

# SPECIAL HOT WORK TOOL STEEL **CR7V-L**



THE PREMIUM STEEL WITH  
MAXIMUM HIGH TEMPERATURE  
WEAR RESISTANCE

**KIND&CO**  
EDELSTAHLWERK

*From the casting of steel to finished die...*



## LONG-STANDING KNOWLEDGE, INNOVATIVE MATERIALS TECHNOLOGY, AND ADVANCED EQUIPMENT ALL FORM THE BASIS FOR TOP QUALITY

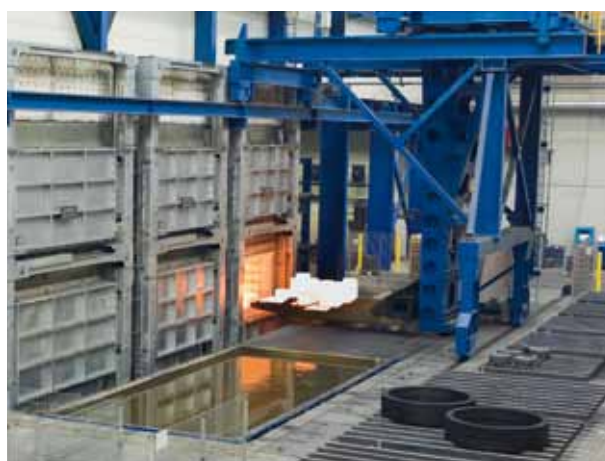
For over 125 years KIND & CO. Edelmetallwerk has been developing expertise in producing, finishing and developing high-alloy steels. Our experience has managed to extend our services to a truly global platform, while maintaining our traditional values.

**Customer orientation and quality:** these are the benchmarks for our daily operations using advanced technology and flexible production as well as a proven quality management system.

In addition to a broad range of tool steels and corrosion, acid and heat resistant steels, we offer a large selection of special steel grades as well as titanium- and nickel-based alloys. Furthermore, KIND & CO. has developed specific materials for various special applications.

Our steels can be found in all major industries including die casting, plastics, extrusion, pipe engineering, die forging, power engineering, aviation, mechanical and apparatus engineering, amongst others.

Our customers receive everything in one single package: high quality steel as well as die processing and finishing services to match their specific requirements.



Our flexibility allows us to develop tailored techniques and processes aligned with your requirements to help you achieve top performance.

Each one of our global customers is unique. Yet we are proud to state that they all have one thing in common: steel by KIND & CO.

This is why we constantly work to further enhance our high quality and customer-focused service. We are large enough to serve every customer but still small enough to find individual solutions.

Do not settle with less than the best.



# CR7V-L – THE PREMIUM STEEL WITH MAXIMUM HIGH TEMPERATURE WEAR RESISTANCE

- EXCELLENT HIGH TEMPERATURE WEAR RESISTANCE
- VERY HIGH HEAT RESISTANCE
- HIGH WORKING HARDNESS
- GOOD MACHINABILITY
- SUITABLE FOR HOT WORK AND COLD WORK APPLICATIONS

## MATERIAL PROPERTIES

CR7V-L is a special high Cr-alloyed steel with Mo and V additives and is characterized by excellent high temperature wear resistance with very high temperature strength and good thermal fatigue resistance. The steel is ideal for use in hot and cold work applications.

## APPLICATION

*Typical applications include:*

### For hot work:

- Drop forge die and die inserts for forging presses in steel processing, especially with serious wear problems
- Hot forming tools (press hardening) of structural automobile parts
- Extrusion die for steel processing
- Hot pressing die for the processing of copper and copper alloys
- Hot shearing blades and flash trimmers
- Push bench rollers for the production of seamless steel piping
- Production tools for seamless steel cylinders (e.g. drawing rollers)

### For cold work:

- Rollers, e.g. Former rolls used for steel rim processing
- Punches and shearing blades for sheet thicknesses of approx. 6-12 mm

## AS-DELIVERED CONDITION

The steel is delivered in a soft-annealed condition with a hardness of max. 240 HB. That ensures a good machining machinability.

Mechanically machined and hardened and tempered workpieces as well as finished tools can be delivered too.

