



RobuSal®800

Air-hardening steels

MATERIALINFORMATIONSLATT (MIB)

MATERIAL No.	1.7734
IMDS NUMBER	84442534
STRENGTH CLASS	D

General information

The Robusal®800 steel grade is not standardized in either hot-rolled or cold-rolled form. This steel belongs to the family of alloyed quenched and tempered steels, which are characterized in particular by very good formability in the soft state (deep drawing properties) and high strength after heat treatment (quenching and tempering), such as a 12CrMoV69. In purely analytical terms, Robusal®800 resembles a 10CrMoV33.

Components made from the material can be heat treated (austenitized) in the furnace under inert gas and then hardened and tempered in natural cooling in air or under inert gas; hence the designation „air-hardening steels“. In addition to carbon and manganese, very good hardenability and tempering resistance are achieved by adding further alloying elements, such as chromium, molybdenum, vanadium, boron or titanium.

The steel has excellent weldability in the soft and air-quenched and tempered condition and in the soft/air-quenched and tempered combination.

Components can be coated well using the usual processes (KTL, conventional or high-temperature zinc coating).

Delivery form

Robusal®800 is supplied as hot strip (in the as-rolled condition, usually pick-

led or n.V. unpickled) in a thickness range ≥ 2.00 mm and ≤ 5.00 mm and as cold strip in thicknesses ≥ 0.80 mm and ≤ 2.60 mm. For the surface finish of the hot-rolled strip, special customer requirements are to be agreed when the order is placed; for cold-rolled strip, surface finish A applies in accordance with DIN EN 10130.

The steel of strength class B is produced as hot-rolled wide strip, strip steel or strip plate (pickled, unpickled) in nominal thicknesses of 2.00 - 5.00 mm and widths of 900 - 1,400 mm. Other dimensions are available upon request.

Deliveries are subject to the conditions of DIN EN 10021 in conjunction with the applicable dimensional standards (DIN EN 10051 for hot-rolled strip, DIN EN 10131 for cold-rolled strip) or special agreements. The test unit is 20 t or per 20 t or part thereof of products of the same steel grade and nominal thickness. For strip material, the test unit is the coil.

Chemical composition

(heat analysis in percent by weight)

	min. in %	max. in %
C	0.07	0.15
Mn	1.60	2.10
Si	0.15	0.40
P		0.020
S		0.010
Al	0.020	0.050
Ti	0.010	
Cr	0.50	1.00
B	0.0015	0.0050
Mo	0.10	0.40
V	0.05	0.15

Mechanical values derived from tensile test along the welding direction (delivery state, soft and untreated)

Cold Strip

$R_{p0.2}/R_{eL}$ in MPa	290 - 420
R_m in MPa	420 - 580

A_{80} in %	≥ 25
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n-value	≥ 0.14
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r-value	0.80 - 1.20
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Hot Strip

R_e in MPa	680 - 980
R_m in MPa	900 - 1,100

A_5 in %	5 - 15
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After air quenching and tempering (i.e. annealing with natural cooling in air or inert gas and subsequent tempering), tensile strengths of up to 1,000 MPa can be achieved with elongation at break values of $A_5 \geq 13$ %. According to ISO 2566/1, this corresponds to A_{50} values of $\geq 7 - 8$ % (depending on the plate thickness).

The characteristic values after quenching and tempering are process- and component-related and are the responsibility of the user. In the soft state, the steel shows an increase in strength when thermally influenced, such as hot-dip galvanizing (increase in yield strength of approx. 80 MPa).





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Microstructure

In the soft as-received condition (hot or cold rolled), RobuSal®800 typically forms a ferritic microstructure with carbonitride precipitates, a small amount of retained austenite and a typical grain size of ≥ 9 ASTM. During hardening, the microstructure of the steel is transferred to the austenitic range by heating, preferably to above 950°C in an inert gas atmosphere. During subsequent cooling in air or inert gas, a martensitic microstructure is formed, resulting in a high-strength component. Subsequent tempering allows residual stresses in the hardened component to be relieved. At the same time, the hardness is reduced in order to achieve the required toughness values.

Forming properties

RobuSal®800 steel combines very high cold-forming capacity in the soft, unhardened condition with high strength and sufficient residual forming capacity in the hard, hardened and tempered condition.

Examples of use

This type of alloyed quenched and tempered steel, in hot- and cold-rolled versions, was developed specifically for the automotive industry, but is also suitable for other applications. The special feature of these steels is that they have very good formability in

the cold-rolled delivery condition, making them suitable for components with complex shapes. Final strength is achieved only after heat treatment with cooling in air or inert gas. These steels have been specially developed to meet the requirements for lighter construction and excellent crash behavior. The mechanical properties of the finished parts allow significant weight savings.

Due to the combination of formability and hardenability, RobuSal®800 is particularly used for welded parts subjected to high static and dynamic loads for load-bearing and safety-relevant components in the automotive industry.

Steel production and the manufacture of hot-rolled and cold-rolled strip are carried out at Salzgitter Flachstahl's plants. In addition, HF-welded precision tubes (alternatively, laser-welded tubes [single tubes] will also be available in the future) can be produced from the strip in accordance with EN 10305-2 or EN 10305-3 in the Group's own subsidiaries. In this case, the customer receives flat material and tubes in identical composition and virtually from a single source.

These tubes are particularly suitable for hydroforming applications, where even the most complex parts can be produced without intermediate annealing due to the very good formability of the steel.

The processor of this steel must satisfy himself that his calculation, design and processing methods are appropriate for the material. The forming technique used must be suitable for the intended use, must be state of the art, and must be adapted as necessary.

This steel grade may be post-treated with a corrosion inhibitor or forming aid (pre-lube oil, hot melt) in accordance with the intended use.

Weldability

The steel described can be welded by all electrical processes, both by hand and by machine, provided the general rules of technology are observed.

RobuSal®800 does not require expensive, high-quality welding consumables. If structures are built up from these steels, it must be possible to transfer the loads (forces) occurring from one individual part to the other through the joint. In the case of joints of this steel with other, lower-strength steels, the strength of the joint is determined by the partner with the lower strength. These conditions must be taken into account by the customer.

Commitments regarding certain properties or a certain purpose of use require written agreements. Technical changes as well as typesetting and printing errors reserved.



**SALZGITTER
FLACHSTAHL**
A Member of the Salzgitter Group

Salzgitter Flachstahl GmbH / Eisenhüttenstraße 99 / 38239 Salzgitter
PHONE +49 (0) 53 41 21 28 90 / FAX +49 (0) 53 41 21 85 36 / MAIL flachstahl@salzgitter-ag.de
www.salzgitter-flachstahl.de