

About Restrictions of Use within the Standards

The NEC (National Electrical Code) standard is provided by NFPA (National Fire Protection Association of the US), which deals with the laying of cables. (It is often referred to NFPA70).  
With the standard revision of 1987, different requirements were added for the cables crossing multiple spaces (rooms) depending on the wiring spot - ceiling, wall or floor.

1. About NFPA79

NFPA79 is an Electrical Standard for Industrial Machinery. In the case of industrial machinery, apart from the NEC standard (NFPA70), additional information is filled in.  
For the wires and flexible cords, the following NEC standard types are indicated.

(1) Wiring materials

① Wire (NFPA79)

The NEC standard Type Letter mentioned in NFPA79 is as follows:

NEC Type Letter	Cable standard	Rated voltage	Rated remperature
MTW	UL1063	600V	90°Cdry, 60°Cwet
THHN	UL83	600V	90°Cdry
THW	UL83	600V	75°Cdry, 75°Cwet
THWN	UL83	600V	75°Cdry, 75°Cwet
RHH	UL44	600V	90°Cdry
RHW	UL44	600V	75°Cdry, 75°Cwet
RHW-2	UL44	600V	90°Cdry, 90°Cwet
XHHW	UL44	600V	90°Cdry, 75°Cwet
XHHW-2	UL44	600V	90°Cdry, 90°Cwet

Our THHW is of NEC standard (NFPA70) Type Letter. The THW mentioned above in the NFPA79 is identical with the UL83 cable standard, and as it is a higher standard regarding the heat resistance grade (usually, THHW Dry90°C, THW Dry75°C), the THHW is of NEC standard Type Letter that can completely cover the THW in regard with cable standards.

② Flexible cords (NFPA79)

NEC flexible cords of the NEC standard can be used. At our company you can select standardly from STOW, STO, SE and other types

③ Other listed cables that are confirmed to be appropriate for use

④ UL758 that met certain required conditions AWM cable

(2) Wiring method

① by type (only insulated wires)

- Black: Electric (motive) power and control circuit
- Red: AC control circuit
- Blue: DC control circuit
- Yellow: A circuit that might be charging even if the main power supply is off (interlock circuit supplied by another power source)
- Yellow/Green (yellow stripes on green): Device's grounding conductor
- White or Natural grey: Grounding circuit conductor (neutral conductor AC)
- Blue/White (blue stripes on white): DC circuit's grounding

However, since there are exclusions, please refer to the NFPA79

② Conductor size

- Electric (motive) power circuit: 14 AWG and above
- Control circuit: 16 AWG and above
- Control circuit inside the control operator: 18 AWG and above
- IO control circuit of a PC (programmer pull controller): 24 AWG (multi-conductor cable: 30 AWG and above)
- Inside a PC's controlling enclosure: 26 AWG

However, as there are exceptions, please confirm the NFPA79 and the end-user upon installation of the wiring materials.

2. Limitations in use

There are limitations in use of the UL standards.

(1) AWM standard

In the AWM standard there are three types of products - ones that can be used only inside the electrical equipment (Internal Wiring), ones that are used for external connection (External Wiring), and ones that can be used for both purposes.  
When difficult to decide which type of cable to use upon installation, it is best to use cables applicable for both internal and external connection.Products conforming to the AWM standard, are not a Type Letter of the NEC standard, but are a part of the latest products part.

\*For internal machine wiring and device communication

(2) Flexible cords (Type STO SE, etc.)

Flexible cords are power supply cables. The flexible cords of type STOW, STO and SE are also of NEC standard's Type Letter, the usage according to NEC standard is "Extra Hard Usage".Type STO is also a type of NFPA79 (Industrial machinery)

\*For power supply (floor-face wiring)

(3)Tray cable (Type TC, TC-ER)

Tray cables are power supply/control cables used when installing cable trays or raceways. There is a NEC standard Type letter for this cable and it is one of the choices in the NEC standard cables' selection

\*For power supply and control (Vertical wiring or wiring including vertical direction wiring)

(4) THHW wire (Type THHW)

THHW wire is a general insulation cable for general wiring.  
It can be used in both dry environment (90°C) or wet environment (75°C).  
This wire too is NEC standard Type Letter and is one of the choices in the NEC standard cables' selection.  
\*For general wiring (Vertical wiring or wiring including vertical direction wiring)

(5) MTW

MTW is a cable for industrial machinery wiring. It can be used in both dry environment (90°C) or wet environment (60°C).  
It is NEC standard Type Letter as well as NFPA79 Type.  
\*For machine tool wiring

(6) CL2

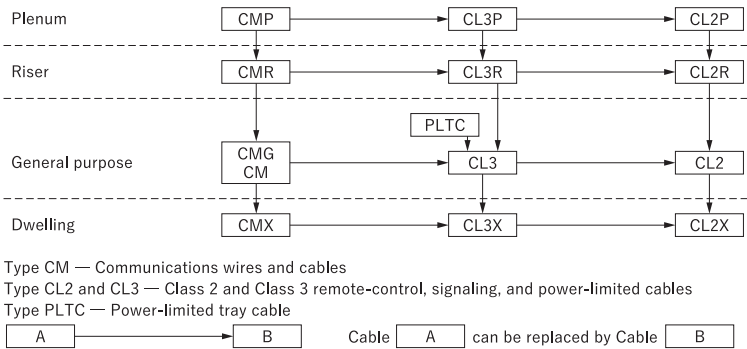
CL2 is a cable for signal/remote control. It is NEC standard Type Letter and and can be used in for Class 2 (up to 150V) remote control signal circuit or indoors cable-tray wiring.

(7) CL3X

CL3X is a cable for signal/remote control.  
It is NEC standard Type Letter and and can be used in for Class 3 (up to 300V) remote control signal circuit wiring.  
CL3X's combustion grade can be used in VW-1 environment wiring.

(8) CM, CMX

CM and CMX are telecommunication cables.  
They are NEC standard Type Letter and can be used as telecommunication cables.  
Within the NEC standard, they can be substituted with the cables included in the following table. CM can be replaced by CL3, CL2, CL3X or CL2X, the conbustion grade is vertical tray and it can be used in vertical tray environment wiring. CMX can be replaced by CL3X or CL2X, the combustion grade is VW-1 and it can be used in VW-1 environment wiring.



3. About tray cables

Tray cables are power and control cables that conform with the American UL1277 and can be used when cable trays and raceways are required for wiring installation by the NEC standard.  
In the US, this cable is necessary when, for exmaple semiconductor equipment is installed and connected in a cleanrooma and cable trays and raceways are used for the wiring between each floor.  
The cable that meets these needs is the tray cable.

This cable passes vertical fire retardancy tests  
For the combustion test method, see p. 203