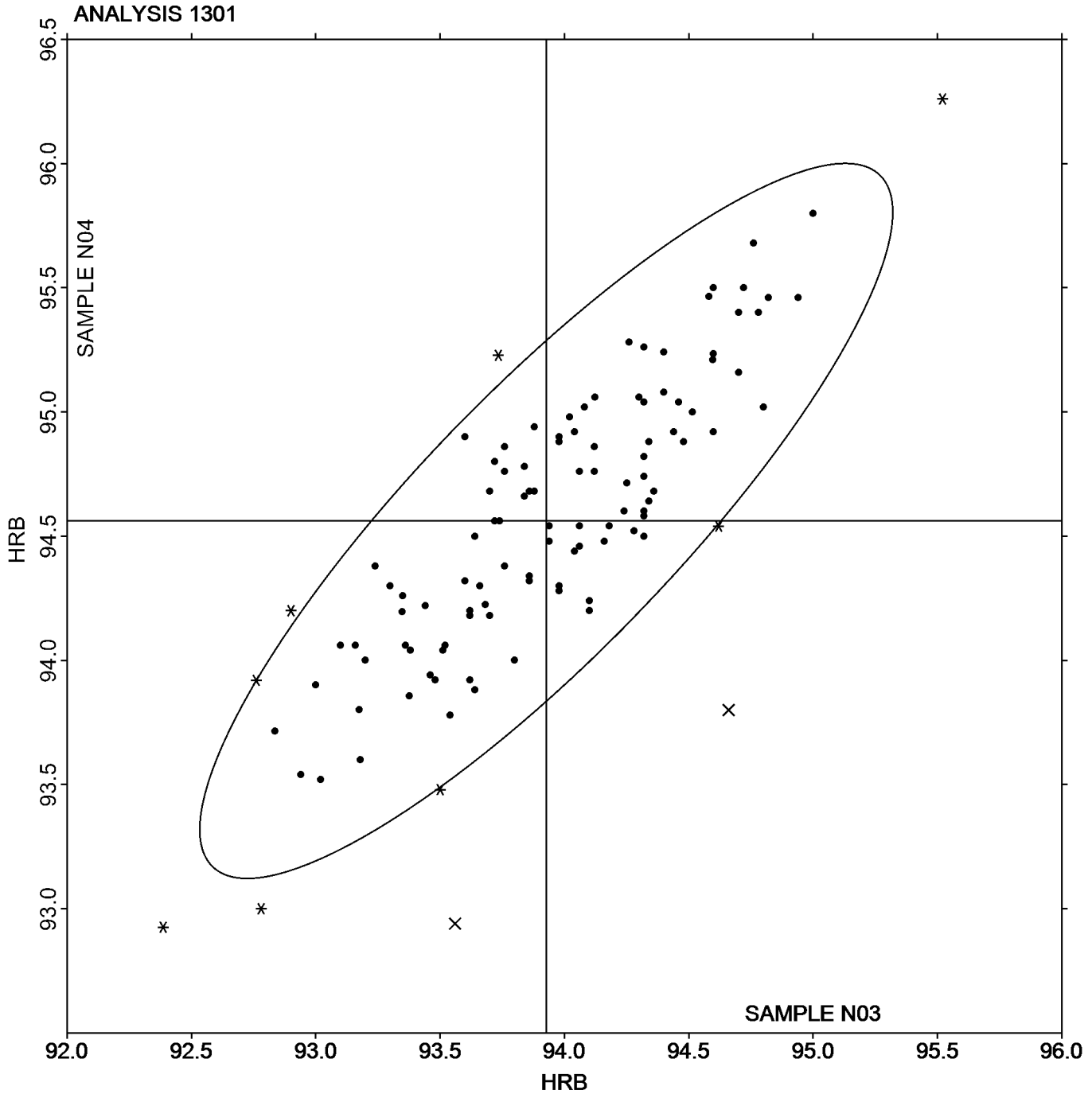
(HD)

SAMPLE N03

93.93 HRB

SAMPLE N04

94.56 HRB





# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1302

Rockwell Hardness: B Scale  
ASTM E18

Cycle 1471  
3rd Qtr 2024  
(HD)

WebCode	Data Flag	Sample N03			Sample N04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
27EUDM		94.38	0.34	0.52	95.04	0.31	0.49
2BPPDQ		94.24	0.20	0.31	94.60	-0.13	-0.20
2C4BMR		94.32	0.28	0.43	95.02	0.29	0.46
2GY7ME		93.38	-0.66	-1.03	93.98	-0.75	-1.19
2KCV3G		93.42	-0.62	-0.97	94.54	-0.19	-0.30
3BMCAU		93.62	-0.42	-0.66	94.78	0.05	0.08
3JDZZQ		94.24	0.20	0.31	95.12	0.39	0.62
3LM3TG		94.06	0.02	0.03	94.64	-0.09	-0.14
3P2R4D		94.16	0.12	0.18	94.70	-0.03	-0.04
3QHYCG		94.80	0.76	1.18	95.20	0.47	0.75
46HVEF	*	95.54	1.50	2.33	96.58	1.85	2.94
4GL9KE		94.50	0.46	0.71	95.22	0.49	0.78
4H2JND		94.00	-0.04	-0.07	94.96	0.23	0.37
4HF6VU	*	92.58	-1.46	-2.28	93.68	-1.05	-1.66
6L2BUG		94.74	0.70	1.08	94.90	0.17	0.27
74W72C		94.17	0.12	0.19	94.97	0.24	0.39
7NJTP7		94.70	0.66	1.02	95.72	0.99	1.57
84A4M9		94.54	0.50	0.77	95.42	0.69	1.10
84R26Z		94.00	-0.04	-0.07	95.00	0.27	0.43
8LBZ9D		94.28	0.24	0.37	94.72	-0.01	-0.01
8QL6LY		92.46	-1.58	-2.46	93.38	-1.35	-2.14
9CH9W6		92.80	-1.24	-1.93	93.32	-1.41	-2.23
AA628G		93.84	-0.20	-0.32	94.12	-0.61	-0.96
ACDXU7	X	92.86	-1.18	-1.84	92.72	-2.01	-3.18
ADAL29		94.86	0.82	1.27	95.70	0.97	1.54
AHZUL3		94.34	0.30	0.46	94.80	0.07	0.11
ARQER2		94.26	0.22	0.34	95.06	0.33	0.53
ATXNU7		95.00	0.96	1.49	96.00	1.27	2.02
AW6TUA		94.36	0.32	0.49	95.32	0.59	0.94
BY6K2D		93.80	-0.24	-0.38	94.54	-0.19	-0.30
BZCZA4		94.44	0.40	0.62	94.88	0.15	0.24
C3KG39		94.98	0.94	1.46	95.52	0.79	1.26
EAUHG9		94.60	0.56	0.87	95.10	0.37	0.59
EC2ZE4		94.22	0.18	0.27	94.66	-0.07	-0.11
ECXBCR		94.20	0.16	0.24	94.50	-0.23	-0.36
ELLECE		94.20	0.16	0.24	95.04	0.31	0.49
EQ48U9		94.20	0.16	0.24	94.72	-0.01	-0.01
EQGYK6		93.88	-0.16	-0.25	94.50	-0.23	-0.36
EUGAF4	X	94.46	0.42	0.65	96.04	1.31	2.08
FFEZAA		94.23	0.18	0.29	94.79	0.06	0.10
FG8YJ2		94.50	0.46	0.71	94.80	0.07	0.11
G28EH4		94.28	0.24	0.37	95.08	0.35	0.56
G76VY6		94.26	0.22	0.34	95.24	0.51	0.81
G82DWY		94.20	0.16	0.24	94.80	0.07	0.11
GBZM6F		93.40	-0.64	-1.00	94.04	-0.69	-1.09
GWY9LX		93.66	-0.38	-0.60	94.26	-0.47	-0.74
H7ZTNQ		93.32	-0.72	-1.12	94.18	-0.55	-0.87





# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1302

Rockwell Hardness: B Scale  
ASTM E18

Cycle 1471  
3rd Qtr 2024  
(HD)

