BUILDING CABLES & WIRES

PVC Insulated / Single & Multi Core / 300 to 1000 V

About Our Building Cables & Wires

Universal Metals (Pvt.) Ltd manufactures a comprehensive range of building cables and wires for residential, commercial and industrial wiring applications. Our products are manufactured using high-purity copper conductors drawn from our own rod manufacturing facility, ensuring consistent quality from raw material to finished cable.

Our building cable range covers single core PVC insulated wires (with and without nylon jacket), multi-core PVC insulated and PVC sheathed cables, panel board cables, and flat wiring cables. All products are manufactured in compliance with IEC, BS, UL and relevant national standards, with alternative designs available to meet customer-specified requirements.

Applications

Our building cables and wires serve a wide range of residential, commercial and industrial wiring applications:

- Residential power and lighting
- Commercial building wiring
- Panel board and switchgear
- Conduit and raceway installations
- Appliance internal wiring
- Industrial control wiring
- Duct and trunking systems
- General purpose hookups

THHN/THWN PVC Insulated / Nylon Jacketed **600 V**

Heat, Moisture, Oil, and Gasoline Resistant American Wires

Applications

THHN/THWN building wires are used for general purpose applications such as supplying power and lighting in residential and commercial buildings. These cables can be installed in ducts, conduits and raceways, and in wet and dry locations. The applications for different wire types are classified as follows:

- THHN 105°C for dry locations, building wire
- THWN 75°C for wet locations, building wire
- TFFN 105°C for dry locations, flexible cord and fixture wire

Features

- Good resistant property against oils, gasoline, water, acids, ozone, sunlight and abrasion
- Meets UL 1581 (VW-1) Vertical Flame Test requirements
- Particularly thin and robust cable for improved conduit fill

Applicable Standards

- UL 83: Thermoplastic Insulated Wires and Cables
- UL 1581: Electrical Wires, Cables and Flexible Cords
- UL 1063: Thermoplastic Insulated Wires and Cables
- UL 62: Flexible Cord and Fixture Wire

Cable Construction

Component	Description
Conductor	Plain annealed solid or stranded copper conductor
Insulation	Colour coded PVC, heat, moisture and flame retardant compound with temperature rating 105°C
Jacket	Polyamide nylon jacket for protection against abrasions and scratches; resistant to oil, gasoline and chemicals

Reference Standards: UL 83, UL 1581, UL 1063, UL 62

Solid Conductor

AWG	Nom. mm^2	No. × Dia	DC Res. Ω/km	Insul. Thick. (mm)	Jacket Thick. (mm)	Approx. OD (mm)	Weight kg/km
14	2.08	1 × 1.63	8.45	0.38	0.10	2.7	24
12	3.31	1 × 2.05	5.31	0.38	0.10	3.1	36
10	5.26	1 × 2.59	3.343	0.51	0.10	3.9	58

Stranded Conductor

AWG	Nom. mm^2	No. × Dia	DC Res. Ω/km	Insul. Thick. (mm)	Jacket Thick. (mm)	Approx. OD (mm)	Weight kg/km
18*	0.82	19 × 0.235	21.9	0.38	0.10	2.2	12
16*	1.31	19 × 0.296	13.7	0.38	0.10	2.5	17
14	2.08	19 × 0.37	8.62	0.38	0.10	2.9	24
12	3.31	19 × 0.47	5.43	0.38	0.10	3.4	37
10	5.26	19 × 0.59	3.409	0.51	0.10	4.2	59
8	8.37	19 × 0.75	2.144	0.76	0.13	5.5	97
6	13.3	19 × 0.944	1.348	0.76	0.13	6.4	195

* Listed as TFFN

Other sizes can be provided on specific request.

The above data is approximate and subject to manufacturing tolerance.

Single Core PVC Insulated Wire UL-Style 1015 Type AWM

600 V

Appliance Wiring Material: 105°C

Applications

Single-core AWM building wires are used for internal wiring of appliances, including wiring for refrigeration equipment, air-conditioning equipment, automatic washers, etc. Type AWM is permitted for use in 600 V applications and for dry locations at temperatures not exceeding 105°C.

Applicable Standards

AWM wires are designed and tested to meet the latest edition of UL 758 and UL 1581 standards. Alternative designs are available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed stranded copper conductor
Insulation	Colour coded PVC, heat, moisture and flame retardant compound with temperature rating 105°C

Flame Retardancy

AWM wires meet UL (VW-1) flame test requirements.

Colours

Standard AWM wire colours are available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Technical data table for AWM Style 1015 continues in the next section.

Reference Standards: UL 758, UL 1581

Stranded Conductor

AWG	Nom. mm^2	No. × Dia	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
18	0.82	19 × 0.232	21.8	0.76	2.7	15
16	1.31	19 × 0.296	13.7	0.76	3.0	20
14	2.08	13×0.408+6×0.96	8.62	0.76	3.4	30
12	3.31	13×0.513+6×0.375	5.43	0.76	3.8	45
10	5.26	13×0.644+6×0.472	8.405	0.76	4.4	65
8	8.37	13×0.810+6×0.550	2.144	1.14	5.9	105
6	13.3	13×1.020+6×0.750	1.348	1.52	7.6	165
4	21.15	19 × 1.3	0.8481	1.52	8.8	245
3	26.7	19 × 1.45	0.6727	1.52	9.3	295
2	33.62	19 × 1.61	0.5335	1.52	10.0	360
1	42.41	19 × 1.8	0.4230	2.03	11.9	480
1/0	53.49	19 × 2	0.3354	2.03	12.7	585
2/0	67.23	19 × 2.25	0.2660	2.03	13.8	710
3/0	85.01	19 × 2.55	0.2110	2.03	15.1	895
4/0	107.2	19 × 2.75	0.1673	2.03	16.1	1090

The above data is approximate and subject to manufacturing tolerance.
Other sizes can be provided on specific request.

H05V-U / H05V2-U

300/500 V

Single Core Non-Sheathed Cable with Solid Copper Conductor and PVC Insulation

Applications

Suitable for power, lighting circuits and building wiring. The cable is intended for use in indoor fixed installation, distribution in conduits as well as in closed installation ducts, and is ideal for the internal wiring of appliances and apparatus.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-31, IEC 60227-3 standards. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed solid copper conductor Class 1 per BS EN 60228 / IEC 60228
Insulation (H05V-U)	PVC insulation, temperature rating 70°C (type TI1 / PVC/C)
Insulation (H05V2-U)	PVC insulation, temperature rating 90°C (type TI3 / PVC/E)

H05V-U Technical Data: PVC 70°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.5	1 × 0.80	36	0.6	2.0	9
0.75	1 × 0.98	24.5	0.6	2.2	12
1.0	1 × 1.13	18.1	0.6	2.3	14

H05V2-U Technical Data: PVC 90°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.5	1 × 0.80	36	0.6	2.0	8
0.75	1 × 0.98	24.5	0.6	2.2	11
1.0	1 × 1.13	18.1	0.6	2.3	13

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H07V-U / H07V2-U

450/750 V

Single Core Non-Sheathed Cable with Solid Copper Conductor and PVC Insulation

Applications

Suitable for power, lighting circuits and building wiring. The cable is intended for use in indoor fixed installation, distribution in conduits as well as in closed installation ducts, and is ideal for the internal wiring of appliances and apparatus. The heat resistant variant (H07V2-U) is suitable for wiring in control boards, machines and instruments with higher operating temperature.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-31, IEC 60227-3 standards. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed solid copper conductor Class 1 per BS EN 60228 / IEC 60228
Insulation (H07V-U)	PVC insulation, temperature rating 70°C (type TI1 / PVC/C)
Insulation (H07V2-U)	PVC insulation, temperature rating 90°C (type TI3 / PVC/E)

H07V-U Technical Data: PVC 70°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	1 × 1.38	12.1	0.7	2.8	21
2.5	1 × 1.78	7.41	0.8	3.4	32
4	1 × 2.25	4.61	0.8	3.9	48
6	1 × 2.76	3.08	0.8	4.4	68

H07V2-U Technical Data: PVC 90°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	1 × 1.38	12.1	0.7	2.8	20
2.5	1 × 1.78	7.41	0.8	3.4	31
4	1 × 2.25	4.61	0.8	3.9	47
6	1 × 2.76	3.08	0.8	4.4	67

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H07V-R

450/750 V

Single Core Non-Sheathed Cable with Stranded Copper Conductor and PVC 70°C Insulation

Applications

Suitable for power, lighting circuits and building wiring. The cable is intended for use in indoor fixed installation, distribution in conduits as well as in closed installation ducts, and is ideal for the internal wiring of appliances and apparatus.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-31, IEC 60227-3 standards. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed stranded copper conductor Class 2 per BS EN 60228 / IEC 60228
Insulation	PVC insulation, temperature rating 70°C (type TI1 / PVC/C per BS EN 50363-3 / IEC 60227-1)

Colours

Standard colours available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2 and BS EN 60332-1.

