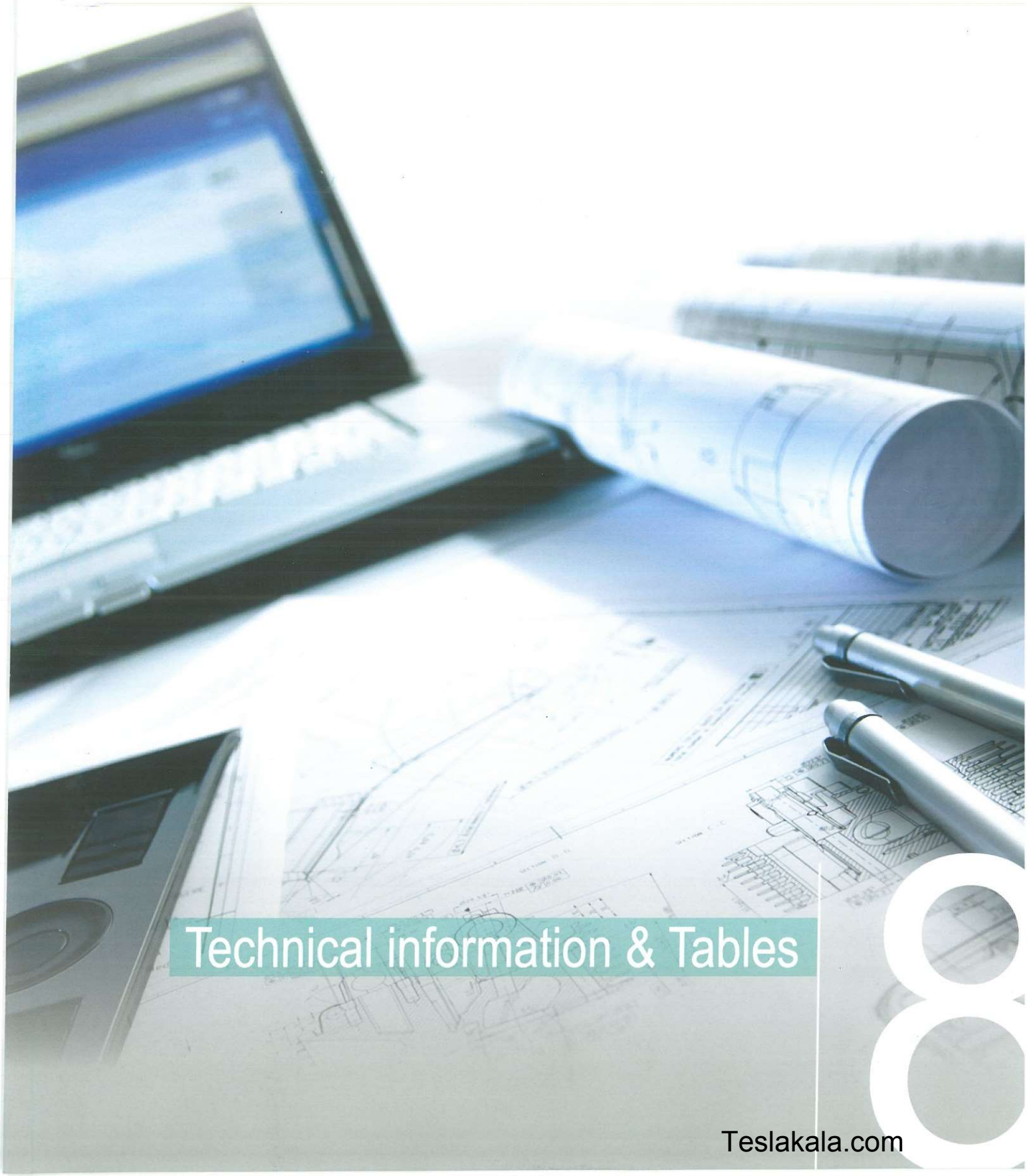
اطلاعـات فنـی



Technical information & Tables

CONTENTS

Conductor resistance

Nominal Cross Sectional Area	Maximum Conductor Resistance at 20°C							
	Annealed Copper Conductor						Aluminum & Aluminum Alloy Conductors	
	Class 1 Solid Conductor		Class 2 Stranded Conductor		Class 5 Flexible Conductor			
	Plain (Ω/km)	Metal-Coated (Ω/km)	Plain (Ω/km)	Metal-Coated (Ω/km)	Plain (Ω/km)	Metal-Coated (Ω/km)	Class 1	Class 2
0.5	36	36.7	36	36.7	39	40.1	---	---
0.75	24.5	24.8	24.5	24.8	26	26.7	---	---
1	18.1	18.2	18.1	18.2	19.5	20	---	---
1.5	12.1	12.2	12.1	12.2	13.3	13.7	---	---
2.5	7.41	7.56	7.41	7.56	7.98	8.21	---	---
4	4.61	4.7	4.61	4.7	4.95	5.09	---	---
6	3.08	3.11	3.08	3.11	3.3	3.39	---	---
10	1.83	1.84	1.83	1.84	1.91	1.95	3.08	3.08
16	1.15	1.16	1.15	1.16	1.21	1.24	1.91	1.91
25	0.727	---	0.727	0.734	0.78	0.795	1.2	1.2
35	0.524	---	0.524	0.529	0.554	0.565	0.868	0.868
50	0.387	---	0.387	0.391	0.386	0.393	0.641	0.641
70	0.268	---	0.268	0.27	0.272	0.277	0.443	0.443
95	0.193	---	0.193	0.195	0.206	0.21	0.32	0.32
120	0.153	---	0.153	0.154	0.161	0.164	0.253	0.253
150	0.124	---	0.124	0.126	0.129	0.132	0.206	0.206
185	0.101	---	0.0991	0.1	0.106	0.108	0.164	0.164
240	0.0775	---	0.0754	0.0762	0.0801	0.0817	0.125	0.125
300	0.062	---	0.0601	0.0607	0.0641	0.0654	0.1	0.1
400	0.0465	---	0.047	0.0475	0.0486	0.0495	0.0778	0.0776

Conversion of conductor resistance

Values for deviating ambient Temperatures

$$CU := R\delta = R_{20}\ \frac{234.5+\sigma}{254.5}$$