WebCode	Data Flag	Sample N03			Sample N04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
H8CV94		93.40	-0.64	-1.00	94.48	-0.25	-0.39
J4NKTB		92.98	-1.06	-1.65	94.00	-0.73	-1.15
J8CWU3		93.96	-0.08	-0.13	94.64	-0.09	-0.14
J9YQA3		94.18	0.14	0.21	94.72	-0.01	-0.01
JBB744	X	93.80	-0.24	-0.38	93.20	-1.53	-2.42
JH9YCX	X	94.24	0.20	0.31	93.68	-1.05	-1.66
JQKEKX	*	94.14	0.10	0.15	94.20	-0.53	-0.84
K3FN6L		93.58	-0.46	-0.72	94.48	-0.25	-0.39
KUEB3W		93.84	-0.20	-0.32	94.64	-0.09	-0.14
L9XK38		94.16	0.12	0.18	95.04	0.31	0.49
LLHZ78		94.34	0.30	0.46	94.78	0.05	0.08
LPHB28		94.92	0.88	1.36	95.42	0.69	1.10
M8XYQR		93.38	-0.66	-1.03	94.24	-0.49	-0.77
N8R3YT		94.28	0.24	0.37	94.90	0.17	0.27
NKZNL		93.88	-0.16	-0.25	94.62	-0.11	-0.17
NQJZBT	X	88.60	-5.44	-8.46	90.18	-4.55	-7.21
NRYFNU		94.30	0.26	0.40	94.88	0.15	0.24
NXT83J		92.64	-1.40	-2.18	93.58	-1.15	-1.82
P48DBA		94.00	-0.04	-0.07	95.00	0.27	0.43
PDW4TV		94.12	0.08	0.12	94.52	-0.21	-0.33
PFKPFR	*	95.72	1.68	2.61	96.25	1.52	2.41
Q8M8M2		93.22	-0.82	-1.28	94.10	-0.63	-1.00
RDL947		94.42	0.38	0.59	94.66	-0.07	-0.11
RK7CAN	*	95.40	1.36	2.11	95.62	0.89	1.41
T6B7H6		94.00	-0.04	-0.07	94.84	0.11	0.18
TUQXXH		93.60	-0.44	-0.69	94.14	-0.59	-0.93
U3JPJG	X	93.72	-0.32	-0.50	93.20	-1.53	-2.42
U8Y3LP		93.28	-0.76	-1.19	93.82	-0.91	-1.44
UJ8WQM	X	93.00	-1.04	-1.62	92.90	-1.83	-2.90
ULTU2Y		94.56	0.52	0.80	95.06	0.33	0.53
UZT9NN		93.26	-0.78	-1.22	93.82	-0.91	-1.44
V642VR	X	37.00	-57.04	-88.69	37.70	-57.03	-90.39
V6ZJTM		93.54	-0.50	-0.78	94.02	-0.71	-1.12
VDDBJK		93.86	-0.18	-0.28	94.60	-0.13	-0.20
VEAJVB		93.42	-0.62	-0.97	94.12	-0.61	-0.96
WBMJQE		94.42	0.38	0.59	95.38	0.65	1.03
YKLZBG		94.16	0.12	0.18	95.06	0.33	0.53
Z69RCX	*	92.48	-1.56	-2.43	92.88	-1.85	-2.93
ZX36CH		94.00	-0.04	-0.07	94.96	0.23	0.37
ZYZLE8		94.02	-0.02	-0.04	94.88	0.15	0.24



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1302

3rd Qtr 2024

Rockwell Hardness: B Scale

(HD)

ASTM E18

### Summary Statistics

	<u>Sample N03</u>		<u>Sample N04</u>	
<b>Grand Means</b>	94.04	HRB	94.73	HRB
<b>Std Dev Btwn Labs</b>	0.64	HRB	0.63	HRB

Samples N03, N04 : Steel, Steel

Statistics based on 79 of 87 reporting participants

### Comments on Assigned Data Flags for Test #1302

ACDXU7 (X) - Data for sample N04 are low. Inconsistent within the determinations of sample N04.

EUGAF4 (X) - Inconsistent in testing between samples.

JBB744 (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample N04.

JH9YCX (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample N04.

NQJZBT (X) - Data for both samples are low. Possible Systematic Error. Inconsistent within the determinations of sample N04.

U3JPJG (X) - Inconsistent in testing between samples. Inconsistent within the determinations of sample N04.

UJ8WQM (X) - Data for sample N04 are low.

V642VR (X) - Extreme data.



# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1302

Rockwell Hardness: B Scale  
ASTM E18

Cycle 1471

3rd Qtr 2024

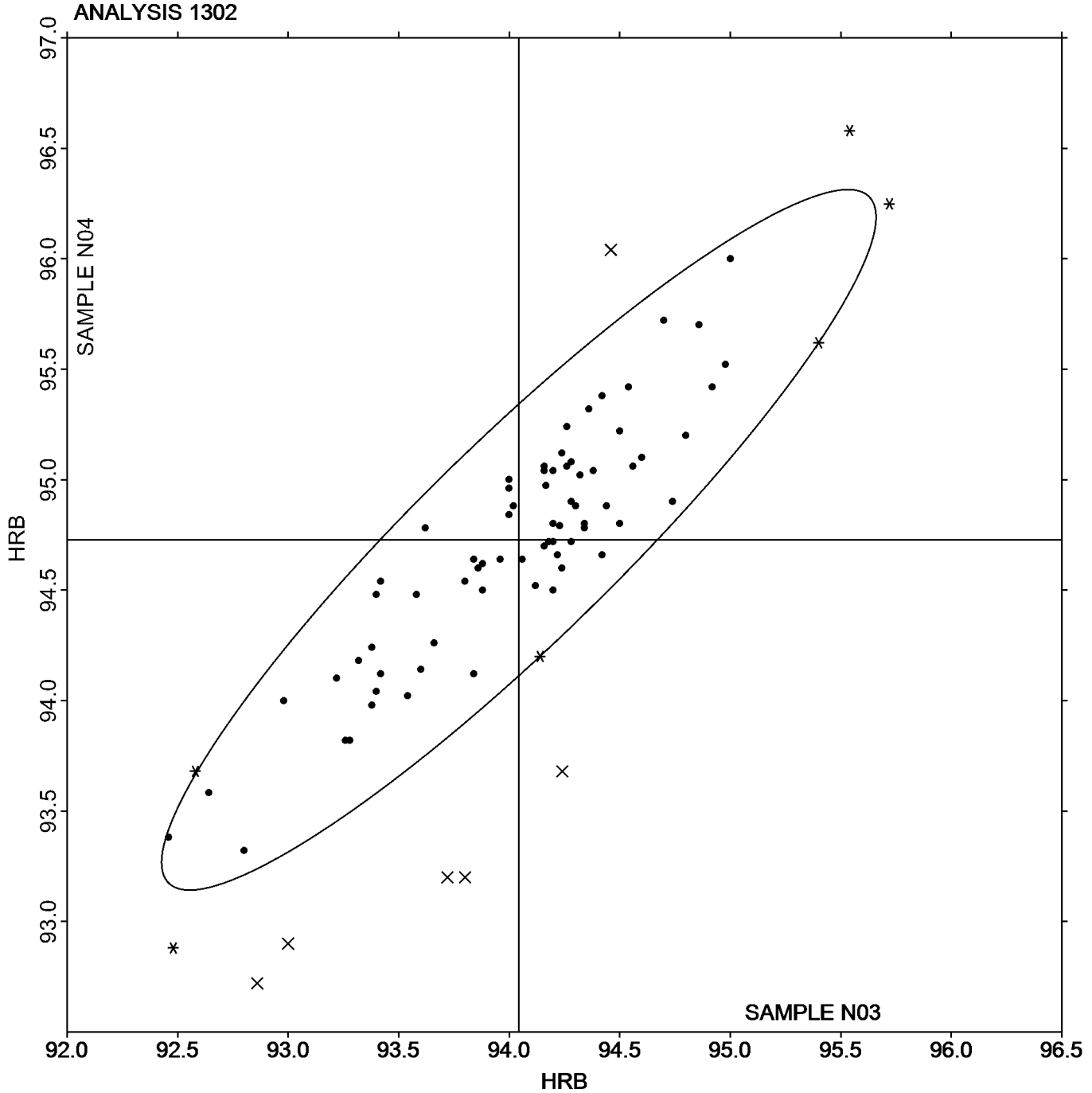
(HD)

