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HISTORY

Noora Electric wire and cable production project has started at November 2013 in a land with the area of 3000 square meters in the eastern Bandpay industrial city (Babol, Mazandaran, Iran) in which a production hall with an area of 800 square meters and an official building with an area of 300 square meters has been built until November 2014. Noora Electric productions has started to produce since January 2016 using modern machines and applying high technology laboratory instruments with a nominal capacity of 600 tones. Nominal production capacity of this company has soon been increased to 1250 tones by starting new production lines at Jun 2018. Employing experts in the production of wire and cable and applying modern production machines and testing instruments in the laboratory on the one hand, and using high quality raw materials on the other hand, caused Noora Electric products to be very qualified. One of the most important goals of Noora Electric's leaders is to preserve and promote the quality of the products. In this way, in addition to paying attention to the suggestions and criticisms of the customers, Noora Electric QC lab is always updated through upgrading the testing instruments and attending special and technical courses. Furthermore, in order to find requirements and extend the amount and variety of products, young researchers in the department of Research and Development (R&D) of Noora Electric are continuously investigating and improving the knowledge of the Noora Electric members. Noora Electric Group succeeded to achieve Iran's national standard organization's certificates ISIRI 607-3, 607-4, 607-5, 607-6 and 3569-1. Moreover, all Noora Electric products have the confirmation certificates of Iran's ministry of power and European *CE* standards certificate.

Regarding to the fact that sustainable development of the company's activities is one of the most important goals of Noora Electric leaders, the quality management system based on the ISO 9001:2015 standards was implemented since March 2019 and the certification was awarded by *TÜV world* Institute (Germany).

Leaders of Noora Electric production group hope to extend the amount and variety of their products in order to help to the national employment and exports.



CEO MESSAGE

Production is one of the most important pillars of every economic system. One who is attempting in this field, helps to improve the economical foundation in the one hand, and makes the opportunity to use the human capitals to pave the ground to improve and develop the industry and make the economy dynamic and productive on the other hand.

Noora Electric wire and cable manufacture, with the aim of obtaining the customers reliance and satisfaction, is hardly endeavoring to monitor and improve the quality of products continuously. Reaching this goal, Iranian National Standard organization certificates, confirmation certificates of Iran's ministry of power and European CE international certificate where achieved. Moreover, regarding to the fact that sustainable development is of quality management system based on ISO 9001:2015 where applied.

I am very honored seeing employees make a striving and bravely effort to do their best and working hard to improve the team working cooperations and their technical knowledge and helping Noora Electric Managing group to move forward toward the drawn goals. Company's managers assure to enhance the job satisfaction and pleasure of employees through improving knowledge and increasing their ability and providing a safe, happy and dynamic environment.

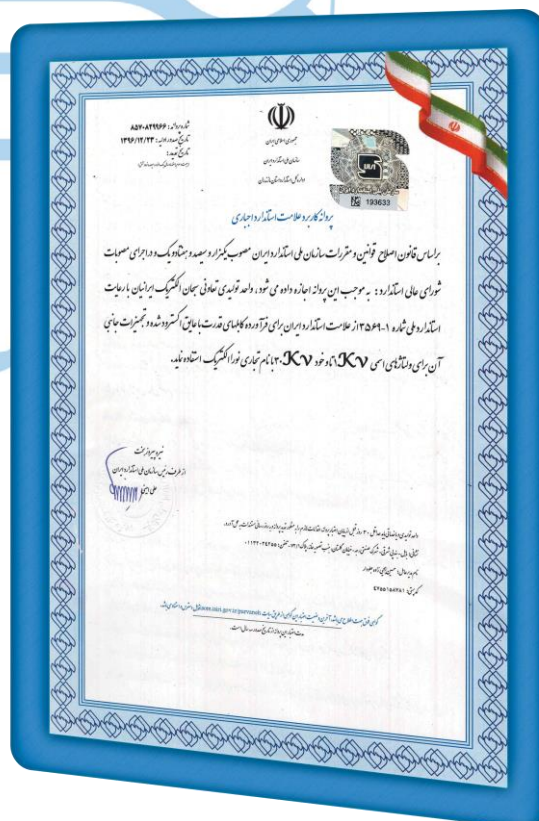
I have to thank all my colleagues and ask them to help the managers of the company with their suggestions and empathy.

With the best wishes
Hossein Yahyazadeh





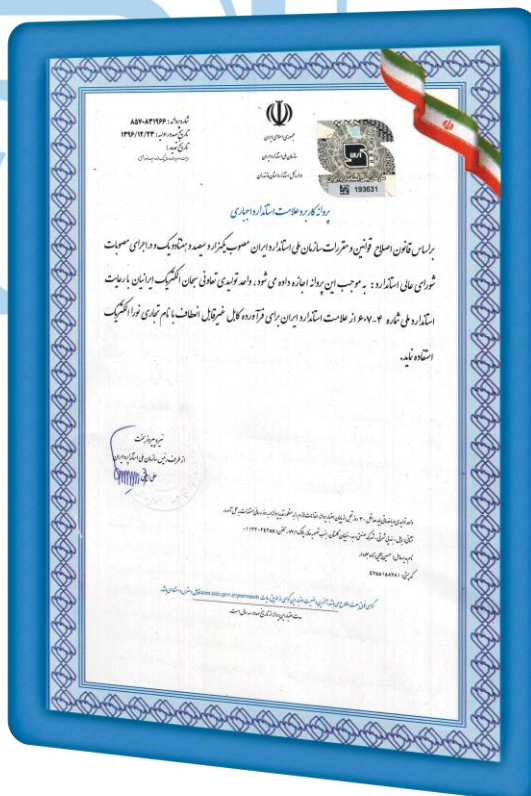
ISIRI 607-5 CERTIFICATE



ISIRI 3569 - 1 CERTIFICATE



ISIRI 607 - 3 CERTIFICATE



ISIRI 607 - 4 CERTIFICATE



PVC INSULATED NON-SHEATHED WIRES WITH FLEXIBLE CONDUCTOR H07V-K, H05V-K (NYA3F)



APPLICATION:

These types of wires are widely used in electric devices, lightning systems, tubes under and on the plaster at dry environment, and also in the cable trays and cabling channels.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC/C

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage for $A \leq 1 \text{ mm}^2$: $U_0/U=300/500 \text{ V}$

Nominal voltage for $A \geq 1.5 \text{ mm}^2$: $U_0/U=450/750 \text{ V}$

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-3, IEC 60227-3

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Cross Section	Insulation thickness	Overall diameter	Min. bending radius	Permissible pulling force	Max. conductor resistance DC at 20°C	Min. Insulation resistance DC at 70°C	Approx. net weight
mm ²	mm	mm	mm	N	Ω/km	Ω/km	Kg/km
0.5	0.6	2.20	10	6	39	0.013	8.9
0.75	0.6	2.35	12	9	26	0.011	11.8
1	0.6	2.50	13	14	19.5	0.010	14.5
1.5	0.7	3	14	23	13.3	0.010	21
2.5	0.8	3.6	17	38	7.98	0.009	33
4	0.8	4	19	60	4.95	0.007	47
6	0.8	4.5	25	90	3.30	0.006	66
10	1	6.5	30	150	1.91	0.0056	108
16	1	7.3	35	240	1.21	0.0046	164
25	1.2	9.1	44	375	0.780	0.0044	255
35	1.2	11	50	525	0.554	0.0038	345
50	1.4	12.5	58	750	0.386	0.0037	490
70	1.4	15	68	1050	0.272	0.0032	680
95	1.6	18.5	76	1425	0.206	0.0032	895
120	1.6	20	84	1800	0.161	0.0029	1130
150	1.8	22.5	94	2250	0.129	0.0029	1400
185	2	24.5	110	9250	0.106	0.0029	1700
240	2.2	26.5	119	12000	0.0801	0.0028	2250

PVC INSULATED NON-SHEATHED WIRES WITH SOLID CONDUCTOR H07V-U, H05V-U (NYA)



APPLICATION:

These types of wires are used for laying in electric-installation tubes installed under and on the plaster, closed channels, internal wiring of electric panels and electricity distributors.

CONSTRUCTION:

Conductor: Solid annealed copper (class 1 according to ISIR 3084 or IEC 60228)

Insulator: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage for $A \leq 1 \text{ mm}^2$: $U_0/U=300/500 \text{ V}$

Nominal voltage for $A \geq 1.5 \text{ mm}^2$: $U_0/U=450/750 \text{ V}$

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-3, IEC 60227-3

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Cross Section	Insulation thickness	Overall diameter	Min. bending radius	Permissible pulling force	Max. conductor resistance DC at 20°C	Min. Insulation resistance DC at 70°C	Approx. net weight
mm ²	mm	mm	mm	N	Ω/km	Ω/km	Kg/km
0.5	0.6	2.0	8	16	36	0.015	9
0.75	0.6	2.2	9	27	24.5	0.012	12
1	0.6	2.4	11	45	18.1	0.011	16
1.5	0.7	2.8	13	75	12.1	0.011	22
2.5	0.8	3.4	16	125	7.41	0.010	35
4	0.8	3.8	18	200	4.61	0.0085	49
6	0.8	4.3	20	300	3.08	0.007	69
10	1	5.5	26	400	1.83	0.007	112

PVC INSULATED NON-SHEATHED WIRES WITH STRANDED CONDUCTOR H07V-R (NYA)



APPLICATION:

These types of wires are used for laying in electric-installation tubes installed under and on the plaster, closed channels, internal wiring of electric panels and electricity distributors.

