

SIMOLD[™] 2099

SPECIAL CORROSION RESISTANT MOULD STEEL

SPECIFICATION SHEET

SIMOLD 2099 is a special stainless martensitic-ferritic mould steel, delivered as pre-hardened.

Thanks to special surface preparation of casted slabs and automatized rolling procedure, rolled plates have very smooth surface.



Homogenous microstructure of SIMOLD 2099 across the whole section of plate

SIMOLD 2099 has an excellent micro cleanliness on the level of ESR grades. Due to its excellent homogeneity acquired through a combination of sophisticated steelmaking process and chemical composition, SIMOLD 2099 has very uniform hardness and dimensional stability.



Mould base made of SIMOLD 2099 for plastic closures mould tool

The main advantages in comparison to standardized corrosion resistant mould steels are:

Mould steel grade	Dimensional stability	Machinability	Homogeneity	Hardness uniformity	Thermal conductivity	Weldability	Corrosion resistance
SIMOLD 2099	+++	+++	+++	+++	+++	+++	++
SIMOLD 2085	++	++	++	++	++	+	++
SIMOLD 2316)	++	+	++	++	++	+	+++
+ ... worse	++ ... good	+++ ... excellent					

STANDARDS

SIMOLD 2099 is an advanced substitute for the following corrosion resistant mould steels:

- EURONORM, DIN – X33CrS16 (Mat. No. 1.2085)
- ASTM/AISI ~ 420 FM

APPLICATION

SIMOLD 2099 is used in all applications of plastic mould manufacturing where machinability, corrosion resistance and mould production costs are the most important issues for the toolmaker. Basically it is applied in moulds and mould bases for plastics and rubber.

CHEMICAL COMPOSITION (Typical values (wt. %))

SIMOLD 2099 is a 12% Chromium low carbon martensitic-ferritic stainless steel, alloyed with sulphur and other additions to improve machinability, thermal conductivity and corrosion resistance.

C	Mn	S	Cr	Cu
0,05	1,10	0,10	12,1	0,70

↘ CUTTING

Thermal cutting operations such as plasma cutting should be avoided, but are not prohibited for plates with a thickness below 60 mm.

Post heating of plasma-cut edges at a prescribed temperature is recommended at temperatures below tempering range (please see tempering chart).

Mechanical cutting operations such as saw cutting, abrasive water-jet and shearing are preferred.

↘ WELDING

SIMOLD 2099 can be successfully welded by any standard welding method (manual arc welding, TIG welding, MIG/MAG welding) with an application of special welding consumables. Welding consumable should have similar chemical composition as base steel to be welded. In the case of use of incorrect welding consumable and welding method, weld deposit could have different hardness related to base material and risk of cracking is higher.

There is no need of preheating and post heat treatment of weld repairs. Stress-relief annealing can be of additional benefit to the final product.

Please refer to Acroni Technical Service for the welding consumables to be recommended for each application.

↘ HEAT TREATMENT

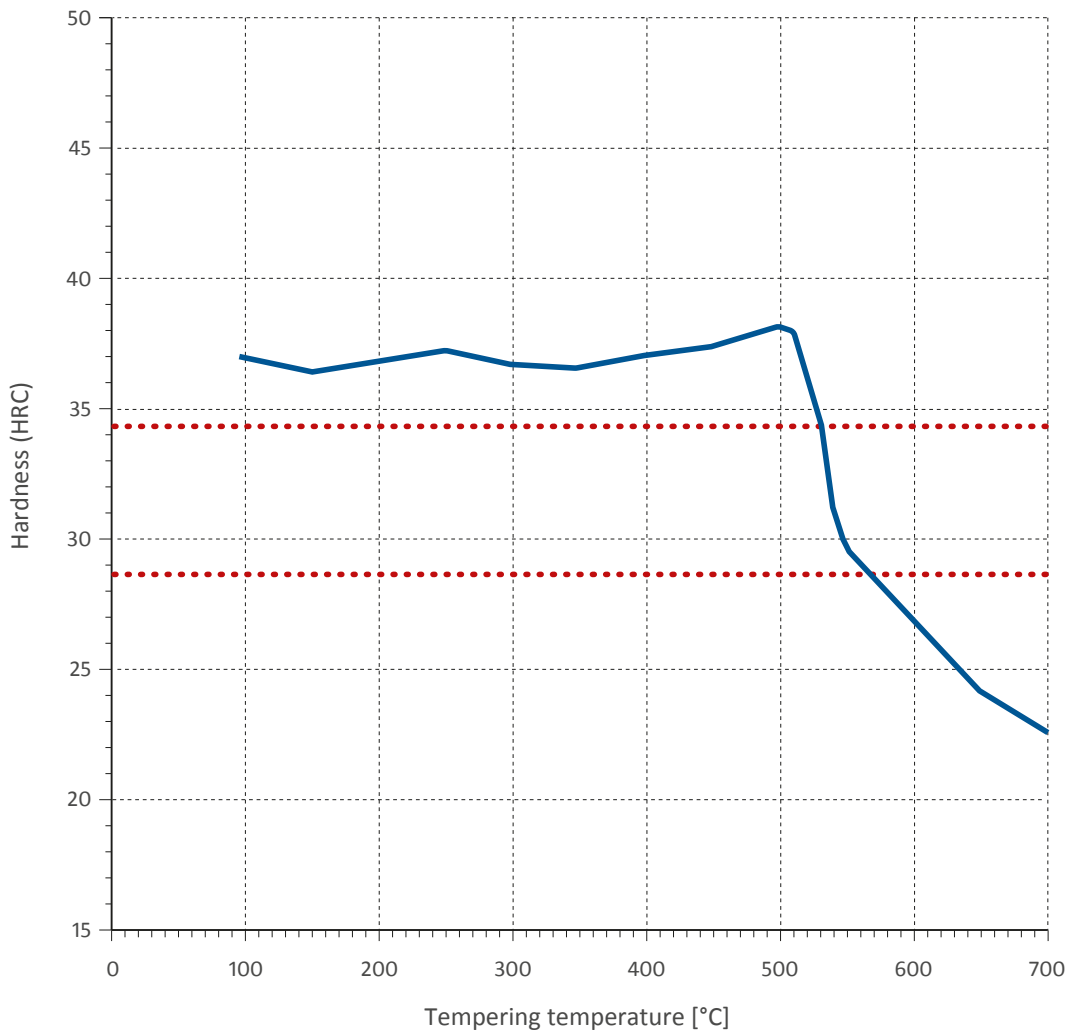
No heat treatment of plates or finally machined parts is requested. SIMOLD 2099 is delivered as pre-hardened.