$$Al : R\delta = R_{20}\ \frac{228+\sigma}{248}$$

R_{20} = Conductor restistance at 20^0C [Ω/km]

Rδ = Conductor resistance atσ ^{0}C[Ω/km]

δ = Conduct or temperature^0[C]

Inductive Reactance(X_L) for Low Voltage power cables 0.6/1(1.2) kv

Nominal Cross Section Of Conductor mm²	PVC Insulated		XLPE Insulated	
	Single-Core	Multi-Core	Single-Core	Multi-Core
	[Ω/km]		[Ω/km]	
25	0.103	0.082	0.092	0.077
35	0.098	0.079	0.090	0.075
50	0.095	0.078	0.088	0.72
70	0.090	0.075	0.085	0.069
95	0.088	0.075	0.082	0.069
120	0.085	0.073	0.082	0.069
150	0.084	0.073	0.082	0.069
185	0.084	0.073	0.82	0.069
240	0.082	0.072	0.079	0.069
300	0.081	0.072	0.078	0.069
400	0.079	—	0.077	—
500	0.079	----	0.077	----

Notes :
The values have to be increased by 10% for armored cables.

Voltage drop at Low voltage power cable

Cross Section	Cosφ = 0.6		Cosφ = 0.7		Cosφ = 0.8		Cosφ = 0.9		Cosφ = 1.0	
mm²	Cu	AL	Cu	AL	Cu	AL	Cu	AL	Cu	AL
10	7.9	—	6.9	—	6.1	—	5.5	—	5.0	—
16	12.3	----	10.7	----	9.5	----	8.6	----	8.0	----
25	18.7	11.8	16.4	10.3	14.7	9.1	13.4	8.2	12.6	7.6
35	25.5	15.9	22.2	13.9	20.0	12.4	18.3	11.3	17.5	10.5
50	32.3	20.9	28.9	18.4	26.3	16.5	24.3	15.1	23.7	14.2
70	43.5	28.9	39.5	25.7	36.4	23.3	34.2	21.4	34.2	20.6
95	55.3	37.7	51.0	34.1	47.8	31.1	45.6	28.9	47.5	28.5
120	65.2	45.5	60.9	41.3	57.7	38.2	55.8	35.9	60.0	36.0
150	74.4	52.9	70.4	48.6	67.5	45.2	66.4	43.0	85.0	44.2
185	87.7	62.0	81.2	57.6	79.2	54.4	79.2	52.4	92.2	55.5
240	98.2	74.2	95.8	70.0	95.1	67.1	97.5	65.8	122.0	72.9
300	109.0	84.5	108.0	80.8	109.0	78.6	114.0	78.5	153.0	91.1