CONSTRUCTION:

Conductor: Stranded annealed copper (class 2 according to ISIR 3084 or IEC 60228)

Insulator: PVC/C

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=450/750$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-3, IEC 60227-3

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Cross Section	Insulation thickness	Overall diameter	Min. bending radius	Permissible pulling force	Max. conductor resistance DC at 20°C	Min. Insulation resistance DC at 70°C	Approx. net weight
mm ²	mm	mm	mm	N	Ω/km	Ω/km	Kg/km
1.5	0.7	2.95	13	75	12.1	0.010	23
2.5	0.8	3.6	16	125	7.41	0.009	36
4	0.8	4.1	18	200	4.61	0.0077	50
6	0.8	4.7	20	300	3.08	0.0065	71
10	1	6	26	400	1.83	0.0065	114
16	1	7	32	800	1.15	0.0050	170
25	1.2	8.7	39	1250	0.727	0.0050	265
35	1.2	10	44	1750	0.524	0.0043	355
50	1.4	11.5	52	2500	0.387	0.0043	490
70	1.4	13.5	60	3500	0.268	0.0035	680
95	1.6	15.7	68	4750	0.193	0.0035	950
120	1.6	17.5	76	6000	0.153	0.0032	1170
150	1.8	19.2	84	7500	0.124	0.0032	1450
185	2	21.5	94	9250	0.0991	0.0032	1790
240	2.2	24.5	106	12000	0.0754	0.0032	2340
300	2.4	27.5	118	15000	0.0601	0.0030	2950
400	2.6	30.5	135	20000	0.0470	0.0028	3750

FLAT AND NOT-SHEATED FLEXIBLE CABLES H03VH-H



APPLICATION:

Highly flexible cable for dry areas, used for connection of small mobile devices, requiring special flexibility in conditions free of any mechanical stresses. Permitted frequent bending, but no twisting. Suitable for radios, desk lamps, electric razors and similar household or office devices, as long as the cable is adapted to essential specifications of the device. Not suitable for cookers and hot devices. Fixed cable connection to the device or by means of a small plug. Cable ends must be provided with inseparable plugs additionally protected by rubber or thermoplastic insertion. Cable length must not exceed 2 m.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 6 according to ISIR 3084 or IEC 60228)

Insulator: PVC/D

TECHNICAL DATA:

Temperature range in continues operation: 5 up to 40 °C

Temperature range at short circuit for 5 sec: up to 150 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=300/300$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-5, IEC 60227-5

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores × Cross Section	Insulation thickness	Overall diameter	Approx. net weight	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	Kg/km	Ω/km	MΩ.km
2×0.5	0.8	2.6×5.2	22	39	0.016
2×0.75	0.8	2.8×5.6	28	26	0.014



PVC INSULATED AND

SHEATHED

FLEXIBLE CABLES up to 4 mm² H05VV-F (NYMHY)



APPLICATION:

These cables are used in the devices with low and medium mechanical stress, machines at production lines, automatic equipment and also in household applications such as refrigerators, cooking and warming instruments.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=300/500$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-5, IEC 60227-5,6

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	Ω/km	MΩ.km
2×0.75	0.6	0.8	6.4	26	0.011
2×1	0.6	0.8	6.6	19.5	0.010
2×1.5	0.7	0.8	7.5	13.3	0.010
2×2.5	0.8	1	9.2	7.98	0.0090
2×4	0.8	1.3	11	4.95	0.007
3×0.75	0.6	0.8	6.8	26	0.011
3×1	0.6	0.8	7	19.5	0.010
3×1.5	0.7	0.9	8.1	13.3	0.010
3×2.5	0.8	1.1	10	7.98	0.0090
3×4	0.8	1.3	11.7	4.95	0.007
4×0.75	0.6	0.8	7.5	26	0.011
4×1	0.6	0.9	7.8	19.5	0.010
4×1.5	0.7	1	9.1	13.3	0.010
4×2.5	0.8	1.1	10.8	7.98	0.0090
4×4	0.8	1.4	13	4.95	0.007
5×0.75	0.6	0.9	8.3	26	0.011
5×1	0.6	0.9	8.5	19.5	0.010
5×1.5	0.7	1.1	10.2	13.3	0.010
5×2.5	0.8	1.2	12.1	7.98	0.0090
5×4	0.8	1.4	14.2	4.95	0.007

PVC INSULATED AND SHEATHED FIX INSTALLATION CABLES H05VV-R, H05VV-U (NYM)



APPLICATION:

These cables are produced for household and industrial usage. These cables can be Laid on or under plaster, in walls or concrete, without special mechanical protection, but not in dry or pre-stressed concrete. These cables are suitable for both dry and wet environments. If external application is required, protection against direct sunlight will be essential.

CONSTRUCTION:

Conductor: Solid or stranded annealed copper
(class 1 or 2 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

STANDARD: ISIRI 607-4, IEC 60227-5,6

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: U0/U=300/500 V

Short circuit current: see technical reference page 33

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Sheath thickness	Overall diameter	Max. conductor resistance	
				DC at 20°C	AC at 70°C
No×mm ²	mm	mm	mm	Ω/km	Ω/km
2×1.5 RE	0.7	1.2	9.1	12.1	14.5
2×2.5 RE	0.8	1.2	10.2	7.41	8.87
2×4 RE	0.8	1.2	11.3	4.61	5.52
2×6 RE	0.8	1.2	12.4	3.08	3.69
2×10 RE	1	1.4	15.4	1.83	2.19
2×16 RM	1	1.4	18.4	1.15	1.38
2×25 RM	1.2	1.4	22.3	0.727	0.870
2×35 RM	1.2	1.6	24.9	0.524	0.630
3×1.5 RE	0.7	1.2	9.6	12.1	14.5
3×2.5 RE	0.8	1.2	10.9	7.41	8.87
3×4 RE	0.8	1.2	12.5	4.61	5.52
3×6 RE	0.8	1.4	13.4	3.08	3.69
3×10 RE	1	1.4	16.2	1.83	2.19
3×16 RM	1	1.4	19.6	1.15	1.38
3×25 RM	1.2	1.6	24	0.727	0.870
3×35 RM	1.2	1.6	26.5	0.524	0.630
4×1.5 RE	0.7	1.2	10.3	12.1	14.5
4×2.5 RE	0.8	1.2	11.7	7.41	8.87
4×4 RE	0.8	1.4	13	4.61	5.52
4×6 RE	0.8	1.4	14.8	3.08	3.69
4×10 RE	1	1.4	17.6	1.83	2.19
4×16 RM	1	1.4	21.5	1.15	1.38
4×25 RM	1.2	1.6	26.3	0.727	0.870
4×35 RM	1.2	1.6	29.1	0.524	0.630
5×1.5 RE	0.7	1.2	11.1	12.1	14.5
5×2.5 RE	0.8	1.2	12.8	7.41	8.87
5×4 RE	0.8	1.4	14.6	4.61	5.52
5×6 RE	0.8	1.4	16.1	3.08	3.69
5×10 RE	1	1.4	19.3	1.83	2.19

PVC INSULATED AND SHEATHED FLEXIBLE POWER CABLES (NYY)



APPLICATION:

These cables are used in order to transfer electricity power under the soil and water, in the channels, power plants, industrial applications, within facilities, in concrete, electric distribution and consumption centers where mechanical injuries do not occur.

CONSTRUCTION:

Conductor: Flexible copper (class 5 or 6 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=0.6/1$ kV

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 3569-1, IEC 60502-1, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores × Cross Section	Insulation thickness	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C
N×mm ²	mm	mm	mm	Ω/km
1×1.5	0.8	1.4	6	13.3
1×2.5	0.8	1.4	6.5	7.98
1×4	1	1.4	7.2	4.95
1×6	1	1.4	7.7	3.3
1×10	1	1.4	9.5	1.91
1×16	1	1.4	10	1.21
1×25	1.2	1.4	12	0.78
2×4	1	1.8	12.5	4.95
2×6	1	1.8	13.5	3.3
2×10	1	1.8	16.5	1.91
2×16	1	1.8	18	1.21
2×25	1.2	1.8	22	0.78
3×4	1	1.8	13	4.95
3×6	1	1.8	14.2	3.3
3×10	1	1.8	17.5	1.91
3×16	1	1.8	19.5	1.21
3×25	1.2	1.8	23.5	0.78
3×35	1.2	1.8	27.5	0.554
4×4	1	1.8	14.4	4.95
4×6	1	1.8	15.5	3.3
4×10	1	1.8	19.4	1.91
4×16	1	1.8	23.2	1.21
4×25	1.2	1.8	25.2	0.78

PVC INSULATED AND SHEATHED POWER CABLES (NYY)



APPLICATION:

These cables are used in order to transfer electricity power under the soil and water, in the channels, power plants, industrial applications, within facilities, in concrete, electric distribution and consumption centers where mechanical injuries do not occur.

CONSTRUCTION:

Conductor: Solid or standard annealed copper (class 1 or 2 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=0.6/1$ kV

Current ratings: see technical reference page 33

Minimum bending radius: see technical reference page 33

Short circuit current: see technical reference page 33

STANDARD:

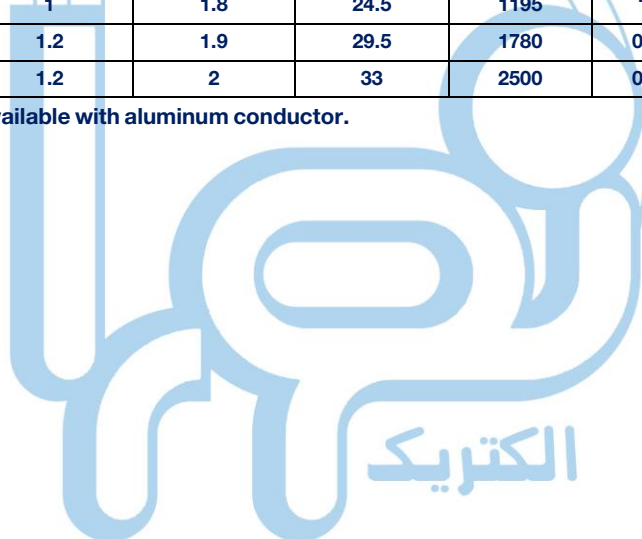
ISIRI 3569-1, IEC 60502-1, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Sheath thickness	Overall diameter	Approx. weight	Max. conductor resistance	
					DC at 20°C	AC at 70°C
No x mm ²	mm	mm	mm	kg/km	Ω/km	Ω/km
1x1.5 RE	0.8	1.4	5.6	49	12.1	14.5
1x2.5 RE	0.8	1.4	6.2	61	7.41	8.87
1x4 RE	1	1.4	7.1	85	4.61	5.52
1x6 RE	1	1.4	7.5	107	3.08	3.69
1x10 RE	1	1.4	8.3	150	1.83	2.19
1x16 RM	1	1.4	9.8	220	1.15	1.38
1x25 RM	1.2	1.4	11.5	325	0.727	0.870
1x35 RM	1.2	1.4	13	430	0.524	0.627
1x50 RM	1.4	1.4	14.5	560	0.387	0.463
2x1.5 RE	0.8	1.8	11.5	180	12.1	14.5
2x2.5 RE	0.8	1.8	12.5	215	7.41	8.87
2x4 RE	1	1.8	14	290	4.61	5.52
2x6 RE	1	1.8	15	352	3.08	3.69
2x10 RE	1	1.8	16.5	470	1.83	2.19
2x16 RM	1	1.8	19.5	675	1.15	1.38
2x25 RM	1.2	1.8	23	970	0.727	0.870
2x35 RM	1.2	1.8	25.5	1250	0.524	0.627
2x50 RM	1.4	1.9	29	1640	0.387	0.463
3x1.5 RE	0.8	1.8	12	200	12.1	14.5

