



**Caledonian**

[www.caledonian-cables.co.uk](http://www.caledonian-cables.co.uk)

# Caledonian Submersible Pump Cables for Oil Industry

>> *IEEE 1018*

>> *IEEE 1019*

>> *API RP 11S5*

 **ADDISON**

[www.addison-cables.com](http://www.addison-cables.com)

# COMPANY PROFILE

Caledonian, established in 1978, offers one of the most complete lines of fiber and copper cabling system solutions with over hundreds of different cabling system products. Our superior products provide leading edge within every cable series and for every application.

Among the national and international standards with which our cables could comply are: BS - British Standard; LPCB Fire Performance Standard, ISO Standard etc. Caledonian Cables offers a comprehensive stock of cables and cabling products through its nationwide network of resellers and distributors. Caledonian Cables has continually expanded its global presence in Europe and Asia.

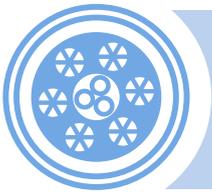
Caledonian & Addison, produces a wide range of cables for communication, power and electronics in its primary plants in UK, Italy and Spain. To stay in front, we continually keep expanding our manufacturing capabilities in more low cost region such as Romania, Taiwan, Malaysia etc. This low-cost manufacturing facilities enable us provide a flexible, scalable global system that delivers superior operational performance and optimal results for our customers.

Our extensive global network of manufacturing facilities gives us significant scale and the flexibility to fulfill our customer requirements. This global presence provides design and consultancy solutions that are combined with core cable manufacturing, logistic services, and vertically integrated with our E commerce technologies, to optimize customer operations by lowering costs and reducing time to market.

Caledonian & Addison has been respected for its high standards of quality, excellent service level, competitive pricing and a unique and innovative spirit. With our latest technologies, we are both inspired and well-positioned to meet the changing needs of our customers. We have the resources to diversify and to enhance our product lines and services. We understand the need for change and with our accurate planning, we are ready for the future and the promise of new marketing opportunities. Our tradition of growth through excellence is assured.

Our Design Centers work closely with customers to constantly improve its standard range of products and technologies and to develop customized, country and industry-specific solutions. Caledonian & Addison has established an extensive network of design, manufacturing, and logistics facilities in the world's major markets to serve the growing outsourcing needs of both multinational and regional customers.





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### Round Cables

## 176°F / 80°C PP/HDPE Round Electrical Submersible Pump Cable 3kV~5kV

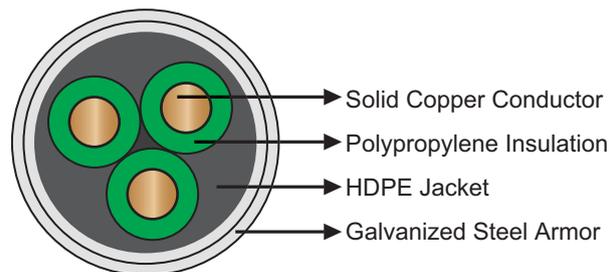
### » Applications

These cables are designed for pumping systems in oil wells to supply current to the submersible pumps in high and low temperature.

### » Standard

IEEE Std. 1019  
API RP 11S5  
API RP 11S6

### » Construction



#### **Conductor:**

Solid bare copper conductor with poly adhesive layer.

#### **Insulation:**

Polypropylene insulation

#### **Jacket:**

Integral HDPE jacket.

#### **Aarmor:**

Galvanized steel armor.



## Round Cables

### » Dimensions and Weight

#### 3kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.075	1.9	1.3	33.8	1.64	2.4
2	33.5	0.26	6.6	0.075	1.9	1.3	32.6	1.42	2.1
4	21.1	0.20	5.1	0.075	1.9	1.1	29.1	1.08	1.6
6	13.3	0.16	4.1	0.075	1.9	1.1	26.8	0.86	1.3

#### 4kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.08	2.1	1.4	34.6	1.68	2.5
2	33.5	0.26	6.6	0.08	2.1	1.3	33.5	1.46	2.2
4	21.1	0.20	5.1	0.08	2.1	1.2	30.0	1.12	1.6
6	13.3	0.16	4.1	0.08	2.1	1.1	27.7	0.90	1.3

#### 5kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.09	2.3	1.4	35.5	1.72	2.5
2	33.5	0.26	6.6	0.09	2.3	1.4	34.3	1.50	2.2
4	21.1	0.20	5.1	0.09	2.3	1.2	30.9	1.16	1.7
6	13.3	0.16	4.1	0.09	2.3	1.1	28.5	0.93	1.4

Other conductor size can be offered upon request.



