ARNO®
WERKZEUGE
We have a passion for precision.

# CARBIDE INSERTS

## For turning exotic materials


www.arno.de



09/2014

# For the most demanding applications:

## High positive inserts

**Ideal for applications in:**
Medical-, automotive-, aerospace- and precision equipment industries

New technologies and the growing diversity of material grades create the need for new tools and cutting materials. With the ARNO® developed special high positive geometry and the use of different kinds of coatings we provide best cutting performance in a multitude of materials.

- **Special geometries for chip contraction**
- **Polished surface for optimal chip flow**
- **High positive chip angle for soft cutting and reliable productivity**

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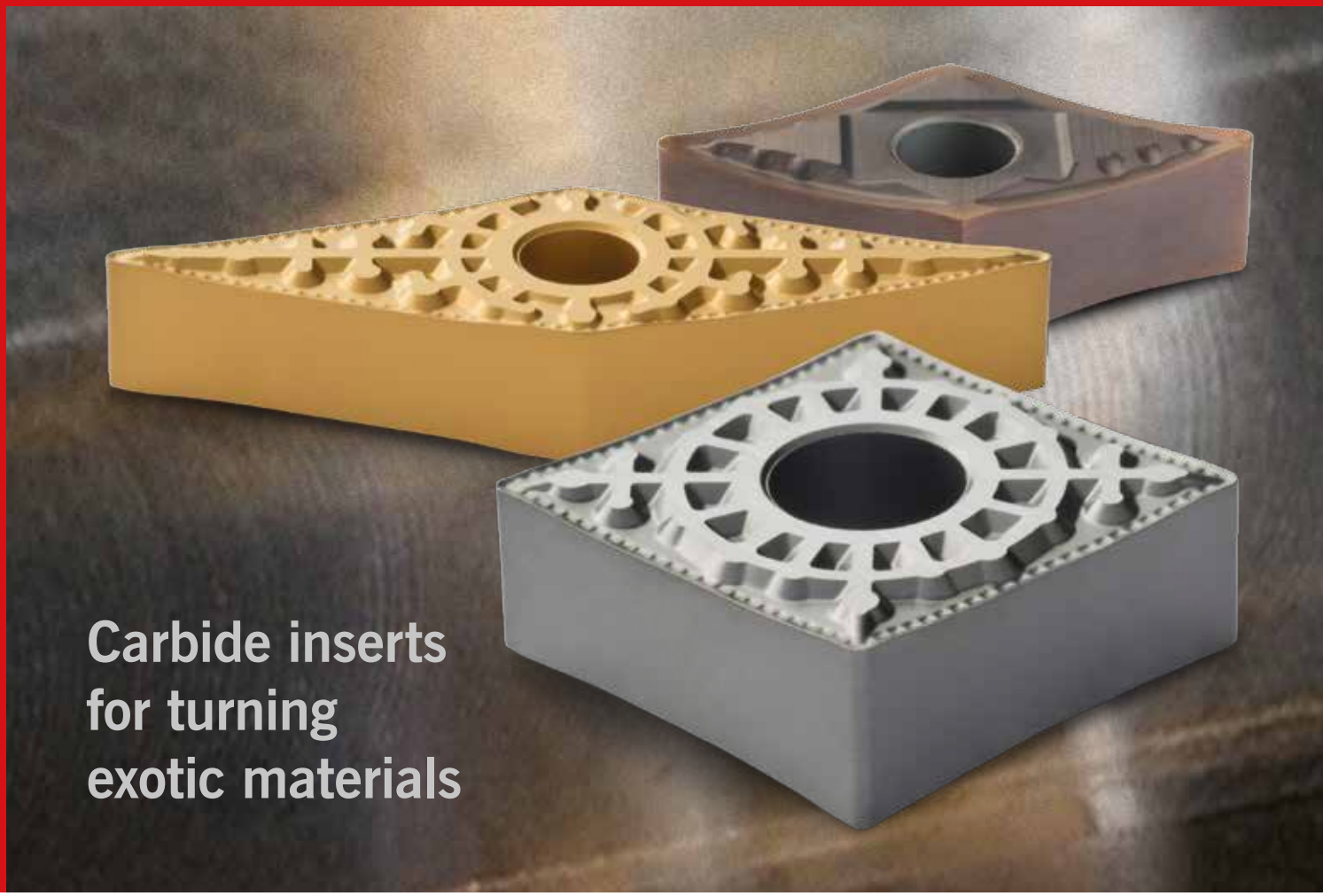


