



# **PREMIUM HOT-WORK TOOL STEELS**

High-quality material solutions tailored to the application



**Edelstahlwerk Kind & Co.**  
**GMH GRUPPE**

Pure Performance



# PREMIUM HOT-WORK TOOL STEELS

When standard steels reach their limits

Demanding applications place exceptional requirements on tool steel. High thermal and mechanical loads, wear and demanding surface requirements can limit tool life and process performance.

Kind & Co. has developed its premium steels for applications where standard grades no longer provide the required combination of properties. Different material concepts allow the steel to be matched to the specific demands of the tool and its operating conditions.

The objective is clear: reliable tool performance and longer tool life.

### From steel to heat treatment – from a single source

At Kind & Co., material expertise and processing go hand in hand. Our capabilities cover melting and forging, machining and heat treatment.

At our Bielstein site in Germany, our own machining facilities offer a wide range of processing options. With more than 40 years of experience in heat treatment, five vacuum furnaces and charging weights of up to 6.5 tonnes, we can also handle large cross-sections and unit weights while achieving the required material properties.

## Kind & Co.

Since 1888, Kind & Co. has produced tool steel at its Bielstein site, in Germany. Our expertise is focused on demanding applications in die casting, extrusion and die forging.

We combine material development, application expertise and processing to help customers select the right solution for the demands of their tools and processes.

### Material solutions by application

This brochure provides an overview of our material portfolio for:

- Die casting
- Extrusion
- Die forging
- Hot-stamping
- Plastic moulds
- Glass moulds

# DIE CASTING

## Built for demanding thermal and mechanical loads

Die casting places tools under repeated thermal and mechanical stress. The right material properties are therefore critical to tool life and stable performance.

Kind & Co. offers standard and premium hot-work tool steels for different load profiles – from demanding surface requirements to applications exposed to high thermal and mechanical loads.

| Brand name | Mat.-Nr. | AISI | Application                                                                                                       | Toughness | Thermal shock resistance | Comments                                                                             |
|------------|----------|------|-------------------------------------------------------------------------------------------------------------------|-----------|--------------------------|--------------------------------------------------------------------------------------|
| CS1*       | Premium  | -    | Applications with highest surface requirements and narrow shape tolerances                                        |           |                          | Combination of high hardness (up to max. 58 HRC) and good toughness at the same time |
| HP1*       | Premium  | -    | Die casting inserts with highest mechanical and thermal loads                                                     |           |                          |                                                                                      |
| TQ1*       | Premium  | -    | High-performance die casting inserts, especially for large-format moulds and structural components                |           |                          |                                                                                      |
| HTR*       | Premium  | -    | Local areas and small-format die casting die inserts that are exposed to high thermal loads, max. hardness 42 HRC |           |                          | Premium steel with excellent thermal conductivity                                    |
| HMoD*      | 1.2889   | H19A | Dies for heavy metal casting, highly stressed cores and inserts in the sprue area                                 |           |                          | Excellent hot strength and high hot wear resistance                                  |
| RM10Co*    | 1.2888   | -    | Shot sleeves, brass die casting                                                                                   |           |                          | Extremely high tempering resistance                                                  |
| RPU**      | 1.2367   | -    | Small and medium-sized die casting die inserts                                                                    |           |                          |                                                                                      |
| USD**      | 1.2344   | H13  | Widely applicable hot-work tool steel for thermally highly stressed dies                                          |           |                          |                                                                                      |
| USN**      | 1.2343   | H11  | Universally applicable hot-work tool steel with balanced properties                                               |           |                          |                                                                                      |

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# EXTRUSION

## Material performance where tool life matters

Extrusion tools operate under high thermal and mechanical loads. Depending on the material being processed and the tool function, the demands on toughness, high-temperature strength and hot-wear resistance can vary considerably.

Kind & Co. offers hot-work tool steels developed for these different requirements – from containers and liners to stems, mandrels and extrusion dies.

Our material portfolio covers the extrusion of aluminium, copper, brass, steel and stainless steel, as well as special materials such as titanium, zirconium and silver brazing alloys.

