

TESTING AND CALIBRATION LABORATORY ACCREDITATION PROGRAM (LAP)

Scope of Accreditation

Accredited Laboratory No. 576

Legal Name of Accredited Laboratory: **BC Hydro**

Location Name or Operating as (if applicable): Powertech Labs Inc.

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SCC File Number:	15669
Accreditation Standard(s):	ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories
Fields of Testing:	Chemical/Physical Electrical/Electronic Mechanical/Physical
Program Specialty Area:	Environmental Testing (ET)
Initial Accreditation:	2005-01-13
Most Recent Accreditation:	2021-04-28
Accreditation Valid to:	2025-01-13

Remarque: La présente portée d'accréditation existe également en français, sous la forme d'un document distinct.

Note: This scope of accreditation is also available in French as a separately issued document.

CONSTRUCTION

Road and Railway & Civil Constructions:

Dams

USACE CERL TR 99/104	Greaseless Bushings for Hydropower Applications
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ELASTOMERS AND PROTECTIVE AND COATINGS

Paints, Varnishes, Inks, Coatings, and Allied Products:

ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ISO 9227	Corrosion tests in artificial atmospheres - Salt spray tests

Plastics, Resins and Rubbers:

ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension Only for: 9, test method A
ASTM D572	Standard Test Method for Rubber - Deterioration by Heat and Oxygen Only for: 10.2 and 10.4
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D785	Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials Only for: 11, procedure A, Rockwell Hardness Scale R & M
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness Only for: 3.0 and 9.2
ASTM D3418	Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry Only for: 10.2 For Glass Transition

ELECTRICAL PRODUCTS AND ELECTRONIC PRODUCTS

Communications Equipment and Systems:

Components and Assemblies

DNVGL-CG-0339	Environmental test specification for electrical, electronic and programmable equipment and systems Only for: Clause 6 Vibration tests, except for Table 9 Extreme vibration strain
IEC 60068-2-27	Environmental Testing – Part 2-27: Tests - Test Ea and guidance: Shock
IEC 60068-2-6	Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)
IEC 60068-2-64	Environmental testing - Part 2-64: Tests – Test Fh: Vibration, broadband random and guidance
IEC 60945	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results Only for: Clause 8.7 Vibration
IEC 61373	Railway applications - Rolling stock equipment - Shock and vibration tests

Power and Signal Distribution Equipment

OpenADR VEN	OpenADR Alliance Virtual End Node (VEN) Certification Test
OpenADR VTN	OpenADR Alliance Virtual Top Node (VTN) Certification Test

Telecommunications Equipment

AeroMACS RCT WMF-T25-006	WiMAX Forum® AeroMACS Radio Conformance Tests
AeroMACS PCT WMF-T25-008	WiMAX Forum® Test Suite Structure and Test Purposes (TSS&TP) Specification

Components and Assemblies:

Conductors

ASTM B1008	Standard Test Method for Stress-Strain Testing for Overhead Electrical Conductors
CAN/CSA C61089	Round wire concentric lay overhead electrical stranded conductors Only for: Annex B
DS/EN 50182	Conductors for overhead lines – Round wire concentric lay stranded conductors Only for: Annex C
IEC 61089	Round wire concentric lay overhead electrical stranded conductors Only for: Annex B
IEC 61395	Overhead Conductors – Creep test procedures for stranded conductors

Electrical Rotating Machines

IEEE 1043	IEEE Recommended Practice for Voltage Endurance Testing of Form-Wound Bars and Coils
IEEE 1310	IEEE Recommended Practice for Thermal Cycle Testing of Form-Wound Stator Bars and Coils for Large Rotating Machines

IEEE 1553	IEEE Standard for Voltage Endurance Testing of Form-Wound Coils and Bars for Hydrogenerators
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Insulators

ANSI C29.1	American National Standard for Electrical Power Insulators - Test Methods Only for: Clause 4.2 Low-Frequency Dry Flashover Voltage Tests Clause 4.3 Low-Frequency Wet Flashover Voltage Tests Clause 4.4 Low-Frequency Dry Withstand Voltage Tests Clause 4.5 Low-Frequency Wet Withstand Voltage Tests Clause 4.7 Impulse Flashover Voltage Tests Clause 4.8 Impulse Withstand Voltage Tests Clause 4.9 Radio Influence Voltage
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Switches and Controls

