High Temperature Low Sag Conductors

ELSEWEDY CABLES

by ELSEWEDY ELECTRIC

HTLS
Conductors

Overview

Elsewedy Cables proudly present the new product catalogue of different types of High Temperature Low Sag (HTLS) conductors which will help our customers and utilities to optimize the efficiency of overhead lines.
Large quantities of transmitted electrical power would be needed due to cities' & industrial expansion, population increase all over the world has led to either to build new transmission lines or use HTLS conductors.
Because of high cost of installation of new transmission lines, time involved and difficulty in acquiring tower sites-right of way, HTLS is the best solution for reconductoring existing lines to increase power flow and also for new lines to accommodate future contingencies and increased demand of power.
HTLS conductors consist of new developed Aluminum materials that are able to operate continuously at higher temperatures up to 150°C - 250°C, while materials used for traditional types of overhead conductors such as AAAC and ACSR are limited to maximum operating temperature of 80°C.
New materials for central core have been developed for HTLS conductors to limit the sag at high temperatures and improve mechanical properties of complete conductor (INVAR steel, Galfan steel, and polymer matrix composites).

Table 1

Outer Layer(s) Material Types for High Temperature Low Sag Conductors

		Outer Layer(s) Type				
		1350-0	AT1	AT2	AT3	AT4
			Aluminum Zirconium Alloy (Al-Zr)			
Definition	Unit	Fully Annealed Aluminum	Thermal Resistant Aluminum Alloy (TAL)	Extra High Strength Thermal Resistant Aluminum Alloy (Hi-TAL)	Super Thermal Resistant Aluminum Alloy (STAL)	Extra Thermal Resistant Aluminum Alloy (XTAL)
Standard		ASTM B609 EN 50540	IEC 62004			
Density at 20°C	g/cm³	2.703	2.703	2.703	2.703	2.703
Minimum tensile strength	MPa	60 - 95	159 - 169	225 - 248	159 - 176	159 - 169
Coefficient of linear expansion	/°C	23×10^{-6}	23×10^{-6}	23×10^{-6}	23×10^{-6}	23×10^{-6}
Maximum resistivity at 20°C	nΩ.m	27.899	28.735	31.347	28.735	29.726
Conductivity (IACS)	%	61.8	60	55	60	58
Allowable continuous operating temperature	°C	180 - 250	150	150	210	230

Table 2

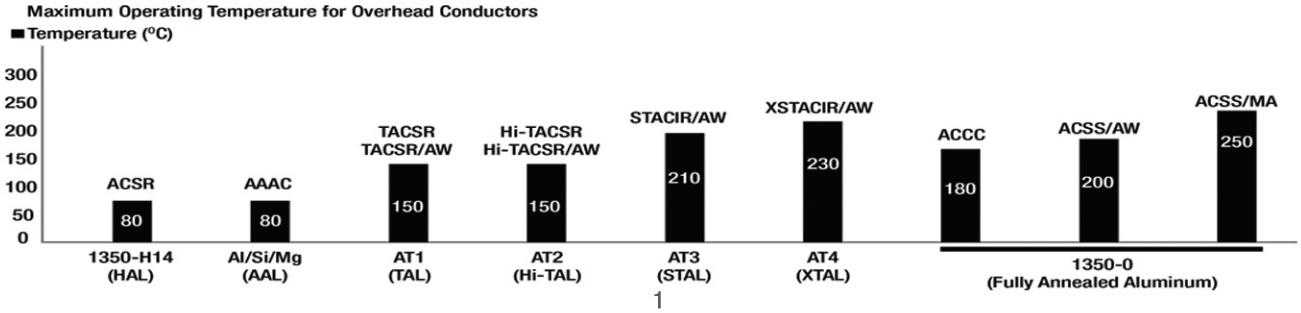
High Temperature Low Sag Conductors Types

		Outer Layer(s) Type				
		1350-0 Fully Annealed Aluminum	AT1 Thermal Resistant Aluminum Alloy	AT2 Extra High-Strength Thermal Resistant Aluminum Alloy	AT3 Super Thermal Resistant Aluminum Alloy	AT4 Extra Thermal Resistant Aluminum Alloy
Central Core Type	Carbon-Glass Fiber Composite Core	ACCC				
	Galvanized Steel Core	ACSS	TACSR	Hi-TACSR		
	Zinc-5% Aluminum Mischmetal Alloy Coated Steel Core (Galfan)	ACSS/MA* [2]				
	Aluminum-Clad Steel Core	ACSS/AW	TACSR/AW	Hi-TACSR/AW		
	Galvanized Invar Core		TACIR [1]	Hi-TACIR [1]	STACIR [1]	XTACIR [1]
	Aluminum-Clad Invar Core		TACIR/AW [1]	Hi-TACIR/AW [1]	STACIR/AW	XTACIR/AW

Notes:

All abovementioned conductor types can be offered with round wires or trapezoidal wires (TW), except the ACCC that shall be with trapezoidal wires only.