H07V-R: Technical Data

Reference Standards: BS EN 50525-2-31, IEC 60227-3

PVC 70°C / 450/750 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	7 × 0.52	12.1	0.7	3.0	22
2.5	7 × 0.67	7.41	0.8	3.6	35
4	7 × 0.85	4.61	0.8	4.2	51
6	7 × 1.04	3.08	0.8	4.7	72
10	7 × 1.43	1.83	1.0	5.7	109
16	7 × 1.78	1.15	1.0	6.7	166
25	7 × 2.24	0.727	1.2	8.3	259
35	7 × 2.65	0.524	1.2	9.3	345
50	19 × 1.86	0.387	1.4	10.9	475
70	19 × 2.22	0.268	1.4	12.5	671
95	19 × 2.66	0.193	1.6	14.5	925
120	19 × 3.05	0.153	1.6	15.8	1156
150	37 × 2.44	0.124	1.8	17.7	1425
185	37 × 2.70	0.0991	2.0	19.8	1783
240	37 × 3.12	0.0754	2.2	22.5	2333
300	61 × 2.70	0.0601	2.4	25.3	2903
400	61 × 3.15	0.047	2.6	28.3	3745
500	61 × 3.38	0.0366	2.8	32.1	4830
630	61 × 3.81	0.0283	2.8	35.7	6098

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H07V2-R

450/750 V

Single Core Non-Sheathed Heat Resistant Cable with Stranded Copper Conductor and PVC 90°C Insulation

Applications

Suitable for fixed installation in lighting networks, power systems, for wiring in control boards, machines and instruments with higher operating temperature.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-31, IEC 60227-3 standards. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed stranded copper conductor Class 2 per BS EN 60228 / IEC 60228
Insulation	PVC insulation, temperature rating 90°C (type TI3 / PVC/E per BS EN 50363-3 / IEC 60227-1)

Colours

Standard colours available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2 and BS EN 60332-1.

Technical data table for H07V2-R continues in the next section.

H07V2-R: Technical Data

Reference Standards: BS EN 50525-2-31, IEC 60227-3

PVC 90°C / 450/750 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	7 × 0.52	12.1	0.7	3.0	21
2.5	7 × 0.67	7.41	0.8	3.6	34
4	7 × 0.85	4.61	0.8	4.2	50
6	7 × 1.04	3.08	0.8	4.7	71
10	7 × 1.43	1.83	1.0	5.7	108
16	7 × 1.78	1.15	1.0	6.7	164
25	7 × 2.24	0.727	1.2	8.3	257
35	7 × 2.65	0.524	1.2	9.3	347
50	19 × 1.86	0.387	1.4	10.9	471
70	19 × 2.22	0.268	1.4	12.5	666
95	19 × 2.66	0.193	1.6	14.5	919
120	19 × 3.05	0.153	1.6	15.8	1145
150	37 × 2.44	0.124	1.8	17.7	1417
185	37 × 2.70	0.0991	2.0	19.8	1773
240	37 × 3.12	0.0754	2.2	22.5	2320
300	61 × 2.70	0.0601	2.4	25.3	2887
400	61 × 3.15	0.047	2.6	28.3	3726
500	61 × 3.38	0.0366	2.8	32.1	4806
630	61 × 3.81	0.0283	2.8	35.7	6071

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H05V-K / H05V2-K

300/500 V

Single Core Non-Sheathed Cable with Flexible Copper Conductor and PVC Insulation

Applications

Suitable for internal wiring of electric motors and transformers as well as other electrical appliances and lighting applications. It can be used in electronic appliances for measuring, regulating and controlling. The heat resistant variant (H05V2-K) is used in power current installations, switch cabinets, motors and transformers subject to direct contact with high temperatures in varnishing machines and drying towers.

Cable Construction

Component	Description
Conductor	Plain annealed flexible copper conductor Class 5 per BS EN 60228 / IEC 60228
Insulation (H05V-K)	PVC insulation, temperature rating 70°C (type TI1 / PVC/C)
Insulation (H05V2-K)	PVC insulation, temperature rating 90°C (type TI3 / PVC/E)

H05V-K Technical Data: PVC 70°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.50	16 × 0.2	39	0.6	2.1	10
0.75	24 × 0.2	26	0.6	2.3	13
1.0	32 × 0.2	19.5	0.6	2.5	16

H05V2-K Technical Data: PVC 90°C

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.50	16 × 0.2	39	0.6	2.1	9
0.75	24 × 0.2	26	0.6	2.3	12
1.0	32 × 0.2	19.5	0.6	2.5	15

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request. Standards: BS EN 50525-2-31, IEC 60227-3. Flame performance: IEC 60332-1-2 / BS EN 60332-1.

H07V-K / H07V2-K

450/750 V

Single Core Non-Sheathed Cable with Flexible Copper Conductor and PVC Insulation

Applications

Suitable for internal wiring of electric motors and transformers as well as other electrical appliances and lighting applications. It can be used in electronic appliances for measuring, regulating and controlling. The heat resistant variant (H07V2-K) is used in power current installations, switch cabinets, motors and transformers subject to direct contact with high temperatures in varnishing machines and drying towers. Also suitable for the internal wiring of electrical equipment such as lighting and heating apparatus.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-31, IEC 60227-3 standards. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed flexible copper conductor Class 5 per BS EN 60228 / IEC 60228
Insulation (H07V-K)	PVC insulation, temperature rating 70°C (type TI1 / PVC/C)
Insulation (H07V2-K)	PVC insulation, temperature rating 90°C (type TI3 / PVC/E)

Colours

Standard colours available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2 and BS EN 60332-1.

H07V-K: Technical Data

Reference Standards: BS EN 50525-2-31, IEC 60227-3

PVC 70°C / 450/750 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	30 × 0.25	13.3	0.7	3.0	24
2.5	50 × 0.25	7.98	0.8	3.7	35
4	56 × 0.30	4.95	0.8	4.2	50
6	84 × 0.30	3.3	0.8	4.6	70
10	84 × 0.4	1.91	1.0	6.2	119
16	130 × 0.4	1.21	1.0	7.6	178
25	196 × 0.4	0.780	1.2	9.1	273
35	280 × 0.4	0.554	1.2	10.3	369
50	400 × 0.4	0.386	1.4	12.6	548
70	361 × 0.5	0.272	1.4	14.6	740
95	475 × 0.5	0.206	1.6	17.0	996
120	608 × 0.5	0.161	1.6	18.9	1255
150	744 × 0.5	0.129	1.8	21.2	1563
185	910 × 0.5	0.106	2.0	23.4	1912
240	1190 × 0.5	0.0801	2.2	26.9	2513

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H07V2-K: Technical Data

Reference Standards: BS EN 50525-2-31, IEC 60227-3

PVC 90°C / 450/750 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
1.5	30 × 0.25	13.3	0.7	3.0	23
2.5	50 × 0.25	7.98	0.8	3.7	34
4	56 × 0.30	4.95	0.8	4.2	49
6	84 × 0.30	3.3	0.8	4.6	69
10	84 × 0.4	1.91	1.0	6.2	117
16	130 × 0.4	1.21	1.0	7.6	176
25	196 × 0.4	0.780	1.2	9.1	270
35	280 × 0.4	0.554	1.2	10.3	366
50	400 × 0.4	0.386	1.4	12.6	543
70	361 × 0.5	0.272	1.4	14.6	735
95	475 × 0.5	0.206	1.6	17.0	988
120	608 × 0.5	0.161	1.6	18.9	1246
150	744 × 0.5	0.129	1.8	21.2	1552
185	910 × 0.5	0.106	2.0	23.4	1899
240	1190 × 0.5	0.0801	2.2	26.9	2496

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

Type BK / Type CK

600/1000 V

Single Core Non-Sheathed Cable with Flexible Plain Copper Conductor and PVC Insulation

Applications

Suitable for use as an internal connector in controllers, motor starters and rectifier equipment. Designed for installation in switch control, metering, relay and instrumentation panels. It can be used in everything from automation and process control, building and construction to marine and defence, and transmission, distribution and power networks.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS 6231. Flame performance per IEC 60332-1-2 and BS EN 60332-1.

