The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

ELEMENT HUNTINGTON BEACH

Huntington Beach, CA

for technical competence in the field of

Chemical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 22nd day of May 2012.

President & CEO
For the Accreditation Council
Certificate Number 0093.01
Valid to May 31, 2014

Bob Olevson

Digitally signed by Bob Olevson
DN: cn=Bob Olevson, o=Element Huntington Beach, ou, email=Bob.Olevson@Element.com, c=US
Date: 2012.05.25 13:16:13 -07'00'

For the tests to which this accreditation applies, please refer to the laboratory's Chemical Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ELEMENT HUNTINGTON BEACH
15062 Bolsa Chica Sreet
Huntington Beach, CA 92649
Bob Olevson Phone: 714 892 1961

CHEMICAL

Valid To: May 31, 2014 Certificate Number: 0093.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following types of metals tests:

Test	Standard[1]
Combustion (LECO) analysis for carbon & sulfur	ASTM E1019; SOP 7.00
Fusion analysis (LECO) for oxygen, nitrogen, and hydrogen	ASTM E1019, E1409, E1447; SOP 12.00, 13.00
Optical emission spectrochemical (OES) analysis (C, Mn, P, S, Si, Cr, Ni, Mo, Al, Cu, W, V, Se, Ta, Nb, Ti, Co, N, B, Be, Cd, Pb, Pb, Zn, Zr, Nd, Nb, Sr, Bi)	ASTM E227, E415, E1086, E1251; SOP 2.02
Portable x-ray dispersive analysis (PMI) Semi-quantitative analysis	SOP 5.00, 6.01
Atomic absorption (AA) for trace elements (Ag, Sn, Ar, Sb, Te, Tl, Pb, Bi, Se in Ni base alloys)	ASTM E1184; SOP 10.00
X-ray fluorescence (XRF) spectrochemical analysis (Al, Si, Cr, V, Mn, Fe, Ni, Cu, Zr, Mo, Sn, Ti, P, Co, Se, Y, Nb, Cb, W, Mg)	ASTM E322, E572, E1085; SOP 4.00
Inductive coupled plasma (ICP) (Mn, Ni, Mo, Cu, Cp, Al, Ti, Sn, Nb, Pb, Mg, W, As, Sb, V, Zr, Si, Cr, P, B, Se, Ta, Fe, Y, Be, Bi, Ga, Te)	SOP 17.00

[1]This accreditation also includes an evaluation of the GE S400 requirements for the tests listed above using the GE AC1.1 checklist.

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The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

ELEMENT HUNTINGTON BEACH

Huntington Beach, CA

for technical competence in the field of

Mechanical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 22nd day of May 2012.

President & CEO
For the Accreditation Council
Certificate Number 0093.02
Valid to May 31, 2014

For the tests to which this accreditation applies, please refer to the laboratory's Mechanical Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ELEMENT HUNTINGTON BEACH
15062 Bolsa Chica Sreet
Huntington Beach, CA 92649
Bob Olevson Phone: 714 892 1961

MECHANICAL

Valid To: May 31, 2014 Certificate Number: 0093.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following types of metals tests:

Test	Standard[1]
Adhesion of metallic coatings on fasteners	AMS 2399; ASTM B571; MIL-C-83488; AMSQQ-P-416A; SAE J207
Aerospace nut tests	
Permanent set test of self-locking nuts	ISO 7481; MIL-N-7873
Push-out test of floating plate nuts, gang channel nuts and anchor nuts	ISO 7481; MIL-N-7873
Reusability test of self-locking internally threaded fasteners	AS 7250, 7251, 7252, 7253; ANSI B18.16.4; IFI 100/107; ISO 7481; MIL-N-7873, MIL-N-25027, MIL-STD-1312-31
Torque tests	MIL-DTL-18240, MIL-F-18240
Torque-out test	IFI 101; ISO 7481; MIL-N-7873, MIL-N-45913, MIL-STD-1312-31
Wrench torque test of externally wrenched nuts of spline, hexagon and double hexagon wrenching configuration	AS 1371; ISO 7481; MIL-N-7873, MIL-STD-1312-31; NASM 1312-31; SAE 7251
Bend test	ASTM A615, E290; ASME IX
Coating tests	
Measurement of fastener coating thickness	
Microscopial method	ASTM B487; MIL-STD-1312-12; NASM 1312-12
Weight of coating	ASTM A90; MIL-STD-1312-12; NASM 1312-12
X-ray method	ASTM B568
Compression strength	ASTM E9