- These types aren't commonly used.
- There are different gardes of Mischmetal Alloy-Coated Steel Core such as MA1, MA2, MA3, MA4, MA5.



ACCC

Aluminum Conductor Composite Core

Description

Aluminum Conductor Composite Core (ACCC) is a concentrically stranded conductor with one or more layers of trapezoidal shaped annealed 1350-O aluminum wires on a central core of light weight Carbon-Glass fiber composite.

Advantages

The ACCC Hybrid Carbon Composite Core is stronger and lighter than the traditional steel core. ACCC is capable to carry twice the current of the traditional ACSR conductor as it's designed for continuous operating temperature up to 180°C, in addition to its lighter core allows to use about 30% more aluminum without increasing the total weight. Usage of ACCC reduces line losses by 30 to 40% - under equal load conditions - compared to traditional ACSR conductors of the same diameter and weight.Greater strength, effective self-damping, superior fatigue resistance and low coefficient of thermal expansion of ACCC reduce conductor sag under heavy electrical load conditions that lead to increased spans between fewer or shorter structures. ACCC conductors have greater corrosion resistance than traditional ACSR.

Application

ACCC conductors are used for overhead distribution and transmission lines as they're especially useful in reconductoring applications requiring increased current with existing tensions and clearances, new line applications where structures can be economized due to reduced conductor sag, new line applications requiring high emergency loadings, and lines where vibration due to wind is a problem, also they can be used at corrosive and coastal environments due to their good corrosion resistance.

Code	Aluminum Cross Section Area	Minimum Number of Layers of Aluminum	Nominal Diameter		Approx. Weight of ACCC Conductor	Rated Tensile Strength	Max. DC Resistance at 20°C	Current Rating at 180°C [1]
			Core	Conductor				
	mm²		mm		kg/km	kN	Ohm/km	Amp
Helsinki	151	2	5.97	15.65	471	68.9	0.1862	765
Copenhagen	220	2	5.97	18.29	661	72.8	0.1272	971
Reykjavik	223	2	7.11	18.82	694	98.3	0.1256	986
Monte Carlo	229	2	10.54	20.78	799	201.2	0.123	1027
Glasgow	237	2	7.75	19.53	732	115	0.1184	1027
Casablanca	274	2	7.11	20.5	834	101.1	0.1024	1120
Oslo	314	2	8.76	22.4	981	147.8	0.0893	1234
Lisbon	316	2	7.11	21.79	948	103.5	0.0887	1227
Amsterdam	367	2	7.75	23.55	1101	122.4	0.0762	1355
Brussels	421	2	8.13	25.15	1265	135.7	0.0666	1479
Stockholm 2L	463	2	8.76	26.4	1395	156.2	0.0605	1576
Warsaw	508	2	8.76	27.72	1519	158.7	0.0553	1673
Dublin	525	2	9.53	28.14	1583	183.3	0.0534	1711
Hamburg	546	3	8.76	28.62	1627	160.9	0.0514	1752
Kolkata	544	3	9.53	28.62	1643	184	0.0517	1748
Milan	568	3	8.76	29.1	1686	162.1	0.0494	1797
Rome	593	3	9.53	29.89	1774	187.1	0.0474	1850
Vienna	629	3	8.76	30.42	1852	165.5	0.0445	1918
Budapest	668	3	9.53	31.5	1984	191.4	0.042	1996
Prague	691	3	8.76	31.77	2030	169	0.0407	2032
Mumbai	685	3	9.53	31.77	2035	192	0.041	2025
Munich	733	3	9.53	32.85	2170	195	0.0384	2113
London	759	3	9.78	33.4	2248	204.8	0.037	2164
Paris	814	3	8.76	34.16	2366	175.9	0.0345	2254
Antwerp	945	3	9.78	36.85	2760	215.2	0.0297	2483
Berlin (Madrid Ice)	1007	3	10.54	38.2	2949	245	0.0278	2594

General Notes (for all products) :

- Guideline values of current carrying capacity are valid up to 60 Hz, assuming an ambient temperature of 40°C, wind velocity of 0.6 m/sec, sun radiation of 1033 W/m2, emissivity of 0.5, absorption factor of 0.5.
- Other sizes according to different standrads or client specifications are available upon request.

