DLO Cable

2000V

SCOPE

This specification specifies the requirements for single-conductor thermoset-insulated wires and cables rated 2000V, for use at conductor temperatures up to 90°C in wet or dry locations in accordance with UL 44.
The construction consists of flexible stranded, uncoated copper conductors insulated with ethylene propylene rubber(EPR) insulation and jacketed with chlorinated polyethylene(CPE).

REFERENCE STANDARD

• UL 44 ('21)	Thermoset-insulated wires and cables
• UL 1581 ('23)	Reference standard for electrical wires, cables, and flexible cords
• ASTM B 33 ('20)	Tinned soft or annealed copper wire for electrical purposes
• ASTM B 172 ('24)	Rope-lay-stranded copper conductors having bunch-stranded member, for electrical conductors
• UL 2806	Heavy Duty Flexible Power Cable (HDFPC-DLO)

CONSTRUCTION

- ***Conductor***
  Each tin-coated conductor shall comply with the requirements of ASTM B 33.
  The length of lay of the outer layer of the rope-lay-stranded conductor shall not be less than 8 nor more than 16 times the outside diameter of the completed conductor. Rope-lay conductors with bunch-stranded shall be either unidirectional or reversed. All unidirectional lays and the outer layer of reversed lays shall be in the left-hand direction.
  The length of lay of the bunch-stranded and rope-stranded members shall be not more than 30 times the outside diameter of the member.
  The number of wires in the conductors shall be in accordance with table 3.
- ***Separator***
  A separator of suitable material, when present between the conductor and the insulation, shall be of contrasting color to the conductor color. The separator and the wire or cable components shall not have any deleterious effect on one another.
- ***Insulation***
  Conductor shall be insulated with ethylene propylene rubber(EPR). The insulation shall meet all the requirements of UL 44 and this specification. The insulation shall be applied directly over the separator.
  The physical properties of the insulation shall comply with UL 44 and this specification Table 1~2.
  The average and minimum insulation thickness shall comply with UL 44 and this specification Table 3.
- ***Jacket***
  A single-conductor wire shall have a jacket applied over the outer surface of the insulation. The temperature rating of the jacket shall be the same as that of the insulated conductor.
  • Black heavy duty thermoset CPE per UL 2806.

TEST

Test list	Applicable test standard
Detailed examination	UL 44 Edition : 16th Section : 4
Tensile strength and elongation	UL 1581 Edition : 4th Section : 470
Conductor resistance	UL 44 Edition : 16th Section : 5.2
Long-term insulation resistance in water	UL 44 Edition : 16th Section : 5.4
Capacitance and relative permittivity	UL 44 Edition : 16th Section : 5.6
Cold bend	UL 44 Edition : 16th Section : 5.11
Cold impact	UL 44 Edition : 16th Section : 5.11
Hot-creep elongation and hot-creep set	UL 44 Edition : 16th Section : 5.13
Horizontal specimen	UL 1581 Edition : 4th Section : 1100
Oil resistance	UL 44 Edition : 16th Section : 5.16
Gasoline and oil resistance	UL 44 Edition : 16th Section : 5.17
Durability of ink printing	UL 44 Edition : 16th Section : 5 .20
Dielectric Voltage-withstand in water	UL 44 Edition : 16th Section : 5.24
Insulation resistance in water at 15°C	UL 44 Edition : 16th Section : 5 .25

CHARACTERISTICS

- *Table 1 Physical properties of insulation and jacket*

Description			Unit	Requirements
EP(Insulation)				
Before aging	Tensile strength(min.)		MPa	4.8
	elongation(min.)		%	250
After air oven accelerated aging	Tensile strength	Min. percent of unaged value	%	75
	elongation		%	75
	Temperature		°C	121±1
	Time		d	7
CPE(Jacket)				
Before aging	Tensile strength(min.)		MPa	8.3
	elongation(min.)		%	200
After air oven accelerated aging	Tensile strength	min. percent of results obtained on unaged specimens	%	50
	elongation		%	50
	Temperature		°C	110±1
	Time		d	10
Oil immersion test	Tensile strength	Min. percent of results obtained on unaged specimen	%	60
	elongation		%	60
	Temperature		°C	121±1
	Time		h	18

- *Table 2 Test requirements*

Description	Requirements	Test conditions
Conductor resistance	see Table 3	20°C
Long-term insulation resistance in water	see Table 33 of UL 44	90°C
Relative permittivity	max. 6	90°C , for 24h
Capacitance	max. 10%	90°C , for 1d ~ 14d
	max. 4%	90°C , for 7d ~ 14d
Cold bend	no crack	-40°C , for 4h
Cold impact	no crack	
Hot-creep elongation	max. 50%	for 15min, 150±2°C
Hot-creep set	max. 5%	
Horizontal specimen	see Section 5.14.1 of UL 44	-
Durability of ink printing	see Section 5.20 of UL 44	-
Dielectric Voltage-withstand in water s	ee Table 44 of UL 44	for 1min
Insulation resistance in water	see Table 47 of UL 44	15°C

MARKING ON CABLE

The cable shall be marked with the following informations through out the length of cable.
The size shall be repeated at intervals that are not longer than a nominal 610mm(maximum 635mm).
All information other than size shall be repeated at intervals that are not longer than 1.02m.

