

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Electric cables – Halogen-free, low smoke, thermoplastic insulated and sheathed cables of rated voltages up to and including 450/750 V –  
Part 3: Flexible cables (cords)

Câbles électriques – Câbles à isolation et gaine thermoplastique sans halogène à faible dégagement de fumée de tension assignée au plus égale à 450/750 V –  
Partie 3: Câbles souples (cordons)



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC CABLES –HALOGEN-FREE, LOW SMOKE, THERMOPLASTIC  
INSULATED AND SHEATHED CABLES OF RATED VOLTAGES  
UP TO AND INCLUDING 450/750 V –**

**Part 3: Flexible cables (cords)**

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FDIS	Report on voting
20/1552A/FDIS	20/1565/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This part of IEC 62821 should be read in conjunction with IEC 62821-1, which specifies general requirements.

A list of all parts in the IEC 62821 series, published under the general title, *Electric cables – Halogen-free, low smoke, thermoplastic insulated and sheathed cables of rated voltages up to and including 450/750 V*, can be found on the IEC website.

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# ELECTRIC CABLES –HALOGEN-FREE, LOW SMOKE, THERMOPLASTIC INSULATED AND SHEATHED CABLES OF RATED VOLTAGES UP TO AND INCLUDING 450/750 V –

## Part 3: Flexible cables (cords)

### 1 Scope

This part of IEC 62821 applies to flexible cables for connection to appliances, insulated and sheathed with halogen-free thermoplastic compound and having low emission of smoke and corrosive gases when exposed to fire.

NOTE For some types of flexible cables, the term "cord" is used.

Low emission of smoke is checked in accordance with IEC 61034-2. Low emission of corrosive gases is checked as part of the check for absence of halogens (see Annex B of IEC 62821-1:2015).

The cables are of rated voltages  $U_0/U$  up to and including 300/500 V.

Circular cables and flat cables are included.

The maximum conductor operating temperature for each of the cables in this standard is 70 °C.

[IEC 62821-3:2015](https://standards.iteh.ai/catalog/standards/sist/55ddb36-b34f-4173-a841-2045c729a2ef/iec-62821-3-2015)

IEC 62440 should be used as guidance on the safe use of cables in this standard.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60227-2, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 2: Test methods*

IEC 60228, *Conductors of insulated cables*

IEC 60332-1-2, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60811-401, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven*

IEC 60811-506, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 506: Mechanical tests – Impact test at low temperature for insulations and sheaths*

IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

IEC 62440, *Electrical cables with a rated voltage not exceeding 450/750 V – Guide to use*

IEC 62821-1:2015, *Electric cables – Halogen-free low smoke thermoplastic insulated and sheathed cables of rated voltage up to and including 450/750 V – Part 1: General requirements*

IEC 62821-2, *Electric cables – Halogen-free low smoke thermoplastic insulated and sheathed cables of rated voltage up to and including 450/750 V – Part 2: Test methods*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62821-1 apply.

### 4 General purpose cables

#### 4.1 Light duty, halogen-free, low smoke flexible cables

##### 4.1.1 Code designation

62821 IEC 101 for circular cable and 62821 IEC 101f for flat cable.

##### 4.1.2 Rated voltage

- 300/300 V

##### 4.1.3 Construction

###### 4.1.3.1 Conductor

The conductor shall comply with Class 5, according to IEC 60228.

###### 4.1.3.2 Sizes of cable

The sizes of cable shall be:

- a) circular cable: 0,5 mm<sup>2</sup> and 0,75 mm<sup>2</sup> – 2, 3 and 4 core;
- b) flat cable: 0,5 mm<sup>2</sup> and 0,75 mm<sup>2</sup> – 2 core only.

###### 4.1.3.3 Insulation

The insulation shall be thermoplastic compound of LSHF/D to IEC 62821-1.

###### 4.1.3.4 Assembly

The cores shall be assembled as follows:

- a) circular cable: the cores shall be twisted together;
- b) flat cable: the cores shall be laid parallel.

A halogen-free tape may be applied around the core assembly before application of the sheath.

###### 4.1.3.5 Sheath

The sheath shall be a thermoplastic compound of Type LSHF/ST1 to IEC 62821-1.

The sheath shall not adhere to the cores. The assembly of cores may be surrounded by a separator which shall not adhere to the cores.



For circular cables, the application of the sheath shall give the finished cable a practically circular shape.

#### 4.1.3.6 Marking

The circular cable shall be marked with the code 62821 IEC 101, and the flat cable shall be marked with the code 62821 IEC 101f.

The marking shall comply with Clause 5 of IEC 62821-1:2015.

#### 4.1.4 Requirements

Each cable shall comply with the appropriate requirements given in IEC 62821-1 and the particular requirements of this standard.

Testing shall be in accordance with Annex A, and the relevant tests indicated in Column 6 in Table A.1.

- a) The surface resistance of sheath shall comply with the minimum requirement of  $10^9 \Omega$ .
- b) The dimensions of the cables shall conform to Table B.1 for type 101 and 101f.
- c) The requirements to be met for the compatibility test shall be as given in Annex C.
- d) When tested in accordance with the method and procedure given in IEC 61034-2, all sizes of cable shall exceed 60 % light transmittance throughout the test.

### 4.2 Ordinary duty, halogen-free, low smoke flexible cables

#### 4.2.1 Code designation

62821 IEC 102 for circular cable and 62821 IEC 102f for flat cable.

#### 4.2.2 Rated voltage

- 300/500 V

#### 4.2.3 Construction

##### 4.2.3.1 Conductor

The conductor shall comply with Class 5, according to IEC 60228.