ACSS/MA

Aluminum Conductor Steel Supported

Description

Aluminum Conductor Steel Supported (ACSS) consists of one or more layers of annealed aluminum 1350-O wires stranded over a central core of zinc-5% aluminum mischmetal alloy-coated steel wires that is designed to withstand most or all of the mechanical load on ACSS.ACSS conductors are manufactured according to ASTM B 856, other standards could be offered.

Advantages

ACSS conductors are similar to traditional ACSR with some very important additional advantages. ACSS can operate continuously at high temperatures up to 250°C without damage.

ACSS sags less under emergency electrical loading than ACSR, it has self-damping properties and its final sags are not affected by long time creep of the aluminum.

Application

ACSS conductors are used for overhead distribution and transmission lines as they're especially useful in reconductoring applications requiring increased current with existing tensions and clearances, new line applications where structures can be economized due to reduced conductor sag, new line applications requiring high emergency loadings, and lines where vibration due to wind is a problem.

Code	Size	"Construction No. x Wire Diameter"		Cross Section Area		Nominal Outer Diameter	Approx. Weight			Rated Tensile Strength		Max. DC Resistance at 20°C	Current Rating at 200°C 1)	Current Rating at 250°C 1)
		Aluminum	Steel	Total	Aluminum		Total	Aluminum	Steel	MA3 2)	MA5 2)			
	Kcmil	No. x mm		mm²		mm	kg/km			kN		Ohm/km	Amp	Amp
PARTRIDGE	267	26X2.57	7X2.00	157	135	16.3	545	374	172	43.3	50.7	0.2072	780	876
JUNCO	267	30X2.40	7X2.40	167	136	16.8	624	377	247	57.8	68.0	0.2044	793	891
OSTRICH	300	26X2.73	7X2.12	177	152	17.3	615	422	193	48.5	56.9	0.1836	843	947
LINNET	336	26X2.89	7X2.25	198	171	18.3	690	473	217	54.3	64.1	0.1638	907	1020
ORIOLE	336	30X2.69	7X2.69	210	170	18.8	784	474	311	72.5	85.4	0.1627	918	1032
BRANT	398	24X3.27	7X2.18	228	202	19.6	763	558	204	53.8	62.7	0.1393	1004	1129
IBIS	398	26X3.14	7X2.44	234	201	19.9	813	558	256	63.2	73.8	0.1388	1010	1137
LARK	398	30X2.92	7X2.92	248	201	20.5	924	558	366	85.8	100.6	0.1381	1021	1151
FLICKER	477	24X3.58	7X2.39	273	242	21.5	915	669	245	63.2	73.6	0.1162	1128	1271
HAWK	477	26X3.44	7X2.67	281	242	21.8	976	670	306	76.1	88.4	0.1157	1136	1280
HEN	477	30X3.20	7X3.20	298	241	22.4	1110	670	440	101.0	118.6	0.1150	1149	1295
PARAKEET	556	24X3.87	7X2.58	319	282	23.2	1068	782	286	73.8	85.8	0.0995	1247	1407
DOVE	556	26X3.72	7X2.89	329	283	23.5	1142	783	359	88.5	103.5	0.0989	1256	1417
EAGLE	556	30X3.46	7X3.46	348	282	24.2	1298	783	514	117.9	138.7	0.0983	1271	1435
PEACOCK	605	24X4.03	7X2.69	346	306	24.2	1159	848	311	80.5	93.2	0.0917	1314	1485
SQUAB	605	26X3.87	7X3.01	356	306	24.5	1236	847	389	96.5	112.3	0.0914	1321	1493
TEAL	605	30X3.61	19X2.16	377	307	25.3	1398	853	545	130.3	154.3	0.0904	1342	1517
WOOD DUCK	605	30X3.61	7X3.61	379	307	25.3	1412	853	560	125.9	148.4	0.0903	1342	1518
ROOK	636	24X4.14	7X2.76	365	323	24.8	1222	895	327	84.5	98.2	0.0869	1359	1537
GROSBEAK	636	26X3.97	7X3.09	374	322	25.2	1302	892	410	99.6	116.2	0.0868	1367	1546
EGRET	636	30X3.70	19X2.22	396	323	25.9	1471	896	576	137.4	162.8	0.0861	1385	1565
SCOTER	636	30X3.70	7X3.70	398	323	25.9	1484	896	588	132.1	155.9	0.0860	1385	1566
FLAMINGO	666	24X4.23	7X2.82	381	337	25.4	1276	934	342	88.5	102.5	0.0832	1399	1580