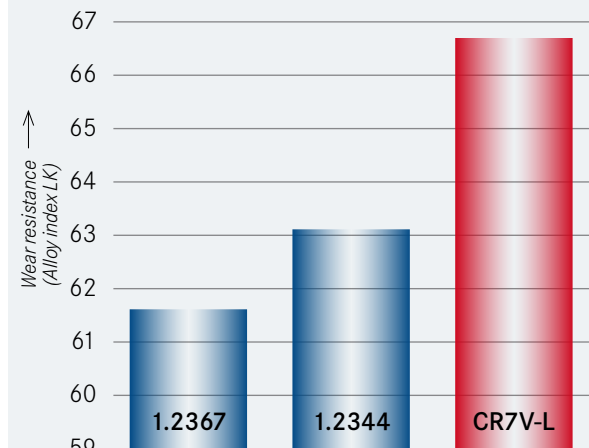
## Reference analysis in %

Material	C	Si	Mn	Cr	Mo	V
<b>CR7V-L</b>	<b>0.42</b>	<b>0.50</b>	<b>0.40</b>	<b>6.50</b>	<b>1.30</b>	<b>0.80</b>

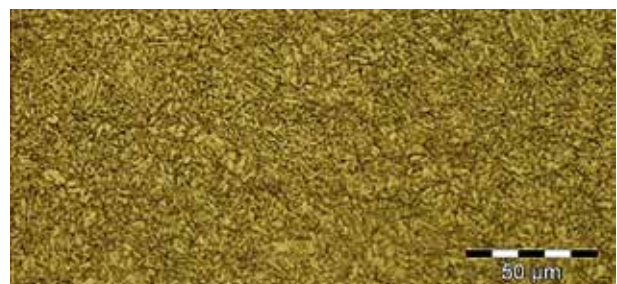
## Handling instruction

<b>Soft annealing</b>	820 - 840°C with slow cooling in furnace
<b>Hardness annealed</b>	max. 240 HB
<b>Stress relieve annealing</b>	approx. 650°C, 2 - 4 hrs. with slow cooling
<b>Hardening</b>	1030 - 1040°C, interrupt oil or polymer cooling at approx. 250 - 300°C, or vacuum harden
<b>Quenched hardness</b>	approx.. 57 HRC
<b>Tempering</b>	500 - 700°C, as needed, see Tempering diagram; temper to increase toughness 2 - 3 x
<b>Nitriding or Tenifer treatment</b>	well suited
<b>Preheating prior to use</b>	150 - 250°C is recommended

## Wear resistance based on the alloy index LK



*Alloy index as per Voss, Wetter, Netzhöfe*



Tempered microstructure for optimum toughness properties

# TOOL RELIABILITY FROM KIND & CO. – FOR MORE THAN 125 YEARS

Tool performance and reliability are some of the most important parameters for minimizing costs especially nowadays with modern production lines networked on multiple levels.

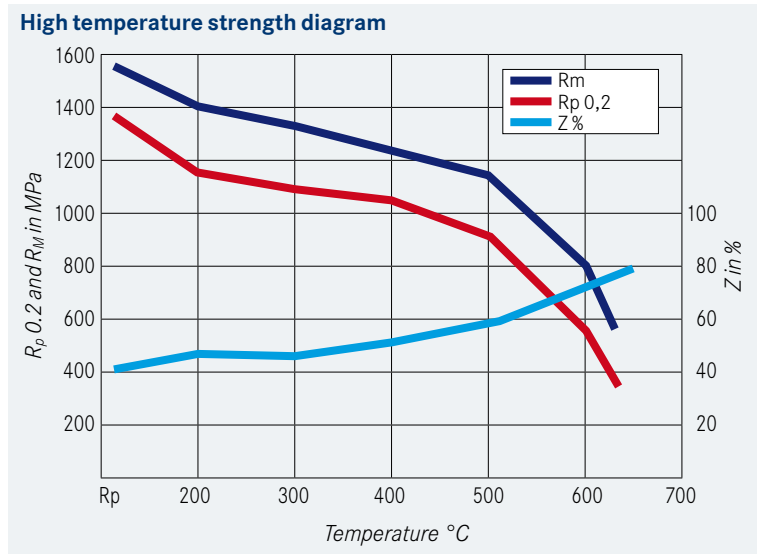
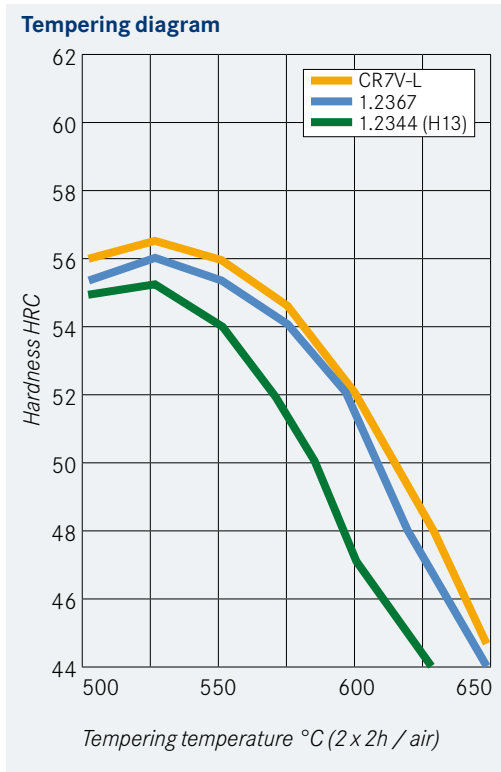
The service life of a tool can be increased mainly by implementing the right steel selection criteria and ensuring high quality production of steel and tools.

