Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

DIAMETERS AND INCREASE IN DIAMETERS OF ENAMELLED ROUND WINDING WIRES BASIS: IS 13730-0-1)

Conductor Diameter		Conductor Tolerance	Grade 1		Grade 2		Grade 3	
(mm)	swg	(mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)
0.04		-	-	0.049	-	0.054	-	-
0.041	48	-	-	0.05	-	0.056	-	-
0.043		-	-	0.052	-	0.058	-	-
0.045		-	-	0.055	-	0.061	-	-
0.048		-	-	0.059	-	0.065	-	-
0.05		-	-	0.06	-	0.066	-	-
0.051	47	-	-	0.062	-	0.068	-	-
0.053		-	-	0.064	-	0.07	-	-
0.056		-	-	0.067	-	0.074	-	-
0.06		-	-	0.072	-	0.079	-	-
0.061	46	-	-	0.074	-	0.081	-	-
0.063		-	-	0.076	-	0.083	-	-
0.067		0.003	0.007	0.08	0.012	0.088	0.018	-
0.071		0.003	0.007	0.084	0.012	0.091	0.018	0.097
0.071	45	0.003	0.007	0.084	0.012	0.091	0.018	0.097
0.075		0.003	0.007	0.089	0.014	0.095	0.02	0.102
0.08		0.003	0.008		0.014	0.101	0.02	0.108
0.081	44	0.003	0.008	0.096	0.015	0.103	0.022	0.11
0.085		0.003	0.008	0.1	0.015	0.107	0.022	0.114
0.09		0.003	0.008	0.105	0.015	0.113	0.022	0.12
0.091	43	0.003	0.008	0.107	0.016	0.115	0.023	0.122
0.095		0.003	0.008	0.111	0.016	0.119	0.023	0.126
0.1		0.003	0.008	0.117	0.016	0.125	0.023	0.132
0.102	42	0.003	0.009	0.119	0.017	0.128	0.026	0.136
0.106		0.003	0.009	0.123	0.017	0.132	0.026	0.14
0.112		0.003	0.009	0.13	0.017	0.139	0.026	0.147
0.112	41	0.003	0.009	0.13	0.017	0.139	0.026	0.147
0.118		0.003	0.01	0.136	0.019	0.145	0.028	0.154
0.122	40	0.003	0.01	0.141	0.019	0.151	0.028	0.16
0.125		0.003	0.01	0.144	0.019	0.154	0.028	0.163
0.132		0.003	0.011	0.152	0.021	0.162	0.03	0.171
0.132	39	0.003	0.011	0.152	0.021	0.162	0.03	0.171
0.14		0.003	0.011	0.16	0.021	0.171	0.03	0.181
0.15		0.003	0.012	0.171	0.023	0.182	0.033	0.193
0.152	38	0.003	0.012	0.174	0.023	0.186	0.033	0.197
0.16		0.003	0.012	0.182	0.023	0.194	0.033	0.205
0.17		0.003	0.013	0.194	0.025	0.208	0.036	0.217
0.173	37	0.003	0.013	0.197	0.025	0.21	0.036	0.222
0.18		0.003	0.013	0.204	0.025	0.217	0.036	0.229
0.19		0.003	0.014	0.216	0.027	0.228	0.039	0.24
0.193	36	0.003	0.014	0.219	0.027	0.232	0.039	0.245
0.2		0.003	0.014	0.226	0.027	0.239	0.039	0.252

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

DIAMETERS AND INCREASE IN DIAMETERS OF ENAMELLED ROUND WINDING WIRES BASIS: IS 13730-0-1)

Conductor Diameter		Conductor Tolerance	Grade 1		Grade 2		Grade 3	
(mm)	swg	(mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)
0.212		0.003	0.015	0.24	0.029	0.254	0.043	0.268
0.213	35	0.003	0.015	0.241	0.029	0.255	0.043	0.269
0.224		0.003	0.015	0.252	0.029	0.266	0.043	0.28
0.234	34	0.004	0.017	0.265	0.032	0.281	0.048	0.296
0.236		0.004	0.017	0.267	0.032	0.283	0.048	0.298
0.25		0.004	0.017	0.281	0.032	0.297	0.048	0.312
0.254	33	0.004	0.018	0.286	0.033	0.303	0.05	0.319
0.265		0.004	0.018	0.297	0.033	0.314	0.05	0.33
0.274	32	0.004	0.018	0.306	0.035	0.323	0.05	0.339
0.28		0.004	0.018	0.312	0.033	0.329	0.05	0.345
0.295	31	0.004	0.019	0.329	0.035	0.347	0.053	0.364
0.3		0.004	0.019	0.334	0.035	0.352	0.053	0.369
0.315		0.004	0.019	0.349	0.035	0.367	0.053	0.384
0.315	30	0.004	0.019	0.349	0.035	0.367	0.053	0.384
0.335		0.004	0.02	0.372	0.038	0.391	0.057	0.408
0.345	29	0.005	0.02	0.382	0.038	0.401	0.057	0.418
0.355		0.004	0.02	0.392	0.038	0.411	0.057	0.428
0.375		0.005	0.021	0.414	0.04	0.434	0.06	0.453
0.376	28	0.005	0.021	0.417	0.04	0.435	0.06	0.454
0.4		0.005	0.021	0.439	0.04	0.459	0.06	0.478
0.417	27	0.005	0.022	0.458	0.042	0.48	0.064	0.5
0.425		0.005	0.022	0.466	0.042	0.488	0.064	0.508
0.45		0.005	0.022	0.491	0.042	0.513	0.064	0.533
0.457	26	0.005	0.024	0.501	0.045	0.523	0.067	0.544
0.475		0.005	0.024	0.519	0.045	0.541	0.067	0.582
0.5		0.005	0.024	0.544	0.045	0.566	0.067	0.587
0.508	25	0.006	0.025	0.554	0.047	0.578	0.071	0.602
0.53		0.006	0.025	0.576	0.047	0.6	0.071	0.623
0.559	24	0.006	0.025	0.605	0.047	0.629	0.071	0.652
0.56		0.006	0.025	0.606	0.047	0.63	0.071	0.653
0.6		0.006	0.027	0.649	0.05	0.674	0.075	0.698
0.61	23	0.006	0.027	0.659	0.05	0.684	0.075	0.708
0.63		0.006	0.027	0.679	0.05	0.704	0.075	0.728
0.67		0.007	0.028	0.722	0.053	0.749	0.08	0.774
0.71		0.007	0.028	0.762	0.053	0.789	0.08	0.814
0.711	22	0.008	0.03	0.766	0.056	0.795	0.085	0.822
0.75		0.008	0.03	0.805	0.056	0.834	0.085	0.861
0.8		0.008	0.03	0.855	0.056	0.884	0.085	0.911
0.813	21	0.009	0.032	0.872	0.06	0.902	0.09	0.931
0.85		0.009	0.032	0.909	0.06	0.939	0.09	0.968
0.9		0.009	0.032	0.959	0.06	0.989	0.09	1.018
0.914	20	0.01	0.034	0.976	0.063	1.008	0.095	1.038

