SECURE
Protection Steels

SECURE 400

Protection Steels

ILSENBURGER
GROBBLECH
A Member of the Salzgitter Group

Armour steel		Steel grade	Material No.	Issue
	ILG-Short Name	EN-Short Name		
Heavy Plate	**SECURE 400**	30CrMoNb5-2	-	04/2022

SCOPE OF APPLICATION

This material data sheet applies to the alloyed, liquid quenched and tempered high-strength special steel grade **SECURE 400** for civil applications, by standard produced in thicknesses from 6 to 50 mm. The steel is supplied with defined ballistic properties. Plate thicknesses above 50 mm are available on request.

APPLICATION

The steel may be used at the discretion of the purchaser for purposes of ballistic protection mainly for applications such as armoured limousines and transporters of valuables. The entire processing technique is of fundamental importance for the good performance of the products made of this steel. The processor must assure himself that his methods of calculation, design and working conform with the material to be used, meet the latest requirements of technical progress, and are suited to the proposed application.

The selection of the material is up to the purchaser.

CHEMICAL COMPOSITION (heat analysis, %)

Thick-ness	C	Si	Mn	P	S	Cr	Mo	Ni	Al
≤ 50 mm	≤ 0.32	≤ 0.40	≤ 1.00	≤ 0.015	≤ 0.005	≤ 1.50	≤ 0.50	≤ 0.70	≤ 0.11

Steel may contain Ti, Nb and B in addition to the elements listed.

CONDITION OF DELIVERY

Quenched and tempered (see paragraph "Heat Treatment")

HARDNESS AT ROOM TEMPERATURE

380 - 430 HBW (other hardness ranges according to customer requirements are possible). The hardness shall be determined in accordance with DIN EN ISO 6506-1. The hardness is measured approx. 1 mm below the sheet surface.

TYPICAL MECHANICAL PROPERTIES in state of delivery condition at room temperature (transverse test sample according to DIN EN ISO 6892-1/Procedure B). Charpy-V test according to DIN EN ISO 148-1 (transverse sample).

Yield strength R_{eH} *) MPa	Tensile strength R_m MPa	Elongation at fracture A %	Impact energy Av - 40 °C, J
950	1,150	11	25

*) If yielding occurs, the yield is determined as $R_{p0.2}$.

SCOPE OF TESTING

Unless otherwise agreed upon in the order, the tests listed below will be performed during inspection:

Hardness testing will be determined once per 40t of a heat. The following options are available in addition and must be agreed upon separately. If not requested at the time of inquiry and order, the products shall be supplied in accordance with the basic specifications as provided in this spec. sheet.

a) Ultrasonic testing according to DIN EN 10160, quality class S_1/E_1
b) bullet resistance testing can be performed according to customer requirements

All test results are documented y inspection certificates following DIN EN 10204-3.1.

GENERAL INFORMATION ON PROCESSING

Prior to processing, it is recommended to check the information provided by the steel manufacturer in order to benefit from the processing experience available in processing respective steels. The general information below can only cover a few important points. The information outlined in Stahl-Eisen-Werkstoffblatt 088 (weldable fine grain structural steels, processing directions especially for welding) applies equally to this steel. Recommendations for welding are also given in EN 1011 part 1 and part 2 - Welding, Recommendation for welding of metallic materials.

COLD FORMING

Plates of the steel grade **SECURE 400** can be cold formed at ambient temperature under consideration of their strength. The forming force and the degree of elastic recovery are greater than for softer structural steels. Cutting edges must be ground, flash trimmed and smoothly rounded before forming. The minimum bending radius for **SECURE 400** should not be less than five times the plate thickness (bending axis transverse to rolling direction) and not less than seven times the sheet thickness (bending axis parallel to the rolling direction). The tool opening should be approximately 20 times the sheet thickness. Cold forming of plates must be performed at low forming speed at room temperature. Preheating is not recommended. Stress relieve heat treatment after forming should be avoided as it would reduce hardness.

