

NORTH AMERICAN LABORATORY

CENTER FOR COMPETENCE AND INNOVATION



“Innovation Creates our Future”

The Lapp Group’s Center for Competence and Innovation develops industry leading and innovative solutions for our customers. We validate designs of high-performance Industrial Cables, Connectors, and Cable Accessories through continuous testing in Lapp Laboratories.

UL completed assessment of this facility for the UL **Data Acceptance Program (DAP)** as a UL **Client Test Data Program (CTPD)** laboratory. This means the equipment and test methods have been certified to precisely meet the same requirements as at UL test facilities.



This facility is a key asset for Lapp’s development, testing, and validation of products. We also have the capacity to simulate specific customer applications and environments to confirm our products performance. We welcome Lapp customers to our lab and witness product testing first hand that is specific to their applications and requirements.

1. Mechanical

- Tensile & Elongation Test
- Direct Burial & Crush Test
- Exposed Run Impact Test

2. Environmental

- Air-oven Aging Test
- Oil Resistance Test

3. Low temperature

- Cold Impact Test
- Cold Bend Test

4. Electrical

- Insulation Resistance Test
- DC Resistance Bridge Test

5. Flexing

- Torsion Test
- Continuous Flex Test

6. Material Construction

- RoHS/WEEE Compliance Test
- Video Microscope Test

7. Flame

- VW1/FT1/FT2 Flame Test

MECHANICAL TESTING

TENSILE & ELONGATION

SCOPE

The quality of polymers used in Lapp product is essential to their performance. This machine determines mechanical properties of polymers. To evaluate physical and mechanical properties of Lapp wire and cable to insure that these products retain critical qualification values of tensile strength and elongation after being exposed to accelerated environmental conditions. These tests are performed to verify compliance with Lapp Mechanical Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

This equipment measures properties called “tensile strength” and “ultimate elongation”. “Tubular” or “dumbbell” samples are stretched on a motor-driven machine, while force and elongation are constantly measured. Un-Aged or Aged multiple samples that are tubular or have been die-cut to a specified length are placed within the clamping jaw mechanism of the extensometer. The lower and upper mechanical grips are securely tightened to prevent against any slipping or pull-out of the specimen. The sample is then subjected to being vertically pulled at a specified rate of speed in which the process is initiated and controlled remotely. The test has been completed once the specimen breaks. Test results are compared to standard requirements electronically to avoid potential error and ensure accuracy.

SAFETY AGENCY STANDARDS

UL1581

ASTM D-412

LAPP STANDARDS

MP-01 to MP-05



MECHANICAL TESTING

DIRECT BURIAL AND CRUSH TEST

SCOPE

While in service, Lapp cables can be inadvertently subjected to crushing forces. This equipment tests the ability of a cable to resist crushing. To evaluate physical and mechanical properties of Lapp cable to insure that these products retain critical qualification values of crush resistance through gradual and constant compression force. These tests are performed to verify compliance with Lapp Mechanical Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

The cable must resist force from a precisely-defined steel head crushing the cable at a specified rate. The minimum force must be sustained without electrical contact between conductors. Finished cable samples are marked at specified intervals along the jacket surface to identify compression points. For gradual compression crush testing both the jacket and insulation of each specimen is stripped and the conductors are connected in series. A current source is connected to the exposed series conductors. Audible and visual devices are used to identify any short circuit condition that occurs while under compression, this process is repeated several times. Direct burial specimens are exposed to a constant compression for a certain time interval at which no damage should occur to the cable insulation or jacket upon visual examination. Test results are compared to standard requirements electronically to avoid potential error and ensure accuracy.