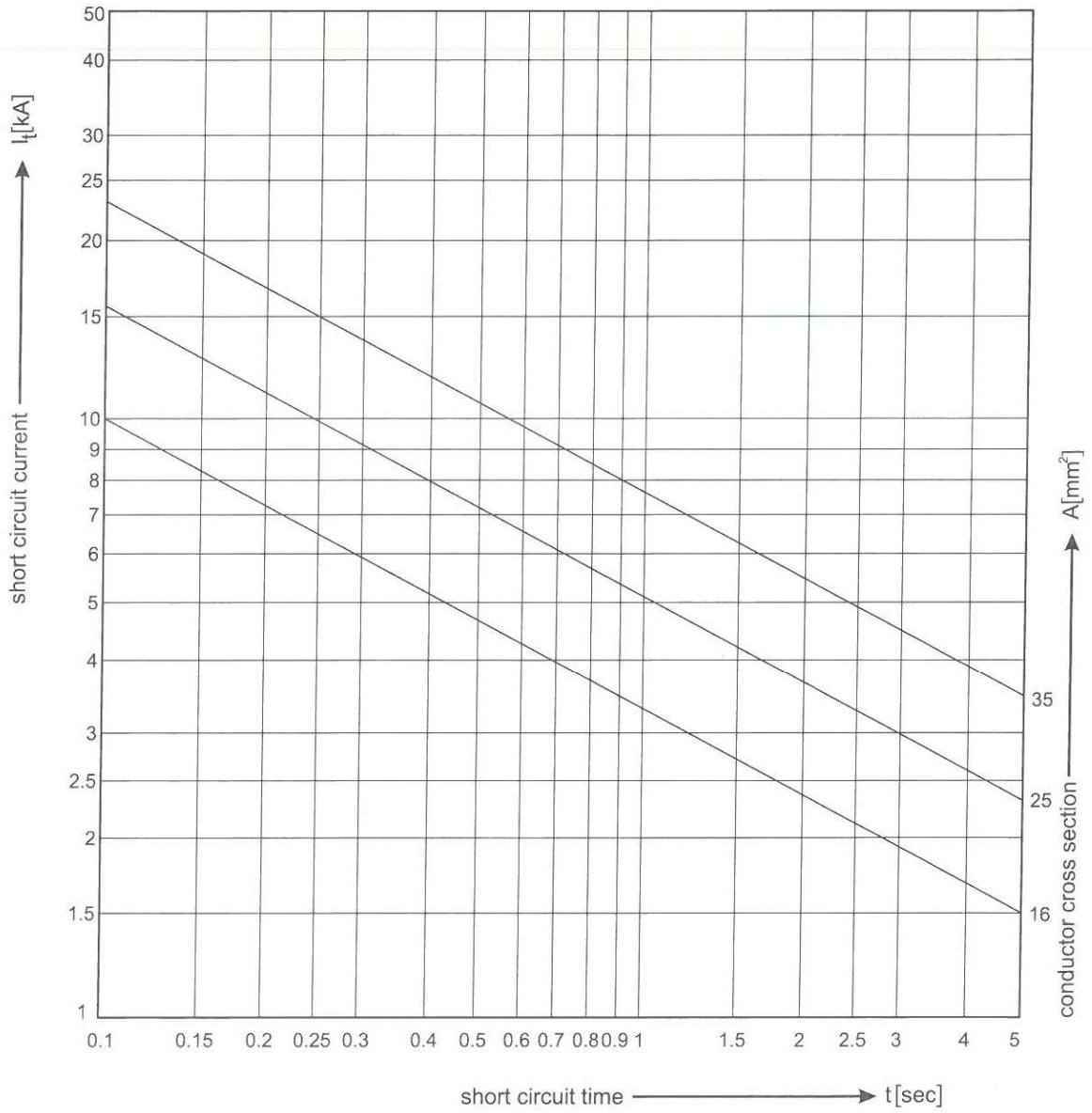
Voltage Drop: 5%
Service Voltage: 220/380V

