



## UL REQUIREMENTS FOR CABLE ASSEMBLIES

Making sure that a cable assembly is “UL approved” before using it in your product or installation is a common task. But what does that really mean in practical terms? What must the user do or be prepared to do?

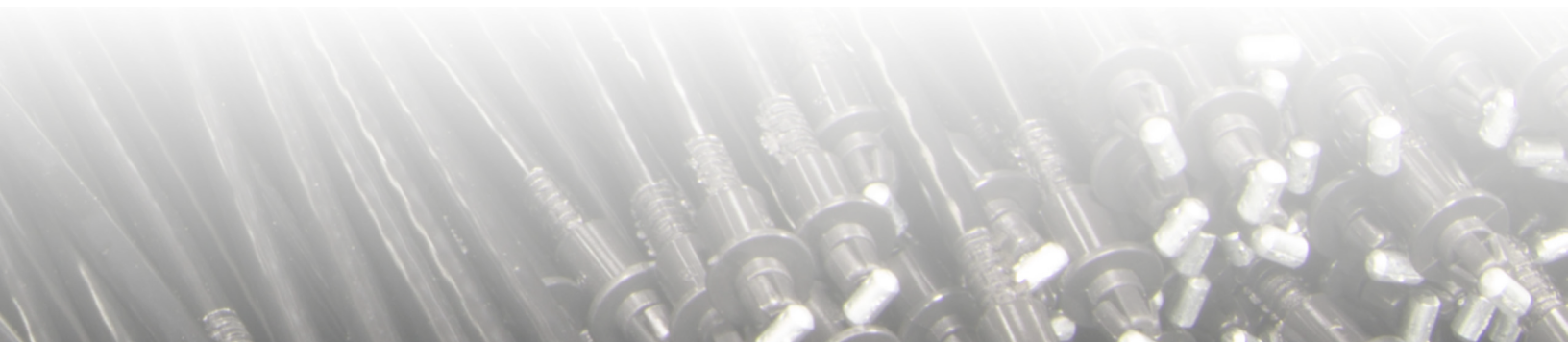
### Inside UL

UL investigates products for hazards capable of harming consumers. A big part of their investigation includes testing the product to verify its safety under normal and abnormal situations.

Potential products are examined and tested in a variety of ways and, if the product is successful, UL grants permission to sell it as a “UL Listed” or a “UL Recognized” product. If the successfully tested product is intended to be a component in other products (such as cables, cords, and wires), it is then publicly declared to be “UL recognized.”

Complete products that are not for use in other products (Such as a toaster, hairdryer, or TV) would be declared as “UL Listed.”

UL’s use of this subtle distinction is a reflection of the fact that they want to make sure that people don’t think that a complete product is automatically UL Listed if all of its components are UL Recognized, which is a common mistake.





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Even if a component product is rigorously tested and fully “recognized,” UL may still require additional testing of the component in the product of a user wishing to use it. This does make some sense because neither UL nor the component manufacturer is capable of predicting which products a component will be used in years ahead of time. The component manufacturer has the burden of seeking “UL recognition” for his component, but the user of that component also may need to seek UL’s acceptance of its use to obtain “UL Listed” status for his product.

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### What Does UL Test For?

If the item under investigation is a component such as a particular cable, for example, the kind of product that the component is expected to be used in needs to be established next.

To help with this, UL has created a large list organized by the end-uses of cables into “types,” which assigns a letter code to the kind of products involved. They provide charts with each letter code, followed by a description of the type and other pertinent data.





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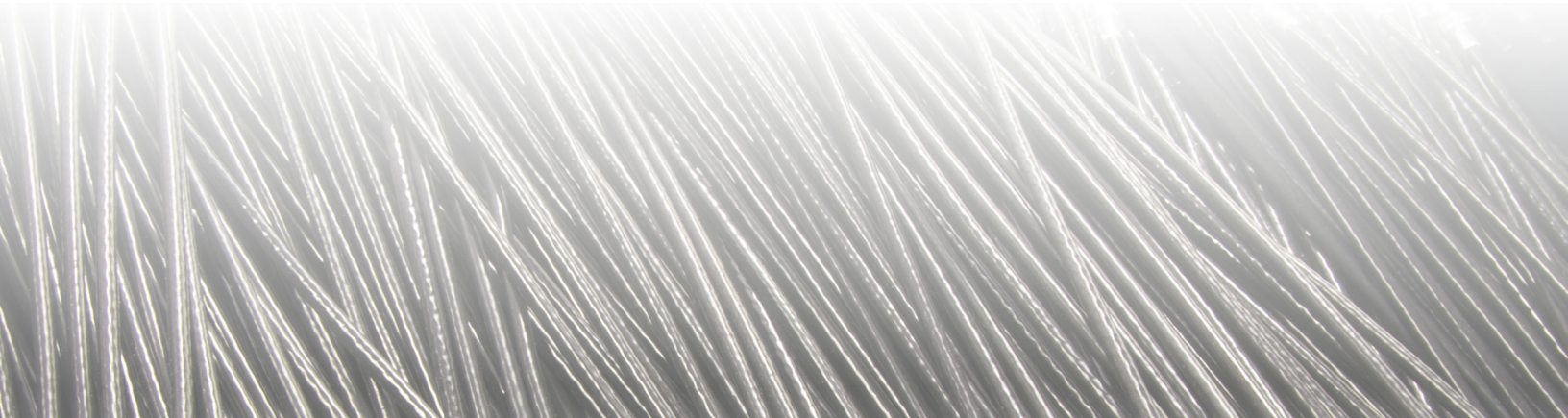
## Choosing Your Type Designation

Below (Table 1) is a small portion of an example table, which happens to group types by their descriptions (descriptions appear as headings in the table).