ANSI/NEMA C37.54	Indoor Alternating Current High-Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear - Conformance Test Procedures Only for: Clause 3.5 Lightning Impulse Withstand Voltage Tests Clause 3.6 Continuous Current Carrying Tests Clause 3.8 Load Current Switching Tests Clause 3.9 Short Time Current Carrying Tests Clause 3.10 Short-Circuit Current Tests Clause 6.2 Power Frequency Withstand Voltage Tests
ANSI/NEMA C37.55	Switchgear - Medium Voltage Metal-Clad Assemblies - Conformance Test Procedures Only for: Clause 5.5.2 Power-Frequency Withstand Voltage Tests Clause 5.5.3 Lightning Impulse Withstand Tests Clause 5.7 Continuous Current Test Clause 5.8 Short-Time Withstand Current Test Clause 5.9 Momentary Withstand Current Test
ANSI/NEMA C37.57	Metal-Enclosed Interrupter Switchgear Assemblies - Conformance Testing Only for: Clause 4.5.2 Power-Frequency Withstand Voltage Tests Clause 4.5.3 Lightning-Impulse Withstand Test Clause 4.7 Continuous Current Test Clause 4.8 Short-Time Withstand Current Test Clause 4.9 Momentary Withstand Current Test
ANSI/NEMA C37.58	Indoor AC Medium-Voltage Switches for Use in Metal-Enclosed Switchgear - Conformance Test Procedures Only for: Clause 4.5 Lightning Impulse Withstand Test Clause 4.6 Continuous Current Test Clause 4.7.2 Momentary Withstand Current Test Clause 4.7.3 Short-Time Withstand Current Test Clause 4.9 Load-Switching Current Test (If Rated)

CSA C22.2 No. 31	<p>Medium Voltage Metal-Clad Assemblies</p> <p>Only for: Clause 6.1 Temperature</p> <p>Clause 8.5.1 Dielectric strength tests</p> <p>Clause 8.5.2 Impulse tests</p> <p>Clause 8.5.3 Corona-extinction tests</p> <p>Clause 8.5.4 Short-circuit withstand rating</p>
CSA-C22.2 No. 253/ UL 347	<p>Medium-Voltage AC Contactors, Controllers, and Control Centers</p> <p>Only for: Clause 6.2.201 Impulse withstand tests</p> <p>Clause 6.2.202 Power-frequency voltage withstand tests</p> <p>Clause 6.5 Temperature Rise Test</p> <p>Clause 6.6 Short-Time, Momentary and Peak Withstand Current Bus Tests</p> <p>Clause 6.102 Make and Break Capacity Test</p> <p>Clause 6.103 Overload Test</p> <p>Clause 6.104 Fault Interruption Test</p> <p>Clause 6.202 Short Time Capability</p>
IEC 60282-1	<p>Standard High-voltage fuses - Part 1: Current-limiting fuses</p> <p>Only for: Clause 7.4.5 Power-frequency voltage dry tests</p> <p>Clause 7.6 breaking tests</p> <p>Clause 7.5 temperature-rise tests and power-dissipation measurement</p> <p>Clause 7.7 tests for time-current characteristics</p>
IEC 60282-2	<p>Standard High-voltage fuses - Part 2: Current-Expulsion fuses</p> <p>Only for: Clause 8.4.5 power-frequency voltage dry tests</p> <p>Clause 8.6 breaking tests</p> <p>Clause 8.5 temperature-rise tests</p> <p>Clause 8.7 time-current characteristics tests</p>
IEC 62271-1	<p>High-voltage switchgear and controlgear –Part 1: Common specifications for alternating current switchgear and controlgear</p> <p>Only for: Clause 7.2 Power-frequency voltage tests</p> <p>Clause 7.4 Resistance measurement</p> <p>Clause 7.5 continuous current tests</p> <p>Clause 7.6 Short-time withstand current and peak withstand current tests</p>

<p>IEC 62271-111/ IEEE C37.60</p>	<p>High-voltage switchgear and controlgear - Part 111: Automatic circuit & reclosers and fault interrupters for alternating current systems up to 38 kV Only for: Clause 6.2 Dielectric tests Clause 6.4 Measurement of the resistance of circuits Clause 6.5 Temperature-rise tests Clause 6.6 Short time withstand current and peak withstand current tests Clause 6.101 Line charging current and cable charging current interruption tests Clause 6.102 Making current capability Clause 6.103 Rated symmetrical interrupting current tests Clause 6.106 Partial discharge (corona) tests Clause 6.111.3 Simulated surge arrester operation test Clause 6.112 Condition of recloser/FI after each test of 6.101, 6.103 and 6.104</p>
<p>IEEE 386</p>	<p>IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems above 600 V Only for: Clause 7.6 Short-time current test Clause 7.7 Switching test Clause 7.8 Fault-closure test</p>
<p>IEEE C37.09</p>	<p>Standard Test Procedure For AC High-Voltage Circuit Breakers Rated On A Symmetrical Current Basis Only for: Clause 4.1 Maximum voltage tests Clause 4.2 Power Frequency Clause 4.3 Continuous Current-Carrying Tests Clause 4.4.3 Power Frequency Withstand Voltage Tests Clause 4.4.4 Full-wave lightning impulse withstand voltage tests Clause 4.4.5 Impulse voltage test for interrupters and resistors Clause 4.4.6 Chopped wave lightning impulse withstand voltage tests Clause 4.4.7 Switching impulse voltage withstand tests Clause 4.5 Standard operating duty (standard duty cycle) Clause 4.6 Interrupting time Clause 4.7 TRV Clause 4.8 Short-circuit current interrupting Clause 4.9.1 Load current switching test conditions Clause 4.9.2 Load current endurance switching test Clause 4.12 Out-of-phase switching current</p>
<p>IEEE C37.09a</p>	<p>Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Amendment 1 - Capacitance Current Switching Only for: Clause 4.10 Capacitance current switching tests</p>

