

# ACSR/TW

## Aluminum Conductor Steel Reinforced/Trapezoidal Shaped



### Complete Conductor:

**A**CSR/TW is a trapezoidal aluminum conductor steel-reinforced concentric-lay-stranded conductor. The aluminum strands are trapezoidal in shape. The wedge-shaped aluminum strands enable a more compact alignment of the aluminum wires. Conductor designs that maintain the same circular mil cross-sectional area of aluminum as a conventional round conductor result in a TW conductor that is 10 to 15 percent smaller in overall diameter. Conductor designs that maintain the same overall diameter as a conventional round conductor result in a TW conductor that has 20 to 25 percent more aluminum cross-sectional area packed in.

The ACSR/TW conductors are manufactured in accordance with the requirements of the latest issue of ASTM B779.

The steel strands form the central core of the conductor, around which is stranded two, three or four layers of aluminum 1350-H19 wires. The steel core may consist of a concentric stranded cable of 7, 19 or more wires. Numerous combinations of aluminum and steel strands and layers are possible. The sizes and constructions listed on the following pages are common examples used in overhead lines.

For ACSR/TW conductors, the standard class A galvanized coating is usually adequate for ordinary environments.

### Features and Benefits:

ACSR/TW has a continuous operating temperature rating of 75°C. ACSR and ACSR/TW conductors have an "industry-accepted" short-duration maximum operating temperature rating of 100°C. Operation of the conductor at elevated temperatures may increase the conductor sag properties and lower the rated tensile strength of the conductor.

ACSR/TW conductors are recognized for their record of economy, dependability and favorable strength-to-weight ratio. ACSR/TW conductors constructed of equivalent aluminum circular mil cross-sectional area provide a conductor that is smaller in overall diameter than the equivalent conventional round wire ACSR conductor. The reduced conductor diameter is advantageous in reducing the effects of ice and wind loading on the conductor. ACSR/TW conductors constructed to equivalent overall diameter enable a greater circular mil cross-sectional area of aluminum within the conductor, allowing a significant increase in conductor current-carrying capacity.

**Applications:**

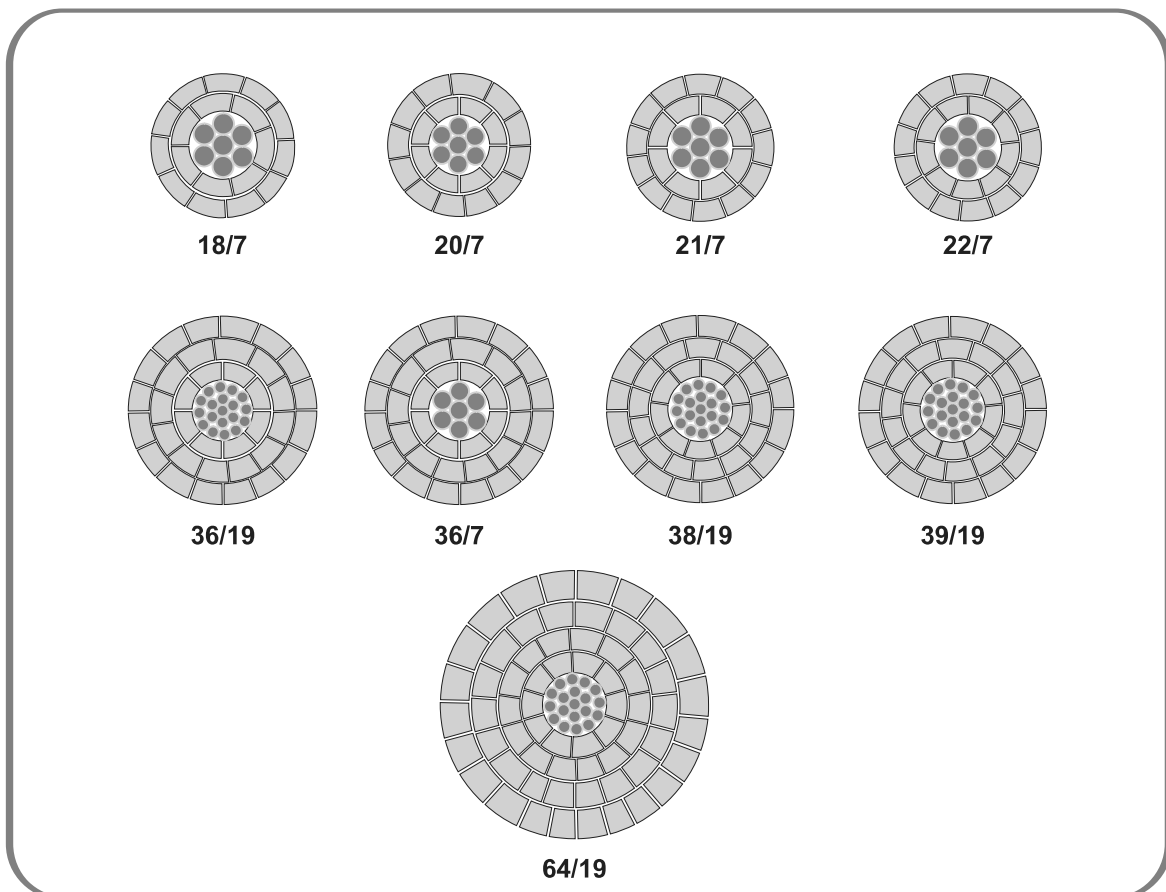
Trapezoidal aluminum conductors steel-reinforced (ACSR/TW) are used for overhead transmission lines.

