

ACCC[®] conductors

The technology

Built on the highly evolved foundation of aerospace derived carbon fibre hybrid composites, the ACCC[®] conductor utilizes a high strength, light weight and dimensionally stable single strand composite core that is stranded with trapezoidal shaped aluminium wire. ACCC[®] conductor offers superior performance and capacity compared to conventional conductors of the same diameter and weight.

The production of ACCC[®] conductor's composite core has been ISO certified since November of 2006 and is currently certified to ISO 9001:2008 standards. ACCC[®] conductor, ACCC[®] core, and associated hardware produced by CTC Cable Corporation and its authorized licensees are protected by patents and pending patent applications in over 70 countries throughout the world.

ACCC[®] conductor advantages

■ Increase line capacity

ACCC[®] conductor can carry up to twice the current of conventional steel-reinforced conductors due to its high temperature capability.

■ Mitigate thermal sag

ACCC[®] conductor's carbon composite core has a much lower coefficient of thermal expansion compared to steel, aluminium, or other core materials.

■ Reduce line losses

Under equivalent load conditions, ACCC[®] conductor reduces line losses by 30 to 40% compared to steel-reinforced conductors of the same diameter and weight.

■ Improve system efficiency

ACCC[®] conductor's additional annealed aluminium content improves conductivity and reduces line losses, which can improve overall system efficiency.

■ Decrease project costs

ACCC[®] conductor can reduce the cost of upgrading existing lines or new corridors due to its greater strength, reduced sag, and increased capacity.

■ Reduce generation requirements, conserve fuel & reduce emissions

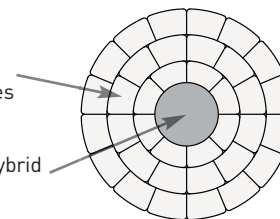
ACCC[®] conductor's ability to reduce line losses can provide significant reductions in fuel consumption and their associated emissions for fossil fuel sources or improve the overall efficiency and economic performance of renewable resources. Increased power delivery can also reduce the demand for new sources of energy.

■ Reduce electro magnetic field level

ACCC[®] conductor's smaller thermal elongation coefficient may result in a reduction of the magnetic field under the line due to its maintaining greater clearance distance at the same current level.

fully annealed
aluminium
trapezoidal wires

high strength hybrid
composite core



ACCC[®] conductor applications

■ Upgrade the capacity of existing lines

ACCC[®] conductors can be used to increase the throughput of existing lines with little or no modifications to the structures due to its greater capacity under similar tower loading conditions.

■ Improve the performance and economics of new lines

ACCC[®] conductor's greater strength, improved sag characteristics, and higher electrical capacity can improve the performance and reduce the costs of new transmission and distribution lines by delivering more power with less losses and reducing structural costs. ACCC[®] conductor can be installed without special equipment or tools and with minimal training.

■ Accommodate long spans and river crossings

ACCC[®] conductor can accommodate long spans and river crossings due to its higher strength, greater thermal stability, and improved self-damping characteristics.

■ Connect renewable resources more efficiently

ACCC[®] conductor can be used to connect renewable resources more efficiently by reducing structural costs through increased spans, while also delivering more power by reducing line losses, which can improve initial and overall project economics.

■ Reduce maintenance costs and improve longevity

ACCC[®] conductor's non-corrosive composite core resists environmental degradation and can also reduce costs associated with vegetation maintenance due to its reduced sag; and under severe weather conditions, such as ice and wind load events resists failure due to its greater strength.

