



Aluminium Clad Steel wire
The new age Technology

DEORA
WIRES N MACHINES (P) LTD.

INTRODUCTION

"DWMP" is the industry leader in the field of power transmission. The Company has proved over time its ability to adapt to the very latest in technology and innovation. We have laid a solid foundation of producing high quality products dealing with world class equipment, supported by highly qualified and experienced team of engineers and production staff since the last 40 years. We are one of the leading manufacturers of Aluminum and Copper wire in India, and subsequently Asia.

"Customer Satisfaction is the basic denominator of our corporate creed; the company has always given its best while trying to achieve client expectation. This has only been possible by harnessing the technical/engineering expertise of qualified & experienced professionals who are relentless in their commitment to excel."

The Company is well equipped and aspires to face new challenges in product breakthrough's and application. We constantly strive to master newer, more complex configurations and combinations of cable and conductors. These require variation and newer assemblies of machinery. Time and over again we have achieved this goal and ambition of ours.



PIONEER IN ACS-WIRE

"DWMP" is the first Aluminum clad Steel (ACS) wire company in India. ACS wire consists of high strength steel core and a high conductivity corrosion resistance Aluminum outer layer which are metallurgically bonded with continuous pressure Cladding technology.

Its unique combination of high mechanical strength, efficient electrical conductivity, lighter weight and superior corrosion resistance has made ACS wire the 'Preferred material' in the broad range of utility communication and Industrial application world wide.

- Overhead Ground Wire for Power Transmission
- Optical Fiber Included Ground Wire
- Core Wire for ACS
- Distributor conductor

PRODUCT RANGE

- ACSR CONDUCTOR
- AA CONDUCTOR
- AAA CONDUCTOR
- LT CABLE
- HT CABLE
- CONTROL CABLE
- EARTH WIRE

DEORA
WIRES N MACHINES (P) LTD.

www.deoragroup.com

What is ACS?

ACS = (Aluminium Clad Steel) is a high strength steel wire with a thick aluminium coating.

Aluminium Clad Steel ("ACS") wire consists of a central steel core with a layer of high conductivity aluminium extruded over it. The aluminium layer forms a seamless metallurgical tie with the steel wire to guarantee permanent bonding during rewinding and stranding.

The aluminium layer thickness is atleast 10% of the wire radius and approximately 25% of the cross-sectional area. Conductivity is proportional to the aluminium layer thickness. Conductivities ranging from 20% to 40% IACS are available.

Conductivity	Tensile Strength
20.3% IACS	1,340 N/mm ² min.
27% IACS	1,080 N/mm ² min.
30% IACS	880 N/mm ² min.
40% IACS	680 N/mm ² min

ASTM B52 - 10

ASTM B52-10 (2007) ASTM Standard specification for Aluminum-Clad Steel Wire, Aluminum Conductors, Aluminum-Clad Steel Reinforced.

ASTM B52 - 10

This specification covers round, aluminum-clad steel core wire used for mechanical reinforcement in the manufacture of aluminum conductors, aluminum-clad steel reinforced. The base metal shall be steel produced by the open earth, electric furnace, or basic-oxygen.

Aluminium Clad Steel cable is well known for its combination of corrosion resistance, high strength and superior electrical conductivity. These properties make it an excellent choice either as overhead static wire (ground wire, "OPGW") It can also be used as core in ACSR conductors.

For high frequency applications where the "skin effect" is an important factor, for example lighting faults, the conductivity of ACS approaches 100% of aluminium because the highest electrical current density is concentrated on the external part of the conductor.

Advantages of ACS wire

- Higher mechanical tensile strength
- Higher tensile strength
- Higher conductivity
- Reduction of performance losses
- Less weight
- Less sag
- Retains strength at High Temperature



PERFORMANCE OF ACS WIRE

Min. Thickness of Aluminum Coating

Code	Min. Thickness of Aluminum Coating	Code	Min. Thickness of Aluminum Coating
DG 14	5% of AS wire nominal diameter	DG 27	14% of AS wire Nominal diameter
DG 20	8% of AS wire nominal diameter (When diameter is less than 1.8mm)	DG 30	15% of AS wire Nominal diameter
	10% of AS wire nominal diameter (When diameter is not less than 1.8mm)	DG 35	20% of AS wire Nominal diameter
DG 23	11% of AS wire Nominal diameter	DG 40	25% of AS wire Nominal diameter

Density, Section Ratio of Aluminum and Steel, weight Ratio of Aluminum and Steel



ACS WIRE (1.5mm TO 4.7mm)



ACS WIRE (3X3.5mm)



ACS WIRE (7X3.00mm)



ACS WIRE (Conductors)



ALUMINIUM Conductor with ACS Wire

ACS – Aluminum-Clad Steel Compared to Aluminum High conductivity

Compared to solid aluminum wire of the same diameter, ACS has a conductivity of 33 percent. For high frequency applications where "skin effect" is a factor, e.g. lightning faults, the conductivity of ACS approaches 100 percent of that of solid aluminum, at a fraction of the cost. When is combined with aluminum wires in composite conductors, a wide range of strength and conductance characteristic is possible.

