Table 29-1: UL mark on cables and wires and its significance with regard to intended usage

“(UL)” Listing being a method of type certification for cable and wire

Intended use of cable and wire with listing per UL or CSA standard mainly comprises wiring inside, or on buildings, as well as for special applications. Such cable or wire shall be used in line with valid installation standards. Apart from a few exceptions, only listed cable and wire is permitted for on-site field wiring of industrial machinery and energy generation systems, regularly. In order for stakeholders to identify listings by UL, the abbreviation “UL” is put in brackets on the surface of cable and wire: “(UL)”. As for package labels, “UL” can appear in brackets or within a closed circle. That being said, cable and wire can have multiple listings, or may be additionally AWM certified, too.

“RU” Recognition mark by UL for AWM certified cable and wire

UL recognized Appliance Wiring Material-Component (AWM) is a certification for cable and wire for all-encompassing factory wiring in AWM applications, but not for field wiring, regularly. AWM is subdivided into Styles. The Style of the outmost design layer will be crucial to the scope of intended AWM use types if cable or wire is installed as AWM. However, so-called multi-rated Styles specify multiple ratings of certain properties, simultaneously. The manufacturer’s data sheet for the cable or wire with multi-rated Style details the actual AWM rating. Depending upon the Style, cable and wire is operated as AWM inside chain track, within closed control panels, or on or inside industrial machinery. UL’s certification mark for AWM is “RU” with “R” being mirror-inverted. Regardless, marking of given AWM certification on the component hardware is not mandatory per UL 758. AWM cable or wire may have more than just one Style for the outmost design layer, and be permitted to be listed by NRTL (Nationally Recognized Testing Laboratory) in parallel.

Exemplary US standards on installation, panels, devices, machinery, appliances, etc.

- National Electrical Code (NEC) of the USA = NFPA 70 on building (structure) etc., regularly requires certain listings, instead of AWM, for instance cable or wire listings per NEC Article 392, such as TC-ER 600 V, PLTC-ER (etc.) for unprotected laying on open tray as well as between trays and other units up to 6 ft or 1.8 m in exposed run (-ER) for each exposed installation section where access is granted to qualified personnel only (Art. 336).
- NFPA 79: Industrial machinery decoupled from building structure, industrial chain track, rarely even for industrial platform (IP) parts decoupled from building structure upon on-site AHJ’s/CEO’s (Authority Having Jurisdiction/Code Enforcement Officer), or upstream NRTL’s (partly offering field inspection pre-evaluation on the factory end) sole decision in the context of field labeling assessment. Section 12.9.2 lists alternative provisions for usage of cable and wire as AWM. Section 4.4.2.8 determines cable selection for VFD/servo motor connection. Further important definitions for instance regarding: Universal marking of short-circuit current ratings, conductor sizing for motor connection per Chapter 12, core identification per Chapter 13, kill switches, separators, etc.
- UL 508A: Industrial control panels
- UL 6141/UL 6142: Wind turbines
- Additional US standards: UL 73 on motor operated-appliances, UL 2011 on factory automation equipment, UL 2200 on stationary engine generator assemblies, ANSI Z 535.4 on product safety signs and labels, UL 508C on safety power conversion equipment, UL 489 on molded case circuit breakers and enclosures, UL 1004 on electric motors, UL 248 on fuses, UL 775 on graphics arts equipment, NFPA 130 on trains, UL 1740 on industrial robots, UL 1077 on supplementary protectors in electrical equipment, UL RP 5770 on repeated flexing applications.

Fundamentally, the operation site may be subject to supplementary, local standardization, or ruleset. Not only in such case, but rather in general, the overall approval process for an industry project or prior to new appliance market launch may profit from the OEM initiated, early involvement of a certifier/NRTL for the purpose of appropriate selection of components and associated installation methods, time-wise and in terms of total costs for engineering, installation, and transport & tariffs. In North America, chosen cable and wire shall meet the requirements according to national, and local standards for installations, devices, appliances, etc. More often than not, a certain component type certification by third party is indispensable.