SAMPLE N03

94.04 HRB

SAMPLE N04

94.73 HRB





# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1321

3rd Qtr 2024

Microhardness: Knoop Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
2B9TLQ		415.40	-6.13	-0.45	432.00	-23.18	-1.61
3BMCAU		409.14	-12.39	-0.91	449.62	-5.56	-0.39
3DUWTN	*	447.20	25.67	1.89	490.20	35.02	2.44
3MHLUH		411.40	-10.13	-0.74	443.40	-11.78	-0.82
46VPRU	*	407.74	-13.79	-1.01	417.08	-38.10	-2.65
4GL9KE		404.86	-16.67	-1.22	445.18	-10.00	-0.70
64EUMD		426.20	4.67	0.34	481.40	26.22	1.82
64FRXA		424.40	2.87	0.21	461.20	6.02	0.42
6F8AT3	X	471.20	49.67	3.65	492.60	37.42	2.60
6JUTX7		423.30	1.77	0.13	451.36	-3.82	-0.27
74W72C		435.60	14.07	1.03	464.40	9.22	0.64
772V4L		435.00	13.47	0.99	450.00	-5.18	-0.36
84QAAD		410.94	-10.59	-0.78	453.50	-1.68	-0.12
88PMUH		420.98	-0.55	-0.04	466.78	11.60	0.81
89L339	X	484.20	62.67	4.60	514.40	59.22	4.12
8HNF49		427.60	6.07	0.45	464.20	9.02	0.63
8T9PR3		434.38	12.85	0.94	446.36	-8.82	-0.61
8Z9739		419.80	-1.73	-0.13	452.80	-2.38	-0.17
9CH9W6		405.78	-15.75	-1.16	447.82	-7.36	-0.51
9YREKB		425.80	4.27	0.31	465.40	10.22	0.71
AA628G		402.60	-18.93	-1.39	455.60	0.42	0.03
ACDXU7		404.20	-17.33	-1.27	456.60	1.42	0.10
AEJAW2		406.60	-14.93	-1.10	444.60	-10.58	-0.74
AN8CU4	X	460.34	38.81	2.85	499.34	44.16	3.07
B6QKE6		438.60	17.07	1.25	467.20	12.02	0.84
B6T67D		404.18	-17.35	-1.27	443.42	-11.76	-0.82
BMC4CC		423.40	1.87	0.14	462.60	7.42	0.52
BNJL4F		429.40	7.87	0.58	457.00	1.82	0.13
C3GVPZ		424.80	3.27	0.24	454.80	-0.38	-0.03
C9NLR7		415.80	-5.73	-0.42	422.60	-32.58	-2.27
D8T3Q6		423.80	2.27	0.17	463.80	8.62	0.60
DJNANA	*	455.72	34.19	2.51	480.94	25.76	1.79
DM4YPX		403.80	-17.73	-1.30	433.20	-21.98	-1.53
DU7T4Z		413.20	-8.33	-0.61	435.40	-19.78	-1.38
EB3TBQ		435.00	13.47	0.99	471.60	16.42	1.14
ET83DB		426.60	5.07	0.37	465.20	10.02	0.70
EUH3CQ		421.40	-0.13	-0.01	438.40	-16.78	-1.17
F2X37U		425.60	4.07	0.30	452.20	-2.98	-0.21
F6VNXW		399.40	-22.13	-1.63	457.00	1.82	0.13
FBJ7EU		407.20	-14.33	-1.05	452.60	-2.58	-0.18
G2PKJF		402.60	-18.93	-1.39	459.60	4.42	0.31
G74YN9		412.60	-8.93	-0.66	458.80	3.62	0.25
G8W26W		439.80	18.27	1.34	476.00	20.82	1.45
GFTUL4		427.60	6.07	0.45	463.80	8.62	0.60
GJR6G4		422.40	0.87	0.06	464.00	8.82	0.61
GPJC2X	X	462.80	41.27	3.03	417.00	-38.18	-2.66
GWY9LX		424.80	3.27	0.24	452.40	-2.78	-0.19



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1321

3rd Qtr 2024

Microhardness: Knoop Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
GYLTR3		404.20	-17.33	-1.27	442.60	-12.58	-0.88
H4CJC4		433.60	12.07	0.89	456.20	1.02	0.07
HFPNJZ		444.80	23.27	1.71	458.40	3.22	0.22
HKYZFZ		428.74	7.21	0.53	460.54	5.36	0.37
HNX68Y		413.00	-8.53	-0.63	466.20	11.02	0.77
JBB744		438.00	16.47	1.21	447.00	-8.18	-0.57
JH9YCX		425.20	3.67	0.27	476.20	21.02	1.46
K3FN6L		410.60	-10.93	-0.80	440.40	-14.78	-1.03
K6KBHQ		429.00	7.47	0.55	454.60	-0.58	-0.04
KC3Q7T		436.60	15.07	1.11	457.00	1.82	0.13
KMZPVE	M	No Data Reported			449.20	-5.98	-0.42
L9FNFZ		444.80	23.27	1.71	479.60	24.42	1.70
LGQQ2Z		415.50	-6.03	-0.44	450.80	-4.38	-0.30
LK6LKJ		400.80	-20.73	-1.52	453.80	-1.38	-0.10
M2Q7Z3		415.00	-6.53	-0.48	432.80	-22.38	-1.56
M4J6AV		412.80	-8.73	-0.64	478.40	23.22	1.62
M8XYQR		433.20	11.67	0.86	454.80	-0.38	-0.03
MLHEVC	M	No Data Reported			425.80	-29.38	-2.04
NBENPV		412.48	-9.05	-0.66	466.42	11.24	0.78
NPX3AH		421.60	0.07	0.00	443.00	-12.18	-0.85
NU6V2R		406.80	-14.73	-1.08	459.80	4.62	0.32
P48DBA		427.00	5.47	0.40	451.00	-4.18	-0.29
PC7Z4V		402.00	-19.53	-1.43	454.60	-0.58	-0.04
PCX6AM		425.60	4.07	0.30	462.60	7.42	0.52
PMMLBB	M	No Data Reported			431.60	-23.58	-1.64
PUHR3Q	*	395.84	-25.69	-1.89	462.94	7.76	0.54
Q7BENR		412.00	-9.53	-0.70	449.40	-5.78	-0.40
Q92TZ9	M	No Data Reported			428.00	-27.18	-1.89
QNUDTP		416.64	-4.90	-0.36	456.53	1.35	0.09
QP8V3M		409.20	-12.33	-0.91	456.00	0.82	0.06
QXYBMK		416.36	-5.17	-0.38	453.34	-1.84	-0.13
R2TRCK		409.00	-12.53	-0.92	445.00	-10.18	-0.71
RAQH XU		426.40	4.87	0.36	465.20	10.02	0.70
U8Y3LP		413.60	-7.93	-0.58	450.40	-4.78	-0.33
UFNNRN		434.00	12.47	0.92	444.00	-11.18	-0.78
UHV42E		406.40	-15.13	-1.11	419.40	-35.78	-2.49
UTA7GL		445.60	24.07	1.77	471.00	15.82	1.10
VDFVBU		402.20	-19.33	-1.42	464.20	9.02	0.63
VERU8N		430.20	8.67	0.64	480.80	25.62	1.78
VYBQXM	*	453.40	31.87	2.34	483.00	27.82	1.94
W4JM2M		427.20	5.67	0.42	462.20	7.02	0.49
W6BPLH		409.60	-11.93	-0.88	431.20	-23.98	-1.67
XDNUGM		444.40	22.87	1.68	461.04	5.86	0.41
XV7TLL		444.60	23.07	1.69	451.40	-3.78	-0.26
XV8JWA		427.00	5.47	0.40	453.80	-1.38	-0.10
XXCBL3	M	No Data Reported			445.40	-9.78	-0.68
Y7LZZZ	M	No Data Reported			429.40	-25.78	-1.79



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1321

3rd Qtr 2024

Microhardness: Knoop Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
Y8V6DP		425.94	4.41	0.32	448.66	-6.52	-0.45
YR4AYD	*	414.86	-6.67	-0.49	416.26	-38.92	-2.71
YRLFZN		418.00	-3.53	-0.26	439.00	-16.18	-1.13
Z3L7JB		433.20	11.67	0.86	459.80	4.62	0.32
ZF9F7F		425.66	4.13	0.30	461.14	5.96	0.41
ZGHECH		438.66	17.13	1.26	461.98	6.80	0.47

Summary Statistics						
	Sample S03			Sample S04		
<b>Grand Means</b>	421.53	HK 500 gf		455.18	HK 500 gf	
<b>Std Dev Btwn Labs</b>	13.61	HK 500 gf		14.37	HK 500 gf	

Samples S03, S04 : Steel, Steel

Statistics based on 90 of 100 reporting participants

### Comments on Assigned Data Flags for Test #1321

- 6F8AT3 (X) - Data for sample S03 are high. Inconsistent within the determinations of both samples.
- 89L339 (X) - Data for both samples are high.
- AN8CU4 (X) - Data for both samples are high. Inconsistent within the determinations of sample S04.
- GPJC2X (X) - Data for sample S03 are high.
- KMZPVE (M) - Participant did not submit data for sample S03.
- MLHEVC (M) - Participant did not submit data for sample S03.
- PMMLBB (M) - Participant did not submit data for sample S03.
- Q92TZ9 (M) - Participant did not submit data for sample S03.
- XXCBL3 (M) - Participant did not submit data for sample S03.
- Y7LZZZ (M) - Participant did not submit data for sample S03.



# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1321

Microhardness: Knoop Indenters (500 gf)  
ASTM E384

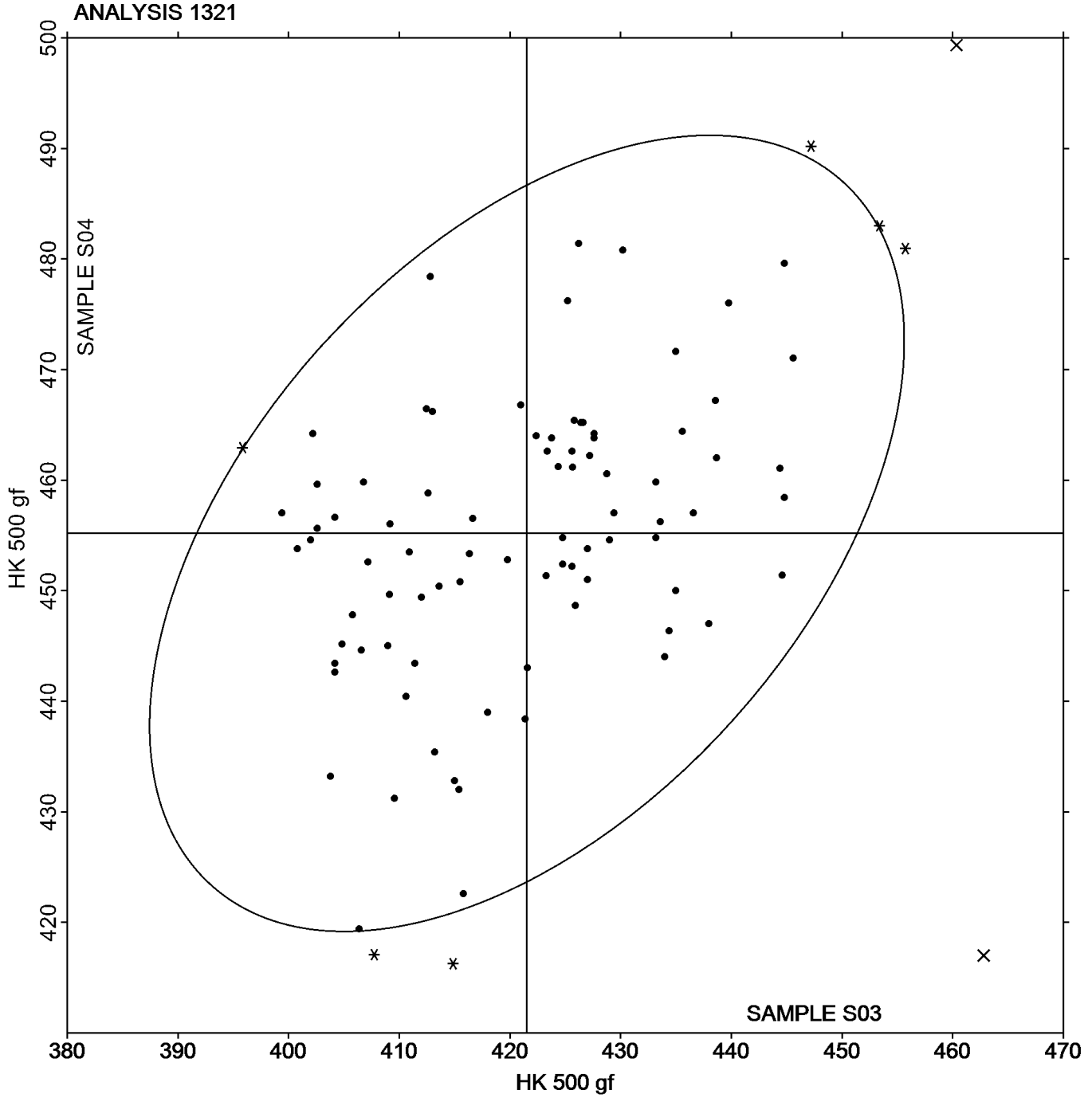
Cycle 1471

3rd Qtr 2024

(HD)

SAMPLE S03  
421.53 HK 500 gf

SAMPLE S04  
455.18 HK 500 gf





# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1322

3rd Qtr 2024

Microhardness: Knoop Indenters (200 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
2B9TLQ		418.20	-13.55	-0.80	435.80	-32.36	-1.89
3MHLUH		420.60	-11.15	-0.65	450.60	-17.56	-1.02
4GL9KE		414.46	-17.29	-1.01	470.78	2.62	0.15
64EUMD		424.60	-7.15	-0.42	470.80	2.64	0.15
6F8AT3		440.80	9.05	0.53	489.20	21.04	1.23
74W72C		445.60	13.85	0.81	467.20	-0.96	-0.06
772V4L	*	467.00	35.25	2.07	464.00	-4.16	-0.24
88PMUH		439.14	7.39	0.43	473.22	5.06	0.29
8HNF49		431.80	0.05	0.00	471.20	3.04	0.18
8T9PR3		436.92	5.17	0.30	465.38	-2.78	-0.16
8Z9739		426.20	-5.55	-0.33	467.00	-1.16	-0.07
9CH9W6		417.38	-14.37	-0.84	463.88	-4.28	-0.25
9YREKB		447.40	15.65	0.92	491.40	23.24	1.35
AA628G		413.60	-18.15	-1.06	464.80	-3.36	-0.20
ACDXU7		434.40	2.65	0.16	504.80	36.64	2.14
AN8CU4	*	474.76	43.01	2.52	512.14	43.98	2.56
B6T67D		415.36	-16.39	-0.96	473.54	5.38	0.31
BNJL4F		433.80	2.05	0.12	462.20	-5.96	-0.35
D8T3Q6		439.80	8.05	0.47	475.80	7.64	0.45
DJNANA	*	482.96	51.21	3.00	480.54	12.38	0.72
DU7T4Z		425.60	-6.15	-0.36	447.80	-20.36	-1.19
EB3TBQ		453.60	21.85	1.28	489.80	21.64	1.26
ET83DB		437.20	5.45	0.32	474.00	5.84	0.34
EUH3CQ		440.80	9.05	0.53	450.60	-17.56	-1.02
F2X37U		434.20	2.45	0.14	455.80	-12.36	-0.72
F6VNXW		398.20	-33.55	-1.97	465.20	-2.96	-0.17
FBJ7EU		416.40	-15.35	-0.90	461.20	-6.96	-0.41
G2PKJF		410.00	-21.75	-1.28	482.00	13.84	0.81
G8W26W		449.60	17.85	1.05	492.00	23.84	1.39
GFTUL4		445.40	13.65	0.80	486.00	17.84	1.04
GJR6G4		443.60	11.85	0.69	485.20	17.04	0.99
GWY9LX		432.40	0.65	0.04	466.40	-1.76	-0.10
GYLTR3		421.80	-9.95	-0.58	461.60	-6.56	-0.38
HFPNJZ	*	409.20	-22.55	-1.32	421.00	-47.16	-2.75
HKYZFZ		437.40	5.65	0.33	457.14	-11.02	-0.64
K3FN6L		418.60	-13.15	-0.77	438.80	-29.36	-1.71
K6KBHQ		421.20	-10.55	-0.62	464.40	-3.76	-0.22
LK6LKJ		410.80	-20.95	-1.23	473.00	4.84	0.28
NBENPV		422.62	-9.13	-0.54	472.58	4.42	0.26
NPX3AH		442.20	10.45	0.61	460.00	-8.16	-0.48
NU6V2R		401.00	-30.75	-1.80	448.20	-19.96	-1.16
P48DBA		437.00	5.25	0.31	463.00	-5.16	-0.30
PC7Z4V		405.00	-26.75	-1.57	454.20	-13.96	-0.81
PCX6AM		441.20	9.45	0.55	482.00	13.84	0.81
Q7BENR		431.60	-0.15	-0.01	493.20	25.04	1.46
QNUDTP		427.64	-4.11	-0.24	465.62	-2.54	-0.15
QP8V3M		423.00	-8.75	-0.51	461.40	-6.76	-0.39





**Fasteners and Metals Interlaboratory Testing Program**

**Cycle 1471**

**Analysis 1322**

**3rd Qtr 2024**

**Microhardness: Knoop Indenters (200 gf)**

**(HD)**

**ASTM E384**

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
QXYBMK		424.66	-7.09	-0.42	454.68	-13.48	-0.79
R2TRCK		413.80	-17.95	-1.05	451.20	-16.96	-0.99
U8Y3LP		422.60	-9.15	-0.54	453.80	-14.36	-0.84
UFNNRN		436.60	4.85	0.28	452.00	-16.16	-0.94
UHV42E		423.20	-8.55	-0.50	442.40	-25.76	-1.50
VDFVBU		412.40	-19.35	-1.14	475.40	7.24	0.42
VERU8N		446.00	14.25	0.84	496.60	28.44	1.66
VYBQXM		447.20	15.45	0.91	485.40	17.24	1.00
W4JM2M		441.00	9.25	0.54	486.40	18.24	1.06
W6BPLH		419.80	-11.95	-0.70	441.80	-26.36	-1.54
XDNUGM		458.24	26.49	1.55	473.10	4.94	0.29
XV7TLL		457.40	25.65	1.50	465.40	-2.76	-0.16
ZF9F7F		439.52	7.77	0.46	479.94	11.78	0.69
ZGHECH		432.58	0.83	0.05	473.35	5.19	0.30