Cable Construction

Component	Description
Conductor	Plain annealed flexible copper conductor Class 5 per BS EN 60228 / IEC 60228
Insulation (Type BK)	PVC insulation Type TI1, temperature rating 70°C per BS EN 50363-3
Insulation (Type CK)	Special PVC insulation Type TI3, temperature rating 105°C per BS EN 50363-3

Colours

Standard colours available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2 and BS EN 60332-1.

Type BK: Technical Data

Reference Standards: BS 6231

PVC 70°C / 600/1000 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.5	16 × 0.2	39	0.8	2.6	12
0.75	24 × 0.2	26	0.8	2.8	15
1	32 × 0.2	19.5	0.8	2.9	18
1.5	30 × 0.25	13.3	0.8	3.2	23
2.5	50 × 0.25	7.98	0.8	3.7	34
4	56 × 0.30	4.95	0.8	4.2	50
6	84 × 0.30	3.3	0.8	4.6	69
10	84 × 0.4	1.91	1.0	6.2	118
16	130 × 0.4	1.21	1.0	7.6	180
25	196 × 0.4	0.780	1.2	9.1	276
35	280 × 0.4	0.554	1.2	10.3	371
50	400 × 0.4	0.386	1.4	12.6	544
70	361 × 0.5	0.272	1.4	14.6	736
95	475 × 0.5	0.206	1.6	17.0	990
120	608 × 0.5	0.161	1.6	18.9	1248
150	744 × 0.5	0.129	1.8	21.2	1554
185	910 × 0.5	0.106	2.0	23.4	1902
240	1190 × 0.5	0.0801	2.2	26.9	2500

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

Tinned Copper Conductor

600/1000 V

Single Core Non-Sheathed Cable with Flexible Tinned Copper Conductor and PVC Insulation

Applications

Suitable for use as an internal connector in controllers, motor starters and rectifier equipment. Designed for installation in switch control, metering, relay and instrumentation panels. It can be used in everything from automation and process control, building and construction to marine and defence, and transmission, distribution and power networks.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS 6231. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Tinned annealed flexible copper conductor Class 5 per BS EN 60228 / IEC 60228
Insulation (Type BK)	PVC insulation Type TI1, temperature rating 70°C per BS EN 50363-3
Insulation (Type CK)	Special PVC insulation Type TI3, temperature rating 105°C per BS EN 50363-3

Colours

Standard colours available in black, white, red, blue, green, yellow, yellow/green, pink, violet, orange, brown and grey. Additional colours can be made on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2 and BS EN 60332-1.

Packing

Available in standard length of 100 yards on coil (other lengths available on request).

Tinned Copper: Technical Data

Reference Standards: BS 6231

PVC 70°C / 600/1000 V

Size mm^2	Cons. No. × mm	DC Res. Ω/km	Insul. Thick. (mm)	Approx. OD (mm)	Weight kg/km
0.5	16 × 0.2	40.1	0.8	2.6	12
0.75	24 × 0.2	26.7	0.8	2.8	15
1	32 × 0.2	20	0.8	2.9	18
1.5	30 × 0.25	13.7	0.8	3.2	23
2.5	50 × 0.25	8.21	0.8	3.7	34
4	56 × 0.30	5.09	0.8	4.2	50
6	84 × 0.30	3.39	0.8	4.6	69
10	80 × 0.4	1.95	1.0	6.2	118
16	126 × 0.4	1.24	1.0	7.6	180
25	193 × 0.4	0.795	1.2	9.1	276
35	280 × 0.4	0.565	1.2	10.3	371
50	392 × 0.4	0.393	1.4	12.6	544
70	354 × 0.5	0.277	1.4	14.6	736
95	466 × 0.5	0.210	1.6	17.0	990
120	600 × 0.5	0.164	1.6	18.9	1248
150	730 × 0.5	0.132	1.8	21.2	1554
185	196 × 0.5	0.108	2.0	23.4	1902
240	1164 ×0.5	0.0817	2.2	26.9	2500

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H05VV-U

300/500 V

Multicore Cable with Solid Copper Conductor, PVC Insulated and PVC Sheathed

Applications

Suitable for domestic and light industrial wiring and can be installed on tray, free air or clipped direct. It should be installed into areas where there is low risk of mechanical damage. Also used for transferring electrical signals among different control units and also used in alarm systems.

Applicable Standards

Designed and tested to meet or exceed the requirements of IEC 60227-4 standard. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed solid copper conductor Class 1 per IEC 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per IEC 60227-1 type PVC/C
Assembly	Insulated cores uniformly twisted together; circular laid up core per manufacturer's standard
Sheath	Extruded PVC compound, temperature rating 70°C per IEC 60227-1 type ST4

Core Identification

Standard H05VV-U core identification:
Two cores: Red and Black
Three cores: Red, Yellow and Blue
Four cores: Red, Yellow, Blue and Black
Five cores: Red, Yellow, Blue, Black and Yellow/Green
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2.

Packing

Available in standard length of 1000 metres on wooden drum (other lengths available upon request).

H05VV-U: Technical Data

Reference Standards: IEC 60227-4

PVC 70°C / 300/500 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Thick. (mm)	Inner Cov. (mm)	Sheath Thick. (mm)	Approx. OD (mm)	Weight kg/km
2	1	1 × 1.13	0.6	0.4	1.2	7.9	95
3	1	1 × 1.13	0.6	0.4	1.2	8.3	110
4	1	1 × 1.13	0.6	0.4	1.2	8.9	130
5	1	1 × 1.13	0.6	0.4	1.2	9.5	150
2	1.5	1 × 1.38	0.7	0.4	1.2	8.8	120
3	1.5	1 × 1.38	0.7	0.4	1.2	9.2	140
4	1.5	1 × 1.38	0.7	0.4	1.2	9.9	170
5	1.5	1 × 1.38	0.7	0.4	1.2	10.7	200
2	2.5	1 × 1.78	0.8	0.4	1.2	10	160
3	2.5	1 × 1.78	0.8	0.4	1.2	10.5	195
4	2.5	1 × 1.78	0.8	0.4	1.2	11.4	235
5	2.5	1 × 1.78	0.8	0.4	1.2	12.3	280
2	4	1 × 2.25	0.8	0.4	1.2	10.9	210
3	4	1 × 2.25	0.8	0.4	1.4	11.5	255
4	4	1 × 2.25	0.8	0.4	1.4	12.9	325
5	4	1 × 2.25	0.8	0.6	1.4	14.4	495
2	6	1 × 2.76	0.8	0.4	1.4	11.9	265
3	6	1 × 2.76	0.8	0.4	1.4	13	345
4	6	1 × 2.76	0.8	0.6	1.4	14.6	440
5	6	1 × 2.76	0.8	0.6	1.4	15.8	530

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

Solid Copper Conductor

600/1000 V

Multicore Cable with Solid Copper Conductor, PVC Insulated and PVC Sheathed

Applications

Suitable for domestic and light industrial wiring and can be installed on tray, free air or clipped direct. It should be installed into areas where there is low risk of mechanical damage. Also used for transferring electrical signals among different control units and also used in alarm systems.