The prompt and competent technical advice provided by our experts is a crucial element of our customer support.



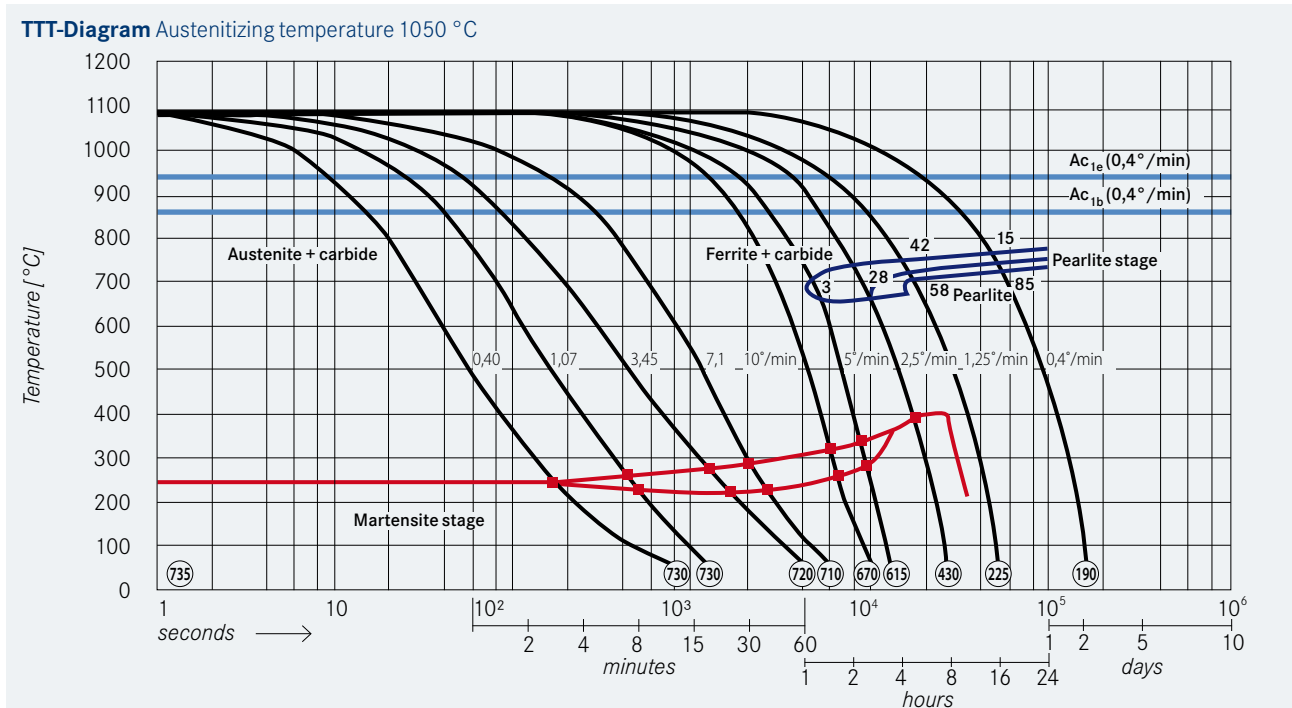
CR7V-L special hot-work tool steel was developed on the basis of standardized chromium-molybdenum-vanadium alloyed hot-work tool steels in order to allow us to provide our customers better wear resistance for specific applica-

tions as a result of the steel's improved case hardness and composition. CR7V-L has proven itself, especially for the hot forming of sheets and for die-forging shops that have to cope with particularly high abrasive wear and tear.