Canada

Canada has its own standards, such as the CEC. Various NRTL’s other than UL and CSA are notified for the UL and/or CSA standardized component type certification of companies under the NRTL’s own certification and testing mark, and that to individual degree, when it comes down to the NRTL individual number or scope of approvable component types covered by the notification. If CSA certifies according to UL standard for US use, the CSA mark will be seamlessly followed by the lower-case suffix “us”. In reverse, the lower-case prefix “c” is seamlessly added ahead of UL’s mark, where UL certifies according to CSA standard for use in Canada. Furthermore, a cable or wire might be parallely certified by more than just one NRTL, or might bring additional certification to European standards by accordingly notified certifier to the table.

Ampacity and conductor sizing

North-American standards, and codes on installation, panels, devices, machinery, appliances, etc. deal with AWG/kcmil scale of nominal conductor cross sections. As far as cable and wire products in Europe are concerned though, these mostly incorporate metric IEC conductors, as explained on proper technical data sheets. Except for a few possible cases, the next higher nominal, metric IEC conductor cross section (VDE 0812, IEC 60228/VDE 0295, etc.) directly exceeding the sized AWG/kcmil cross section will have to be chosen regularly if cable and wire with metric IEC conductor is supposed to be operated according to a North-American standard or code on installation, appliance, panel etc., and on the basis of an application specific, North-American component type certification. This is how the AWG/kcmil sized conductor ampacity must be secured, from a technical standpoint, despite contained IEC conductor. As a consequence, cable and wire certified to UL or CSA standard, but incorporating metric IEC conductor, normatively and technically only fulfils the next smaller (mostly even-numbered), nominal AWG/kcmil conductor cross section, regularly, apart from a few possible exemptions. For further information on transcoding between conductor scales, please have a look at technical appendix T16.

Table 29-2: overview of corresponding products in this catalogue – type “Listed”

