

KBE Elektrotechnik GmbH

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KBE Solar



→ **Fast**

→ **Flexible**

→ **Individual Solutions**

→ **Cost-Optimized**



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WHO WE ARE:

KBE Elektrotechnik GmbH is specialised in manufacturing electrical cables for the photovoltaic industry, automotive industry and electrical household appliances.

KBE Elektrotechnik GmbH does not assemble wires but supplies downstream-users and processing industries like wire harness manufacturers, producers of modules, tier 1 suppliers to automotive industry and distributors of photovoltaic systems.

KBE Elektrotechnik GmbH is certified in accordance with ISO/TS 16949. We mainly focus on continuous innovation of products and processes and work close on the customer. We are able to react quickly and flexibly, and we offer a wide range of products and services.

KBE Elektrotechnik GmbH produces over 1,5 Mio km wires p.a. and uses about 20.000 t copper. KBE employs 250 people in total in Berlin / Germany, and Sousse / Tunisia.

WHAT WE OFFER:

KBE Solarcables provide for fast and cost-saving power transmission in PV-systems.

KBE Solarcables are certified in accordance with TÜV 2 PFG 1169/08.2007. Due to specially cross-linked insulations our solarcables exceed technical requirements in terms of product life and product reliability.

KBE Solarcables are available in various outer diameters and therefore are compatible with all standard plugs / plug connectors and connection boxes. Our short delivery periods are outstanding. Divers package sizes meet customer specific requests.

KBE Solarcables are manufactured within an optimised production process using modern manufacturing technologies. Due to our long experience in copper business we are able to offer cost-efficient solutions.



Technical Data Sheet - KBE Solar PV1-F

18.11.2011

Conductor	<ul style="list-style-type: none"> E-Cu tinned acc. IEC 60228 Class 5
Insulation core	<ul style="list-style-type: none"> Crosslinked special Polyolefin 36 Shore D Halogen free Weather- and UV-resistant Ozon resistant
Sheath material	<ul style="list-style-type: none"> Crosslinked special Polyolefin 36 Shore D Halogen free Weather- and UV-resistant Ozon resistant
Temperature range	<ul style="list-style-type: none"> - 40°C to +126°C based on EN 60216-1
Voltage rating	<ul style="list-style-type: none"> $U_0/U = 600/1000 V_{AC}$ max 1800V_{DC} (conductor-conductor, not earthed system, unloaded circuit)
Flame resistance	<ul style="list-style-type: none"> Acc. to DIN EN 60332-1-2
Colours	<ul style="list-style-type: none"> Black, red, blue
Directives / Certificates	<ul style="list-style-type: none"> TÜV 2 PFG 1169/08.2007, R 60027876 Acc. to Directive RoHS 2002/95/EC

Printing: KBE SOLAR PV1-F X,XXmm²

Cross section	Conductor design	Resistance	min. insulation thickness	min. jacket thickness	Outer- ø	Weight	KBE Item no.
[mm ²]	n x max- ø [mm]	Rmax. [mΩ/m]	[mm]	[mm]	[mm]	[kg / km]	
2,5	50 x 0,260	8,21	0,5	0,5	4,60	46,0	730250015002UU
4,0	53 x 0,310	5,09	0,5	0,5	5,00	60,0	730400015001UU
6,0	80 x 0,310	3,39	0,5	0,5	5,60	80,0	730600015003UU
10	80 x 0,410	1,95	0,5	0,5	7,40	140,0	731000015001UU
16	120 x 0,410	1,24	0,5	0,5	8,10	185,0	731600015001UU
25	196 x 0,410	0,795	0,5	0,5	10,30	310,0	732500015001UU
35	280 x 0,410	0,565	0,5	0,5	11,40	410,0	733500015001UU



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Directives / Certificates	<ul style="list-style-type: none"> TÜV 2 PFG 1169/08.2007, R 60027876 Acc. to Directive RoHS 2002/95/EC

Printing: KBE SOLAR PV1-F X,XXmm² V2

Cross section	Conductor design	Resistance	min. insulation thickness	min. jacket thickness	Outer- ø	Weight	KBE Item no.
[mm ²]	n x max- ø [mm]	Rmax. [mΩ/m]	[mm]	[mm]	[mm]	[kg / km]	
2,5	50 x 0,260	8,21	0,62	0,62	5,40	55,0	730250015001UU
4,0	53 x 0,310	5,09	0,62	0,62	5,90	77,0	730400015003UU
6,0	80 x 0,310	3,39	0,71	0,71	6,80	92,0	730600015001UU



Requirement Profile - KBE Solar PV1-F

18.11.2011

Product name	KBE Solar KBE Solar (V2)
Code designation	PV1-F
Cross sections available	2,5 mm ² - 35,0 mm ²
Norms / Approbations	Acc. requirement profile for cables for PV-systems DKE/VDE AK 411.2.3 TÜV 2 PFG 1169/08.2007, R 60027876
Usage	KBE Solarcables are made for flexible and freely suspended installations as well as for fixed cable installations in solar PV power supply systems. They can be used indoors, outdoors, in commercial and industrial as well as agricultural installations or locations. The cables are suitable for use in applications and devices containing protective insulation (safety class II). Laying of cables directly in the ground is allowed by using a cable channel, if an earth leakage or short-circuit to earth is excluded.