Applicable Standards

Designed and tested to meet or exceed the requirements of IEC 60502-1 standard. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed solid copper conductor Class 1 per IEC 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per IEC 60502-1 type PVC/A
Assembly	Insulated cores uniformly twisted together; circular laid up core per manufacturer's standard
Sheath	Extruded PVC compound, temperature rating 80°C per IEC 60502-1 type ST1

Core Identification

Standard solid power cable core identification:
Two cores: Red and Black
Three cores: Red, Yellow and Blue
Four cores: Red, Yellow, Blue and Black
Five cores: Red, Yellow, Blue, Black and Yellow/Green
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2.

Packing

Available in standard length of 1000 metres on wooden drums (other lengths available upon request).

Solid Multicore 600/1000 V: Technical Data

Reference Standards: IEC 60502-1

PVC 70°C / 600/1000 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Thick. (mm)	Inner Cov. (mm)	Sheath Thick. (mm)	Approx. OD (mm)	Weight kg/km
2	1.5	1 × 1.38	0.8	1.8	1.8	9.6	145
3	1.5	1 × 1.38	0.8	1.8	1.8	10	170
4	1.5	1 × 1.38	0.8	1.8	1.8	10.8	200
5	1.5	1 × 1.38	0.8	1.8	1.8	11.7	240
2	2.5	1 × 1.78	0.8	1.8	1.8	10.4	180
3	2.5	1 × 1.78	0.8	1.8	1.8	11	220
4	2.5	1 × 1.78	0.8	1.8	1.8	11.8	265
5	2.5	1 × 1.78	0.8	1.8	1.8	12.7	315
2	4	1 × 2.25	1	1.8	1.8	12.1	255
3	4	1 × 2.25	1	1.8	1.8	12.8	315
4	4	1 × 2.25	1	1.8	1.8	13.8	385
5	4	1 × 2.25	1	1.8	1.8	15.1	465
2	6	1 × 2.76	1	1.8	1.8	13.2	325
3	6	1 × 2.76	1	1.8	1.8	14	405
4	6	1 × 2.76	1	1.8	1.8	15.1	500
5	6	1 × 2.76	1	1.8	1.8	16.5	610

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

H05VV-R

300/500 V

Multicore Cable with Stranded Copper Conductor, PVC Insulated and PVC Sheathed

Applications

Used for industrial and wiring purposes. Useable in the open environments in outdoor and indoor applications, as well as supplying power to electrical units and equipment in different projects.

Applicable Standards

Designed and tested to meet or exceed the requirements of IEC 60227-4 standard. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed stranded copper conductor Class 2 per IEC 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per IEC 60227-1 type PVC/C
Assembly	Insulated cores uniformly twisted together; circular laid up core per manufacturer's standard
Sheath	Extruded PVC compound, temperature rating 70°C per IEC 60227-1 type ST4

Core Identification

Standard H05VV-R core identification:
Two cores: Red and Black
Three cores: Red, Yellow and Blue
Four cores: Red, Yellow, Blue and Black
Five cores: Red, Yellow, Blue, Black and Yellow/Green
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2.

Packing

Available in standard length of 1000 metres on wooden drum (other lengths available upon request).

H05VV-R: Technical Data

Reference Standards: IEC 60227-4

PVC 70°C / 300/500 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Th. (mm)	Inner Cov. (mm)	Sheath Th. (mm)	Approx. OD (mm)	Weight kg/km
2	1.5	7 × 0.52	0.7	0.4	1.2	9.2	125
3	1.5	7 × 0.52	0.7	0.4	1.2	9.6	145
4	1.5	7 × 0.52	0.7	0.4	1.2	10.4	175
5	1.5	7 × 0.52	0.7	0.4	1.2	11.2	210
2	2.5	7 × 0.67	0.8	0.4	1.2	10.4	170
3	2.5	7 × 0.67	0.8	0.4	1.2	11	205
4	2.5	7 × 0.67	0.8	0.4	1.2	11.8	245
5	2.5	7 × 0.67	0.8	0.4	1.2	13	295
2	4	7 × 0.85	0.8	0.4	1.2	11.5	220
3	4	7 × 0.85	0.8	0.4	1.2	12.2	270
4	4	7 × 0.85	0.8	0.4	1.2	13.7	345
5	4	7 × 0.85	0.8	0.6	1.4	15.2	425
2	6	7 × 1.04	0.8	0.4	1.2	12.6	285
3	6	7 × 1.04	0.8	0.4	1.4	13.8	365
4	6	7 × 1.04	0.8	0.6	1.4	15.5	460
5	6	7 × 1.04	0.8	0.6	1.4	16.8	560
2	10	7 × 1.34	1	0.6	1.4	15.4	435
3	10	7 × 1.34	1	0.6	1.4	16.3	540
4	10	7 × 1.34	1	0.6	1.4	17.8	670
5	10	7 × 1.34	1	0.6	1.4	19.5	815
2	16	7 × 1.68	1	0.6	1.4	17.3	600
3	16	7 × 1.68	1	0.8	1.4	18.5	760
4	16	7 × 1.68	1	0.8	1.4	20.4	965
5	16	7 × 1.68	1	0.8	1.6	22.5	1205

The above data is approximate and subject to manufacturing tolerance. Other sizes and temperature ratings can be provided on specific request. For voltage 450/750 V can be provided on specific request.

H05VV-F

300/500 V

Multicore Cable with Flexible Copper Conductor, PVC Insulated and PVC Sheathed

Applications

Used for mobile electrical equipment and units, supply pumps and motors, etc., in which cables with high flexibility are required. These cables are also used in household appliances such as washing machines, refrigerators, kitchen equipment, and in offices and prefabricated houses.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS EN 50525-2-11 standards. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed flexible copper conductor Class 5 per BS EN 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per BS EN 50363-3 type TI1
Assembly	Insulated cores uniformly twisted together; circular laid up core per manufacturer's standard
Sheath	Extruded PVC compound, temperature rating 70°C per BS EN 50363-4-1 type TM2

Core Identification

Standard H05VV-F core identification:
Two cores: Brown and Blue
Three cores: Brown, Blue and Yellow/Green
Four cores: Brown, Black, Grey and Blue
Five cores: Brown, Black, Grey, Blue and Yellow/Green
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards BS EN 60332-1.

Packing

Available in standard length of 1000 metres on wooden drum (other lengths available upon request).

H05VV-F: Technical Data

Reference Standards: BS EN 50525-2-11

PVC 70°C / 300/500 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Th. (mm)	Inner Cov. (mm)	Sheath Th. (mm)	Approx. OD (mm)	Weight kg/km
2	0.75	24 × 0.2	0.6	0.8	0.8	6.3	58
3	0.75	24 × 0.2	0.6	0.8	0.8	6.7	70
4	0.75	24 × 0.2	0.6	0.8	0.8	7.3	85
5	0.75	24 × 0.2	0.6	0.9	0.9	8.2	110
2	1	32 × 0.2	0.6	0.8	0.8	6.7	68
3	1	32 × 0.2	0.6	0.8	0.8	7.1	85
4	1	32 × 0.2	0.6	0.9	0.9	7.9	110
5	1	32 × 0.2	0.6	0.9	0.9	8.6	130
2	1.5	30 × 0.25	0.7	0.9	0.9	8.3	95
3	1.5	30 × 0.25	0.7	1.0	1.0	9.3	120
4	1.5	30 × 0.25	0.7	1.0	1.0	9.3	150
5	1.5	30 × 0.25	0.7	1.1	1.1	10.3	185
2	2.5	50 × 0.25	0.8	1.0	1.0	9.3	145
3	2.5	50 × 0.25	0.8	1.1	1.1	10.1	180
4	2.5	50 × 0.25	0.8	1.1	1.1	11.1	225
5	2.5	50 × 0.25	0.8	1.2	1.2	12.3	280
2	4	56 × 0.3	0.8	1.1	1.1	10.7	200
3	4	56 × 0.3	0.8	1.2	1.2	11.5	250
4	4	56 × 0.3	0.8	1.2	1.2	12.6	315
5	4	56 × 0.3	0.8	1.4	1.4	14.2	395
2	6	84 × 0.3	0.8	1.2	1.2	12.0	265
3	6	84 × 0.3	0.8	1.4	1.4	13.2	345
4	6	84 × 0.3	0.8	1.4	1.4	14.5	430
5	6	84 × 0.3	0.8	1.4	1.4	15.8	525
2	10	80 × 0.4	1	1.4	1.4	15.2	430
3	10	80 × 0.4	1	1.4	1.4	16.2	540
4	10	80 × 0.4	1	1.4	1.4	17.8	680
5	10	80 × 0.4	1	1.4	1.4	19.5	830
2	16	126 × 0.4	1	1.4	1.4	17.3	600
3	16	126 × 0.4	1	1.4	1.4	18.5	760
4	16	126 × 0.4	1	1.4	1.4	20.4	965
5	16	126 × 0.4	1	1.6	1.4	22.8	1205

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request. For sizes 4 mm^2 and above available upon request with rated voltage 450/750 V.