IEEE C37.20.2	<p>Standard for Metal-Clad Switchgear</p> <p>Only for: Clause 6.2.1 Dielectric tests</p> <p>Clause 6.2.2 Rated continuous current tests</p> <p>Clause 6.2.3 Momentary withstand current tests</p> <p>Clause 6.2.4 Short-time withstand current tests</p> <p>Clause 6.2.5 Auxiliary equipment primary disconnecting device momentary current withstand test</p>
IEEE C37.20.3	<p>Standard for Metal-Enclosed Interrupter Switchgear</p> <p>Only for: Clause 6.2 Dielectric tests</p> <p>Clause 6.5 Temperature-rise tests</p> <p>Clause 6.6 Short-time withstand current and peak withstand current tests</p> <p>Clause 6.14.1 Test for bus-bar insulation</p>
IEEE C37.20.4	<p>IEEE Standard for Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Switchgear</p> <p>Only for: Clause 6.6 Short-time withstand current and peak withstand current (formerly momentary) tests</p> <p>Clause 6.13 Fault-making test</p> <p>Clause 6.14 Load-switching current test</p> <p>Clause 6.15 Cable-charging current switching test (optional)</p> <p>Clause 6.16 Unloaded-transformer switching test (optional)</p> <p>Clause 6.17 Direct-acting fuse-tripping current test (optional)</p>
IEEE C37.20.7	<p>IEEE Guide for Testing Metal-Enclosed Switchgear Rated Up to 38 kV for Internal Arcing Faults</p> <p>Only for: 5 Arcing Fault</p>
IEEE C37.23	<p>Metal-Enclosed Bus</p> <p>Only for: Clause 6.2.1.1 Power Frequency Withstand Voltage Tests</p> <p>Clause 6.2.1.2 Lightning impulse withstand voltage tests</p> <p>Clause 6.2.1.3 Test for bus-bar insulation, bus-joint insulation, and bus-tap insulation</p> <p>Clause 6.2.2 Continuous-current</p> <p>Clause 6.2.3 Momentary withstand current</p> <p>Clause 6.2.4 Short-time withstand current</p>
IEEE C37.30.1	<p>Standard Requirements for AC High-Voltage Air Switches Rated Above 1000 V</p> <p>Only for: Clause 8.1.1 Power frequency withstand voltage tests</p> <p>Clause 8.1.2 Lightning impulse dry withstand voltage tests</p> <p>Clause 8.1.3 Power frequency and lightning impulse open gap withstand voltage tests</p> <p>Clause 8.1.4 Switching impulse voltage test of switches rated 362 kV and above</p> <p>Clause 8.2 Temperature rise tests</p> <p>Clause 8.3 Short-time Withstand Current Tests</p> <p>Clause 8.4 Fault-making current test</p> <p>Clause 8.7 Corona tests</p>

IEEE C37.41	<p>ANSI/IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories</p> <p>Only for: Clause 8.2 Power-frequency dry-withstand voltage tests</p> <p>Clause 8.3 Power-frequency wet-withstand voltage tests on outdoor devices</p> <p>Clause 8.5 Lightning impulse-withstand voltage tests</p> <p>Clause 9 Interrupting tests</p> <p>Clause 10 Radio-influence tests</p> <p>Clause 11 Temperature-rise tests</p> <p>Annex A.4 Short-time withstand current tests for disconnecting switches</p> <p>Annex A.5 Load-break tests</p>
IEEE C37.42	<p>IEEE Standard Specifications for High-Voltage (> 1000 V) Expulsion-Type Distribution-Class Fuses, Fuse and Disconnecting Cutouts, Fuse Disconnecting Switches, and Fuse Links, and Accessories Used with These Devices</p> <p>Only for: Clause 3.3.1 Dielectric tests</p> <p>Clause 3.3.2 Interrupting [breaking]</p> <p>Clause 3.3.5 Short-time current tests for disconnecting cutouts</p> <p>Clause 3.3.6 Temperature-rise tests</p>
IEEE C37.45	<p>IEEE Standard for Design Test Specifications for High Voltage (> 1000 V) Distribution Class Enclosed Single-Pole Air Switches</p> <p>Only for: Clause 8.1 Dielectric tests</p> <p>Clause 8.3 Short-time current tests</p> <p>Clause 8.4 Temperature-rise tests</p>
IEEE C37.46	<p>Specifications for High-Voltage (>1000 V) Expulsion and Current-Limiting Power Class Fuses and Fuse Disconnecting Switches</p> <p>Only for: Clause 4.1 Dielectric tests</p> <p>Clause 4.2 Interrupting [breaking]</p> <p>Clause 4.4 Temperature-rise</p>
IEEE C37.66	<p>IEEE Standard Requirements for Capacitor Switches for AC Systems (1 kV to 38 kV)</p> <p>Only for: Clause 6.2 Insulation (dielectric) tests</p> <p>Clause 6.3 Short-time current tests</p> <p>Clause 6.4 Rated fault-making current tests</p> <p>Clause 6.5 Operating duty tests</p>