GANNET	666	26X4.07	7X3.16	393	338	25.8	1366	937	429	104.1	121.6	0.0826	1411	1594
STILT	716	24X4.39	7X2.92	410	363	26.3	1373	1006	366	94.7	110.0	0.0773	1467	1658
STARLING	716	26X4.21	7X3.28	421	362	26.7	1465	1003	462	112.1	130.9	0.0772	1475	1668
REDWING	716	30X3.92	19X2.35	444	362	27.5	1651	1006	645	151.2	177.4	0.0767	1494	1690
CUCKOO	795	24X4.62	7X3.08	454	402	27.7	1522	1115	407	103.6	120.2	0.0698	1566	1774
DRAKE	795	26X4.44	7X3.45	468	403	28.1	1626	1115	511	124.5	144.9	0.0694	1577	1787
MALLARD	795	30X4.14	19X2.48	496	404	29.0	1840	1122	718	168.6	197.6	0.0687	1601	1815
MACAW	795	42X3.50	7X1.94	425	404	26.8	1281	1120	162	56.0	63.2	0.0703	1545	1749
TERN	795	45X3.38	7X2.25	432	404	27.0	1336	1119	217	67.6	77.4	0.0701	1550	1755
CONDOR	795	54X3.08	7X3.08	454	402	27.7	1522	1115	407	103.6	120.2	0.0698	1566	1774
RUDDY	900	45X3.59	7X2.40	487	456	28.7	1509	1262	247	75.6	86.4	0.0622	1675	1898
CANARY	900	54X3.28	7X3.28	515	456	29.5	1726	1264	462	117.4	136.3	0.0615	1699	1925
REDBIRD	954	24X5.06	7X3.38	545	483	30.4	1828	1337	491	124.5	144.6	0.0582	1763	1997
CANVASBACK	954	30X4.53	19X2.72	594	484	31.7	2207	1343	864	201.9	237.6	0.0574	1799	2039
RAIL	954	45X3.70	7X2.47	517	484	29.6	1603	1341	262	80.1	91.6	0.0585	1743	1973
TOWHEE	954	48X3.58	7X2.79	526	483	29.8	1673	1339	334	94.7	109.1	0.0584	1748	1979
CARDINAL	954	54X3.38	7X3.38	547	485	30.4	1833	1342	491	124.5	144.7	0.0579	1767	2001
SNOWBIRD	1034	42X3.99	7X2.21	552	525	30.6	1665	1455	210	72.9	82.3	0.0541	1832	2075
ORTOLAN	1034	45X3.85	7X2.57	560	524	30.8	1735	1451	284	86.7	99.2	0.0541	1829	2080
CURLEW	1034	54X3.51	7X3.51	590	523	31.6	1977	1448	529	134.8	156.1	0.0537	1849	2104
BLUEJAY	1113	45X4.00	7X2.66	604	565	32.0	1871	1567	304	93.9	106.5	0.0501	1922	2188
FINCH	1113	54X3.65	19X2.19	637	565	32.8	2133	1573	560	147.7	172.1	0.0500	1940	2209
BUNTING	1193	45X4.14	7X2.76	648	606	33.1	2005	1678	327	100.1	114.5	0.0467	2010	2280
GRACKLE	1193	54X3.77	19X2.27	680	603	34.0	2280	1678	602	157.9	184.6	0.0468	2026	2300
BITTERN	1272	45X4.27	7X2.85	689	644	34.2	2134	1785	349	106.8	122.0	0.0439	2095	2377
PHEASANT	1272	54X3.90	19X2.34	727	645	35.1	2435	1796	640	165.9	192.4	0.0438	2117	2404
DIPPER	1352	45X4.40	7X2.93	731	684	35.2	2264	1896	369	113.4	129.1	0.0414	2173	2473
MARTIN	1352	54X4.02	19X2.41	772	685	36.2	2587	1908	678	176.1	204.2	0.0412	2198	2503
BOBOLINK	1431	45X4.53	7X3.02	775	725	36.3	2401	2009	392	120.1	137.0	0.0390	2253	2572
PLOVER	1431	54X4.14	19X2.48	819	727	37.2	2742	2024	718	186.4	216.3	0.0388	2277	2601
NUTHATCH	1511	45X4.65	7X3.10	817	764	37.2	2530	2117	413	125.0	142.3	0.0371	2330	2655
PARROT	1511	54X4.25	19X2.55	863	766	38.2	2892	2133	759	196.6	228.5	0.0368	2357	2687
RATITE	1590	42X4.94	7X2.75	847	805	37.9	2555	2230	325	111.2	125.4	0.0353	2402	2731
LAPWING	1590	45X4.77	7X3.18	860	804	38.2	2662	2228	434	131.7	149.7	0.0352	2410	2741
FALCON	1590	54X4.36	19X2.62	909	806	39.2	3046	2245	802	207.3	241.1	0.0350	2438	2774

Notes:

- ACSS/MA3: supported with high-strength Zinc-5% Aluminum-Mischmetal Alloy (Zn-5A1-MM) coated steel core. ACSS/MA5: supported with ultra-high strength Zinc-5% Aluminum-Mischmetal Alloy (Zn-5A1-MM) coated steel core.Different grades of zinc-5% aluminum mischmetal alloy-coated steel core specified in ASTM B856 (MA1,MA2,MA4) are available upon request.
- ACSS conductor also with different grades of galvanized Steel core can be offered upon request.

