

# 6419X Conduit Cable

Application: Industrial and commercial wiring, these cables are intended for installation in trunking and conduit. They may also be used inside fixed, protected installations such as light fittings, appliances, switchgear and control gear.

Technical Data:



1	Conductor	H07V-R: Class 2 standard plain copper conductors H07V-U: Class 1 solid plain copper conductor
2	Insulation	PVC (Polyvinyl Chloride)

**Voltage Rating**            450/750V

**Conductor Operating Temperature**    0°C to +70°C

## Core Identification

Black  
Brown  
Grey  
Blue  
Green / Yellow



## Sizes and Dimensions

Part No	Class Of Conductor	Conductor Cross Section Area (mm <sup>2</sup> )	Cable Cross Section Area (mm <sup>2</sup> )	Overall Diameter (mm)	Nominal Weight (kg/km)	Resistance of Copper Conductor (Ω/Km) at 20°C
*	1	1.0	5.75	2.7		18.1
*	1	1.5	8.04	3.2	25	12.1
6419X 1.5	2	1.5	8.55	3.3	25	12.1
*	1	2.5	11.95	3.9	35	7.41
6419X 2.5	2	2.5	12.566	4.0	35	7.41
6419X 4.0	2	4	16.62	4.6	50	4.61
6419X 6.0	2	6	21.24	5.2	75	3.08
6419X 10.0	2	10	35.26	6.7	115	1.83
6419X 16.0	2	16	47.78	7.8	165	1.15
6419X 25.0	2	25	73.90	9.7	260	0.727
*	2	35	93.31	10.9	345	0.524
*	2	50	128.68	12.8	475	0.387
*	2	70	167.42	14.6	665	0.268
*	2	95	229.66	17.1	920	0.193
*	2	120	277.60	18.8	1145	0.153
*	2	150	343.07	20.9	1415	0.124
*	2	185	426.38	23.3	1780	0.0991
*	2	240	555.72	26.6	2330	0.0754
*	2	300	688.14	29.6	2935	0.0601
*	2	400	865.70	33.2	3900	0.0470
*	2	500	1069.40	36.9	4995	0.0366
*	2	630	1366.70	41.1	6300	0.0283

\* = Non Stock Items

*The information contained within this datasheet is for guidance only. Please note the actual cable dimensions may vary due to manufacturing tolerance.*



TABLE 4D1A - Single-core 70°C thermoplastic insulated cables, non-armoured, with or without sheath (COPPER CONDUCTORS)

Ambient Temperature: 30°C  
Conductor Operating Temperature 70°C

CURRENT-CARRYING CAPACITY (amperes)

Conductor Cross - Sectional Area	Reference Method A (enclosed in conduit in thermally insulating wall etc)		Reference Method B (enclosed in conduit on a wall or in trunking etc)		Reference Method C (Clipped Direct)		Reference Method F (In free air or on a perforated cable tray horizontal or vertical)					
	2 Cables, Single - phase a.c. or d.c	3 or 4 cables, three - phase a.c	2 Cables, single - phase a.c. or d.c.	3 or 4 cables, three - phase a.c.	2 cables, single - phase a.c. or d.c. flat and touching	3 or 4 cables, three - phase a.c. flat and touching or trefoil	Touching			Spaced By One Diameter		
							2 Cables, single - phase a.c. or d.c. flat	3 cables, three - phase a.c. flat	3 cables, three - phase a.c. trefoil	2 Cables, single phase a.c. or d.c. or 3 cables three-phase a.c. flat	Horizontal	Vertical
(mm <sup>2</sup> )	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	11	10.5	13.5	12	15.5	14	-	-	-	-	-	-
1.5	14.5	13.5	17.5	15.5	20	18	-	-	-	-	-	-
2.5	20	18	24	21	27	25	-	-	-	-	-	-
4	26	24	32	28	37	33	-	-	-	-	-	-
6	34	32	41	36	47	43	-	-	-	-	-	-
10	46	42	5	50	65	59	-	-	-	-	-	-
16	61	56	76	68	87	79	-	-	-	-	-	-
25	80	73	101	98	114	104	131	114	110	146	130	
35	99	89	125	110	141	129	162	143	137	181	162	
50	119	108	151	134	182	167	196	174	167	219	197	
70	151	136	182	171	234	214	251	225	216	281	254	
95	182	164	232	207	284	261	304	275	264	341	311	
120	210	188	269	239	330	303	352	321	308	396	362	
150	240	216	300	262	381	439	406	32	356	456	419	
185	273	245	341	296	436	400	463	427	409	521	480	
240	321	286	400	346	515	472	546	507	485	615	569	
300	367	328	458	394	594	545	629	587	561	709	659	
400	-	-	546	467	694	634	754	689	656	852	795	
500	-	-	626	533	792	723	868	789	749	982	920	
630	-	-	720	611	904	826	1005	905	855	1138	1070	
800	-	-	-	-	1030	943	1086	1020	971	1265	1188	
1000	-	-	-	-	1154	1058	1216	1149	1079	1420	1337	