### Round Cables

## 205°F /96°C PP/NBR Round Electrical Submersible Pump Cable 3kV~5kV

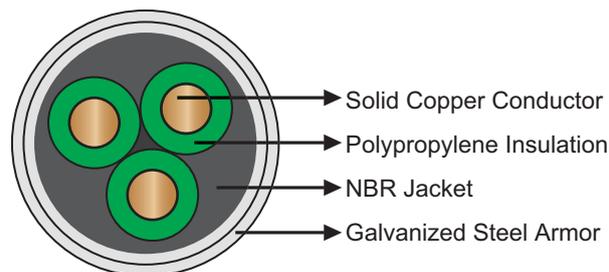
### » Applications

These cables are designed for pumping systems in oil wells to supply current to the submersible pumps in high and low temperature.

### » Standard

IEEE Std. 1019  
API RP 11S5  
API RP 11S6

### » Construction



#### **Conductor:**

Solid bare copper conductor with poly adhesive layer.

#### **Insulation:**

Polypropylene insulation

#### **Jacket:**

Integral NBR jacket.

#### **Aarmor:**

Galvanized steel armor.



## Round Cables

### » Dimensions and Weight

#### 3kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.075	1.9	1.3	33.8	1.73	2.6
2	33.5	0.26	6.6	0.075	1.9	1.3	32.6	1.50	2.3
4	21.1	0.20	5.1	0.075	1.9	1.1	29.1	1.16	1.7
6	13.3	0.16	4.1	0.075	1.9	1.1	26.8	0.92	1.4

#### 4kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.08	2.1	1.4	34.6	1.78	2.6
2	33.5	0.26	6.6	0.08	2.1	1.3	33.5	1.55	2.3
4	21.1	0.20	5.1	0.08	2.1	1.2	30.0	1.20	1.8
6	13.3	0.16	4.1	0.08	2.1	1.1	27.7	0.96	1.4

#### 5kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.09	2.3	1.4	35.5	1.83	2.7
2	33.5	0.26	6.6	0.09	2.3	1.4	34.3	1.59	2.4
4	21.1	0.20	5.1	0.09	2.3	1.2	30.9	1.24	1.8
6	13.3	0.16	4.1	0.09	2.3	1.1	28.5	1.00	1.5

Other conductor size can be offered upon request.



### Flat Cables

## 176°F/80°C PP/HDPE Flat Electrical Submersible Pump Cable

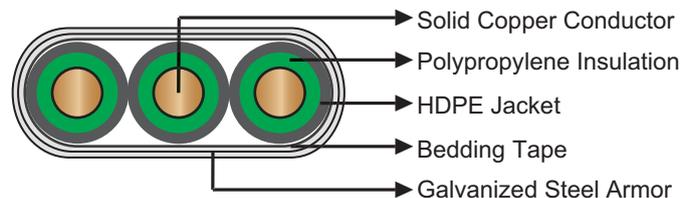
### » Applications

These cables are designed for pumping systems in oil wells to supply current to the submersible pumps in high and low temperature.

### » Standard

IEEE Std. 1019  
API RP 11S5  
API RP 11S6

### » Construction



#### **Conductor:**

Solid bare copper conductor with poly adhesive layer.

#### **Insulation:**

Polypropylene insulation

#### **Jacket:**

HDPE jacket.

#### **Tape:**

Helicoidally applied bedding tape.

#### **Armor:**

Galvanized steel armor.