3×2.5 RE	0.8	1.8	13	245	7.41	8.87
3×4 RE	1	1.8	14.5	335	4.61	5.52
3×6 RE	1	1.8	16	415	3.08	3.69
3×10 RE	1	1.8	17.5	570	1.83	2.19
3×16 RM	1	1.8	20.5	830	1.15	1.38
3×25 RM	1.2	1.8	24.5	1205	0.727	0.870
3×35 RM	1.2	1.8	27	1585	0.524	0.627
3×50 RM	1.4	1.8	25.5	1650	0.387	0.463
4×1.5 RE	0.8	1.8	13	235	12.1	14.5
4×2.5 RE	0.8	1.8	14	290	7.41	8.87
4×4 RE	1	1.8	16	400	4.61	5.52
4×6 RE	1	1.8	17	500	3.08	3.69
4×10 RE	1	1.8	19	700	1.83	2.19
4×16 RM	1	1.8	22.5	1010	1.15	1.38
4×25 RM	1.2	1.8	26.5	1510	0.727	0.870
4×35 RM	1.2	1.9	29.5	2010	0.524	0.627
4×50 RM	1.4	1.9	30	2180	0.387	0.463
5×1.5 RE	0.8	1.8	13.5	273	12.1	14.5
5×2.5 RE	0.8	1.8	15	336	7.41	8.87
5×4 RE	1	1.8	17	480	4.61	5.52
5×6 RE	1	1.8	18.5	595	3.08	3.69
5×10 RE	1	1.8	20.5	860	1.83	2.19
5×16 RM	1	1.8	24.5	1195	1.15	1.38
5×25 RM	1.2	1.9	29.5	1780	0.727	0.870
5×35 RM	1.2	2	33	2500	0.524	0.627

These cables are also available with aluminum conductor.



MULTY CORE PVC INSULATED AND SHEATHED FLEXIBLE CABLES over 2.5 mm² (NYMHY)



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=450/750$ V

Short circuit current: see technical reference page 33

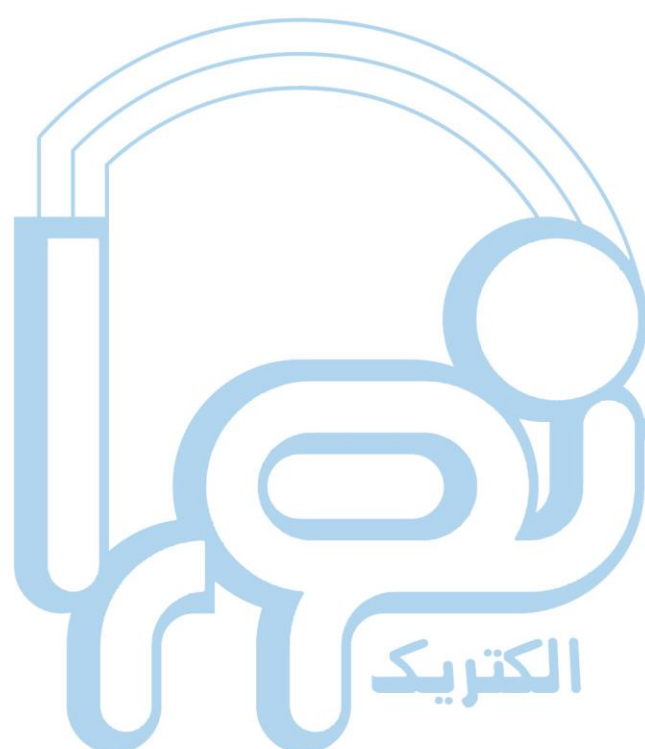
STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	Ω/km	MΩ.km
2×4	0.8	1	10.4	4.95	0.007
2×6	0.8	1.3	12.2	3.3	0.006
2×10	1	1.3	15.6	1.91	0.0056
2×16	1	1.3	18	1.21	0.0046
2×25	1.2	1.6	23.8	0.78	0.0044
2×35	1.2	1.9	26.2	0.554	0.0038
3×4	0.8	1.3	12	4.95	0.007
3×6	0.8	1.3	13.1	3.3	0.006
3×10	1	1.6	17.9	1.91	0.0056
3×16	1	1.6	20.4	1.21	0.0046
3×25	1.2	1.8	25.5	0.78	0.0044
3×35	1.2	2	28.6	0.554	0.0038
4×4	0.8	1.3	12.2	4.95	0.007
4×6	0.8	1.3	14.8	3.3	0.006
4×10	1	1.6	18.8	1.91	0.0056
4×16	1	1.6	20.7	1.21	0.0046
4×25	1.2	2	25.8	0.78	0.0044
4×35	1.2	2.4	29.2	0.554	0.0038
5×4	0.8	1.3	13.5	4.95	0.007
5×6	0.8	1.3	14.8	3.3	0.006
5×10	1	1.6	20.8	1.91	0.0056
5×16	1	2	23.7	1.21	0.0046
5×25	1.2	2.4	29.5	0.78	0.0044

5×35	1.2	2.4	34.5	0.554	0.0038
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MULTI CORE PVC INSULATED AND SHEATHED FLAT FLEXIBLE CABLES H05VVH6-F (0.75 mm²)



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=300/500$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores × Cross Section	Insulation thickness	Clearance e_1	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	mm	Ω/km	MΩ.km
6×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	18.5×4.2	26	0.011
9×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	26.5×4.2	26	0.011
12×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	33.8×4.2	26	0.011
16×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	44.5×4.2	26	0.011
18×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	49.2×4.2	26	0.011
20×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	55×4.2	26	0.011
24×0.75	0.6	1	$e_2=0.9$ $e_3=1.5$	65.5×4.2	26	0.011

MULTI CORE PVC INSULATED AND SHEATHED FLAT FLEXIBLE CABLES H05VVH6-F (1 mm²)



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=300/500$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores × Cross Section	Insulation thickness	Clearance e_1	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	mm	Ω/km	MΩ.km
6×1	0.6	1	$e_2=0.9$ $e_3=1.5$	19×4.3	19.5	0.010
9×1	0.6	1	$e_2=0.9$ $e_3=1.5$	27.5×4.3	19.5	0.010
12×1	0.6	1	$e_2=0.9$ $e_3=1.5$	35×4.3	19.5	0.010
16×1	0.6	1	$e_2=0.9$ $e_3=1.5$	46×4.3	19.5	0.010
18×1	0.6	1	$e_2=0.9$ $e_3=1.5$	51×4.3	19.5	0.010
20×1	0.6	1	$e_2=0.9$ $e_3=1.5$	57×4.3	19.5	0.010
24×1	0.6	1	$e_2=0.9$ $e_3=1.5$	68×4.3	19.5	0.010

MULTI CORE PVC INSULATED AND SHEATHED FLAT FLEXIBLE CABLES H07VVH6-F (1.5 mm²)



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=450/750$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Clearance e_1	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	mm	Ω/km	MΩ.km
4×1.5	0.7	1	$e_2=1$ $e_3=1.5$	14.8×5	13.3	0.010
5×1.5	0.7	1	$e_2=1$ $e_3=1.5$	18.7×5	13.3	0.010
6×1.5	0.7	1	$e_2=1$ $e_3=1.5$	22×5	13.3	0.010
9×1.5	0.7	1	$e_2=1$ $e_3=1.5$	32×5	13.3	0.010
12×1.5	0.7	1	$e_2=1$ $e_3=1.5$	41×5	13.3	0.010
16×1.5	0.7	1	$e_2=1$ $e_3=1.5$	54×5	13.3	0.010
18×1.5	0.7	1	$e_2=1$ $e_3=1.5$	60×5	13.3	0.010
20×1.5	0.7	1	$e_2=1$ $e_3=1.5$	67×5	13.3	0.010
24×1.5	0.7	1	$e_2=1$ $e_3=1.5$	80×5	13.3	0.010

MULTI CORE PVC INSULATED AND SHEATHED FLAT FLEXIBLE CABLES H07VVH6-F (2.5 mm²)



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=450/750$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores x Cross Section	Insulation thickness	Clearance e_1	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	mm	Ω/km	MΩ.km
4×2.5 Flat	0.8	1.5	$e_2=1$ $e_3=1.8$	18×5.6	7.98	0.009
5×2.5 Flat	0.8	1.5	$e_2=1$ $e_3=1.8$	24.6×5.6	7.98	0.009
6×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	26.7×5.6	7.98	0.009
9×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	39×5.6	7.98	0.009
12×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	50×5.6	7.98	0.009
16×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	65.5×5.6	7.98	0.009
18×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	73×5.6	7.98	0.009
20×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	81.5×5.6	7.98	0.009
24×2.5	0.8	1.5	$e_2=1$ $e_3=1.8$	97.5×5.6	7.98	0.009

MULTI CORE PVC INSULATED AND SHEATHED FLAT FLEXIBLE CABLES over 2.mm² H07VVH6-F



APPLICATION:

These cables are used in elevators, overhead cranes and moving joints.

CONSTRUCTION:

Conductor: Flexible annealed copper (class 5 according to ISIR 3084 or IEC 60228)

Insulator: PVC

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -30 up to 70 °C

Temperature range at short circuit for 5 sec: up to 160 °C

Ambient temperature: up to 40 °C

Nominal voltage: $U_0/U=450/750$ V

Short circuit current: see technical reference page 33

STANDARD:

ISIRI 607-6, IEC 60227-6, IEC 60332

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Number of cores × Cross Section	Insulation thickness	Clearance e_1	Sheath thickness	Overall diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance at 70°C
No×mm ²	mm	mm	mm	mm	Ω/km	MΩ.km
4×4 Flat	0.8	1.5	$e_2=1.2$ $e_3=1.8$	6.5×19.5	4.95	0.007
4×6 Flat	0.8	1.5	$e_2=1.2$ $e_3=1.8$	7×21.5	3.3	0.006
4×10 Flat	1	1.5	$e_2=1.4$ $e_3=1.8$	9.3×29.5	1.91	0.0056
4×16 Flat	1	1.5	$e_2=1.5$ $e_3=2$	10.3×33.2	1.21	0.0046
4×25 Flat	1.2	1.5	$e_2=1.6$ $e_3=2$	12.3×40.4	0.78	0.0044
4×35 Flat	1.2	1.5	$e_2=1.6$ $e_3=2$	14.2×48	0.554	0.0042
5×4 Flat	0.8	1.5	$e_2=1.2$ $e_3=1.8$	6.4×26.6	4.95	0.007
5×6 Flat	0.8	1.5	$e_2=1.2$ $e_3=1.8$	7×29	3.3	0.006
5×10 Flat	1	1.5	$e_2=1.4$ $e_3=1.8$	9.3×39	1.91	0.0056
5×16 Flat	1	1.5	$e_2=1.5$ $e_3=2$	10.3×43.5	1.21	0.0046
5×25 Flat	1.2	1.5	$e_2=1.6$ $e_3=2$	12.3×52.5	0.78	0.0044
5×35 Flat	1.2	1.5	$e_2=1.6$ $e_3=2$	14.2×62	0.554	0.0042

HIGH FREQUENCY COAXIAL CABLES



APPLICATION:

Radio frequency cables (RFC) are manufactured for application in high quality communication apparatus as well as leading wire for high frequency measuring instruments and localized transmitters or receivers.