## Hot-work tool steels

| Brand name | Mat.-Nr. | AISI | Application                                                                                                           | Toughness | High-temperature strength | Hot wear resistance | Comments                                                                             |
|------------|----------|------|-----------------------------------------------------------------------------------------------------------------------|-----------|---------------------------|---------------------|--------------------------------------------------------------------------------------|
| CS1*       | Premium  | -    | Extrusion dies with specific compressive stress > 1000 MPa, very highly stressed stems, dummy blocks and inner liners |           |                           |                     | Combination of high hardness (up to max. 58 HRC) and good toughness at the same time |
| HP1*       | Premium  | -    | Highly stressed extrusion stems and dies with high toughness requirements                                             |           |                           |                     |                                                                                      |
| TQ1*       | Premium  | -    | Highly stressed intermediate and inner liners and stems, mandrels and extrusion dies                                  |           |                           |                     |                                                                                      |
| Q10        | Premium  | -    | Tools for extrusion with very long tool life for highly stressed inner liners and smaller stems                       |           |                           |                     |                                                                                      |
| HTR*       | Premium  | -    | Air-cooled intermediate liners in copper/brass alloys extrusion, extrusion dies and mandrels                          |           |                           |                     |                                                                                      |
| GSF        | Premium  | -    | Tie rods, press columns, mandrel holders and piston rods                                                              |           |                           |                     |                                                                                      |

| Brand name | Mat.-Nr. | AISI | Application                                                                                                 | Toughness | High-temperature strength | Hot wear resistance | Comments |
|------------|----------|------|-------------------------------------------------------------------------------------------------------------|-----------|---------------------------|---------------------|----------|
| HMoD**     | 1.2889   | H19A | Extrusion dies and die holders for the processing of copper/brass alloys                                    |           |                           |                     |          |
| HWD        | 1.2678   | H19  | Extrusion dies and die holders for the processing of copper/brass alloys                                    |           |                           |                     |          |
| RM10Co**   | 1.2888   | -    | Extrusion dies, die holders and inner liners for processing copper/brass alloys                             |           |                           |                     |          |
| RPCo       | 1.2885   | H10A | Tool head for indirect stems for copper/brass alloys                                                        |           |                           |                     |          |
| RPU**      | 1.2367   | -    | Intermediate and inner liners for high loads, extrusion stems, mandrels, dies, dummy blocks and die holders |           |                           |                     |          |
| USD**      | 1.2344   | H13  | Containers, intermediate and inner liners, press stems, mandrels and dies                                   |           |                           |                     |          |
| USN**      | 1.2343   | H11  | Highly stressed container mantles, intermediate and inner liners, mandrels and dies                         |           |                           |                     |          |

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High temperature austenitic steels

| Brand name | Mat.-Nr. | AISI | Characteristics                           | Application                                                                      |
|------------|----------|------|-------------------------------------------|----------------------------------------------------------------------------------|
| AWS        | 1.2731   | -    | Austenitic hot-work tool steel            | Extrusion dies for processing copper alloys                                      |
| HWF        | 1.2779   | A286 | Austenitic precipitation hardenable steel | Thermally highly stressed inner liners for the processing of copper/brass alloys |
| MA-Rekord  | 1.2758   | -    | Austenitic hot-work tool steel            | Extrusion dies for processing of copper/brass alloys                             |

Nickel-base alloys

| Brand name | Mat.-Nr. | AISI     | Characteristics                                                                     | Application                                                                            |
|------------|----------|----------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| SA50Ni     | 2.4973   | R41      | Precipitation-hardenable nickel-base alloy with very high high-temperature strength | Dies, die holders and mandrel tips for processing of copper/brass alloys               |
| SA718      | 2.4668   | UNS 7718 | Precipitation-hardenable nickel-base alloy with high high-temperature strength      | Inner liners, dies, die holders and mandrel tips for processing of copper/brass alloys |

DIE FORGING

Performance under high wear and demanding loads

Forging dies must withstand combinations of mechanical, thermal and wear-related stresses. The material therefore needs to match both the application and the dominant failure mechanism.

Kind & Co. offers premium and standard tool steels for a wide range of forging applications – from highly stressed dies and inserts to mandrels, stems and tools for high-speed forging machines.