ACSS/AW

Aluminum Conductor Aluminum-Clad Steel Supported

Description

Aluminum Conductor Aluminum-Clad Steel Supported (ACSS/AW) consists of one or more layers of annealed aluminum 1350-O wires stranded over a central core of aluminum clad steel wires that is designed to withstand most or all of the mechanical load on ACSS/AW.ACSS/AW conductors are manufactured according to ASTM B 856, other standards could be offered.

Advantages

ACSS/AW can operate continuously at high temperatures up to 200°C without damage. The aluminum clad steel core, which consists of a thick layer of aluminum (approx. 10% of the nominal wire radius) over steel, gives ACSS/AW conductors the advantages of standard ACSS along with light weight and good conductivity of aluminum with the high tensile strength and ruggedness of steel.

Application

ACSS/AW conductors are used for overhead distribution and transmission lines as they're especially useful in reconductoring applications requiring increased current with existing tensions and clearances, new line applications where structures can be economized due to reduced conductor sag, new line applications requiring high emergency loadings, and lines where vibration due to wind is a problem.ACSS/AW offers strength characteristics similar to ACSS, along with slightly greater ampacity and resistance to corrosion due to aluminum-cladding of the steel core wires.

Code	Size	"Construction No. x Wire Diameter"		Cross Section Area		Nominal Outer Diameter	Approx. Weight			Rated Tensile Strength	Max. DC Resistance at 20°C	Current Rating at 200°C 1)
		Aluminum	ACS	Total	Aluminum		Total	Aluminum	ACS	AW2 2)		
	Kcmil	No. x mm		mm²		mm	kg/km			kN	Ohm/km	Amp
PARTRIDGE	267	26x2.57	7x2.00	157	135	16.3	519	374	146	37.0	0.2010	792
JUNCO	267	30x2.40	7x2.40	167	136	16.8	586	377	210	50.0	0.1958	810
OSTRICH	300	26x2.73	7x2.12	177	152	17.3	585	422	163	42.0	0.1782	856
LINNET	336	26x2.89	7x2.25	198	171	18.3	657	473	184	47.0	0.1590	921
ORIOLE	336	30x2.69	7x2.69	210	170	18.8	737	474	263	63.0	0.1559	938
BRANT	398	24x3.27	7x2.18	228	202	19.6	731	558	173	46.0	0.1360	1015
IBIS	398	26x3.14	7x2.44	234	201	19.9	774	558	217	55.0	0.1347	1025
LARK	398	30x2.92	7x2.92	248	201	20.5	868	558	310	74.0	0.1323	1043
FLICKER	477	24x3.58	7x2.39	273	242	21.5	877	669	208	56.0	0.1134	1142
HAWK	477	26x3.44	7x2.67	281	242	21.8	929	670	259	66.0	0.1122	1153
HEN	477	30x3.20	7x3.20	298	241	22.4	1043	670	372	89.0	0.1102	1174
PARAKEET	556	24x3.87	7x2.58	319	282	23.2	1024	782	242	65.0	0.0971	1263
DOVE	556	26x3.72	7x2.89	329	283	23.5	1087	783	304	78.0	0.0960	1274
EAGLE	556	30x3.46	7x3.46	348	282	24.2	1219	783	435	102.0	0.0942	1297
PEACOCK	605	24x4.03	7x2.69	346	306	24.2	1111	848	263	71.0	0.0895	1330
SQUAB	605	26x3.87	7x3.01	356	306	24.5	1177	847	330	85.0	0.0887	1342
TEAL	605	30x3.61	19x2.16	377	307	25.3	1314	853	462	111.0	0.0867	1370
WOOD DUCK	605	30x3.61	7x3.61	379	307	25.3	1327	853	474	109.0	0.0866	1372
ROOK	636	24x4.14	7x2.76	365	323	24.8	1172	895	277	74.0	0.0848	1376
GROSBEAK	636	26x3.97	7x3.09	374	322	25.2	1239	892	347	89.0	0.0842	1388
EGRET	636	30x3.70	19x2.22	396	323	25.9	1383	896	488	117.0	0.0825	1414
SCOTER	636	30x3.70	7x3.70	398	323	25.9	1394	896	498	112.0	0.0824	1416