CONSTRUCTION:

Inner Conductor: Solid or Stranded copper (class 1 or 2 according to ISIR 3084 or IEC 60228).

Insulation: Solid PE

Outer Conductor: Braid of annealed copper wires

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -40 up to 85 °C

Behavior in fire: IEC 60332-1

STANDARD:

MIL-C-17

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Type		RG 11	RG 58	RG 59	RG 213	RG 216
No. & Dia. Of inner conductor (copper)	No×mm	7×0.40	19×0.18	1×0.57	7×0.75	7×0.40
Insulation thickness	mm	3	1	1.56	2.5	3
No. & Dia. Of outer braided conductor (copper)	No×(No×mm)	16×(8×0.22)	16×(7×0.12)	16×(7×0.16)	16×(8×0.22)	16×(8×0.16)
Sheath thickness	mm	1.1	0.7	0.8	1.1	1.1
Overall diameter	mm	10.3	5	6.1	10.3	10.3
impedance	Ω	75	50	75	50	75
Max. conductor resistance DC at 20°C	Ω/km	20.7	37.1	70.37	5.77	20.7
Standard attenuation at 100 MHz	dB/100m	7	17	12	7	7.5
Test voltage	V	10000	5000	7000	10000	10000
Total weight	Kg/km	136	36	57	162	187

75 Ω COAXIAL CABLES



APPLICATION:

These types of cables are used in high frequency transmissions spatially for transmitters and receivers, computers, radio and TV transmissions.

CONSTRUCTION:

Inner Conductor: Solid or Stranded copper (class 1 or 2 according to ISIR 3084 or IEC 60228).

Insulation: Solid PE

Outer Conductor: Braid of annealed copper wires

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -40 up to 85 °C

Behavior in fire: IEC 60332-1

STANDARD:

JIS C 3501

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Type		1.5C-2V	2.5C-2V	3C-2V	5C-2V	4.5C-2V	7C-2V
No. & Dia. Of inner conductor (copper)	No×mm	1×0.26	1×0.40	1×0.50	1×0.80	1×1	7×0.40
Insulation thickness	mm	0.67	1	1.3	2.05	1.8	3.05
No. & Dia. Of outer braided conductor (copper)	No×(No×mm)	16×(5×0.10)	16×(6×0.12)	16×(7×0.12)	16×(9×0.14)	16×(4×0.16)	24×(7×0.18)
Sheath thickness	mm	0.4	0.5	0.8	0.9	0.8	1.1
Overall diameter	mm	2.9	4	5.4	7.4	6.4	10.4
Max. conductor resistance DC at 20°C	Ω/km	968	145	91.4	35.9	24	20.7
Standard attenuation at 10 MHz	dB/m	96	52	42	27	26	22
Test voltage	V	1000	1000	1000	1000	1000	1000
Total weight	Kg/km	15	23	41	71	72	141

50 Ω COAXIAL CABLES



APPLICATION:

Radio frequency cables (RFC) are manufactured for application in high quality communication apparatus as well as leading wire for high frequency measuring instruments and localized transmitters or receivers.

CONSTRUCTION:

Inner Conductor: Solid or Stranded copper (class 1 or 2 according to ISIR 3084 or IEC 60228).

Insulation: Solid PE

Outer Conductor: Braid of annealed copper wires

Outer sheath: PVC

TECHNICAL DATA:

Temperature range in continues operation: -40 up to 85 °C

Behavior in fire: IEC 60332-1

STANDARD:

JIS C 3501

DIMENSIONAL, ELECTRICAL AND MECHANICAL DATA:

Type		1.5D-2V	2.5D-2V	3D-2V	5D-2V	8D-2V
No. & Dia. Of inner conductor (copper)	No×mm	7×0.18	1×0.80	7×0.32	1×1.40	7×0.80
Insulation thickness	mm	0.53	95	1.02	1.7	2.7
No. & Dia. Of outer braided conductor (copper)	No×(No×mm)	16×(5×0.10)	16×(6×0.12)	16×(7×0.12)	16×(9×0.14)	24×(8×0.18)
Sheath thickness	mm	0.4	0.5	0.8	0.9	1.2
Overall diameter	mm	2.9	4.3	5.3	7.3	11.1
Max. conductor resistance DC at 20°C	Ω/km	110	35.9	33.3	11.7	5.13
Standard attenuation at 10 MHz	dB/m	85	45	47	27	20
Test voltage	V	300	1000	1000	1000	1000
Total weight	Kg/km	21	33	44	78	178

OUTDOOR TELEPHONE CABLES A-2Y(St)2Y



APPLICATION:

For connecting in local networks for telephone purposes and signal or data transmission.

CONSTRUCTION:

Conductor: Solid annealed copper

Insulation: Solid PE

Core wrap: Heat barrier polyester tape between core and screen

Drain wire: Solid annealed copper

Screen: Aluminum-polyester (AL foil) tape in continuous contact with drain wire

Jacket: Black PE

STANDARD:

VDE, TCI, IEC 60708

ELECTRICAL DATA:

Conductor diameter	Max. conductor resistance DC at 20°C	Min. Insulation resistance DC at 20°C	Max. mutual capacitance at 800~1000 Hz	Max. capacitance unbalance at 800~1000 Hz	attenuation at 1024 kHz	attenuation at 1500 kHz	Operating voltage RMS	Test Voltage, DC
mm	Ω/km	$\text{M}\Omega/\text{km}$	nF/km	pF/km	dB/m	dB/m	V	kV
0.4	147	2000	52±2	181	26	31.5	150	2.4 (for 3 sec.) wire to wire 5 (for 3 Sec.) wire to shield
0.6	65				19.5	24		3.5 (for 3 sec.) wire to wire 5 (for 3 Sec.) wire to shield

DIMENSIONAL DATA:

No. of pairs	Dia. Of Conductor	Sheath thickness	Approx. Overall diameter	Approx. net weight	No. of pairs	Dia. Of Conductor	Sheath thickness	Approx. Overall diameter	Approx. net weight
No	Mm	mm	mm	Kg/km	No	Mm	mm	mm	Kg/km
2	0.4	1	5.2	25	2	0.6	1	6	35
4	0.4	1	5.7	30	4	0.6	1	7.2	50
6	0.4	1	6.5	40	6	0.6	1	8	70
8	0.4	1	6.7	50	8	0.6	1	8.5	80
10	0.4	1	7.7	60	10	0.6	1	9.5	100
20	0.4	1.4	10.3	105	20	0.6	1.4	13	185
30	0.4	1.4	12	145	30	0.6	1.4	15	260
40	0.4	1.4	13	180	40	0.6	1.4	17	335
50	0.4	1.4	14.5	215	50	0.6	1.4	18.5	405

INDOOR TELEPHONE CABLES J-Y(St)Y



APPLICATION:

For transferring analog or digital signals in communication systems and also for fix installation. Laying under the ground is not permitted for these kind of cables.

CONSTRUCTION:

Conductor: Solid annealed copper

Insulation: PVC

Core wrap: Heat barrier polyester tape between core and screen

Drain wire: Solid annealed copper

Screen: Aluminum-polyester (AL foil) tape in continuous contact with drain wire

Jacket: Gray PVC

STANDARD:

VDE 0815, TCI, IEC 60189

ELECTRICAL DATA:

Conductor diameter	Max. conductor resistance DC at 20°C	Min. insulation resistance DC at 20°C	Max. mutual capacitance at 800 Hz	Max. capacitance unbalance at 800 Hz	Operating voltage RMS	Test Voltage, DC
mm	Ω/km	$\text{M}\Omega/\text{km}$	nF/km	pF/100m	V	kV
0.4	147	500	100	300	200	0.7 (for 1 min.) wire to wire 2 (for 1 min.) wire to shield
0.6	65					
0.8	36					

DIMENSIONAL DATA:

No. of pairs	Dia. Of Conductor	Sheath thickness	Approx. Overall diameter	Approx. net weight	No. of pairs	Dia. Of Conductor	Sheath thickness	Approx. Overall diameter	Approx. net weight
No	Mm	mm	mm	Kg/km	No	Mm	mm	mm	Kg/km
2	0.4	1	5.2	30	2	0.6	1	6.2	45
4	0.4	1	5.7	40	4	0.6	1	7	60
6	0.4	1	6.5	50	6	0.6	1	8.2	85
10	0.4	1	7.5	70	10	0.6	1	9.5	120
20	0.4	1	9.2	115	20	0.6	1.2	12.5	210
30	0.4	1	11	156	30	0.6	1.2	14.5	295
40	0.4	1.2	12.6	208	40	0.6	1.2	16.7	375
50	0.4	1.2	14	250	50	0.6	1.4	18.5	470

