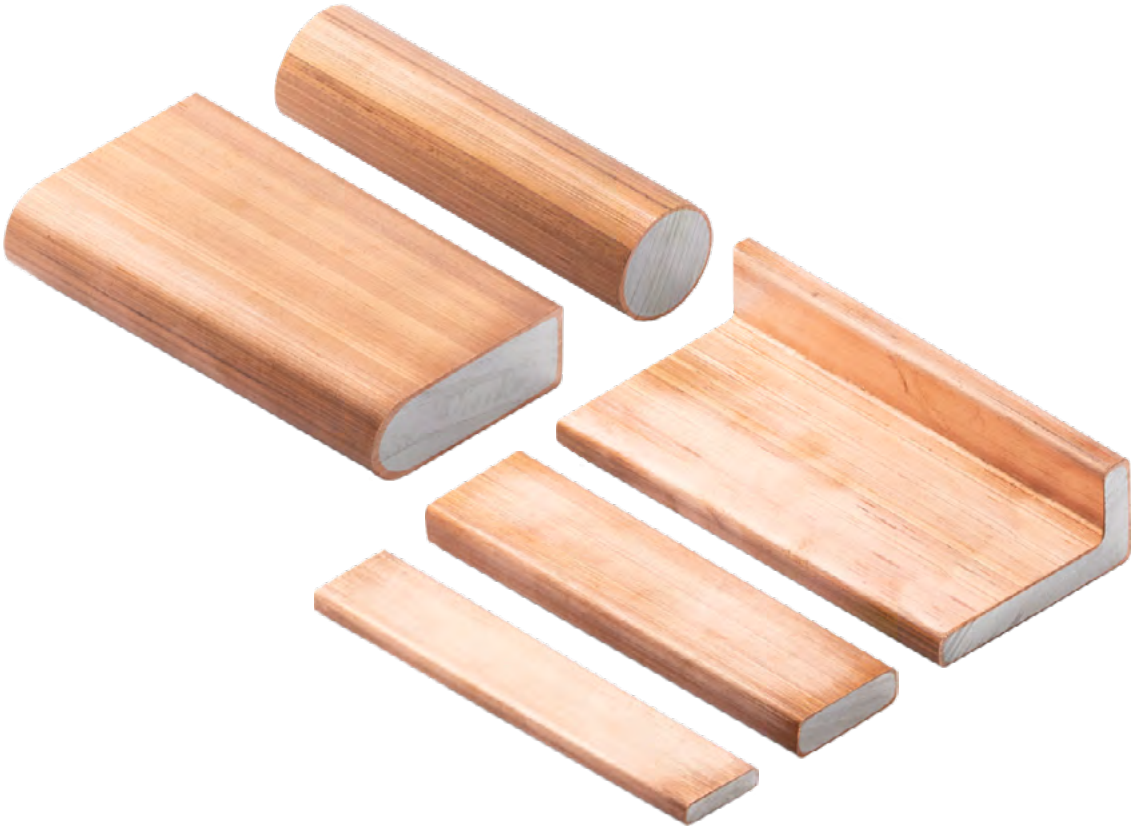
VDM Metals

A company of ACERINOX

Cuponal



Copper-clad aluminum bimetal material

Tough demands are our business

VDM Metals was founded in 1930 and is today part of the Acerinox Group, a global leader in high-performance metallic materials. With its offering, VDM Metals covers a very wide range of materials and services for numerous industries.

VDM Metals produces nickel alloys and special stainless steels with unique mechanical, physical and corrosion properties. The quality of the strips, sheets, bars, wires and powders produced by VDM Metals as well as the associated services is based on integrated production in Germany and the United States plus a worldwide service network. Our passion for research and development and support from our strong application technology help us cater to the most demanding of industrial fields.

VDM Engineered Solutions
The VDM Engineered Solutions unit of VDM Metals offers extensive technical services with custom products of aluminum, copper and copper alloys as well as specialty brass and nickel materials. These services encompass the traditional area of technical project management, advising customers on part development from VDM Metals nickel materials and non-ferrous metals as well as worldwide sourcing and range from quality management all the way to logistics. VDM Metals supports customers in creating custom parts and standard parts, whether in small series or mass production – from the initial sample test report to order-picking and shipping. Engineered Solutions also deals worldwide in the above-mentioned non-ferrous metals.

Exclusive sales partnership
VDM Engineered Solutions is the exclusive sales partner of Hydrostatic Extrusions Ltd., headquartered in Perth, Scotland. This company is part of the globally active Bruker Corporation. Hydrostatic Extrusions Ltd. has decades of experience in hydrostatic extrusion and is a leading producer of electrical conductors of copper-clad aluminum (CCA). Under the brand name of Cuponal, Hydrostatic Extrusions Ltd. supplies bimetal busbars, bars, profiles and wires with a seamless, highly conductive copper outer coating combined with an aluminum core in electrical quality.

As an exclusive sales partner for Cuponal – the copper/aluminum compound material for demanding applications – VDM Engineered Solutions is the only provider of this proven material in the German-speaking world and is also your contact in the Benelux region. We also sell this material in France and Taiwan.

Hydrostatic extrusion
Hydrostatic extrusion is a demanding production process for creating special metal composites. In this extrusion process, an aluminum core is joined with the copper shell to form a component material under high pressure and with oil as the force transmitter.

Cuponal

Cuponal is a copper-clad aluminum bimetal material. With hydrostatic extrusion, the electroconductive aluminum core is permanently joined with a seamless external layer of highly conductive copper.