**Electrical Parameters:**

The electrical parameters for the trapezoidal ACSR equivalent circular mil area and equivalent overall diameter conductors may be found in the last table of this section.



**ACSS/TW cross section according to the number of layers:**



ASTM B779 with eual area

Code Word	Size AWG or kcmil	Type	No. Al. Wires	Fill Factor	Equivalent Aluminum Diameter	Steel Core No. x Dia.	Steel Core O.D.	Cross Section	
								Total	Aluminum
								mm <sup>2</sup>	
Oriole	336.4	23	17	88.7	3.5738	7x2.6898	8.0696	210.19	170.45
Flicker	477	13	18	91.3	4.1351	7x2.3876	7.1628	273.16	241.81
Hawk	477	16	18	91.3	4.1351	7x2.6746	8.0239	280.97	241.61
Hen	477	23	16	88.7	4.3866	7x3.2029	9.6088	298.06	241.68
Parakeet	556.5	13	18	92	4.4653	7x2.5781	7.7343	318.58	282.06
Dove	556.5	16	20	91.8	4.2367	7x2.8905	8.6716	327.93	282
Rook	636	13	18	92.6	4.7752	7x2.7559	8.2677	363.93	322.19
Grosbeak	636	16	20	92	4.5288	7x3.0886	9.2659	374.77	322.32
Tern	795	7	17	93.5	5.494	7x2.2555	6.7666	430.97	403.03
Puffin	795	11	21	93.5	4.9403	7x2.8143	8.443	446.19	402.64
Condor	795	13	21	93	4.9403	7x3.0810	9.2431	454.9	402.71
Drake	795	16	20	93.1	5.0622	7x3.4544	10.3632	468.32	402.71
Mallard	795	23	22	93	4.8285	19x2.4815	12.4079	494.71	402.84
Phoenix	954	5	30	92.9	4.5314	7x2.1259	6.3779	508.52	483.68
Rail	954	7	33	92.2	4.318	7x2.4663	7.399	516.84	483.42
Cardinal	954	13	21	93.9	5.4127	7x3.3756	10.127	546	483.35
Snowbird	1033.5	5	30	92.5	4.7142	7x2.2123	6.637	550.45	523.55
Ortolan	1033.5	7	33	92.3	4.4933	7x2.5654	7.6962	559.55	523.35
Curlew	1033.5	13	21	93.7	5.6363	7x3.5128	10.5385	591.61	523.74
Avocet	1113	5	30	93	4.892	7x2.2961	6.8885	592.64	563.68
Bluejay	1113	7	33	92.7	4.666	7x2.6644	7.9934	603.29	564.26
Finch	1113	13	39	91.9	4.2901	19x2.1894	10.9474	635.16	563.68
Oxbird	1192.5	5	30	93.2	5.0622	7x2.3774	7.1323	635.03	603.93
Bunting	1192.5	7	33	93	4.8285	7x2.7584	8.2753	646.19	604.39

