Korea Laboratory Accreditation Scheme

CERTIFICATE OF ACCREDITATION

Korea Testing and Research Institute

Accreditation No. : KT011

Corporation Registration No. : 134122-0007297

Address of Laboratory : 98, Gyoyukwon-ro, Gwacheon-si, Gyeonggi-do, Korea
68, Gajaeul-ro, Seo-gu, Incheon, Korea
15, Jongga-ro, Jung-gu, Ulsan, Korea
42-27, Jungbu-daero 2517beon-gil, Yangji-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
5, Myeongji ocean city 9-ro, Gangseo-gu, Busan, Korea
12-63, Sandan-gil, Hwasun-eup, Hwasun-gun, Jeollanam-do, Korea
122-11, Seongseo4chacheomdan-ro, Dalseo-gu, Daegu, Korea

date of Initial Accreditation : December 10, 1994

Duration : April 28, 2014 ~ April 27, 2018

Scope of Accreditation : Attached Annex

Date of issue : August 7, 2017

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

Jung Dong Hee

Administrator
Korea Laboratory Accreditation Scheme

Korea Laboratory Accreditation Scheme(KOLAS) is a signatory of the ILAC mutual recognition arrangement

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Address of Laboratory : 5, Myeongji ocean city 9-ro, Gangseo-gu, Busan, Korea

01. Mechanical Test

01.001 Metals and Metal Products

Test Method	Standard designation	Test range
KS B 0233 : 2005	Mechanical properties of steel bolts and screws	Max. 1 000 kN
KS B 0234 : 2009	Mechanical properties of steel nuts	Max. 1 000 kN
KS B 0241 : 2016	Mechanical properties of corrosion-resistant stainless-steel fasteners	Max. 1 000 kN
KS B 0802 : 2003	Method of tensile test for metallic materials	Load : Max. 1 000 kN Elongation : (0 ~ 99) % Reduction of Area : (0 ~ 99) %
KS B 0804 : 2001	Metallic materials - Bend test	Max. 1 000 kN
KS B 0805 : 2000	Metallic materials - Test method of brinell hardness	(612.5 ~ 29 400) N
KS B 0806 : 2000	Metallic materials - Test method of rockwell hardness	Scale B : 20 ~ 100 Scale C : 20 ~ 70
KS B 0810 : 2003	Method of impact test for metallic materials	Absorbed Energy : Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
KS B 0811 : 2003	Metallic materials - Vickers hardness test - Part 1 : Test method	(9.8 ~ 490.3) N
KS B 0821 : 2007	Methods of tension and impact tests for deposited metal	Tensile Test : Max. 1 000 kN Impact Test : Max. 542 J
KS B ISO 5173 : 2000	Destructive tests on welds in metallic materials-Bend tests	Max. 1 000 kN
KS B 0833 : 2001	Fusion-welded butt joints in steel-Transverse tensile test	Max. 1 000 kN
KS B ISO 9018 : 2003	Destructive tests on welds in metallic materials-Tensile test on cruciform and lapped joints	Max. 1 000 kN

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Test Method	Standard designation	Test range
JIS Z 2241 : 2011	Metallic materials - Tensile testing - Method of test at room temperature	Load : Max. 1 000 kN Elongation : (0 ~ 99) % Reduction of Area : (0 ~ 99) %
JIS Z 2242 : 2005	Method for Charpy pendulum impact test of metallic materials	Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
JIS Z 2243 : 2008	Brinell hardness test - Test method	(612.5 ~ 29 400) N
JIS Z 2244 : 2009	Vickers hardness test - Test method	(9.8 ~ 490.3) N
JIS Z 2245 : 2016	Rockwell hardness test - Test method	Scale B: 20 ~ 100 Scale C: 20 ~ 70
JIS Z 2248 : 2014	Metallic materials - Bend test	Max. 1 000 kN
JIS Z 3111 : 2005	Methods of tension and impact tests for deposited metal	Tensile Test: Max. 1 000 kN Impact Test: Max. 542 J
JIS Z 3121 : 2013	Methods of tensile test for butt welded joints	Max. 1 000 kN
JIS Z 3122 : 2013	Methods of bend test for butt welded joint	Max. 1 000 kN
ASTM A352/A352M-06 (2012)	Standard Specification for Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts, Suitable for Low-Temperature Service 7.2 Impact Test	Absorbed Energy: Max. 542 J
ASTM A370-17	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	1. Tensile Test Load : Max. 1 000 kN Elongation: (0 ~ 99) % Reduction of Area : (0 ~ 99) % 2. Bend Test Max. 1 000 kN 3. Brinell Hardness (612.5 ~ 29 400) N 4. Rockwell Hardness

