



# Material: Toolox 33



**Material No.:** TX33

**Abbreviated DIN Name:** Special Alloy

Chemical Analysis (%)	C	Si	Mn	Cr	V	Ni	Mo
	0,23	0,75	0,8	1,2	0,1	≤1,0	0,3

**Hardness:** Hardened & tempered  
max. 300 HB (~1000 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Alloyed and pre hardened Tool Steel, specially suited to polishing and has a high dimension stability. Excellent machining properties and minimum sulphur content due to the production process.

Covers applications of steels 1.2311, 1.2312 and 1.2738.

### **Uses:**

Cavity plates and inserts for the plastics and die casting industry. Mould components subjected to high pressure. Other applications in mould design where relatively high strength is specified without subsequent heat treatment.

## Remarks

**Polishing:** Highly suitable for polishing through homogenous structure.

**Graining:** Well suited

**Nitriding:** Possible at temperatures up to 590°C. Improves wear resistance and prevents sticking of insets and components.

**Hardening:** Material is hardened to approx. 29 HRC when supplied and is not intended for further heat treatment.

**Soft annealing:** Not intended.

**Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 540°C, 4 h with slow heating and furnace cooling.

**Dimensions Available:** W x L : Max 1250 x 2050 mm

H - : 12, 14, 18, 22, 30, 40, 50, 60, 70, 80, 90, 100, 110, 130, 150, 165

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

20	200	300	400	500	°C
13,1	13,1				

### **Thermal conductivity**

W / (m·K)

20	350	700	°C
35,0	35,0	30,0	

# Material: Toolox 44



**Material No.:** TX44

**Abbreviated DIN Name:** Special Alloy

Chemical Analysis (%)	C	Si	Mn	Cr	V	Ni	Mo
	0,32	0,75	0,8	1,35	0,14	≤1,0	0,8

**Hardness:** Hardened & tempered  
max. 450 HB (~1530 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Alloyed and pre hardened Tool Steel, specially suited to polishing and has a high dimension stability. Good machining properties and toughness due to the production process. Covers applications of steels 1.2343, 1.2344 and 1.2767.

### **Uses:**

Cavity plates and inserts for the plastics and die casting industry. Mould components subjected to high pressure. Other applications in mould design where relatively high strength is specified without subsequent heat treatment.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

20	200	300	400	500	°C
13,5	13,5		13,5		

Thermal conductivity

W / (m·K)	20	350	700	°C
	34,0	32,0	31,0	

## Remarks

- Polishing:** Highly suitable for polishing through homogenous structure.
- Graining:** Well suited
- Nitriding:** Possible at temperatures up to 590°C. Improves wear resistance and prevents sticking of insets and components.
- Hardening:** Material is hardened to approx. 45 HRC when supplied and is not intended for further heat treatment.
- Soft annealing:** Not intended.
- Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 540°C, 4 h with slow heating and furnace cooling.
- Dimensions Available:** W x L : Max 1250 x 2050 mm  
H - : 6, 14, 18, 22, 25, 30, 40, 50, 60, 70, 80, 90, 100, 110, 130, 150

# Material: Toolox 44 - Round Bar



**Material No.:** TX44

**Abbreviated DIN Name:** Special Alloy

Chemical Analysis (%)	C	Si	Mn	Cr	V	Ni	Mo
	0,32	0,75	0,8	1,35	0,14	≤1,0	0,8

**Hardness:** Hardened & tempered  
max. 450 HB (~1530 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Toolox is based on a low carbon concept, which results in excellent machinability. The low carbon concept and high cooling rate have made Toolox two to three times tougher than comparable steels of similar hardness. The high hardness combined with excellent toughness ensures less wear and a longer operating life for components, when compared to standard steel.

### **Uses:**

Suitable for engineering applications in tool holders and in different types of shafts and rolls, the diameter dimensions also provide a better solution for round parts in tooling applications like moulding and in dies for aluminium die casting.

