Collaborative Testing Services, Inc.

Fasteners & Metals Interlaboratory Testing Program

Summary Report Cycle 1321, 4th Qtr 2020 (GS)

About the Metals Program About CTS Key to Tables and Graphs

Analysis	Test Group
	Hardness / Metallography Tests
1412	Grain Size (Inconel)

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, 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 50 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
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	CAUTION - 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	STOP - immediate review of data and/or testing procedure is required (all tests exept 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	PROCEED - 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.

		Sample J71			Sample J72		
WebCode	Data Flag	Lab Mean	Diff. from Grand Mean	CPV	Lab Mean	Diff. from Grand Mean	CPV
2LVN48		6.80	0.16	0.18	7.72	0.45	0.50
2X69LE		6.20	-0.44	-0.48	7.00	-0.27	-0.31
37EXYD		5.60	-1.04	-1.13	5.78	-1.49	-1.69
3UP2XF		8.51	1.88	2.04	8.51	1.23	1.39
49EMGC		7.50	0.86	0.94	8.00	0.73	0.82
6BL3P4		7.67	1.03	1.12	7.99	0.71	0.80
6Z4LVC		6.70	0.06	0.07	7.90	0.63	0.71
8YZZXM		6.00	-0.64	-0.69	7.00	-0.27	-0.31
998UUZ		5.70	-0.94	-1.02	5.60	-1.67	-1.89
AAEEC9		5.60	-1.04	-1.13	5.10	-2.17	-2.46
BJCUEJ		6.00	-0.64	-0.69	7.90	0.63	0.71
BVQU87		6.96	0.33	0.35	9.04	1.76	1.99
EM3AF2		7.00	0.36	0.39	8.00	0.73	0.82
EXP7KA		6.60	-0.04	-0.04	7.80	0.53	0.59
FFZFYE		5.30	-1.34	-1.45	7.00	-0.27	-0.31
G2HA37		6.80	0.16	0.18	6.70	-0.57	-0.65
GNCYTX		5.50	-1.14	-1.24	7.30	0.03	0.03
GWG79X	X	24.35	17.71	19.24	23.83	16.56	18.70
HBG6WV		7.00	0.36	0.39	8.20	0.93	1.04
JAHGVB		6.00	-0.64	-0.69	5.80	-1.47	-1.67
JF9VFC		7.00	0.36	0.39	7.50	0.23	0.25
LEPLL2		6.70	0.06	0.07	7.00	-0.27	-0.31
LHPXG2		8.70	2.06	2.24	7.70	0.43	0.48
M6GEGL		8.14	1.50	1.63	8.04	0.77	0.86
QRG2EH		6.55	-0.08	-0.09	8.77	1.50	1.69
RLN2VG		7.00	0.36	0.39	6.80	-0.47	-0.54
THKQDL		6.00	-0.64	-0.69	7.20	-0.07	-0.08
UYNKKL		5.44	-1.20	-1.30	7.82	0.55	0.62
VEZFJE		8.34	1.70	1.85	7.56	0.29	0.32
VFTDPZ		6.70	0.06	0.07	6.20	-1.07	-1.21
VG2LVY		6.50	-0.14	-0.15	7.20	-0.07	-0.08
VK4J7R		7.00	0.36	0.39	7.00	-0.27	-0.31
W646HH		6.40	-0.24	-0.26	7.40	0.13	0.14
XAVQQW		5.70	-0.94	-1.02	6.00	-1.27	-1.44
XCGDJJ		7.00	0.36	0.39	7.80	0.53	0.59
XCWW3G		4.50	-2.14	-2.32	5.90	-1.37	-1.55
XRA9VB		7.10	0.46	0.50	7.40	0.13	0.14
YFW8YG		7.78	1.14	1.24	7.70	0.43	0.48
YZKP6V		6.60	-0.04	-0.04	7.10	-0.17	-0.20
ZLZQBE		6.30	-0.34	-0.37	7.30	0.03	0.03

Summary Statistics

	Sample J71		Sample J72	
Grand Means	6.64	ASTM Grain Size	7.27	ASTM Grain Size
Stnd Dev Btwn Labs	0.92	ASTM Grain Size	0.89	ASTM Grain Size