IEEE C37.74	<p>Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems up to 38 kV</p> <p>Only for: Clause 6.7.2 Dielectric tests Clause 6.7.3 Continuous current test Clause 6.7.4 Short-circuit withstand current tests Clause 6.7.5 Switching tests Clause 6.7.6 Thermal runaway test Clause 6.7.7 Partial discharge tests Clause 6.7.8 DC withstand voltage test</p>
IEEE/IEC 62271-37-013	<p>IEEE/IEC International Standard for High-voltage switchgear and controlgear -- Part 37-013: Alternating-current generator circuit-breakers</p> <p>Only for: Clause 6.2.2.1 Rated power frequency withstand voltage (dry) Clause 6.2.6.2 Lightning impulse voltage test Clause 6.2.12 Sound level tests Clause 6.5 Temperature rise test Clause 6.6 Short-time withstand current and peak withstand current tests Clause 6.103 System-source short-circuit current making and breaking tests Clause 6.104 Load Current Breaking Tests Clause 6.105 Generator-source short-circuit current making and breaking tests Clause 6.106 Out-Of-Phase Current Switching Tests</p>

Transformers

ASTM D3612	<p>Standard test Method for Analysis of Gases Dissolved in Electrical Insulating Oil by Gas Chromatography</p> <p>Except for: Propane and Propylene</p>
IEC 61869-1	<p>Instrument transformers - Part 1: General requirements</p> <p>Only for: Clause 7.2.2 Temperature-rise test Clause 7.2.3 Impulse voltage withstand test on primary terminals Clause 7.2.4 Wet test for outdoor type transformers Clause 7.3.1 Power-frequency voltage withstand tests on primary terminals Clause 7.3.2 Partial discharge measurement Clause 7.3.4 Power-frequency voltage withstand tests on secondary terminals Clause 7.3.6 Verification of markings Clause 7.4.1 Chopped impulse voltage withstand test on primary terminals</p>
IEC 61869-3	<p>Instrument transformers - Part 3: Additional requirements for inductive voltage transformers</p> <p>Only for: Clause 7.2.2 Temperature-rise test Clause 7.2.3 Impulse voltage withstand test on primary terminals</p>
IEEE C57.12.90	<p>Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers</p>

	<p>Only for: Clause 5 Resistance measurements Clause 6 Polarity and phase-relation tests Clause 7 Ratio tests Clause 8 No-load losses and excitation current Clause 9 Load losses and impedance voltage Clause 10 Dielectric tests Clause 11 Temperature-rise tests Clause 12 Short circuit tests Clause 13 Audible sound emissions</p>
IEEE C57.12.91	<p>Standard Test Code for Dry-Type Distribution and Power Transformers Only for: Clause 5 Resistance measurements Clause 6 Polarity and phase relation tests Clause 7 Ratio tests Clause 8 No load losses and excitation current Clause 9 Load losses and impedance voltage Clause 10 Dielectric tests Clause 11 Temperature tests Clause 12 Short circuit tests Clause 13 Audible Sound Level Measurements</p>
IEEE C57.13	<p>Standard Requirements for Instrument Transformers Only for: Clause 8.2 Impedance excitation, and composite error measurements Clause 8.3 Polarity Clause 8.4 Resistance measurements Clause 8.6 Partial discharge measurement Clause 8.9 Measurement of Open-Circuit Voltage of Current Transformers Clause 9.3 Impedance measurements Clause 9.4 Polarity Clause 10.2 Impedance measurements Clause 10.3 Polarity Clause 11.2 Temperature rise tests Clause 11.4 Partial discharge measurement Clause 12.2 Current transformer temperature rise tests</p>