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DIAMETERS AND INCREASE IN DIAMETERS OF ENAMELLED ROUND WINDING WIRES BASIS: IS 13730-0-1)

Conductor Diameter		Conductor Tolerance	Grade 1		Grade 2		Grade 3	
(mm)	swg	(mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)	Minimum Increase (mm)	Maximum Increase (mm)
0.95		0.01	0.034	1.012	0.063	1.044	0.095	1.074
1		0.01	0.034	1.062	0.063	1.094	0.095	1.124
1.016	19	0.011	0.034	1.08	0.065	1.113	0.098	1.144
1.06		0.011	0.034	1.124	0.065	1.157	0.098	1.188
1.12		0.011	0.034	1.184	0.065	1.217	0.098	1.248
1.18		0.012	0.035	1.246	0.067	1.279	0.1	1.311
1.219	18	0.013	0.035	1.285	0.067	1.318	0.1	1.35
1.25		0.013	0.035	1.316	0.067	1.349	0.1	1.381
1.32		0.013	0.036	1.388	0.069	1.422	0.103	1.455
1.4		0.014	0.036	1.468	0.069	1.502	0.103	1.535
1.422	17	0.015	0.038	1.492	0.071	1.528	0.107	1.562
1.5		0.015	0.038	1.57	0.071	1.606	0.107	1.64
1.6		0.016	0.038	1.67	0.071	1.706	0.107	1.74
1.626	16	0.017	0.039	1.698	0.073	1.735	0.11	1.77
1.7		0.017	0.039	1.772	0.073	1.809	0.11	1.844
1.8		0.018	0.039	1.872	0.073	1.909	0.11	1.944
1.829	15	0.019	0.04	1.903	0.075	1.941	0.113	1.977
1.9		0.019	0.04	1.974	0.075	2.012	0.113	2.048
2		0.02	0.04	2.074	0.075	2.112	0.113	2.148
2.032	14	0.02	0.041	2.108	0.077	2.147	0.116	2.184
2.12		0.021	0.041	2.196	0.077	2.235	0.116	2.272
2.24		0.022	0.041	2.316	0.077	2.355	0.116	2.392
2.337	13	0.024	0.042	2.415	0.079	2.455	0.119	2.493
2.36		0.024	0.042	2.438	0.079	2.478	0.119	2.516
2.5		0.025	0.042	2.578	0.079	2.618	0.119	2.656
2.642	12	0.027	0.043	2.722	0.081	2.764	0.123	2.803
2.8		0.028	0.043	2.88	0.081	2.922	0.123	2.961
2.85		0.027	0.043	2.73	0.081	2.772	0.123	2.811
2.946	11	0.03	0.045	3.029	0.084	3.072	0.127	3.112
3		0.03	0.045	3.083	0.084	3.126	0.127	3.166
3.15		0.032	0.045	3.233	0.084	3.276	0.127	3.316
3.35		0.034	0.046	3.435	0.086	3.479	0.13	3.521
3.55		0.036	0.046	3.635	0.086	3.679	0.13	3.721
3.75		0.038	0.047	3.838	0.089	3.883	0.134	3.926
4		0.04	0.047	4.088	0.089	4.133	0.134	4.176
4.25		0.043	0.049	4.341	0.092	4.387	0.138	4.431
4.5		0.045	0.049	4.591	0.092	4.637	0.138	4.681
4.75		0.048	0.05	4.843	0.094	4.891	0.142	4.936
5		0.05	0.05	5.093	0.094	5.141	0.142	5.186

Notes :

1) For intermediate conductor diameter, increase corresponding to the next larger nominal;

2) Maximum overall diameter for intermediate conductor size is equal to maximum overall

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Manufacturer's & Exporter's of Enameled Wire Test Equipments

DIAMETERS –TOLERANCES-AREA-WEIGHT & RESISTANCE OF ENAMELLED ROUND COPPER WINDING WIRES - SWG SIZES (BASIS : IS 13730-0-1)