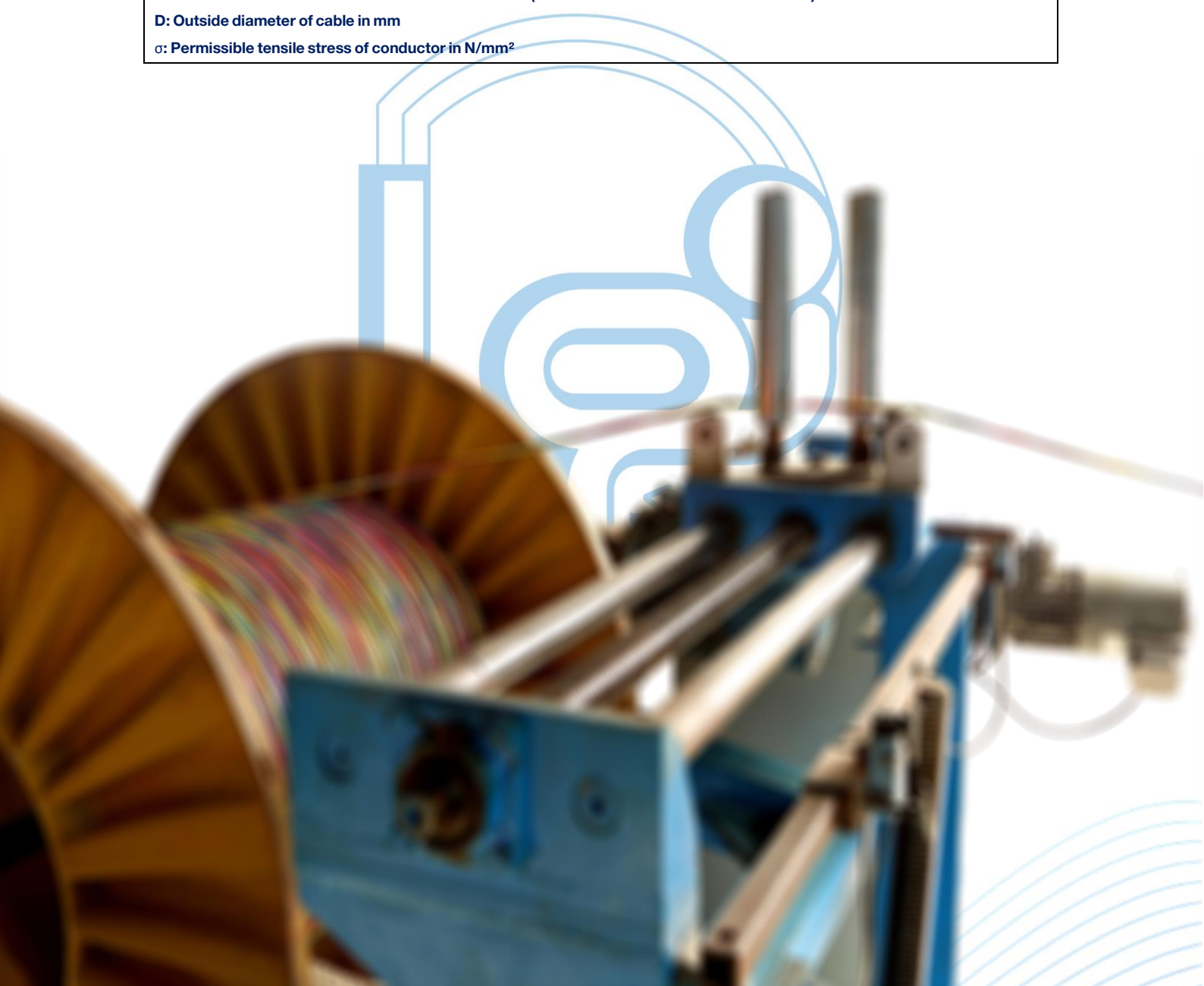
No. of pairs	Dia. Of Conductor	Sheath thickness	Approx. Overall diameter	Approx. net weight
No	Mm	mm	mm	Kg/km
2	0.8	1	7.7	65
4	0.8	1	9.5	100
6	0.8	1	10.5	135
10	0.8	1.2	13	210
20	0.8	1.2	16.5	375
30	0.8	1.4	20.5	555
40	0.8	1.6	23.5	735
50	0.8	1.6	26	890

Appendix 1: MINIMUM PERMISSIBLE BENDING RADII WHEN LAYING

Multi core cables		All single core cables
Up to $U_0/U=0.6/1$ kV	Over $U_0/U=0.6/1$ kV	
12 x D	15 x D	15 x D

Appendix 2 : PERMISSIBLE PULLING FORCES

Means of pulling	Type of cable	Formula	Factor
With pulling head attached to conductors	All types of cable	$P = \sigma \cdot A$	$\sigma = 50 \text{ N/mm}^2$ (Cu conductor) $\sigma = 30 \text{ N/mm}^2$ (AL conductor)
With pulling stocking	All wire armored cables	$P = K \cdot D^2$	$K = 9 \text{ N/mm}^2$
P: Pull in N A: Total cross sectional area in mm^2 of all conductors (but not screen or concentric conductor) D: Outside diameter of cable in mm σ: Permissible tensile stress of conductor in N/mm^2			



Appendix 3 : SHORT CIRCUIT CURRENT OF CONDUCTORS FOR 1 sec

Nominal cross sectional area (mm ²)	PVC insulated cables (70°C is to be considered as conductor temp. at the start of short circuit and final temp. is 160°C) (kA)	XLPE insulated cables (90°C is to be considered as conductor temp. at the start of short circuit and final temp. is 250°C) (kA)
1.5	0.173	0.215
2.5	0.228	0.358
4	0.460	0.572
6	0.690	0.858
10	1.15	1.43
16	1.84	2.29
25	2.87	3.57
35	4.02	5.00
50	5.75	7.15
70	8.05	10.0
95	10.9	13.6
120	13.08	17.2
150	17.2	21.4
185	21.3	26.5
240	27.6	34.3
300	34.5	42.9
400	41.2	57.2
500	51.5	71.5
630	64.9	90
800	82.4	114
1000	103	143

The maximum short circuit current for times between 0.2 and 5 seconds may be calculated with the following formula:

$$I_K = \frac{I_1}{\sqrt{t_K}}$$

Where:

I_K : short circuit current in amps during the time t_K

I_1 : short circuit current in amps during the time of 1 sec

t_K : short circuit current duration, seconds

A) PVC insulated cables in ground

Copper conductor					
Nominal cross sectional area (mm²)	Current carrying capacity (A)				
	Single core in flat formation	Single core in trefoil formation	2 core	3 or 4 core	5 core
1.5	35	29.6	32	26	26
2.5	46	39	42	34	34
4	59	50	54	44	44
6	73	62	68	56	56
10	97	82	90	75	75
16	127	107	116	98	98
25	163	137	151	128	129
35	195	165	185	157	157
50	230	195	214	185	-
70	282	239	264	228	-
95	336	287	316	275	-
120	382	326	356	313	-
150	428	366	388	353	-
185	483	414	438	399	-
240	561	481	510	464	-
300	632	542	576	524	-
400	730	624	-	-	-
500	823	698	-	-	-
630	928	780	-	-	-
800	1046	870	-	-	-
1000	1180	973	-	-	-

Aluminum conductor			
Nominal cross sectional area (mm²)	Current carrying capacity (A)		
	Single core in flat formation	Single core in trefoil formation	3 or 4 core
25	-	-	99
35	151	127	118
50	179	151	142
70	218	186	176
95	261	223	211
120	297	254	242
150	332	285	270
185	376	323	308
240	437	378	363
300	494	427	412
400	572	496	475
500	649	562	-

Appendix 4 : CURRENT CARRYING CAPACITY IN NORMAL OPERATION

B) PVC insulated cables in air

Copper conductor					
Nominal cross sectional area (mm ²)	Current carrying capacity (A)				
	Single core in flat formation	Single core in trefoil formation	2 core	3 or 4 core	5 core
1.5	25	20	20	18.5	18.6
2.5	34	27	27	25	25
4	45	37	37	34	33
6	57	48	48	43	42
10	78	66	66	60	57
16	103	89	89	80	75
25	137	118	118	106	102
35	169	145	145	131	127
50	206	176	176	159	-
70	261	224	224	202	-
95	321	271	271	244	-
120	374	314	314	282	-
150	428	361	361	324	-
185	494	412	412	371	-
240	590	484	484	436	-
300	678	549	568	481	-
400	817	657	-	-	-
500	940	749	-	-	-
630	1071	854	-	-	-
800	1220	973	-	-	-
1000	1390	1109	-	-	-

CURRENT CARRYING CAPACITY IN NORMAL OPERATION

Aluminum conductor			
Nominal cross sectional area (mm ²)	Current carrying capacity (A)		
	Single core in flat formation	Single core in trefoil formation	3 or 4 core
25	-	-	83
35	131	113	102
50	160	138	124
70	202	174	158
95	249	210	190
120	291	244	221
150	333	281	252
185	384	320	289
240	460	378	339
300	530	433	377
400	642	523	444
500	744	603	-

Appendix 4 : CURRENT CARRYING CAPACITY IN NORMAL OPERATION

C) XLPE insulated cables in ground

Copper conductor					
Nominal cross sectional area (mm ²)	Current carrying capacity (A)				
	Single core in flat formation	Single core in trefoil formation	2 core	3 or 4 core	5 core
1.5	39	32	36	30	30
2.5	51	43	48	40	39
4	66	55	62	52	50
6	82	68	71	64	64
10	109	90	103	86	85
16	139	115	122	111	110
25	179	149	157	143	140
35	213	178	190	173	173
50	251	211	246	205	-
70	307	259	277	252	-
95	366	310	333	303	-
120	416	352	374	346	-
150	465	396	430	390	-
185	526	449	485	441	-
240	610	521	536	511	-
300	689	587	609	580	-
400	788	669	-	-	-
500	889	748	-	-	-
630	993	836	-	-	-
800	1112	934	-	-	-
1000	1240	1044	-	-	-

CURRENT CARRYING CAPACITY IN NORMAL OPERATION

Aluminum conductor			
Nominal cross sectional area (mm ²)	Current carrying capacity (A)		
	Single core in flat formation	Single core in trefoil formation	3 or 4 core
25	-	-	111
35	164	137	132
50	195	163	157
70	238	201	195
95	284	240	233
120	323	274	266
150	361	308	299
185	408	350	340
240	476	408	401
300	537	462	455
400	616	531	526
500	699	601	-

Appendix 4 : CURRENT CARRYING CAPACITY IN NORMAL OPERATION

D) XLPE insulated cables in air

Copper conductor					
Nominal cross sectional area (mm ²)	Current carrying capacity (A)				
	Single core in flat formation	Single core in trefoil formation	2 core	3 or 4 core	5 core
1.5	32	25	29	24	24
2.5	42	34	38	32	32
4	56	44	51	42	42
6	71	57	63	53	53
10	96	77	87	73	72
16	128	102	115	96	96
25	173	139	143	130	129
35	212	170	176	160	158
50	258	208	214	195	-
70	328	265	270	247	-
95	404	326	335	305	-
120	471	381	390	355	-
150	541	438	448	407	-
185	626	507	516	469	-
240	749	606	606	551	-
300	864	697	702	638	-
400	1018	816	-	-	-
500	1173	933	-	-	-
630	1340	1066	-	-	-
800	1531	1218	-	-	-
1000	1750	1392	-	-	-