NOTE:  
For cable having flexible conductors, see section 2.4 of this appendix for adjustment factors for current-carrying capacity and voltage drop.



# TABLE 4D1B

VOLTAGE DROP (per ampere per metre):

Conductor Operating Temperature: 70°C

Conductor Cross Sectional area	2 Cables d.c.	2 Cables, single - phrase a.c.									3 or 4 cables, three - phrase a.c.											
		Reference Methods A & B (Enclosed in conduit or trunking)			Reference Methods C & F (Clipped direct, on tray or in free air)						Reference Methods A & B (enclosed in conduit or trunking)			Reference Methods C & F (Clipped direct, on tray or in free air)								
					Cables Touching			Cables Spaced*						Cables Touching trefoil			Cables Touching Flat			Cables Spaces*, Flat		
(mm <sup>2</sup> )	(mV/A/m)	(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)		
1	44	44			44			44			38			38			38			38		
1.5	29	29			29			29			25			25			25			25		
2.5	18	18			18			18			15			15			15			15		
4	11	11			11			11			9.5			9.5			9.5			935		
6	7.3	7.3			7.3			7.3			6.4			6.4			6.4			6.4		
10	4.4	4.4			4.4			4.4			3.8			3.8			3.8			3.8		
16	2.8	2.8			2.8			2.8			2.4			2.4			2.4			2.4		
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
25	1.75	1.80	0.33	1.80	1.75	0.20	1.75	1.75	0.29	1.80	1.50	0.29	1.55	1.50	0.175	1.50	1.50	0.25	1.55	1.50	0.32	1.55
35	1.25	1.30	0.31	1.30	1.25	0.195	1.25	1.25	0.28	1.30	1.10	0.27	1.10	1.10	0.170	1.10	1.10	0.24	1.10	1.10	0.32	1.15
50	0.93	0.95	0.30	1.00	0.93	0.190	0.95	0.93	0.28	0.97	0.81	0.26	0.85	0.80	0.165	0.82	0.80	0.24	0.84	0.80	0.32	0.86
70	0.63	0.65	0.29	0.72	0.63	0.185	0.66	0.63	0.27	0.69	0.56	0.25	0.61	0.55	0.160	0.57	0.55	0.24	0.60	0.55	0.31	0.63
95	0.46	0.49	0.28	0.56	0.47	0.180	0.50	0.47	0.27	0.54	0.42	0.24	0.48	0.41	0.155	0.43	0.41	0.23	0.47	0.40	0.31	0.51
120	0.36	0.39	0.27	0.47	0.37	0.175	0.41	0.37	0.26	0.45	0.33	0.23	0.41	0.32	0.150	0.36	0.32	0.23	0.40	0.32	0.30	0.44
150	0.29	0.31	0.27	0.41	0.30	0.175	0.34	0.29	0.26	0.39	0.27	0.23	0.36	0.26	0.150	0.30	0.26	0.23	0.34	0.26	0.30	0.40
185	0.23	0.25	0.27	0.37	0.24	0.170	0.29	0.24	0.26	0.35	0.22	0.23	0.32	0.21	0.145	0.26	0.21	0.22	0.31	0.21	0.30	0.36
240	0.180	0.195	0.26	0.33	0.185	0.165	0.25	0.185	0.25	0.31	0.17	0.23	0.29	0.160	0.145	0.22	0.160	0.22	0.27	0.160	0.29	0.34
300	0.145	0.160	0.26	0.31	0.150	0.165	0.22	0.150	0.25	0.29	0.14	0.23	0.27	0.130	0.140	0.190	0.130	0.22	0.25	0.130	0.29	0.32
400	0.105	0.160	0.26	0.29	0.120	0.160	0.20	0.115	0.25	0.27	0.12	0.22	0.25	0.105	0.140	0.175	0.105	0.21	0.24	0.100	0.29	0.31
500	0.086	0.110	0.26	0.28	0.098	0.155	0.185	0.093	0.24	0.26	0.10	0.22	0.25	0.086	0.135	0.160	0.086	0.21	0.23	0.081	0.29	0.30
630	0.068	0.094	0.25	0.27	0.081	0.155	0.175	0.076	0.24	0.25	0.08	0.22	0.24	0.072	0.135	0.150	0.072	0.21	0.22	0.066	0.28	0.29
800	0.053	-			0.068	0.150	0.165	0.061	0.24	0.25	-			0.060	0.130	0.145	0.060	0.21	0.22	0.053	0.28	0.29
1000	0.042	-			0.059	0.150	0.160	0.050	0.24	0.24	-			0.052	0.130	0.140	0.052	0.20	0.21	0.044	0.28	0.28