In many cases, especially for Large cross sections, the inductive voltage drop must be taken into consideration.

General formula for three phase system : $e = \frac{100\sqrt{3}\, I.L}{U} [R.\cos\varphi + x .\sin\varphi]$

U=Phase to phase voltage[V] L=Length of cable [km] e= Voltage drop [%]
R=Resistance [Ω/km] I=Current Loading [A] X=Inductance [Ω/km]

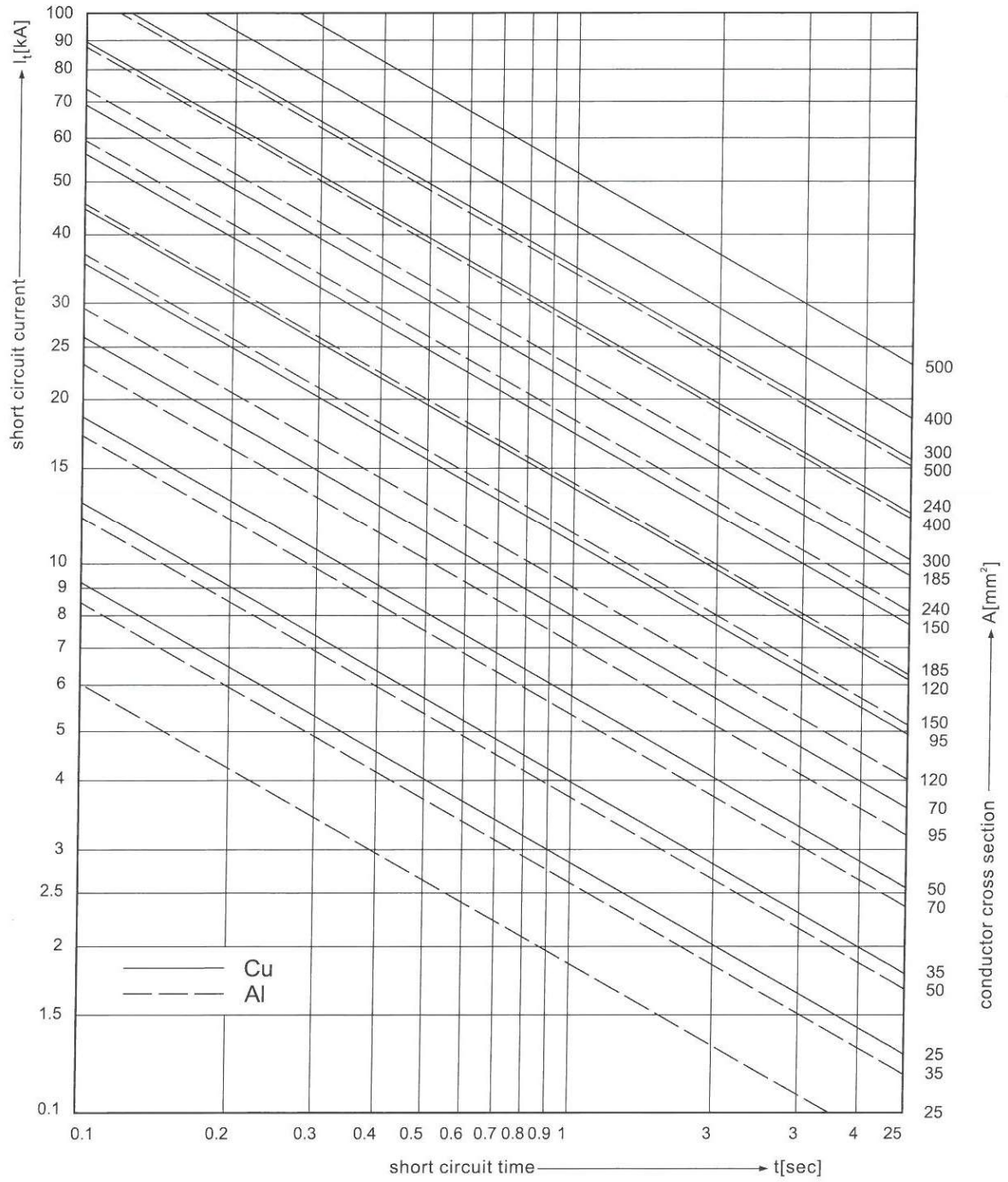
Short circuit ratings for copper screen of XLPE-insulated cables



