

**IEEMA (PVC)/MV SCREEN CABLE/2019**

**Effective from: 1<sup>st</sup> September 2019**

**Note:** For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet

D= Density= 8.89 for Cu. & 2.703 for Al **SMIFS=(A\*D)/1000**

**H. For Copper conductor XLPE insulated 3.3 to 33 kV Single Core Armoured power cables**

$$P = P_o + CuF (Cu - Cu_0) + XLFCu(CC-Cc_0) + SMIFS (SMIF1-SMIF_0) + AIF(Al-A_{l0}) + CCFAl ( PVCc - PVCc_0)$$

For Single Core unarmoured cables Aluminium factor (AIF) shall be 0

**Table References:**

CuP	Copper conductor Factor in single core ; CuF
H2(a)	XLPE Compound Factor ; XLFCu
H3(a)	Copper Tape Factor ; SMIFS
H4(a)	Aluminium Armour factor ; AIF
H5(a)	Polymer factor for Single core cable ; CCFCu

**Note:** For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet

D= Density= 8.89 for Cu. & 2.703 for Al

**SMIFS=(A\*D)/1000**

**I. For Aluminium conductor XLPE insulated 3.3 to 33 kV Three Core Armoured power cables**

$$P = P_o + AIF (Al - Al_0) + XLFAl(CC-Cc_0) + SMIF (SMIF1-SMIF_0) + FeF(FeF1-FeF_0) + CCFAl ( PVCc - PVCc_0)$$

For unarmoured Three Core cables , Steel Armour factor (FeF for Strip & FeW for Wire) shall be 0

**Table References:**

ALP	Aluminium conductor Factor in three core ; AIF
H2(b)	XLPE Compound Factor ; XLFAl
H3(b)	Copper Tape Factor ; SMIF
H4(b)	Steel Strip Armour Factor ; FeF. For Steel Wire Armour Refer Table H4(c); FeW
H5(b)	Polymer factor for Three Core cable ; CCFAl

**Note:** For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet

D= Density= 8.89 for Cu. & 2.703 for Al

**SMIF=(A\*D)/1000**

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**J. For Copper conductor XLPE insulated 3.3 to 33 kV Three Core Armoured power cables**

$$P = P_0 + CuF (Cu - Cu_0) + XLFCu(CC-Cco) + SMIF(SMIF1-SMIF0) + FeF(FeF1-FeF0) + CCFCu ( PVCc - PVCco)$$

For Three Core unarmoured cables , Steel Armour factor (FeF for Strip & FeW for Wire) shall be 0

**Table References:**

CuP	Copper conductor Factor in three core ; CuF
H2(b)	XLPE Compound Factor ; XLFCu
H3(b)	Copper Tape Factor ; SMIF
H4(b)	Steel Strip Armour Factor ; FeF. For Steel Wire Armour Refer Table H4(c); FeW
H5(b)	Polymer factor for Three Core cable ; CCFCu

**Note:** For cases where specific Earth Fault Current through Screen is required, Screen area as approved by the customer in Datasheet/Earth Fault Current calculation of Screen shall be used to derive SMIF as below

If A= Area of Metallic Screen in Approved Datasheet / Calculation Sheet

D= Density= 8.89 for Cu. & 2.703 for Al

$$SMIF=(A*D)/1000$$

The PV factor for metallic screen will be computed based on approved screen area in case of cables having a specific short circuit capacity

  
**Authorized Signatory**

**TABLE ALP**

**VARIATION FACTOR FOR ALUMINIUM (AIF)**  
POWER CABLES WITH ALUMINIUM CONDUCTOR  
(EXCLUDING SINGLE CORE ARMoured CABLES)

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.007	0.014	0.021	-	0.028
4	0.011	0.023	0.034	-	0.046
6	0.017	0.034	0.052	-	0.069
10	0.029	0.053	0.087	-	0.116
16	0.046	0.091	0.137	-	0.183
25/16	0.073	0.146	0.219	0.262	0.292
35/16	0.101	0.202	0.302	0.345	0.404
50/25	0.137	0.273	0.410	0.478	0.547
70/35	0.197	0.395	0.593	0.687	0.791
95/50	0.274	0.548	0.821	0.949	1.095
120/70	0.346	0.691	1.036	1.221	1.382
150/70	0.425	0.853	1.279	1.464	1.706
185/95	0.533	1.070	1.605	1.861	2.140
225/120	0.655	1.310	1.965	2.287	2.620
240/120	0.703	1.400	2.099	2.421	2.799
300/150	0.879	1.757	2.635	3.033	3.514
400/185	1.126	2.249	3.374	3.873	4.498
500	1.418	2.838	4.256	-	5.675
630	1.828	3.663	5.494	-	7.326
800	2.340	4.679	7.018	-	9.357
1000	2.951	5.890	8.834	-	11.779