Flexible Copper Conductor

600/1000 V

Multicore Cable with Flexible Copper Conductor, PVC Insulated and PVC Sheathed

Applications

These control and power flexible cables are used indoors and outdoors, in cable ducts, in power and switching plants, industrial plants, underground applications where there is no risk of mechanical damage.

Applicable Standards

Designed and tested to meet or exceed the requirements of IEC 60502-1 standard. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed flexible copper conductor Class 5 per IEC 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per IEC 60502-1 type PVC/A
Assembly	Insulated cores uniformly twisted together; circular laid up core per manufacturer's standard
Sheath	Extruded PVC compound, temperature rating 80°C per IEC 60502-1 type ST1

Core Identification

Standard flexible power cable core identification:
Two cores: Red and Black
Three cores: Red, Yellow and Blue
Four cores: Red, Yellow, Blue and Black
Five cores: Red, Yellow, Blue, Black and Yellow/Green
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards IEC 60332-1-2.

Packing

Available in standard length of 1000 metres on wooden drum (other lengths available upon request).

Reference Standards: IEC 60502-1

PVC 70°C / 600/1000 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Th. (mm)	Inner Cov. (mm)	Sheath Th. (mm)	Approx. OD (mm)	Weight kg/km
2	1.5	30 × 0.25	0.8	1.8	1.8	10.0	150
3	1.5	30 × 0.25	0.8	1.8	1.8	10.5	170
4	1.5	30 × 0.25	0.8	1.8	1.8	11.3	205
5	1.5	30 × 0.25	0.8	1.8	1.8	12.2	245
2	2.5	50 × 0.25	0.8	1.8	1.8	11.0	190
3	2.5	50 × 0.25	0.8	1.8	1.8	11.6	220
4	2.5	50 × 0.25	0.8	1.8	1.8	12.6	270
5	2.5	50 × 0.25	0.8	1.8	1.8	13.6	320
2	4	56 × 0.3	1	1.8	1.8	12.6	260
3	4	56 × 0.3	1	1.8	1.8	13.3	310
4	4	56 × 0.3	1	1.8	1.8	14.5	380
5	4	56 × 0.3	1	1.8	1.8	15.8	455
2	6	84 × 0.3	1	1.8	1.8	13.6	320
3	6	84 × 0.3	1	1.8	1.8	14.4	390
4	6	84 × 0.3	1	1.8	1.8	15.7	485
5	6	84 × 0.3	1	1.8	1.8	17.1	585
2	10	84 × 0.4	1	1.8	1.8	15.6	450
3	10	84 × 0.4	1	1.8	1.8	16.6	565
4	10	84 × 0.4	1	1.8	1.8	18.1	705
5	10	84 × 0.4	1	1.8	1.8	19.8	855
2	16	130 × 0.4	1	1.8	1.8	18.8	655
3	16	130 × 0.4	1	1.8	1.8	20.0	820
4	16	130 × 0.4	1	1.8	1.8	22.0	1030
5	16	130 × 0.4	1	1.8	1.8	24.1	1260

The above data is approximate and subject to manufacturing tolerance. Other sizes can be provided on specific request.

Flat Cables

300/500 V

Flat Cable with Stranded Copper Conductor, PVC Insulated and PVC Sheathed

Applications

Used for supplying power to fixed electrical equipment and appliances in various types of buildings. Due to its flat shape it occupies lesser space when fixed on external or internal walls of buildings and in outdoor electronic signboards.

Applicable Standards

Designed and tested to meet or exceed the requirements of BS 6004 standard. Alternative designs available to meet customer-specified requirements.

Cable Construction

Component	Description
Conductor	Plain annealed stranded copper conductor Class 2 per BS EN 60228
Insulation	Extruded PVC insulation, temperature rating 70°C per BS EN 50363-3 type TI1
Sheath	Extruded PVC compound, temperature rating 70°C per BS 7655 PVC Type 6

Core Identification

Standard flat cable core identification:
Two cores: Red and Black
Three cores: Red, Yellow and Blue
Additional colours on request subject to factory minimum order quantities.

Flame Retardancy

Cables have been tested and approved with the flame performance standards BS EN 60332-1.

Packing

Available in standard lengths of 100, 80, 50 and 40 yards on coils (other lengths available on request).

Flat Cables: Technical Data

Reference Standards: BS 6004

PVC 70°C / 300/500 V

Cores No.	Size mm^2	Cons. No. × mm	Insul. Thick. (mm)	Inner Cov. (mm)	Approx. Dim. (mm)	Weight kg/km
2	1.5	7 × 0.52	0.7	0.9	4.8 × 7.8	75
3	1.5	7 × 0.52	0.7	0.9	4.8 × 10.7	105
2	2.5	7 × 0.67	0.8	1.0	5.6 × 9.2	115
3	2.5	7 × 0.67	0.8	1.0	5.6 × 12.8	160
2	4	7 × 0.85	0.8	1.0	6.2 × 10.3	155
3	4	7 × 0.85	0.8	1.1	6.4 × 14.7	225
2	6	7 × 1.04	0.8	1.1	6.9 × 11.6	210
3	6	7 × 1.04	0.8	1.1	6.9 × 16.4	305
2	10	7 × 1.43	1.0	1.2	8.1 × 13.8	315
3	10	7 × 1.43	1.0	1.2	8.1 × 19.5	455
2	16	7 × 1.78	1.0	1.3	9.3 × 16	455
3	16	7 × 1.78	1.0	1.3	9.3 × 22.7	665

The above data is approximate and subject to manufacturing tolerance. Other sizes and temperature ratings can be provided on specific request.

Ampacity is the maximum current (measured in amperes or more simply, amps) an insulated conductor can safely carry without exceeding its insulation and jacket temperature limitations. As the amount of current passing through a conductor is increased, the amount of heat produced in the conductor increases. The heat created in the conductor must be dissipated to the environment. If the heat cannot escape, the temperature of the conductor would continue to increase until the cable exceeds its temperature rating and deteriorates.

The ampacity of a cable should equal or exceed the maximum current the cable will be expected to carry during its service life, without exceeding its temperature rating. Temperature ratings depend on the heat resistance of the materials used for the insulation and jacket of the cable. The higher a material's heat resistance, the less likely it will deteriorate in higher temperatures.

Depending on the installation environment of the cable, ampacity ratings may need to be adjusted or derated to control heat flow. The rate at which heat is dissipated to the environment depends on many factors, but the two main requirements in the NEC for derating ampacity are ambient temperatures and number of current-carrying conductors. Ampacity ratings need to be derated if more than three current-carrying conductors are in a raceway or cable. More current-carrying conductors in an enclosed space may result in a greater ambient temperature. The ampacity of those conductors must be derated to account for this increase in ambient heat.