CURRENT CARRYING CAPACITY IN NORMAL OPERATION

Aluminum conductor			
Nominal cross sectional area (mm ²)	Current carrying capacity (A)		
	Single core in flat formation	Single core in trefoil formation	3 or 4 core
25	-	-	100
35	163	131	122
50	200	161	147
70	254	205	189
95	313	253	232
120	366	296	270
150	420	341	308
185	486	395	357
240	585	475	435
300	675	548	501
400	798	647	592
500	926	749	-

Appendix 5 : RATING FACTORS FOR CALCULATION OF CURRENT CARRYING CAPACITY IN DIFFERENT CONDITIONS

A) RATING FACTOR FOR GROUND TEMPERATURE, SOIL THERMAL RESISTIVITY AND LOAD FACTOR

Max. conductor temp. °C	Ground temp. °C	Soil thermal resistivity																			
		0.7 K m/W					1 K m/W					1.5 K m/W					2.5 K m/W				
		Load factor					Load factor					Load factor					Load factor				
		0.50	0.60	0.70	0.85	1.00	0.50	0.60	0.70	0.85	1.00	0.50	0.60	0.70	0.85	1.00	0.50 to 1.00				
90	5	1.24	1.21	1.18	1.12	1.07	1.11	1.09	1.07	1.03	1.00	0.99	0.98	0.97	0.96	0.94	0.89				
	10	1.23	1.19	1.16	1.11	1.05	1.09	1.07	1.05	1.01	0.98	0.97	0.96	0.95	0.93	0.91	0.86				
	15	1.21	1.17	1.14	1.08	1.03	1.07	1.05	1.02	0.99	0.95	0.95	0.93	0.92	0.91	0.89	0.84				
	20	1.19	1.15	1.12	1.06	1.00	1.05	1.02	1.00	0.96	0.93	0.92	0.91	0.90	0.88	0.86	0.81				
	25						1.02	1.00	0.98	0.94	0.90	0.90	0.88	0.87	0.85	0.84	0.78				
	30						0.95	0.91	0.88			0.87	0.86	0.84	0.83	0.81	0.75				
	35													0.82	0.80	0.78	0.72				
	40																0.68				
70	5	1.29	1.26	1.22	1.15	1.09	1.13	1.11	1.08	1.04	1.00	0.99	0.98	0.97	0.95	0.93	0.86				
	10	1.27	1.23	1.19	1.13	1.06	1.11	1.08	1.06	1.01	0.97	0.96	0.95	0.94	0.92	0.89	0.83				
	15	1.25	1.21	1.17	1.10	1.03	1.08	1.06	1.03	0.99	0.94	0.93	0.92	0.91	0.88	0.86	0.79				
	20	1.23	1.18	1.14	1.08	1.01	1.06	1.03	1.00	0.96	0.91	0.90	0.89	0.87	0.85	0.83	0.76				
	25						1.03	1.00	0.97	0.93	0.88	0.87	0.85	0.84	0.82	0.79	0.72				
	30						0.94	0.89	0.85			0.84	0.82	0.80	0.78	0.76	0.68				
	35													0.77	0.74	0.72	0.63				
	40																0.59				

B) RATING FACTOR FOR SINGLE CORE CABLES, IN TREFOIL FORMATION WITH 7cm CLEARANCE BETWEEN

SYSTEMS IN GROUND

Type of cables	Number of systems	Soil thermal resistivity																			
		0.7 K m/W					1 K m/W					1.5 K m/W					2.5 K m/W				
		Load factor					Load factor					Load factor					Load factor				
		0.50	0.60	0.70	0.85	1.00	0.50	0.60	0.70	0.85	1.00	0.50	0.60	0.70	0.85	1.00	0.50 to 1.00				
XLPE cables	1	1.09	1.04	0.99	0.93	0.87	1.11	1.05	1.00	0.93	0.87	1.13	1.07	1.01	0.94	0.87	1.17	1.09	1.03	0.94	0.87
	2	0.97	0.90	0.84	0.77	0.71	0.98	0.91	0.85	0.77	0.71	1.00	0.92	0.86	0.77	0.71	1.02	0.94	0.87	0.78	0.71
	3	0.88	0.80	0.74	0.67	0.61	0.89	0.82	0.75	0.67	0.61	0.90	0.82	0.76	0.68	0.61	0.92	0.83	0.76	0.68	0.61
	4	0.83	0.75	0.69	0.62	0.56	0.84	0.76	0.70	0.62	0.56	0.85	0.77	0.70	0.62	0.56	0.82	0.78	0.71	0.63	0.56
	5	0.79	0.71	0.65	0.58	0.52	0.80	0.72	0.66	0.58	0.52	0.80	0.73	0.66	0.58	0.52	0.81	0.73	0.67	0.59	0.52
	6	0.76	0.68	0.62	0.55	0.50	0.77	0.69	0.63	0.55	0.50	0.77	0.70	0.63	0.56	0.50	0.78	0.70	0.64	0.56	0.50
	8	0.72	0.64	0.58	0.51	0.46	0.72	0.65	0.59	0.52	0.46	0.73	0.65	0.59	0.52	0.46	0.74	0.66	0.59	0.52	0.46
	10	0.69	0.61	0.56	0.49	0.44	0.69	0.62	0.56	0.49	0.44	0.70	0.62	0.56	0.49	0.44	0.70	0.63	0.57	0.49	0.44
PVC cables	1	1.01	1.02	0.99	0.93	0.87	1.04	1.05	1.00	0.93	0.87	1.07	1.06	1.01	0.94	0.87	1.11	1.08	1.01	0.94	0.87
	2	0.94	0.89	0.84	0.77	0.71	0.97	0.91	0.85	0.77	0.71	0.99	0.92	0.86	0.77	0.71	1.01	0.93	0.87	0.78	0.71
	3	0.86	0.79	0.74	0.67	0.61	0.89	0.81	0.75	0.67	0.61	0.90	0.83	0.76	0.68	0.61	0.91	0.83	0.77	0.68	0.61
	4	0.82	0.75	0.69	0.62	0.56	0.84	0.76	0.70	0.62	0.56	0.85	0.77	0.71	0.62	0.56	0.86	0.78	0.71	0.63	0.56
	5	0.78	0.71	0.65	0.58	0.52	0.80	0.72	0.66	0.58	0.52	0.80	0.73	0.66	0.58	0.52	0.81	0.73	0.67	0.59	0.52
	6	0.75	0.68	0.62	0.55	0.50	0.77	0.69	0.63	0.55	0.50	0.77	0.70	0.64	0.56	0.50	0.78	0.70	0.64	0.56	0.50
	8	0.71	0.64	0.58	0.51	0.46	0.72	0.65	0.59	0.52	0.46	0.73	0.65	0.59	0.52	0.46	0.73	0.66	0.60	0.52	0.46
	10	0.68	0.61	0.55	0.49	0.44	0.69	0.62	0.56	0.49	0.44	0.69	0.62	0.56	0.49	0.44	0.70	0.63	0.57	0.49	0.44

C : RATING FACTOR FOR SINGLE CORE CABLES, IN TREFOIL FORMATION WITH 25cm CLEARANCE BETWEEN SYSTEMS IN GROUND

Type of cables	Number of systems	Soil thermal resistivity			
		0.7 K m/W	1 K m/W	1.5 K m/W	2.5 K m/W
		Load factor	Load factor	Load factor	Load factor
		0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00
XLPE cables	1	1.09 1.04 0.99 0.93 0.87	1.11 1.05 1.00 0.93 0.87	1.13 1.07 1.01 0.94 0.87	1.17 1.09 1.03 0.94 0.87
	2	1.01 0.94 0.89 0.82 0.75	1.02 0.95 0.89 0.82 0.75	1.04 0.97 0.90 0.82 0.75	1.06 0.98 0.91 0.83 0.75
	3	0.94 0.87 0.81 0.74 0.67	0.95 0.88 0.82 0.74 0.67	0.97 0.89 0.82 0.74 0.67	0.99 0.90 0.83 0.74 0.67
	4	0.91 0.84 0.78 0.70 0.64	0.92 0.84 0.78 0.70 0.64	0.93 0.85 0.79 0.70 0.64	0.95 0.86 0.79 0.71 0.64
	5	0.88 0.80 0.74 0.67 0.60	0.89 0.81 0.75 0.67 0.60	0.90 0.82 0.75 0.67 0.60	0.91 0.83 0.76 0.67 0.60
	6	0.86 0.79 0.72 0.65 0.59	0.87 0.79 0.73 0.65 0.59	0.88 0.80 0.73 0.65 0.59	0.89 0.81 0.74 0.65 0.59
	8	0.83 0.76 0.70 0.62 0.56	0.84 0.76 0.70 0.62 0.56	0.85 0.77 0.70 0.62 0.56	0.86 0.78 0.71 0.62 0.56
	10	0.81 0.74 0.68 0.60 0.54	0.82 0.74 0.68 0.60 0.54	0.83 0.75 0.68 0.61 0.54	0.84 0.76 0.69 0.61 0.54
PVC cables	1	1.01 1.02 0.99 0.93 0.87	1.04 1.05 1.00 0.93 0.87	1.07 1.06 1.01 0.94 0.87	1.11 1.08 1.01 0.94 0.87
	2	0.97 0.95 0.89 0.82 0.75	1.00 0.96 0.90 0.82 0.75	1.03 0.97 0.91 0.82 0.75	1.06 0.98 0.92 0.83 0.75
	3	0.94 0.88 0.82 0.74 0.67	0.97 0.88 0.82 0.74 0.67	0.97 0.89 0.83 0.74 0.67	0.98 0.90 0.84 0.74 0.67
	4	0.91 0.84 0.78 0.70 0.64	0.92 0.85 0.79 0.70 0.64	0.93 0.86 0.79 0.70 0.64	0.95 0.87 0.80 0.71 0.64
	5	0.88 0.81 0.75 0.67 0.60	0.89 0.82 0.76 0.67 0.60	0.90 0.82 0.76 0.67 0.60	0.91 0.83 0.77 0.67 0.60
	6	0.86 0.79 0.73 0.65 0.59	0.87 0.80 0.74 0.65 0.59	0.88 0.81 0.74 0.65 0.59	0.89 0.81 0.75 0.65 0.59
	8	0.83 0.76 0.70 0.62 0.56	0.84 0.77 0.71 0.62 0.56	0.85 0.78 0.71 0.62 0.56	0.86 0.78 0.72 0.62 0.56
	10	0.82 0.75 0.69 0.60 0.54	0.82 0.75 0.69 0.60 0.54	0.83 0.76 0.69 0.61 0.54	0.84 0.76 0.70 0.61 0.54