## Flat Cables

### » Dimensions and Weight

#### 3kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.075	1.9	1.9 x 0.7	48.9 x 17.7	1.56	2.4
2	33.5	0.26	6.6	0.075	1.9	1.8 x 0.7	46.5 x 16.9	1.36	2.1
4	21.1	0.20	5.1	0.075	1.9	1.7 x 0.6	42.4 x 15.5	1.06	1.6
6	13.3	0.16	4.1	0.075	1.9	1.5 x 0.6	39.2 x 14.4	0.85	1.3

#### 4kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.08	2.1	2.0 x 0.7	50.1 x 18.1	1.59	2.4
2	33.5	0.26	6.6	0.08	2.1	1.9 x 0.7	47.7 x 17.3	1.39	2.1
4	21.1	0.20	5.1	0.08	2.1	1.7 x 0.6	43.6 x 15.9	1.09	1.7
6	13.3	0.16	4.1	0.08	2.1	1.6 x 0.6	40.4 x 14.8	0.88	1.4

#### 5kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.09	2.3	2.0 x 0.7	51.3 x 18.5	1.62	2.5
2	33.5	0.26	6.6	0.09	2.3	1.9 x 0.7	48.9 x 17.7	1.42	2.2
4	21.1	0.20	5.1	0.09	2.3	1.8 x 0.6	44.8 x 16.3	1.12	1.7
6	13.3	0.16	4.1	0.09	2.3	1.6 x 0.6	41.6 x 15.2	0.91	1.4

Other conductor size can be offered upon request.



### Flat Cables

#### 205°F /96°C PP/NBR Flat Electrical

#### Submersible Pump Cable 3kV~5kV

##### » Applications

These cables are designed for pumping systems in oil wells to supply current to the submersible pumps in high and low temperature.

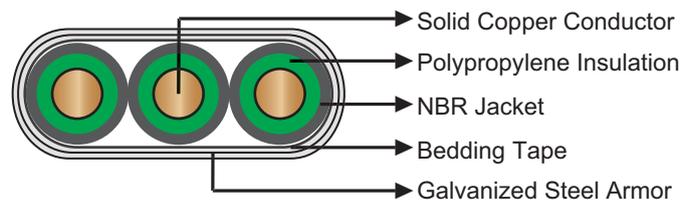
##### » Standard

IEEE Std. 1019

API RP 11S5

API RP 11S6

##### » Construction



##### **Conductor:**

Solid bare copper conductor with poly adhesive layer.

##### **Insulation:**

Polypropylene insulation

##### **Jacket:**

NBR jacket.

##### **Tape:**

Helicoidally applied bedding tape.

##### **Armor:**

Galvanized steel armor.



## Flat Cables

### » Dimensions and Weight

#### 3kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.075	1.9	1.9 x 0.7	48.9 x 17.7	1.60	2.4
2	33.5	0.26	6.6	0.075	1.9	1.8 x 0.7	46.5 x 16.9	1.41	2.1
4	21.1	0.20	5.1	0.075	1.9	1.7 x 0.6	42.4 x 15.5	1.09	1.6
6	13.3	0.16	4.1	0.075	1.9	1.5 x 0.6	39.2 x 14.4	0.89	1.3

#### 4kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.08	2.1	2.0 x 0.7	50.1 x 18.1	1.64	2.6
2	33.5	0.26	6.6	0.08	2.1	1.9 x 0.7	47.7 x 17.3	1.45	2.3
4	21.1	0.20	5.1	0.08	2.1	1.7 x 0.6	43.6 x 15.9	1.12	1.8
6	13.3	0.16	4.1	0.08	2.1	1.6 x 0.6	40.4 x 14.8	0.92	1.5

#### 5kV

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.09	2.3	2.0 x 0.7	51.3 x 18.5	1.67	2.6
2	33.5	0.26	6.6	0.09	2.3	1.9 x 0.7	48.9 x 17.7	1.48	2.3
4	21.1	0.20	5.1	0.09	2.3	1.8 x 0.6	44.8 x 16.3	1.16	1.8
6	13.3	0.16	4.1	0.09	2.3	1.6 x 0.6	41.6 x 15.2	0.95	1.5

Other conductor size can be offered upon request.