##### 4.2.3.2 Sizes of cable

The sizes of cable shall be:

- a) circular cable: 0,75 mm<sup>2</sup> to 4 mm<sup>2</sup> – 2, 3, 4 and 5 core
- b) flat cable: 0,75 mm<sup>2</sup> and 1,0 mm<sup>2</sup> – 2 core only.

##### 4.2.3.3 Insulation

The insulation shall be thermoplastic compound of Type LSHF/D to IEC 62821-1.

##### 4.2.3.4 Assembly

The cores shall be assembled as follows:

- a) circular cable: the cores, and the fillers if any, shall be twisted together.
- b) flat cable: the cores shall be laid parallel.

For cable having two cores, the space between the cores shall be filled either by separate halogen-free fillers or by the sheath filling the interstices.

For circular cables with 3, 4 or 5 cores, a central halogen-free filler may be used.

A halogen-free tape may be applied around the core assembly before application of the sheath.

#### 4.2.3.5 Sheath

The sheath shall be thermoplastic compound of LSHF/ST1 to IEC 62821-1.

The sheath shall not adhere to the cores. The assembly of cores may be surrounded by a separator which shall not adhere to the cores.

For circular cables, the application of the sheath shall give the finished cable a practically circular shape.

#### 4.2.3.6 Marking

The circular cable shall be marked with the code 62821 IEC 102, and the flat cable shall be marked with the code 62821 IEC 102f.

The marking shall comply with Clause 5 of IEC 62821-1:2015.

#### 4.2.4 Requirements

Each cable shall comply with the appropriate requirements given in IEC 62821-1, and the particular requirements of this standard.

Testing shall be in accordance with Annex A, and the relevant tests indicated in Column 7 in Table A.1.

- a) The surface resistance of the sheath shall comply the minimum requirement of  $10^9 \Omega$ .
- b) The dimensions of the cables shall conform to Table B.2 for Type 102 and 102f.
- c) The requirements to be met for the compatibility test shall be as given in Annex C.
- d) When tested in accordance with the method and procedure given in IEC 61034-2, a value of 60 % cable light transmittance is adopted as a minimum for all sizes of cable throughout the test.

## Annex A (normative)

### Tests for cables of type 62821 IEC 101, 101f, 102, 102f

**Table A.1 – List of tests related to cable types**

1	2	3	4	5	6	7
Ref No.	Tests <sup>a</sup>	Category of test	Test method described in		Applicability of test – Subclause	
			IEC standard	Clause/subclause	4.1	4.2
					62821 IEC 101 and IEC 101f	62821 IEC 102 and IEC 102f
<b>1</b>	<b>Electrical tests <sup>b</sup></b>					
1.1	Resistance of conductors	T, S	60227-2	2.1	X	X
1.2	Voltage test on completed cable at 2 000 V	T, S	60227-2	2.2	X	X
1.3	Voltage test on cores according to specified insulation thickness:	T, S	60227-2	2.3		
1.3.1	- at 1 500 V for insulation thickness up to and including 0,6 mm				X	X
1.3.2	- at 2 000 V for insulation thickness above 0,6 mm				–	X
1.4	Insulation resistance at 70 °C	T, S	60227-2	2.4	X	X
1.5	Long term resistance of insulation to d.c.	T	62821-2	5.1.1	X	X
1.6	Absence of faults in insulation	R	62821-2	5.1.2	X	X
1.7	Surface resistance of sheath	T	62821-2	5.1.3	X	X
<b>2</b>	<b>Constructional and dimensional tests</b>					
2.1	Checking of compliance with constructional provisions	T, S	62821-1		X	X
2.2	Measurement of thickness of insulation	T, S	60227-2	1.9	X	X
2.3	Measurement of thickness of sheath	T, S	60227-2	1.10	X	X
2.4	Measurement of overall dimensions					
2.4.1	Mean value	T, S	60227-2	1.10.2	X	X
2.4.2	Ovality	T, S	60227-2	1.11	X <sup>e</sup>	X <sup>e</sup>
<b>3</b>	<b>Insulation material tests</b>	T	62821-1 <sup>c</sup>	LSHF/D	X	X
<b>4</b>	<b>Sheath material tests</b>	T	62821-1 <sup>c</sup>	LSHF/ST1	X	X
<b>5</b>	<b>Compatibility test</b>	T	60811-401		X	X
<b>6</b>	<b>Impact test at –15 °C</b>	T	60811-506		X	X
<b>7</b>	<b>Mechanical strength of completed cable <sup>d</sup></b>					
	Flexing test followed, after immersion in water, by a voltage test at 2 000 V on cores	T	60227-2 62821-2	3 5.1.4	X X	X X
<b>8</b>	<b>Tests under fire conditions</b>					
8.1	Test on single vertical cable	T	60332-1-2	–	X	X
8.2	Smoke emission	T	61034-2	–	X	X

**Table A.1 – List of tests related to cable types (concluded)**

1	2	3	4	5	6	7
Ref No.	Tests <sup>a</sup>	Category of test	Test method described in		Applicability of test – Subclause	
			IEC standard	Clause/ subclause	4.1 62821 IEC 101 and IEC 101f	4.2 62821 IEC 102 and IEC 102f
9	<b>Assessment of halogens for all non-metallic materials</b>	T, S	62821-1	Annex B	X	X

<sup>a</sup> The order given does not imply a sequence of testing.

<sup>b</sup> Particular test conditions and requirements are given in Table 3 of IEC 62821-1:2015.

<sup>c</sup> This standard includes all the test methods and requirements for the material. Material to be tested is taken from the finished cable.

<sup>d</sup> Not applicable to cables having conductors greater than 2,5 mm<sup>2</sup>.

<sup>e</sup> Not applicable for flat cables.

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