# Carbide inserts for turning exotic materials

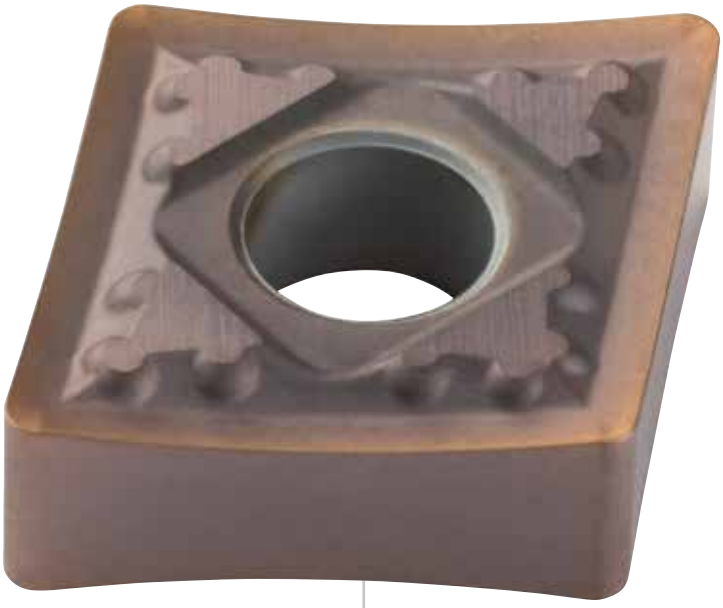
## Introduction

High temperature alloys, super alloys, exotic materials from various manufacturers, for example: Inconel and Hastelloy are due to their high nickel and chrome contents often considered as hard to machine materials. Carbide inserts often fail on these tough materials with breakage, early notch wear or poor chip control. These materials, with their reduced weight and higher heat resistance are becoming more and more universally used in all industries. ARNO®-Werkzeuge is offering reliable tools which are suitable for the materials.

### Your advantages:

- **The solution for turning exotic materials**
- **Reliable performance**
- **Notch and heat resistant for very good tool life**
- **Process secure performance with excellent chip control**
- **ISO designation code carbide inserts**

## ISO designation code – carbide inserts



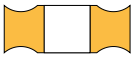
| CNMG | 120404EN | -NMT | AM2130 |
|---|---|---|---|
| ISO form – Insert | Insert | Chip breaker | Grade description |
| | 12 = Edge length | | |
| | 04 = Insert thickness | | |
| | 08 = Corner radius | | |
| | EN = Edge preparation | | |

## Geometry description

### - NFT

**For finishing and semi-finish turning.**
Main application area for exotic materials and high temperature titanium and nickel alloys. Can also be used for machining stainless steel.
Chip angle 20°.

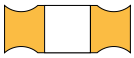
**Finish and semi-finish turning**
**double sided**



### - NMT1

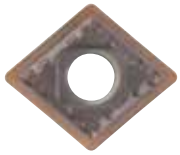
**For medium and rough turning.**
Main application area for exotic materials and high temperature titanium and nickel alloys. Can also be used for machining stainless steel.
Chip angle 30°.