Nominal Conductor diameter		Conductor tolerance	Conductor Diameters		Nominal conductor area	Conductor weight for 1000 m length	Conductor Resistance at 20°C for 1 meter (ohms)		
			Min.	Max					
(mm)	SWG	(mm)	(mm)	(mm)	(mm)	KG	Nominal	Minimum	Maximum
0.04		-	-	-	0.00126	0.011	13.6	12.28	14.92
0.041	48	-	-	-	0.00132	0.012	2.95	14.2062	11.6939
0.045		-	-	-	0.00159	0.014	10.75	9.705	11.79
0.05		-	-	-	0.00196	0.019	8.706	7.922	9.489
0.051	47	-	-	-	0.00204	0.018	8.3794	9.1335	7.6253
0.056		-	-	-	0.00246	0.022	6.94	6.316	7.565
0.061	46	-	-	-	0.00292	0.026	5.8541	6.3809	5.3272
0.063		-	-	-	0.00312	0.028	5.484	5.045	5.922
0.071		0.003	0.068	0.074	0.00396	0.035	4.318	3.941	4.747
0.071	45	0.003	0.068	0.074	0.00396	0.035	4.3167	4.7475	3.9408
0.08		0.003	0.077	0.083	0.00503	0.044	3.401	3.133	3.703
0.081	44	0.003	0.078	0.084	0.00515	0.046	3.3192	3.6062	3.058
0.09		0.003	0.087	0.093	0.00636	0.057	2.687	2.495	2.9
0.091	43	0.003	0.088	0.094	0.0065	0.058	2.6298	2.8348	2.4423
0.1		0.003	0.097	0.103	0.00785	0.07	2.176	2.034	2.333
0.102	42	0.003	0.099	0.105	0.00817	0.073	2.0923	2.2398	1.9574
0.112		0.003	0.109	0.115	0.00985	0.088	1.735	1.632	1.848
0.112	41	0.003	0.109	0.115	0.00985	0.088	1.7354	1.8477	1.6318
0.122	40	0.003	0.119	0.125	0.01169	0.104	1.4623	1.5502	1.3811
0.125		0.003	0.122	0.128	0.01227	0.109	1.393	1.317	1.475
0.132	39	0.003	0.129	0.135	0.01368	0.122	1.2496	1.3192	1.1841
0.14		0.003	0.137	0.143	0.01539	0.136	1.11	1.055	1.17
0.152	38	0.003	0.149	0.155	0.01815	0.161	0.9418	0.9888	0.8982
0.16		0.003	0.157	0.163	0.02011	0.179	0.8502	0.8122	0.8906
0.173	37	0.003	0.17	0.176	0.02351	0.209	0.7271	0.7596	0.6967
0.18		0.003	0.177	0.183	0.02544	0.226	0.6718	0.6444	0.7007
0.193	36	0.003	0.19	0.196	0.02926	0.26	0.5842	0.6081	0.5618
0.2		0.003	0.197	0.203	0.03142	0.279	0.5441	0.5237	0.5657
0.213	35	0.003	0.21	0.216	0.03563	0.317	0.4798	0.4978	0.4625
0.224		0.003	0.221	0.227	0.03941	0.35	0.4338	0.4188	0.4495
0.234	34	0.004	0.23	0.238	0.4301	0.382	0.3974	0.4149	0.3809
0.25		0.004	0.246	0.254	0.04909	0.436	0.3482	0.3345	0.3628
0.254	33	0,004	0.25	0.258	0.05067	0.45	0.3374	0.3512	0.3242
0.274	32	0,004	0.27	0.278	0.05896	0.524	0.2899	0.3011	0.2792
0.28		0.004	0.276	0.284	0.06158	0.547	0.2776	0.2676	0.2882
0.295	31	0.004	0.291	0.299	0.06835	0.608	0.2501	0.2592	0.2414
0.315		0.004	0.311	0.319	0.07793	0.693	0.2193	0.2121	0.227
0.315	30	0.004	0.311	0.319	0.07793	0.693	0.2193	0.2269	0.2121
0.345	29	0.004	0.341	0.349	0.09348	0.831	0.1829	0.1888	0.1772
0.355		0.004	0.351	0.359	0.09897	0.88	0.1727	0.1674	0.1782
0.376	28	0.005	0.371	0.381	0.111	0.987	0.1539	0.1595	0.1487
0.4		0.005	0.395	0.405	0.12566	1.117	0.136	0.1316	0.1407

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DIAMETERS –TOLERANCES-AREA-WEIGHT & RESISTANCE OF ENAMELLED ROUND COPPER WINDING WIRES - SWG SIZES (BASIS : IS 13730-0-1)