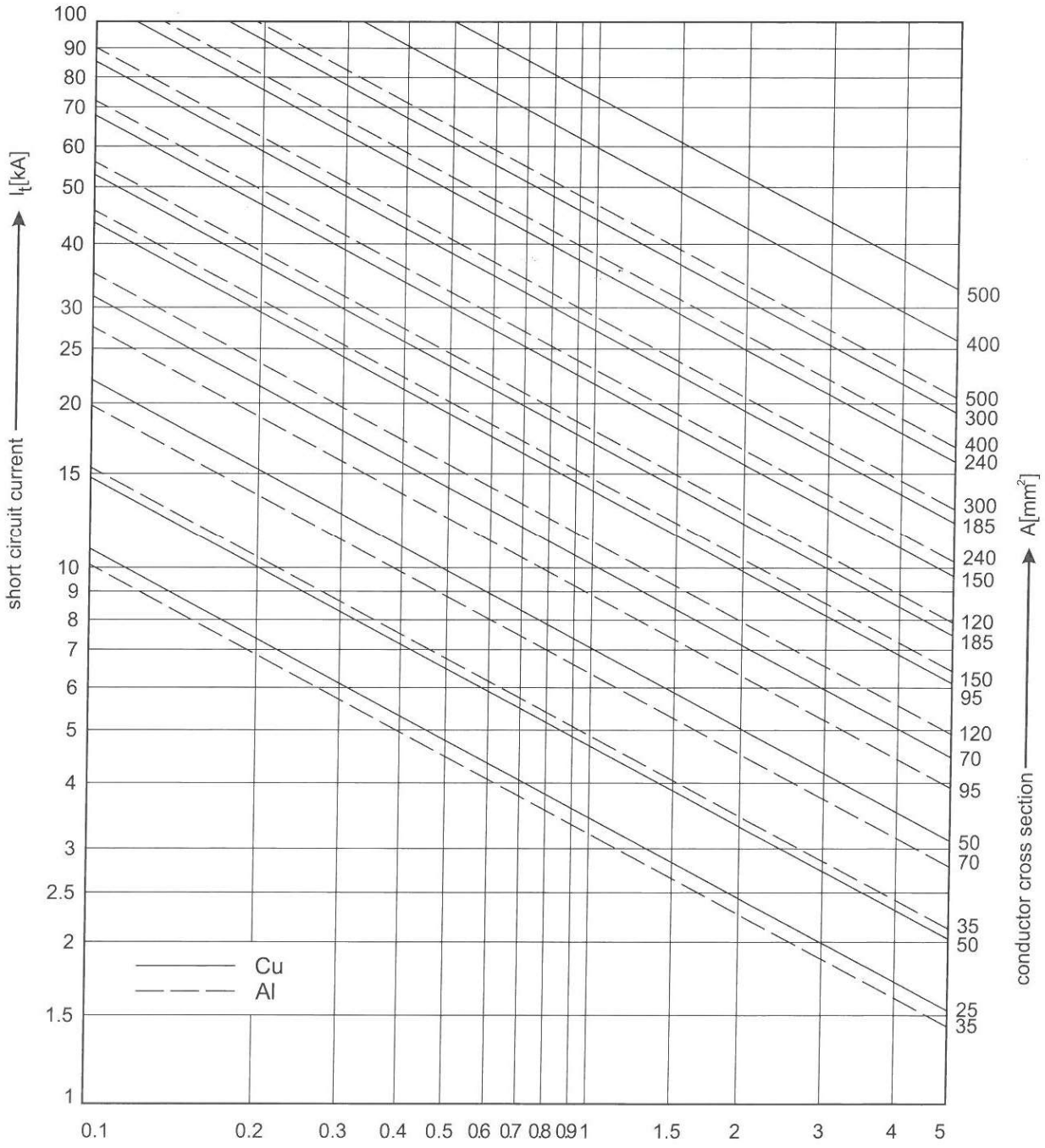
Standard cross section of screens

cross section of conductor mm²	screen mm²
35 ... 120	16
150 ... 300	25
400 ... 500	35

Short circuit ratings for PVC-insulated cables (0.6/1 KV)

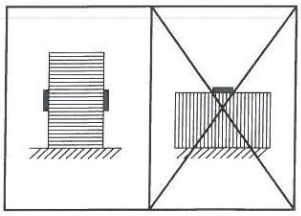


Short circuit ratings for XLPE-insulated cables (0.6/1 - 18/30 KV)



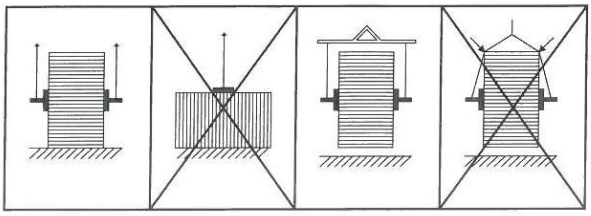
1.1. Position of Drums:

Drums must be handled only in the upright position, not on the Flanges.



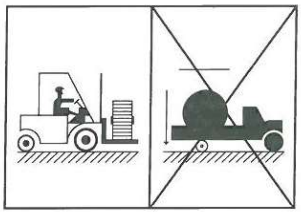
1.2. Loading:

Drums must be lifted only with mandrel or a chain through the central Hole. It is important to use a spacing bar to leave a gap between the Chain and the flanges of the drum.
Do not lift more than one drum if its diameter is equal to or greater than 1, 2 meters.



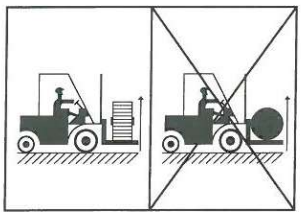
1.3. Unloading:

When unloading from vehicles (truck, ship, wagon etc.) the correct Lifting gear must be used (forklift, truck, crane, etc.). Never drop Drums, even from a small height.