Code Word	Size AWG or kcmil	Type	No. Al. Wires	Fill Factor	Equivalent Aluminum Diameter	Steel Core No. x Dia.	Steel Core O.D.	Cross Section	
								Total	Aluminum
								mm <sup>2</sup>	
Grackle	1192.5	13	39	92.3	4.4425	19x2.2656	11.3284	681.0309	604.4504
Scissortail	1272	5	30	93.6	5.2299	7x2.4561	7.3685	677.9341	644.7729
Bittern	1272	7	33	93.3	4.9886	7x2.8473	8.542	689.3535	644.7729
Pheasant	1272	13	39	93	4.5872	19x2.3393	11.6967	725.934	644.3213
Dipper	1351.5	7	33	93.5	5.141	7x2.9337	8.8011	732.2566	684.9019
Martin	1351.5	13	39	93	4.7269	19x2.4104	12.0523	771.2243	684.5148
Bobolink	1431	7	33	93	5.2908	7x3.0200	9.0602	775.4823	725.3534
Plover	1431	13	39	93	4.8666	19x2.4815	12.4079	817.1597	725.2889
Lapwing	1590.0	7	36	93.0	5.3391	7x3.1826	9.5479	861.3531	805.6758
Falcon	1590.0	13	42	93.5	4.9428	19x2.6162	13.0810	907.4821	805.3532
Chukar	1780.0	8	38	93.5	5.4966	19x2.2199	11.0998	975.6110	902.0627
Bluebird	2156	8	64	91	4.6609	19x2.4409	12.2047	1181.417	1092.5139

Overall Diameter	Weight			Percent By Mass		Rated Strength			Resistance		Ampacity 75
	Total	Aluminum	Steel	Aluminum	Steel	kg			ohm/km		
	mm	kg/km				GA	HS	UHS	DC 20°C	DC 75°C	
17.526	782.77	473.24	311.03	60.34	39.66	7756.4	8300.7	8845.1	0.1647	0.2011	525
19.812	910.76	666.7	244.06	73.14	26.86	7801.8	8210	8618.3	0.1171	0.1434	640
20.066	974.75	666.7	306.56	68.47	31.53	8799.7	9298.6	9843	0.1168	0.1427	645
21.082	1110.17	669.67	440.5	60.34	39.66	10704.8	11475.9	12247	0.1161	0.1421	655
21.336	1062.55	776.82	285.73	73.15	26.85	9071.8	9570.8	10069.8	0.1004	0.123	705
21.59	1136.96	778.31	358.65	68.45	31.55	10251.2	10886.2	11475.9	0.1001	0.1227	710
22.606	1214.34	888.43	325.91	73.15	26.85	10387.3	10931.6	11521.2	0.0879	0.1079	765
23.114	1299.17	889.92	409.25	68.47	31.53	11521.2	12247	12972.7	0.0876	0.1073	770
24.384	1327.44	1108.68	218.76	83.54	16.46	9933.7	10296.5	10659.4	0.0705	0.0873	870
24.892	1449.47	1110.17	340.79	76.55	23.45	11884.1	12473.8	13063.5	0.0705	0.0866	875
25.146	1517.93	1110.17	407.76	73.15	26.85	12791.3	13517.1	14197.4	0.0702	0.0866	880
25.654	1623.59	1111.66	511.93	68.45	31.55	14424.2	15331.4	16193.2	0.0699	0.086	885
26.5684	1836.39	1117.61	718.78	60.84	39.16	17554	18778.7	19958.1	0.0699	0.0856	895
26.416	1529.83	1336.37	193.46	87.32	12.68	10795.5	11113	11430.5	0.0594	0.0764	950
26.924	1598.29	1337.86	260.43	83.66	16.34	11748	12201.6	12655.2	0.0591	0.0761	955
27.432	1821.51	1331.91	489.61	73.15	26.85	15195.3	16057.2	16873.6	0.0584	0.0725	985
27.686	1657.81	1446.5	209.83	87.32	12.68	11657.3	12020.2	12383.1	0.0548	0.0705	995
27.94	1730.73	1447.98	282.75	83.68	16.32	12745.9	13199.5	13698.5	0.0548	0.0705	1000
28.702	1973.31	1443.52	529.79	73.15	26.85	16465.4	17372.6	18279.8	0.0541	0.0669	1035
28.702	1784.31	1558.11	226.2	87.32	12.68	12473.8	12836.7	13244.9	0.0509	0.0656	1045
28.956	1864.67	1559.6	305.07	83.66	16.34	13743.8	14242.8	14787.1	0.0509	0.0656	1050
29.972	2123.61	1564.06	559.55	73.64	26.36	17735.5	18688	19595.2	0.0505	0.065	1065
29.718	1912.29	1669.72	242.57	87.31	12.69	13335.6	13789.2	14197.4	0.0476	0.0617	1090
29.97	1998.6	1671.21	327.4	83.65	16.35	14696.4	15286.1	15830.4	0.0472	0.0614	1095