Nominal Conductor diameter		Conductor tolerance	Conductor		Nominal conductor area	Conductor weight for 1000 m length	Conductor Resistance at 20°C for 1 meter (ohms)		
			Min. Max.	Max					
(mm)	SWG	(mm)	(mm)	(mm)	(mm)	KG	Nominal	Minimum	Maximum
0.417	27	0.005	0.412	0.422	0.1366	1.214	0.1252	0.1293	0.1212
0.45		0.005	0.445	0.455	0.15904	1.414	0.1075	0.1042	0.11
0.457	26	0.005	0.452	0.462	0.164	1.458	0.1042	0.1075	0.1011
0.5		0.005	0.495	0.505	0.19635	1.746	0.0871	0.0846	0.0896
0.508	25	0.006	0.502	0.514	0.2027	1.802	0.08434	0.08711	0.08168
0.559	24	0.006	0.553	0.565	0.2454	2.182	0.06965	0.07178	0.0676
0.56		0.006	0.554	0.566	0.2463	2.19	0.0694	0.0674	0.0715
0.61	23	0.006	0.504	0.616	0.2923	2.598	0.05848	0.06017	0.05687
0.63		0.006	0.624	0.636	0.31172	2.771	0.05484	0.0534	0.0564
0.71		0.007	0.703	0.717	0.3959	3.52	0.04318	0.04198	0.0444
0.711	22	0.008	0.703	0.719	0.397	3.53	0.04305	0.04442	0.04175
0.8		0.008	0.792	0.808	0.50265	4.469	0.03401	0.03305	0.035
0.813	21	0.009	0.804	0.822	0.5191	4.615	0.03293	0.03293	0.03194
0.9		0.009	0.891	0.909	0.63617	5.656	0.02687	0.02612	0.02765
0.914	20	0.01	0.904	0.924	0.6561	5.833	0.02605	0.02688	0.02528
1		0.01	0.99	1.01	0.78539	6.982	0.02176	0.02116	0.0224
1.016	19	0.011	1.005	1.027	0.8107	7.207	0.02108	-	-
1.12		0.011	1.109	1.131	0.9852	8.759	0.01735	-	-
1.219	18	0.013	1.206	1.232	1.1671	10.375	0.01465	-	-
1.25		0.013	1.237	1.263	1.22718	10.91	0.01393	-	-
1.4		0.014	1.386	1.414	1.53938	13.685	0.0111	-	-
1.422	17	0.015	1.407	1.437	1.5881	14.119	0.01076	-	-
1.6		0.016	1.584	1.616	2.01062	17.874	0.0085	-	-
1.626	16	0.017	1.607	1.643	2.0765	18.46	0.00823	-	-
1.8		0.018	1.782	1.818	2.54469	22.622	0.00672	-	-
1.829	15	0.018	1.81	1.848	2.6274	23.357	0.00651	-	-
2		0.02	1.98	2.02	3.14159	27.929	0.00544	-	-
2.032	14	0.021	2.011	2.053	3.2429	28.83	0.00527	-	-
2.24		0.022	2.22	2.262	3.94081	35.034	0.00434	-	-
2.337	13	0.024	2.313	2.361	4.2895	38.134	0.00399	-	-
2.5		0.025	2.475	2.525	4.90873	43.639	0.00348	-	-
2.642	12	0.027	2.615	2.669	5.4822	48.737	0.00312	-	-
2.8		0.028	2.772	2.828	6.15752	54.74	0.00278	-	-
2.946	11	0.03	2.916	2.976	6.8164	60.598	0.00251	-	-
3.15		0.032	3.118	3.182	7.79311	69.281	0.00219	-	-
3.55		0.036	3.464	3.586	9.89798	87.993	0.00173	-	-
4		0.04	3.96	4.04	12.5664	111.715	0.00136	-	-
4.5		0.045	4.455	4.545	15.9043	141.389	0.00108	-	-
5		0.05	4.95	5.05	19.6349	174.555	0.00087	-	-

Note : Nominal conductivity of copper = 1/58.5 ohm.mm^2.m^{+1}

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

BREAK DOWN VOLTAGE FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS : IS 13730-.. and IS 13778 – 5)

Nominal Conductor		Test Specimen Configuration	Test specimen Preparation		Break down voltage Volts (min.)		
			Force	Twists per 125 mm	Grade 1	Grade 2	Grade 3
(mm)	SWG		(N)		Grade 1B	Grade 2B	
0.018		Cylinder Wrap			110	225	350
0.020					120	250	410
0.022					130	275	470
0.025					150	300	470
0.028					170	325	530
0.032					190	375	590
0.036					225	425	650
0.040					250	475	710
0.041	48		0.1	-	275	550	-
0.045					275	550	710
0.050					300	600	830
0.051	47		0.15	-	325	650	-
0.056					325	650	890
0.061	46		0.15	-	375	700	-
0.063					375	700	1020
0.071	45		0.2	-	425	700	1100
0.071					425	700	1100
0.080					425	850	1200
0.081	44		0.3	-	500	900	1300
0.090					500	900	1300
0.091	43		0.4	-	500	950	1400
0.100		Twisted pair			500	950	1400
0.102	42				1300	2700	3900
0.112	41				1300	2700	3900
0.112					1300	2700	3 900
0.122	40				1500	2800	4100
0.125					1500	2800	4100
0.138	39				1600	3000	4200
0.140					1600	3000	4200
0.152	38		0.85	33	1700	3200	4400
0.160					1700	3200	4400
0.173	37				1700	3300	4700
0.180					1700	3300	4700
0.193	36				1800	3500	5100
0.200					1800	3500	5100
0.213	35				1900	3700	5200
0.224					1900	3700	5200
0.234	34				2100	3900	5500
0.250					2100	3900	5500
0.254	33				2200	4000	5800
0.274	32				2200	4000	5800
0.280					2200	4000	5800
0.295	31		1.7	23	2200	4100	6100

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Manufacturer's & Exporter's of Enameled Wire Test Equipments

BREAK DOWN VOLTAGE FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS : IS 13730-.. and IS 13778 – 5)