Wiring and Related Products

HD 629.1-S3	<p>Test Requirements for accessories for use on power cable of rated voltage from 3,6/6(7,2) kV up to 20,8/36(42) kV – Part1: Accessories for cables with extruded insulation Exception: Table 14</p>
EN 61442	<p>Test methods for accessories for power cables with rated voltages from 6 kV ($U_m = 7,2$ kV) up to 36 kV ($U_m = 42$ kV) Only for: Clause 4 AC voltage tests Clause 6 Impulse voltage tests</p>

	Clause 7 Partial discharge test Clause 9 Heating cycle voltage test Clause 9.4 Immersion test for outdoor terminations Clause 10 Thermal short-circuit test (screen) Clause 11 Thermal short-circuit test (conductor) Clause 12 Dynamic short-circuit test Clause 13 Humidity and salt fog tests Clause 14 Impact test at ambient temperature
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ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY

Environmental:

Soil/Sediment (PCB in Soil)

ACTP-6	PCB Content in Soil Samples by Gas Chromatography
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Soil/Sediment (EPH in Soil)

ACTP-22	Extractable Petroleum Hydrocarbons (EPH) in Solids by GC/FID [BC ENV] EPHs10-19 EPHs19-32
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Soil/Sediment (Metals in Soil)

EPA 6010D, BC ENV	Strong Acid Leachable Metals (SALM) in Soil by Inductively Coupled Plasma (ICP) [ACTP 25] Aluminum Antimony Arsenic Barium Beryllium Boron Cadmium Chromium Cobalt Copper Iron Lead Lithium Manganese Mercury Molybdenum Nickel Selenium Silver Strontium Sulphur
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	Thallium Thorium Tin Titanium Tungsten Uranium Vanadium Zinc
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Soil/Sediment (PAH in Soil)

ACTP 14	Polycyclic Aromatic Hydrocarbons (PAHs) in Soil by Gas Chromatography-Mass Spectrometry (GC-MS) [BC ENV, EPA 8270D] Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b+j)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, 1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene
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Water (Inorganic)

ACTP 8	pH Value (APHA 4500-H+)
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Water (Organic – PCB in Water)

ACTP-7	PCB in Aqueous Samples by Gas Chromatography
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Water (Organic – EPH in Water)

ACTP-23	Extractable Petroleum Hydrocarbons (EPH) in Water by GC/FID [BC ENV] EPHw10-19 EPHw19-32
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Water (Organic – PAH in Water)

ACTP 15	Polycyclic Aromatic Hydrocarbons (PAH) in Water by Gas Chromatography-Mass Spectrometry (GC-MS) [BC ENV, EPA 8270D] Acenaphthene, Acenaphthylene, Acridine, Anthracene,
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	Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b+j)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)pyrene, 1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, Phenanthrene, Pyrene, Quinoline
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Occupational Health and Safety:

Asbestos

ACTP 10	Asbestos (Bulk) by PM (NIOSH 9002, EPA 600/R-93/116 Standard, Clauses 2.1, 2.2, 2.3)
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Silica

ACTP 12	Respirable Particulate and Silica Analysis by FT-IR [NIOSH 0600, NIOSH 7602]
ACTP 27	Respirable Particulate and Silica Analysis by XRD [NIOSH 0600, NIOSH 7500]

MACHINERY

Boilers, Pressure Vessels and Piping:

ISO 7866	Gas cylinders - Refillable seamless aluminium alloy gas cylinders - Design, construction and testing Only for: Annex B Test method to determine the sustained-load cracking resistance of aluminium alloy gas cylinders
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Transportation, Agricultural and Construction Vehicles and Components:

Automobiles, Light Trucks, Vans & Trailers

ANSI HGV 2	Compressed hydrogen gas vehicle fuel containers Only for: Clause 11.3 Leak Test Clause 12.4 Burst Test Clause 12.5 Cycle Test Clause 18.3.2 Ambient Cycling Test Clause 18.3.3 Environmental Test Clause 18.3.4 Extreme Temperature Cycling
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	<p>Clause 18.3.5 Hydrostatic Burst Test Clause 18.3.6 Flaw Tolerance Test Clause 18.3.7 Drop Test Clause 18.3.8 Fire Test Clause 18.3.9 Accelerated Stress Rupture Test Clause 18.3.10 High Strain Rate Impact Test Clause 18.3.11 Permeation Test Clause 18.3.12 Boss Torque Test Clause 18.3.13 Hydrogen Gas Cycling Test Clause 18.3.14 Leak Before Break Test Clause 18.5.2 Ambient Cycling Test Clause 18.5.3 Hydrostatic Burst Test Clause 18.5.4 Container test for performance durability Clause 18.5.5 High strain rate impact test Clause 18.5.6 Permeation test Clause 18.5.7 Container test for expected on-road performance</p>
ANSI HGV 3.1	<p>Fuel system components for compressed hydrogen gas powered vehicles Only for: Clause 5.3 Hydrostatic strength Clause 5.4 Leakage Clause 5.5 Excess torque resistance Clause 5.6 Bending moment Clause 5.7 Continuous operation Clause 5.8.1 Salt spray exposure Clause 5.9 Ultraviolet resistance of external surfaces Clause 5.10 Automotive fluid exposure Clause 5.12 Abnormal electrical voltages Clause 5.13 Vibration resistance Clause 5.15 Insulation resistance Clause 5.16 Pre-cooled hydrogen exposure Clause 8.4.1 Leakage Clause 8.4.2 Continuous operation Clause 10.4.1 Continuous operation Clause 10.4.2 Operating torque Clause 11.4.1 Automatic valve Clause 11.4.2 Automatic container valve Clause 13.4.3 Insulation resistance Clause 14.4.1 Hydrostatic strength Clause 14.4.2 External leakage Clause 14.4.3 Continuous operation Clause 14.4.4 Pressure impulse Clause 15.4.1 Hydrostatic strength Clause 15.4.2 Continuous operation Clause 15.4.3 Opening and reseating characteristics</p>
ANSI/CSA HGV 4.4	<p>Breakaway devices for compressed hydrogen dispensing hoses and systems Only for: 2.2 Leakage 2.3 Hydrostatic Strength 2.4 Separation Test 2.5.1 Oxygen Aging Test 2.6 Electrical Conductivity 2.7.1 Deformation 2.7.2 Strength Tests - Impact Test 2.7.3 Drop Test</p>

	2.8.1 Pressure Cycle Test
ANSI HPRD 1	<p>Thermally activated pressure relief devices for compressed hydrogen vehicle fuel containers</p> <p>Only for: 7.2 Pressure Cycling</p> <p>7.3 Accelerated Life</p> <p>7.4 Thermal Cycling</p> <p>7.6 Automotive Fluid Exposure</p> <p>7.7 UV exposure</p> <p>7.8.1 Atmospheric exposure (oxygen ageing)</p> <p>7.10 Impact due to drop and vibration</p> <p>7.11 Leakage</p> <p>7.12 Bench top activation</p> <p>7.13 Flow capacity</p> <p>7.14 High Pressure activation and flow rate</p>
ANSI NGV 2	<p>Compressed natural gas vehicle fuel containers</p> <p>Only for: Section 11.3 Leak Test</p> <p>Section 12.4 Burst Test</p> <p>Section 12.5 Cycle Test</p> <p>Section 19.3 Ambient Cycling Test</p> <p>Section 19.4 Environmental Test</p> <p>Section 19.5 Extreme Temperature Cycling</p> <p>Section 19.6 Hydrostatic Burst Test</p> <p>Section 19.7 Composite Flaw Tolerance Test</p> <p>Section 19.8 Drop Test</p> <p>*Section 19.9 Bonfire Test</p> <p>Section 19.10 Accelerated Stress Rupture Test</p> <p>*Section 19.11 Penetration Test</p> <p>Section 19.12 Permeation Test</p> <p>Section 19.13 Natural Gas Cycling Test</p> <p>Section 19.14 Leak Before Break Test</p>
ANSI NGV3.1/ CSA 12.3	<p>Fuel System Components for Natural Gas Powered Vehicles</p> <p>Only for: 5.2 Hydrostatic Strength</p> <p>5.7.2 Salt spray exposure – Salt spray test only</p> <p>5.8.2 Atmospheric Exposure Test - Oxygen Aging</p> <p>5.11 Vibration resistance</p> <p>5.14 Ultraviolet Resistance of External Surfaces</p> <p>5.15 Automotive fluid exposure</p>
ANSI PRD 1	<p>Pressure relief devices for natural gas vehicle (NGV) fuel containers</p> <p>Only for: 7.7 UV resistance</p> <p>7.10.2 Impact due to drop and vibration – vibration</p> <p>7.14.1 Atmospheric exposure - Oxygen Aging</p>
ANSI/CSA HGV 4.10	<p>Standards For Fittings for compressed hydrogen gas and hydrogen rich gas mixtures</p> <p>Only for: 2.3 External Leak Test</p> <p>2.4 Hydrostatic Burst Test</p> <p>2.5 Hydraulic Cyclic Endurance Test</p> <p>2.6 Gas Cyclic Endurance Test</p> <p>2.8 Explosive Decompression</p> <p>2.9 Make or Break Test</p> <p>2.10 Thermal Shock</p>
CSA B51 Part 2	<p>High-Pressure Cylinders for the On-board Storage of Natural Gas as a Fuel for Automotive Vehicles</p> <p>Only for: Clause 14.12 Hydrostatic Pressure Burst Test</p>

