Sterlite

ACSS & GAP
CONDUCTORS

2025

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KEY PARAMETERS & LIMITATION - ACSS DOG CONDUCTOR

OVERVIEW

The ACSS Dog conductor is a specialized variant within the Aluminum Conductor Steel Supported (ACSS) family, engineered to meet the demands of modern high-voltage power transmission. This conductor utilizes fully annealed aluminum strands wrapped around a high-strength steel core, designed to provide superior electrical performance with minimal sag even at elevated operating temperatures. Its enhanced design targets applications where long spans, high ampacity, and durability are critical.

APPLICATION

- Distribution
- Reconductoring
- Renewable Energy Integration

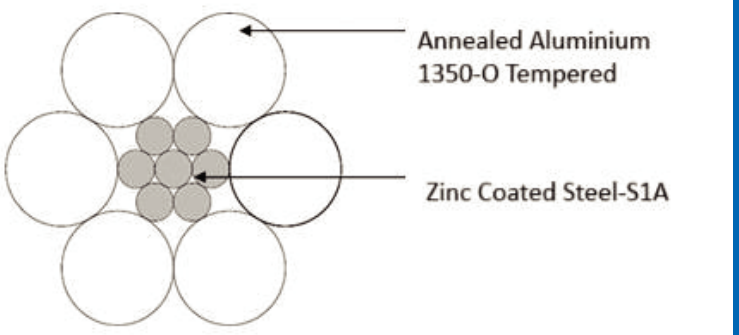
APPLICABLE STANDARDS

IEC 63248, IEC 60888, IEC 62641, BS EN 50540/ASTM B856, ASTM B 609 Standards.

TECHNICAL PROPERTIES

Conductor	ACSS DOG (207 kcmil)	
Total Sectional Area	118.53 mm^2	0.1837 in^2
Aluminum sectional area	104.98 mm^2	0.1627 in^2
Composite Core sectional area	13.55 mm^2	0.021 in^2
Construction/Stranding details		
No.of Aluminum wires & diameter	6 Nos. x 4.72 mm	6 Nos. x 0.186 in
No. of Steel wires & diameter	7 x 1.57 mm	7 x 0.062 in
Overall diameter	14.15 mm	0.56 in.
Weight	0.394 kg/m	0.265 lb/ft
Rated strength of Conductor	24.21 kN	5443 lbs
Rated strength of Core	18.16 kN	4083 lbs
DC Resistance @ 20°C (68°F)	0.2600 Ω/Km	0.4184 Ω/mile
Current Capacity @ 180°C (356°F)	590 A	
Current Capacity @ 200°C (392°C)	627 A	
Max. Operating Temperature	180 °C	356 °F
Direction of lay	Right hand	
Coefficient of thermal expansion	19.42 x 10^{-6} /°C	10.79 x 10^{-6} /°F
Final modulus of elasticity	69.67 Gpa	10104.8 ksi

Note:- Current capacity based on referenced conductor temperature, 0.6 m/s (2 ft/s) wind, 0 m (0 ft) Elevation, 0.5 Emissivity, 0.5 absorptivity, 25 °C (77 F) Ambient temperature, 1033 W/m^2 (96 w/ft2) solar radiation.



Key Features/PRO's

- High Ampacity and Low Sag: The conductor is optimized for operation at higher temperatures while maintaining low thermal expansion, ensuring minimal sag and consistent ground clearance over long spans.
- Enhanced Electrical Conductivity: Fully annealed aluminum strands offer lower electrical resistance, leading to reduced energy losses and improved transmission efficiency.
- Robust Mechanical Strength: The high-strength steel core provides excellent mechanical support, enabling the conductor to withstand environmental stresses such as wind, ice, and thermal cycling.
- Improved Durability and Corrosion Resistance: Advanced material treatments and design features enhance the conductor's resistance to corrosion and mechanical fatigue, contributing to a longer service life.
- Improved for current carrying capacity: It is designed to transmit higher ampacity than the existing conductors, making it ideal for upgrading existing lines.

Limitation/CON's

- Higher Initial Cost: More expensive than ACSR due to the use of fully annealed aluminum.
- Increased Installation Complexity: Requires specialized tools and handling techniques due to softer aluminum strands.
- Reduced Tensile Strength: The fully annealed aluminum strands have lower tensile strength, making the conductor more dependent on the steel core for mechanical properties.