#### Physical-mechanical properties of CR7V-L

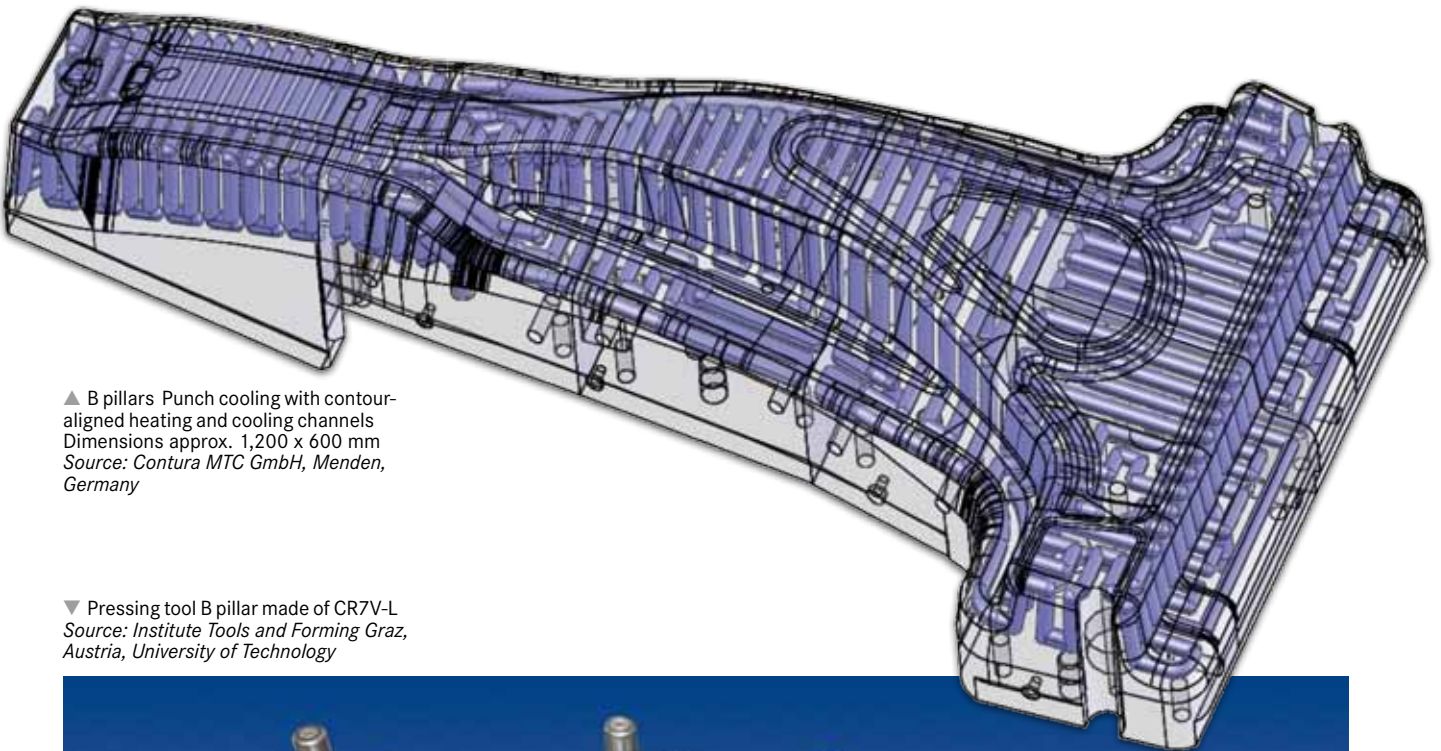
Temperature	°C	20	100	200	300	400	500	600	700	
Thermal conductivity	W/m x K	26.7	29.1	29.8	30.4	30.8	31.1	30.8	29.9	
Coefficient of linear thermal expansion	10 <sup>-6</sup> /m x K	11.2	11.4	12.5	12.4	12.5	12.8	13.1	13.3	
Density	g/cm <sup>3</sup>	7,6								



The press hardening process of sheet steel for automotive body parts places high demands on the high temperature strength and wear resistance of the tool steel that is used. Thanks to a working hardness of up to 56 HRC, CR7V-L special hot-work tool steel is especially resistant to wear – and that is even without any additional surface treatment like nitrogen hardening or PVD coating.