FLAMINGO	666	24x4.23	7x2.82	381	337	25.4	1224	934	289	78.0	0.0813	1416
GANNET	666	26x4.07	7x3.16	393	338	25.8	1300	937	363	93.0	0.0802	1433
STILT	716	24x4.39	7x2.92	410	363	26.3	1317	1006	310	84.0	0.0755	1485
STARLING	716	26x4.21	7x3.28	421	362	26.7	1394	1003	391	98.0	0.0749	1498
REDWING	716	30x3.92	19x2.35	444	362	27.5	1552	1006	546	131.0	0.0736	1526
CUCKOO	795	24x4.62	7x3.08	454	402	27.7	1460	1115	345	93.0	0.0681	1586
DRAKE	795	26x4.44	7x3.45	468	403	28.1	1548	1115	433	109.0	0.0674	1602
MALLARD	795	30x4.14	19x2.48	496	404	29.0	1730	1122	608	146.0	0.0659	1634
MACAW	795	42x3.50	7x1.94	425	404	26.8	1256	1120	137	51.0	0.0696	1552
TERN	795	45x3.38	7x2.25	432	404	27.0	1303	1119	184	60.0	0.0692	1560
CONDOR	795	54x3.08	7x3.08	454	402	27.7	1460	1115	345	93.0	0.0681	1586
RUDDY	900	45x3.59	7x2.40	487	456	28.7	1472	1262	210	68.0	0.0613	1687
CANARY	900	54x3.28	7x3.28	515	456	29.5	1656	1264	391	103.0	0.0601	1720
REDBIRD	954	24x5.06	7x3.38	545	483	30.4	1753	1337	416	109.0	0.0568	1785
CANVASBACK	954	30x4.53	19x2.72	594	484	31.7	2075	1343	732	175.0	0.0551	1837
RAIL	954	45x3.70	7x2.47	517	484	29.6	1562	1341	222	72.0	0.0578	1755
TOWHEE	954	48x3.58	7x2.79	526	483	29.8	1622	1339	283	85.0	0.0575	1763
CARDINAL	954	54x3.38	7x3.38	547	485	30.4	1758	1342	416	109.0	0.0566	1788
SNOWBIRD	1034	42x3.99	7x2.21	552	525	30.6	1633	1455	178	66.0	0.0535	1834
ORTOLAN	1034	45x3.85	7x2.57	560	524	30.8	1692	1451	240	78.0	0.0533	1841
CURLEW	1034	54x3.51	7x3.51	590	523	31.6	1896	1448	448	116.0	0.0524	1872
BLUEJAY	1113	45x4.00	7x2.66	604	565	32.0	1824	1567	257	84.0	0.0494	1935
FINCH	1113	54x3.65	19x2.19	637	565	32.8	2048	1573	474	128.0	0.0488	1964
BUNTING	1193	45x4.14	7x2.76	648	606	33.1	1955	1678	277	90.0	0.0461	2024
GRACKLE	1193	54x3.77	19x2.27	680	603	34.0	2188	1678	510	137.0	0.0457	2051
BITTERN	1272	45x4.27	7x2.85	689	644	34.2	2081	1785	295	96.0	0.0434	2109
PHEASANT	1272	54x3.90	19x2.34	727	645	35.1	2338	1796	542	146.0	0.0427	2137
DIPPER	1352	45x4.40	7x2.93	731	684	35.2	2208	1896	312	102.0	0.0408	2187
MARTIN	1352	54x4.02	19x2.41	772	685	36.2	2483	1908	575	155.0	0.0402	2224
BOBOLINK	1431	45x4.53	7x3.02	775	725	36.3	2341	2009	332	108.0	0.0385	2268
PLOVER	1431	54x4.14	19x2.48	819	727	37.2	2632	2024	608	164.0	0.0379	2305
NUTHATCH	1511	45x4.65	7x3.10	817	764	37.2	2467	2117	350	114.0	0.0366	2346
PARROT	1511	54x4.25	19x2.55	863	766	38.2	2776	2133	643	173.0	0.0360	2386
RATITE	1590	42x4.94	7x2.75	847	805	37.9	2505	2230	275	101.0	0.0349	2414
LAPWING	1590	45x4.77	7x3.18	860	804	38.2	2596	2228	368	120.0	0.0348	2427
FALCON	1590	54x4.36	19x2.62	909	806	39.2	2924	2245	679	183.0	0.0342	2468

Notes

- ACSS/AW2: supported with regular strength aluminum-clad core wire.
  Different grades of Aluminum-Clad Steel core (High strength AW3) are available upon request

TACSR

Thermal Resistant Aluminum Alloy Conductor Steel Reinforced

Description

Thermal Resistant Aluminum Alloy Conductor Steel Reinforced (TACSR) consists of one or more layers of thermal resistant aluminium zirconium alloy (AT1) wires stranded over a central core of zinc coated steel wire(s). TACSR conductors are manufactured according to IEC 62004 and IEC 60888 and generally according to IEC 61089, other standards could be offered.