ACCC[®] conductors

Technical summary

		ACCC Helsinki 160	ACCC Copenhagen 230	ACCC Reykjavik 235	ACCC Monte Carlo 240	ACCC Glasgow 245	ACCC Casablanca 285	ACCC Lisbon 325	ACCC Oslo 325	ACCC Amsterdam 380	ACCC Brussels 430	ACCC Stockholm 470	ACCC Stockholm 3L 470
Nominal aluminium equivalent area	mm ²	158,8	230,4	233,8	241,7	247,8	285,9	329,2	328,2	383,7	439,4	482,7	476,1
Nominal cross sectional area of aluminium	mm ²	153,7	223,0	226,2	233,9	239,8	276,7	318,6	317,7	371,3	425,3	467,2	460,7
Number of aluminium wires	#	16	16	16	28	16	16	16	20	20	20	20	36
Equivalent diameter of trapezoidal aluminium wires	mm	3,50	4,21	4,24	3,26	4,37	4,69	5,04	4,50	4,86	5,20	5,45	4,03
Minimum filling factor of the aluminium cross section	%	93	93	93	93	93	93	93	93	93	93	93	93
Overall diameter	mm	15,65	18,29	18,82	20,79	19,53	20,50	21,80	22,40	23,55	25,14	26,40	26,40
Diameter of core	mm	5,97	5,97	7,11	10,54	7,75	7,11	7,11	8,76	7,75	8,13	8,76	8,76
Rated tensile strength of conductor*	kN	69,0	72,9	98,5	201,5	115,2	101,3	103,7	148,0	122,6	135,4	156,4	156,1
Extreme load safety strength of conductor**	kN	64,0	65,6	91,0	193,8	107,3	92,2	93,2	137,6	110,4	121,9	141,1	141,0
Nominal mass per unit length - total	g/m	479,7	669,7	702,4	813,9	749,8	842,7	956,6	991,5	1112,5	1275,3	1405,5	1387,3
Nominal mass per unit length - aluminium	g/m	425,7	615,7	626,4	649,9	663,4	766,6	880,5	878,5	1026,1	1177,4	1292,4	1274,2
Nominal mass per unit length - core	g/m	54	54	76	164	86	76	76	113	86	98	113	113
Coefficient of linear expansion above thermal kneepoint	10 ⁻⁴ K ⁻¹	1,61	1,61	1,61	1,61	1,61	1,61	1,61	1,45	1,61	1,61	1,45	1,45
Coefficient of linear expansion below thermal kneepoint	10 ⁻⁴ K ⁻¹	17,3	18,7	17,5	13,9	17,0	18,3	18,8	17,0	18,7	18,8	18,5	18,4
Modulus of elasticity of the core	GPa	112,3	112,3	112,3	112,3	112,3	112,3	112,3	116,0	112,3	112,3	116,0	116,0
Modulus of elasticity below thermal kneepoint	GPa	65,1	62,9	64,9	71,6	65,7	63,5	62,8	66,1	62,9	62,6	63,4	63,4
Nominal DC resistance at 20 °C (nominal)	Ohm/km	0,1824	0,1254	0,1236	0,1202	0,1169	0,1013	0,0878	0,0882	0,0754	0,0659	0,0600	0,0608
DC current rating at 175 °C***	A	813	1024	1039	1085	1081	1177	1286	1294	1420	1546	1645	1633

Standard applied for conductor manufacturer: EN50182

Maximum allowable continuous operating temperature (surface) 175 °C

Maximum allowable continuous operating temperature (core) 180 °C

* RTS as per ASTM B 857 - ASTM calculates aluminium strength at 96% of the minimum Tensile Strength of the aluminium wire

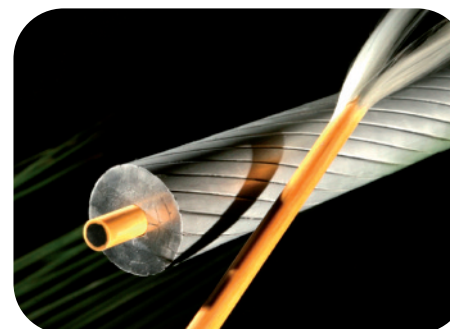
** With 40% of the aluminium strength this safety strength is recommended where sustained loads of over 80% of the RTS are expected for prolonged periods. For further information, please see the ACCC Conductor Technical Note TN-750-001.

*** At maximum continuous surface operating temperature (calculated with nominal DC resistance at 20 °C). Conditions: Wind: 0,6m/s; emissivity=abs.Coef.=0,5; sun radiation: 1000W/m²; Ambient temperature: 25 °C

For long spans and river crossings, a range of specific ACCC[®] designs has been developed.