LAPP cable type with UL listing	Listed type	Voltage in V	Temperature in °C	Compound	Compliant with NFPA 79, Edition 2018
Multi-Standard SC 2.1	MTW	600	90	PVC	✔
Multi-Standard SC 2.2	MTW	600	90	PVC	✔
ÖLFLEX® CONTROL TM, TM CY	MTW, TC-ER, WTTC, SUNRES, Subm.Pump	600, 1000	90	Thermopl. Polymer	✔
ÖLFLEX® TRAY II, TRAY II CY	MTW, TC-ER, WTTC, SUNRES, Subm.Pump	600, 1000	90	Thermopl. Polymer	✔
ÖLFLEX® POWER MULTI	TC-ER, STOOW, SUNRES	600	90, 105	Thermopl. Polymer	✔
ÖLFLEX® SERVO 7TCE, FD 7TCE	TC-ER, Flexible Motor Supply	600, 1000	90	Thermopl. Elastomer	✔
ÖLFLEX® VFD 2XL, 2XL with Signal	TC-ER, Flexible Motor Supply	600, 1000, 2000	90	Thermopl. Elastomer	✔
ÖLFLEX® CHAIN TM, TM CY	MTW, TC-ER, WTTC	600, 1000	90	Special compound	✔
UNITRONIC® 300, 300 S, 300 STP	CMG, PLTC, Open Wiring, Oil Res 1	300	105	PVC	✔
UNITRONIC® FD CP plus	CMX	250	75	PUR	✔
UNITRONIC® FD CP (TP) plus	CMX	250	75	PUR	✔
UNITRONIC® BUS IBS A	CMX	250	70	PVC	✔
UNITRONIC® BUS IBS P COMBI	CMX	250	75	PUR	✔
UNITRONIC® BUS IBS FD P	CMX	250	70	PUR	✔
UNITRONIC® BUS IBS FD P COMBI	CMX	450	70	PUR	✔
UNITRONIC® BUS IBS Yv	CMX	250	75	PVC	✔
UNITRONIC® BUS IBS Yv COMBI	CMX	250	75	PVC	✔
UNITRONIC® BUS LD	CMX	250	70	PVC	✔
UNITRONIC® BUS LD FD P	CMX	250	75	PUR	✔
UNITRONIC® BUS PB A	CMX	250	75	PVC	✔
UNITRONIC® BUS PB FC	CMG	100	60	PVC	✔
UNITRONIC® BUS PB 7-W FC	CMX	250	75	PVC	✔
UNITRONIC® BUS PB H FC	CMX	100	75	FRNC	✔
UNITRONIC® BUS PB P FC	CMX	100	75	PUR	✔
UNITRONIC® BUS PB FD P A	CMX	250	70	PUR	✔
UNITRONIC® BUS PB TORSION	CMX	300	75	PUR	✔
UNITRONIC® BUS PB FESTOON	CMG	600	75	PVC	✔
UNITRONIC® BUS PB FRNC FC	CM	250	60	PUR	✔
UNITRONIC® BUS PB FD FRNC FC	CM	250	60	PUR	✔
UNITRONIC® BUS PB TRAY	CMG/PLTC-ER	600	75	PVC	
UNITRONIC® BUS PA (BU)	CMX	100	75	PVC	✔
UNITRONIC® BUS PA (BK)	CMX	100	75	PVC	✔
UNITRONIC® BUS PA FC	CMG	100	75	PVC	✔
UNITRONIC® BUS FF 3 (YE)	CMG/PLTC	300	105	PVC	✔
UNITRONIC® BUS FF 3 ARM	CMG/PLTC	300	105	PVC	✔
UNITRONIC® BUS FF 2	CMG	300	105	PVC	✔
UNITRONIC® BUS CC	CM/PLTC	300	75	PVC	✔
UNITRONIC® BUS CAN	CMX	250	75	PVC	✔
UNITRONIC® BUS CAN FD P	CMX	250	70	PUR	✔
UNITRONIC® BUS CAN TRAY	CMG/PLTC-ER	600	75	PVC	
UNITRONIC® BUS ASI (PVC)	CMG	300	80	PVC	✔
UNITRONIC® BUS SAFETY	CMX	250	75	Compound	✔
UNITRONIC® BUS DN THICK FRNC	CMG	300	80	FPE FRNC	✔
UNITRONIC® BUS DN THIN FRNC	CMG	300	80	FPE FRNC	✔
UNITRONIC® BUS DN THICK Y	CMG	300	80	PVC	✔
UNITRONIC® BUS DN THIN Y	CMG	300	80	PVC	✔
UNITRONIC® BUS DN THICK FD P	CMX	300	80	PUR	✔
UNITRONIC® BUS DN THIN FD Y	CMG	300	80	PVC	✔
UNITRONIC® BUS DN THICK FD Y	CMG	300	80	PVC	✔
UNITRONIC® BUS DN THIN FD P	CMX	300	80	PUR	✔
ETHERLINE® PN Cat.5e Y	CMX	300	75	PVC	✔
ETHERLINE® Y FC Cat.5	CMG/PLTC	600	75	PVC	✔
ETHERLINE® PN Cat.5e YY	CMG	300	75	PVC	✔
ETHERLINE® PN Cat.5 Y Flex FC	CMG/PLTC	600	75	PVC	✔
ETHERLINE® FD P FC Cat.5e	CMX	300	75	PUR	✔
ETHERLINE® PN Cat.5e FRNC FLEX FC	CMG/PLTC	300	75	FRNC	✔
ETHERLINE® Y FLEX Cat.5e	CMG	300	75	PVC	✔
ETHERLINE® Y EC FLEX Cat.5e	CMX	300	75	PVC	✔
ETHERLINE® P EC FLEX Cat.5e	CMX	300	75	PUR	✔
ETHERLINE® P EC FD Cat.5e	CMG	300	75	PUR	✔
ETHERLINE® FESTOON PN Cat.5e	CMG	600	75	PVC	✔
ETHERLINE® PN Cat.6_A Y FLEX	CM	300	75	PVC	✔
ETHERLINE® PN Cat.6_A FRNC FLEX	CM	300	75	FRNC	✔
ETHERLINE® PN Cat.6_A FD Y	CM	300	75	PVC	✔
ETHERLINE® PN Cat.6_A FD P	CMX	300	75	PUR	✔
ETHERLINE® PN Cat.6_A TORSION Y	CM	300	75	PVC	✔
ETHERLINE® PN Cat.6_A TORSION P	CMX	300	75	PUR	✔
ETHERLINE® PN Cat.7 Y A	CMG	300	75	PVC	✔
ETHERLINE® PN Cat.7 Y FLEX A	CMG	300	75	PVC	✔
ETHERLINE® PN Cat.7 FRNC FLEX A	CM	300	75	FRNC	✔
ETHERLINE® FD P Cat.6	CMX	300	75	PUR	✔
ETHERLINE® TRAY ER PN Y FC	CMG/PLTC-ER	600	75	PVC	✔
ETHERLINE® MARINE FRNC FC	CMG/PLTC	600	75	FRNC	✔
ETHERLINE® TORSION Cat.7	CMX	300	75	PUR	✔
HITRONIC® PCF Duplex PN B PVC-PVC A	OFNG		75	PVC	✔

The table displays the state of available certifications at the time of catalogue printing. Please contact us regarding the current certification status of our products.

