

Born from fire,  
made to endure

MOULD STEELS –  
TOOL STEELS FOR  
PLASTIC MOULDING

**sij** | acroni



IN TODAY'S GLOBAL PRODUCTION OF PLASTIC PRODUCTS THERE ARE DIFFERENT TECHNOLOGICAL PROCESSES, AMONG WHICH THEY ARE THE MOST COMMON BLOW MOULDING, COMPRESSION MOULDING, EXTRUSION MOULDING AND INJECTION MOULDING IN DIFFERENT SHAPES, MADE OF TOOL STEELS FOR PLASTIC MOULDING.

Tool steels for plastic moulding are suitable for the manufacturing of different moulds and mould frames for moulding of different types of plastics, synthetic resins and rubber.

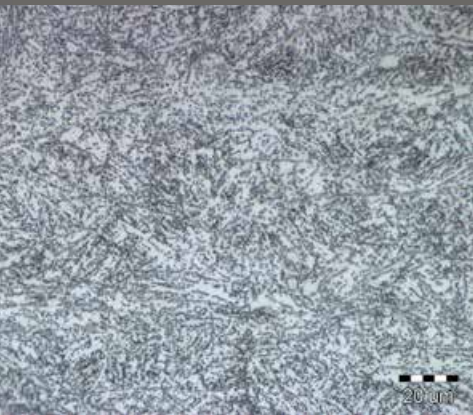
Moulds are exposed to the pressure, temperature, wear and in some cases also to corrosion.

Mould steels alloyed with sulphur to improve the machinability, are used for mould frames of different shapes and sizes.

Some mould steels are corrosion resistant because of the high addition of chromium.

The latest technology of steel making (EAF, LF, VOD/VD and CC), rolling, heat treatment and surface treatment of heavy plates enables Acroni to supply to the market steels that meet the highest requirements of our customers.





## The main features of Acroni mould steels

- Micro cleanliness - a high purity steel
- Polishability
- Machinability (steels, alloyed with sulphur)
- Temperature resistance
- Abrasion resistance
- Dimensional stability



## Acroni mould steels are produced according to the following standards

- EN ISO 4957: Tool steels
- DIN 17350: Werkzeugstähle - Technische Lieferbedingungen
- VDE SE 201: Werkstoffe für Werkzeuge
- EN10083-3: Steels for quenching and tempering – Technical delivery conditions for alloy steels
- EN 10029: Hot-rolled steel plates 3 mm thick or above - Tolerances on dimensions and shape
- EN 10160: Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)
- VDE SEP 1920: Ultraschallprüfung von gewalztem Halbzeug auf innere Werkstoffungängen
- EN 10163: Delivery requirements for surface condition of hot rolled steel plates, wide flats and sections – Part 2: Plate and wide flats

## DESIGNATIONS AND PROPERTIES

STEEL GRADE ACRONI	MATERIAL NUMBER	DESIGNATION		PROPERTY OF STEEL / APPLICATION	MOULD STEEL GROUP
		EN	AISI		
ACRONI T25	1.7225	42CrMo4	4142	Good polishability / mechanical parts, mould frames	Tool steels for plastic moulding
ACRONI T27	1.7227	42CrMoS4	4140	Improved machinability / mould frames	
ACRONI T11	1.2311	40CrMnMo7	~ P20	Good polishability / mould frames	
ACRONI T12	1.2312	40CrMnMoS8-6	~ P20 + S	Improved machinability/ mould frames	
ACRONI T38	1.2738	40CrMnNiMo8-6-4	~ P20 + Ni	Improved through-hardening / moulds for synthetic resins	
ACRONI T83	1.2083	X40Cr14	420	Good polishability / corrosion resistant moulds	Corrosion resistant tool steels for plastic moulding
ACRONI T85	1.2085	X33CrS16	~ 420 FM	Improved machinability/ corrosion resistant mould frames	
ACRONI T16	1.2316	X38CrMo16	~ 420 mod	Good polishability/ moulds with increased corrosion resistance	

## CHEMICAL COMPOSITION

Prescribed chemical composition of Acroni mould steels:

Steel grade ACRONI	Material number	CHEMICAL COMPOSITION (WT.%)							
		C	Si	Mn	P	S	Cr	Mo	Ni
ACRONI T25	1.7225	0,38 – 0,45	≤0,40	0,60 – 0,90	≤0,025	≤0,035	0,90 – 1,20	0,15 – 0,30	–
ACRONI T27	1.7227	0,38 – 0,45	≤0,30	0,60 – 0,90	≤0,025	0,02–0,04	0,90 – 1,20	0,15 – 0,30	–
ACRONI T11	1.2311	0,35 – 0,45	0,20 – 0,40	1,30 – 1,60	≤0,035	≤0,035	1,80 – 2,10	0,15 – 0,25	–
ACRONI T12	1.2312	0,35 – 0,45	0,20 – 0,40	1,40 – 1,60	≤0,030	0,05 – 0,10	1,80 – 2,00	0,15 – 0,25	–
ACRONI T38	1.2738	0,35 – 0,45	0,20 – 0,40	1,30 – 1,60	≤0,030	≤0,01	1,80 – 2,10	0,15 – 0,25	0,90 – 1,20
ACRONI T83	1.2083	0,36 – 0,42	≤1,00	≤1,00	≤0,030	≤0,01	12,5 – 14,5	–	–
ACRONI T85	1.2085	0,28 – 0,38	≤1,00	≤1,40	≤0,030	0,05 – 0,10	15,0 – 17,0	–	≤1,00
ACRONI T16	1.2316	0,33 – 0,45	≤1,00	≤1,50	≤0,030	≤0,01	15,5 – 17,5	0,80 – 1,30	≤1,00

## HARDNESS

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### IN THE QUENCHED AND TEMPERED CONDITION:

Hardness values in the quenched and tempered condition are in the range from **280 to 330 HB**. Other hardness ranges are possible if requested by customer.

### IN THE SOFT ANNEALED CONDITION:

Hardness values in the soft annealed state are up to **250 HB**.

## HEAT TREATMENT

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Typical heat treatment of tool steels is quenching and tempering. Quenching of mould steels is normally carried out in oil or in polymers.

Acroni applies special quenching technology - a combination of air and water cooling. Tempering is performed in roller or chamber furnaces.

With the exception of steels ACRONI T25, T27 and T83 we supply all mould steels in the quenched and tempered condition. End user does not need to carry out any heat treatment of the finished product.

### HEAT TREATMENT OF PRODUCTS MADE FROM ACRONI T25 AND ACRONI T27

These two steels can be delivered either soft annealed or quenched + tempered.

Recommended heat treatment conditions:

**Soft annealing:** 680 to 720 °C, cooling in the furnace (maximum hardness: 240 HB)

**Quenching:** 820 to 880°C in oil: hardness 56 HRC

**Tempering:**

Temperature (°C)	200	300	400	500	600
Hardness (HRC)	54	51	46	44	32

### HEAT TREATMENT OF PRODUCTS MADE FROM ACRONI T83

ACRONI T83 is delivered in the soft annealed condition.

Recommended heat treatment conditions:

**Soft annealing:** 760 to 800°C, cooling in the furnace (maximum hardness: 240 HB)

**Quenching:** 1000 to 1050°C in oil: hardness 56 HRC

**Tempering:**

Temperature (°C)	100	200	300	400	500	600
Hardness (HRC)	56	55	52	51	52	41

Precise heat treatment for the individual moulds cannot be prescribed and must be determined by mould manufacturers themselves.



## MACHINING AND OTHER MECHANICAL PROCESSING

The users can perform milling, drilling, grinding, polishing and other mechanical operations to manufacture finished products from the supplied plates of our mould steels in the quenched and tempered condition with the appropriate hardness.

Cold forming of mould steel heavy plates can be performed only in the soft annealed condition. The final heat treatment (quenching and tempering) shall follow after forming.

## DELIVERY CONDITION

Heavy plates of tool steels are available in following conditions:

- Soft annealed
- Quenched and tempered
- Other (if requested)

## PLATE SURFACE CONDITION

- As rolled
- Shot blasted
- Shot blasted and protected with water based shop primer

## PLATE EDGE CONDITION

- As rolled (mill edges)
- Plasma cut with subsequent edge tempering
- Band saw cut

Thickness [mm]	Width [mm]	Length [mm]
15 – 100	1000 - 2500	4000 - 12000

Note: the length of heavy plates is limited by the maximum possible weight of 10 t