D : RATING FACTOR FOR SINGLE CORE CABLES, IN FLAT FORMATION WITH 7cm CLEARANCE BETWEEN CABLES IN GROUND

Type of cables	Number of systems	Soil thermal resistivity			
		0.7 K m/W	1 K m/W	1.5 K m/W	2.5 K m/W
		Load factor	Load factor	Load factor	Load factor
		0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00	0.50 0.60 0.70 0.85 1.00
XLPE cables	1	1.08 1.05 0.99 0.91 0.85	1.13 1.07 1.00 0.92 0.85	1.18 1.09 1.01 0.92 0.85	1.19 1.11 1.03 0.93 0.85
	2	1.01 0.93 0.86 0.77 0.71	1.03 0.94 0.87 0.78 0.71	1.05 0.95 0.88 0.78 0.71	1.06 0.96 0.88 0.79 0.71
	3	0.92 0.84 0.77 0.69 0.62	0.93 0.85 0.77 0.69 0.62	0.95 0.86 0.78 0.69 0.62	0.96 0.86 0.79 0.69 0.62
	4	0.88 0.80 0.73 0.65 0.58	0.89 0.80 0.73 0.65 0.58	0.90 0.81 0.74 0.65 0.58	0.91 0.82 0.74 0.65 0.58
	5	0.84 0.76 0.69 0.61 0.55	0.85 0.77 0.70 0.61 0.55	0.87 0.78 0.70 0.62 0.55	0.87 0.78 0.71 0.62 0.55
	6	0.82 0.74 0.67 0.59 0.53	0.83 0.75 0.68 0.60 0.53	0.84 0.75 0.68 0.60 0.53	0.85 0.76 0.69 0.60 0.53
	8	0.79 0.71 0.64 0.57 0.51	0.80 0.71 0.65 0.57 0.51	0.81 0.72 0.65 0.57 0.51	0.81 0.72 0.65 0.57 0.51
	10	0.77 0.69 0.62 0.55 0.49	0.78 0.69 0.63 0.55 0.49	0.78 0.70 0.63 0.55 0.49	0.79 0.70 0.63 0.55 0.49
PVC cables	1	0.96 0.97 0.98 0.91 0.85	1.01 1.01 1.00 0.92 0.85	1.07 1.05 1.01 0.92 0.85	1.16 1.10 1.02 0.93 0.85
	2	0.92 0.89 0.86 0.77 0.71	0.96 0.94 0.87 0.78 0.71	1.00 0.95 0.88 0.78 0.71	1.05 0.97 0.89 0.79 0.71
	3	0.88 0.84 0.77 0.69 0.62	0.91 0.85 0.78 0.69 0.62	0.95 0.86 0.79 0.69 0.62	0.96 0.87 0.79 0.69 0.62
	4	0.86 0.80 0.73 0.65 0.58	0.89 0.81 0.74 0.65 0.58	0.90 0.82 0.74 0.65 0.58	0.91 0.82 0.75 0.65 0.58
	5	0.84 0.76 0.70 0.61 0.55	0.85 0.77 0.70 0.61 0.55	0.87 0.78 0.71 0.62 0.55	0.87 0.79 0.71 0.62 0.55
	6	0.82 0.74 0.68 0.59 0.53	0.83 0.75 0.68 0.60 0.53	0.84 0.76 0.69 0.60 0.53	0.85 0.76 0.69 0.60 0.53
	8	0.79 0.71 0.65 0.57 0.51	0.80 0.72 0.65 0.57 0.51	0.81 0.72 0.65 0.57 0.51	0.81 0.73 0.66 0.57 0.51
	10	0.77 0.69 0.63 0.55 0.49	0.78 0.70 0.63 0.55 0.49	0.79 0.70 0.63 0.55 0.49	0.79 0.71 0.64 0.55 0.49

E : RATING FACTOR FOR THREE CORE CABLES, WITH 7cm CLEARANCE BETWEEN CABLES IN GROUND

Type of cables	Number of systems	Soil thermal resistivity																							
		0.7 K m/W						1 K m/W						1.5 K m/W						2.5 K m/W					
		Load factor						Load factor						Load factor						Load factor					
		0.50	0.60	0.70	0.85	1.00		0.50	0.60	0.70	0.85	1.00		0.50	0.60	0.70	0.85	1.00		0.50	0.60	0.70	0.85	1.00	
XLPE cables	1	1.02	1.03	0.99	0.94	0.89		1.06	1.05	1.00	0.94	0.89		1.09	1.06	1.01	0.94	0.89		1.11	1.07	1.02	0.95	0.89	
	2	0.95	0.89	0.84	0.77	0.72		0.98	0.91	0.85	0.78	0.72		0.99	0.92	0.86	0.78	0.72		1.01	0.94	0.87	0.79	0.72	
	3	0.86	0.80	0.74	0.68	0.62		0.89	0.81	0.75	0.68	0.62		0.90	0.83	0.77	0.69	0.62		0.92	0.84	0.77	0.69	0.62	
	4	0.82	0.75	0.69	0.63	0.57		0.84	0.76	0.70	0.63	0.57		0.85	0.78	0.71	0.63	0.57		0.86	0.78	0.72	0.64	0.57	
	5	0.78	0.71	0.65	0.59	0.53		0.80	0.72	0.66	0.59	0.53		0.81	0.73	0.67	0.59	0.53		0.82	0.74	0.67	0.60	0.53	
	6	0.75	0.68	0.63	0.56	0.51		0.77	0.69	0.63	0.56	0.51		0.78	0.70	0.64	0.57	0.51		0.79	0.71	0.65	0.57	0.51	
	8	0.71	0.64	0.59	0.52	0.47		0.72	0.65	0.59	0.52	0.47		0.73	0.66	0.60	0.52	0.47		0.74	0.66	0.60	0.53	0.47	
	10	0.68	0.61	0.56	0.49	0.44		0.69	0.62	0.56	0.50	0.44		0.70	0.63	0.57	0.50	0.44		0.71	0.63	0.57	0.50	0.44	
PVC cables	1	0.91	0.92	0.94	0.94	0.89		0.97	0.97	1.00	0.94	0.89		1.04	1.03	1.01	0.94	0.89		1.13	1.07	1.02	0.95	0.89	
	2	0.86	0.87	0.85	0.77	0.72		0.91	0.90	0.86	0.78	0.72		0.97	0.93	0.87	0.78	0.72		1.01	0.94	0.88	0.79	0.72	
	3	0.82	0.80	0.75	0.68	0.62		0.86	0.82	0.76	0.68	0.62		0.91	0.84	0.77	0.69	0.62		0.92	0.84	0.78	0.69	0.62	
	4	0.80	0.76	0.70	0.63	0.57		0.84	0.77	0.71	0.63	0.57		0.86	0.78	0.72	0.63	0.57		0.87	0.79	0.73	0.64	0.57	
	5	0.78	0.72	0.66	0.59	0.53		0.81	0.73	0.67	0.59	0.53		0.81	0.74	0.68	0.59	0.53		0.82	0.75	0.68	0.60	0.53	
	6	0.76	0.69	0.64	0.56	0.51		0.77	0.70	0.64	0.56	0.51		0.78	0.71	0.65	0.57	0.51		0.79	0.72	0.65	0.57	0.51	
	8	0.72	0.65	0.59	0.52	0.47		0.73	0.66	0.60	0.52	0.47		0.74	0.67	0.61	0.52	0.47		0.75	0.67	0.61	0.53	0.47	
	10	0.69	0.62	0.57	0.49	0.44		0.70	0.63	0.57	0.50	0.44		0.71	0.64	0.58	0.50	0.44		0.71	0.64	0.58	0.50	0.44	

F : RATING FACTOR FOR DIFFERENT AIR TEMPERATURE

Type of cables	Max. conductor temp. °C	Air temperature (°C)									
		10	15	20	25	30	35	40	45	50	
		Rating factor									
XLPE cables	90	1.15	1.12	1.08	1.04	1.0	0.96	0.91	0.87	0.82	
PVC cables	70	1.22	1.17	1.12	1.06	1.0	0.94	0.87	0.79	0.71	



Appendix 6 : FORMULAS

INDUCTANCE:

$$L = 0.05 + 0.2 \operatorname{Ln}\left(\frac{k \cdot s}{r}\right) \text{ [mH/km]}$$

Where:

$k = 1$ In trefoil formation and $k = 1.26$ In flat formation.

s = Distance between conductor axes (mm)

r = Conductor screen radius (mm)

INDUCTIVE REACTANCE:

$$X = 2 \pi f \frac{L}{1000} \text{ [\Omega/km]}$$

Where:

f = Frequency (Hz)

L = Inductance (mH/km)

CAPACITANCE:

$$C = \frac{\varepsilon}{18 \operatorname{Ln}\left(\frac{d_o}{d_i}\right)} \text{ [\mu F/km]}$$

Where:

ε = Relative permittivity of the insulation (for XLPE insulation $\varepsilon = 2.3$)

d_o = External diameter of the insulation (mm)

d_i = Diameter of conductor including conductor screen (mm)

IMPEDANCE:

$$Z = \sqrt{R_{ac}^2 + X^2} \text{ [\Omega/km]}$$

Where:

R_{ac} = AC resistance of conductor (Ω/km)

X = Reactance (Ω/km)

ELECTRICAL FIELD:

$$\text{Conductor screen: } E_i = \frac{U}{r_i \operatorname{Ln}\left(\frac{r_o}{r_i}\right)} \text{ [kV/mm]}$$

$$\text{Insulation screen: } E_o = \frac{U}{r_o \operatorname{Ln}\left(\frac{r_o}{r_i}\right)} \text{ [kV/mm]}$$

Where:

r_i = Radius of conductor screen (mm)

r_o = Radius of XLPE insulation (mm)

U = Voltage across insulation

SHORT CIRCUIT CURRENT:

$$\text{Copper conductor: } I_s = 226 \frac{S}{\sqrt{t}} \sqrt{\ln \frac{t_f + 234.5}{t_i + 234.5}} [A]$$

$$\text{Aluminum conductor: } I_s = 148 \frac{S}{\sqrt{t}} \sqrt{\ln \frac{t_f + 228}{t_i + 228}} [A]$$

Where:

S = Cross section (mm²)

t = Short circuit duration (sec)

t_i = Initial temperature before the short circuit (90°C for XLPE cables)

t_f = Final temperature after the short circuit (250°C for XLPE cables)

CHARGING CURRENT:

$$I_c = U_0 \omega C = U_0 2\pi f C 10^{-3} [A/km]$$

Where:

U_0 = Voltage (kV)

$\omega = 2\pi f$

f = Frequency (Hz)

C = Capacitance (μF/km)

DIELECTRIC LOSSES:

$$W_d = \frac{U^2}{3} 2\pi f C \tan(\delta) [W/km]$$

Where:

U = Rated voltage (kV)

f = Frequency (Hz)

C = Capacitance (μF/km)

$\tan(\delta)$ = Loss angle

TEMPERATURE CORRECTION FACTORS FOR CONDUCTOR RESISTANCE:

$$\text{For Copper Conductors: } K_t = \frac{254.5}{234.5 + t}, R_t = \frac{R_{20}}{K_t} \times \frac{L}{1000}$$

$$\text{For Aluminum Conductors: } K_t = \frac{248}{228 + t}, R_t = \frac{R_{20}}{K_t} \times \frac{L}{1000}$$

Where:

K_t = Is the temperature correction factor

R_{20} = Is the conductor resistance at 20°C (Ω/km)

R_t = Is the conductor resistance at t°C (Ω/km)

L = Is the length of cable (m)

Appendix 7 : CORE COLOR FOR LOW VOLTAGE CABLES

No. of cores	Color			
	Regarding to IEC standard (without protective core)	Regarding to IEC standard (with protective core)	Regarding to BS standard	Regarding To TAVANIR standard
1	Black		Black	Black
2	Black and Blue		Red and Black	Black and Blue
3	Brown, Black and Grey	Blue, Brown and Green or Yellow	Red, Yellow and Blue	Red, Black and Blue
3+1/2	Brown, Black, Grey and Blue (for neutral)	Brown, Black, Grey and Green or Yellow (for neutral)	Red, Yellow, Blue and Black (for neutral)	Red, Yellow, Black and Blue (for neutral)
4	Brown, Black, Grey and Blue	Brown, Black, Grey and Green or Yellow	Red, Yellow, Blue and Black	Red, Yellow, Black and Blue
5	Brown, Black, Grey, Red and Blue	Brown, Black, Grey, Blue and Green or Yellow	Black Cores with White Numerals	Red, Yellow, Black, Blue and Green or Yellow
Over 5	Black Cores with White numerals	Black Cores with White Numerals with a Green or Yellow Core	Black Cores with White Numerals	Black Cores with White Numerals

Appendix 8 : CORE COLOR FOR TELECOMMUNICATION CABLES

No. of Pairs	Pair Color	
	Conductor A	Conductor B
1	White	Blue
2	White	Orange
3	White	Green
4	White	Brown
5	White	Grey
6	Red	Blue
7	Red	Orange
8	Red	Green
9	Red	Brown
10	Red	Grey
11	Black	Blue
12	Black	Orange
13	Black	Green
14	Black	Brown
15	Black	Grey
16	Yellow	Blue
17	Yellow	Orange
18	Yellow	Green
19	Yellow	Brown
20	Yellow	Grey
21	Violet	Blue
22	Violet	Orange
23	Violet	Green
24	Violet	Brown
25	Violet	Grey

Appendix 9 : Designation Code for Harmonized Wires and Cables (According to DIN VDE 0281/0282/0292)

1	Identification of Designation: A: Authorized National Standard H: Harmonized Standard	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
2	Nominal Voltage U: 01: 100 V 03: 300/300 V 05: 300/500 V 07: 450/750 V	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
3	Insulating Materials: B: (EPR) Ethylene propylene rubber G: (EVA) Ethylene Vinylacetat Copolymer N2: (CR) Chloroprene rubber for welding cables R: (NR/SR) Natural or synthetic rubber S: (SiR) Silicone rubber V: (PVC) Polyvinyl chloride V2: (PVC) Polyvinyl chloride heat resistant V3: (PVC) Polyvinyl chloride low-temperature V4: (PVC) Polyvinyl chloride cross-linked Z: (XLPE) Polyethylene cross-linked	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
4	Structural Elements: C: Shielding Q4: (PA) Additional polyamide conductor jacket T: Additional textile braiding over laid-up conductors T6: Additional textile braiding over individual conductors	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
5	Jacket Material: B: (EPR) Ethylene propylene rubber J: Glass fiber braid N: (CR) Chloroprene rubber N2: (CR) Chloroprene rubber for welding cables N4: (CR) Chloroprene rubber heat-resistant Q: (PUR) Polyurethane R: (NR/SR) Natural or synthetic rubber T: Textile braid T2: Textile braid with flame retardant compound V: (PVC) Polyvinyl chloride V2: (PVC) Polyvinyl chloride heat resistant V3: (PVC) Polyvinyl chloride low temperature V4: (PVC) Polyvinyl chloride cross linked V5: (PVC) Polyvinyl chloride oil resistant	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
6	Special Structural Features: D3: Stress relieving elements (support wire) D5: Center conductor (no supporting element) H: Flat, separable cable (twin cable) H2: Flat, non-separable cable (two-conductor shielded cable) H6: Flat, non-separable cable (multi- and multiple shielded cable) H7: Two-layer insulating jacket H8: Spiral Cables	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
7	Conductor Type: D: Flexible conductor, for welding cables E: Very flexible conductor, for welding cables F: Flexible conductor, for flexible cables H: Very flexible conductor, for flexible cables K: Flexible conductor, for cables for fixed installation R: Stranded rigid conductor, class 2 U: Rigid bare conductor und, class 1 Y: Copper-similar conductor, DIN 47104	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
8	Number of Conductors	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
9	Ground Conductor: G: With Ground Conductor X: Without Ground Conductor	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐
10	Conductor Nominal Cross-section in mm²	☐ ☐ ☐ ☐ ☐ ☐ - ☐ ☐ ☐

Appendix 10 : Designation Code for Power Cables (According to DIN VDE 0271/0276)

1	Identification of Designation: N: DIN VDE Standard (N): Similar to DIN VDE Standard	- x
2	Conductor Material: A: Aluminum Conductor - : Copper Conductor	- x
3	Insulating Materials: Y: PVC 2X: Cross-linked PE (XLPE) - : Impregnated paper	- x
4	Concentric Conductor (Shielding): C: Concentric Copper Conductor CW: Concentric Copper Conductor in wave-conal formation CE: Concentric Copper Conductor over each individual conductor S: Shielding of Copper Wires SE: Shielding of Copper Wires over each individual conductor H: Conductive layers (F): Longitudinally water-proof shielding	- x
5	Armoring: B: Steel tape armoring F: Armor of galvanized flat steel wires G: counter helix of galvanized steel tape R: Armor of galvanized round steel wires	- x
6	Jacket Material: A: Outer jacket made of fiber material K: Lead jacket KL: Aluminum jacket Y: PVC 2Y: PE 2X: Cross-linked PE (XLPE)	- x
7	Protective Conductor: J: with protective conductor O: without protective conductor	- x
8	Number of Conductors	- x
9	Conductor cross-section in mm ²	- x
10	Conductor Type: r...: Circular conductor s...: Sector conductor o...: Oval conductor e...: Circular, solid conductor ...m: Stranded conductor ...h: Hollow circular conductor /V: Compact conductor	- x
11	Rating Voltage: 0.6/1 kV 3.6/6 kV 6/10 kV	- x



Appendix 11 : Designation Code for Power Cables (According to DIN VDE 0271/0276)

1	Basic Cable Type with additional information: A: Outdoor CableAB: Outdoor Cable with lightning protection requirements AJ: Outdoor Cable with induction protection requirementsG: Mining CableJ: Fix Installation Cable JE: Fix Installation Cable for industrial electronicsJE-H: Fix Installation Cable for industrial electronics, Halogen-free S: Switchboard CableT: Distribution CableYV/Li: Jumper Wires or Hook-up Wires								
2	Insulation: P: Dry PaperY: PVC (Polyvinyl chloride)2Y: PE (Polyethylene)02Y: Foamed PE (cellular)02YS: Foam-skin insulation 3Y: Styroflex5Y: PTFE6Y: FEP7Y: ETFE								
3	Shielding: C: Shield of braided copper wiresD: Copper shield, helically strandedF: Filling of cable conductor with petrol-jelly (K): Shield of copper tape with PE-inner jacket(L): Aluminum tape(ms): Magnetic shield steel tape (St): Shield of plastic coated metallic foil(Z): High tensile steel wire braiding								
4	Protective Coating: L: Smooth Aluminum jacket(L)2Y: Copolymer coated Aluminum moisture barrier jacketLD: Corrugated Aluminum jacket M: Lead jacketMz: Lead alloy jacketW: Corrugated steel jacket								
5	Jacket Material: Y: PVC jacketYv: Reinforced protective PVC jacketYw: PVC jacket, heat-resistantYu: PVC flame resistant (non-flammable) 2Y: PE jacket2Yv: Reinforced protective PE jacketE: Compound with embedded plastic tapeC: Protective covering of jute and compound								
6	Number of Stranding Elements: x1x: Single conductorx2x: Pair (double-conductor)x3x: Triple-conductorx4x: Quad-conductorx5x: Five-conductor								
7	Conductor Diameter in mm								
8	Type of Stranding Components: F: Star quad with phantom circuit in railway cablesS: Signal conductor in railway signal cable St: Star quad with phantom circuit for long distanceSt I: Star quad without phantom circuit St II: Star quad like St III, but with increased capacitance unbalancesSt III: Star quad in local (Subscriber) cable St IV: Star quad for transmission $f = 120$ kHzSt V: Star quad for transmission $f = 550$ kHz ST VI: Star quad for transmission $f = 17$ MHzDM: Dieselhorst-Martin quad TF: Carrier frequency star quadP: Twisted pairPiMF: Pair in metal foil TiMF: Three in metal foilQiMF: Four in metal foilViMF: Five in metal foil BdiMF: Unit in metal foilKx: Coaxial cableSt O: Star quad general								
9	Stranding Layout: Lg: Layer stranding concentricBd: Unit stranding								
10	Armoring Wire: A: Layer of Aluminum-wires for inductive protectionb: Armoring B: Armoring of steel band for inductive protection1B0.3: One layer steel tape, thickness 0.3 mm 2B0.5: Two layers steel tape, thickness 0.5 mmD: Layer of copper wires for inductive protection (T): Strain bearing of steel wires for aerial cable								