### Flat Cables

## 250°F / 121°C PP/LEAD Flat Electrical Submersible Pump Cable 5kV

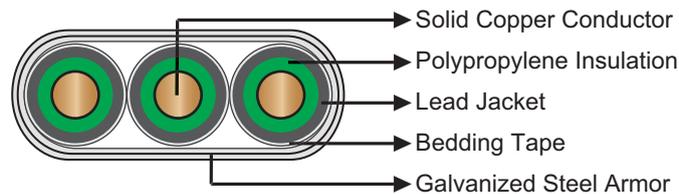
#### » Application

These cables are designed for transmitting power to the submersible motor in the oil industry, suitable for installed down well in the oil industry.

#### » Standard

IEEE Std. 1019  
API RP 11S5  
API RP 11S6

#### » Construction



#### **Conductor:**

Solid bare copper conductor.

#### **Insulation:**

Polypropylene insulation with a metal deactivator and a poly adhesive layer to the conductor.

#### **Jacket:**

Lead jacket.

#### **Tape:**

Longitudinally applied, rubber backed, fabric bedding tap.

#### **Armor:**

Galvanized steel tape.



## Flat Cables

### » Dimensions and Weight

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.3	0.09	2.3	1.85 x 0.70	47.0 x 17.8	2.4	3.6
2	33.6	0.26	6.6	0.09	2.3	1.76 x 0.67	44.7 x 17.0	2.1	3.1
4	21.1	0.20	5.2	0.09	2.3	1.60 x 0.62	40.6 x 15.7	1.7	2.5

Other conductor size can be offered upon request.



## Flat Cables

### 250°F / 121°C EPDM/NBR Flat Electrical Submersible Pump Cable 5kV

#### » Application

These cables are designed for transmitting power to the submersible motor in the oil industry, suitable for installed down well in the oil industry.

#### » Standard

IEEE Std. 1018  
API RP 11S5  
API RP 11S6

#### » Construction

**Conductor:** Stranded bare copper (7/3.503) with water & gas blocking compound adhesive in the outer layer.

**Insulation:** EPDM insulation.

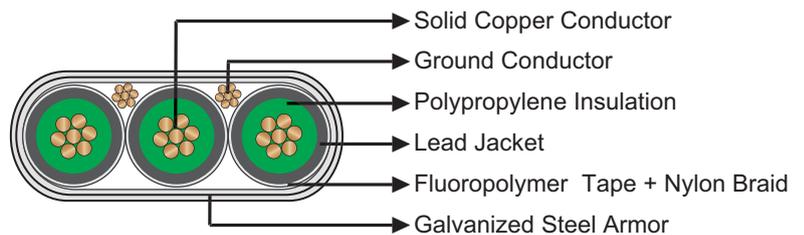
**Jacket:** NBR jacket.

**Tape:** Fluoropolymer tape.

**Braid:** Nylon braid.

**Ground Conductor:** Stranded bare copper (7/1.4mm), 2x7AWG (4AWG).

**Armor:** Interlocked galvanized steel.



#### » Dimensions and Weight

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
2/0	67.4	0.41	10.47	0.09	2.3	2.40x0.85	61.0 x 21.7	2.7	4.1

Other conductor size can be offered upon request.



## Flat Cables

### 450°F / 232°C EPDM/LEAD Flat Electrical Submersible Pump Cable 5kV

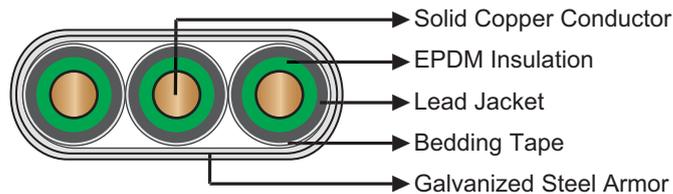
#### » Application

These cables are designed for transmitting power to the submersible motor in the oil industry, suitable for installed down well in the oil industry.

#### » Standard

IEEE Std. 1018  
API RP 11S5  
API RP 11S6

#### » Construction



**Conductor:** Solid bare copper conductor.

**Insulation:** EPDM insulation with a poly adhesive layer to the conductor.

**Jacket:** Lead jacket.

**Tape:** Longitudinally applied, rubber backed, fabric bedding tap.

**Armor:** Galvanized steel tape.

#### » Dimensions and Weight

Conductor Size		Conductor O.D.		Insulation Thickness		Overall O.D.		Weight	
AWG	mm <sup>2</sup>	inches	mm	Inches	mm	Inches	mm	lbs/ft	kg/m
1	42.4	0.29	7.4	0.08	2.0	1.73 x 0.67	43.9 x 17.0	2.1	3.1
2	33.6	0.26	6.6	0.08	2.0	1.63 x 0.64	45.5 x 16.5	1.9	2.8
4	21.1	0.20	5.2	0.08	2.0	1.47 x 0.59	41.3 x 15.1	1.5	2.2

Other conductor size can be offered upon request.