**TABLE CUP**

**VARIATION FACTOR FOR COPPER CONDUCTOR (CUF)  
POWER CABLES WITH COPPER CONDUCTOR**

Nominal Cross Sectional Area (in Sq. mm.)	1 core	2 core	3 core	3.5 core	4 core
2.5	0.023	0.046	0.069	-	0.092
4	0.036	0.076	0.112	-	0.151
6	0.056	0.112	0.171	-	0.227
10	0.095	0.174	0.286	-	0.382
16	0.151	0.299	0.451	-	0.602
25/16	0.240	0.480	0.720	0.862	0.960
35/16	0.332	0.664	0.993	1.135	1.329
50/25	0.451	0.898	1.348	1.572	1.799
70/35	0.648	1.299	1.950	2.260	2.602
95/50	0.901	1.802	2.700	3.121	3.601
120/70	1.138	2.273	3.407	4.016	4.545
150/70	1.398	2.806	4.207	4.815	5.611
185/95	1.753	3.519	5.279	6.121	7.038
225/120	2.154	4.309	6.463	7.522	8.617
240/120	2.312	4.605	6.904	7.963	9.206
300/150	2.891	5.779	8.667	9.976	11.558
400/185	3.703	7.397	11.097	12.738	14.794
500	4.664	9.334	13.998	-	18.665
630	6.012	12.048	18.070	-	24.095
800	7.696	15.389	23.082	-	30.775
1000	9.706	19.372	29.055	-	38.741

**Table : H1**

**VARIATION FACTOR FOR ALUMINIUM (AIF)**  
**ALUMINIUM ARMoured SINGLE CORE XLPE INSULATED 3.3 TO 33 KV CABLES**

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Aluminium Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.251	0.284	0.301	0.344	0.358	0.473
50	0.312	0.336	0.352	0.397	0.408	0.672
70	0.385	0.409	0.423	0.469	0.501	0.723
95	0.476	0.500	0.518	0.637	0.656	0.856
120	0.561	0.586	0.601	0.726	0.744	0.949
150	0.653	0.678	0.696	0.823	0.842	1.050
185	0.773	0.797	0.893	0.949	0.965	1.183
240	0.997	1.063	1.083	1.139	1.154	1.387
300	1.209	1.271	1.283	1.333	1.307	1.753
400	1.438	1.556	1.565	1.620	1.636	2.046
500	1.873	1.901	1.910	2.110	2.128	2.484
630	2.337	2.361	2.369	2.580	2.595	2.978
800	3.007	3.071	3.080	3.145	3.163	3.588
1000	3.737	3.741	3.749	3.804	3.822	4.565

**TABLE : H2 (a)**  
**VARIATION FACTOR FOR XLPE( XLFAI/XLFCu)**  
**SINGLE CORE** ARMoured /UNARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Al / Cu CONDUCTOR

Nominal Cross-Sectional Area (in Sq. mm.)	XLPE Factor for Armoured/ Unarmoured Cable with AL /CU Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.110	0.131	0.170	0.279		
35	0.122	0.137	0.175	0.284	0.317	0.522
50	0.135	0.151	0.191	0.307	0.341	0.563
70	0.155	0.172	0.215	0.342	0.379	0.615
95	0.174	0.193	0.241	0.377	0.417	0.670
120	0.192	0.212	0.262	0.407	0.449	0.713
150	0.209	0.229	0.283	0.437	0.481	0.757
185	0.228	0.250	0.308	0.471	0.518	0.809
240	0.255	0.279	0.343	0.519	0.569	0.883
300	0.280	0.322	0.372	0.560	0.613	0.943
400	0.326	0.392	0.420	0.625	0.683	1.041
500	0.388	0.461	0.469	0.694	0.757	1.142
630	0.467	0.520	0.529	0.777	0.845	1.265
800	0.567	0.593	0.602	0.874	0.949	1.407
1000	0.656	0.665	0.660	0.955	1.036	1.525

Note : XLPE factors include Semicons for Conductor & Insulation screen

**TABLE – H2 (b)**  
**VARIATION FACTOR FOR XLPE (XLFAI/XLFCu)**  
**THREE CORE** ARMoured /UNARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Al / Cu CONDUCTOR