Samples J71, J72 : Inconel 718, Inconel 718

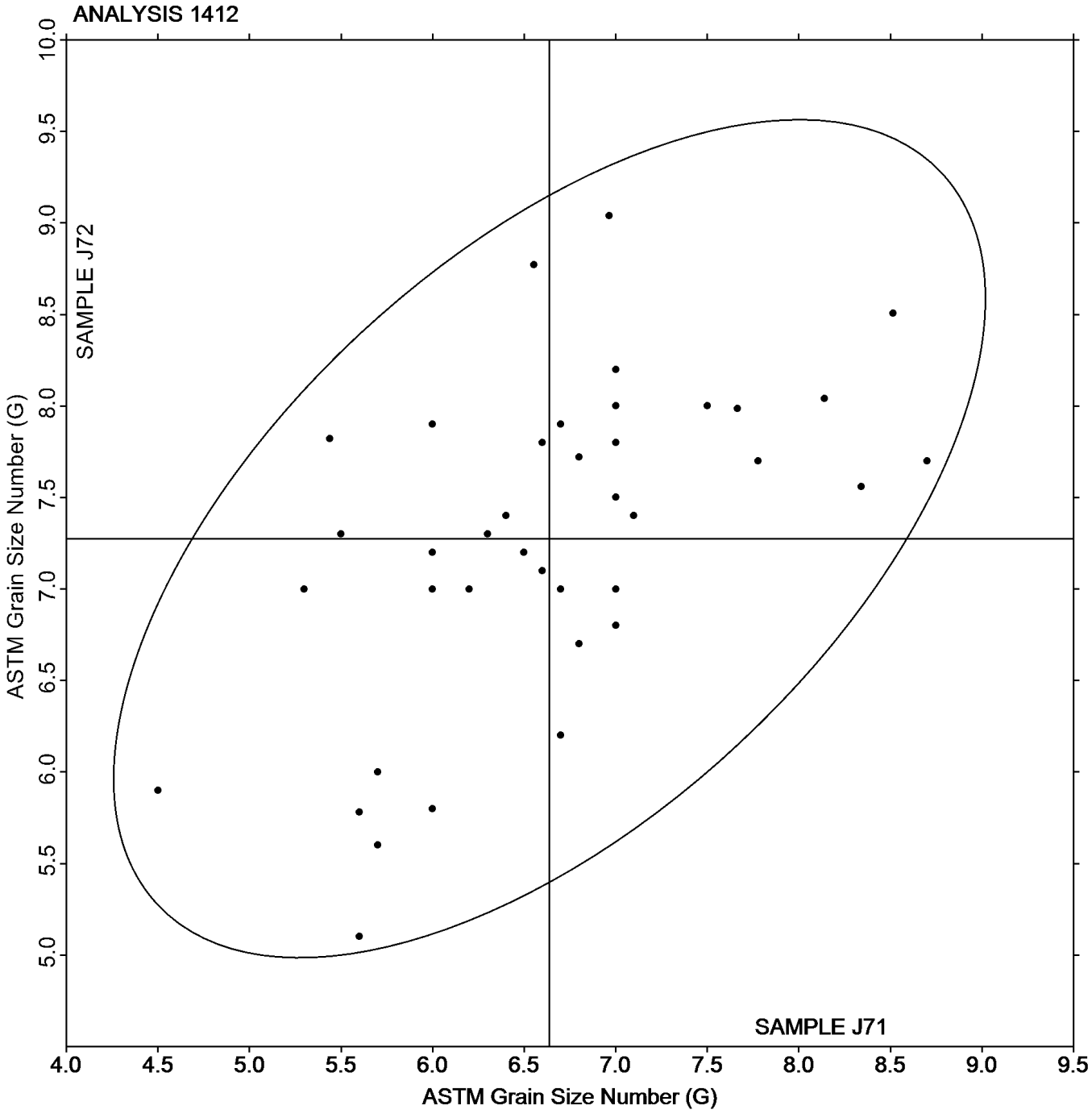
Statistics based on 39 of 40 reporting participants

Comments on Assigned Data Flags for Test #1412

GWG79X (X) - Extreme data.

SAMPLE J71
6.638 ASTM Grain Size Number (G)

SAMPLE J72
7.275 ASTM Grain Size Number (G)



-End of Report-