Table 29-3: overview of corresponding products in this catalogue – type AWM

LAPP cable type with AWM style	Style number	Voltage in V	Temperature in °C	Compound	Compliant with NFPA 79, Edition 2018
Multi-Standard SC 2.1	1015	600	105	PVC	✔
Multi-Standard SC 2.2	10269	1000	105	PVC	✔
Multi-Standard SC 1	1007, 1569	300	105	PVC	✔
ÖLFLEX® CLASSIC 110 H	21089	600	75	Special compound, halogen-free	✔
ÖLFLEX® CLASSIC 110 CH	21089	600	75	Special compound, halogen-free	✔
ÖLFLEX® CLASSIC 130 H	21217	600	75	Special compound, halogen-free	✔
ÖLFLEX® CLASSIC 135 CH	21217	600	75	Special compound, halogen-free	✔
ÖLFLEX® CLASSIC 130 H BK	21156	1000	75	Special compound, halogen-free	✔
ÖLFLEX® CLASSIC 135 CH BK	21156	1000	75	Special compound, halogen-free	✔
ÖLFLEX® 150	21098	600	90	PVC	✔
ÖLFLEX® 150 CY	21098	600	90	PVC	✔
ÖLFLEX® 191	21098	600	90	PVC	✔
ÖLFLEX® 191 CY	21098	600	90	PVC	✔
ÖLFLEX® CONTROL TM, TM CY	20886	1000	105	Thermopl. Polymer	✔
ÖLFLEX® TRAY II, TRAY II CY	20886	1000	105	Thermopl. Polymer	✔
ÖLFLEX® 409 P/409 CP	20234	1000	80	PUR	✔
ÖLFLEX® CHAIN TM, TM CY	20886	1000	105	Special compound	✔
ÖLFLEX® CHAIN 809	20886	1000	80	PVC	✔
ÖLFLEX® CHAIN 809 CY	20886	1000	80	PVC	✔
ÖLFLEX® CHAIN PN	20886	1000	90	PVC	✔
ÖLFLEX® FD 891	2587, 21098	600	90	PVC	✔
ÖLFLEX® FD 891 CY	2587, 21098	600	90	PVC	✔
ÖLFLEX® CHAIN 819 P, CP	21576	1000	80	PUR	✔
ÖLFLEX® FD 855 P, CP	21576	1000	80	PUR	✔
ÖLFLEX® FD 891 P	20234	600	80	PUR	✔
ÖLFLEX® CHAIN 896 P	20234	1000	80	PUR	✔
ÖLFLEX® CHAIN 809 SC, SC CY	10107	600	90	PVC	✔
ÖLFLEX® FD 90	10107	600	90	PVC	✔
ÖLFLEX® FD 90 CY	10107	600	90	PVC, DESINA-compliant	✔
ÖLFLEX® CHAIN 90 P, CP	11624	1000	80	PUR	✔
ÖLFLEX® TORSION FRNC	21288	1000	80	Special compound, halogen-free	✔
ÖLFLEX® HEAT 180 MS	4476, 3529	600	150	Silicone compound	✔
ÖLFLEX® HEAT 180 C MS	4476, 3529	600	150	Silicone compound	✔
ÖLFLEX® HEAT 180 SiF A	3644	1000	150	Silicone	✔
ÖLFLEX® PETRO C HFFR	10587, 20234	1000	80	PUR	✔
ÖLFLEX® ROBOT 998 P/998 DP	20724	300	80	PUR	✔
ÖLFLEX® ROBOT 991 P/991 DP	20940	600	80	PUR	✔
ÖLFLEX® ROBOT F1	20940	Up to 1.5 mm²: 600 From 2.5 mm²: 1000	80	PUR	✔
ÖLFLEX® SERVO 719	2570	1000	80	PVC	✔
ÖLFLEX® SERVO 719 CY	2570	1000	80	PVC	✔
ÖLFLEX® SERVO 728 CY	2464	300	80	PVC	✔
ÖLFLEX® SERVO 9YSLCY-JB	2570, 20886	1000	80	PVC	✔
ÖLFLEX® SERVO 7DSL	2570	1000/300	80	PVC	✔
ÖLFLEX® SERVO FD 796 P	20234	1000	80	PUR	✔