NOTE:

\* Spacings larger than one cable diameter will result in a larger voltage drop.

# A

## Appendix Cable capacities of conduit and trunking

### A1 General

This Appendix describes a method based on practical work and experiment which can be used to determine the size of conduit or trunking necessary to accommodate cables of the same size or differing sizes, and provides a means of compliance with the requirements of Chapter 52 of BS 7671.

The method employs a 'unit system', each cable size being allocated a factor. The sum of all factors for the cables intended to be run in the same enclosure is compared against the factors given for conduit, ducting or trunking, as appropriate, in order to determine the size of the conduit or trunking necessary to accommodate those cables.

It has been found necessary, for conduit, to distinguish between:

- Case 1 - Straight runs not exceeding 3m in length, and
- Case 2 - Straight runs exceeding 3m, or runs of any lengths incorporating bends or sets.

*The term 'bends' signifies a British Standard 90° bend and on double set is equivalent to one bend.*

For case 1, each conduit size is represented by only one factor. For case 2, each conduit size has a variable factor which is dependent on length of run and the number of bends or sets. For a particular size of cable the factor allocated to it for case 1 is not the same as for case 2.

For trunking, each size of cable has been allocated a factor, as has been each size of trunking.

A number of variables affect any attempt to arrive at a standard method of assessing the capacity of conduit or trunking. Some of these are:

1. Reasonable care in installation
2. Acceptable use of the space available
3. Tolerance in cable size
4. Tolerance in conduit and trunking

The Following tables can only give guidance on the maximum number of cables which should be drawn in. The sizes should ensure an easy pull with low risk of damage to the cable.

**Table A1** - Cable factors for use in conduit in short straight runs

Type of conductor	Conductor cross sectional area (mm <sup>2</sup> )	Cable Factor
Solid	1	22
	1.5	27
	2.5	39
Standard	1.5	31
	2.5	43
	4	58
	6	88
	10	146
	16	202
	25	385

Only the ease of drawing-in is taken into account. The electrical effects of grouping are not. As the number of circuits increases, the current-carrying capacity of the cables decrease. Thus cable size have to be increased, with the consequent increase in cost cable and conduit.