Cost effectiveness
Thanks to the material ratio of the solid aluminum core to the thinner external layer made of copper, Cuponal offers huge benefits in terms of cost effectiveness. Due to the raw material price itself, the high ratio of aluminum delivers substantial cost savings compared with a product made of copper alone. The lower ratio of copper in the composite results in additional savings, allowing for better calculation of planning costs and reducing storage costs for the semi-finished product significantly.

Material benefits
Cuponal is made of 15% copper by volume in its standard version. The copper cladding has a purity level of > 99.9%. The aluminum core has a purity level of > 99.7%. Despite the larger cross-section required, Cuponal products are lighter than products made of copper alone, yet they offer the same electrical conductivity, making them an equivalent substitute for previous components. The thermal short-circuit strength is similar to that of copper.

Processing
Cuponal features very good workability. Similar to busbars made of pure copper, the material can be processed ideally by means of drilling, bending, stamping, cutting, etc.

Safety
Cuponal has proven itself as a versatile material in the electronics industry and is certified internationally by various institutes.

Properties of Cuponal busbar material

Property	Units	H C Copper		Cuponal	Aluminum		
		Annealed	1/2 Hard	15%	M EIE (EC)	H2 EIE (EC)	TF E91E(6101)
0.1 %-proof stress	MN/m^2	62	108-186	*	-	-	163
0.2 %-proof stress	MN/m^2	78	108-186	†	-	-	170
Min. ultimate tensile	MN/m^2	217	235-300	130-170	60	85	200
Modus of elasticity	MN/m^2	95×10^3	120×10^3	85×10^3	69×10^3	69×10^3	65×10^3
Density at 20°C	kg/m^3	8.89×10^3	8.89×10^3	3.63×10^3	2.70×10^3	2.70×10^3	2.70×10^3
Max.electrical resistivity at 20°C	≤ m	1.724×10^{-8}	1.777×10^{-8}	2.65×10^{-8}	2.826×10^{-8}	2.826×10^{-8}	3.133×10^{-8}
Max.electrical conductivity at 20°C	1/≤/m	58×10^6	56×10^6	37.7×10^6	35.4×10^6	35.4×10^6	31.9×10^6
	%IACS	100	97	65	61	61	55
Temp. coefficient of resistance at 20°C	1/°C	3.93×10^{-3}	3.93×10^{-3}	4.01×10^{-3}	4.03×10^{-3}	4.03×10^{-3}	3.64×10^{-3}
Coeff. of linear thermal expansion 20-100°C	1/°C	17×10^{-6}	17×10^{-6}	21.9×10^{-6}	23×10^{-6}	23×10^{-6}	23×10^{-6}
Melting point	°C	1,083	1,083	658	658	658	600-650
Specific heat	J/kg/°C	393.5	393.5	711.7	921.1	921.1	879.2
Thermal conductivity	$W/m^2/°C$	3.85×10^6	3.85×10^6	2.38×10^6	2.22×10^6	2.22×10^6	1.80×10^6

* 0.1% proof stress = 70% of ultimate tensile strength
† 0.2% proof stress = 70% of ultimate tensile strength

Physical properties of Cuponal wire

Property	Units	Annealed	Hard Drawn
Density at 20°C	kg/m^3	3.63×10^3	3.63×10^3
Max. electrical resistivity at 20°C	Ohm m	2.65×10^{-8}	2.67×10^{-8}
Max. electrical conductivity at 20°C	1/Ohm m	37.7×10^5	37.45×10^6
	%IACS	65.0	64.6
Temp. coefficient of resistance at 20°C	1/°K	4.01×10^{-3}	4.01×10^{-3}
Min. ultimate tensile strength	N/mm^2	130	207
Modulus of elasticity	N/mm^2	85×10^3	–
Coefficient of linear thermal expansion (20-100°C)	1/°K	21.9×10^{-6}	21.9×10^{-6}
Melting Point (Aluminium Core)	°C	658	658
Specific Heat	J/kg/°K	711.7	711.7
Thermal Conductivity	W/m2/°K	2.38×10^6	–

Product portfolio

1

2a

2b

3

As a long product, the material Cuponal is offered as profiles as well as wire. Standard Cuponal products have a nominal copper cladding of 15% by volume (37 wt.-%).

1: Rounded and sharp-edged profiles
We offer Cuponal as a rounded profile and sharp-edged profile in the following dimensions as standard:

Standard length:	4,000 mm
Maximum length:	6,000 mm
Width range:	10 – 120 mm
Thickness range:	3 – 15 mm
Diameter:	< 40 mm
Surface area:	20 – 1,260 mm²

2a and 2b: D and L profiles
As special shapes, we offer D and L profiles. We can also produce additional profile shapes on customer request. Simply contact us regarding your specific requirements.

3: Wire and bars
Bars are available in various dimensions up to 40 mm diameter. As wire, we offer Cuponal in the diameters 2 – 8 mm, 10 mm and 12 mm as standard sizes. Other dimensions as well as fine wires can also be produced on customer request. Contact us.

Applications

Cuponal products are suitable anywhere that solid copper is typically used. The applications run from low voltage through to medium and high voltage.

Electronics and electrical engineering
In the electronics industry and electrical engineering, the material is used in a wide range of applications, for example, as an electrical connection in busbars for various rated currents, busbar trunking systems, control cabinets, power switching stations, rectifiers and distributors.

Railroad technology
In railroad technology, Cuponal products are used in traction systems, as a connection element in wagon construction and as a ground conductor.

Automotive manufacturing
When it comes to electromobility, Cuponal's low weight has made it an essential part of motors and control units in the automotive industry, for example.

Building construction
Cuponal is also used in lightning rods on buildings.

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