## Remarks

- Polishing:** Highly suitable for polishing through homogenous structure.
- Graining:** Well suited
- Nitriding:** Possible at temperatures up to 590°C. Improves wear resistance and prevents sticking of insets and components.
- Hardening:** Material is hardened to approx. 45 HRC when supplied and is not intended for further heat treatment.
- Soft annealing:** Not intended.
- Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 540°C, 4 h with slow heating and furnace cooling.
- Dimensions Available:** Max length 5000 mm up to 141 or can be cut to size  
Max length 1000 mm from 192 to 405 or can be cut to size  
H - : 26, 31, 36, 41, 46, 51, 61, 71, 81, 91, 101, 111, 126, 131, 141, 192, 262, 302, 353, 405

## Physical Properties

**Thermal expansion coefficient**  
(10<sup>-6</sup>·m) / (m·K)

20	200	300	400	500	°C
13,5	13,5		13,5		

**Thermal conductivity**

W / (m·K)	20	350	700	°C
	34,0	32,0	31,0	

# Material: 1.0570 - Mild Steel S 355 WA J2



**Material No.:** 1.0570

**Abbreviated DIN Name:** S 355 J2 G3

<b>Chemical Analysis (%):</b>	C	Si	Mn
	0,22	0,55	1,6

**Hardness:** max. 180 HB(~625 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Very good machinability with good weldability and dimensional stability.

### **Uses:**

General machine components, base plates, mould frames

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
11,1	12,2	12,9	13,5	13,9			

### **Thermal conductivity**

W / (m·K)

20	350	700	°C
54			

## Remarks

**Polishing:** Not usual.

**Graining:** Not usual.

**Nitriding:** Not usual.

**Hardening:** At 860-890°C

The most suitable heat treatment for the relevant workpiece should be suggested by the heat treatment company.

**Soft annealing:** 650°C - 700°C, 4-6 h

**Stress-relief annealing:** To eliminate residual stress after coarse machining at 550-580°C, 4 h with slow cooling.

**Normal work hardness:** <20 HRC

**Dimensions Available:** W x L : Max 1200 x 2500 mm

H - : 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 90, 100, 110, 130

# Material: 1.1730



**Material No.:** 1.1730

**Abbreviated DIN Name:** C 45 U

<b>Chemical Analysis (%):</b>	C	Si	Mn
	0,45	0,3	0,7

**Hardness:** annealed to max. 190 HB  
(~650 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Unalloyed mould steel, readily machinable, surface hardened.

### **Uses:**

In mould and apparatus construction where unhardened parts are used e.g. mould frames and add-on parts.

This material is normally used in its supplied condition.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
11,0	12,0	13,0	13,5	14,0	14,2		

Thermal conductivity

W / (m·K)	20	350	700	°C
	50			

For parts subjected to higher stresses, we recommend our case-hardening and heat-treatable steel type as well as our fully hardened steel.

## Remarks

**Polishing:** Not usual.

**Graining:** Not usual.

**Nitriding:** Not usual.

**Hardening:** Hardening is fundamentally not usual because the risk of stress cracking and hardness distortion can occur. Should a hardening treatment be necessary in exceptional cases, it is suggested that you consult with the heat treatment company for the most suitable process for the relevant workpiece.

**Soft annealing:** 680°C - 710°C, approx. 3 h

**Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 620°C, approx. 4 h with slow furnace cooling.

**Dimensions Available:** W x L : on request

H - : on request

# Material: 1.2085



**Material No.:** 1.2085

**Abbreviated DIN Name:** X 33 CrS 16

<b>Chemical Analysis (%):</b>	C	Si	Mn	Cr	S
	0,3	0,05	1,0	16,0	0,1

**Hardness:** annealed to max. 280 - 325 HB  
(~950 - 1100 N/mm<sup>2</sup>)  
depending on x-section

## Characteristics

### **Material Properties:**

Corrosion-resistant, pre hardened mould steel with high strength. Good machinability and high strength without subsequent heat treatment.