Post-welding heat treatment shall be performed related to the tempering chart.

Stress-relief annealing shall be performed below 500 °C.

If customer wishes to perform any other heat treatment like soft annealing, quenching etc., please refer to SIJ Acroni Technical Service for further assistance.

TEMPERING DIAGRAM



DELIVERY CONDITION

Pre-hardened to 280-330 HB

DIMENSIONAL RANGE

SIMOLD 2099 is supplied in plates of standard dimensions:

- thickness range: 12 to 100 mm
- length 2000 to 12000 mm
- width 1000 to 2500 mm

Other dimensions are a matter of agreement between customer and SIJ Acroni.

PHYSICAL PROPERTIES

Density at 20 °C 7800 kg/m³

α (10 ⁻⁶ OC ⁻¹)	20-100	20-200	20-300	20-400	20-500	20-600
	11,5	11,6	11,7	11,8	11,9	12,1

SIMOLD 2099 is an advanced substitute for the following corrosion resistant mould steels:

Thermal conductivity (W/m·K)	at 25 °C
SIMOLD 2099	24,62
X33CrS16 (1.2085)	21,70



SIMOLD 2099 Mould base built in Injection moulding machine at SIBO Group



SIMOLD 2099 hot rolled plates cooled after rolling on Quarto plate mill

RELATED STANDARDS

SIMOLD 2099 is produced in accordance with following standards:

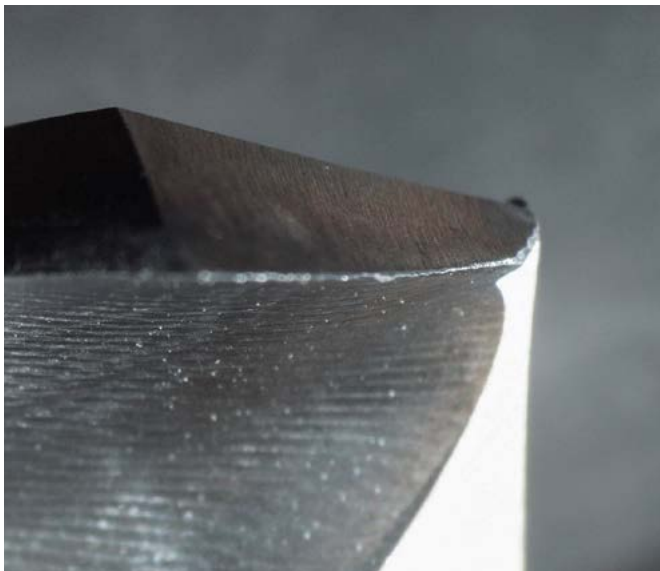
- **EN 10029** – Hot-rolled plates of 3 mm thickness - Tolerances on dimensions and shape
- **EN 10160** – Ultrasonic testing of flat steel products with a thickness equal to or greater than 6 mm (reflection method)
- **SEP 1920** – Ultraschallprüfung von gewalztem Halbzeug auf innere Werkstoffungängen (Ultrasonic testing of rolled steel semi-products to internal defects)
- **EN 10163** – Requirements for surface quality in the supply of hot rolled steel plates, wide flat products and profiles