Corrosion Resistance Means Long and Reliable Performance.

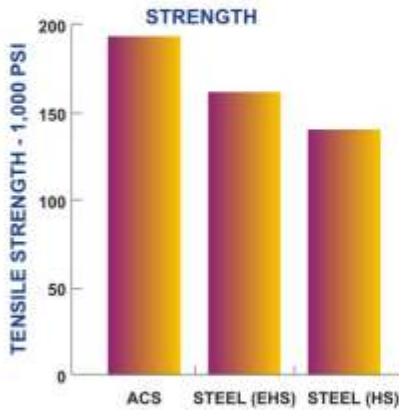
The thick aluminum cladding of ACS percent of the wire radius - provides a high degree of corrosion resistance, resulting in longer service life and reduced maintenance. ACS offers corrosion resistance comparable to EC grade aluminum wires under many different types of corrosive conditions. This fact has been proven true by accelerated laboratory tests simulating industrial, marine, and tropical atmospheres. In addition to the tests, ACS has proven itself as an electrical conductor in many utility installations; some in space for as long as 40 years.

Combines High Strength with Low Weight.

ACS has a higher strength-to-weight ratio than other wires commonly used on overhead lines. It has eight times the strength of solid aluminum wire of the same diameter and only a little more than twice the weight. This high strength – to-weight ratio provides a maximum margin of safety for long-span construction. And the high strength of ACS's steel core is permanently protected by its thick aluminum covering.

TENSILE STRENGTH AND RESISTIVITY

Tensile Strength and Resistivity

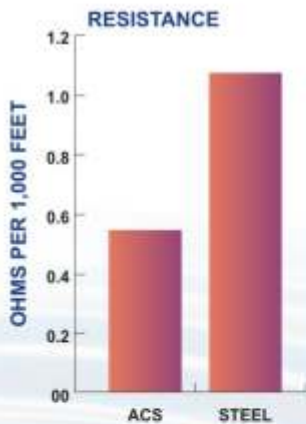
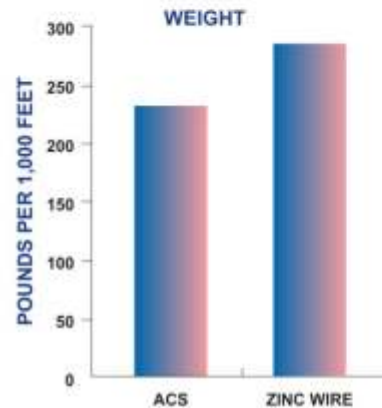


Strength Comparable to steel

In addition to superior conductivity and corrosion resistance, ACS strand also equal to or greater than other overhead ground wires. Figure 2 below compares the ACS to that of various grades of steel strand. Tensile strengths of the individual commonly used sizes of ACS approach 200,000 pounds per square inch. Where for overhead ground wire, this high strength permits smaller sags, increased mid-sp and greater safety under storm loading conditions.

Light weight

Directly related to strength and sag performance is the lighter weight of ACS thick cladding of aluminum, ACS is 15 percent lighter than a steel strand of lighter weight, combined with high strength, permits ACS strands to be strung as steel with correspondingly lower tensions and lower stresses on the towers or such structures.



Excellent Conductivity

Due to a thick aluminum cladding, ACS overhead ground wire provides one-t conductivity of an aluminum conductor of equal size, and several times the conduct ACS product is tested for resistivity, a practice not generally used for steel. Electrical properties in ACS overhead ground wires.

These properties are maintained throughout the life of the line, as contrasted to the wires with other protective coatings which can deteriorate over time. Such deteriorate reduce the already low conductivity of steel overhead ground wires.