Current Rating (Ampacity) For UL THHN/THWN American Wires

14	Solid	1	18	25	30	20	
12	Solid	1	40	30	35	25	
10	Solid	1	55	40	50	35	
18	Stranded	19	18	14	—	—	
16	Stranded	19	24	18	—	—	
14	Stranded	19	35	25	30	20	
12	Stranded	19	40	30	35	25	
10	Stranded	19	55	40	50	35	
8	Stranded	19	80	55	70	50	
6	Stranded	19	105	75	95	65	

For ambient temperature other than 30 °C, please use the below derating factors to adjust the current value.

21	25	1.04	1.05	
26	30	1.00	1.00	
31	35	0.96	0.94	
36	40	0.91	0.88	
41	45	0.87	0.82	
46	50	0.82	0.75	
51	55	0.76	0.67	
56	60	0.71	0.58	
61	70	0.58	0.33	

Current Carrying Capacity (Ampacity) for Single Core Non-Sheathed PVC Insulated Wires

Solid Conductors							
0.5	3	3	—	—	—	—	—
0.75	6	6	—	—	—	—	—
1.00	10	10	—	—	—	—	—
1.50	13	15	—	—	—	—	—
2.50	17	21	—	—	—	—	—
4.00	23	28	—	—	—	—	—
6.00	30	36	—	—	—	—	—
10	40	50	—	—	—	—	—
Stranded Conductors							
1.5	13	15	—	—	—	—	—
2.5	17	21	—	—	—	—	—
4	23	28	—	—	—	—	—
6	30	36	—	—	—	—	—
10	40	50	—	—	—	—	—
16	53	66	—	—	—	—	—
25	70	88	114	96	127	99	113
35	86	109	141	119	157	124	141
50	103	131	170	145	190	151	171
70	131	167	218	188	244	196	221
95	158	202	264	230	297	239	270
120	183	234	306	268	344	279	315
150	209	—	353	310	397	323	364
185	237	—	403	356	453	371	417
240	279	—	475	422	535	441	495
300	319	—	547	488	617	510	573
400	—	—	656	570	741	599	691
500	—	—	755	651	854	686	800
630	—	—	874	743	990	787	930
Flexible Conductors							
0.50	3	3	—	—	—	—	—
0.75	6	6	—	—	—	—	—
1.0	10	10	—	—	—	—	—
1.5	13	15	—	—	—	—	—
2.5	17	21	—	—	—	—	—
4	23	28	—	—	—	—	—
6	30	36	—	—	—	—	—
10	40	50	—	—	—	—	—
16	53	66	—	—	—	—	—
25	70	88	114	96	127	99	113
35	86	109	141	119	157	124	141
50	103	131	170	145	190	151	171
70	131	167	218	188	244	196	221
95	158	202	264	230	297	239	270
120	183	234	306	268	344	279	315
150	209	—	353	310	397	323	364
185	237	—	403	356	453	371	417
240	279	—	475	422	535	441	495

Laying Conditions: Ambient air temperature of 40 °C and ambient ground temperature of 35 °C. In case of different laying conditions, appropriate correction (derating) factors have to be applied to cater for the actual installation conditions.

Derating factors for ambient air temperature

PVC	1.40	1.34	1.29	1.22	1.15	1.08	1.00	0.91	0.82	0.70	0.57

Derating factors for ambient air temperature

PVC	1.31	1.25	1.19	1.13	1.06	1.00	0.92	0.85	0.75	0.65

Current Carrying Capacity (Ampacity) for Multicore Cable with PVC Insulation

1.5	21	19	18	15
2.5	28	24	23	20
4.0	38	32	32	26
6.0	48	40	40	33
10	65	53	55	43
16	86	70	72	57

- The above data is calculated at 40°C ambient air temperature and ambient ground temperature of 35°C.

Derating factors for ambient air temperature

PVC	1.40	1.34	1.29	1.22	1.15	1.08	1.00	0.91	0.82	0.70	0.57

Derating factors for ambient air temperature

PVC	1.31	1.25	1.19	1.13	1.06	1.00	0.92	0.85	0.75	0.65	0.54

The central component of any cable, the conductor is the term for the metallic wire or wires that carry the signal and/or power through the cable.

Metals

There is a wide range of metals that can be used as a conductor, however Copper (Cu) is by far the most common due to its relative low cost and availability. Other common options such as aluminum, steel or tinsel wire (mixed strands of copper and cotton) may offer advantages in strength, weight or flex-life, however they almost always come at the cost of reduced conductivity. Plated copper such as Tin Plated Copper (TPC), Silver Plated Copper (SPC) and Nickel Plated Copper (NPC) offer additional features such as elevated temperatures and improved conductivity or solderability. Purer conductors such as Oxygen Free High Conductivity (OFHC) plated copper can improve the signal performance, and are often used for audio frequencies, whilst High strength Copper Alloy (HSA) conductors can provide a much improved dynamic performance over standard copper conductors. A variety of other metals and alloys are often used for their unique conducting properties when exposed to heat. Commonly known as Resistance Wires, they are used in Thermocouple cables where combinations of resistance wires can be used to detect variations in temperature. Some of the most commonly used are Nickel-Chromium (NiCr), Copper-Nickel (CuNi) and Iron (Fe).

Aluminium	2700	964	446000	660
Brass	8100	—	—	896
Bronze	8800	—	—	871
Copper	8890	428	168000	1083
Iron	7100	535	95400	1527
Lead	11340	—	24600	327
Manganese	7800	—	—	1260
Mercury	13600	138.3	—	—
Monel Metal	8800	—	19300	1455
Nickel	8900	—	19300	1455
Silver	10500	235	92000	—
Steel	7800	—	—	1499
Tin	7400	230	55800	232
Zinc	7000	—	11800	376

Stranding

The simplest form of conductor is a single, solid strand, however although this offers the smallest diameter, the purest signal and the largest cross-sectional area, this is also the weakest option and solid conductors are prone to breaking after just a few bending cycles. To improve the durability and flexibility of a conductor it is common to strand multiple wires together, the more wires that are stranded together to make a given size, the more flexible the conductor will be. Metric sizes categories the number of strands into Classes, the higher the class, the more strands in the conductor:

- Class 1 Solid, round.

- Class 2 Stranded conductor, 7 strands (larger sizes will be 19 strands).
- Class 5 Multi-stranded conductor for flexible 'general purpose' installations.
- Class 6 Extra-multi-stranded conductor for improved flexibility / flex-life.

Conductor Construction as Per IEC 60228 / BS EN 60228

Class 1

Solid Plain Copper Conductors for Single Core & Multi Core Cables

0.5	1	0.80	36
0.75	1	0.98	24.5
1	1	1.13	18.1
1.5	1	1.38	12.1
2.5	1	1.78	7.41
4	1	2.25	4.61
6	1	2.76	3.08
10	1	3.57	1.83

Class 2

Stranded Plain Copper Conductors for Single Core & Multi Core Cables

0.5	7	0.30	36
0.75	7	0.37	24.5
1	7	0.43	18.1
1.5	7	0.52	12.1
2.5	7	0.67	7.41
4	7	0.85	4.61
6	7	1.04	3.08
10	7	1.43	1.83
16	7	1.78	1.15
25	7	2.24	0.727
35	7	2.65	0.524
50	19	1.86	0.387
70	19	2.22	0.268
95	19	2.66	0.193
120	19	3.05	0.153
150	37	2.44	0.124
185	37	2.70	0.0991
240	37	3.12	0.0754
300	61	2.70	0.0601
400	61	3.15	0.047
500	61	3.38	0.0366
630	61	3.81	0.0283

Class 5

Flexible Plain Copper Conductors for Single Core & Multi Core Cables

0.5	39	40.1
0.75	26	26.7
1	19.5	20
1.5	13.3	13.7
2.5	7.98	8.21
4	4.95	5.09
6	3.30	3.39
10	1.91	1.95
16	1.21	1.24
25	0.78	0.795
35	0.554	0.565
50	0.386	0.393
70	0.272	0.277
95	0.206	0.21
120	0.161	0.164
150	0.129	0.132
185	0.106	0.108
240	0.0801	0.0817

Color Coding

Core Identification or Color Coding is used to identify conductors/cores for point-to-point wiring and for circuit diagrams. The standard colors used for core identification in accordance with IEC standards, which applies to our standard range of low voltage cables, are described in Table-1. The New Harmonized colors for core identification to (HD 308 S2) or IEC 60445 are described in Table-1 as well. Any other colors for core identification can be offered to our customers upon their request.