SAFETY AGENCY STANDARDS

UL 1277

LAPP STANDARDS

MP-01 to MP-05



MECHANICAL TESTING

EXPOSED RUN IMPACT TEST

SCOPE

While in service, Lapp cables can be inadvertently subjected to impacts. This equipment tests the ability of a cable to withstand impact. To evaluate physical and mechanical properties of Lapp cable to ensure that these products retain critical qualification values of impact resistance when exposed to a free-fall force. These tests are performed to verify compliance with Lapp Mechanical Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Finished cable samples are marked at specified intervals along the jacket surface to identify impact points. For free-fall impact testing both the jacket and insulation of each specimen is stripped and the conductors are connected in parallel. A current source is connected to the exposed paralleled conductors. Visual devices are used to identify any short circuit condition that occurs while under impact, this process is repeated several times. The test is completed once all points along the specimen have been impacted with the specified weight without the occurrence of a short circuit condition. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy. The cable must resist impact from a precisely-defined steel weight that is dropped from a specified height onto the product. The impact must be sustained without electrical contact between conductors.

SAFETY AGENCY STANDARDS

UL 1277

LAPP STANDARDS

MP-01 to MP-05



ENVIRONMENTAL TESTING

AIR-OVEN AGING AND OIL RESISTANCE

SCOPE

Lapp cables are known for their ability to perform well in difficult environments. This equipment stresses polymers to assure they do not degrade during use in extreme environment. Common stresses applied to the cables include heat-aging and oil immersion. To evaluate physical and chemical properties of Lapp wire and cable to ensure that these products retain critical qualification values of tensile strength and elongation after being exposed to accelerated environmental conditions. These tests are performed to verify compliance with Lapp Oil Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Cable materials must retain a specified percentage of their original property values after exposure to extreme environmental conditions. Un-Aged multiple samples that are tubular or have been die-cut to a specified length are prepared and then placed within a mechanical air-convection oven. If specimens are to be chemically tested, they must be fully submerged. The oven temperature is elevated to the required level for the specified period of time. Upon aging completion the samples are removed and allowed to relax under an ambient environment for the appropriate time interval. The sample is then subjected to being vertically pulled at a specified rate of speed in which the process is initiated and controlled remotely. The test has been completed once the specimen breaks. Test results are compared to standard requirements electronically to avoid potential error and ensure accuracy.

SAFETY AGENCY STANDARDS

UL 62
UL 1581

LAPP STANDARDS

OR-01 to OR-06



LOW TEMPERATURE TESTING

COLD IMPACT TEST

SCOPE

Lapp offers cables that do not become brittle at low temperatures. This equipment tests the ability of a product to withstand impact at very low temperatures. To evaluate physical and mechanical properties of Lapp cable to ensure that these products retain critical low temperature qualification values of impact resistance when subjected to a free-fall force. These tests are performed to verify compliance with Lapp Mechanical Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Products are placed in a chamber typically at -25°C or -40°C for extended period of time. Immediately after removal from the cold chamber, the cable must resist impact from a precisely-defined steel weight that is dropped from a specified height onto the product sample. Impact must be sustained without damage to the cable jacket or conductor insulation. Several finished cable samples are cut to a specified length and then are straightened if any bends or curves are apparent. Specimens are then placed within the cold storage unit at a defined low temperature for certain period of time. Simultaneously, the support anvil of the impact tester is required to be exposed to the same low temperature conditions and duration of time. Upon completion of low temperature aging, samples are individually removed and placed on the support anvil. The specimens are then subjected to impact by a free falling weight from the required height. The test is completed once all the aged samples have been impacted and allowed to relax under an ambient environment for the appropriate time interval. Samples are then visually inspected for any occurrence of damage on the jacket or insulation. Test results are compared to standard requirements electronically to avoid potential error and ensure accuracy.