For demanding applications, our premium grades provide different combinations of toughness, high-temperature strength and hot-wear resistance, allowing the material to be selected according to the specific operating conditions.

| Brand name | Mat.-Nr. | AISI | Application                                                                                                                                                                                                                                   | Toughness | High-temperature strength | Hot wear resistance | Comments                                                                             |
|------------|----------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------|---------------------|--------------------------------------------------------------------------------------|
| Cr7V-L     | Premium  | -    | High performance forging dies with high wear requirements                                                                                                                                                                                     |           |                           |                     | Ideal for large series                                                               |
| CS1*       | Premium  | -    | Dies subjected to a combination of intensive wear with simultaneous risk of cracking - as in semi-hot forging and other demanding applications                                                                                                |           |                           |                     | Combination of high hardness (up to max. 58 HRC) and good toughness at the same time |
| DFA        | Premium  | -    | Dies and inserts with simple engravings and high wear requirements                                                                                                                                                                            |           |                           |                     |                                                                                      |
| FTCo*      | Premium  | -    | Dies and mandrels for high-speed forging machines, ejectors and semi-hot forging tools and near net shape forging tools                                                                                                                       |           |                           |                     |                                                                                      |
| GSF        | Premium  | -    | Highly stressed hammer dies, build-up welded press dies, large hammer dies and finishing dies for hydraulic presses, rams and tool holders                                                                                                    |           |                           |                     | Significant increase in performance compared to 1.2714 in case of cracking           |
| HP1*       | Premium  | -    | Forging of light metals, especially for deep cavities, e.g. chassis parts                                                                                                                                                                     |           |                           |                     | Particularly suitable for forging aluminium                                          |
| HSF        | Premium  | -    | Tools for mandrels, liners and medium-sized or larger stems in high-speed forging machines, round dies with high requirements for hot wear resistance combined with very good toughness, large product series and high tolerance requirements |           |                           |                     |                                                                                      |
| HTR*       | Premium  | -    | Dies requiring very high tempering resistance, forging of brass                                                                                                                                                                               |           |                           |                     |                                                                                      |

# DIE FORGING

## Performance under high wear and demanding loads

| Brand name | Mat.-Nr. | AISI | Application                                                                                                         | Toughness                                                                           | High-temperature strength                                                            | Hot wear resistance                                                                   | Comments                          |
|------------|----------|------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------|
| LMF        | Premium  | -    | Aluminium forging, forging dies subjected to cracking, finishing dies                                               |    |    |    | Alternative to 1.2343, 1.2343 ESR |
| Q10        | Premium  | -    | Dies subjected to high impact stress, dies with complex geometry, exposed to high thermal stress with high hot wear |    |    |    |                                   |
| TQ1*       | Premium  | -    | Medium and large press dies with deep cavity and intensively cooled multi-stage dies                                |    |    |    |                                   |
| PWM        | 1.2714   | ~L6  | Hammer dies and press saddles                                                                                       |    |    |    |                                   |
| PWU        | 1.2744   | -    | Hammer dies, jaws on forging machines, moulding press dies                                                          |  |  |  | More efficient alternative to PWM |
| RP         | 1.2365   | H10  | Small press dies, mandrels and dies for high-speed forging machines                                                 |  |  |  |                                   |
| RPCo       | 1.2885   | H10A | Moulding press dies, especially mandrel inserts for copper and copper alloys                                        |  |  |  |                                   |
| RPU        | 1.2367   | -    | Dies or die inserts under forging presses for steel forming                                                         |  |  |  |                                   |
| USD        | 1.2344   | H13  | Widely applicable hot-work tool steel for press dies and inserts for steel and light metals                         |  |  |  |                                   |
| USN        | 1.2343   | H11  | Universal hot-work tool steel for press dies and inserts for steel and light metals                                 |  |  |  |                                   |

# HOT-STAMPING

## Wear resistance for long tool life

Hot stamping combines high temperatures with demanding wear conditions. The tool steel must maintain the properties required for reliable performance throughout the production process.

