

Steel

SECURE and SECURE M

Ballistic steels for civilian and
military special vehicles and
applications.



thyssenkrupp

Play it safe: with thyssenkrupp's specially developed ballistic steels. Whether it's SECURE for ballistic protection in civilian applications or SECURE M for maximum safety in e.g. armored military vehicles – you profit from the excellent combination of exceptional hardness and enormous toughness and meet even the highest security standards. Good cold forming and welding properties and a differentiated grade portfolio permit weight-optimized protection solutions for a broad range of applications, from vehicles to bank counters to buildings.

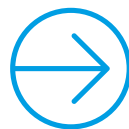
Consistent protection. With SECURE and SECURE M.

Threats from firearms and explosives call for ballistic steels with special protective properties. Our SECURE steels for civilian applications and SECURE M grades for military use offer this protection along with further advantages that set new standards.

Advantages at a glance



Optimized combination of enormous toughness and hardnesses up to 600 HBW



Good cutting, welding, cold and hot forming properties



Weight-optimized plates thanks to thickness tolerances of max. 0.4 mm



Quality testing can be carried out to national, international and customer specifications

Optimizing weight the SECURE way.

Our SECURE ballistic steels obtain their outstanding protective properties from a special combination of selected alloying elements and tailored heat treatment by water or oil quenching. A state-of-the-art hot strip mill permits exceptionally close thickness tolerances of max. 0.4 mm – a key advantage for example in developing secure, weight-optimized vehicles.



Civilian applications.

SECURE steels with hardnesses of 450, 500 and 600 HBW are the ideal solution for ballistic protection in civilian applications. Depending on requirements they permit weight-optimized protection solutions – even in difficult designs. SECURE 500 and SECURE 600 pave the way to maximum protection through high or even extreme hardness coupled with good toughness, for example on the sides of a protected vehicle. In addition, the exceptional toughness of SECURE 450 also permits optimal underbody protection against explosive attack.



Military applications.

SECURE M ballistic steels with hardnesses from 300 to 600 HBW allow the design of fully protected armored vehicles with optimized weight per unit area. The good formability and weldability of the steels also allow a broad range of development options. For example, use of SECURE M 500 for basic body protection and SECURE M 450 as underbody protection against explosives ensures a high level of vehicle protection. With its extreme hardness SECURE M 600 is the ideal solution where adaptive add-on protection is required.

SECURE and SECURE M are ideally suited for use in

- ➞ Passenger cars
- ➞ State limousines
- ➞ Off-road vehicles
- ➞ Trucks
- ➞ Security vans
- ➞ Police vehicles
- ➞ Facades
- ➞ Security fences
- ➞ Firing ranges
- ➞ Bank counters
- ➞ Security doors and partition walls
- ➞ Building protection
- ➞ Military vehicles and equipment



SECURE 450
SECURE 500
SECURE 600

We test SECURE ballistic steels according to national and international specifications. Thanks to our experience (and our in-house ballistic test facilities), we can also perform tests to customer specifications.

➞ Civilian applications

DIN EN 1522/1063
VPAM PM 2007
NIJ 0108.01
NF A 36-800

➞ Military applications

TL 2350-0000
STANAG 4569
UK DEF STAN
MIL – DTL-32332
MIL – DTL-46100
MIL – DTL-12560
NF A 36-800

Grade portfolio

	Thickness [mm]	Brinell hardness [HBW]
Steel grade		
SECURE M 300	3–50 ¹⁾	280–330
SECURE M 350	3–50 ¹⁾	330–380
SECURE 400/SECURE M 400	3–50 ¹⁾	380–430
SECURE 450/SECURE M 450	4–20	400–480
SECURE 500/SECURE M 500	3–50 ¹⁾	480–530
SECURE 600/SECURE M 600	4–40	570–640

Sizes available

	Thickness [mm]	Width [mm]
Cut-to-length plate	3–9	1.935 ²⁾
Quarto plate	4–50 ¹⁾	3.200 ²⁾

¹⁾ Higher thicknesses on request. Further dimensions on request.

²⁾ Maximum width depends on plate thickness.

