

## **Bulletin 12-36-2**

### **Use of flexible cord and cord sets Rules 12-116, 12-402 and 12-020**

**Issued May 2022**

Supersedes Bulletin 12-36-1

#### **Scope**

- 1) Background
- 2) Permitted use of flexible cord and cord sets as a wiring method
- 3) Connection of approved equipment with integral flexible cord
- 4) Connectors, support and protection of flexible cord
  - a) Connectors approved for flexible cords
- 5) Flexible cord for show window or show cases
- 6) Wiring under raised floors for data processing and similar systems
- 7) Flexible cords and attachment plugs (cord caps) removal
- 8) Misapplication of cord sets
- 9) Termination of fine stranded conductors

#### **1) Background**

There has been significant debate with respect to where and when it is appropriate to use flexible cord and if the “Uses of flexible cord” listed in Rule 12-402 apply to approved electrical products.

Flexible cords are a versatile, robust wiring method which may be employed for many different types of wiring applications, provided that the flexible cord is:

- Approved as per Rule 2-024;
- suitable for the specific conditions of intended use;
- marked as listed in Table 11; and
- installed only where permitted by Rule 12-402.

When selecting a flexible cord for an electrical installation, selection shall be based on, but not limited to: moisture; corrosive action; temperature; degree of enclosure; exposure to mechanical injury as per Rule 12-402 1) and flame spread requirements as per Rule 2-130 (where applicable).

#### **2) Permitted use of flexible cord and cord sets as a wiring method**

Rule 12-402 2) provides direction for acceptable use of flexible cord.

Examples of where the Ontario Electrical Safety Code (OESC) permits the use of flexible cord to be hard-wired in a junction box are:

- Pendant drops to luminaires or other electrical equipment
- Vertical drops to fixed equipment
- Pendant pushbutton stations for cranes

- Wiring of cranes, hoists, passenger ropeways and passenger conveyors
- The connection of appliances such as ranges and clothes dryers
- The prevention of noise and vibration transmission, such as motors
- The connection of electrical components between which relative motion is required
- Electrical equipment for industrial use which must be capable of being moved from place to place
- Both connection and interconnection of data processing systems using an attachment plug, provided the cord is of the extra-hard-usage type.

The following answers are intended to address some frequently asked questions about the use of flexible cords.

**Question 1**

Does the OESC permit a flexible cord for connection of electrical equipment such as industrial machinery?

**Answer 1**

Yes.

**Rationale 1**

Rule 12-402 1) & 2) b) permit a flexible cord to be used, provided it is **intended for use**, as listed in Table 11, as per the examples above.

**Question 2**

Does the OESC permit an electrical device to be suspended and/or supported by a flexible cord?

**Answer 2**

Yes, provided the electrical device does not weigh more than 2.3 kg or the cord and device assembly are marked as capable of supporting a weight up to 11 kg, as permitted by Rule 12-402 3) c).

**3) Connection of approved equipment with integral flexible cord**

**Question 3**

Is the power cord assembly for an overhead projector installed on a drop mount, permitted to pass through an acoustic ceiling tile to a receptacle?

**Answer 3**

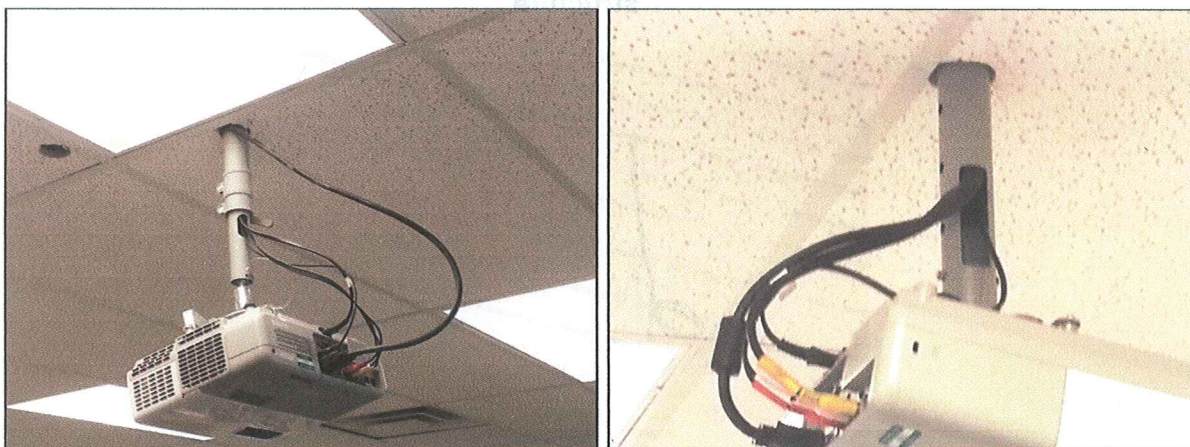
Yes, as long as the cord is secured away from sharp edges.