Overall Diameter	Weight			Percent by Mass		Rated Strength			Resistance			Ampacity 75°
	Total	Aluminum	Steel	Aluminium	Steel	GA	HS	UHS	DC 20°C	AC 25°C	DC 75°C	
	mm	kg/km				kg			ohm/km			
30.99	2275	1676	600	73.65	26.35	19005.5	20003.4	21001.3	0.0472	0.0495	0.0607	1110
30.48	2040	1781	259	87.3	12.7	14242.8	14696.4	15150	0.0443	0.0476	0.0577	1130
30.99	2131	1783	348	83.67	16.33	15694.3	16284	16873.6	0.0443	0.0472	0.0577	1135
32	2426	1787	638	73.66	26.34	20003.4	21046.7	22135.3	0.0443	0.0466	0.0571	1155
31.75	2263	1894	369	83.68	16.32	16646.8	17281.9	17916.9	0.0417	0.0446	0.0545	1180
33.02	2577	1899	679	73.68	26.32	21228.1	22362.1	23496.1	0.0417	0.0443	0.0538	1195
32.77	2397	2006	391	83.67	16.33	17644.7	18325.1	19005.5	0.0394	0.0423	0.0515	1220
33.78	2729	2011	719	73.66	26.34	22498.2	23677.5	24902.2	0.0394	0.042	0.0509	1240
34.54	2664	2229	435	83.67	16.33	19141.6	19912.7	20638.5	0.0354	0.0387	0.0466	1300
35.56	3033	2234	799	73.65	26.35	24992.9	26308.4	27669.1	0.0354	0.0381	0.0459	1320
36.83	3067	2491	576	81.24	18.76	22997.1	23949.7	24902.2	0.0316	0.0348	0.0417	1400
40.89	3738	3043	695	81.39	18.61	27714.5	28893.8	30027.8	0.0263	0.0295	0.0344	1585