Nominal Cross-Sectional Area (in Sq. mm)	3.3 KV unscreened Arm	6.6 KV (E) ARM	6.6 KV (UE)/ 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
25	0.315	0.394	0.511	0.838		
35	0.339	0.427	0.545	0.880	0.982	1.638
50	0.378	0.474	0.600	0.957	1.065	1.751
70	0.435	0.541	0.679	1.067	1.183	1.916
95	0.489	0.604	0.755	1.171	1.295	2.071
120	0.537	0.661	0.822	1.265	1.396	2.210
150	0.585	0.719	0.890	1.359	1.497	2.350
185	0.642	0.784	0.968	1.468	1.614	2.513
240	0.717	0.873	1.074	1.615	1.773	2.732
300	0.781	1.006	1.167	1.744	1.928	2.919
400	0.886	1.227	1.314	1.948	2.130	3.229
500	0.956	1.421	1.446	2.148	2.381	3.588
630	1.129	1.582	1.609	2.382	2.630	3.940

Note : XLPE factors include Semicons for Conductor & Insulation screen

**TABLE – H3 (a)**  
**VARIATION FACTOR FOR COPPER TAPE (SMIFS)**  
**SINGLE CORE** ARMoured /UNARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Al / Cu CONDUCTOR

Nominal Cross-Sectional Area in sq.mm.	6.6 KV (E)	6.6 KV (UE) / 11 KV (E)	11 KV (UE)	22 KV (E)	33 KV (E)
	ARM	ARM	ARM	ARM	ARM
35	0.0181	0.0201	0.0249	0.0263	0.0163
50	0.0194	0.0215	0.0263	0.0277	0.0348
70	0.0217	0.0237	0.0285	0.0299	0.0370
95	0.0237	0.0257	0.0305	0.0319	0.0387
120	0.0254	0.0275	0.0323	0.0337	0.0408
150	0.0273	0.0291	0.0339	0.0353	0.0424
185	0.0292	0.0313	0.0361	0.0375	0.0446
240	0.0322	0.0340	0.0388	0.0401	0.0472
300	0.0351	0.0364	0.0426	0.0426	0.0497
400	0.0403	0.0411	0.0457	0.0471	0.0543
500	0.0446	0.0450	0.0499	0.0513	0.0582
630	0.0494	0.0496	0.0544	0.0558	0.0630
800	0.0545	0.0547	0.0595	0.0609	0.0681
1000	0.0598	0.0584	0.0645	0.0659	0.0731

**TABLE – H3 (b)**  
**VARIATION FACTOR FOR COPPER TAPE (SMIF)**  
**THREE CORE** ARMoured /UNARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Al / Cu CONDUCTOR

Nominal Cross-Sectional Area in sq.mm.	6.6 KV (E)	6.6 KV (UE) / 11 KV (E)	11 KV (UE)	22 KV (E)	33 KV (E)
	ARM	ARM	ARM	ARM	ARM
35	0.0549	0.0607	0.0717	0.0790	0.0000
50	0.0590	0.0649	0.0755	0.0831	0.1044
70	0.0654	0.0712	0.0822	0.0895	0.1110
95	0.0714	0.0773	0.0882	0.0955	0.1171
120	0.0771	0.0829	0.0939	0.1012	0.1225
150	0.0818	0.0878	0.0989	0.1062	0.1278
185	0.0884	0.0943	0.1052	0.1125	0.1341
240	0.0968	0.1026	0.1136	0.1209	0.1425
300	0.1062	0.1102	0.1216	0.1289	0.1497
400	0.1216	0.1238	0.1348	0.1422	0.1638
500	0.1353	0.1356	0.1467	0.1545	0.1762
630	0.1485	0.1491	0.1602	0.1680	0.1897

**TABLE : H4 (a)**  
**VARIATION FACTOR FOR ALUMINIUM (AIF)**  
**SINGLE CORE** ARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm.)	Aluminium Factor for Aluminium Armoured Cable with Copper Conductor					
	3.3 KV(E) unscreened Arm	6.6 KV (E)	11 KV (E)/ 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
35	0.153	0.187	0.204	0.247	0.258	0.372
50	0.179	0.203	0.220	0.262	0.275	0.425
70	0.196	0.219	0.233	0.278	0.311	0.444
95	0.213	0.237	0.254	0.373	0.392	0.470
120	0.228	0.253	0.268	0.393	0.410	0.488
150	0.243	0.269	0.287	0.414	0.432	0.504
185	0.261	0.285	0.381	0.437	0.455	0.526
240	0.324	0.389	0.410	0.465	0.480	0.556
300	0.365	0.428	0.440	0.490	0.510	0.737
400	0.432	0.471	0.480	0.536	0.552	0.783
500	0.489	0.517	0.526	0.726	0.744	0.844
630	0.544	0.568	0.572	0.787	0.801	0.902
800	0.706	0.787	0.797	0.862	0.880	0.982
1000	0.824	0.865	0.867	0.923	0.940	1.324