Table-1: Identification of conductors --- National and Harmonized Color Codes

Phase of single-phase circuit (L)	Red	Brown	Black
Neutral of single- or three-phase circuit (N)	Black	Blue	Blue
Phase 1 of three-phase AC circuit (L1)	Red	Brown	Black
Phase 2 of three-phase AC circuit (L2)	Yellow	Black	Brown
Phase 3 of three-phase AC circuit (L3)	Blue	Grey	Grey
Protective conductors (PE)	Green-and-yellow	Green-and-yellow	Green-and-yellow

(1) Function in a.c. Power circuits include lighting circuits.

Conversions

American Wire Gauge

American Wire Gauge (AWG), also known as Brown & Sharpe Gage, is the United States' standard method for denoting the cross-sectional areas of round, solid conductors. The cross-sectional area is useful in determining a conductor's current-carrying capacity and resistivity. Rather than using fractional inches, gauges are based on whole numbers with 38 commonly known sizes (4/0 to 36 AWG). Sizes smaller than 36 AWG can be calculated in gauge, but wires larger than 4/0 are commonly expressed in 1,000 circular mils (kcmil or MCM) where one cmil is the area of a circle with a diameter of one mil (1/1,000 inch).

A fact that is often confusing to the beginner is that smaller gauge numbers correspond to larger conductor diameters: physical size and the AWG number are inversely proportional. This relationship was influenced by the number of drawing operations needed to produce a designated gauge size. Smaller wires were required to be drawn multiple times through drawing dies to be thinned out, while larger diameter wires required less processing. The relationship between gauge sizes is not linear, but logarithmic.

How to convert AWG to mm

Wire diameter calculation

The n gauge wire diameter d_n in millimeters (mm) is equal to 0.127 mm times 92 raised to the power of 36 minus gauge number n, divided by 39:

$$d_n \text{ (mm)} = 0.127 \text{ mm} \times 92^{(36-n)/39}$$

where 0.127 mm is the diameter of gauge #36.

Wire cross sectional area calculation

The n gauge wire's cross sectional area A_n in square millimeters (mm^2) is equal to (π) divided by 4 times the square wire diameter d in millimeters (mm):

$$A_n \text{ (mm}^2\text{)} = (\pi/4) \times d_n^2 = 0.012668 \text{ mm}^2 \times 92^{(36-n)/19.5}$$

Conversion Table

Gauge AWG	Equivalent cross-section mm^2 mm^2	Nearest available cross-section mm^2	
20	0.519	0.5 -- 0.75	
18	0.823	1.0	
16	1.31	1.5	
14	2.08	2.5	
12	3.31	4	
10	5.26	6	
8	8.37	10	
6	13.3	16	
4	21.15	25	
2	33.62	35	
1	42.41	50	
1/0	53.49	50 -- 70	
2/0	67.23	70	
3/0	85.01	95	
4/0	107.2	120	

Gauge MCM	Equivalent cross-section mm^2 mm^2	Nearest available cross-section mm^2	
250	126.7	120 -- 150	
300	152	150	
350	177.3	185	
400	202.7	185	
450	228	185 -- 240	
500	253	240	
550	278.7	240 -- 300	
600	304	300	
650	329.4	300	
700	354.7	300 -- 400	
750	380	400	
800	405.4	400	
850	430.7	400	
900	456	400	
950	481.4	400	
1000	506.7	400 -- 630	
1250	633.4	630	
1500	760	800	
1750	886.7	800 -- 1000	
2000	1013.4	1000	

Voltage Drop

When current flows in the cable conductor there is a voltage drop between the ends of conductors; it is the product of the current and impedance.

The tabulated voltage drop values are based on a load power factor of 85% lagging and given for a current of one meter run. For any given cable length, the values should be multiplied by the length (in meters) and by the current (in amperes) that the cables are to carry.

EXAMPLE:

150 meters of three core cable
PVC insulated (rated 85 °C)
PVC sheathed
installed in air
to carry 64 amperes load
supply voltage 380 volt
three phase system 60Hz

The formula applicable is the following:

$$V_{ap} = \frac{V_p \times 1000}{I \times L}$$

Where:

I = Current in amperes
L = Route length in meters
V_{ap} = Approximate voltage drop/ampere/meter
V_p = Maximum permissible voltage drop (say 2.5% of 380 volts)

By substituting current, route length and maximum permissible voltage drop.

$$V_{ap} = \frac{9.5 \times 1000}{64 \times 150} = 0.99 \text{ mV}$$

To determine the suitable size of a conductor, select a cable from the tables on the next page such that the voltage drop value from this column is less than the calculated value of 0.99 mV.

Voltage Drop

The Voltage drop equations are as follow:

A - Single Phase circuit $V_d = 2\,I\,\ell\,(R\cos\phi + X\sin\phi)$ V

B - Three Phase circuit $V_d = \sqrt{3}\,I\,\ell\,(R\cos\phi + X\sin\phi)$ V

WHERE:

V_d : Voltage Drop (V)
I : Load Current (A)
ℓ : Route length
R : AC resistance (Ω/km)
X : Reactance (Ω/km)
$\cos\phi$: Power factor for load

WHERE: $X = \omega L \times 10^{-3}$

WHERE:

$\omega = 2\pi f$
f = operating frequency Hz
L = inductance (mH/Km)
ℓ = route length (Km)

RELATION BETWEEN COS ϕ & SIN ϕ AS FOLLOWS:

COSϕ	1	0.9	0.8	0.71	0.6
SINϕ	0	0.44	0.6	0.71	0.8

Voltage Drop for Stranded Single Core

C.S.A MM2	Voltage Drop PVC 70°C mV/Amp/Meter	Voltage Drop PVC 85°C mV/Amp/Meter
1.5	20.25	21.24
2.5	12.46	13.06
4	7.8	8.17
6	5.25	5.5
10	3.17	3.32
16	2.04	2.13
25	1.33	1.39
35	0.99	1.04
50	0.75	0.79

The above data is based on: Power factor: 0.8, Rated frequency: 60 Hz, Three phase.

Conversion Table

Length - Imperial

Multiply	By	To Obtain
Miles	0.0254	mm
Inches	2.54	cm
Feet	30.48	cm
Yards	0.9144	meters
Miles	1.6093	Kilometers

Length - Metric

Multiply	By	To Obtain
Millimeters	39.37	Mils
Centimeters	0.3937	Inches
Meters	1.0936	Yards
Kilometers	0.62137	Miles

Area - Imperial

Multiply	By	To Obtain
Square mils	0.000507	Square mm
Circular mils	0.7854	Square mils
Square Inches	6.4516	Square cm
Square feet	0.0929	Square meters
Square yards	0.8361	Square meters

Area - Metric

Multiply	By	To Obtain
Square millimeter	0.00155	Square inches
Square centimeters	0.155	Square inches
Square meters	1.19599	Square yards

Volume - Imperial

Multiply	By	To Obtain
Cubic inches	16.38716	Cubic cm
Cubic feet	0.028317	Cubic meters

Volume - US

Multiply	By	To Obtain
Quarts (liquid)	0.9463	liters
Gallons	3.7854	liters

Volume - Metric

Multiply	By	To Obtain
Cubic cm	0.06102	Cubic inches

Weight - Imperial

Multiply	By	To Obtain
Ounces	28.3495	grams
Pounds (Av)	453.59	grams
Pounds (Av)	0.45335	kg
Tons (short)	907.19	kg
Tons (long)	1016.05	kg

Weight - Metric

Multiply	By	To Obtain
Grams	0.03527	Ounces
Grams	0.002205	Pounds (Av)
Kilograms	35.274	Ounces
Kilograms	2.2046	Pounds (Av)

Miscellaneous - Imperial

Multiply	By	To Obtain
Pounds per 100 feet	1.48816	kg/km
Pounds per sq. inch	0.07031	kg per sq. cm
Ohms per 1000 feet	3.28083	Ohms per kilometer
Decibels	0.1153	nepers
Decibels per mile	0.62137	Decibels per km

Miscellaneous - Metric

Multiply	By	To Obtain
Kg/Km	0.67197	Pounds per 100 feet
Kg per sq. cm	14.2234	Pounds per sq. inch
Ohms per kilometer	0.3048	Ohms per 1000 feet
Ohms per kilometer	1.6093	Ohms per mile
Decibels per km	1.6093	Decibels per mile

Temperature

Multiply	By	To Obtain
Celsius	9/5 (C) + 32	Fahrenheit
Fahrenheit	5/9 (F) – 32	Celsius

Glossary

A

AWG
Abbreviation for American Wire Gauge. A standard used in the determination of the physical size of a conductor determined by its circular mil area.