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Test Method	Standard designation	Test range
ASTM A370-17		Scale B: 20 ~ 100 Scale C: 20 ~ 70 5. Impact Test Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
ASTM E8/E8M-16a	Standard Test Methods for Tension Testing of Metallic Materials	Load : Max. 1 000 kN Elongation: (0 ~ 99) % Reduction of Area : (0 ~ 99) %
ASTM E10-17	Standard Test Method for Brinell Hardness of Metallic Materials	(612.5 ~ 29 400) N
ASTM E18-16	Standard Test Methods for Rockwell Hardness of Metallic Materials	Scale B: 20 ~ 100 Scale C: 20 ~ 70
ASTM E23-16b	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials	Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
ASTM E384-11e1	Standard Test Method for Knoop and Vickers Hardness of Materials	Vickers Hardness: (9.8 ~ 490.3) N
ASME BPVX, 2015 Section II, PART A, SA-370	TEST METHODS AND DEFINITIONS FOR MECHANICAL TESTING OF STEEL PRODUCTS	1. Tensile Test Load : Max. 1 000 kN Elongation: (0 ~ 99) % Reduction of Area: (0 ~ 99) % 2. Bend Test Max. 1 000 kN 3. Brinell Hardness (612.5 ~ 29 400) N

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Test Method	Standard designation	Test range
		4. Rockwell Hardness Scale B: 20 ~ 100 Scale C: 20 ~ 70 5. Impact Test Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
ASME BPVC, 2015 Section IX	QUALIFICATION STANDARD FOR WELDING AND BRAZING PROCEDURES, WELDERS, BRAZERS, AND WELDING AND BRAZING OPERATORS QW-150 TENSION TESTS QW-160 GUIDED-BEND TESTS QW-170 NOTCH-TOUGHNESS TESTS -Charpy V-Notch	1. Tensile Test Max. 1 000 kN 2. Bend Test Max. 1 000 kN 3. Impact Test Absorbed Energy: Max. 542 J
AWS D1.1/D1.1M : 2015	Structural Welding Code-Steel 4.9.3 Mechanical Testing	Max. 1 000 kN
ISO 6892-1 : 2016	Metallic materials - Tensile testing - Part 1: Method of test at room temperature	Load : Max. 1 000 kN Elongation: (0 ~ 99) % Reduction of Area : (0 ~ 99) %
ISO 148-1 : 2016	Metallic materials - Charpy pendulum impact test - Part 1: Test method	Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm
ISO 7438 : 2016	Metallic materials - Bend test	Max. 1 000 kN
ISO 6506-1 : 2014	Metallic materials - Brinell hardness test - Part 1 : Test method	(612.5 ~ 29 400) N
ISO 6507-1 : 2005	Metallic materials - Vickers hardness test - Part 1: Test method	(9.8 ~ 490.3) N

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Test Method	Standard designation	Test range
ISO 6508-1 : 2016	Metallic materials - Rockwell hardness test - Part 1: Test method (scales B, C)	Scale B: 20 ~ 100 Scale C: 20 ~ 70
ISO 4136 : 2012	Destructive tests on welds in metallic materials - Transverse tensile test	Max. 1 000 kN
ISO 5173 : 2009	Destructive tests on welds in metallic materials - Bend tests	Max. 1 000 kN
ISO 5178 : 2001	Destructive tests on welds in metallic materials - Longitudinal tensile test on weld metal in fusion welded joints	Max. 1 000 kN
ISO 9015-1 : 2001	Destructive tests on welds in metallic materials - Hardness testing - Part 1: Hardness test on arc welded joints	Vickers Hardness: 49.03 N or 98.07 N
ISO 9015-2 : 2016	Destructive tests on welds in metallic materials - Hardness testing - Part 2: Microhardness testing of welded joints	Vickers Hardness: (9.8 ~ 49.03) N
ISO 9016 : 2012	Destructive tests on welds in metallic materials - Impact tests - Test specimen location, notch orientation and examination	Absorbed Energy: Max. 542 J % of Fracture Area : (0 ~ 100) % Lateral Expansion : (0 ~ 10) mm