When things get tough, true quality shows through.

Our in-house ballistic test facility and collaboration with external test institutes enable us to supply ballistic steels that meet a broad range of specifications and test conditions. The photo on the right shows an example of multi-hit ballistic testing.



Multi-hit ballistic testing of SECURE.

Ballistic testing

Weapon		Bullet		Test conditions		SECURE 500 (480–530 HBW)
Type	Caliber	Type	Weight [g]	Test range [m]	Bullet velocity ¹⁾ [m/s]	Guide values for minimum plate thicknesses [mm]

DIN EN 1063/DIN EN 1522

Classification

BR/FB 3	Hand gun	.357 Magnum	FJ/CB/SC	10.2	5	430 ± 10	3.0 ²⁾
BR/FB 4	Hand gun	.44 Magnum	FJ/FN/SC	15.6	5	440 ± 10	3.0
BR/FB 5	Rifle	5.56 mm × 45 (SS 109) Twist length: 178 ± 10 mm	FJ/PB/SCPI	4.0	10	950 ± 10	6.5
BR/FB 6	Rifle	7.62 mm × 51	FJ/PB/SC	9.5	10	830 ± 10	6.5
BR/FB 7	Rifle	7.62 mm × 51 (AP) Twist length: 254 ± 10 mm	FJ/PB/HCI	9.8	10	820 ± 10	15.0
No classification	Hand gun	.44 Magnum	FJ/FN/SC	15.6	3	435–455	3.0
	Rifle	7.62 mm × 39 (Kalashnikov)	FJ/PB/SC	7.9	25	710 ± 15	4.0
			API	7.7	25	730 ± 15	12.0
	Rifle	7.62 mm × 51	FJ/PB/SC	9.5	10	785–795	5.5
	Rifle	7.62 mm × 51 (AP)	FJ/PB/HCI	9.8	25	800–810	14.0
	Rifle	5.56 mm × 45 (SS 92)	FJ/PB/SC	3.6	25	965–975	9.0

Terms and abbreviations in the table:

- 1) No classification: Velocity 2.5 m behind muzzle;
DIN EN1063, DIN EN 1522: Velocity ≤ 2.5 m from front of sample.
2) The required plate thickness is below the minimum available thickness of 3 mm.

FJ/RN: Full metal jacket, round nose
FJ/PB: Full metal jacket, pointed bullet
SC: Soft core (lead)
HCI: Steel hard core, weight 3.7 ± 0.1 g, > 63 HRC

FJ/FN: Full metal jacket, flat nose
FJ/CB: Full metal jacket, cone bullet
SCPI: Soft core (lead) with steel penetrator (type SS 109)
API: Armor piercing, incendiary



Nothing is left to chance in the stringent SECURE quality assurance process: Visual inspection, hardness, flatness and thickness checks.

thyssenkrupp – a partner that understands its business. And yours.

Our mission is to advance your business – through sound advice, individual and innovative solutions and fulfillment of your specific needs. Our extensive technological know-how, gained over many years, makes this possible. As does our ability to see things the way you do. This enables us to develop an in-depth understanding of your business model. Our brand promise says it all: “engineering. tomorrow. together.” Because when it comes to finding successful solutions for tomorrow, the closer we cooperate the better.

Comprehensive advice.

To ensure that you get the best advice on the selection and processing of SECURE steels, our Technical Customer Service is at your disposal. They are 100% committed to offering you comprehensive assistance with regard to design and processing, answers to structure- and forming-related issues, product training, and of course technical support in optimizing fabrication processes.



Our goal – perfect quality.

High quality is provided when materials and own expertise are continuously improved. Our in-house research teams and their in close collaborations with universities and external institutes allow the further optimization of SECURE ballistic steels undergoing regular quality checks.

Practical virtual tool.

Naturally, you can find specific information about our steels on our website:

www.thyssenkrupp-steel.com/plate

This includes useful product information, processing recommendations and a direct line to your personal service representatives for sales and technical consulting. You can also access ProWeld, thyssenkrupp's web-based application for welding calculations. After registering as a user, you can log in and use this tool for your projects at any time, free of charge.



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