**Summary Statistics**

	Sample S03		Sample S04	
<b>Grand Means</b>	431.75	HK 200 gf	468.16	HK 200 gf
<b>Stnd Dev Btwn Labs</b>	17.05	HK 200 gf	17.15	HK 200 gf

Samples S03, S04 : Steel, Steel

Statistics based on 61 of 61 reporting participants



# Fasteners and Metals Interlaboratory Testing Program

## Analysis 1322

Microhardness: Knoop Indenters (200 gf)  
ASTM E384

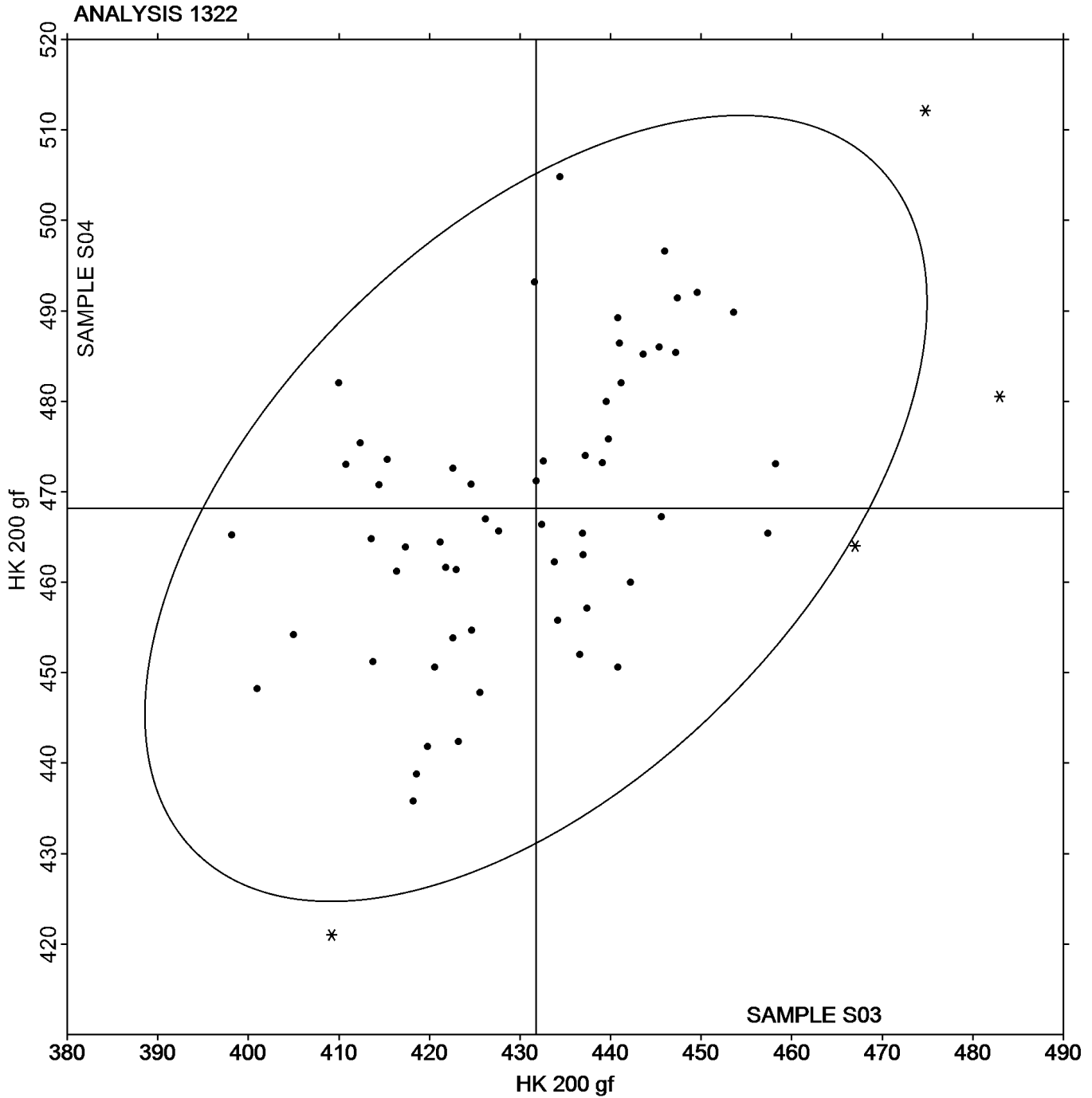
Cycle 1471

3rd Qtr 2024

(HD)

SAMPLE S03  
431.75 HK 200 gf

SAMPLE S04  
468.16 HK 200 gf





# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1323

3rd Qtr 2024

Microhardness: Vickers Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
2B9TLQ		400.40	0.45	0.04	426.20	-9.51	-0.66
2QNRWJ		415.00	15.05	1.23	463.20	27.49	1.91
2WP4TF		415.20	15.25	1.25	439.20	3.49	0.24
3MHLUH		386.20	-13.75	-1.13	420.20	-15.51	-1.08
3P2R4D		411.24	11.29	0.93	461.10	25.39	1.76
3QWB7E		386.60	-13.35	-1.09	441.40	5.69	0.39
46VPRU		407.74	7.79	0.64	417.08	-18.63	-1.29
48J2TK		378.00	-21.95	-1.80	430.68	-5.03	-0.35
4DQUJA	X	350.20	-49.75	-4.08	353.16	-82.55	-5.73
4GL9KE		390.84	-9.11	-0.75	433.42	-2.29	-0.16
64EUMD		394.40	-5.55	-0.45	429.60	-6.11	-0.42
6F8AT3		389.00	-10.95	-0.90	427.20	-8.51	-0.59
6N4CTT		424.48	24.53	2.01	456.08	20.37	1.41
6YMJU3		403.20	3.25	0.27	441.20	5.49	0.38
74W72C		406.60	6.65	0.55	436.80	1.09	0.08
772V4L		408.00	8.05	0.66	438.40	2.69	0.19
7HUFKC		407.56	7.61	0.62	436.76	1.05	0.07
84A4M9		389.60	-10.35	-0.85	444.40	8.69	0.60
88PMUH		402.02	2.07	0.17	436.88	1.17	0.08
89L339		407.20	7.25	0.59	452.00	16.29	1.13
8HNF49		390.60	-9.35	-0.77	432.60	-3.11	-0.22
8T9PR3		394.08	-5.87	-0.48	413.74	-21.97	-1.52
8Z9739		399.20	-0.75	-0.06	440.80	5.09	0.35
9CH9W6		398.70	-1.25	-0.10	436.86	1.15	0.08
9YREKB		401.40	1.45	0.12	443.60	7.89	0.55
A9REP3		378.40	-21.55	-1.77	430.60	-5.11	-0.35
AA628G		393.40	-6.55	-0.54	437.40	1.69	0.12
ACDXU7		389.00	-10.95	-0.90	440.60	4.89	0.34
AHZUL3	*	387.20	-12.75	-1.04	461.20	25.49	1.77
AMWP3G		420.50	20.55	1.68	451.24	15.53	1.08
AN8CU4		414.64	14.69	1.20	457.90	22.19	1.54
AUT8V8		374.66	-25.29	-2.07	435.70	-0.01	0.00
BAM3V6		401.80	1.85	0.15	455.20	19.49	1.35
BNJL4F		399.40	-0.55	-0.04	434.00	-1.71	-0.12
BXA3YB		425.20	25.25	2.07	465.20	29.49	2.05
BY3ZA4		392.60	-7.35	-0.60	429.80	-5.91	-0.41
C3GVPZ		401.80	1.85	0.15	427.40	-8.31	-0.58
C8F7ML		401.40	1.45	0.12	423.00	-12.71	-0.88
CBFD7X		417.20	17.25	1.41	437.80	2.09	0.15
D8T3Q6		397.40	-2.55	-0.21	429.60	-6.11	-0.42
DAC86U		405.00	5.05	0.41	458.80	23.09	1.60
DEUACZ		403.60	3.65	0.30	409.80	-25.91	-1.80
DM4YPX		375.00	-24.95	-2.04	406.20	-29.51	-2.05
DU7T4Z		400.60	0.65	0.05	415.20	-20.51	-1.42
DX74XE		382.48	-17.47	-1.43	418.32	-17.39	-1.21
E6GK6E		400.70	0.75	0.06	411.52	-24.19	-1.68
EAUHG9		409.60	9.65	0.79	451.40	15.69	1.09