SAFETY AGENCY STANDARDS

UL 1581
UL 1277

LAPP STANDARDS

MP-01 to MP-05



LOW TEMPERATURE TESTING

COLD BEND TEST

SCOPE

Lapp offers cables that do not become brittle at low temperatures. This equipment tests the ability of a cable to resist damage when bent at very low temperatures. To evaluate physical and mechanical properties of Lapp wire and cable to ensure that these products retain critical low temperature qualification values of flexibility when subjected to bending. These tests are performed to verify compliance with Lapp Mechanical Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Immediately after removing from the cold chamber, the cable is bent around a mandrel of specified diameter at a specified rate. The cable must coil around the mandrel without damage to the cable jacket or conductor insulation. Several wire or cable samples are cut to a specified length and then are straightened if any bends or curves are apparent. Specimen are then placed within the mechanical cold chamber at a defined low temperature for a certain period of time. Simultaneously, the mandrel of the appropriate size is required to be exposed to the same low temperature conditions and duration of time. Upon completion of low temperature aging, samples are individually removed and bent around the circumference of the mandrel for specified number of windings. The test is completed once all the aged samples have been bent around the mandrel and then are allowed to relax under an ambient environment for the appropriate time interval. Samples are then visually inspected for any occurrence of damage on the jacket or insulation. Test results are compared to standard requirements electronically to avoid potential error and ensure accuracy.

SAFETY AGENCY STANDARDS

UL 444
UL 1581
UL 1277

LAPP STANDARDS

MP-01 to MP-05



ELECTRICAL TESTING

INSULATION RESISTANCE

SCOPE

Lapp cables provide excellent electrical insulation in extreme applications. This equipment measures the ability of an insulating material to resist voltage. To evaluate electrical properties of Lapp wire to insure that these products retain critical insulation resistance qualification values when subjected to wet high temperature conditions. These tests are performed to verify compliance with Lapp Insulation Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Insulation Resistance testing is used to validate materials, designs, manufacturing processes , and quality. It can also be used to assess a change in properties after environmental conditioning. Several wire samples are cut to a specified length, coiled and then are stripped at both ends to expose the conductor. Specimens are then placed in a circulating high temperature water bath with both test ends extending out of the water bath. A continuous voltage source is applied to each sample for specified period of time while submerged in the high temperature water bath. At set intervals measurements of insulation resistance are recorded for each sample. These values are then plotted graphically to define insulation resistance characteristics. Completion of the test is determined by the final value recorded. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.

SAFETY AGENCY STANDARDS

UL 83

UL 1581



ELECTRICAL TESTING

DC RESISTANCE BRIDGE

SCOPE

Electrical conductors in Lapp cables must be an efficient path for electrical current. This equipment tests the electrical resistance of conductors. To evaluate electrical properties of Lapp wire to insure that these products retain critical conductor resistance qualification values when subjected to high voltage conditions. These tests are performed to verify compliance with Lapp DC Resistance Conductor Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Specified sizes of conductors must have a maximum resistance over a specified length. The equipment precisely measures conductor resistance over a precise distance. Several wire samples are cut to a specified length and then are straightened if any bends or curves are apparent. Specimens are stripped at both ends and at certain intervals exposing the conductor along the sample length. A continuous voltage source is applied to each sample for a specified period of time after it has been clamped in the device. Upon completion of the voltage application cycle the temperature adjusted value for the DC resistance is obtained. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.

SAFETY AGENCY STANDARDS

UL 1581
UL 1277



FLEX TESTING

TORSION TEST

SCOPE

Lapp cables can be used in applications where they are subjected to constant movement. Poorly designed or improperly specified cables can experience failures when subjected to strenuous or repeated twisting. This equipment tests the ability of a cable to resist twisting. To evaluate twist motion properties of Lapp cable to insure that these products retain critical operating performance characteristics when subjected to severe torsion cycle conditions. These tests are performed to verify compliance with Lapp Motion Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Cable torsion requirements are normally set by specific applications. Cables on robots are often subjected to continuous, rapid and large twisting motions. Cables in wind turbines experience similar twisting motions, but the rates and angles are much lower, as are the number of twisting cycles required. Several cable samples are cut to a specified length, allowed to relax and then are straightened if any bends or curves are apparent. Specimens are stripped at both ends exposing the conductor and connected in series. A current source is connected to the exposed series conductors. Audible and visual devices are used to identify any short circuit condition that occurs while under torsion. Physical adjustments and connections are made for the test samples which regulates the astringent degree of twist. Completion of the test is determined by reaching the required number of torsion cycles or if either visual or audible failure is observed. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.