Electrical Specifications	
Nominal voltage	U ₀ /U 0,6/1,0 kV AC
Direct voltage, max. permissible	1,8KV DC (conductor-conductor, not earthed system, unloaded circuit)
Current carrying capacity	Acc. requirement profile for cables for PV-systems DKE/VDE AK 411.2.3
Resistance	EN 50395 clause 5
Voltage test AC / DC of the complete conductor	EN 50395 clause 6
Surface resistance	EN 50395 clause 11
Insulation resistance	EN 50395 clause 8.2 (performed at 20 °C - 90 °C in climatic exposure test cabinet)
Spark test	EN 50395 clause 10
Long term resistance to DC	Acc. requirement profile for cables for PV-systems DKE/VDE AK 411.2.3 (10 days, 85 °C in NaCl 3%, 0,9kV DC)

Mechanical Specifications	
Properties before ageing	EN 60811-1-1 EN 60811-1-2 (tensile strength insulation ≥ 6,5N/mm ² tensile strength jacket ≥ 8,0N/mm ² elongation at break ≥ 125%)
Hot set test	EN 60811-2-1 (200 °C, 15 min. under load, 20N/cm ² stress)
Bending radius	≥ 4 x outer diameter
Dynamic penetration test	Acc. requirement profile for cables for PV-systems DKE/VDE AK 411.2.3
Notch propagation	Acc. requirement profile for cables for PV-systems DKE/VDE AK 411.2.3 (test performed at -15 °C, at ambient temperature and at +85 °C)



Requirement Profile - KBE Solar PV1-F

18.11.2011

Thermal Specifications	
Ambient temperature	-40 °C to +90 °C
Min. allowable ambient temperature	-40 °C
Max. conductor temperature	+126 °C, based on EN 60216-1 (20.000h, 50 % residual elongation)
Short-circuit temperature	+200 °C (max. 5 sec. on conductor)
Cold impact test	EN 60811-1-4 (mass of hammer 1000g)
Damp heat test	EN 60068-2-78 (1.000h at 90 °C and 85% relative humidity)
Shrinkage test	EN 60811-1-3 (120 °C, 1h, time intervals: 5
Pressure test at high temperature	EN 60811-3-1 (140 °C, 240 min, depth of penetration max. 50%)
Cold bending test	EN 60811-1-4 (-40 °C, duration of conditioning: 16 h)

Specifications Regarding Safety	
Resistance against acid and alkaline solution	EN 60811-2-1 7 days, 23 °C (N-Oxalic-acid solution, N-Sodium hydroxide solution)
Ozone resistance on completed cable	EN 50396 clause 8.1.3, method B
Weathering/UV-resistance	HD 605-A1 clause 2.4.20 (720 h; 65 °C ± 3 °C, 65% relative humidity)
Test under fire conditions	EN 60332-1-2
Test of absence of halogens Determination of halogens - Elemental test	EN 50267-2-2 EN 50267-2-1 EN 60684-2 HD 22.13, Annex C
Recycling Ecological requirements	All materials and substances used comply with RoHS EU Directive 2002/95/EC

General Information	
Conductor	E-Cu tinned acc. IEC 60228 Class 5
Insulation	Crosslinked special Polyolefin 36 Shore D
Sheathing	Crosslinked special Polyolefin 36 Shore D
Printing	KBE Solar PV1-F X,XXmm ² KBE Solar PV1-F X,XXmm ² (V2)
Printing / Marking Color	white
Continuity of marks	≤550mm
Expected period of use	25 Years



Zertifikat

Certificate



Zertifikat Nr. *Certificate No.*
R 60027876

Blatt *Page*
0001

Ihr Zeichen *Client Reference*

Unser Zeichen *Our Reference*
0001-- 21138599 010

Ausstellungsdatum
18.01.2010

Date of Issue
(day/mo/yr)

Genehmigungsinhaber *License Holder*
KBE Elektrotechnik GmbH
Symeonstr. 8
12279 Berlin
Deutschland

Fertigungsstätte *Manufacturing Plant*
KBE Elektrotechnik GmbH
Symeonstr. 8
12279 Berlin
Deutschland

Prüfzeichen *Test Mark*

Geprüft nach *Tested acc. to*
2 PFG 1169/08.07



Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

PV-Cables

Type designation: 1. KBE Solar
2. KBE Solar (V2)
Code designation: PV1-F
Rated diameter: 1. 2,5mm²; 4,0mm²; 6,0mm²; 10,0mm²
16,0mm²; 25,0mm²; 35,0mm²
2. 2,5mm²; 4,0mm²; 6,0mm²
Rated voltage: AC 0,6/1,0kV
max. voltage: DC 1,8 kV
Ambient temperature: -40°C to +90°C
max. core temperature: +126°C (20.000h)
Colour of insulation: black, white
Colour of sheath: black, red, blue
Material of insulation: crosslinked special Polyolefin
Material of sheath: crosslinked special Polyolefin

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Replaces certificate R_60024348

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Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.
This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

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Zertifizierungsstelle



Dipl.-Ing. F. Esdöhr