Sag Data

ACS overhead ground wires may be sagged to provide the proper mechanical lightning protection for any power conductor. Refer to the National Electrical Safety specifications for all three loading district in the United States. Such data is present maximum everyday stress limits specified by this code, and will provide minimum

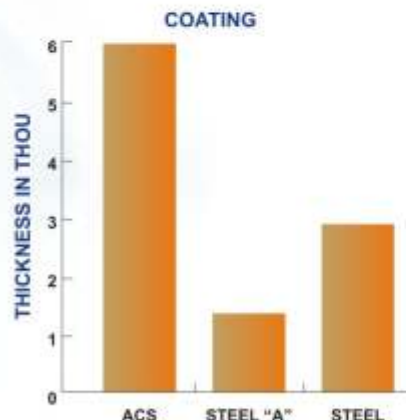
Also available are special data based on lower everyday stress limits. These call for correspondingly lower tensions which may add certain economies to the line design.

Corrosion resistance

Numerous laboratory and field tests confirm the excellent corrosion resistance of all its strength and conductivity are permanent in any atmosphere where aluminum is especially those known to be corrosive from industrial or atmospheric conditions.

This assurance against corrosion is obtained through the applications of a thick cover aluminum which provides a substantial barrier of protective metal. This minimum d ACS is ten percent of the radius of the wire. The cladding has a continuous, bond to the steel core and will not crack or flake. In fact, damage to the cladding by be sever to expose the steel core.

On the other hand, thin protective coatings like those found in aluminized steel can point of steel exposure even by ordinary construction methods; resulting in progress of the coating and eventual rusting of the steel.



www.deoragroup.com



ACS AS WIRE TEST ITEMS AND TEST EQUIPMENTS

Standard of ACS Wire

International Standard:

- IEC 61232-1993 : Aluminium-clad steel wires for electrical purposes.
 ASTM B415 - 98 (2007) : Standard Specification for Hard-Drawn ALuminum-Clad Steel core Wire for Aluminum Conductors, Aluminum-Clad Steel Reinforced

Conductivity

- The conductivity of an aluminum clad steel wire is designed according to the 61% IACS aluminum and 9% IACS steel.
- For example: The following shows the conductivity design of LB30
 $61\% \times 0.43 + 9\% \times 0.57 = 31.36\%$ IACS
- And considering the relative accuracy, the minimum design is 30% IACS. (resistivity: 57.47 nW.m)

Code	DG 14	DG 20		DG 23	DG 27	DG 30	DG 35	DG 40
		A	B					
Conductivity (%IACS)	14	20.3	20.3	23	27	30	35	40



Physical Constant

Code	DG 14	DG 20		DG 23	DG 27	DG 30	DG 35	DG 40
Type	-	A	B	-	-	-	-	-
Final Modulus of Elasticity (GPa)	170	162	155	149	140	132	122	109
Thermal Elongation Coefficient (K ⁻¹ *10 ⁻⁶)	12.3	13.0	12.6	12.9	13.4	13.8	14.5	15.5
Temperature Coefficient (K ⁻¹)	0.0034	0.0036	0.0036	0.0036	0.0036	0.0038	0.0038	0.0040

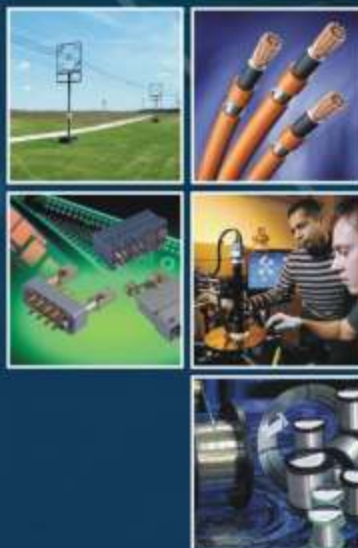
Quality, Testing, Tolerances



- Tensile Strength Tests
- Wrap Tests
- Proof Stress Tests
- Bend Tests
- Torsion Tests
- Hardness Tests

ACS Wire Test Items:

- 1) Surface Quality
- 2) Diameter
- 3) Tensile Strength
- 4) Elongation at break
- 5) Torsion
- 6) Resistivity
- 7) Minimum Thickness of Aluminum Coating
- 8) Stress at 1% Elongation



w w w . d e o r a g r o u p . c o m





Regd. Offices:

“DEORA AVENUE” Mithakhali Six Road, Navarangpura,
Ahmedabad - 380 009, Gujarat - India.

Ph.: +91-79-26440794, 26565415, 26560417 • Fax: +91-79-26425082

Email: contact@deoragroup.com

Website: <http://www.deoragroup.com>

www.deoragroup.com