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KEY PARAMETERS & LIMITATION – ACSS/TW SUWANNEE

OVERVIEW

The ACSS/TW Suwannee (Aluminum Conductor Steel Supported Trapezoidal Wire) Suwannee conductor is a high-efficiency transmission conductor that combines the benefits of ACSS (Aluminum Conductor Steel Supported) with a trapezoidal wire (TW) design. The TW design allows for a more compact conductor, increasing the aluminum content for enhanced current carrying capacity while maintaining the same diameter as a standard round-wire conductor.

A zinc-5% aluminum-mischmetal (Zn-5Al-MM) alloy coating is used on the steel core wire for enhanced corrosion protection and heat resistance compared to galvanized steel.

APPLICATION

- Medium Voltage, High-Voltage & Extra High-Voltage Transmission Lines
- Overhead Power Lines in Urban and Rural Areas
- Power Distribution Networks
- Renewable Energy Projects
- Extreme Weather Conditions

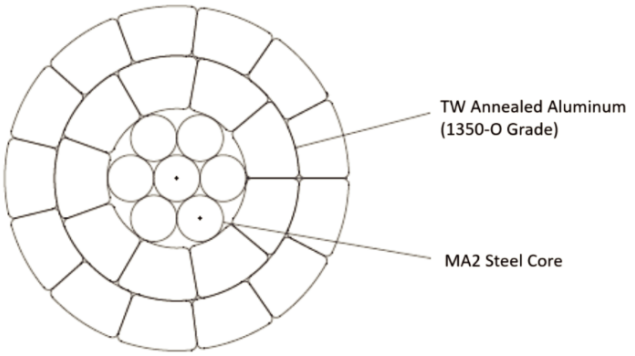
APPLICABLE STANDARDS

BS EN 50540, ASTM B 609, ASTM B857, ASTM B802/IEC 63248 Standards.

TECHNICAL PROPERTIES

Conductor	ACSS/TW SUWANNEE (960 kcmil)	
Total Sectional Area	565.3 mm²	0.8762 in²
Aluminum sectional area	486.2 mm²	0.7536 in²
Composite Core sectional area	79.1 mm²	0.1225 in²
Construction/Stranding details		
No.of Aluminum wire & *Equivalent diameter	22 Nos. x 5.305*mm	22 nos. x 0.2088*in
No. of Steel core wires & diameter	7 x 3.792 mm	7 x 0.149 in
Overall diameter	28.19 mm	1.11 in.
Weight	1.9597 kg/m	1.317 lb/ft
Rated strength of Conductor	136.56 kN	30700 lbs
Rated strength of Core	109.1 kN	24527 lbs
DC Resistance @ 20°C	0.0564 Ω/Km	0.0907 Ω/mile
Current Capacity @ 210°C (410 °F)	1710 A	
Max. Operating Temperature	210 °C	410 °F
Direction of lay	Right hand	
Coefficient of thermal expansion	18.93 x 10^{-6} /°C	10.52 x 10^{-6} /°F
Final modulus of elasticity	77.2 Gpa	11197 ksi

Note:- Current capacity based on referenced conductor temperature, 0.56 m/s (1.84 ft/s) wind, 0 m (0 ft) Elevation, 0.45 emissivity, 0.80 absorptivity, 45°C (113 F) Ambient temperature, 1045 W/m² (97.08 w/ft2) solar radiation



Key Features/PRO's

- Higher Ampacity & Low Sag: Can operate at temperatures up to 250°C, allowing for increased current capacity without significant sag.
- Enhanced Conductivity: Uses fully annealed aluminum strands, which have lower electrical resistance compared to ACSR, improving efficiency.
- Compact Design for Increased Aluminum area: The trapezoidal wire (TW) shape allows for more aluminum in the same diameter, improving current carrying capacity.
- Reduced Line Losses: The increased aluminum content results in lower resistance and reduced power losses during transmission.
- Improved Corrosion Resistance: The fully annealed aluminum strands and Zinc-5 % aluminium coated steel (MA2) core enhance durability in harsh environmental conditions.
- Longer Service Life: Less prone to mechanical fatigue and vibration-induced damage, resulting in extended operational life.

Limitation/CON's

- Higher Initial Cost: More expensive than standard ACSR due to the specialized trapezoidal wire design and fully annealed aluminum strands.
- Complex Installation & Handling: Requires trained personnel and specialized tools for installation due to its increased flexibility and different wire shape.