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1323

3rd Qtr 2024

Microhardness: Vickers Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
EB3TBQ		407.00	7.05	0.58	433.20	-2.51	-0.17
EFKVHV	*	425.44	25.49	2.09	428.26	-7.45	-0.52
EQ2M2Y	*	370.60	-29.35	-2.41	434.40	-1.31	-0.09
ET83DB		402.60	2.65	0.22	445.40	9.69	0.67
EUH3CQ		405.80	5.85	0.48	418.00	-17.71	-1.23
F2X37U		393.80	-6.15	-0.50	420.60	-15.11	-1.05
F6VNXW	*	371.80	-28.15	-2.31	436.40	0.69	0.05
FBJ7EU		378.00	-21.95	-1.80	440.40	4.69	0.33
FXV8L7		401.20	1.25	0.10	445.20	9.49	0.66
G28EH4		419.40	19.45	1.59	456.90	21.19	1.47
G2PKJF		375.80	-24.15	-1.98	430.60	-5.11	-0.35
G82DWY		401.80	1.85	0.15	445.20	9.49	0.66
G8W26W		401.20	1.25	0.10	445.60	9.89	0.69
GBEGGA		403.20	3.25	0.27	450.20	14.49	1.01
GFTUL4		408.40	8.45	0.69	448.00	12.29	0.85
GJR6G4		400.60	0.65	0.05	443.80	8.09	0.56
GKJ92X		377.00	-22.95	-1.88	428.40	-7.31	-0.51
GN3FAX		397.80	-2.15	-0.18	433.80	-1.91	-0.13
GWY9LX		400.20	0.25	0.02	445.40	9.69	0.67
GYLTR3		388.80	-11.15	-0.91	435.00	-0.71	-0.05
HDLT3H		410.36	10.41	0.85	440.90	5.19	0.36
HFPNJZ	*	404.00	4.05	0.33	397.40	-38.31	-2.66
HNX68Y		384.60	-15.35	-1.26	432.80	-2.91	-0.20
HX3CMY		400.60	0.65	0.05	440.40	4.69	0.33
JAUAC4		420.40	20.45	1.68	432.40	-3.31	-0.23
JBB744		395.80	-4.15	-0.34	406.80	-28.91	-2.01
JH9YCX		421.60	21.65	1.77	461.00	25.29	1.75
K3FN6L		400.20	0.25	0.02	419.00	-16.71	-1.16
K6KBHQ		392.40	-7.55	-0.62	424.20	-11.51	-0.80
K88XBD		394.00	-5.95	-0.49	421.60	-14.11	-0.98
KC3Q7T		412.40	12.45	1.02	434.60	-1.11	-0.08
KCXG4V		399.00	-0.95	-0.08	432.00	-3.71	-0.26
KKVYPY	X	42.00	-357.95	-29.34	43.78	-391.93	-27.19
KMZPVE	M	393.00	-6.95	-0.57	No Data Reported		
KXELYW		386.58	-13.37	-1.10	444.64	8.93	0.62
L9FNFZ		417.80	17.85	1.46	449.60	13.89	0.96
LK6LKJ		389.20	-10.75	-0.88	441.00	5.29	0.37
M27UV3	*	421.52	21.57	1.77	473.80	38.09	2.64
M4J6AV		398.20	-1.75	-0.14	457.00	21.29	1.48
MLHEVC	M	380.20	-19.75	-1.62	No Data Reported		
NBENPV		401.96	2.01	0.16	447.02	11.31	0.78
NKZNL		412.20	12.25	1.00	436.20	0.49	0.03
NPX3AH		403.60	3.65	0.30	428.60	-7.11	-0.49
NU6V2R		388.00	-11.95	-0.98	417.20	-18.51	-1.28
P48DBA		400.00	0.05	0.00	426.00	-9.71	-0.67
PC7Z4V		386.80	-13.15	-1.08	437.60	1.89	0.13
PCX6AM		399.60	-0.35	-0.03	410.40	-25.31	-1.76



# Fasteners and Metals Interlaboratory Testing Program

Cycle 1471

## Analysis 1323

3rd Qtr 2024

Microhardness: Vickers Indenters (500 gf)

(HD)

ASTM E384

WebCode	Data Flag	Sample S03			Sample S04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
PMMLBB	M	346.60	-53.35	-4.37	No Data Reported		
Q7BENR		388.80	-11.15	-0.91	434.60	-1.11	-0.08
Q92TZ9	M	382.60	-17.35	-1.42	No Data Reported		
QFEKNL		409.80	9.85	0.81	418.80	-16.91	-1.17
QGWUGM		417.20	17.25	1.41	423.20	-12.51	-0.87
QP8V3M		399.60	-0.35	-0.03	441.40	5.69	0.39
QXYBMK		388.22	-11.73	-0.96	429.36	-6.35	-0.44
QYAFW3		404.20	4.25	0.35	445.00	9.29	0.64
QYXEGV		407.64	7.69	0.63	446.82	11.11	0.77
R2TRCK		400.00	0.05	0.00	438.20	2.49	0.17
R43WRU	*	420.20	20.25	1.66	470.60	34.89	2.42
RDL947		400.40	0.45	0.04	437.60	1.89	0.13
RN6M6M		400.08	0.13	0.01	444.06	8.35	0.58
T6B7H6		399.56	-0.39	-0.03	440.47	4.76	0.33
U8Y3LP		418.60	18.65	1.53	452.00	16.29	1.13
UFNNRN		419.74	19.79	1.62	432.14	-3.57	-0.25
UHV42E		391.80	-8.15	-0.67	406.40	-29.31	-2.03
VDFVBU		387.80	-12.15	-1.00	427.00	-8.71	-0.60
VERU8N		398.20	-1.75	-0.14	438.60	2.89	0.20
VYBQXM		407.60	7.65	0.63	448.60	12.89	0.89
W4JM2M		401.20	1.25	0.10	445.00	9.29	0.64
W6BPLH		385.40	-14.55	-1.19	411.60	-24.11	-1.67
WT3TRF		381.20	-18.75	-1.54	435.00	-0.71	-0.05
XDNUGM		412.84	12.89	1.06	439.94	4.23	0.29
XLKMTN	X	428.00	28.05	2.30	484.20	48.49	3.36
XV7TLL		421.80	21.85	1.79	436.40	0.69	0.05
XV8JWA		390.00	-9.95	-0.82	444.80	9.09	0.63
XXCBL3	M	384.60	-15.35	-1.26	No Data Reported		
XZED8W		401.00	1.05	0.09	418.80	-16.91	-1.17
Y7LZZZ	M	375.80	-24.15	-1.98	No Data Reported		
Y8V6DP		396.20	-3.75	-0.31	423.80	-11.91	-0.83
YR3CTN		403.02	3.07	0.25	438.84	3.13	0.22
YRLFZN		400.40	0.45	0.04	423.60	-12.11	-0.84
Z3L7JB		402.00	2.05	0.17	434.60	-1.11	-0.08
ZF9F7F		397.80	-2.15	-0.18	444.20	8.49	0.59
ZGHECH		397.80	-2.15	-0.18	430.18	-5.53	-0.38
ZRHXXJ		396.40	-3.55	-0.29	416.40	-19.31	-1.34
ZZV6F9		396.98	-2.97	-0.24	410.06	-25.65	-1.78

### Summary Statistics

	Sample S03		Sample S04	
<b>Grand Means</b>	399.95	HV 500 gf	435.71	HV 500 gf
<b>Std Dev Btwn Labs</b>	12.20	HV 500 gf	14.41	HV 500 gf

Samples S03, S04 : Steel, Steel

Statistics based on 123 of 132 reporting participants



---

**Comments on Assigned Data Flags for Test #1323**

- 4DQUJA (X) - Data for both samples are low.
- KKVYPY (X) - Extreme data.
- KMZPVE (M) - Participant did not submit data for sample S04.
- MLHEVC (M) - Participant did not submit data for sample S04.
- PMMLBB (M) - Participant did not submit data for sample S04.
- Q92TZ9 (M) - Participant did not submit data for sample S04.
- XLKMTN (X) - Data for sample S04 are high.
- XXCBL3 (M) - Participant did not submit data for sample S04.
- Y7LZZZ (M) - Participant did not submit data for sample S04.