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Test	Standard[1]
Corrosion tests	
Copper sulfate test for free iron on the surface of fasteners	ASTM A380; MIL-STD-753 (Method 102)
Humidity testing	AMS-QQ-P-35; ASTM D2247; MIL-STD-753, MIL-STD-810, MIL-STD-1312-3; NASM 1312-3
Passivation (type II & VI only)	AMS-QQ-P-35; AMS 2700, ASTM A967, A380; MIL-S-5002
Intergranular corrosion susceptibility	ASTM A262 Practices A, C, E
Salt spray (fog)	ASTM B117; ISO 9227; MIL-STD-810, MIL-STD-1312-1; NASM 1312-1
Alternate immersion stress corrosion	SOP 66.00 using portions of ASTM G38, G44, G47, G49; Fed-Std-151b (Method 823); MIL-STD 1312-9, NASM 1312-9
Hydrogen embrittlement (stress durability) Externally threaded fasteners	ASTM A143, F519, F606, F606M; MIL-STD-1312-5A; NASM 1312-5; AMSQQ-P-416A; SAE J81
Fatigue Testing	
Linear-Elastic Plane-Strain Fracture Toughness K_{1c} of Metallic Materials	ASTM E399
Conducting Force Controlled Constant Amplitude Axial Fatigue Tests of Metallic Materials	ASTM E466
Strain-Controlled Fatigue Testing	ASTM E606
Fatigue testing of full-size threaded fasteners	BS 3518, Part 2 & 3
High Cycle Fatigue (HCF)	DOD-STD-1312-111; ISO 3800/1; MIL-STD-1312-11; NASM 1312-11
Hardness testing:	
Rockwell (A, B, C, E, F, 15N, 30N, 45N, 15T, 30T, 45T,)	ASTM A370, E18, E140, F606, F606M; ISO 898-1, 3738-1, 6508-1; MIL-STD-1312-6; NASM 1312-6; SAE J417, J1199
Vickers to 30kg	ASTM E384
Brinell hardness (500 Kg & 3000 Kg)	ASTM A370, E10
Heat Treat	SOP 63.00
Microhardness (10-1000 HV, 10-1000 Knoop)	ASTM E384; MIL-STD-1312-6; NASM 1312-6
Charpy V-notch impact testing	ASTM A370, E23; BS EN 10045-1; JIS B1051
Prevailing torque	IFI-100/107

Test	Standard[1]
Proof load tests	
Cone proof of internally threaded fasteners	ASTM A194/A194M, F606, F606M, F812/F812M; IFI 533; SAE J122
Proof load of full-size externally threaded fasteners	ASTM A370, F606, F606M; ISO 898-1; JIS B1051; MIL-STD-1312-8; NASM 1312-8; SAE J429, J1216
Proof load of internally threaded fasteners	ASTM A370, A563, F606, F606M; BPS-N-70; ISO 898-2, 898-6; JIS B1052, B1056; SAE J995, J1216
Rotational capacity of full-size threaded fasteners	ASTM A325, A325M
Screw tests	
Drive test	ASME B18.6.4; SAE J81, J933
Torsional strength test of thread rolling and self drilling tapping screws	ASME B18.6.4; ASTM F738M; SAE J78, J81, J993
Shear strength of externally threaded fasteners	
Double shear	ANSI/ASME 18.8.2; ASTM B565; SAE J429; DOD-STD-1312-113; MIL-STD-1312-13; NASM 1312-13
Single shear	ASTM F606, F606M; MIL-STD-1312-20; NASM 1312-20
Stress rupture of fasteners & metals and Creep rupture	ASTM E139, E292; MIL-STD-1312-10; NASM 1312-10
Tensile strength	
Axial tensile strength of full-size threaded fasteners & metals	ASTM A370, E8, F606, F606M; DOD-STD-1312-108; ISO 898-1, 6892; JIS B1051, J1054; MIL-STD-1312-8; NASM 1312-8; SAE J82, J429, J1199, J1216
Tension testing of machined specimens from externally threaded fasteners & metals	ASTM A370, E8, F606, F606M; BS4A4; BSEN 10002-1, 10002-5; ISO 898-1; JIS B1051; MIL-STD-1312-8; SAE J429, J1199, J1216
Total extension at fracture of externally threaded fasteners & metals	ASTM E8, F606, F606M; ISO 3506, 6892; JIS B1054
Wedge tensile strength of full-size threaded fasteners	ASTM A370, E8, F606, F606M; DOD-STD-1312-108; ISO 898-1, 6892; JIS B1051, D4604; MIL-STD-1312-8A, MIL-STD-1312-18A; NASM 1312-8, 1312-18; SAE J82, J429, J1199, J1216
Yield strength of full-size threaded fasteners & metals	ASTM A370, E8, F606, F606M; DOD-STD-1312-108; ISO 898-1, 6892; JIS B1051, B1054; MIL-STD-1312-8A; SAE J429, J1216

Test	Standard[1]
Tensile strength	
Elevated temperature tensile test of fasteners & metals (see also Stress rupture)	ASTM E8, E21; BPS-N-70; BSEN 10002-5; MIL-DTL-25027, MIL-STD-1312-18; NAS 3350, NASM 1312-18
Torque tension	
Locking torque	MIL-F-18240, MIL-STD-1312-31; NASM 1312-31
Recess strength test in both installation and removal directions	MIL-STD-1312-25; NASM 1312-25
Washer tests	
Compression/flattening test	FF-W-84; JIS B1251
Free height interlocking test	FF-W-84
Twist test of lock washers	ASME B18.21.1; FF-W-84; JIS B1251
Metallurgical	
Decarburization and case depth	ASTM A490, A574, E3, E384, E1077, F835, G79; ISO 898-1, 898-5, 4507; SAE J78, J121, J419, J423
Inclusion Content of Steel	ASTM E45 (Parts A & D)
Grain size	ASTM E112, E930, E1181; ISO 643
Macroscopic examination by etching	ASTM A604, E340, E381; SAE J123, J1061; AMS 2380
Microscopic examination by etching	AMS 2643; ASTM E407
Scanning electron microscope	SOP 68.00, 68.10
Surface discontinuities	
Externally threaded fasteners	ASTM A490, F788, F788M; ISO 6157-1, 6157-3; SAE J123, J1061; Aerospace fastener specifications
Internally threaded fasteners	ASTM F812, F812M; SAE J122; Aerospace fastener specifications
Non-Destructive Testing	
Magnetic particle inspection	ASTM E1444; MIL-STD-1949, MIL-STD-271F; T9074-AS-GIB-010/271
Penetrant	ASTM E1417; MIL-STD-271F, MIL-STD-6866; T9074-AS-GIB-010/271
Magnetic permeability of fasteners using a low-mu permeability indicator	ASTM A342; MIL-I-17214

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