HEAT TREATMENT

In general, this steel obtains its mechanical properties by austenitizing followed by conventional quenching and, if necessary, tempering. The heat treatment depends on the chemical composition and the plate thickness. To avoid hardness degradation, the steel grade **SECURE 400** must subsequently not be heated above 400 °C.

THERMAL CUTTING

Sheets with thicknesses up to 15 mm are preferably cut by laser. For sheets up to 40 mm thickness, underwater plasma cutting is recommended. Flame cutting is also possible. Depending on the plate thickness, sufficient preheating and, if necessary, post heating must be ensured. For detailed information, please refer to our recommendations for thermal cutting of **SECURE steels**.

WELDING

If due consideration is given to the general rules for welding, this steel is weldable both manually and automatically. To prevent cold cracking in the welded joints only welding consumables should be used that lead to the lowest possible hydrogen content in the weld metal. The use of the austenitic welding consumable type 18 8 Mn is recommended. For plate thicknesses up to 25 mm preheating is generally not necessary.

For high loaded welds, welded with a ferritic welding consumable, preheating should be carried out for the thicknesses specified in Stahl-Eisen-Werkstoffblatt 088. The height of the preheating temperature for welding depends on plate thickness and residual stress behavior of the construction. Interpass temperatures above 200 °C should be avoided. For detailed information, please refer to our recommendations for welding **SECURE steels**.

DIMENSIONS AND TOLERANCES

		Quarto Plate
Thickness		6 - 150 mm*
Thickness tolerance	≥ 6.0 and ≤ 13.0 mm:	-0 / +0.8 mm
	>13.0 and ≤ 20.0 mm:	-0 / +1.0 mm
	> 20.0 and ≤ 40.0 mm:	-0 / +1.2 mm
	> 40.0 and ≤ 60.0 mm:	-0 / +1.6 mm
	> 60.0 and ≤ 80.0 mm:	-0 / +2.0 mm
	> 80.0 and ≤ 110.0 mm:	-0 / +2.4 mm
	≥ 110 mm:	-0 / +3.0 mm
Width		max. 3,200 mm**
Length		4,000 - 12,000 mm

* thinner plates on request
** depending on thickness

NOTES

Unless otherwise agreed upon in the order, the delivery will be subjected to the conditions outlined in DIN EN 10021.

For quarto plates, dimensional deviations are based on DIN EN 10029, unless other conditions are agreed.

The thickness tolerances are according to the table shown above (paragraph "Dimensions and tolerances").

The plates are supplied with a maximum flatness deviation according to DIN EN 10029, class N (smaller flatness tolerances by special agreement). The flatness is determined in acc. to DIN EN10029.

For surface quality requirements DIN EN 10163 is applicable.

As per special agreement, it is possible to supply plates descaled or descaled and primed.

SOURCES OF SUPPLY

DIN EN-, DIN EN ISO-Normen
Beuth Verlag GmbH, 10772 Berlin, Germany

Steel-Iron Material Sheets
Beuth Verlag GmbH, 10772 Berlin, Germany

Recommendations for thermal cutting of SECURE steels
Ilsenburger Grobblech GmbH, Veckenstedter Weg 10,
38871 Ilsenburg, Germany

Recommendations for the welding of SECURE steels
Ilsenburger Grobblech GmbH, Veckenstedter Weg 10,
38871 Ilsenburg, Germany

Publication of Ilsenburger Grobblech GmbH
"SECURE safety steels"
Ilsenburger Grobblech GmbH, Veckenstedter Weg 10,
38871 Ilsenburg, Germany

SECURE
Protection Steels

Ilsenburger Grobblech GmbH
Veckenstedter Weg 10
38871 Ilsenburg
Germany

E ilg.sales@salzgitter-ag.de

ilsenburger-grobblech.de

SECURE Protection Steels

ILSENBURGER
GROBBLECH
A Member of the Salzgitter Group