ASTM B779 equivalent area to ACSR with equal diameter

Code Word	Size AWG or kcmil	Type	No. Al. Wires	Fill Factor	Equivalent Aluminum Diameter	Steel Core No. x Dia.	Steel Core O.D.	Cross Section	
								Total	Aluminum
								mm <sup>2</sup>	
<b>Cheyenne</b>	1168.1	5	30	92.9	5.0114	7x2.3520	7.0561	622.06	591.61
<b>Genesee</b>	1158	7	33	92.5	4.7574	7x2.7381	8.2144	627.87	586.71
<b>Hudson</b>	1158.4	13	26	93.7	5.3619	7x3.7261	11.1785	663.16	586.84
<b>Catawba</b>	1272	5	30	93.3	5.2299	7x2.4561	7.3685	677.87	644.71
<b>Nelson</b>	1257.1	7	35	92.4	4.8133	7x2.8321	8.4963	681.16	637.1
<b>Yukon</b>	1233.6	13	39	91	4.5161	*	11.557	704.71	625.03
<b>Truckee</b>	1372.5	5	30	93.6	5.4331	7x2.5501	7.6505	731.42	695.68
<b>Mackenzie</b>	1359.7	7	36	92.9	4.9352	7x2.9438	8.8316	736.32	688.64
<b>Thames</b>	1334.6	13	39	92.6	4.699	*	11.9888	761.8	676.06
<b>St. Croix</b>	1467.8	5	30	93.4	5.6185	7x2.6441	7.9324	782.39	744
<b>Miramichi</b>	1455.3	7	36	93.4	5.1054	7x3.048	9.144	788.32	737.22
<b>Merrimack</b>	1433.6	13	39	92.1	4.8692	*	12.4206	818.19	726.13
<b>Platte</b>	1569	5	33	93.7	5.5397	7x2.7279	8.1839	836.26	795.35
<b>Potomac</b>	1557.4	7	36	93.2	5.2832	7x3.1521	9.4564	844.13	789.48
<b>Rio Grande</b>	1533.3	13	39	93.2	5.0368	*	12.8524	875.74	777.16
<b>Schuykill</b>	1657.4	7	36	93.5	5.4483	7x3.2512	9.7536	897.55	839.48
<b>Pecos</b>	1622.0	13	39	93.1	5.1791	*	13.5128	930.64	821.68
<b>Pee Dee</b>	1758.6	7	37	93	5.5372	7x3.3502	10.0508	952.51	890.77
<b>James</b>	1730.6	13	39	92.5	5.3518	*	13.6525	988.51	877.29
<b>Athabaska</b>	1949.6	7	42	93.4	5.4737	7x3.5356	10.607	1057.03	988.26
<b>Cumberland</b>	1926.9	13	42	93.3	5.4407	*	14.3891	1099.61	976.06
<b>Powder</b>	2153.8	8	64	92.2	4.6584	*	12.2047	1180.19	1091.29
<b>Santee</b>	2627.3	8	64	93.1	5.1486	*	13.4874	1440.51	1331.93

ASTM B779 with equal diameter

Code Word	Size AWG or kcmil	Type	No. Al. Wires	Fill Factor	Equivalent Aluminum Diameter	Steel Core No. x Dia.	Steel Core O.D.	Cross Section	
								Total	Aluminum
								mm <sup>2</sup>	
<b>Mohawk</b>	571.7	13	18	92.2	4.5263	7x2.6162	7.8486	327.23	289.6123
<b>Calument</b>	565.3	16	20	91.5	4.2697	7x2.9108	8.7325	332.97	286.322
<b>Mystic</b>	666.6	13	20	92.3	4.638	7x2.8219	8.4658	381.61	337.8058
<b>Oswego</b>	664.8	16	20	92.3	4.6304	7x3.1597	9.4793	391.81	336.9026
<b>Maumee</b>	768.2	13	20	93	4.9784	7x3.0353	9.1059	439.81	389.1605
<b>Wabash</b>	762.8	16	20	92.9	4.9606	7x3.3807	10.1422	449.22	386.3863
<b>Kettle</b>	957.2	7	33	92.2	4.3256	7x2.4714	7.4143	518.58	485.0313
<b>Suwanee</b>	959.6	16	22	93.4	5.3061	7x3.7922	11.3767	565.42	486.3861
<b>Columbia</b>	966.2	13	21	93.6	5.4483	7x3.3985	10.1956	553.29	489.741