ÖLFLEX® SERVO FD 796 CP	20234	1000	80	PUR	✔
ÖLFLEX® SERVO FD 798 CP	20236	30	80	PUR	✔
ÖLFLEX® SERVO FD 7DSL	21223	1000/300	80	PUR	✔
ÖLFLEX® SERVO FD 7OCS	21223, 20233	1000/300	80	PUR	✔
ÖLFLEX® SERVO 3D 7DSL	21223	600	80	PUR	✔
SERVO cables acc. to INDRAMAT® standard INK	Power cables: 20234 Signalling cables: 20236	Power cables: 600/1000 Signalling cables: 300	80	PUR	✔
SERVO cables acc. to LENZE® standard	Resolver + encoder cable: 2464, 21165 Motor cable: 2570, 20940	Resolver + encoder cable: 300 Motor cable: 600	80	PUR	✔
SERVO cables acc. to SIEMENS® standard FX 8PLUS	Power cables: 21223 Signalling cables: 20236	Power cables: 1000 Signalling cables: 30	80	PUR	✔
UNITRONIC® 300, 300 S, 300 STP	2464	300	80	PVC	✔
UNITRONIC® LiYCY A	2464	300	80	Special PVC	✔
UNITRONIC® LiYCY(TP) A	2464	300	80	Special PVC	✔
UNITRONIC® LiYY A	2464	300	80	Special PVC	✔
UNITRONIC® FD Li2YCY (TP) A BE/BA	2570	1000	80	PVC	✔
UNITRONIC® FD P plus	21576	1000	80	PUR	✔
UNITRONIC® FD CP plus	21576	1000	80	PUR	✔
UNITRONIC® FD CP (TP) plus	21576	1000	80	PUR	✔
UNITRONIC® BUS CC FD P FRNC	20233	300	80	PUR	✔
UNITRONIC® BUS ASI (TPE)	2103	300	105	TPE	✔
UNITRONIC® BUS ASI FD FRNC	20549	300	80	PUR	✔
UNITRONIC® SENSOR FD	20549	300	80	PUR	✔
UNITRONIC® SENSOR master cable	21198	300	80	PUR	✔
ETHERLINE® Cat.5 FRNC HYBRID	21282	150	80	FRNC	✔
ETHERLINE® FESTOON PN Cat.5e	21694	600	60	PVC	✔
ETHERLINE® PN Cat.5 Y FLEX FC	21694	600	60	PVC	✔
ETHERLINE® TORSION Cat.5	21161	300	80	PUR	✔
ETHERLINE® FD P Cat.5e	21576	1000	80	PUR	✔
ETHERLINE® P Cat.5e	21576	1000	80	PUR	✔
ETHERLINE® P Cat.5e Flex	21576	1000	80	PUR	✔
ETHERLINE® FD BK Cat.5	21576	1000	80	PUR	✔
ETHERLINE® FD P Cat.6_A	21576	1000	80	PUR	✔
ETHERLINE® TORSION P Cat.6_A	21576	1000	80	PUR	✔
ETHERLINE® TORSION P Cat.7	21576	1000	80	PUR	✔
ETHERLINE® TRAY ER PN Y	20201	600	60	PVC	✔
ETHERLINE® Y FC Cat.5	21694	600	60	PVC	✔
ETHERLINE® Cat.7 FLEX	21576	1000	80	PUR	✔
ETHERLINE® PN Cat.7 Y A	21695	600	80	PVC	✔
ETHERLINE® PN Cat.7 FRNC A	21286	300	80	Special compound, halogen-free	✔
ETHERLINE® PN Cat.7 P A	21576	1000	80	PUR	✔
ETHERLINE® PN Cat.7 Y FLEX A	21695	600	80	PVC	✔

The table displays the state of available certifications at the time of catalogue printing. Please contact us regarding the current certification status of our products. The use is mentioned in the UL Style pages.