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Standard Specification for Concentric-Lay-Stranded Aluminum Conductors, Aluminum Matrix Composite Reinforced (ACAMCR), Formerly ACCR¹

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1. Scope

1.1 This specification covers concentric-lay-stranded conductors made from round aluminum-zirconium alloy wires and an aluminum matrix composite (AMC) core wire(s) for use as overhead electrical conductors (Explanatory **Note 1** and Explanatory **Note 2**).

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The following documents form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:²

B263/B263M Test Method for Determination of Cross-Sectional Area of Stranded Conductors

B354 Terminology Relating to Uninsulated Metallic Electrical Conductors

B941 Specification for Heat Resistant Aluminum-Zirconium Alloy Wire for Electrical Purposes

B976 Specification for Fiber Reinforced Aluminum Matrix Composite (AMC) Core Wire for Aluminum Conductors

¹ This specification is under the jurisdiction of ASTM Committee B01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.07 on Conductors of Light Metals.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Aluminum Matrix Composite Reinforced (ACAMCR)
(formerly known as ACCR)

B1008 Test Method for Stress-Strain Testing for Overhead
Electrical Conductors

2.3 *NIST Document*:³

NBS Handbook 100 Copper Wire Tables

2.4 *Aluminum Association Documents*:⁴

Publication 50 Code Words for Overhead Aluminum Elec-
trical Conductors

3. Terminology

3.1 *Acronyms*:

3.1.1 **ACAMCR**—aluminum conductor, aluminum matrix
composite reinforced

3.1.2 **AMC**—aluminum matrix composite

3.1.3 **Al-Zr**—aluminum zirconium

4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Quantity of each size, stranding, and class,

4.1.2 Conductor size, area (Section 8 and **Table 1** and **Table 2**),

4.1.3 Number of wires, aluminum-zirconium alloy and
AMC (see **Table 1** and **Table 2**),

4.1.4 Type of AMC core wires (see 5.3),

4.1.5 Direction of lay of outer layer of aluminum-zirconium
alloy wires if other than right-hand (see 7.3),

4.1.6 Special tension test, if desired (see 14.3),

4.1.7 Place of inspection (Section 16),

4.1.8 Package size and type (see 17.1),

4.1.9 Heavy wood lagging, if required (see 17.3), and

4.1.10 Special package marking, if required (see 17.4).

5. Requirement for Wires

5.1 Tests for mechanical and electrical properties of aluminum-zirconium alloy and core wires shall be made before stranding.

³ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

⁴ Available from Aluminum Association, 1400 Crystal Dr., Suite 430, Arlington, VA 22202, <http://www.aluminum.org>.



TABLE 1 Construction Requirements of Aluminum Conductors, Aluminum Matrix Composite Reinforced (ACAMCR)

Designation	Nominal, kcmil	Stranding, Aluminum- Zirconium Alloy/AMC	Rated Strength, lb	Cross Sectional Area, in. ²		Layers of Aluminum- Zirconium Alloy	Diameter				Total Mass (lb)/1000 ft
				Aluminum- Zirconium Alloy	Total		Individual Wires		Complete Cable, in.		
							Aluminum- Zirconium Alloy, in.	AMC, in.		AMC Core, in.	
300-T16	297	26/7	12100	0.233	0.271	2	0.107	0.083	0.249	0.677	337
336-T16	340	26/7	13900	0.267	0.310	2	0.114	0.089	0.267	0.724	385
477-T16	470	26/7	19200	0.369	0.429	2	0.134	0.105	0.314	0.852	533
557-T16	573	26/7	23100	0.450	0.524	2	0.149	0.116	0.347	0.941	650
636-T16	656	26/19	25600	0.516	0.598	2	0.159	0.074	0.371	1.006	740
795-T16	824	26/19	32200	0.648	0.751	2	0.178	0.083	0.416	1.128	930
954-T13	967	54/19	33200	0.760	0.856	3	0.134	0.080	0.402	1.205	1059
1033-T13	1036	54/19	35600	0.814	0.917	3	0.139	0.083	0.416	1.247	1134
1272-T11	1236	51/19	38500	0.972	1.075	3	0.156	0.083	0.416	1.350	1.325
1351-T13	1334	54/19	45300	1.048	1.180	3	0.157	0.094	0.472	1.415	1460
1590-T11	1594	51/19	49500	1.252	1.385	3	0.094	0.177	0.472	1.532	1.706

Conversion factors:

1 cmil = 5.067 E – 4.0 mm²

1 in. = 2.54 E + 01 mm

1 lb/1000 ft = 1.488 E + 00 kg/km

1 ft = 3.048 E – 01 m

1 lb = 4.536 E – 01 kg

1 lbf = 4.448 N

TABLE 2 Construction Requirements of Aluminum Conductors, Aluminum Matrix Composite Reinforced (ACAMCR) – Metric

Designation	Nominal, mm ²	Stranding Aluminum- Zirconium Alloy/AMC	Rated Strength, kN	Cross Sectional Area, mm ²		Layers of Aluminum- Zirconium Alloy	Diameter				Complete Cable, mm	Total Mass kg/m
				Aluminum- Zirconium Alloy	Total		Individual Wires		AMC Core, mm			
							Aluminum- Zirconium Alloy, mm	AMC, mm				
300-T16	150	26/7	53.8	150	175	2	2.7	2.1	6.3	17.2	0.501	
336-T16	172	26/7	61.8	172	200	2	2.9	2.3	6.8	18.4	0.573	
477-T16	238	26/7	85.4	238	277	2	3.4	2.7	8.0	21.6	0.793	
556-T16	291	26/7	102.8	291	338	2	3.8	2.9	8.8	23.9	0.967	
636-T16	333	26/19	113.9	332	385	2	4.0	1.9	9.4	25.5	1.101	
795-T16	418	26/19	143.2	418	484	2	4.5	2.1	10.6	28.6	1.384	
954-T13	490	54/19	147.7	490	552	3	3.4	2.0	10.2	30.6	1.576	
1033-T13	525	54/19	158.4	525	591	3	3.5	2.1	10.6	31.7	1.687	
1272-T11	627	51/19	171.3	627	694	3	4.0	2.1	10.6	34.3	1.972	
1351-T13	676	54/19	201.5	676	761	3	4.0	2.4	12.0	35.9	2.172	
1590-T11	806	51/19	220.2	808	894	3	4.5	2.4	12.0	38.9	2.539	

Conversion factors:

1 cmil = 5.067 E – 4.0 mm²

1 in. = 2.54 E + 01 mm

1 lb/1000 ft = 1.488 E + 00 kg/km

1 ft = 3.048 E – 01 m

1 lb = 4.536 E – 01 kg

1 lbf = 4.448 N

5.2 Before stranding, the aluminum-zirconium alloy wire used shall meet the requirements of Specification B941.

5.3 Before stranding, the AMC core wire used shall meet the requirements of Specification B976.

6. Joints

6.1 Electric-butt welds, cold-pressure welds, and electric-butt, cold-upset welds in the finished individual aluminum-zirconium alloy wires composing the conductor may be made during the stranding process. No weld shall occur within 50 ft [15 m] of any weld in the completed conductor (Explanatory Note 3).

6.2 There shall be no joints of any kind made in the finished AMC core wires.

7. Lay

7.1 The length of lay of the various layers of wires in a conductor shall conform to Table 3 (see Explanatory Note 4). These are expressed in values of lay factor.

7.2 In a conductor having multiple layers of Al-Zr alloy wires, the length of lay of any Al-Zr layer shall not be less than the length of lay of the Al-Zr layer immediately beneath it. Similarly, in a conductor having multiple layers of AMC wires