**Medium and rough turning**
**double sided**

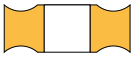


### - NMT

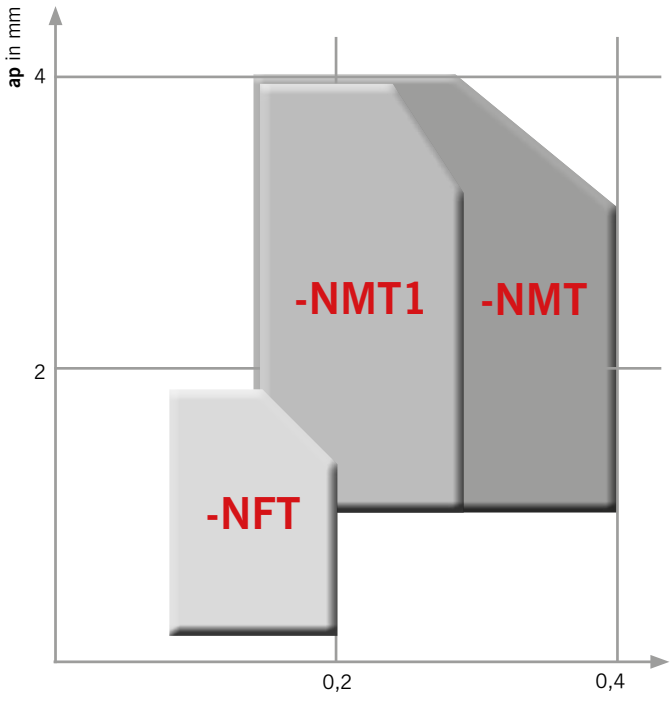
**For medium and rough turning.**
Main application area for exotic materials and high temperature titanium and nickel alloys. Can also be used for machining stainless steel.
Chip angle 10°.



**Medium and rough turning**
**double sided**



## Feed rate and cutting depth recommendation




| Geometry | ap in mm | f in mm/rev |
|---|---|---|
| -NFT | 0,25 – 1,7 | 0,08 – 0,2 |
| -NMT1 | 1 – 4 | 0,15 – 0,3 |
| -NMT | 1 – 4 | 0,15 – 0,4 |

## Coated

### AM2130
**CVD multilayer coating**
Main grade for medium to rough machining of stainless steel. Due to the very hard and micro fine coating this grade offer improved wear resistance and long tool life.

### AM5110
**PVD multilayer coating**
Grade for finish machining of VA-steel, nickel and titanium alloys and exotic materials. Also suitable for abrasive and naturally hardened materials such as CoCrMo or hard cast iron.

### AM5120
**PVD multilayer coating**
Grade for roughing stainless steel, also well suited for exotic materials, heat resistant alloys and titanium alloys.

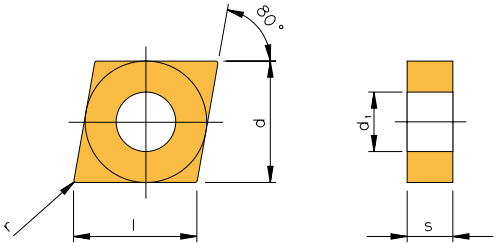
### AM5130
**PVD multilayer coating**
Universal grade for medium machining of stainless steel, alloyed steel and exotic materials.

## Uncoated

### AS1010
**Uncoated grade**
Grade for finish and light medium machining of hard to machine materials, high temperature resistant nickel and titanium alloys as well as exotic materials. Grade can also be used for finish turning of stainless steel.

### AS1020
**Uncoated grade**
Grade for medium machining of hard to machine materials, high temperature resistant nickel and titanium alloys as well as exotic materials. Grade can also be used for light medium turning of stainless steel.