Nominal Conductor		Test Specimen Configuration	Test specimen Preparation		Break down voltage Volts (min.)		
			Force	Twists per 125 mm	Grade 1	Grade 2	Grade 3
(mm)	SWG		(N)		Grade 1B	Grade 2B	
0.315	30	Twisted pair			2200	4100	6100
0.315					2200	4100	6100
0.345	29				2300	4300	6400
0.355					2300	4300	6400
0.376	28				2300	4400	6600
0.400					2300	4400	6600
0.417	27		3.4	16	2300	4400	6800
0.450					2300	4400	6800
0.457	26				2400	4600	7000
0.500					2400	4600	7000
0.508	25				2500	4600	7100
0.559	24				2500	4600	7100
0.560					2500	4600	7100
0.61	23		7	12	2600	4800	7100
0.630					2600	4800	7100
0.710					2600	4800	7200
0.711	22				2600	4900	7400
0.800					2600	4900	7400
0.813	21				2700	5000	7600
0.900					2700	5000	7600
0.914	20		13.5	8	2700	5000	7600
1.000					2700	5000	7600
1.016	19				2700	5000	7600
1.219	18		27	6	2700	5000	7600
1.422	17				2700	5000	7600
1.626	16				2700	5000	7600
1.829	15		54	5	2700	5000	7600
2.032	14				2700	5000	7600
2.337	13		108	3	2700	5000	7600
2.500 & over		Shot Ball			1300	2500	3800
2.642	12		-	-	1300	2500	3800
2.946	11		-	-	1300	2500	3800

Notes :

1) For intermediate nominal conductor diameter, break down voltage value for next largest nominal conductor diameter shall be taken.

2) 1N = 0.102 kg

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

RESISTANCE TO ABRASION (UNIDIRECTIONAL SCRAPE) TEST FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS: IS 13730-.. and IS 13778 – 3)

Nominal Conductor Diameter		Requirements for													
		Part 34 Polyester Wires Class 130L				Part 3 Polyester Wires Class 155				Part 8 Polyesterimide Wires Class 180					
		Grade 1		Grade 2		Grade 1		Grade 2		Grade 1		Grade 2		Grade 2	
(mm)	SWG	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)	MIN. (n)	Avg. (N)	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)
0.25	-	2.3	2.7	3.8	4.5	2.3	2.7	3.8	4.5	2.45	2.85	4	4.7	4.9	5.8
0.28	33 & 32	2.45	2.9	4.1	4.8	2.45	2.9	4.1	4.8	2.6	3.1	4.3	5.05	5.3	6.25
0.315	31 & 30	2.65	3.15	4.4	5.2	2.65	3.15	4.4	5.2	2.8	3.35	4.6	5.45	5.7	6.7
0.355	29	2.85	3.4	4.75	5.6	2.85	3.4	4.75	5.6	3.05	3.6	4.95	5.85	6.1	7.2
0.4	28	3.05	3.65	5.1	6	3.05	3.65	5.1	6	3.25	3.85	5.3	6.25	6.5	7.7
0.45	27	3.3	3.9	5.45	6.45	3.3	3.9	5.45	6.45	3.5	4.15	5.7	6.75	7	8.25
0.5	26	3.55	4.2	5.85	6.9	3.55	4.2	5.85	6.9	3.75	4.45	6.1	7.2	7.5	8.85
0.56	25 & 24	3.8	4.5	6.25	7.4	3.8	4.5	6.25	7.4	4.05	4.75	6.5	7.7	8.05	9.5
0.63	23	4.1	4.85	6.7	7.9	4.1	4.85	6.7	7.9	4.35	5.1	7	8.25	8.65	10.2
0.71	-	4.4	5.2	7.2	8.5	4.4	5.2	7.2	8.5	4.65	5.45	7.5	8.85	9.25	10.9
0.8	22	4.7	5.6	7.7	9.1	4.7	5.6	7.7	9.1	4.95	5.85	8.05	9.5	9.9	11.7
0.9	21	5.1	6.05	8.2	9.7	5.1	6.05	8.2	9.7	5.35	6.3	8.5	10.2	10.6	12.5
1	20	5.5	6.55	8.8	10.4	5.5	6.55	8.8	10.4	5.75	6.75	9.2	10.9	11.3	13.3
1.12	19	5.95	7.05	9.4	11.1	5.95	7.05	9.4	11.1	6.2	7.35	9.8	11.6	12	14.2
1.25	18	6.45	7.6	10	11.9	6.45	7.6	10	11.9	6.7	7.9	10.5	12.5	12.9	15.2
1.4	-	6.95	8.2	10.8	12.7	6.95	8.2	10.8	12.7	7.2	8.5	11.3	13.3	13.9	16.4
1.6	17	7.55	8.9	11.6	13.7	7.55	8.9	11.6	13.7	7.8	9.2	12.1	14.3	14.9	17.6
1.8	16	8.15	9.6	12.4	14.7	8.15	9.6	12.4	14.7	8.4	9.95	13	15.4	-	-
2	15	8.75	10.3	13.3	15.7	8.75	10.3	13.3	15.7	9	10.6	13.9	16.4	-	-
2.24	14	9.4	11.1	14.2	16.7	9.4	11.1	14.2	16.7	9.9	11.7	14.8	17.5	-	-
2.5	13	10.1	11.9	15.1	17.8	10.1	11.9	15.1	17.8	10.8	12.8	15.8	18.6	-	-

Notes :

1. For intermediate nominal conductor diameters, the resistance to abrasion figure of the next largest nominal diameter shall be taken.
2. 1 N = 0.102 kg

RESISTANCE TO ABRASION (UNIDIRECTIONAL SCRAPE) TEST FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS: IS 13730-.. and IS 13778 – 3)