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KEY PARAMETERS & LIMITATION –GTACSR-568 mm² (GAP)

OVERVIEW

GTACSR-568 mm2 is GAP type Thermal resistant Aluminum alloy Conductor Steel Reinforced, specially designed for Re-Conductoring of existing ACSR Conductor for 400kV transmission line. Gap-type aluminum conductor steel reinforced (GTACSR) designed with Thermal/heat-resistant aluminum alloy (AT1 Type) with both Round and Trapezoidal shape wire over a Zinc coated steel core (S4A Grade).

A small annular Gap is maintained between a high-strength steel core and the first layer of aluminum alloy strands. The gap between the first layer trapezoidal shaped aluminum strands and the steel core is filled with high thermal resistant grease.

At the time of sagging, the tension is applied to the steel core by a special stringing method. As a result of lesser thermal expansion of steel core, the sag is limited at high temperatures.
Tension on the core and the external layer acts independently to have the knee-point at the installation temperature.

APPLICATION

- Reconductoring Transmission line. (Uprating)
- Medium Voltage, High-Voltage Transmission Lines.
- Utilities & Power Distribution Networks
- Renewable Energy Integration

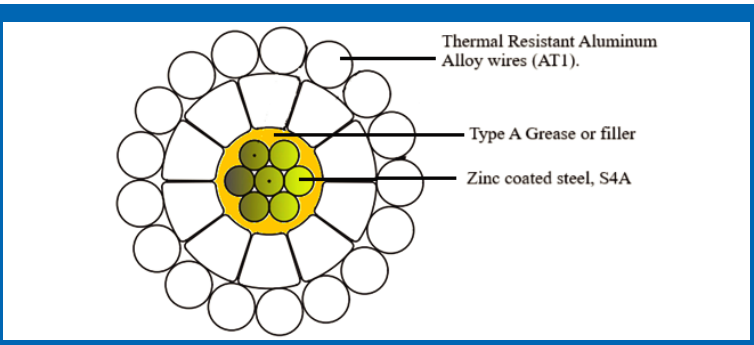
APPLICABLE STANDARDS

IEC 62420, IEC 62641, ASTM B957, IEC 63248 & IEC 61394 standards.

TECHNICAL PROPERTIES

Conductor	GTACSR-568 mm² (GAP) (1120 kcmil)	
Total Sectional Area	567.56 mm²	0.880 in²
Aluminum sectional area	521.32 mm²	0.808 in²
Composite Core sectional area	46.24 mm²	0.0717 in²
Construction/Stranding details		
No.of Aluminum wire & layer	27 / 2-Layer	27 / 2-Layer
No. of Steel core wires & diameter	7 x 2.90 mm	7 x 0.114 in
Overall diameter	30.15 mm	1.187 in.
Weight	1.823 kg/m	1.225 lb/ft
Rated strength	137.59 kN	30931 lbs
DC Resistance @ 20°C	0.05551 Ω/Km	0.0893 Ω/mile
Current Capacity @ 150°C/302°F	1410 A	
Max. Operating Temperature	150 °C	302 °F
Direction of lay	Right hand	
Coefficient of thermal expansion	20.3 x 10^{-6} /°C	11.28 x 10^{-6} /°F
Final modulus of elasticity	66 Gpa	9572.5 ksi
Grease/Filler type	High Temp Grease (Type -A)	

Note:- Current capacity based on referenced conductor temperature, 0.56 m/s (1.84 ft/s) wind, 0 m (0 ft) Elevation, 0.45 emissivity, 0.80 absorptivity, 45°C (113 F) Ambient temperature, 1045 W/m² (97.08 w/ft2) solar radiation.



Key Features/PRO's

- Enhanced thermal Performance /Efficiency: Withstand higher temperatures, allowing for Higher operation temp./ environments without significant loss of strength or sag.
- Higher operating temperature: Can operate at continuous temp. up to 150°C, maintaining the mechanical strength of the conductor.
- Higher current carrying capacity: Significantly higher the current-carrying capacity (i.e., 1.6 times) than the equivalent size of ACSR conductor.
- Cost effective solution: Can be used to increase the capacity of existing overhead lines by simply replacing the existing conductors, without requiring significant modifications to existing towers or structures.
- Ideal for Reconductoring (uprating lines): No modification or reinforcement required for existing towers.
- Reduced Sag: Low Sag at high temperatures & Low thermal knee point
- Life span: Can be Deployed in Existing Structures or can reduce strain on structures, increasing life.

Limitation/CON's

- Higher Initial Cost: GTACSR conductors are typically more expensive than conventional ACSR conductors
- Specific Design Considerations: require careful design and installation to ensure proper operation and longevity.
- Limited Flexibility: less flexible than ACSR conductors, which can make them somewhat difficult to install in certain situations.
- Installation Complexity: -The unique shape may require more complex installation techniques and special fittings.