## CNMG

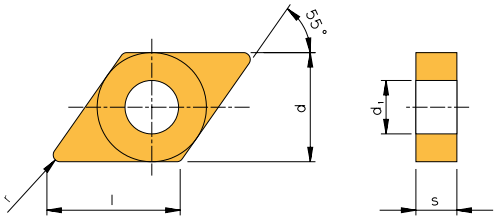



| Designation | l | d | s | $d_1$ | r | PG | coated AM2130 | coated AM5110 | coated AM5120 | coated AM5130 | uncoated AS1010 | uncoated AS1020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CNMG 120404EN-NFT | 12,90 | 12,700 | 4,76 | 5,2 | 0,4 | 40 | ● | ● | ● | | ● | ● | NEW |
| CNMG 120408EN-NFT | 12,90 | 12,700 | 4,76 | 5,2 | 0,8 | 40 | ● | ● | ● | | ● | ● | NEW |
| CNMG 120404EN-NMT | 12,90 | 12,700 | 4,76 | 5,2 | 0,4 | 40 | ● | ● | ● | ● | | | |
| CNMG 120408EN-NMT | 12,90 | 12,700 | 4,76 | 5,2 | 0,8 | 40 | ● | ● | ● | ● | | | |
| CNMG 120412EN-NMT | 12,90 | 12,700 | 4,76 | 5,2 | 1,2 | 40 | ● | ● | ● | ● | | | |
| CNMG 120408EN-NMT1 | 12,90 | 12,700 | 4,76 | 5,2 | 0,8 | 40 | ● | ● | ● | | ● | ● | NEW |
| CNMG 120412EN-NMT1 | 12,90 | 12,700 | 4,76 | 5,2 | 1,2 | 40 | ● | ● | ● | | ● | ● | NEW |

● Main application area
○ Secondary application area

| | | | | | | |
|---|---|---|---|---|---|---|
| P | | | | | | |
| M | ● | ● | ● | ● | ○ | ○ |
| K | | | | | | |
| N | | | | | | |
| S | ○ | ● | ● | ● | ● | ● |
| H | | | | | | |

## DNMG



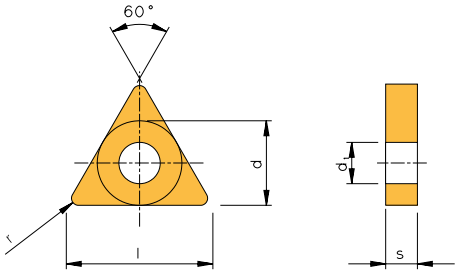

| Designation | l | d | s | $d_1$ | r | PG | coated AM2130 | coated AM5110 | coated AM5120 | coated AM5130 | uncoated AS1010 | uncoated AS1020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DNMG 150604EN-NFT | 15,50 | 12,700 | 6,35 | 5,2 | 0,4 | 2 | ● | ● | ● | | ● | ● | NEW |
| DNMG 150608EN-NFT | 15,50 | 12,700 | 6,35 | 5,2 | 0,8 | 2 | ● | ● | ● | | ● | ● | NEW |
| DNMG 110404EN-NMT | 11,60 | 9,525 | 4,76 | 5,2 | 0,4 | 2 | ● | ● | ● | ● | | | |
| DNMG 150604EN-NMT | 15,50 | 12,700 | 6,35 | 5,2 | 0,4 | 2 | ● | ● | ● | ● | | | |
| DNMG 150608EN-NMT | 15,50 | 12,700 | 6,35 | 5,2 | 0,8 | 2 | ● | ● | ● | ● | | | |
| DNMG 150608EN-NMT1 | 15,50 | 12,700 | 6,35 | 5,2 | 0,8 | 2 | ● | ● | ● | | ● | ● | NEW |
| DNMG 150612EN-NMT1 | 15,50 | 12,700 | 6,35 | 5,2 | 1,2 | 2 | ● | ● | ● | | ● | ● | NEW |

● Main application area
○ Secondary application area

| | | | | | | |
|---|---|---|---|---|---|---|
| P | | | | | | |
| M | ● | ● | ● | ● | ○ | ○ |
| K | | | | | | |
| N | | | | | | |
| S | ○ | ● | ● | ● | ● | ● |
| H | | | | | | |

