SALZGITTER FLACHSTAHL

Ein Unternehmen der Salzgitter Gruppe

LH®900

Air-hardening steels

Material no.	1.7734
SZFG material data sheet	3.15-3
Stength class	D

General information

The steel grade LH®900 in its hot- and cold-rolled state is not standardized. It belongs to the product category of alloyed tempering steels similar to 12CrMoV69 (material no. 1.7734) and features very good forming properties in the soft-state (deep-drawing properties) and high strength after treatment (hardening & tempering).

The components manufactured by deep drawing, hydroforming (after foregoing tube welding) or other forming methods, can be heat treated in the furnace in a protective gas atmosphere (austenitized) and then hardened and tempered during natural cooling in air or a protective gas. Therefore, this steel grade is also referred to colloquially as „air-hardening steels“.

The very good hardenability and resistance to tempering is achieved by adding, in addition to carbon and manganese, other alloying elements such as chrome, molybdenum and vanadium, as well as boron and titanium.

The steel is very easy to weld in both its soft and air-hardened states, as well as in the combination of soft/air-hardened.

The components made of air-hardening steels respond well to coating methods (KTL, conventional batch hot-dip galvanizing, high-temperature batch hot-dip galvanizing).

Form of delivery

The air-hardening steel LH®900 is delivered as hot strip (generally pickled / also unpickled on agreement) with a thickness of ≥2,0 mm ≤6,00 mm and as cold strip with a thickness of ≥0,80 mm ≤2,60 mm, with surface finish category A in accordance with DIN EN 10130. Since the surface finish of hot-rolled strip is not standardized, special customer requirements have to be agreed in advance of placing an order.

Delivery is based on the provisions of DIN EN 10021, in combination with relevant valid dimensioning standards (DIN EN 10131 for cold-rolled strip, DIN EN 10051 for hot-rolled strip) or special delivery terms. The test unit comprises 20 tons, or 20 tons of each new batch, of products of the same steel grade and nominal thickness. Strip material is tested in coil form.

The minimum strip width is 900 mm and the maximum strip width is 1450 mm, also as agreed.

Chemical composition

(melt analysis in percent by weight)

	min.	max.
C	0,07	0,15
Mn	1,60	2,10
Si	0,15	0,30
P	-	0,020
S	-	0,010
Al	0,020	0,060
Ti	0,010	0,050[1)]
Cr	0,50	1,00
B	0,0015	0,0060
Mo	0,30	0,60
V	0,10	0,20[2)]

1)2) microalloying elements: Ti, V ≤ 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	310 - 430
R_m in MPa	480 - 600
A_g in %	≥13
A_{80} in %	≥24
n-value	≥0,13

Hot strip

$R_{p0,2}/R_{eL}$ in MPa	290 - 410
R_m in MPa	480 - 670
A_5 in %	≥ 24

After air-hardening (i.e. annealing with air-cooling and subsequent tempering) this steel grade features a tensile strength up to 1000 MPa with a total elongation A_5 ≥ 13%.

The characteristic values available after hardening are process- and component-specific and are produced at the responsibility of the user. In a soft state, with hot-dip galvanizing, the steel demonstrates a comparable increase in strength to the bake-hardening effect (increase in yield point approx. 80 MPa).

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Structure (cold strip, delivery state soft and untreated)

When delivered in its soft state (hot- or colled-rolled), LH®900 typically forms a ferrite structure with carbide precipitations, together with a small amount of retained austenite and a typical grain size of ≥9 ASTM.

Structure (delivery state tempered)

In the hot forming process, the structure of the steel is transformed to the austenitic state by heating, preferably to above 950°C in a protective gas atmosphere.

During the subsequent cooling in either air or protective gas, a martensitic microstructure forms which leads to a high strength component.

The subsequent tempering enables the break down of internal stresses in the hardened component. At the same time, the hardness of the component is sufficiently reduced to enable the required toughness values to be achieved.

Forming properties

The steel LH®900 combines very high cold-forming properties in a soft, non heat-treated state with high strength with sufficient residual formability in a hardened and tempered state.

Examples of use

Hot- and cold-rolled alloyed tempered steels were developed especially for automotive engineering. An increasing number of applications in other areas can be expected.

This steel features very good forming capabilities in the cold-rolled delivery state and is thus suitable for the production of components with a complex structure. It reaches its ultimate strength after heat treatment with cooling in air or protective gas. This steel was specially developed to meet the requirements of lightweight design and construction and ensure outstanding vehicle crash properties. The mechanical properties of the finished parts enable significant weight reduction.

The combination of forming and hardening capabilities makes LH®900 particularly suitable for the construction of welded components subjected to high static and dynamic stresses and for load-bearing and safety-relevant components in the automotiv industry.

Steel manufacture and the production of hot and cold strip takes place at Salzgitter Flachstahl GmbH.

This steel strip can additionally be used for the production of HF-welded precision tubes (in future, laser-welded tubes, otherwise known as single tubes, will also be available) in accordance with EN 10305-2 or EN 10305-3 at the company's own subsidiaries. In this case, the customer receives flat material and tubes with identical composition virtually from a single stop. These tubes are particularly suitable for hydroforming applications where, thanks to the good forming properties of the steel, even the most complex of parts can be created without intermediate annealing.

Processing information

Companies processing such steel products must verify compliance of their calculation, construction and processing methods with material requirements. The forming technology deployed must be fit for purpose, meet the state of the art, and should be adapted as required.

Depending on the intended use, this steel grade can be subsequently treated with a corrosion protection or a forming aid (prelube oil, hotmelt).

The steel described in this document can be welded either manually or mechanically using all electrical welding techniques, in accordance with the general technical rules. LH®900 does not require the addition of any expensive, high-quality filler materials.

If steel sructures are made from this steel, it must be possible to transfer the stresses (forces) that occur from one part to the next via the joints.

If this steel is combined with other, lower strength steels, the strength of the joint is dertermined by the partner with the lower strength. Customers must make allowances for such factors.

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