It may sometimes be more attractive economically to divide the circuits concerned between two or more enclosures.

For sizing conduit and trunking the following three cases are dealt with:

Single-core thermoplastic (PVC) insulated cables to BS 6004 or single-core thermosetting cables to BS 7211:

1. In straight runs of conduit not exceeding 3m in length (Tables A1 and A2).
2. In straight runs conduit exceeding 3m in length, or in runs of any length incorporating bends or sets (Tables A3 and A4).
3. In trunking (Tables A5 and A6).

Other sizes and types of cable in conduit or trunking dealt with in section A5 of this appendix.

For cables and/or conduits not covered by this appendix, advice on the number of cables which can be drawn in should be obtained from the manufacturer.

## A2 Single-core thermoplastic (PVC) insulated cables in straight runs of conduit not exceeding 3m in length

For each cable it is intended to use, obtain the appropriate factor from table A1.

Add the cable factors together and compare the total with the conduit factors given in Table A2.

The minimum conduit size is having a factor equal to or greater than the sum of the cable factors.

Conduit Diameter (mm)	Conduit Factor
16	290
20	460
25	800
32	1400
38	1900
50	3500
63	5600

**Table A2** - Conduit factors for use in short straight runs.

## A3 Single-core thermoplastic (PVC) insulated cables in straight runs of conduit exceeding 3m in length, or in runs of any length, or in runs of any length incorporating bends or sets.

For each cable it is intended to use, obtain the appropriate factor from table A3.

Add the cable factors together and compare the total with the conduit factors given in Table A4, taking into account the length of run it is intended to use and the number of bends and sets in that run.

The minimum conduit size is that size having a factor equal to or greater than the sum of the cable factors. For the larger sizes of conduit, multiplication factors are given relating them to 32mm diameter conduit.

Type Of Conductor	Conductor Cross - Sectional Area (mm <sup>2</sup> )	Cable Factor
Solid or Stranded	1	16
	1.5	22
	2.5	30
	4	43
	6	58
	10	105
	16	145
	25	217

**Table A3** - Cable factor for use in conduit in long straight runs over 3m, or runs of any length incorporating bends.



**Table A4 - Cable factors for runs incorporating bends and long straight runs**

Length of run (m)	Conduit Diameter (mm)																			
	16	20	25	32	16	20	25	32	16	20	25	32	16	20	25	32	16	20	25	32
	Straight				One Bend				Two Bends				Three Bends				Four Bends			
1					188	303	543	947	177	286	514	900	158	256	463	818	130	213	388	692
1.5					182	294	528	923	167	270	487	857	143	233	422	750	111	182	333	600
2					177	286	514	900	158	256	463	818	130	213	388	692	97	159	292	529
2.5					171	278	500	878	150	244	442	783	120	196	358	643	86	141	260	474
3					167	270	487	857	143	233	422	750	111	182	333	600				
3.5	179	290	521	911	162	263	475	837	136	222	404	720	103	169	311	563				
4	177	286	514	900	158	256	463	818	130	213	388	692	97	159	292	529				
4.5	174	282	507	889	154	250	452	800	125	204	373	667	91	149	275	500				
5	171	278	500	878	150	244	442	783	120	196	358	643	86	141	260	474				
6	167	270	487	857	143	233	422	750	111	182	333	600								
7	162	263	475	837	136	222	404	720	103	169	311	563								
8	158	256	463	818	130	213	388	692	97	159	292	529								
9	154	250	452	800	125	204	373	667	91	149	275	500								
10	150	244	442	763	120	196	358	643	85	141	260	474								

**Additional Factors**

For 38 mm Diameter use 1.4 x (32mm factor).  
 For 50 mm Diameter use 2.6 x (32mm factor).  
 For 63 mm Diameter use 4.2 x (32mm factor).