Nominal Conductor Diameter		Requirements for											
		Part 13 PE (PEI) + PAI Wires Class 200				Part 20 Polyurethane Wires Class 155				Part 2 Bondable Wires Class 130			
		Grade 1		Grade 2		Grade 1		Grade 2		Grade 1		Grade 2	
(mm)	SWG	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)	Min. (N)	Avg. (N)	Min. (N)	Avg. (n)	MIN. (n)	Avg. (N)	Min. (N)	Avg. (N)
0.25	33 & 32	2.55	3	4.15	4.9	1.95	2.3	3.5	4.1	1.95	2.3	3.5	4.1
0.28	31 & 30	2.75	3.25	4.45	5.25	2.1	2.5	3.7	4.4	2.1	2.5	3.7	4.4
0.315	29	2.95	3.5	4.8	5.65	2.3	2.7	4	4.75	2.3	2.7	4	4.75
0.355	28	3.2	3.75	5.15	6.05	2.5	2.9	4.3	5.1	2.5	2.9	4.3	5.1
0.4		3.45	4.05	5.5	6.5	2.7	3.15	4.6	5.45	2.7	3.15	4.6	5.45
0.45	27	3.7	4.35	5.9	7	2.9	3.4	4.9	5.8	2.9	3.4	4.9	5.8
0.5	26	3.95	4.65	6.35	7.5	3.1	3.65	5.25	6.2	3.1	3.65	5.25	6.2
0.56	25 & 24	4.25	5	6.8	8	3.3	3.9	5.6	6.65	3.3	3.9	5.6	6.65
0.63	23	4.55	5.35	7.3	8.6	3.55	4.2	6	7.1	3.55	4.2	6	7.1
0.71	-	4.85	5.7	7.8	9.2	3.8	4.5	6.45	7.6	3.8	4.5	6.45	7.6
0.8	22	5.15	6.1	8.4	9.9	4.1	4.8	6.9	8.1	4.1	4.8	6.9	8.1
0.9	21	5.55	6.55	9	10.6	-	-	-	-	4.4	5.2	7.4	8.7
1	20	5.95	7.05	9.6	11.3	-	-	-	-	4.75	5.6	7.9	9.3
1.12	19	6.45	7.6	10.2	12.1	-	-	-	-	5.15	6	8.5	10
1.25	18	6.95	8.2	11	12.9	-	-	-	-	5.55	6.5	9.1	10.7
1.4	-	7.45	8.8	11.8	13.9	-	-	-	-	5.95	7	9.7	11.4
1.6	17	8	9.45	12.6	14.9	-	-	-	-	6.35	7.5	10.4	12.2
1.8	16	8.6	10.1	13.5	16	-	-	-	-	6.8	8	11.1	13.1
2	15	9.2	10.9	14.4	17.1	-	-	-	-	7.3	8.6	11.9	14
2.24	14	-	-	15.4	18.2	-	-	-	-	-	-	-	-
2.5	13	-	-	16.4	19.4	-	-	-	-	-	-	-	-

Notes :

1. For intermediate nominal conductor diameters, the resistance to abrasion figure of the next largest nominal diameter shall be taken.
2. 1 N = 0.102 kg

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

HEAT SHOK TEST FOR ENAMELLED ROUND COPPER WINDING WIRES(BASIS : IS 13730-.. and IS 13778 – 6)

Nominal Conductor Diameter				Heat shock test requirements Temp. & Mandrel diameters (mm) stretching requirements					
Over	Up to incl.	From	Up to incl.	Part 34 Polyester Wires	Part 3 Polyester Wires	Part 8 Polyester-imide Wires	Part 13 PE (PEI) + PAI Wires	Part 20 PUR Solderable Wires	Part 1 PVA Wires
(mm)		(SWG)		Class 130L	Class 155	Class 180	Class 200	Class 155	Class 105
Heat Shock Temperature °C				155	175	200	220	175	155
0.05	0.063	47	46	3d	0.150(1)	0.150(1)	0.150(1)	0.150(1)	D
0.063	0.8	-	45	3d	0.150(2)	0.150(2)	0.150(2)	0.150(2)	D
0.08	0.112	44	41	3d	0.150(3)	0.150(3)	0.150(3)	0.150(3)	D
0.112	0.14	40	39	3d	0.15	0.15	0.15	0.15	D
0.14	0.16	39	38	3d	0.25	0.25	0.25	0.25	D
0.16	0.14	38	37	3d	0.28	0.28	0.28	0.28	D
0.18	0.2	-	36	4d	0.315	0.315	0.315	0.315	D
0.2	0.224	-	35	4d	0.355	0.355	0.355	0.355	D
0.224	0.25	-	34	4d	0.4	0.4	0.4	0.4	D
0.25	0.28	33	32	6d	0.63	0.63	0.63	0.63	D
0.28	0.315	31	30	6d	0.71	0.71	0.71	0.71	D
0.315	0.355	-	29	6d	0.8	0.8	0.8	0.8	D
0.355	0.4	-	28	6d	0.9	0.9	0.9	0.9	D
0.4	0.45	-	27	6d	1	1	1	1	D
0.45	0.5	-	26	6d	1.12	1.12	1.12	1.12	D
0.5	0.56	25	24	6d	1.25	1.25	1.25	1.25	D
0.56	0.63	-	23	6d	1.4	1.4	1.4	1.4	D
0.63	0.71	-	-	6d	1.6	1.6	1.6	1.6	D
0.71	0.8	-	22	6d	1.8	1.8	1.8	1.8	D
0.8	0.9	-	21	6d	2	2	2	2	D
0.9	1	-	20	6d	2.24	2.24	2.24	2.24	D
1	1.12	-	19	7d	3.55	3.55	3.55	3.55	D
1.12	1.25	-	18	7d	4	4	4	4	D
1.25	1.4	-	-	7d	4.5	4.5	4.5	4.5	D
1.4	1.6	-	17	7d	5	5	5	5	D
1.6	5	16	11	10% stretch	25% Stretch	25% Stretch	25% Stretch	25% Stretch	25% Stretch

Notes :

1) d = Nominal Conductor diameter
2) D = Overall diameter of the wire
3) Elongation before winding on Mandrel
   - (1) = 15% (Or to the breaking point of conductor)
   - (2) = 10% (Or to the breaking point of conductor)
   - (3) = 5% (Or to the breaking point of conductor)