Advantages

TACSR conductors are able to carry load current higher than traditional ACSR conductors about 150 % as they are designed for continuous operating temperature up to 150°C. TACSR conductors have the same installation technique of ACSR.

Application

TACSR conductors are used for overhead distribution and transmission lines as they're especially useful in new line applications requiring increased current.

Size	Construction No. x Wire Diameter		Cross Section Area		Nominal Outer Diameter	Approx. Weight			Rated Tensile Strength	Max. DC Resistance at 20°C	Modulus of Elasticity	Coefficient of Linear Expansion	Current Rating at 150°C 1)
	TAL	Steel	Total	TAL		Total	TAL	Steel					
mm²	No. x mm		mm²		mm	kg/km			kN	Ohm/km	kgf/mm²	x10⁻⁶/°C	Amp
58	6x3.5	1x3.5	67	58	10.5	233	158	75	19.9	0.5053	8400	18.9	378
80	6x4.2	1x4.2	97	83	12.6	336	228	108	28.5	0.3509	8400	18.9	476
95	6x4.5	1x4.5	111	95	13.5	386	262	124	32.7	0.3057	8400	18.9	520
120	30x2.3	7x2.3	154	125	16.1	572	345	227	54.2	0.2357	9080	18	621
160	30x2.6	7x2.6	196	159	18.2	731	440	291	69.3	0.1845	9080	18	726
200	30x2.9	7x2.9	244	198	20.3	909	548	362	85.6	0.1483	9080	18	834
240	30x3.2	7x3.2	298	241	22.4	1107	667	440	101.0	0.1218	9080	18	946
330	26x4.0	7x3.1	380	327	25.3	1316	902	413	110.1	0.0899	8360	19	1138
410	26x4.5	7x3.5	481	414	28.5	1669	1142	527	139.8	0.0710	8360	19	1323
480	45x3.7	7x2.47	517	484	29.6	1599	1337	262	116.6	0.0607	7250	20.8	1445
520	54x3.5	7x3.5	587	520	31.5	1963	1437	527	158.2	0.0566	7990	19.5	1523
610	54x3.8	7x3.8	692	612	34.2	2314	1694	621	186.5	0.0480	7990	19.5	1690
680	54x4.0	7x4.0	767	679	36.0	2565	1877	688	204.7	0.0433	7990	19.5	1801
680	45x4.4	7x2.9	730	684	35.1	2252	1891	362	161.5	0.0429	7250	20.8	1794

Notes

- Different grades of Galvanized steel core (high strength, extra high strength) are available upon request

TACSR/AW

Thermal Resistant Aluminum Alloy Conductor Aluminum-Clad Steel Reinforced

Description

Thermal Resistant Aluminum Alloy Conductor Aluminum-Clad Steel Reinforced (TACSR/AW) consists of one or more layers of thermal resistant aluminium zirconium alloy (AT1) wires stranded over a central core of stranded aluminum-clad steel (20SA Type A) wire(s).TACSR/AW conductors are manufactured according to IEC 62004 and IEC 61232 and generally according to IEC 61089, other standards could be offered.

Advantages

TACSR/AW conductors are able to carry load current higher than traditional ACSR conductors as they are designed for continuous operating temperature up to 150°C, additionally they have increased corrosion resistance and lower electrical resistance and lower mass than TACSR. TACSR/AW conductors have same installation technique of ACSR.

Application

TACSR/AW conductors are used for overhead distribution and transmission lines as they're especially useful in new line applications requiring increased current, also they can be used at corrosive and coastal environments due to their good corrosion resistance.

Size	Construction No. x Wire Diameter		Cross Section Area		Nominal Outer Diameter	Approx. Weight			Rated Tensile Strength	Max. DC Resistance at 20°C	Modulus of Elasticity	Coefficient of Linear Expansion	Current Rating at 150°C 1)
	TAL	ACS	Total	TAL		Total	TAL	ACS					
mm²	No. x mm		mm²		mm	kg/km			kN	Ohm/km	kgf/mm²	x10⁻⁶/°C	Amp
120	30x2.3	7x2.3	154	125	16.1	537	345	193	56.0	0.2182	8100	19.2	646
160	30x2.6	7x2.6	196	159	18.2	686	440	246	71.5	0.1707	8100	19.2	755
200	30x2.9	7x2.9	244	198	20.3	854	548	306	88.4	0.1372	8100	19.2	867
210	30x3.2	7x3.2	298	241	22.4	1040	667	373	106.6	0.1127	8100	19.2	983
330	26x4.0	7x3.1	380	327	25.3	1252	902	350	115.4	0.0851	7620	20	1168
410	26x4.5	7x3.5	481	414	28.5	1588	1142	446	142.5	0.0672	7630	20	1357
480	45x3.7	7x2.47	517	484	29.6	1559	1337	222	118.6	0.0593	6910	21.5	1454
520	45x3.5	7x3.5	587	520	31.5	1883	1437	446	160.9	0.0542	7390	20.4	1549
610	54x3.8	7x3.8	692	612	34.2	2220	1694	526	186.5	0.0459	7330	20.4	1718
680	45x4.4	7x3.9	730	684	35.1	2197	1891	306	164.3	0.0420	6900	21.5	1807