**Fasteners and Metals Interlaboratory Testing Program**

**Analysis 1323**

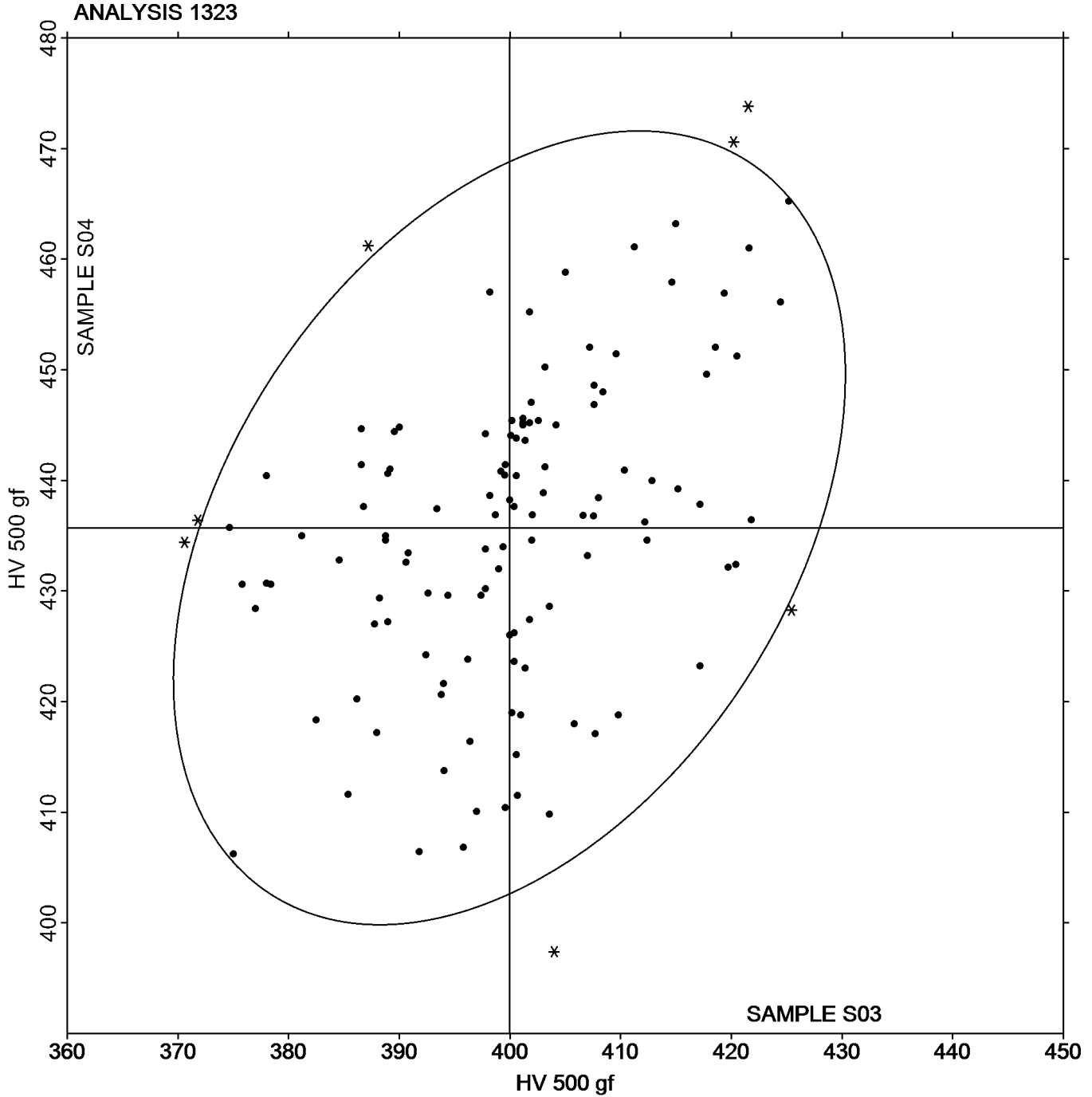
Microhardness: Vickers Indenters (500 gf)  
ASTM E384

**Cycle 1471**

**3rd Qtr 2024  
(HD)**

SAMPLE S03  
399.95 HV 500 gf

SAMPLE S04  
435.71 HV 500 gf





**Fasteners and Metals Interlaboratory Testing Program**  
**Analysis 1341**  
**Brinell Hardness**  
**ASTM E10**

**Cycle 1471**  
**3rd Qtr 2024**  
**(HD)**

WebCode	Data Flag	Sample D03			Sample D04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
24A2JN		321.00	0.92	0.16	352.00	-3.66	-0.43
27EUDM		321.00	0.92	0.16	352.00	-3.66	-0.43
2939ZC		318.00	-2.08	-0.36	361.04	5.38	0.64
2GY7ME		316.80	-3.28	-0.57	350.60	-5.06	-0.60
2HP8QG		321.00	0.92	0.16	363.00	7.34	0.87
2KCV3G		321.00	0.92	0.16	356.40	0.74	0.09
3LM3TG		327.00	6.92	1.21	364.80	9.14	1.09
3MHLUH		328.20	8.12	1.42	360.40	4.74	0.56
3P2R4D		316.60	-3.48	-0.61	363.00	7.34	0.87
3QWB7E		321.00	0.92	0.16	365.40	9.74	1.16
46VPRU		323.00	2.92	0.51	359.40	3.74	0.44
4MVFBH	X	240.40	-79.68	-13.88	343.80	-11.86	-1.41
4NRVJA		323.00	2.92	0.51	363.00	7.34	0.87
4PFRMT		324.74	4.66	0.81	371.12	15.46	1.84
62A3Y8		321.00	0.92	0.16	363.00	7.34	0.87
6AYZB8		326.40	6.32	1.10	366.90	11.24	1.33
6TJKHD		313.50	-6.58	-1.15	346.50	-9.16	-1.09
74W72C		313.20	-6.87	-1.20	345.36	-10.29	-1.22
772V4L		319.62	-0.46	-0.08	355.00	-0.66	-0.08
7K2QH2		311.40	-8.68	-1.51	339.80	-15.86	-1.88
82MFB9		306.40	-13.68	-2.38	341.00	-14.66	-1.74
89L339		328.40	8.32	1.45	366.20	10.54	1.25
8CM46Q		321.00	0.92	0.16	362.20	6.54	0.78
8HAWE6		315.88	-4.20	-0.73	352.50	-3.16	-0.37
8WAV79	*	334.20	14.12	2.46	363.00	7.34	0.87
8Z9739		311.00	-9.08	-1.58	345.40	-10.26	-1.22
9GR8QJ		319.00	-1.08	-0.19	363.00	7.34	0.87
AN8CU4		320.80	0.72	0.13	359.40	3.74	0.44
AR8MQ4		317.55	-2.52	-0.44	346.93	-8.73	-1.04
ATXNU7		318.00	-2.08	-0.36	351.82	-3.84	-0.46
AUT8V8		321.00	0.92	0.16	348.60	-7.06	-0.84
B8CAQ6		327.04	6.96	1.21	364.04	8.38	0.99
BU82YE		318.60	-1.48	-0.26	357.20	1.54	0.18
C3GVPZ		314.95	-5.13	-0.89	358.87	3.22	0.38
C4CKM3		311.40	-8.68	-1.51	349.00	-6.66	-0.79
CBRC28		321.00	0.92	0.16	353.60	-2.06	-0.24
CJ9Q4C		316.60	-3.48	-0.61	357.20	1.54	0.18
DQYPVA	*	321.00	0.92	0.16	341.00	-14.66	-1.74
DU7T4Z		330.60	10.52	1.83	372.00	16.34	1.94
E3PTN3		321.00	0.92	0.16	352.00	-3.66	-0.43
EAUHG9		324.40	4.32	0.75	355.20	-0.46	-0.05
EB3TBQ		319.80	-0.28	-0.05	352.00	-3.66	-0.43
EMGXDF		315.42	-4.65	-0.81	356.41	0.75	0.09
EUGAF4		324.20	4.12	0.72	357.60	1.94	0.23
EUH3CQ		319.20	-0.88	-0.15	352.00	-3.66	-0.43
F2X37U		323.80	3.72	0.65	355.80	0.14	0.02
FBJ7EU		321.80	1.72	0.30	359.60	3.94	0.47