HEAT BONDING TEST METHOD AND REQUIREMENTS FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS : IS 13730-2 and IS 13778-3)

Nominal Wire Size				Specimen preparation		Bond strength requirements
					Load on coil during bonding	For solderable wires Class 130 with bonding layer
				Mandrel dia.		
mm		SWG				
Over	Up to & incl.	From	Up to	mm	(N)	(N)
0.05	0.071	47	45	1	0.05	0.05
0.071	0.1	44	43	1	0.05	0.08
0.1	0.16	42	38	1	0.15	0.12
0.16	0.2	37	36	1	0.25	0.25
0.2	0.315	35	30	2	0.35	0.35
0.315	0.4	29	28	3	0.5	0.7
0.4	0.5	27	26	4	0.75	1.1
0.5	0.63	25	23	5	1.25	1.6
0.63	0.71	-	-	6	1.75	2.2
0.71	0.8	22	22	7	2	2.8
0.8	0.9	21	21	8	2.5	3.4
0.9	1	20	20	9	3.25	4.2
1	1.12	19	19	10	4	5
1.12	1.25	19	18	11	4.5	5.8
1.25	1.4	-	-	12	5.5	6.5
1.4	1.6	17	-	14	6.5	8.5
1.6	1.8	16	-	16	8	10.5
1.8	1.2	15	-	18	10	10.5

Note : 1N = 0.102 kg

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

ELONGATION & SPRINGINESS FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS: IS 13730-.. and IS 13778 – 3)

Nominal conductor dia.		Elongation to break	Test Method			Spring back requirements (degrees)		
			Type	Mandrel tension				
						Part 20: Solderable PUR, Class 155		
						Part 13: Dual coated PE(I)+PAI,Class 200		
						Part 1 : PVA, Class 105		
						Part 34: Polyester, Class 130L		
						Part 3 : Polyester, Class 155		
						Part 8 : Polyesterimide, Class 180		
mm	**SWG**	**(%)**		**(mm)**	**(N)**	**Grade 1**	**Grade 2**	**Grade 3**
							Grade 1B	**Grade 2B**
0.018		5						
0.020		6						
0.022		6						
0.025		7						
0.028		7						
0.032		8						
0.036		8						
0.040		9						
0.041	48	9		-	-	-	-	-
0.045		9						
0.050		10						
0.051	47	10		-	-	-	-	-
0.056		10						
0.061	46	12		-	-	-	-	-
0.063		12						
0.071	45	13		-	-	-	-	-
0.080		14	Five	5	0.25	70	80	100
0.081	44	15	turns	5	0.25	67	77	94
0.090		15	around	5	0.25	67	77	94
0.091	43	16	the	5	0.25	64	73	90
0.100		16	Mandrel	5	0.25	64	73	90
0.102	42	17		7	0.5	64	73	88
0.112	41	17		7	0.5	64	73	88
0.122	40	17		7	0.5	62	70	84
0.125		17		7	0.5	62	70	84
0.132	39	18		7	0.5	59	67	79
0.140		18		7	0.5	59	67	79
0.152	38	19		10	1	59	67	78
0.160		19		10	1	59	67	78
0.173	37	20		10	1	57	65	75
0.180		20		10	1	57	65	75
0.193	36	21		10	1	54	62	72
0.200		21		10	1	54	62	72
0.213	35	21		12.5	2	51	59	68
0.224		21		12.5	2	51	59	68
0.234	34	22		12.5	2	49	56	65
0.250		22		12.5	2	49	56	65
0.254	33	22		12.5	2	47	53	61
0.274	32	22		12.5	2	47	53	61
0.280		22		12.5	2	47	53	61
0.295	31	23		19	4	50	55	62
0.315	30	23		19	4	50	55	62
0.315		23		19	4	50	55	62

ELONGATION & SPRINGINESS FOR ENAMELLED ROUND COPPER WINDING WIRES (BASIS: IS 13730-.. and IS 13778 – 3)

Nominal conductor dia.		Elongation to break	Test Method			Spring back requirements (degrees)		
			Type	Mandrel tension				
mm	SWG	(%)		(mm)	(N)	Grade 1	Grade 2	Grade 3
							Grade 1B	Grade 2B
0.345	29	23	Five turns around the Mandrel	19	4	48	53	59
0.355		23		19	4	48	53	59
0.376	28	24		19	4	45	50	55
0.400		24		19	4	45	50	55
0.417	27	25		25	8	44	48	53
0.450		25		25	8	44	48	53
0.457	26	25		25	8	43	47	51
0.500		25		25	8	43	47	51
0.508	25	26		25	8	41	44	48
0.559	24	26		25	8	41	44	48
0.560		26		25	8	41	44	48
0.610	23	27		37.5	12	46	50	53
0.630		27		37.5	12	46	50	53
0.710		28		37.5	12	44	47	50
0.711	22	28		37.5	12	41	43	46
0.800		28		37.5	12	41	43	46
0.813	21	29		50	15	45	48	51
0.900		29		50	15	45	48	51
0.914	20	30		50	15	42	45	47
1.000		30		50	15	42	45	47
1.016	19	30		50	15	39	41	43
1.120		30		50	15	39	41	43
1.219	18	31		50	15	35	37	39
1.250		31		50	15	35	37	39
1.400		32		50	15	32	34	36
1.422	17	32		50	15	28	30	32
1.600		32		50	15	28	30	32
1.626	16	32	By 30° Bending			5	5	5
1.800		32				5	5	5
1.829	15	33				5	5	5
2.000		33				5	5	5
2.032	14	33				5	5	5
2.240		33				5	5	5
2.337	13	33				5	5	5
2.500		33				5	5	5
2.642	12	34				5	5	5
2.800		34				5	5	5
2.946	11	34				5	5	5
3.150		34				5	5	5
3.550		35				5	5	5
4.000		35				5	5	5
4.500		36				5	5	5
5.000		36				5	5	5

Note: For intermediate conductor sizes, the elongation value and spring back figure of the next larger Nominal conductor diameter shall be taken.