1) UL file number and Company name : "UL# ApollonCable"
2) Conductor size : "500kcmil" or "3/0AWG"
3) Voltage marking : "2000V"
4) UL marking and cable type : "(UL) RHW-2"
5) c(UL) marking and cable type : "c(UL) RW90"
6) Low-temperature marking : "(-40C)"
7) Year of manufacture
8) Length of wire in meter

EX.) E543251 ApollonCable 500kcmil 2000V (UL) RHW-2 c (UL) RW90 (-40C) 2026 0000M

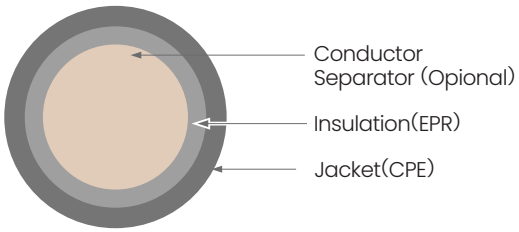
MARKING ON DRUM

On a flange of the drum, necessary information such as maximum voltage, manufacturer's name, year of manufacture, cable type, size, length of cable, drum no., gross weight, net weight, etc. shall be printed. An arrow shall be printed on the drum with suitable instructions to show the direction of rotation of the drum.

PACKING

The completed cable shall be placed on the wooden drum in such a manner that it will be protected from damages during transportation. The both ends of the complected cable shall be sealed by cap.

- *Construction*



Classification	Construction Detail
1. Conductor	Flexible stranded bare copper in accordance with ASTM B-3 and UL 62 Option : A Suitable Tape may be applied on the conductor
2. Insulation	EPDM Compound, UL 44
3. Jacket	CPE Compound UL 2806 .

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Conductor Size	Conductor Stranding	Nominal Conductor Diameter		Nominal Insulation Thickness		Nominal Jacket Thickness		Nominal Overall Diameter		Nominal Net Weight	Ampacity 30°C in Air
AWG	No./AWG	inches	mm	inches	mm	inches	mm	inches	mm	lbs/ft	
14	19/27	0.072	1.83	0.045	1.14	0.015	0.38	0.192	4.88	28	35
12	19/25	0.091	2.31	0.045	1.14	0.015	0.38	0.215	5.46	38	40
10	27/24	0.123	3.12	0.045	1.14	0.03	0.76	0.277	7.04	63	55
8	41/24	0.148	3.76	0.055	1.4	0.03	0.76	0.302	7.67	92	80
6	65/24	0.186	4.72	0.06	1.52	0.03	0.76	0.37	9.4	128	105
4	105/24	0.24	6.1	0.06	1.52	0.03	0.76	0.424	10.77	188	140
2	168/24	0.315	8	0.06	1.52	0.045	1.14	0.528	13.41	292	190
1	225/24	0.363	9.22	0.08	2.03	0.045	1.14	0.613	15.57	394	220
1/0	273/24	0.417	10.59	0.08	2.03	0.045	1.14	0.671	17.04	468	260
2/0	329/24	0.457	11.61	0.08	2.03	0.045	1.14	0.787	19.99	720	350
4/0	551/24	0.64	14.99	0.08	2.03	0.065	1.65	0.884	22.45	886	405
262.6	644/24	0.636	16.15	0.09	2.29	0.065	1.65	0.95	24.13	1032	471
313.1	772/24	0.72	17.78	0.09	2.29	0.065	1.65	1.015	25.78	1209	511
373.1	925/24	0.772	19.61	0.09	2.29	0.065	1.65	1.086	27.58	1422	590
444.4	1091/24	0.854	21.69	0.09	2.29	0.065	1.65	1.169	29.69	1652	656
535.3	1325/24	0.954	24.23	0.09	2.29	0.065	1.65	1.22	30.99	1953	741
646.4	1584/24	1.096	25.3	0.09	2.29	0.065	1.65	1.311	33.3	2312	815
777.4	1925/24	1.192	27.65	0.09	2.29	0.065	1.65	1.397	35.48	2778	905
929.2	2281/24	1.197	30.4	0.09	2.29	0.065	1.65	1.511	38.38	3246	1005
1111 MCM	2727/24	1.325	33.66	0.14	3.56	0.095	2.41	1.799	45.69	4077	1115