Dimensions in mm

## TNMG

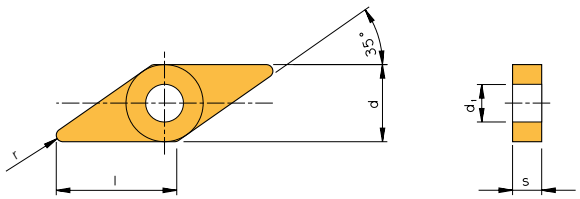



| | Designation | l | d | s | $d_1$ | r | PG | coated AM2130 | coated AM5110 | coated AM5120 | coated AM5130 | uncoated AS1010 | uncoated AS1020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **TNMG 160404EN-NFT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,4 | **2** | ● | ● | ● | | ● | ● | NEW |
| | **TNMG 160408EN-NFT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,8 | **2** | ● | ● | ● | | ● | ● | NEW |
|  | **TNMG 160404EN-NMT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,4 | **2** | ● | ● | ● | ● | | | |
| | **TNMG 160408EN-NMT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,8 | **2** | ● | ● | ● | ● | | | |
|  | **TNMG 160408EN-NMT1** | 16,50 | 9,525 | 4,76 | 3,81 | 0,8 | **2** | ● | ● | ● | | ● | ● | NEW |
| | **TNMG 160412EN-NMT1** | 16,50 | 9,525 | 4,76 | 3,81 | 1,2 | **2** | ● | ● | ● | | ● | ● | NEW |

● Main application area
○ Secondary application area

| | | | | | |
|---|---|---|---|---|---|
| P | | | | | |
| M | ● | ● | ● | ● | ○ | ○ |
| K | | | | | |
| N | | | | | |
| S | ○ | ● | ● | ● | ● | ● |
| H | | | | | |

## VNMG

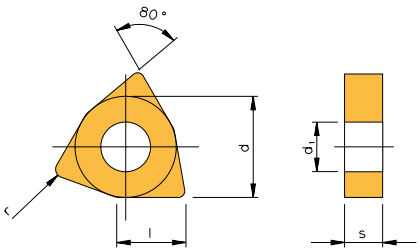



| | Designation | l | d | s | $d_1$ | r | PG | coated AM2130 | coated AM5110 | coated AM5120 | coated AM5130 | uncoated AS1010 | uncoated AS1020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | **VNMG 160404EN-NFT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,4 | **2** | ● | ● | ● | | ● | ● | NEW |
| | **VNMG 160408EN-NFT** | 16,50 | 9,525 | 4,76 | 3,81 | 0,8 | **2** | ● | ● | ● | | ● | ● | NEW |

● Main application area
○ Secondary application area

| | | | | | |
|---|---|---|---|---|---|
| P | | | | | |
| M | ● | ● | ● | ● | ○ | ○ |
| K | | | | | |
| N | | | | | |
| S | ○ | ● | ● | ● | ● | ● |
| H | | | | | |

# WNMG




| Designation | l | d | s | $d_1$ | r | PG | coated AM2130 | coated AM5110 | coated AM5120 | coated AM5130 | uncoated AS1010 | uncoated AS1020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **WNMG 080404EN-NFT** | 8,72 | 12,700 | 4,76 | 5,16 | 0,4 | **2** | ● | ● | ● | | ● | ● | NEW |
| **WNMG 080408EN-NFT** | 8,72 | 12,700 | 4,76 | 5,16 | 0,8 | **2** | ● | ● | ● | | ● | ● | NEW |
| **WNMG 080404EN-NMT** | 8,72 | 12,700 | 4,76 | 5,16 | 0,4 | **2** | ● | ● | ● | ● | | | |
| **WNMG 080408EN-NMT** | 8,72 | 12,700 | 4,76 | 5,16 | 0,8 | **2** | ● | ● | ● | ● | | | |
| **WNMG 080408EN-NMT1** | 8,72 | 12,700 | 4,76 | 5,16 | 0,8 | **2** | ● | ● | ● | | ● | ● | NEW |
| **WNMG 080412EN-NMT1** | 8,72 | 12,700 | 4,76 | 5,16 | 1,2 | **2** | ● | ● | ● | | ● | ● | NEW |