Rajeshwari Electronics

Manufacturer's & Exporter's of Enameled Wire Test Equipments

FLEXIBILITY AND ADHERENCE MANDREL WINDING TEST REQUIREMENTS FOR ENAMELLED ROUND WINDING WIRES (BASIS: IS 13730-.. AND IS 13778 – 3)

Nominal Conductor Diameter				Elongation	Mandrel Winding Test Requirement According to IS 13730-..	
Over	Up to & Including	From	Up to & Including	Before Mandrel winding	Part 34: Polyester copper wires, Class 130L	Part 9: Polyester aluminium Wires, Class 130
					Part 3: Polyester copper wires, Class 155	Part 15: Polyesterimide aluminium Wires, Class 180
					Part 20: Polyurethane solderable copper wires, Class 155	
					Part 8 : Polyesterimide copper wires, Class 180	
					Part 13: Dual coated PE (I) + PAI copper wires, Class 200	
(mm)		(SWG)		(%)		
0.05	0.063	47	46	15	0.150 mm	3d
0.063	0.08	-	45	10	0.150 mm	3d
0.08	0.112	44	41	5	0.150 mm	3d
0.112	0.14	40	39	0	0.150 mm	3d
0.14	1.6	38	17	0	1 x d	3d
1.6	5	16	14	0	32% linear elongation	15% linear elongation

Notes:

1. Definition of crack: An opening in the insulation, which exposes the conductor to view at the stated magnification.
2. Magnification : 10-15 times for Conductor dia. Up to & including 0.04 mm
   6 – 10 times for Conductor dia. over 0.040 mm up to & including 0.5 mm
   Normal vision or up to 6 times for Conductor dia. over 0.5 mm dia.

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PEEL TEST FOR ENAMELLED ROUND COPPER WINDING WIRES
(BASIS: IS 13730-.. & IS 13778 – 3)

Nominal Diameter				Load	Minimum Revolutions (n) for enameled round winding wires according to IS				
(mm)		(SWG)			Part 34 Polyester Copper Wires Class 130L	Part 3 Polyester Copper Wires Class 155	Part 8 Polyesterimide Copper Wires Class 180	Part 13 PE (PEI) +PAI Copper Wires Class 200	Part 20 Polyurethane Solderable Copper Wires Class 155
Over	Up to & including	From	Up to & including	N					
1	1.4	19	18	25	$n = \frac{150}{d\ (mm)}$	$n = \frac{130}{d\ (mm)}$	$n = \frac{110}{d\ (mm)}$	$n = \frac{110}{d\ (mm)}$	$n = \frac{150}{d\ (mm)}$
1.4	1.8	17	16	40					
1.8	2.24	15	14	60					
2.24	2.8	13	12	100					
2.8	3.55	11	10	160					
3.55	4.5	9	7	250					
4.5	5	-	6	400					

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CONTINUITY OF COVERING FOR ENAMELLED ROUND COPPER WINDING WIRES
(BASIS: IS 13730-.. & IS 13778 – 5)

Conductor	Nominal Conductor diameter				Pulley arrangement	Test Voltage V (D.C.)			Permissible Faults Per 30 m [*]		
	(mm)		(SWG)								
	Over	Up to & Including	From	To		Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
Copper	0.05	0.08	47	45		250	500	750	60	24	3
	0.08	0.125	44	40		350	500	750	40	15	3
	0.125	0.25	39	34		500	750	1000	25	5	3
	0.25	0.5	33	26		750	1000	1500	25	5	3
	0.5	1.6	23	17		1000	1500	2000	25	5	3

Note: [*] For enameled round copper wires with all types of insulation

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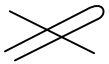
CUT THROUGH TEST FOR ENAMELLED ROUND COPPER & ALUMINIUM WINDING WIRES
(BASIS: IS 13730-.. & 13778 – 6)

Nominal Diameter				Load		Specimen Loading	Time for insertion until loading	Temperature °C (2 min. withstand) Requirement according to IS 13730-..						
mm		SWG						Part 34 Polyester Copper Wires	Part 3 Polyester Copper Wire	Part 8 Polyester-Imide copper Wires	Part 13 PE (PEI) + PAI Copper Wires	Part 20 Polyurethane Solderable Copper Wires	Part 9 Polyester Aluminium Wires	Part 15 Polyester-Imide Aluminium wires
Over	Up to & Incl.	From	Up to & Incl.	(g)	(N)		(s)	Class 130L	Class 155	Class 180	Class 200	Class 155	Class 130	Class 180
0.02	0.032	-	49	25	0.25		1	240	240	300	320	200	240 [*]	300 [*]
0.032	0.05	-	48	41	0.4									
0.05	0.08	47	45	71	0.7									
0.08	0.125	44	40	128	1.25									
0.125	0.2	39	36	224	2.2									
0.2	0.315	35	30	224	2.2		1							
0.315	0.5	29	26	459	4.5									
0.5	0.8	25	22	918	9									
0.8	1	21	20	1836	18									
1	1.25	19	18	1836	18		2							
1.25	2	17	15	3672	36									
2	5	14	-	7140	71		3							

Note: [*] Loads for aluminium wires are under consideration