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KEY PARAMETERS & LIMITATION –GzTACSR MATTHEW (Non-Specular)

OVERVIEW

GzTACSR MATTHEW (Non-Specular) is GAP type Super Thermal resistant Aluminum alloy Steel Reinforced conductor, designed for high-performance power transmission conductor designed to operate at high temperatures with minimal sag.

It consists of Super Thermal/heat-resistant aluminum alloy (AT3 Type) with all Trapezoidal shape wire over an Ultra high strength Zinc coated steel core. Trapezoidal shape (TW) wires enable a more compact alignment of the aluminum wires & helps to increase the surface area for a better current -carrying capacity.

A small annular Gap is maintained between an Ultra high-strength steel core and the first layer of aluminum alloy strands. The gap between the first layer trapezoidal shaped aluminum strands and the steel core is filled with high thermal resistant grease. At the time of sagging, the tension is applied to the steel core by a special stringing method. As a result of lesser thermal expansion of steel core, the sag is limited at high temperatures.

APPLICATION

- Reconductoring Transmission line. (Uprating)
- Medium Voltage, High-Voltage, EHV Transmission Lines.
- Long span crossings: Ideal for river crossings, valleys, and mountainous terrains
- Renewable Energy Integration

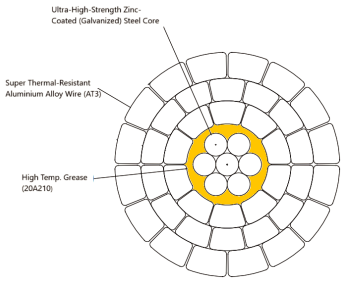
APPLICABLE STANDARDS

IEC 62004/IEC 62641, ASTM B957 / IEC 63248, ASTM B 979, IEC 62420 & BS EN 50326 standards.

TECHNICAL PROPERTIES

Conductor	GzTACSR MATTHEW (Non-Specular) (1224 kcmil)	
Total Sectional Area	676.3 mm²	1.048 in²
Aluminum sectional area	620 mm²	0.961 in²
Steel Core sectional area	56.3 mm²	0.087 in²
Construction/Stranding details		
No.of Aluminum wire & layer	40/ 3-Layer	40/ 3-Layer
No. of Steel core wires & diameter	7 x 3.20 mm	7x 0.126 in
Overall diameter	31.50 mm	1.240 in.
Weight (including grease weight)	2.186 kg/m	1.469lb/ft
Rated strength	178.0 kN	40016 lbs
DC Resistance @ 20°C	0.0478 Ω/Km	0.0769 Ω/mile
Current Capacity @ 210°C (410 °F)	1923 A	
Max. Operating Temperature	210 °C	410 °F
Direction of lay	Right hand	
Coefficient of thermal expansion	20.25 x 10^{-6} /°C	11.25 x 10^{-6} /°F
Final modulus of elasticity	66.24 Gpa	9607 ksi
Grease/Filler type	High Temperature Grease (20A210)	

Note:- Current capacity based on referenced conductor temperature, 0.56 m/s (1.84 ft/s) wind, 0 m (0 ft) Elevation, 0.45 emissivity, 0.80 absorptivity, 45°C (113 F) Ambient temperature, 1045 W/m² (97.08 w/ft²) solar radiation



Key Features/PRO's

- Higher operating temperature: It can operate continuous temp. up to 210 °C, maintaining the mechanical strength of the conductor.
- Higher current carrying capacity: Trapezoidal shape (TW) wire Significantly higher the current-carrying capacity (i.e., 2 times) than the equivalent size of ACSR conductor.
- Ideal for Reconductoring (uprating lines): No modification or reinforcement required for existing towers.
- Reduced Sag: Low Sag at high temperatures & Low thermal knee point.
- Life span: Can be Deployed in Existing Structures or can reduce strain on structures, increasing life.
- Non-Specular (Dull) surface finish improved emissivity & allows the conductor to become less visible when observed from a distance and enables the transmission line to blend in with the skyline or landscape background.
- Enhanced corrosion resistance & service: Grease-filled gap reduces stress on the aluminum strands, leading to lower fatigue and longer durability.

Limitation/CON's

- Higher Initial Cost: GZTACSR conductors are typically more expensive than conventional ACSR conductors.
- Specific Design Considerations: require careful design and installation to ensure proper operation and longevity.
- Complex Installation Process: Requires trained personnel and specialized tools for proper installation and handling.