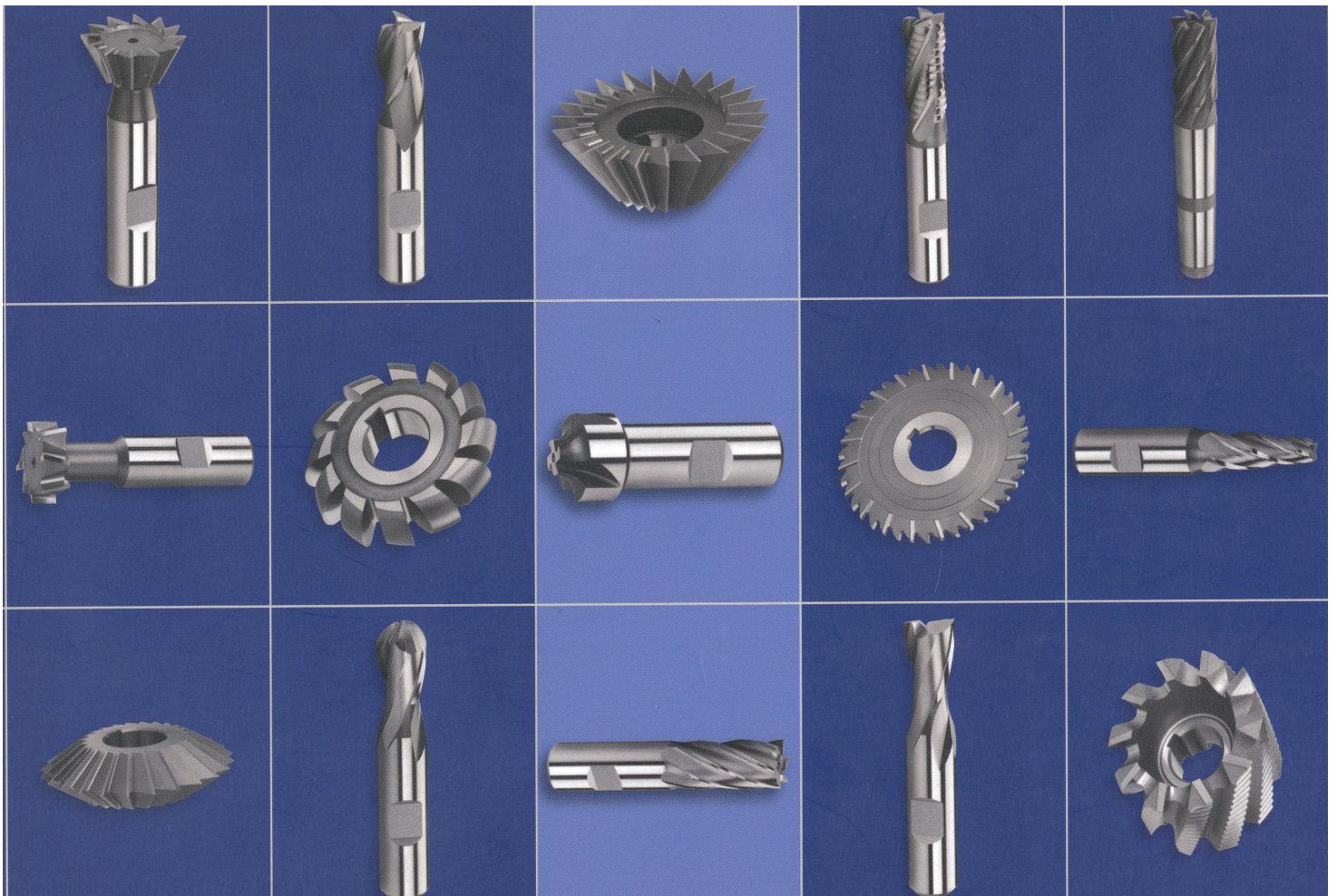


PM - ASP

Pulverstahl + HSS-E - Co8 - Fräser



Übersicht HSE-Fräser + ASP - Pulverstahl

| HSS - X - XENIX | | | Seite |
|---|--|--|-------------|
|  | Xenix Schlicht- Feinschrupp- und Schruppfräser XNF | | 2/2 |
| Nutenfräser | | | |
|  | Mini-3-Schneidenfräser kurz / lang | | 2/3 |
|  | Langlochfräser / Bohrnutenfräser kurz / lang | | 2/4 |
|  | 3-Schneiden-Schlichtfräser kurz / lang | | 2/5 |
|  | Pulverstahl - Bohrnutenfräser ASP | | 2/8 |
|  | Pulverstahl - 3-Schneiden-Fräser ASP | | 2/9 |
| Schlichtfräser | | | |
|  | Schlichtfräser kurz / lang | | 2/6 |
|  | Pulverstahl - Schlichtfräser ASP | | 2/10 |
| Feinschruppfräser | | | |
|  | Feinschruppfräser kurz / lang | | 2/7 |
|  | Pulverstahl - Feinschruppfräser ASP | | 2/11 |
|  | Schruppfräser kurz / lang | | 2/12 |
|  | Schlichtfräser ALU | | 2/13 |
| Schruppfräser | | | |
|  | Schruppfräser ALU kurz / ALU lang | | 2/14 |
|  | Einzahnfräser ALU / lang | | 2/15 |
|  | Schrupp-Radiusfräser | | 2/16 |
|  | Radiusfräser kurz / lang | | 2/17 |
|  | Schlichtfräser extra lang | | 2/18 |
|  | Schruppfräser / Schlichtfräser kurz | | 2/18 |
| Walzenstirnfräser | | | |
|  | Walzenstirnfräser-Schlicht ALU | | 2/19 |
|  | Walzenstirnfräser-Schrupp ALU | | 2/19 |
|  | Walzenstirnfräser-Feinschrupp ALU | | 2/19 |
|  | Scheibenfräser kreuzverzahnt | | 2/20 + 2/21 |
| | Winkel- und Prismenfräser | | 2/25 |
| | Halbkreisfräser Konvex / Konkav | | 2/26 |
| T-Nuten - und Schlitzfräser | | | |
|  | Schlitzfräser | | 2/22 |
|  | T-Nutenfräser | | 2/22 |
|  | Winkelfräser 45° / 60° | | 2/23 |
|  | Viertelkreisfräser | | 2/24 |