**Rationale 3**

The power cord assembly is part of the projector, which is an approved product. Passing the cord and plug through an acoustic ceiling tile or through a drop mount pipe is an acceptable practice and not considered part of field (building) wiring (Photo B1). The receptacle attached to the building structure must be accessible.



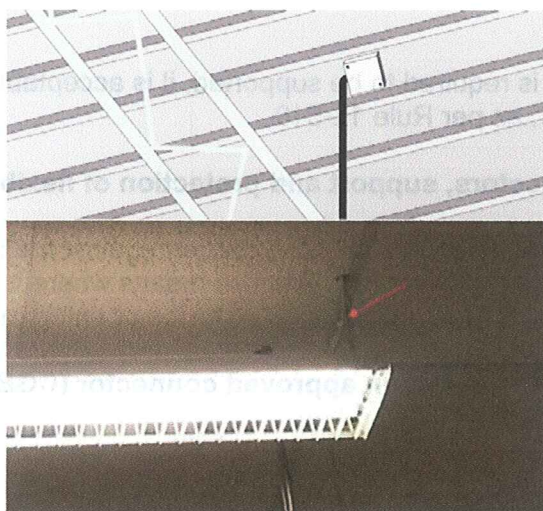
**Photo B1 – Power cord for an overhead projector**



**Question 4**

Is a flexible cord, that is part of a luminaire, permitted to run through a ceiling, as shown in Photo B2, for connection to a junction box?

**Photo B2 - Luminaire approved with flexible cord**



**Answer 4**

Yes, provided that the cord is secured away from sharp edges and the flexible cord is directly terminated into the junction box, without being attached to the building structure at any point of the run.

If the flexible cord is attached to the building structure, as per example in Photo B3, the installation is required to meet Rule 2-130 which refers to building code flame spread requirements (FT4 or FT6).

**Photo B3 – Flexible cord that is part of a luminaire and secured to the building structure**



**Rationale 4**

In Photo B2, the flexible cord is connected to a junction box and is not considered to be part of the building wiring. In Photo B3, the flexible cord is attached to the building structure, so it is considered part of the building wiring. Since flexible cords are typically found with flame spread rating of FT1 or FT2, which are not suitable to be attached to building structure, then building official approval is necessary to ensure safety of the installation.

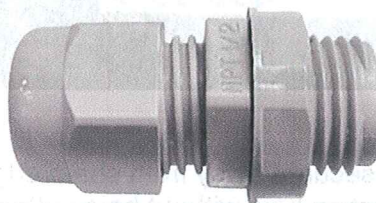
**Note:**

Where the flexible cord is required to be supported, it is acceptable to follow support requirements for NMSC, as per Rule 12-510.

**4) Connectors, support and protection of flexible cord**

Rule 12-402 4) states flexible cord shall be protected against mechanical damage by an approved connector (Photo B4) or other effective means where it enters or passes through the enclosure wall, the partitioning of a device or enters a lampholder.

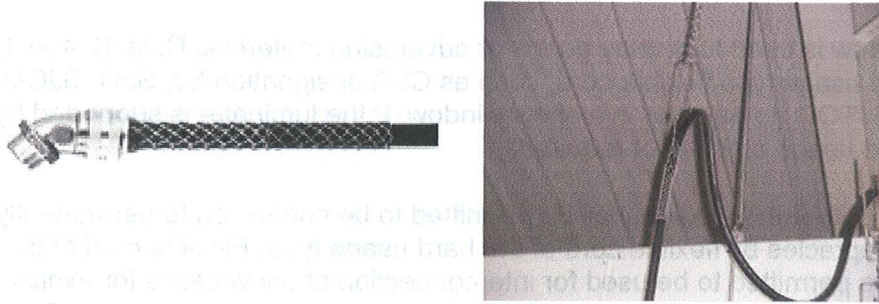
**Photo B4 – Example of an approved connector (CGB Connector)**



Flexible cord shall be secured to all electrical enclosures with acceptable box connectors, such as CGB type connectors, and strain relief connectors. It is important to note that strain relief shall be installed where the cord connection could be subjected to pulling stress (Photo B5).



