

Cold-rolled steel strip with electromagnetic characteristics

Supermod[®], Ultramod[®], Extramod[®] and ARMCO[®] pure iron



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Not only in the continuously growing field of electromobility, do markets demand ever newer, adapted materials and components to solve customer-oriented problems.

The product family Supermod®, Ultramod®, Extramod® from the BILSTEIN Group and ARMCO® pure iron is suitable as a cold-strip solution in many applications where soft magnetic properties are required.

Below is an overview of the various possible uses:

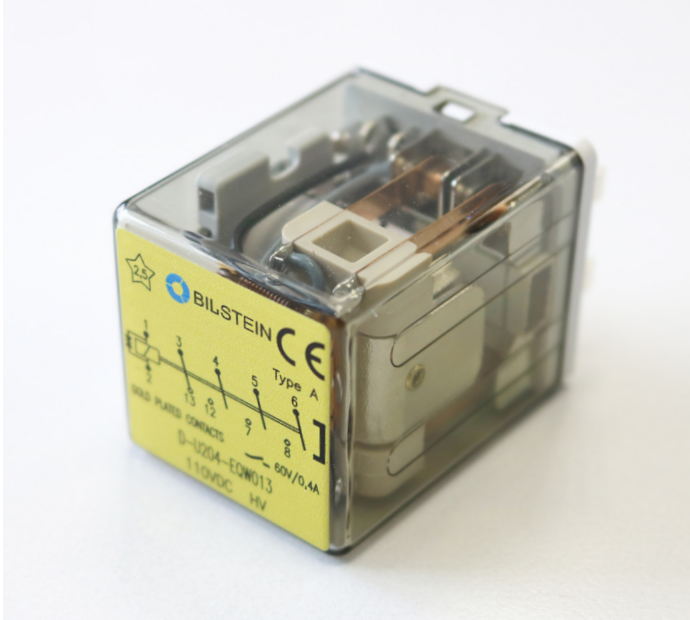
- Electromagnetic applications:
Electromagnets, particle accelerators, magnetic yokes
- Control and regulation technology:
DC relays, pressure regulators, valves etc.
- Electrical components:
magnet housing, stator laminations etc.
- Magnetic shielding:
e.g. for cable connections, MRT's and CRT's ...
- Soft metal seals

Due to the flexible manufacturing process, the electromagnetic properties can be adjusted between around 50 and 250 A/m for further direct use.

The materials Supermod®, Ultramod®, Extramod® and ARMCO® pure iron, close the gap between classic cold-strip and electrical strip and are flexible in terms of dimensions and quantities, both qualitatively and economically.

The grades developed by BILSTEIN already have good electromagnetic properties in the delivered condition and thus enable direct parts production without subsequent annealing treatment. The grades Supermod®, Ultramod®, Extramod® correspond in all essential points to a DC 04 according to the requirements of DIN EN 10139 and DIN EN 10140.

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ARMCO® is a registred Trademark of Cleveland-Cliffs Inc. USA



CHEMICAL COMPOSITION

Mass fraction in %						
Grade	C ≤	Si ≤	Mn ≤	P ≤	S ≤	Al ≤
Extramod®	0,05	0,050	0,30	0,02	0,015	0,08
Supermod®	0,04	0,040	0,28	0,02	0,012	0,08
Ultramod®	0,003	0,040	0,30	0,015	0,012	0,005
ARMCO® pure iron	0,006	0,015	0,10	0,008	0,005	0,008

MECHANICAL PROPERTIES

Grade	YS Mpa*	UTS Mpa*	Elongation % min. *
Extramod®	170	300	≥ 40 %
Supermod®	145	260	≥ 40 %
Ultramod®	120	250	≥ 40 %
ARMCO® pure iron	130	240	≥ 40 %