**Fasteners and Metals Interlaboratory Testing Program**  
**Analysis 1341**  
**Brinell Hardness**  
**ASTM E10**

**Cycle 1471**  
**3rd Qtr 2024**  
**(HD)**

WebCode	Data Flag	Sample D03			Sample D04		
		Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
G8W26W	X	300.20	-19.88	-3.46	345.00	-10.66	-1.26
GFTUL4		319.00	-1.08	-0.19	356.40	0.74	0.09
GKJ92X		328.00	7.92	1.38	371.40	15.74	1.87
GWY9LX		318.20	-1.88	-0.33	361.20	5.54	0.66
H89BGU		330.10	10.02	1.75	374.84	19.18	2.28
HMLL83		314.60	-5.48	-0.95	347.20	-8.46	-1.00
HVK4NZ		327.00	6.92	1.21	356.40	0.74	0.09
J7DRET	X	341.40	21.32	3.71	365.80	10.14	1.20
JBB744		328.40	8.32	1.45	365.00	9.34	1.11
JH9YCX	X	303.80	-16.28	-2.83	361.70	6.04	0.72
JPT2FU	M	322.20	2.12	0.37	No Data Reported		
JT72BZ		323.00	2.92	0.51	349.80	-5.86	-0.70
K3FN6L		325.40	5.32	0.93	361.80	6.14	0.73
KUEB3W	*	304.20	-15.88	-2.76	342.20	-13.46	-1.60
LCUZVN		321.00	0.92	0.16	352.00	-3.66	-0.43
LGRN9P		322.62	2.54	0.44	362.34	6.68	0.79
LJVJRT		321.80	1.72	0.30	353.20	-2.46	-0.29
M4J6AV		307.80	-12.28	-2.14	340.80	-14.86	-1.76
MJQ9PU		311.80	-8.28	-1.44	353.00	-2.66	-0.32
NE9HMMW		314.80	-5.28	-0.92	350.80	-4.86	-0.58
PEN7DQ		327.40	7.32	1.28	358.40	2.74	0.33
PFKPFR		331.00	10.92	1.90	363.00	7.34	0.87
PUHR3Q		321.00	0.92	0.16	352.00	-3.66	-0.43
PWP4KR		319.52	-0.56	-0.10	351.86	-3.80	-0.45
PZ92EA		321.00	0.92	0.16	360.80	5.14	0.61
QFEKNL		323.80	3.72	0.65	367.00	11.34	1.35
RXTJ44		321.80	1.72	0.30	352.80	-2.86	-0.34
TG4VAY		313.00	-7.08	-1.23	347.60	-8.06	-0.96
TMPMLX		323.00	2.92	0.51	363.00	7.34	0.87
TRJKAP	*	314.60	-5.48	-0.95	332.60	-23.06	-2.74
TRZL9K		324.87	4.80	0.84	371.94	16.28	1.93
U8Y3LP		312.00	-8.08	-1.41	357.20	1.54	0.18
UAG9VK		321.00	0.92	0.16	363.00	7.34	0.87
UFNNRN		325.00	4.92	0.86	360.80	5.14	0.61
UHV42E		317.38	-2.70	-0.47	350.42	-5.24	-0.62
V642VR		314.24	-5.84	-1.02	346.78	-8.88	-1.05
VX6E4R		310.40	-9.68	-1.69	351.20	-4.46	-0.53
WA92PU		317.00	-3.08	-0.54	346.20	-9.46	-1.12
WTLLEX		321.06	0.98	0.17	353.82	-1.84	-0.22
WXYKZC		316.60	-3.48	-0.61	346.00	-9.66	-1.15
X299NE		319.03	-1.05	-0.18	344.83	-10.83	-1.28
Y7MUMD		314.40	-5.68	-0.99	349.00	-6.66	-0.79
YHH7TY		328.60	8.52	1.48	362.40	6.74	0.80
YRLFZN	*	321.00	0.92	0.16	341.00	-14.66	-1.74
YTZRZE		318.64	-1.44	-0.25	357.82	2.16	0.26
YXRUY7Y	X	341.00	20.92	3.64	375.20	19.54	2.32
ZHAKGF	X	305.20	-14.88	-2.59	355.40	-0.26	-0.03



Summary Statistics

	<u>Sample D03</u>		<u>Sample D04</u>	
<b>Grand Means</b>	320.08	HBW	355.66	HBW
<b>Std Dev Btwn Labs</b>	5.74	HBW	8.43	HBW

Samples D03, D04 : Steel, Steel

Statistics based on 87 of 94 reporting participants

Samples D03, D04 are hardness test blocks made from steel. The blocks are heat treated to hardness levels specified by CTS.

**Comments on Assigned Data Flags for Test #1341**

4MVFBH (X) - Data for sample D03 are low.

G8W26W (X) - Data for sample D03 are low.

J7DRET (X) - Data for sample D03 are high. Inconsistent within the determinations of both samples.

JH9YCX (X) - Data for sample D03 are low. Inconsistent within the determinations of sample D03.

JPT2FU (M) - Participant did not submit data for sample D04.

YXRU7Y (X) - Data for sample D03 are high. Inconsistent within the determinations of sample D04.

ZHAKGF (X) - Inconsistent in testing between samples.

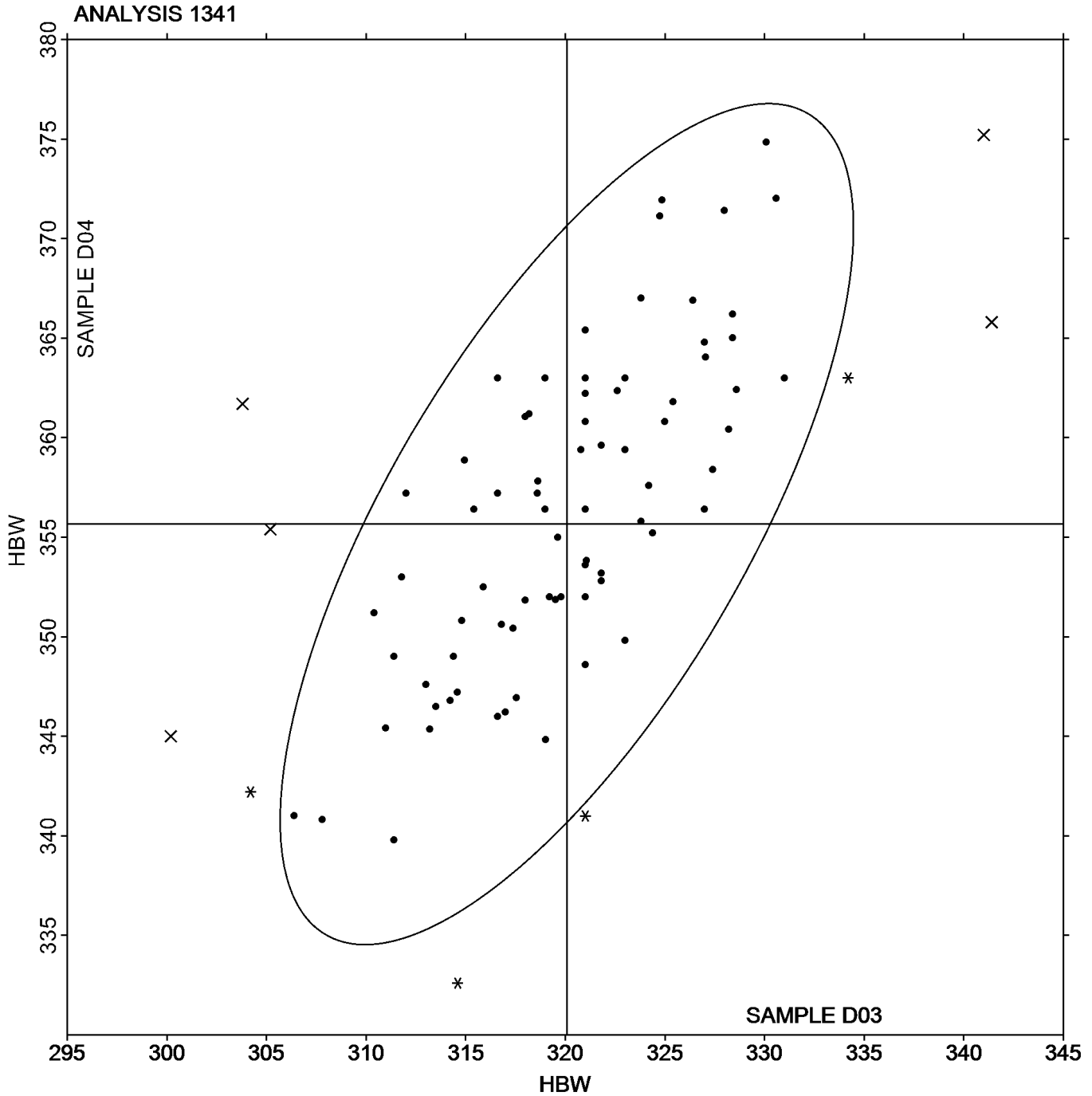


SAMPLE D03

SAMPLE D04

320.08 HBW

355.66 HBW





**Fasteners and Metals Interlaboratory Testing Program**

**Analysis 1341**

**Brinell Hardness**

**ASTM E10**

**Cycle 1471**

**3rd Qtr 2024**

**(HD)**

---

-End of Report-