### **Uses:**

Cavity and frame plates in injection moulding and die-casting tools. Further applications in mould design for metal and plastics processing, where corrosion resistance is required due to aggressive plastics or damp climate conditions.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
10,5	11,0	11,0	12,0				

Thermal conductivity

W / (m·K)

20	350	700	°C
17,2	21,0	24,7	

## Remarks

**Polishing:** Not usual because of the high Sulphur content.

**Graining:** Possible to a limited extent, but not usual.

**Nitriding:** Possible by all known processes, but not usual.

**Hardening:** Is fundamentally not usual with this material.

**Soft annealing:** Is fundamentally not usual with this material.

**Stress-relief annealing:** To eliminate residual stress after coarse machining at max 480°C, approx. 4 h with slow furnace cooling. At higher temperatures, the surface will scale.

**Dimensions Available:** W x L : Max 1250 x 2000 mm

H - : 25, 35, 40, 50, 60, 70, 80, 90, 100, 110, 130

# Material: 1.2311



**Material No.:** 1.2311

**Abbreviated DIN Name:** 40 CrMnMo 7

<b>Chemical Analysis (%)</b>	C	Mn	Cr	Mo
	0,4	1,5	1,9	0,2

**Hardness:** annealed to max. 280 - 325 HB  
(~950 - 1100 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

This material should be used in its supplied condition. High mechanical properties, toughness and compressive strength.

### **Uses:**

Cavity plates and inserts in plastics processing. Tool components subjected to high pressures. Other uses in mould making where high strength is needed without subsequent heat treatment.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
11,1	12,9	13,4	13,8	14,2	14,6	14,9	

Thermal conductivity

W / (m·K)

20	350	700	°C
34,5	33,5	32,0	

## Remarks

**Polishing:** Technical polishing possible because the Sulphur content is very low.

**Graining:** Possible.

**Nitriding:** Possible.

**Hardening:** Not usual because material should be used in its supplied condition.

**Soft annealing:** Not usual.

**Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 480°C, approx. 4 h with slow furnace cooling.

**Dimensions Available:** W x L : Max 1250 x 2050 mm

H - : 30, 40, 50, 60, 70, 80, 90, 100, 110, 130, 150, 170, 190, 210, 230, 250, 270, 300, 330, 360



# Material: 1.2312



**Material No.:** 1.2312

**Abbreviated DIN Name:** 40 CrMnMoS 8-6

**Chemical Analysis (%):**

C	Mn	S	Cr	Mo
0,4	1,5	0,07	1,9	0,2

**Hardness:** annealed to max. 280 - 325 HB  
(~950 - 1100 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

This material should be used in its supplied condition. There is consequently no need to harden the finished parts. Good machinability due to the high Sulphur content.

### **Uses:**

Cavity and frame plates for compression moulds and injection moulding tools. Tool components subjected to high pressure. Other uses in mould making where relatively high strength is specified with subsequent heat treatment.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
12,2	12,9	13,5	13,9	14,2	14,5	14,8	

Thermal conductivity

W / (m·K)

20	350	700	°C
34,5	33,5	32,0	

## Remarks

**Polishing:** Not usual because of the high Sulphur content.

**Graining:** Not usual because of the high Sulphur content.

**Nitriding:** Possible, improves the wear resistance of the surface.

**Hardening:** Not usual because material is used in its supplied condition.

**Soft annealing:** Not usual.

**Stress-relief annealing:** To eliminate residual stress after coarse machining at max 480°C, approx. 4 h with slow furnace cooling.

**Dimensions Available:** W x L : Max 1250 x 2050 mm

H - : 30, 40, 50, 60, 70, 80, 90, 100, 110, 130, 150, 170, 190, 210, 230, 250

# Material: 1.2343



**Material No.:** 1.2343

**Abbreviated DIN Name:** X 37 CrMoV 5-1

**Chemical Analysis (%):**

C	Si	Cr	Mo	V
0,37	1,0	5,3	1,3	0,4

**Hardness:** soft-annealed to max. 220 HB  
(~770 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

High alloy hot work steel with high resistance to changing temperatures and good heat resistance. High thermal conductivity and toughness.