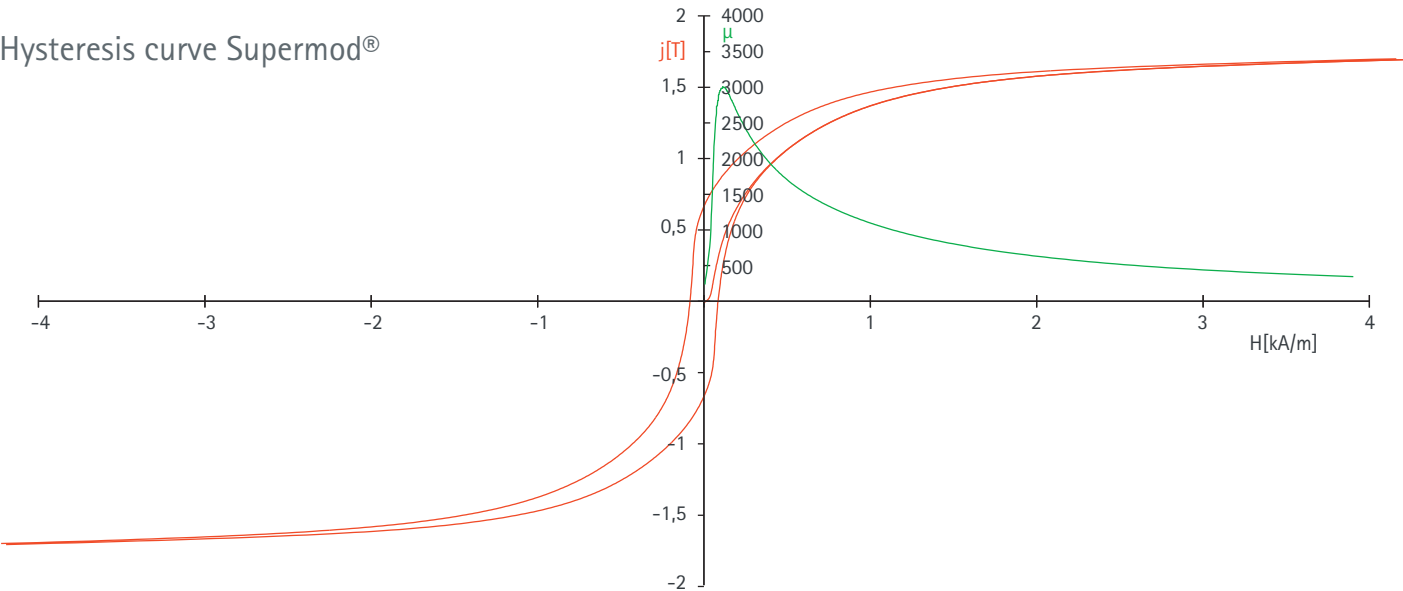
*Benchmarks

ELECTROMAGNETIC PROPERTIES

Grade	Coercive Force Hc (A/m)	Remanence Br (μT)*	Saturation Magnetization Js (μT)*
Extramod®	140 -180	1,7 - 2,1	2,12
Supermod®	65 - 90**	0,7 - 1,1	2,09
Ultramod®	≤ 65	0,65	2,08
ARMCO® pure iron	140 - 180	1,6	2,05
ARMCO® pure iron mod.	≤ 50	0,5	2,05

*Benchmarks **Depending on other technical requirements

Hysteresis curve Supermod®



Application-Characteristics

- **Weldability**
All of the BILSTEIN grades are basically weldable with all common methods. However it must be considered that a modification of the electromagnetic characteristics can occur in areas that have been heated.
- **Surface Quality**
As a standard the BILSTEIN types are delivered with the surface quality MA and the surface finish RM (Ra 09 - 1,6 um). Differing surface qualities and finishes can be arranged upon request.
- **Coating**
The BILSTEIN types are suitable for the application of wet- and powder coatings, as well as electrolytically applied metallic coatings.

Advantages of BILSTEIN grades with soft magnetic characteristics

- Direct use and cost savings due to the elimination of annealing treatments on the component
- Very good cold formability and good weldability
- Variable dimensions and tolerances regardless of the known standards
- Good availability of the starting (raw) material and small batch size in the manufacturing process
- Substitution of turned parts, efficiency due to higher material output by means of cold forming
- Individual adjustment of the material features to the specifications required by the customer

TOLERANCES BILSTEIN

thickness	tolerances
> 0,10 ≤ 0,5 mm	± 0,015 mm
> 0,50 ≤ 1,0 mm	± 0,020 mm
> 1,0 ≤ 1,5 mm	± 0,025 mm
> 1,5 ≤ 2,0 mm	± 0,030 mm
> 2,0 ≤ 2,5 mm	± 0,035 mm
> 2,5 ≤ 3,0 mm	± 0,035 mm
> 3,0 ≤ 3,5 mm	± 0,040 mm
> 3,5 ≤ 4,0 mm	± 0,045 mm
> 4,0 ≤ 5,0 mm	± 0,050 mm