Notes

- Different grades of Aluminum-Clad Steel core (high strength) are available upon request.

STACIR/AW

Super Thermal Resistant Aluminum Alloy Conductor Aluminum-Clad Invar Reinforced

Description

Super Thermal Resistant Aluminum Alloy Conductor Aluminum-Clad Invar Reinforced (STACIR/AW) consists of one or more layers of super thermal resistant aluminium zirconium alloy (AT3) wires stranded over a central core of stranded aluminum-clad invar wires. Invar: Special Fe/Ni alloy with very low coefficient of linear expansion.
STACIR/AW conductors are manufactured according to IEC 62004 and generally according to IEC 61089 and IEC 61232, other standards could be offered.

Advantages

STACIR/AW conductors are able to carry load current up to double than traditional ACSR conductors as they are designed for continuous operating temperature up to 210°C.
Beyond Knee point STACIR/AW will conductor experiences a sag increase due to the expansion of Invar core alone (extremely low value ≤ 3.7 x10-6 /°C) which control sag at high operating temperatures.
STACIR/AW conductors have the same installation technique of ACSR, additionally they have increased corrosion resistance.

Application

STACIR/AW conductors are used for overhead distribution and transmission lines as they're especially useful in replacing existing conductors for line applications requiring increased current , also they can be used at corrosive and coastal environments due to their good corrosion resistance.

Size	Construction No. x Wire Diameter		Cross Section Area		Nominal Outer Diameter	Approx. Weight			Rated Tensile Strength	Max. DC Resistance at 20°C	Modulus of Elasticity	Coefficient of Linear Expansion	Current Rating at 210°C [1]
	STAL	Invar	Total	STAL		Total	STAL	Invar					
mm^2	No. x mm		mm^2		mm	kg/km			kN	Ohm/km	kgf/mm^2	$x10^{-6}/°C$	Amp
135	30x2.38	7x2.38	165	133	16.7	591	369	222	55.9	0.2086	8040	16	804
160	30x2.60	7x2.60	196	159	18.2	706	440	265	65.4	0.1748	8040	16	902
200	30x2.90	7x2.90	244	198	20.3	878	548	330	80.7	0.1405	8040	16	1039
210	28x3.07	7x2.70	247	207	20.4	859	573	286	75.1	0.1355	7790	16.8	1058
220	30x3.05	7x3.05	270	219	21.4	971	606	365	87.3	0.1270	8040	16	1108
230	28x3.24	7x2.85	276	231	21.5	957	638	319	83.6	0.1217	7790	16.8	1134
238	40x2.75	7x4.20	335	238	23.6	1362	656	706	136.4	0.1129	8970	13.3	1212
240	30x3.20	7x3.20	298	241	22.4	1069	667	402	96.1	0.1154	8040	16	1179
255	26x3.54	7x2.75	297	256	22.4	1004	707	297	84.5	0.1105	7580	17.5	1205
255	36x3.00	7x3.99	342	254	24.0	1329	704	625	128.0	0.1069	8650	14.2	1251
290	28x3.64	7x3.20	348	291	24.2	1207	805	402	104.2	0.0964	7790	16.8	1320
300	26x3.85	7x3.00	352	303	24.4	1189	836	353	100.2	0.0934	7580	17.5	1343
330	26x4.00	7x3.10	380	327	25.3	1279	902	377	106.4	0.0865	7580	17.5	1410
340	28x3.92	7x3.45	403	338	26.0	1401	934	467	121.0	0.0831	7790	16.8	1452
345	26x4.11	7x3.20	401	345	26.0	1355	953	402	112.9	0.0819	7580	17.5	1462
410	26x4.50	7x3.50	481	414	28.5	1623	1142	481	135.1	0.0684	7580	17.5	1643
480 (Rail)	45x3.70	7x2.47	517	484	29.6	1576	1337	239	114.3	0.0597	6900	20.2	1776

Notes

- Galvanized invar core is availbale upon request.

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19159