### **Uses:**

Cavity plates and inserts in plastics and die casting industry (e.g. where nitriding is to be carried out with high core strength).

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
10,8	11,4	11,8	12,0	12,4	12,8	12,9	

Thermal conductivity

W / (m·K)

20	350	700	°C
25,3	27,2	30,5	

## Remarks

**Polishing:** Highly suitable for polishing due to homogenous structure.

**Graining:** Well suited.

**Nitriding:** Increases wear resistance and prevents sticking of insert and components.

**Hardening:** At 1000°C - 1030°C

The most suitable heat treatment for the relevant workpiece should be discussed with the heat treatment company.

**Soft annealing:** 800°C - 840°C, approx. 4 h

**Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 600°C - 650°C, approx. 4 h with slow furnace cooling.

**Normal Working Hardness:** 30 - 50 HRC

**Dimensions Available:** W x L : on request

H - : on request

# Material: 1.2344



**Material No.:** 1.2344

**Abbreviated DIN Name:** X 40 CrMoV 5-1

<b>Chemical Analysis (%):</b>	C	Si	Cr	Mo	V
	0,4	1,0	5,3	1,4	1,0

**Hardness:** max. 220 HB (~750 - 770 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Cr-Mo-V alloyed hot-work steel with a high heat resistance and a high temperature wear resistance. Suitable for full quenching and tempering, water-coolable and with thermal shock resistance.

### **Uses:**

Cavity plates, slides, cores and ejectors for pressure die casting tools, standard material for hot-work tools.

## Physical Properties

### **Thermal expansion coefficient**

(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
10,9	11,9	12,3	12,7	13,0	13,3	13,5	

Thermal conductivity

W / (m·K)

20	350	700	°C
24,5	26,8	28,8	

## Remarks

**Polishing:** Possible.

**Graining:** Possible.

**Nitriding:** Possible.

**Hardening:** At 1020 - 1040°C

The most suitable heat treatment for the relevant workpiece should be suggested by the heat treatment company.

**Soft annealing:** 820 - 840°C, 4-6 h

**Stress-relief annealing:** To eliminate residual stress after coarse machining at 600-650°C, 4 h with slow cooling.

**Normal Working Hardness:** approx. 55 HRC

**Dimensions Available:** W x L : on request

H - : on request

# Material: 1.2379



**Material No.:** 1.2379  
**Abbreviated DIN Name:** X155 CrVMo 12-1

<b>Chemical Analysis (%):</b>	C	Cr	Mo	V
	1,53	12,0	0,7	1,0

**Hardness:** soft-annealed to max. 225 HB  
(~860 N/mm<sup>2</sup>)

## Characteristics

### **Material Properties:**

Versatile cold working steel, high chrome alloyed steel, good dimensional stability and toughness combined with high compressive strength. For good eroding properties, secondary hardening is recommended.

### **Uses:**

Compression moulding and injection moulding tools for reinforced plastics. Cutting, punching and thermoforming tools and other applications where a high level of toughness is required.

### **Remarks**

- Polishing:** Possible in the hardened state.
- Graining:** Not usual.
- Nitriding:** Only recommended after secondary hardening.
- Hardening:** At 1000°C - 1050°C  
The most suitable heat treatment for the relevant workpiece should be suggested by the heat treatment company.
- Soft annealing:** 820°C - 850°C, ca. 4 Std.
- Stress-relief annealing:** To eliminate residual stress after coarse machining at approx. 600°C - 650°C, approx. 4 h with slow heating and furnace cooling.
- Normal Working Hardness:** 58 - 62 HRC
- Dimensions Available:** W x L : on request  
H - : on request

## Physical Properties

**Thermal expansion coefficient**  
(10<sup>-6</sup>·m) / (m·K)

100	200	300	400	500	600	700	°C
10,5	11,0	11,0	12,0				

**Thermal conductivity**  
W / (m·K)

20	350	700	°C
17,2	21,0	24,7	