## A4 Single-core thermoplastic (PVC) insulated cables trunking

For each cable it is intended to use, obtain the appropriate factor from Table A5.

Add the cable factors together and compare the total with the factors for trunking in Table A6.

The minimum size of trunking is that size having a factor equal to or greater than the sum of the cable factor.

**Table A5 - Cable factors for trunking**

Type of conductor	Conductor cross - sectional area (mm <sup>2</sup> )	Thermoplastic (PVC) BS 6004 Table 1 Cable Factor	Thermosetting BS 7211 Table 3 Cable Factor
Solid	1.5	8.0	8.6
	2.5	11.9	11.9
Stranded	1.5	8.6	9.6
	2.5	12.6	13.9
	4	16.6	18.1
	6	21.2	22.9
	10	35.3	36.3
	16	47.8	50.3
	25	73.9	75.4
	35	93.3	95.1
	50	128.7	132.8
	70	167.4	176.7
	95	229.7	227.0
	120	277.6	283.5
	150	343.1	346.4
	185	426.4	433.7
240	555.7	551.6	

Notes:

1. Cable factors are the cross-sectional area using BS upper limit mean overall diameter.
2. The provision of spare space is advisable; however, any circuits added at a latter date must take into account grouping (see Appendix 4 of BS 7671 for further details).
3. Where thermosetting insulated conductors designed to operate at 90°C (BS 5467 or BS 7211 etc.) are installed together with thermoplastic (PVC) insulated conductors designed to operate at 70°C, it must be ascertained that the thermoplastic (PVC) insulated conductors will not be damaged (Regulation 523.5.)

Dimensions of trunking (mm x mm)	Trunking factor
50 x 38	767
50 x 50	1037
75 x 25	738
75 x 38	1146
75 x 50	1555
75 x 75	2371
100 x 25	993
100 x 38	1542
100 x 50	2091
100 x 75	3189
100 x 100	4252
150 x 38	2999
150 x 50	3091
150 x 75	4743
150 x 100	6394
150 x 150	969
200 x 38	3082
200 x 50	4145
200 x 75	6359

Dimensions of trunking (mm x mm)	Trunking factor
200 x 100	8572
200 x 150	13001
200 x 200	17429
225 x 38	3474
225 x 50	4671
225 x 75	7167
225 x 100	9662
225 x 150	14652
225 x 200	19643
225 x 225	22138
300 x 38	4648
300 x 50	6251
300 x 75	9590
300 x 100	12929
300 x 150	19607
300 x 200	26285
300 x 225	29624
300 x 300	39428

*Note: These factors are for metal trunking with trunking thickness taken into account. They may be optimistic for plastic trunking, where the cross-sectional area available may be significantly reduced from the nominal by the thickness of the wall material.*

## A5 Other sizes and types of cable in conduit or trunking, including flexible conduit

For sizes and types of cable in conduit or trunking other than those given in tables A1 to A6, the number of cables installed should be such that the resulting space factor does not exceed 35 per cent of the net internal cross-sectional area for conduit and 45 per cent of the net internal cross-sectional area for trunking.

Flexible conduit types may have a smaller internal diameter due to increase wall thickness. The conduit manufacturer's advice should be obtained regarding cable capacity and cable grouping, and the required flexibility must be considered. The 35% space factor could also be utilized for flexible conduit.

Space factor is defined as the ratio (expressed as a percentage) of the sum of the overall cross-sectional areas of cables (insulation and any sheath) to the internal cross-sectional area of the conduit or other cable enclosure in which they are installed. The effective overall cross-sectional area of a non-circular cable is taken as that of a circle of diameter equal to the major axis of the cable.

The minimum internal radii of bends of cable for fixed wiring as given in Table G2 should be used. Care should be taken to use bends in trunking systems, particularly with larger cables, that allow adequate bending radius.