# Technical Information

## Material Options

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### » Conductor (tinned or untinned)

- AWG / Solid conductor
- AWG / Stranded (round) conductor
- Compacted strand conductor

### » Insulation

- Polypropylene
- Ethylene propylene diene (EPDM)

### » Barrier (optional)

- Extruded fluoropolymers
- Wrapped tapes
- Tape and woven braid

### » Jacket

- High density polyethylene (HDPE)
- Ethylene propylene diene (EPDM)
- Nitrile
- Polypropylene

### » Armor

- Galvanized steel (one or two layers)
- Heavy galvanized steel
- Stainless steel
- Double galvanized steel (two layers)



## Technical Information

### Conductor Characteristics

Conductor Size	Conductor Area		Nominal Diameter of Conductor (mm)		Conductor Resistance (ohms/km @ 25 °C)	
	mm <sup>2</sup>	Solid	Stranded 7 wire	Compact 7 wire	Plain Copper	Tinned Copper
6 AWG	13.3	4.11	—	—	1.32	1.36
4 AWG	21.1	5.19	—	—	0.830	0.856
4 AWG	21.1	—	5.89	5.41	0.846	0.882
2 AWG	33.6	6.54	—	—	0.522	0.538
2 AWG	33.6	—	7.42	6.81	0.531	0.554
1 AWG	42.4	7.35	—	—	0.413	0.426
1 AWG	42.4	—	8.33	7.57	0.423	0.440
2/0 AWG	67.4	—	10.80	—	0.266	0.276



## Technical Information

### Material properties

#### Polypropylene properties

<b>Physical requirements—unaged</b>	
Tensile strength, minimum, MPa	20.7 (3000 psi)
Elongation at rupture, minimum, percent	250
<b>Physical requirements—aged in air</b>	
<b>Oven at 121 °C (250 °F) for 1 week</b>	
Tensile strength, minimum, percent of unaged value	75
Elongation at rupture, minimum, percent retention	75

#### Ethylene-propylene properties

<b>Physical requirements—unaged</b>	
Tensile strength, minimum, MPa	6.2 (900 psi)
Elongation at rupture, minimum, percent	100
<b>Physical requirements—aged in air</b>	
<b>Oven at 121 °C (250 °F) for 1 week</b>	
Tensile strength, minimum, percent of unaged value	70
Elongation at rupture, minimum, percent retention	70

#### Nitrile properties

<b>Physical requirements—unaged</b>	
Tensile strength, minimum, MPa	12.4 (1800 psi)
Elongation at rupture, minimum, percent	300
<b>Physical requirements—aged in air</b>	
<b>Oven at 100 °C (212 °F) for 1 week</b>	
Tensile strength, minimum, percent of unaged value	50
Elongation at rupture, minimum, percent retention	50
<b>Physical requirements—aged in ASTM</b>	
<b>IRM 9002 oil at 121 °C (250 °F) for 18 hours</b>	
Tensile strength, minimum, percent of unaged value	60
Elongation at rupture, minimum, percent retention	60



## Technical Information

### EPDM properties

<b>Physical requirements—unaged</b>	
Tensile strength, minimum, MPa	6.9 (1000 psi)
Elongation at rupture, minimum, percent	125
<b>Physical requirements—aged in air</b>	
<b>Oven at 121 °C (250 °F) for 1 week</b>	
Tensile strength, minimum, percent of unaged value	75
Elongation at rupture, minimum, percent retention	75
<b>Physical requirements—aged in ASTM</b>	
<b>IRM 9002 oil at 121 °C (250 °F) for 18 hours</b>	
Tensile strength, minimum, percent of unaged value	60
Elongation at rupture, minimum, percent retention	60

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