● Main application area
○ Secondary application area

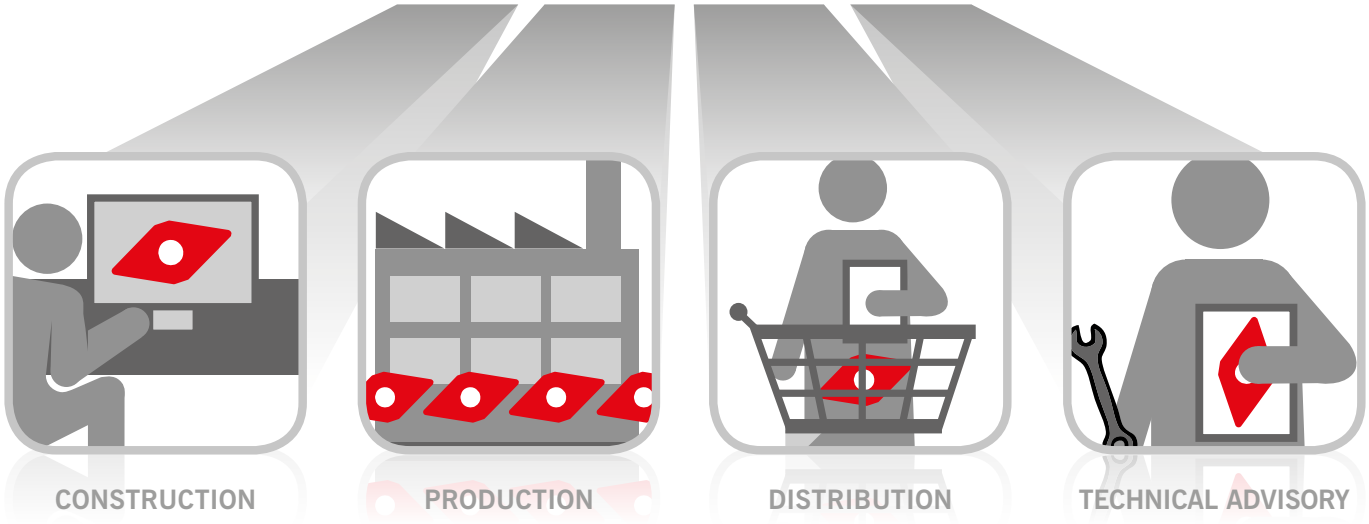
| | AM2130 | AM5110 | AM5120 | AM5130 | AS1010 | AS1020 |
|---|---|---|---|---|---|---|
| P | | | | | | |
| M | ● | ● | ● | ● | ○ | ○ |
| K | | | | | | |
| N | | | | | | |
| S | ○ | ● | ● | ● | ● | ● |
| H | | | | | | |