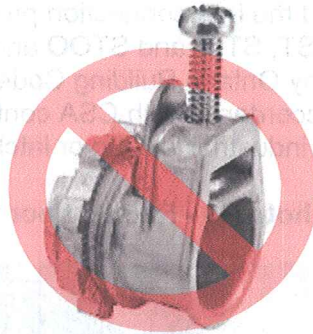
**Photo B5 - Strain relief connector**



**a) Connectors approved for flexible cords**

Selection of the proper approved connector is important when using flexible cords. “L” type connectors are not approved for use with flexible cords, see Photo B6.

**Photo B6 – “L” Type connectors are not approved for flexible cord**



CSA Standard C22.2 No 18.3 distinctively addresses the different testing requirements for nonmetallic sheathed cable (NMSC) connectors and flexible cord connectors. Some connectors are approved for both applications, see Photo B7.

**Photo B7 – An example of connector approved for NMSC & Flexible cord**



Structure wiring connection boxes shall be installed as close as practicable to the flexible cable drop and the flexible cable drop to the electrical equipment termination enclosure shall be kept as short as possible for the application.

### 5) Flexible cord for show window or show cases

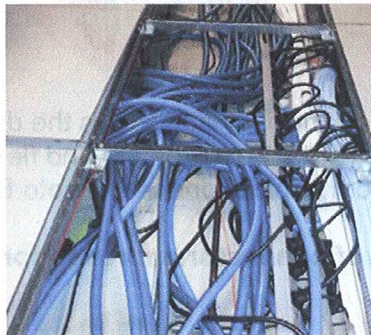
A show window is used to display goods or advertising materials. Rule 12-404 1) permits hard usage type flexible cord, such as CSA designation SJ, SJO, SJOO, SJT, SJTO and SJTOO, to be used in a show window. If the luminaire is supported by a chain, a hard usage cord is not required.

Show cases, other than fixed, shall be permitted to be connected to permanently installed receptacles by flexible cord of the hard usage type. Flexible cord of the hard usage type is permitted to be used for interconnection of show cases for exhibition purposes only and to supply power to portable lamps and other devices in show cases.

### 6) Wiring under raised floors for data processing and similar systems

Rule 12-020 1) permits flexible cord to be used for the connection and interconnection of data processing and similar systems under raised floors (Photo B8), and to pass through openings in the raised floor directly below the equipment for termination at the equipment with some conditions. The flexible cord can be used for both the connection using an attachment plug, and the interconnection provided the cord is of the extra hard usage type such as S, SOO, ST, STO, and STOO and has adequate flame spread markings of FT1 as required by Ontario Building Code (Article 3.1.5.21). The attachment plug shall be in accordance with CSA configurations for locking receptacles Diagram 2 or be classified as industrial locking or latching-type special-use.

**Photo B8 - Raised floor wiring**



### 7) Flexible cords and attachment plugs (cord caps) removal

Question 5: Is it permitted to replace a damaged cord cap (attachment plug) on a certified piece of utilization equipment?

Answer 5: Yes, ESA will permit this provided the replacement attachment plug is approved, equivalent in rating to the original, and the electrical equipment is not intended for resale.



Question 6: Is it permitted to remove the cord set or attachment plug from equipment that is fixed in place and hard wire it to the electrical system?

Answer 6: Yes.

**Note**

Where the cord cap for motorized equipment/appliances also serves as the disconnecting means, then a Code compliant type disconnecting means must be provided when the cord cap is removed and the equipment is hard wired.

**8) Misapplication of cord sets**

Rule 12-402 3) provides guidance where the uses of flexible cord and cord sets are not permitted. Flexible cord and cord sets shall not be used as a substitute for the fixed wiring of structures. Extension cords and power bars are examples of cord sets.

Cord sets shall not be:

- i) Permanently secured to any structural member;
- ii) Run through holes in walls, ceilings, or floors (Photo B9); or
- iii) Run through doorways, windows, or similar openings.

Fixed wiring of a structure is considered to be all permanently installed feeders, branch circuits and distribution equipment within a structure, except utilization equipment.

**Photo B9 - Cord set stapled to wall or floor**



**9) Termination of fine stranded conductors**

Termination of fine strands of flexible cords will require the use of specifically approved connectors as shown in Bulletin 12-31-\* to ensure the strands are confined to prevent stray strands to cause either short-circuits or grounds as per Rule 12-116. The use of set screw type lugs shall not be accepted.