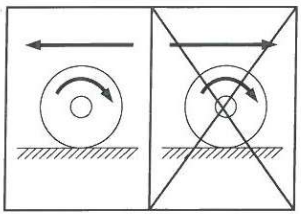
1.4. Handling by forklift:

If a forklift is used, always cradle both drum flanges between the forks. The forks must not bear on the unsupported laggings between flanges.



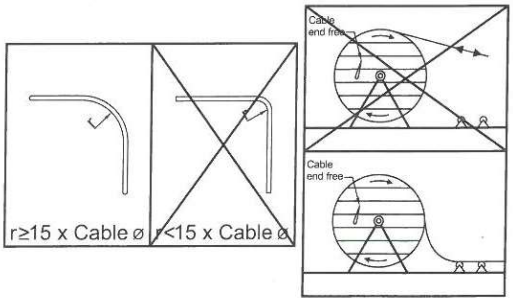
1.5 Rolling:

Drums are permitted to be rolled for short distances, the ground being smooth and free of injurious impediments, but only in the opposite direction of the arrow painted on flanges. If arrow sign Is missed, drums may be rolled but only in the direction to cable Winding, to keep cable from loosening the drum.



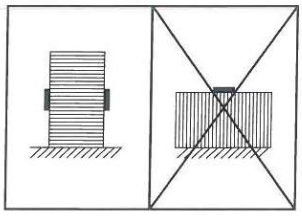
1.6. Paying-off the Cable:

When paying off a cable from a drum;
1) The lower end of the cable should be free.
2) Drums should be unreeled without exceeding the maximum allowed pulling force of the cable.
3) The minimum bending radius of the cable should be equal to or greater than 15x of the outer diameter of the cable.