ACCC[®] conductors

ACCC Warsaw 530	ACCC Dublin 540	ACCC Hamburg 570	ACCC Milan 590	ACCC Rome 610	ACCC Vienna 650	ACCC Budapest 690	ACCC Prague 710	ACCC Munich 760	ACCC London 780	ACCC Paris 840	ACCC Antwerp 970	ACCC Madrid 1050	ACCC Berlin 1050	ACCC Athens 1470
531,7	546,4	571,8	593,8	619,5	657,4	697,8	720,9	772,3	791,5	848,0	983,6	1057,7	1049,3	1470,3
514,5	528,8	553,4	574,7	599,5	636,2	675,3	697,7	747,3	766,0	820,7	951,9	1023,6	1015,5	1423,0
36	22	36	36	36	36	36	36	36	36	36	36	54	46	68
4,27	5,53	4,42	4,51	4,60	4,74	4,89	4,97	5,12	5,20	5,39	5,80	4,91	5,30	5,16
93	93	93	93	93	93	93	93	93	93	93	93	93	93	93
27,72	28,15	28,62	29,10	29,89	30,42	31,50	31,77	32,85	33,40	34,17	36,85	38,20	38,20	44,75
8,76	9,53	8,76	8,76	9,53	8,76	9,53	8,76	9,53	9,78	8,76	9,78	9,78	10,54	10,54
159,1	183,5	161,3	162,5	187,5	165,9	191,8	169,4	195,8	205,2	176,3	215,6	219,7	245,5	268,4
142,2	166,2	143,1	143,6	167,8	145,1	169,6	146,5	171,3	180,0	149,4	184,4	186,1	212,1	221,7
1538,8	1594,8	1646,3	1705,1	1793,1	1871,7	2002,7	2049,7	2209,2	2267,3	2385,3	2778,9	2976,4	2973,7	4102,1
1425,7	1463,0	1533,2	1592,0	1661,3	1758,6	1870,9	1936,6	2077,4	2124,3	2272,2	2635,9	2833,5	2809,7	3938,1
113	132	113	113	132	113	132	113	132	143	113	143	143	164	164
1,45	1,61	1,45	1,45	1,61	1,45	2,00	1,45	1,61	1,61	1,45	1,61	1,61	1,61	1,61
18,8	18,5	19,1	19,2	18,9	19,5	19,0	19,7	19,6	19,5	20,2	20,1	20,3	19,9	20,7
116,0	112,3	116,0	116,0	112,3	116,0	112,3	116,0	112,3	112,3	116,0	112,3	112,3	112,3	112,3
62,7	63,2	62,3	62,1	62,4	61,7	61,8	61,1	61,2	61,5	60,6	60,6	60,4	61,0	59,8
0,0545	0,0530	0,0507	0,0488	0,0468	0,0440	0,0416	0,0403	0,0376	0,0366	0,0342	0,0295	0,0274	0,0276	0,0197
1749	1783	1831	1875	1930	2001	2081	2118	2214	2255	2351	2589	2716	2679	3360



ACCC[®] case study

Increasing capacity by reconductoring with ACCC[®] conductor challenge:

Increase the capacity of an existing 138 kV 65 km line passing through mountainous terrain.

	Existing Conductor ACSR 477 Hawk	Proposed Conductor ACSR 795 Drake	Selected Conductor ACCC [®] 325 Lisbon
Weight (kg/km)	976	1627	957
Max Current (A)	717	987	1188
Conductor Cost (approximate)		EUR 2,200,000	EUR 3,000,000
Assumptions regarding structural modifications		70% replaced 30% modified	5% modified
Structural Modification Costs		EUR 9,660,000 EUR 414,000	EUR 69,000
Total Project Cost		EUR 12,274,000	EUR 3,069,000

Total project savings (not including stringing costs) EUR 9,205,000

Structural Cost Assumptions:
92 structures, structure replacement cost EUR 150K, structure modification cost EUR 15K (labour included).

Industry acceptance and independent conductor/hardware testing

ACCC[®] conductor has been installed in the US, China, Europe, South America, and Mexico in many different, environmentally sensitive, challenging, and extreme conditions. As of June 30, 2010, over 9,300 kilometers of ACCC[®] conductor are currently ordered or in service at over 140 sites installed using over 15,000 specially designed patented dead-ends and splices. ACCC[®] conductor has survived heavy ice, wind, cyclic thermal, and documented storm and typhoon conditions when other adjacent lines have failed. Thousands of production tests and hundreds of lab tests, including detailed test programs by independent test labs and utility grid operators, have confirmed ACCC[®] conductor's improved performance and longevity attributes. A substantial volume of data retrieved from lines being monitored worldwide has also proven that ACCC[®] conductor outperforms the competition.

If increasing line capacity, improving system efficiency, reducing emissions, or reducing overall project costs are challenges you face, we can help you find an optimized conductor for your next project. Whether it's a reconductor, new line, or other challenging project, you must explore how ACCC[®] conductor can help your organization meet its strategic objectives and improve efficiency and grid security.

ACCC[®] conductor datasheets and our other brochures can be downloaded from our website. Lamifil nv is one of a small number of producers of ACCC[®] conductor under license of CTC Cable Corp.

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