LOW VOLTAGE CABLES, FLEXIBLE CORD AND FIXTURE WIRE														
Low Voltage Cables	NEC <sup>1</sup>		UL Mark	Temperature	Temperature	Voltage	Outdoor	Sunlight	Cable	Oil	Gasoline	Direct	Submersible	
	Article	Code	Or Procsd	(°C) Dry	(°C) Wet	(V)	Use	Resistance	Trns Use	Resistance	Resistance	Burial	Pump Use	Other
<b>Communications Cable:</b>														
Types CM, CMG, CMR, CMP	800	DUEX	R	60(15)	-	(22)	(34)	-	Yes	-	-	-	-	(57, 60, 66, 75)
Types CMUC, CMX, CMX Outdoor	800	DUEX	R	60(15)	-	(22)	(34)	-	-	-	-	-	-	(57, 60, 66)
<b>Community Antenna Television Cable:</b>														
Types CATV, CATVP, CATVR	820	DVCS	R	60(15)	-	(22)	-	(35)	Yes	-	-	(50)	-	(60, 75)
Type CATVX	820	DVCS	R	60(15)	-	(22)	-	(35)	-	-	-	(50)	-	(60, 75)
<b>Optical Fiber Cable:</b>														
Types OFC, OFGS, OFCP, DFCR, OFH, OFNG, OFNR, OFNR	770	QAYK	R	-	-	(22)	-	(35)	Yes	-	-	-	-	(75)
<b>Power-Limited-Circuit Cable:</b>														
Types CL2, CL2R, CL2P, CL3, CL3R, CL3P	725	QPTZ	R	60(15)	(17)	(22)	-	(35)	Yes	-	-	(50)	-	(57, 60, 61, 75)
Types CL2X, CL3X	725	QPTZ	R	60(15)	(17)	(22)	-	(35)	-	-	-	(50)	-	(57, 60, 61)
PLTC	725	QPTZ	R	60(15)	(17)	(22)	-	Yes	Yes	(45)	-	(50)	-	(57, 59, 60, 61, 71)
<b>Power-Limited Fire Alarm Cable:</b>														
Types FFL, FFLR, FFLP	760	HNR	R	60(15)	(17)	(22)	-	(35)	-	-	-	(50)	-	(57, 60, 75)
<b>Network Powered Broadband Communications Cable:</b>														
Types BL, BLP, BLR, BM, BMR	830	PMP	R	60(15)	-	(22)	-	Yes	Yes	-	-	-	-	(57, 60, 75)
Type BLX	830	PMP	R	60(15)	-	(22)	-	Yes	-	-	-	-	-	(57, 60)
BLU, BMU	830	PMP	R	60(15)	-	(22)	-	(35)	-	-	-	Yes	-	(57, 60)

Table 1: Example of a Very Small Part of the UL "Type" Chart

<sup>1</sup>UL, "UL Wire and Cable Marking and Application Guide.Pdf" (Underwriters Laboratories, 2016).





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The cable, cord, or wire that you intend to use in your product should be chosen such that its type designation is in-line with your kind of product. For example, if your product is a public address system, a natural choice from Table 1 might be a type "CM" communication cable.

Once the most appropriate type is identified, UL can select the evaluations and tests that they will need to apply to your product when using that cable. The goal of the test program will be to challenge the combination of product and cable to a series of environmental exposures and actions that may affect, or may be affected by, the new component.

Once the UL investigation is completed, a report of the results is provided. This report then faces a review process conducted by other UL employees that were not involved in that particular investigation. If the review is completed successfully, a letter will be immediately sent out by UL that indicates formal approval to use the new UL recognized cable.

Sometime later, the entire report and additional documentation will be sent to you via postal mail and electronic means. The UL investigation process is now complete. However, UL's involvement with your product is never really over.

### UL's Follow-Up Services

Arguably the largest sub-division of the UL organization is known as "Follow-Up Services," which has the goal of checking on your product four times each year. This will naturally include a check on a new cable, cord, or wire that was added to a product.





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UL Follow-Up Services will send an inspector to your manufacturing facility or listed installation site to perform an inspection of your product. Part of that inspection will involve verifying that you are still using only the cable, cord, or wire that you had submitted for investigation and testing.

The UL inspector will expect to find that you have not changed your source for it and they may also check to make sure that you are still using it properly. In some ways, this is a much-shortened version of the same investigation.

If an unapproved change is found, your organization may receive a variation notice that will require you to work with UL to resolve the issue, which may involve investigation and testing related to the change. Rarely, you may be asked to pause production until the matter is resolved.

### Conclusion

The use of UL recognized components in your product adds a new layer of complexity, which can increase the level of confusion and frustration involved with your cable assembly.

The purpose of this article has been to describe this complex layer of the process and to offer explanations of the concepts behind each step with the hope that a little foreknowledge will help make the experience less confusing and less frustrating. As always, CMA is here to offer our expertise and take care of every step of the cable assembly design and manufacturing process to ensure your final product is successful. Contact us today for more information or to request a quote on your project.





CABLE MANUFACTURING & ASSEMBLY CO. INC.

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### Questions?

If you have questions or are interested in speaking with us about the proper conductive cables for your project, we are happy to help.

**Contact CMA today!**

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