LAPP STANDARDS

T-01

TCF-01



FLEX TESTING

CONTINUOUS FLEX

SCOPE

Continuous flexing of cables is common in industrial applications and often test its durability. In the absence of industry-standard test equipment, Lapp designed its own machine to rigorously test cables under accelerated conditions of continuous flex linear motion. To evaluate continuous motion properties of Lapp cable to insure that these products retain critical operating performance characteristics when subjected to severe flexing cycle conditions experienced in power chain applications. These tests are performed to verify compliance with Lapp Motion Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

This custom equipment is capable of providing accelerated cable track motion for specified period of time at a fixed # cycles/minute, or # cycles/month. The machine has XXX tracks into which cable is installed. Several cable samples are cut to a specified length, allowed to relax and then are straightened if any bends or curves are apparent. Specimens are stripped at both ends exposing the conductor and connected in series. A current source is connected to the exposed series conductors. Audible and visual devices are used to identify any short circuit condition that occurs while under continuous flexing. Physical adjustments and connections are made for the test samples which regulates bend radius severity. Completion of the test is determined by reaching the required number of flex cycles or if either visual or audible failure is observed. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.

LAPP STANDARDS

CF-01 to CF-03



MATERIAL CONSTRUCTION

ROHS/ WEEE COMPLIANCE

SCOPE

Lapp assures its products meet environmental standards with the help of special equipment. To evaluate the potential hazardous substance content of Lapp products to insure compliance and also retain characteristics with regards to global initiatives and directives. These tests are performed to verify compliance with RoHS / WEEE and REACH directives, other Industry tests and Safety agency standards.

TECHNICAL DETAIL

Lapp products do not include lead or lead by products and complies with both RoHS and WEEE standards. The test equipment used verifies omissions of all materials which assures that Lapp products conform to global standards. Several samples are exposed to the detection sensors of the analyzing equipment for certain time duration. Once the analysis is complete, notifications of results is provided visually. Investigation and recording of several hazardous substances is done simultaneously based on any contents detected. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.



MATERIAL CONSTRUCTION

VIDEO MICROSCOPE

SCOPE

Lapp products have a high degree of dimensional precision and consistency. This equipment allow us to quickly inspect the dimensions of products. To evaluate physical and design properties of Lapp wire and cable to insure that these products retain critical dimensional tolerance values of material thickness and diameter. These tests are performed to verify compliance with Lapp Cable Design Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

Product dimensions are often regulated. This equipment allows us to quickly conform with industry compliance. Multiple tubular samples of insulation or jacket are stripped from the cable. There can be no longitudinal cuts with any sample lengths. Thin sliced specimens of cross sections are individually placed for measurement under the appropriate optical lens. Adjustments are made to insure accuracy of all thickness, diameter and roundness measurements. Upon the completion of measurement multiple precise values are provided to be evaluated. Test results are compared to standard requirements electronically to avoid potential error and insure accuracy.

SAFETY AGENCY TANDARDS

UL 1581



FLAME TESTING

VW1/FT1/FT2 FLAME TEST

SCOPE

Lapp cable insulations must be selected so they do not propagate flame in a given application. This equipment allows to perform flammability testing in cables. To evaluate flame resistance characteristics of Lapp wire and cable to insure that these products do not propagate flame or spread burning particles within the specified application. These tests are performed to verify compliance with Lapp Flame Resistance Cable Attributes, Industry tests and Safety agency standards.

TECHNICAL DETAIL

An external flame is applied to a cable in a draft-free chamber for 15 seconds. After the flame is removed, the cable must not emit fame or glowing particles. Multiple samples are cut to a specified length and then a Kraft paper flag is applied to each specimen. The samples are hung vertically in the support apparatus within the flame chamber. The test is performed in chamber which is completely sealed and free from any air drafts. An application of flame is directly applied to the sample in such a manner so that flame traverses upward towards the Kraft paper flag. After the specified flame application cycle, the flame is removed for certain duration. This cycle may be repeated several times. Failure occurs if the sample does not self-extinguish, or if falling burning particles ignite the chamber floor bedding, or if the Kraft paper flag has been burnt.

SAFETY AGENCY STANDARDS

UL 1581
UL-VW1
UL HORIZONTAL FLAME

LAPP STANDARD

FR-01 to FR-05



ÖLFLEX®

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