Ampacity
The maximum current an insulated wire or cable can safely carry without exceeding limitations of insulation material.

AWM
Designation for Appliance Wiring Material.

ASTM
Abbreviation for American Society for Testing and Materials.

Ambient Temperature
The normal temperature within a given area.

B

Building Wire
Insulated wires used in building for lighting and power, 600 volts or less, usually not exposed to outdoor environment.

Bare Conductor
A conductor with no coating or cladding on the copper.

Bedding
A layer of material applied to a cable immediately below the armouring.

Buried Cable
A cable installed directly in the ground without use of underground conduit. Also called direct burial cable.

C

Cable
Multicore stranded insulated wires under protective sheath to conduct electrical energy.

Conductor
A material capable of easily transferring electrical charge.

Current Rating
The maximum continuous electrical flow of current.

D

D.C.
Abbreviation for direct current.

Decibel (dB)
A unit to express differences of power level, power gain in amplifiers or power loss in passive circuits or cables.

Dielectric Constant (K)
The ratio of the capacitance of a capacitor (or consoles) with dielectric between the electrodes to the capacitance when air is between the electrode.

Dielectric Strength
The voltage which as insulation can withstand before breakdown occurs. Usually expressed as a voltage gradient.

Duct
An underground or overhead tube or conduit for carrying electrical cables.

E

Eccentricity
A measure of the center of a conductor's location with respect to the circular cross-section of the insulation expressed as a percentage of center displacement of one circle with the other.

Elongation
The fractional increase in length of a material stressed in tension.

Embossing
A means of identification or lettering using heat and pressure to leave raised lettering on the sheath material of the cable.

EMF
Abbreviation for Electro Motive Force-force determining flow of electricity (Voltage).

F

Farad
A measuring unit of electrical capacity.

Film
A thin plastic sheet.

Flame Resistance
Ability of the material to extinguish flame once the source of heat removed.

Flat Cable
A cable with two essentially flat surfaces.

Foils
A thin supporting film of continuous sheet such as plastic foil, metal foil, laminated foil etc. for static shielding, contracts and other electrical application.

G

Gauge
A term used to denote physical size of a wire.

Ground Conductor
An electrical conductor for the connection to the earth. Making a complete electrical circuit.

H

Heat Resistance
Ability of a substance to maintain physical, chemical and electrical integrity under specified temperature conditions.

Henry
A measuring unit of inductance such that the induced voltage in numerically equal to the rate of change of current in amperes per second.

Hertz (Hz)
A measuring unit of the frequency equal to one cycle per second.

I

ICEA
Abbreviation for Insulated Cable Engineers Association.

IEC
Abbreviation for International Electrotechnical Commission.

IEEE
Abbreviation for Institute of Electrical and Electronics Engineers.

Impedance
Resistance to flow of an alternating current at particular frequency. It is a combination of resistance and reactance x, measured in ohms.

Insulation
A non conducting substance, named as dielectric, surrounding the conductor.

J

Jacket
An overall covering of a cable, called also sheath which protects against the environment.

Jumper
A short length of conductor used to make a temporary connection between terminals, around break in a circuit, or around an instrument.

K

KV
Abbreviation for kilovolt = 1000 volts.

KW
Abbreviation for kilowatt = 1000 watts.

L

Laser
Light Amplification by Stimulated Emission of radiation. An electro-optic device that produces coherent light with a narrow range of wavelengths, typically centered 780 mm, 1310 mm, or 1550 mm.

LAN
Local Area Network. A network located in a localised area e.g. in an office, building, complex building whose communication technology provides a high-bandwidth, low-cost medium to which many can be connected.

LED
Light Emitting Diode.

Leakage Current
The undesirable flow of current through or over the surface of an insulation.

Loop Resistance
The total resistance of two conductors measured round trip from one end.

M

MCM
Cross-section of greater AWG-sizes. (1 MCM = 1000 circular mils = 0.5067 mm^2)

Megaohm
One million ohms.

Mho
The unit of conductivity. The reciprocal of an ohm.

MHz
Megahertz (one million cycles per second).

Micro phonics
Noise in a system caused by mechanical vibration of component within the system.

Mylar
Dupont trademark for polyethylene terephalate (polyester) film used in the front of a tape.

N

National Electric Code (NEC)
A set of regulation governing construction and installation of electrical wiring and apparatus.

NEMA
National Electrical Manufacturers Association.

Nylon
A group of polyamide polymers, used for wire and cable jacketing with good chemical and abrasion resistance.

O

Ohm
Unit of resistance such that a constant current of one ampere produces a force of one volt.

Overlap
A certain portion of a foil or band which laps over the leading edge of a helica or longitudinally wrapping tape.

Over Current
The current which causes and excessive temperature rise in a conductor.

Overload Capacity
The maximum level of current, voltage, or power which a device can withstand before it is damaged.

Oxygen Index
Percentage of Oxygen necessary to support combustion of specified material.

P

Pair
Two insulated wires of a single circuit laying up together.

Polyester
Polyethylene terephthalate which is used extensively in the production of a high strength moisture resistant film used as a cable core wrapping material.

Polyvinylchloride (PVC)
A thermoplastic material composed of polymers of vinylchloride which may be rigid or elastomeric depending on specific formulation.

Propagation
Delay time required for an electrical wave to travel between two points on a transmission line.

Q

Quad
A four-wire unit of insulated conductors.

R

Rated Temperature
The maximum temperature at which an electric component can operate for extended period without loss of its operating properties.

Rated Voltage
The maximum voltage at which an electric component can operate for extended periods without degradation of performance or safety hazard.

Reactance

The opposition offered to the flow of alternating current by the inductance or capacitance of the component or circuit.

Resistance
In D.C. circuits, the opposition material offers to current, measured in ohms. In A.C. circuits, resistance is the real component of impedance, and may be higher than the value measured at D.C.

S

Sheath
The material, usually an extruded plastic or elastomer, applied outermost to a wire or cable, very often referred to as jacket.

Solid Conductor
A conductor consisting of a single wire.

Stranded Conductor
A conductor composed of individual groups of wires twisted together to form an entire unit.

T

Tensile Strength
A term denoting the greatest longitudinal tensile stress a substance can bear without mechanical failure.

Tinned Copper
Tin coating over copper to aid in soldering and inhibit corrosion.

Twin Cable
A cable composed of two separate insulated stranded conductor laid parallel under a common covering.

THHN
Thermoplastic insulated, High heat resistant 90°C dry locations, Nylon jacketed cable.

THWN
Thermoplastic insulated, Heat and moisture resistant 75°C Wet locations, Nylon jacketed cable.

U

UL
Abbreviation for Underwriters Laboratories, Inc.

V

VDE
West Germany approval agency.

Volt
A unit of electromotive force.

Voltage Drop
The amount of voltage loss from original input to point of electrical device.

VW-1
A flammability rating established by Underwriters laboratories for wires and cables that pass a specially designed vertical flame test.

W

Wall Thickness
The thickness of the applied insulation or jacket.

Wire Gauge
A system of numerical designation of wire of wire sizes.

X

XLPE
Cross-linked polyethylene.