**TABLE : H4 (b)**  
**VARIATION FACTOR FOR STEEL STRIP ARMOUR (FeF)**  
**THREE CORE** ARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
Al / Cu CONDUCTOR

Nominal Cross Sectional Area Sq. mm.	3.3 KV (E) unscreened arm	6.6 KV (E)	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	0.551	0.604	0.656	0.814		
35	0.645	0.645	0.731	0.879	0.937	-
50	0.675	0.703	0.761	0.937	0.966	1.181
70	0.761	0.761	0.849	0.996	1.055	1.289
95	0.820	0.849	0.907	1.083	1.113	1.348
120	0.879	0.907	0.966	1.142	1.172	1.406
150	0.966	0.966	1.055	1.201	1.259	1.494
185	1.025	1.055	1.113	1.259	1.318	1.553
240	1.142	1.142	1.231	1.377	1.406	1.641
300	1.231	1.259	1.318	1.465	1.524	1.758
400	1.348	1.406	1.435	1.582	1.641	1.876



**TABLE : H4 (c)**  
**VARIATION FACTOR FOR STEEL WIRE ARMOUR (FeW)**  
**THREE CORE ARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH**  
**Al / Cu CONDUCTOR**

Nominal Cross Sectional Area in Sq. mm	3.3 KV (E) Unscreened arm	6.6 KV (E)	11 KV (E) / 6.6 KV (UE)	11 KV (UE)	22 KV (E)	33 KV (E)
25	1.258	1.457	1.612	2.509	1.503	--
35	1.361	1.569	1.853	2.644	2.797	2.517
50	1.682	1.687	2.321	2.800	2.921	4.569
70	2.033	1.979	2.503	3.219	3.347	4.809
95	2.202	2.507	2.718	4.019	4.200	5.437
120	2.371	2.675	2.882	4.241	4.416	6.713
150	2.870	2.847	3.265	4.447	4.621	6.976
185	3.121	3.309	4.148	4.726	5.289	7.356
240	3.758	4.227	4.442	5.442	6.651	7.718
300	4.099	5.024	5.182	6.894	7.084	8.187
400	5.750	6.572	6.658	7.433	7.657	8.760
500	6.716	6.777	6.861	7.588	7.797	8.830
630	7.492	7.465	7.477	8.209	8.386	9.413

**TABLE : H5 (a)**  
**VARIATION FACTOR FOR Polymer (CCFAL/CCFCu)**  
**SINGLE CORE** ARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
 Al / Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV(E) Unscreened ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
35	0.123	0.259	0.278	0.330	0.376	0.468
50	0.152	0.272	0.294	0.379	0.394	0.483
70	0.170	0.295	0.317	0.404	0.419	0.508
95	0.184	0.317	0.338	0.435	0.449	0.554
120	0.197	0.337	0.392	0.457	0.472	0.576
150	0.194	0.389	0.413	0.477	0.492	0.597
185	0.224	0.414	0.445	0.502	0.539	0.674
240	0.276	0.456	0.479	0.558	0.573	0.711
300	0.294	0.489	0.506	0.587	0.602	0.811
400	0.333	0.569	0.578	0.687	0.703	0.866
500	0.367	0.675	0.679	0.809	0.826	1.056
630	0.438	0.735	0.739	0.873	0.928	1.168
800	0.529	0.863	0.866	1.027	1.05	1.189
1000	0.648	1.031	1.035	1.138	1.158	1.402

**TABLE : H5 (b)**  
**VARIATION FACTOR FOR POLYMER (CCFAI / CCFCu)**  
**THREE CORE** ARMoured XLPE INSULATED 3.3 to 33 KV POWER CABLES WITH  
 Al / Cu CONDUCTOR

Nominal Cross Sectional Area (in Sq. mm)	3.3 KV ARM Unscreen ARM	6.6 KV (E) ARM	6.6 KV (UE) / 11 KV (E) ARM	11 KV (UE) ARM	22 KV (E) ARM	33 KV (E) ARM
35	0.374	0.990	1.142	1.604	1.782	-
50	0.445	1.119	1.260	1.834	2.046	2.864
70	0.547	1.290	1.396	2.011	2.284	3.219
95	0.594	1.440	1.647	2.269	2.428	3.367
120	0.732	1.692	1.877	2.498	2.715	3.646
150	0.812	1.906	2.061	2.767	2.931	3.927
185	0.960	2.086	2.406	3.028	3.180	4.166
240	1.130	2.484	2.744	3.398	3.580	4.589
300	1.219	2.912	3.161	3.840	4.016	5.029
400	1.313	3.530	3.664	4.353	4.666	5.736
500	1.652	3.925	3.971	4.621	4.878	5.913
630	1.949	4.487	4.982	5.225	5.477	6.696

Fillers added in PVC consumption