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02. Chemical Test

02.001 Iron and Steel

Test Method	Standard designation	Test range
KS D 1652 : 2007	Iron and steel－Method for spark discharge atomic emission spectrometric analysis	C : (0.003 ~ 4.2) % Si : (0.008 ~ 3.3) % Mn : (0.02 ~ 7.1) % P : (0.003 ~ 1.0) % S : (0.000 2 ~ 0.3) % Ni : (0.019 ~ 35.3) % Cr : (0.014 ~ 31.4) % Mo : (0.001 ~ 9.41) % Cu : (0.012 ~ 4.1) % W : (0.01 ~ 20.4) % V : (0.001 ~ 1.82) % Co : (0.002 ~ 10.64) % Ti : (0.000 5 ~ 2.15) % Al : (0.001 ~ 1.1) % As : (0.002 ~ 0.013) % Sn : (0.002 ~ 0.1) % B : (0.000 4 ~ 0.028) % Pb : (0.001 ~ 0.027) % Zr : (0.005 ~ 0.12) % Nb : (0.003 ~ 0.99) % Mg : (0.013 ~ 0.075) % Sb : (0.008 ~ 0.1) %
KS D 1779 : 2016	General rules for determination of sulfur in metallic materials 5. b) 5) Infrared Absorption	〉0.005 %
KS D 1780 : 2016	General rules for determination of carbon in metallic materials 5.7 Infrared Absorption	〉0.001 %
KS D 1803 : 2003	Methods for determination of sulfur in iron and steel 10. Infrared absorption method after combustion in an induction furnace	〉0.005 %

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02.001 Iron and Steel

Test Method	Standard designation	Test range
KS D 1804 : 2003	Determination of carbon in iron and steel 8. Infrared absorption 8.1 Integral calculus	〉0.001 %
JIS G 1211-3 : 2013	Iron and steel - Determination of carbon content - Part 3 : Infrared absorption method after combustion	(0.001 ~ 5.0) %
JIS G 1215-4 : 2015	Iron and steel - Determination of sulfur content - Part 4 : Infrared absorption method after combustion in an induction furnace	(0.005 ~ 0.2) %
JIS G 1253 : 2013	Iron and steel - Method for spark discharge atomic emission spectrometric analysis	C : (0.003 ~ 4.2) % Si : (0.008 ~ 3.3) % Mn : (0.02 ~ 7.1) % P : (0.05 ~ 1.0) % S : (0.02 ~ 0.3) % Ni : (0.019 ~ 35.3) % Cr : (0.014 ~ 31.4) % Mo : (0.001 ~ 9.41) % Cu : (0.012 ~ 4.1) % W : (0.01 ~ 20.4) % V : (0.001 ~ 1.82) % Co : (0.002 ~ 10.64) % Ti : (0.000 5 ~ 2.15) % Al : (0.001 ~ 1.1) % As : (0.002 ~ 0.013) % Sn : (0.06 ~ 0.1) % B : (0.000 4 ~ 0.028) % Pb : (0.001 ~ 0.027) % Zr : (0.005 ~ 0.12) % Nb : (0.003 ~ 0.99) % Mg : (0.013 ~ 0.075) % Sb : (0.008 ~ 0.1) %
ASTM E415-15	Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry	Al : (0.000 2 ~ 0.075) % As : (0.002 ~ 0.013) % B : (0.000 4 ~ 0.007) % C : (0.003 ~ 1.1) % Cr : (0.000 1 ~ 2.25) %

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02.001 Iron and Steel

Test Method	Standard designation	Test range
		Co : (0.000 2 ~ 0.18) % Cu : (0.000 1 ~ 0.5) % Mn : (0.013 ~ 2.0) % Mo : (0.001 ~ 0.6) % Ni : (0.019 ~ 5.0) % Nb : (0.003 ~ 0.085) % P : (0.003 ~ 0.085) % Si : (0.008 ~ 1.15) % S : (0.001 ~ 0.055) % Sn : (0.002 ~ 0.045) % Ti : (0.000 4 ~ 0.2) % V : (0.000 9 ~ 0.3) % Zr : (0.005 ~ 0.05) %
ASTM E1019-11	Standard Test Methods for Determination of Carbon, Sulfur, Nitrogen, and Oxygen in Steel, Iron, Nickel, and Cobalt Alloys by Various Combustion and Fusion Techniques	C : (0.001 ~ 4.50) % S : (0.002 ~ 0.35) %
ASTM E1086-14	Standard Test Method for Analysis of Austenitic Stainless Steel by Spark Atomic Emission Spectrometry	Cr : (17.0 ~ 23.0) % Ni : (7.5 ~ 13.0) % Mo : (0.01 ~ 3.0) % Mn : (0.02 ~ 2.0) % Si : (0.01 ~ 0.90) % Cu : (0.01 ~ 0.30) % C : (0.005 ~ 0.25) % P : (0.003 ~ 0.15) % S : (0.003 ~ 0.065) %