<p>EC 79</p>	<p>Implementing Regulation (EC) No 79/2009 of the European Parliament and of the Council on type-approval of hydrogen-powered motor vehicles Annex IV</p> <p>Only for: Part 2, Para. 4.2.1 Burst test Part 2, Para. 4.2.2 Ambient temperature pressure cycle test Part 2, Para. 4.2.3 Leak-before-break (LBB) performance test *Part 2, Para. 4.2.4 Bonfire test *Part 2, Para. 4.2.5 Penetration test Part 2, Para. 4.2.6 Chemical exposure test Part 2, Para. 4.2.7 Composite flaw tolerance test Part 2, Para. 4.2.8 Accelerated stress rupture test Part 2, Para. 4.2.9 Extreme temperature pressure cycle test Part 2, Para. 4.2.10 Impact damage test Part 2, Para. 4.2.11 Leak test Part 2, Para. 4.2.12 Permeation test Part 2, Para. 4.2.13 Boss torque test Part 2, Para. 4.2.14 Hydrogen gas cycling test Part 3, Para. 4.1.1.2(b) Hydrogen compatibility test (non-metallic materials) Part 3, Para. 4.1.2 Ageing test Part 3, Para. 4.2.1 Corrosion resistance test (Test a only) Part 3, Para. 4.2.2 Endurance Part 3, Para. 4.2.3 Hydraulic pressure cycle test Part 3, Para. 4.2.4 Internal leakage test Part 3, Para. 4.2.5 External leakage test</p>
<p>ISO 11114-4</p>	<p>Transportable gas cylinders - Compatibility of cylinder and valve materials with gas contents -Part 4: Test methods for selecting steels resistant to hydrogen embrittlement</p> <p>Only for: Section 5.1 (Method A) – Disc test Section 5.3 (Method C) - Test method to determine the resistance to hydrogen assisted cracking of steel cylinders</p>
<p>ISO 11119-3</p>	<p>Gas cylinders - Refillable composite gas cylinders and tubes - Design, construction and testing - Part 3: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450L with non-load-sharing metallic or non-metallic liner</p> <p>Only for: 8.5.1 Proof pressure test 8.5.3 Cylinder burst test 8.5.4 Ambient cycle test 8.5.6 Environmental cycle test 8.5.7 Environmentally assisted stress rupture test 8.5.8 Flaw test 8.5.12 Permeability test 8.5.13 Torque test on cylinder neck boss 8.5.15 Leak test 8.5.16 Pneumatic cycle test</p>
<p>ISO 17268</p>	<p>Gaseous hydrogen land vehicle refuelling connection devices</p> <p>Only for: Section 7 Design Verification Tests Procedures</p>
<p>SAE J2600</p>	<p>Compressed hydrogen surface vehicle fueling connection devices</p> <p>Only for: Section 5 Type (Design Verification) Tests</p>
<p>UNECE R110</p>	<p>Uniform provisions concerning the approval of:</p> <p>I. Specific components of motor vehicles using compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system II. Vehicles with regard to the installation of specific components of an</p>

	<p>approved type for the use of compressed natural gas (CNG) and/or liquefied natural gas (LNG) in their propulsion system Annex 3A, Appendix A Only for: Para. A.6 Leak Before Break Test Para. A.7 Extreme Temperature Cycling Para. A.10 Leak Test Para. A.11 Hydraulic Test Para. A.12 Hydrostatic pressure burst test Para. A.13 Ambient temperature pressure cycling Para. A.14 Acid environment test *Para. A.15 Bonfire test *Para. A.16 Penetration tests Para. A.17 Composite flaw tolerance tests Para. A.18 High temperature creep test Para. A.19 Accelerated stress rupture test Para. A.20 Impact damage test Para. A.21 Permeation test Para. A.25 Boss torque test Para. A.24 (a) Pressure relief device requirements - 24 hr temperature and pressure hold Para. A.24 (b) Pressure relief device requirements - Pressure Cycling Para. A.27 Natural gas cycling test</p>
<p>UNECE R134</p>	<p>Uniform provisions concerning the approval of motor vehicles and their components with regard to the safety-related performance of hydrogen-fuelled vehicles (HFCV) Only for: Para. 5.1 Verification tests for baseline metrics Para. 5.2 Verification tests for performance durability (sequential hydraulic tests) Para. 5.3 Verification test for expected on-road performance (sequential pneumatic tests) Para. 5.4 Verification test for service terminating performance in fire Para. 9.3.2.1 Rupture test in batch testing Para. 9.3.2.2 Ambient temperature pressure cycling test in batch testing Annex 3, Para. 2 Test procedures for baseline performance metrics Annex 3, Para. 3 Test procedures for performance durability Annex 3, Para. 4 Test procedures for expected on-road performance Annex 3, Para. 5 Test procedures for service termination performance in fire Annex 4, Para. 1.1 Pressure cycling test Annex 4, Para. 1.2 Accelerated life test Annex 4, Para. 1.3 Temperature cycling test Annex 4, Para. 1.5 Vehicle environment test Annex 4, Para. 1.7 Drop and vibration test Annex 4, Para. 1.8 Leak test Annex 4, Para. 1.9 Bench top activation test Annex 4, Para. 1.10 Flow rate test Annex 4, Para. 2.1 Hydrostatic strength test Annex 4, Para. 2.2 Leak test Annex 4, Para. 2.3 Extreme temperature pressure cycling test Annex 4, Para. 2.4 Salt corrosion resistance test Annex 4, Para. 2.5 Vehicle environment test Annex 4, Para. 2.6(a) Atmospheric exposure test (oxygen) Annex 4, Para. 2.7 Electrical tests</p>