Dimensions in mm

| ISO | Material | | Tensile strength (N/mm²) | Cutting speed $V_c$ (m/min) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | coated | | | | uncoated | |
| | | | | AM2130 | AM5110 | AM5120 | AM5130 | AS1010 | AS1020 |
| P | Unalloyed steel and cast steel | < 0.15 % C/hardened and tempered | 350 | – | – | – | – | – | – |
| | | 0.15 - 0.45 % C/hardened and tempered | 650 | – | – | – | – | – | – |
| | | > 0.45 % C/hardened and tempered | 1000 | – | – | – | – | – | – |
| | Low alloyed steel and cast steel | annealed | 600 | – | – | – | – | – | – |
| | | hardened and tempered | 900 | – | – | – | – | – | – |
| | | | 1200 | – | – | – | – | – | – |
| | High alloyed steel | annealed | 700 | – | – | – | – | – | – |
| | High alloyed tool steel and cast steel | hardened | 1100 | – | – | – | – | – | – |
| | Stainless steel | ferritic, annealed | 700 | – | – | – | – | – | – |
| | Cast steel | martensitic, hardened and tempered | 1000 | – | – | – | – | – | – |
| M | Stainless steel | ferritic / martensitic, annealed | 450 – 600 | 100 – 140 | 80 – 180 | 80 – 160 | 80 – 150 | 60 – 130 | 60 – 120 |
| | | martensitic / austenitic, heat treated | 600 – 900 | 70 – 140 | 40 – 140 | 40 – 130 | 40 – 120 | 50 – 120 | 40 – 110 |
| K | Cast iron | pearlitic/ferritic | 500 – 700 | – | – | – | – | – | – |
| | | pearlitic/martensitic | 700 – 850 | – | – | – | – | – | – |
| | | | 800 – 1100 | – | – | – | – | – | – |
| | Cast iron with nodular graphite | ferritic | 550 | – | – | – | – | – | – |
| | | pearlitic | 800 | – | – | – | – | – | – |
| | Malleable cast iron | ferritic | 450 | – | – | – | – | – | – |
| | | pearlitic | 750 | – | – | – | – | – | – |
| N | Aluminium alloys long chipping | not heat treatable | 200 | – | – | – | – | – | – |
| | | heat treatable, heat treated | 350 | – | – | – | – | – | – |
| | Casted aluminium alloys | ≤ 12 % Si, heat treated | 250 | – | – | – | – | – | – |
| | | ≤ 12 % Si, heat treatable, heat treated | 300 | – | – | – | – | – | – |
| | | ≤ 12 % Si, not heat treatable | 450 | – | – | – | – | – | – |
| | Copper and copper alloys (Brass/Bronze) | Lead alloys, Pb > 1 % | 400 | – | – | – | – | – | – |
| | | Brass, Bronze | 300 | – | – | – | – | – | – |
| | | Aluminium bronze | 500 | – | – | – | – | – | – |
| | | Copper and elektrolyte copper | 200 | – | – | – | – | – | – |
| | Non-ferrous materials | Duroplastice | – | – | – | – | – | – | – |
| | | Re-inforced plastics | – | – | – | – | – | – | – |
| | | Hard rubber | – | – | – | – | – | – | – |
| S | High temperature resistant alloys | Fe-alloyed, annealed | 700 | 20 – 50 | 20 – 70 | 20 – 60 | 20 – 50 | 20 – 55 | 20 – 50 |
| | | Fe-alloyed, heat treated | 950 | 20 – 50 | 20 – 70 | 20 – 60 | 20 – 50 | 20 – 55 | 20 – 50 |
| | | Ni- or Co-alloyed, annealed | 800 | 15 – 40 | 15 – 60 | 15 – 50 | 15 – 40 | 15 – 55 | 15 – 50 |
| | | Ni- or Co-alloyed, casting | 1100 | 15 – 40 | 15 – 50 | 15 – 50 | 15 – 40 | 15 – 55 | 15 – 40 |
| | | Ni- or Co-alloyed, heat treated | 1200 | 15 – 40 | 15 – 50 | 15 – 50 | 15 – 40 | 15 – 50 | 15 – 40 |
| | Titanium alloys | Pure titan | 500 – 700 | 70 – 130 | 100 – 210 | 90 – 180 | 80 – 170 | 70 – 120 | 60 – 100 |
| | Alpha- and Beta-alloys | heat treated | 700 – 1000 | 40 – 70 | 40 – 90 | 40 – 80 | 80 – 170 | 30 – 80 | 30 – 70 |
| H | Hardened steel | hardened | 55 HRC | – | – | – | – | – | – |
| | | | 60 HRC | – | – | – | – | – | – |
| | Hard cast iron | casting | 41 HRC | – | – | – | – | – | – |
| | Hardened cast iron | hardened | 55 HRC | – | – | – | – | – | – |

The recommended cutting data are only approximate values.
It may be necessary to adjust them to each individual machining application.

ARNO®
WERKZEUGE




# Quick, flexible and individual.

## To have design, production and service all under one roof

**is the perfect way of providing standard and special products.**

**95 % of the standard programme is available from stock. Order received before 18.00 CET are dispatched the very same day and in most cases supplied next day.**

**Our competent team of technical sales engineers will be available to support you on site.**

**For more information see:**
**www.arno.de**

# ARNO®-Werkzeuge

Tools and inserts
for parting and grooving

Tooling and indexable inserts
for turning and threading

Milling cutters and indexable inserts
for milling and thread milling

Drilling tools and indexable inserts
for drilling



## We have a passion for precision.

With passion and enthusiasm we face the challenges of our customers, to modify, develop and precisely manufacture – this is the way of ARNO®-Werkzeuge. Every single tool contains the knowledge and experience of over 70 years traditional tool manufacturing. That is proven quality and precision at the highest level.

ARNO®
WERKZEUGE


**For further information please ask for our complete catalogue.**

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