

Special structural steels for cold forming	Steel grade		Material No.	Material Specification
	TKSE-Short name	EN- Short name		
	Heavy plates	PAS 315 PAS 355 PAS 380 PAS 420 PAS 460 PAS 500 PAS 550 PAS 600 PAS 650 PAS 700	S315MC S355MC - S420MC S460MC S500MC S550MC S600MC S650MC S700MC	

620

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Scope

This Material Specification applies to plates made of low carbon high strength steels with minimum yield strength values between 315 and 700 MPa¹⁾ in the thermomechanically rolled delivery condition. They offer improved formability and show favourable properties such as low tendency towards hardening and high cold cracking resistance at welding. Available are plates cut from hot strip in thicknesses equal or greater than 3 mm and four high mill plates in thicknesses equal or greater than 10 mm. Maximum widths and thicknesses are depending on the steel grade and the product (see paragraph "Available sizes"). The steels can also be ordered in accordance to EN 10149-2.

Application

The steels are used for cold formed parts of different kinds such as truck frames, axle designs and other special profiles and shapes. The entire processing technique is of fundamental importance for the good performance of the products made of these steels. The processor must assure himself, that his calculation, designing 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, %)

Steel grade	C	Si	Mn	P	S	Nb	V	Ti
PAS 315	≤ 0.10	≤ 0.15	≤ 1.30	≤ 0.025	≤ 0.010	≤ 0.05	≤ 0.08	-
PAS 355	≤ 0.10	≤ 0.15	≤ 1.50	≤ 0.025	≤ 0.010	≤ 0.06	≤ 0.08	-
PAS 380	≤ 0.10	≤ 0.15	≤ 1.50	≤ 0.025	≤ 0.010	≤ 0.06	≤ 0.08	-
PAS 420	≤ 0.10	≤ 0.15	≤ 1.60	≤ 0.025	≤ 0.010	≤ 0.07	≤ 0.10	-
PAS 460	≤ 0.10	≤ 0.15	≤ 1.60	≤ 0.025	≤ 0.010	≤ 0.08	≤ 0.10	-
PAS 500	≤ 0.10	≤ 0.15	≤ 1.70	≤ 0.025	≤ 0.010	≤ 0.08	≤ 0.12	-
PAS 550	≤ 0.10	≤ 0.50	≤ 1.80	≤ 0.025	≤ 0.010	≤ 0.08	≤ 0.14	-
PAS 600	≤ 0.10	≤ 0.50	≤ 1.90	≤ 0.025	≤ 0.010	≤ 0.08	-	≤ 0.14
PAS 650	≤ 0.10	≤ 0.60	≤ 2.00	≤ 0.025	≤ 0.010	≤ 0.08	-	≤ 0.14
PAS 700	≤ 0.12	≤ 0.60	≤ 2.10	≤ 0.025	≤ 0.010	≤ 0.08	-	≤ 0.14

PAS-steels are fully killed fine-grained structural steels with an Al-content of 0.015 % minimum. The grades PAS 600, PAS 650 and PAS 700 may additionally contain molybdenum up to 0.50 % and boron up to 0.005 %. With regard to special aspects of processing a limitation of the Si-content to 0.03 % maximum for the grades up to PAS 500 can be ordered.

¹⁾ 1 MPa = 1 N/mm²

b) Four high mill plates:

On special agreement at the time of order the steel grades PAS 315 / 355 / 380 / 420 can also be supplied as four-high mill plates with the following dimensions:

Thickness: 10 to 20 mm, widths: 1500 to 3000 mm.

Length: 4500 to 15000 mm (length min. 4000 mm after consultation), a minimum rolling length of 8000 is necessary.

Tolerances: According to EN 10029.

For the testing of tensile- and toughness properties transverse specimens are used.

General processing information

See EN 10149-2 chapter 7.5 "Technological Properties" and STAHL-EISEN-Werkstoffblatt 088.

Recommendations for welding are also given in EN 1011 part 1 and part 2 - Welding, Recommendation for welding of metallic materials -.

In addition to that it has to be noted, that at MAG and manual arc welding of the grades PAS 315 to PAS 550 at cooling times $t_{8/5}$ from 5 to 20 s sufficient mechanical properties in the heat affected zone of the weld are achieved as experience shows. For the grades PAS 600, 650 and 700 the appropriate cooling times are from 5 to 15 s.

For those, who process this steel for the first time it is recommended to consult the steel supplier to take advantage of the experiences gathered so far.

General information

Unless otherwise agreed upon in the order, the delivery will be governed by the conditions outlined in EN 10021.

The admissible tolerances are based on EN 10051 for plates cut from coils and on EN 10029 for four-high mill plates.

The plates will be supplied with a maximum flatness tolerance according to EN 10029, table 4. Smaller flatness tolerances can be agreed upon at the time of ordering.

For surface quality requirements EN 10163 is applicable.

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

Publisher`s addresses

EN-, ISO Standards

Beuth Verlag GmbH, Postfach, D-10772 Berlin

STAHL-EISEN-Werkstoffblätter

Verlag Stahleisen GmbH, Postfach 10 51 64, D-40042 Düsseldorf

ThyssenKrupp Steel Europe brochures
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