Overall Diameter	Weight			Percent by Mass		Rated Strength			Resistance			Ampacity 75°
	Total	Aluminum	Steel	Aluminium	Steel	GA	HS	UHS	DC 20°c	AC 25°c	DC 75°c	
mm	kg/km							kg			ohm/km	
29.46	1873.6	1635.5	238.1	87.32	12.68	13063	13472	13925	0.0486	0.0515	0.0627	1075
29.46	1945	1623.6	321.4	83.45	16.55	14334	14923	15467	0.0489	0.0515	0.063	1075
30.48	2214.4	1617.6	596.8	73.08	26.92	17962	19278	20276	0.0482	0.0505	0.06	1110
30.48	2040.3	1781.3	258.9	87.3	12.7	14243	14696	15150	0.0443	0.0476	0.0577	1130
30.73	2105.8	1762	343.8	83.65	16.35	15513	16103	16692	0.0449	0.0479	0.0584	1130
31.75	2357.3	1733.7	623.5	73.53	26.47	19459	20502	21546	0.0456	0.0482	0.0587	1135
31.75	2201	1921.2	279.8	87.32	12.68	15150	15649	16103	0.0413	0.0443	0.0538	1185
32	2278.4	1906.3	372	83.67	16.33	16738	17418	18053	0.0417	0.0446	0.0541	1185
32.77	2546.2	1875.1	671.2	73.64	26.36	21001	22090	23224	0.042	0.0446	0.0545	1190
32.77	2355.8	2055.2	300.6	87.26	12.74	16239	16738	17282	0.0384	0.0417	0.0505	1235
33.02	2439.1	2040.3	398.8	83.64	16.36	17781	18461	19142	0.0387	0.0417	0.0509	1235
34.04	2735.2	2015	720.3	73.65	26.35	22544	23723	24948	0.039	0.0417	0.0509	1240
33.78	2516.5	2196.5	320	87.3	12.7	17327	17872	18416	0.0361	0.0394	0.0476	1285
34.29	2610.2	2183.1	427.1	83.65	16.35	19006	19777	20502	0.0364	0.0394	0.0476	1285
35.05	2925.7	2154.9	770.9	73.63	26.37	24131	25401	26717	0.0367	0.0394	0.0476	1295
35.31	2776.9	2323	453.9	83.66	16.34	19958	20729	21546	0.0341	0.0371	0.0449	1335
36.07	3132.6	2278.4	852.7	72.77	27.23	26082	27488	28939	0.0344	0.0371	0.0453	1340
36.32	2946.6	2464.4	482.2	83.65	16.35	21183	21999	22861	0.0321	0.0354	0.0427	1380
37.34	3302.2	2431.7	870.6	73.64	26.36	26943	28395	29846	0.0324	0.0351	0.0427	1390
38.1	3269.5	2732.3	537.2	83.58	16.42	23541	24449	25401	0.029	0.0323	0.0387	1470
39.12	3674.3	2707	967.3	73.68	26.32	29937	31570	33158	0.0292	0.032	0.0384	1485
40.64	3735.3	3038.8	695	81.37	18.63	27714	28848	30028	0.0263	0.0295	0.0344	1580
44.7	4556.8	3708.5	849.7	81.36	18.64	33793	35244	36650	0.0216	0.0252	0.0291	1765

Overall Diameter	Weight			Percent by Mass		Rated Strength			Resistance			Ampacity 75°
	Total	Aluminum	Steel	Aluminium	Steel	GA	HS	UHS	DC 20°c	AC 25°c	DC 75°c	
mm	kg/km							kg			ohm/km	
21.59	1092	799	293	73.1	26.9	9344	9843	10342	0.0978	0.1004	0.1198	715
21.844	1155	790	363	68.48	31.52	10387	11022	11657	0.0984	0.101	0.1207	715
23.114	1272	932	342	73.14	26.86	10886	11476	12066	0.0837	0.0863	0.103	790
23.622	1359	930	429	68.44	31.56	12066	12791	13562	0.0837	0.086	0.1027	795
24.892	1469	1073	396	73.07	26.93	12565	13245	13925	0.0728	0.0751	0.0896	860
25.146	1557	1067	491	68.49	31.51	13835	14696	15513	0.0728	0.0751	0.0896	865
26.924	1604	1342	262	83.65	16.35	11793	12247	12701	0.0591	0.062	0.0761	955
28.194	1960	1342	618	68.49	31.51	16874	18189	19278	0.0581	0.06	0.0715	995
27.686	1845	1350	496	73.13	26.87	15422	16239	17100	0.0577	0.06	0.0715	995