➤ **MACHINABILITY COMPARISON TESTS SIMOLD 2099 / X33CRS16 (1.2085)**

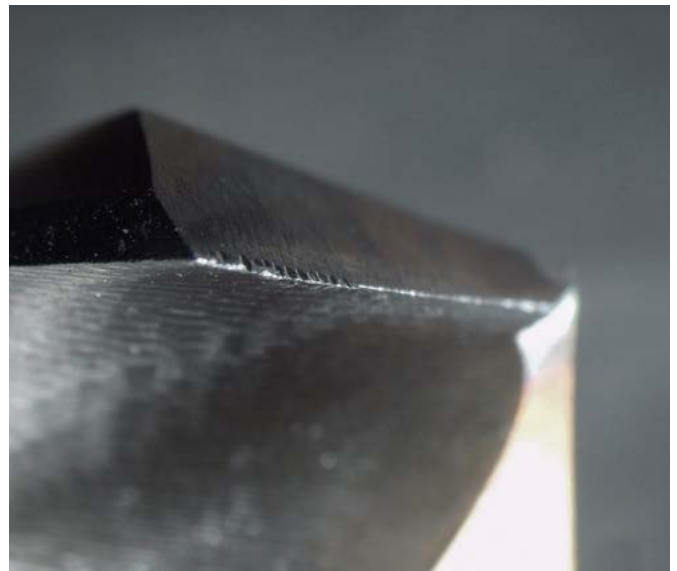
Pre-hardened – (hardness: 300 HB)

Recommended conditions	SIMOLD 2099	X33CrS16 (1.2085)
ROUGH DRILLING (Drill ϕ29 mm)		
Drill: Taegu Tec TDR 4290-32T2-09; TT9080		
Number of holes: 7		
Drill depth: 58 mm		
No. of revolutions (min-1)	1600	1760
Feed (mm/min)	160	180
Comparative evaluation	++	+++
DRILLING (Drill ϕ10 mm)		
Drill: Dormer HSS 10		
Number of holes: 52		
Drill depth: 50 mm		
No. of revolutions (min-1)	640	630
Feed (mm/min)	70	60
Comparative evaluation	+++	++

Drill blade condition after drilling of holes ϕ 10 mm:



Drill blade after drilling 52 holes into plate made of SIMOLD 2099



Drill blade after drilling 44 holes into plate made of X33CrS16 (1.2085)

Pre-hardened – (hardness: 300 HB)

Recommended conditions	SIMOLD 2099	X33CrS16 (1.2085)
DEEP-HOLE DRILLING (Drill ϕ8 mm)		
Drill: Dormer HSS 8 Drill depth: 300 mm		
No. of revolutions (min-1)	720	650
Feed (mm/min)	40	30
Comparative evaluation	+++	++
ROUGH MACHINING		
Milling cutter: TGC 25 R3		
No. of revolutions (min-1)	2000	2200
Feed in Z-Direction (mm/min)	500	500
Feed in X/Y -Direction (mm/min)	5000	7000
Comparative evaluation	++	+++
ROUGH MILLING		
Milling cutter: TGC ϕ 16 mm (2) Tageuc R=0,8 mm		
No. of revolutions (min-1)	3200	3200
Feed in Z-Direction (mm/min)	500	500
Feed in X/Y -Direction (mm/min)	680	600
Comparative evaluation	+++	++

+ ... worse ++ ... good +++ ... excellent

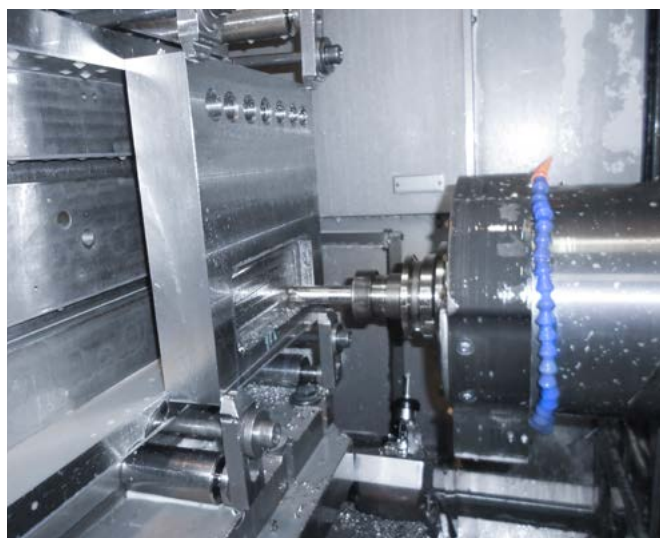
The general assessment of the machinability during mechanical processing of steel (productivity)

X33CrS16 (1.2085)	100 %
SIMOLD 2099	110-115 %

All tests performed at: SIBO Group – Tool Shop, Škofja Loka



Deep-hole drilling test



Rough milling test

DISCLAIMER

The information and data in this product data sheet are intended for informational purpose only, and may be revised at any time without notice. Application suggested of the materials are described only to help readers make their own evaluations and decisions, and are not guarantees for these or other applications.