Kind & Co. offers different material solutions for hot-stamping tools, including grades for applications with particularly high wear or temperature requirements.

| Brand name | Mat.-Nr. | AISI | Application                                                                                                                 | Toughness                                                                             | High-temperature strength                                                             | Hot wear resistance                                                                   | Comments                                                                     |
|------------|----------|------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Cr7V-L     | Premium  | -    | Well-established steel for high tool performance with low tool care requirements                                            |    |    |    |                                                                              |
| UH1*       | Premium  | -    | High-performance steel for hot-stamping tools with particularly high wear resistance, large product series                  |    |    |    | High working hardness up to max. 58 HRC with good toughness at the same time |
| HMoD*      | 1.2889   | -    | Hot-work tool steel for inserts subjected to particularly high temperature with simultaneous high wear - Tailored Tempering |  |  |  |                                                                              |
| RM10Co*    | 1.2888   | -    | Local inserts with highest temperature requirements in the Tailored Tempering process                                       |  |  |  |                                                                              |
| RPU        | 1.2367   | -    |                                                                                                                             |  |  |  |                                                                              |
| USD        | 1.2344   | H13  |                                                                                                                             |  |  |  |                                                                              |

\*only available in ESR-quality

# PLASTIC MOULDS

## The right properties for demanding mould surfaces

Efficient plastics production places different demands on mould steel. Depending on the application, corrosion resistance, polishability, thermal conductivity, wear resistance and mould life can all play an important role.

Kind & Co. offers corrosion-resistant and through-hardenable steels for different mould requirements, including precision parts, demanding surface qualities, high glass-fibre contents and large production series.

High steel cleanliness supports the surface quality required in demanding mould applications.

## Corrosion-resistant steels

| Brand name | Mat.-Nr. | AISI | Application                                                                                                 | Corrosion resistance                                                              | Polishability                                                                      | Thermal conductivity                                                                |
|------------|----------|------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| CMR**      | 1.2316   | -    | Moulds for precision plastic parts for use under corrosive conditions                                       |  |  |  |
| RF*        | 1.2083   | 420  | Moulds for precision plastic parts for use under corrosive conditions, with high demands on surface quality |  |  |  |

## Through-hardenable steels

| Brand name | Mat.-Nr. | AISt | Application                                                                                                                                                | Wear resistance | Polishability | Thermal conductivity |
|------------|----------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|----------------------|
| CS1*       | Premium  | -    | Texturized and polished mould inserts and mould plates for processing plastics with a high glass fibre content or moulds with highest surface requirements |                 |               |                      |
| GSF*       | Premium  | -    | High-quality mould inserts for medium-sized product series                                                                                                 |                 |               |                      |
| TQ1*       | Premium  | -    | Moulds of all sizes for precision plastic parts, suitable for large production series, suitable for mirror polishing                                       |                 |               |                      |
| N400       | 1.2767   | -    | Variety of highly stressed moulds, injection moulds for transparent plastics                                                                               |                 |               |                      |
| USD**      | 1.2344   | H13  | Moulds of all sizes for precision plastic parts, suitable for large production series - for mirror polishing we recommend the ESR-quality                  |                 |               |                      |
| USN**      | 1.2343   | H11  | Moulds of all sizes for precision plastic parts, suitable for large production batches - for mirror polishing we recommend the ESR-quality                 |                 |               |                      |

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# GLASS MOULDS

## Tool steel matched to the glass-forming process

Glass-forming processes place different demands on mould materials depending on the product and manufacturing method.

Kind & Co. offers tool steels for applications ranging from hollow glassware to tempered and technical glass, with material properties selected for requirements such as scale resistance, polishability and high-temperature strength.

| Brand name | Mat.-Nr. | AISI | Application                                                                                                           | Scale resistance | Polierbarkeit | High-temperature strength |
|------------|----------|------|-----------------------------------------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| FAM*       | 1.2787   | 431  | Glass moulds for high demands on glass quality, suitable for tempered and technical glass and large production series |                  |               |                           |
| ZF2*       | 1.2782   | 314  | Glass moulds for high demands on glass quality, suitable for tempered and technical glass and large production series |                  |               |                           |

\*only available in ESR-quality