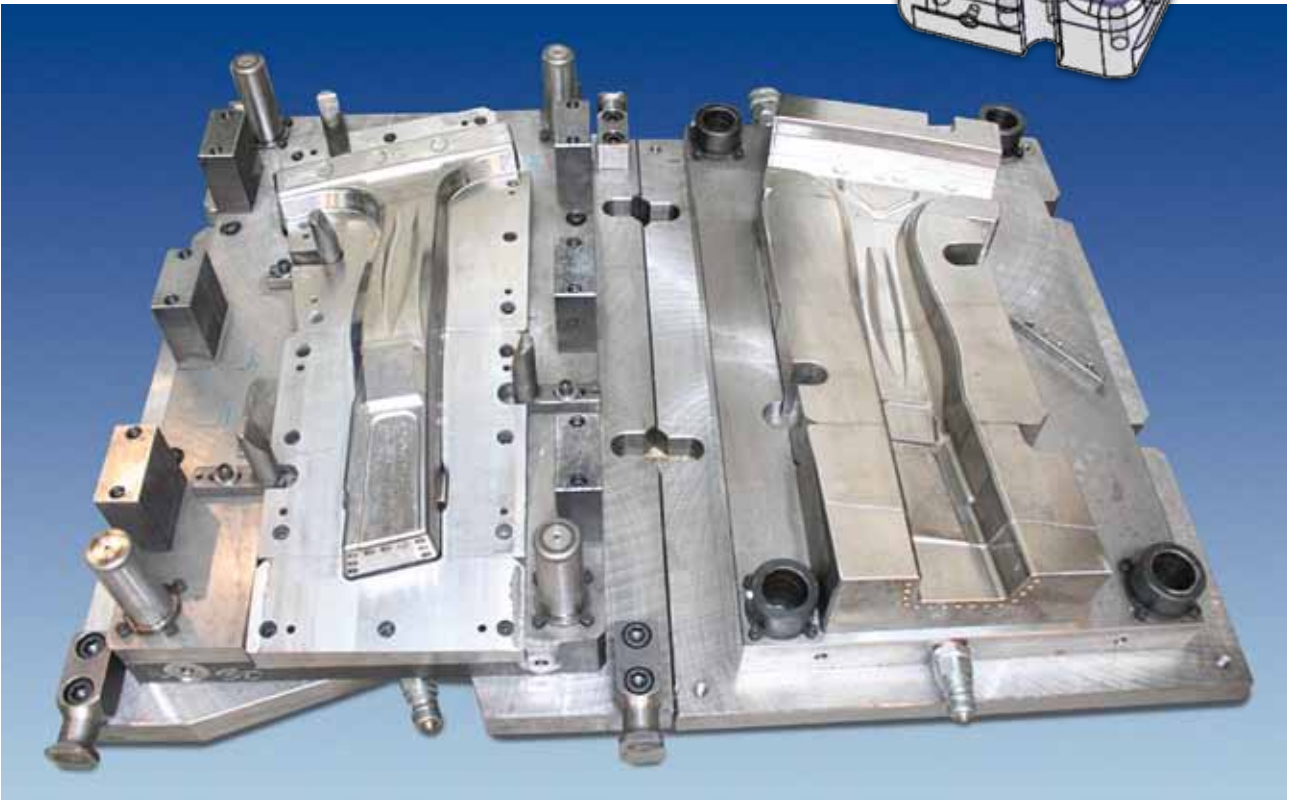
For the highest demands on press hardening tools, we recommend using CR7V-L that is produced in the electroslag remelting process (ESR).

The improved toughness provides tool designers with additional opportunities



▲ B pillars Punch cooling with contour-aligned heating and cooling channels  
Dimensions approx. 1,200 x 600 mm  
Source: Contura MTC GmbH, Menden, Germany

▼ Pressing tool B pillar made of CR7V-L  
Source: Institute Tools and Forming Graz, Austria, University of Technology



# TAILORED QUALITY DIES FOR PEAK PERFORMANCE



## PRODUCTS

HOT WORK TOOL STEELS  
COLD WORK TOOL STEELS  
DIE STEELS  
PLASTIC MOULD STEELS

## INDUSTRIES

DIE CASTING  
DIE FORGING  
EXTRUSION  
PIPE PRODUCTION  
PLASTICS TECHNOLOGY



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## More service

Tool steels and  
special materials

Melting

Forging

Ring rolling

Heat treatment

Machining

Surface treatment