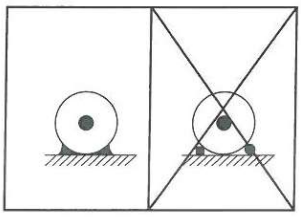
2.1. Position of the Drums:

Drums must be transported only in the upright position, not on the flanges. Never allow an unauthorized person to operate any lifting device or a mechanical transport.



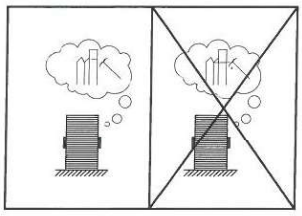
2.2. Fastening Drums:

Wedges must be used to retain drums. Wedges must be positioned at flanges' edges and not between flanges. The use of stones is forbidden. Where the load is unusual and is likely to need special care, ensure that all precautions are properly checked before the transport is allowed to move.



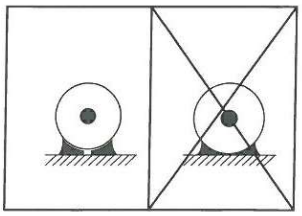
2.3. Use of Nails:

When nails are used to fasten drums on vehicles, be sure that the length of the nail is less than the thickness of the flange.



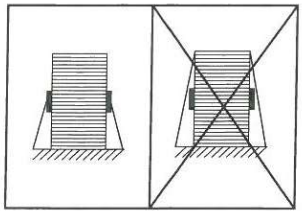
2.4. Bigger Drums:

Drums with diameter greater than 1,6 meters must be supported by wedges and must not touch the vehicle's floor. Never use a lifting device or transport device for a weight which exceeds its permitted capacity.



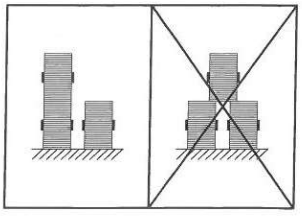
2.5. Binding of the Drums:

Binding must be made with ropes crossing through the central hole and, if necessary, on the drum flanges. Binding with ropes only crossing the drum's edges is strictly forbidden.

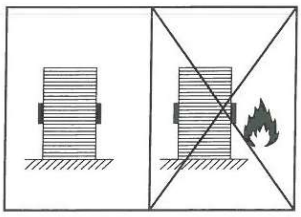


2.6. Multiple Drum Storage:

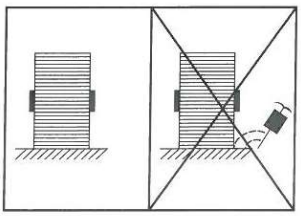
Multiple drum storage, either double or single layer must be obtained with flange to flange contact. Flanges contacting to unsupported part of lagings are forbidden.



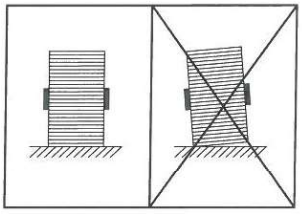
3.1. Do not store near heat sources.



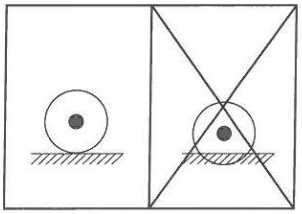
3.2. Do not store on vibrating surfaces. (Ship engine room etc.)



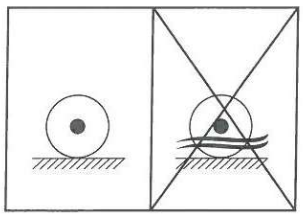
3.3. Do not store on irregular surfaces.



3.4. Do not store on soft surfaces.



3.5. Do not store on areas liable of flooding. All cable ends must be fully sealed at all times to prevent the ingress of water. It is preferable to store reels off the ground on timbers or other supports. In damp locations, it is advisable to allow at least 3 inches between reels to permit circulation of air.



3.6. If storage is likely to last more than 6 months, drums should be stored in order to be protected from effects like rain, sunlight etc.