	Annex 4, Para. 2.8 Vibration test Annex 4, Para. 2.10 Pre-cooled hydrogen exposure test
ISO 19880-3	Gaseous hydrogen - Fueling stations - Part 3: Valves Only for: 5 General test methods 6 Check valves 7 Excess flow valves 8 Flow control valves 9 Hose breakaway devices (Except for 9.2.13 Twisting test) 10 Manual valves 11 Pressure safety valves (PSV) 12 Shut-off valves
UN GTR No. 13	Global technical regulation on hydrogen and fuel cell vehicles Part II Only for: Para. 5.1.1 Verification tests for baseline metrics Para. 5.1.2 Verification tests for performance durability (hydraulic sequential tests) Para. 5.1.3 Verification test for expected on-road performance (pneumatic sequential tests) Para. 5.1.4 Verification test for service terminating performance in fire Para. 6.2.2 Test procedures for baseline performance metrics Para. 6.2.3 Test procedures for performance durability Para. 6.2.4 Test procedures for expected on-road performance Para. 6.2.5 Test procedures for service terminating performance in fire Para. 6.2.6.1.1 Pressure cycling test Para. 6.2.6.1.2 Accelerated life test Para. 6.2.6.1.3 Temperature cycling test Para. 6.2.6.1.5 Vehicle environment test Para. 6.2.6.1.7 Drop and vibration test Para. 6.2.6.1.8 Leak test Para. 6.2.6.1.9 Bench top activation test Para. 6.2.6.1.10 Flow rate test Para. 6.2.6.2.1 Hydrostatic strength test Para. 6.2.6.2.3 Extreme temperature pressure cycling test Para. 6.2.6.2.4 Salt corrosion resistance test Para. 6.2.6.2.5 Vehicle environment test Para. 6.2.6.2.6(a) Atmospheric exposure test (oxygen) Para. 6.2.6.2.7 Electrical tests Para. 6.2.6.2.8 Vibration tests Para. 6.2.6.2.10 Pre-cooled hydrogen exposure test

METALLIC ORES AND PRODUCTS

Articles of Metal:

Cast, Forged, Welded or Pressed Metal Components

ASTM E18	Standard Test Methods for Rockwell Hardness of Metallic Materials
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NON-METALLIC MINERALS AND PRODUCTS

Petroleum Refinery Products (including asphalt materials, petrochemicals, fuels and lubricants):

Fuels and Lubricants

ASTM D4059	Polychlorinated Biphenyls (PCB) in Oil by Gas Chromatography [ACTP4]
ASTM D664	Acid Number of Petroleum Products by Potentiometric Titration [ACTP 16]
ASTM D7042	Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity) [ACTP 17]

Number of Scope Listings: 97

Notes:

AeroMACS: Aeronautical Mobile Airport Communication System

ACTP: Internal Powertech Labs Inc. Procedure (Applied Chemistry Test Procedure)

ASME: American Society of Mechanical Engineers

ASTM: ASTM International, previously American Society for Testing and Materials

BC ENV: British Columbia Environmental Laboratory Manual

CSA: Canadian Standards Association

DNVGL: Det Norske Veritas (Norway) and Germanischer Lloyd (Germany)

EC: European Environment Agency

EPA: United States Environmental Protection Agency

IEC: International Electrotechnical Commission

IEEE: Institute of Electrical and Electronics

NIOSH: National Institute for Occupational Safety and Health (USA)

UNECE: United Nations Economic Commission for Europe

UN GTR: United Nations Global Technical Regulations

USACE: United States Army Corps of Engineers

(*): These tests are performed in a temporary location (Justice Institute of BC (JI), 13500 256 St, Maple Ridge, BC V4R 1C9; Or Dewdney Creek North PIT #7004 (Off Coquihalla highway, Carolin Mines exit, between Hope and Coquihalla summit).



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