HSS - X - XENIX

Art.-Nr. 7000
Schlichtfräser


Art.-Nr. 7010
Feinschruppfräser

Art.-Nr. 7020
Schruppfräser **XNF**




Typ
N

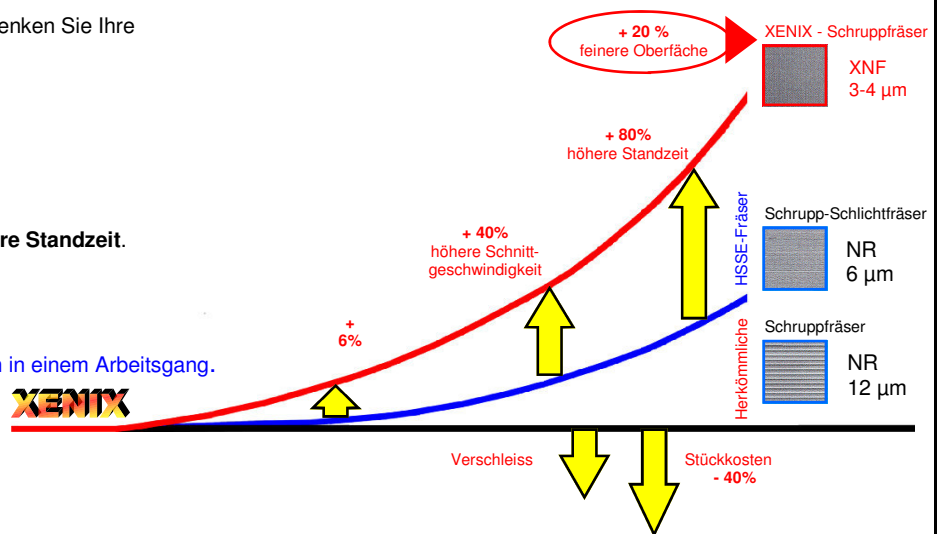


Typ

HR




Typ

XNF

- ★ Mit diesen **neuentwickelten** HSS-Fräsern senken Sie Ihre Stückkosten um mindestens **40%**.
- ★ **Extrem zäh** bei 68 HRC.
- ★ **40%** höhere Schnittgeschwindigkeit.
- ★ weniger Verschleiss, daher wesentlich **höhere Standzeit**.
- ★ **40%** tiefere Werkzeugkosten.
- ★ **Art. Nr. 7020 schrumpfen + fertigmachen** in einem Arbeitsgang.



| Best.-Nr. 7000b... 7010b... 7020b... | Ø | Schneid- länge | Schaft- Ø | Gesamt- länge | 7000 | Zähne 7010 | 7020 | 7000 B N | 7010 B HR | 7020 B XNF |
|---|----|-------------------|--------------|------------------|------|---------------|------|-------------|--------------|---------------|
| ..0600 | 6 | 13 | 6 | 57 | 4 | 4 | 3 | 18.- | 29.- | 33.- |
| ..0800 | 8 | 19 | 10 | 69 | 4 | 4 | 3 | 20.- | 32.- | 39.- |
| ..1000 | 10 | 22 | 10 | 72 | 4 | 5 | 4 | 22.- | 36.- | 43.- |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 5 | 4 | 28.- | 47.- | 49.- |
| ..1400 | 14 | 26 | 12 | 83 | 4 | 5 | 4 | 39.- | 52.- | 58.- |
| ..1600 | 16 | 32 | 16 | 92 | 6 | 5 | 4 | 48.- | 58.- | 65.- |
| ..1800 | 18 | 32 | 16 | 92 | 6 | 5 | 4 | 57.- | 67.- | 78.- |
| ..2000 | 20 | 38 | 20 | 104 | 6 | 5 | 4 | 63.- | 87.- | 92.- |
| ..2200 | 22 | 38 | 20 | 104 | 4 | 5 | 5 | 86.- | 108.- | 137.- |
| ..2500 | 25 | 45 | 25 | 121 | 6 | 6 | 5 | 122.- | 125.- | 141.- |
| ..3000 | 30 | 45 | 25 | 121 | 6 | 6 | 5 | 132.- | 178.- | 195.- |

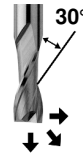
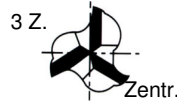
| | | | | | | | | |
|------------------|---------|--------|----------------------|---|-----|-------|-------|-------|
| Artikel Nr. 7100 | Typ N | 6 Stk. | Ø 6-8-10-12-16-20 mm |  | Set | 198.- | | |
| Artikel Nr. 7200 | Typ HR | 6 Stk. | Ø 6-8-10-12-16-20 mm | | Set | | 284.- | |
| Artikel Nr. 7300 | Typ XNF | 6 Stk. | Ø 6-8-10-12-16-20 mm | | Set | | | 321.- |

HSSE-Co 8 Mini-3-Schneiden-Fräser

1281 W Kurz
1291 W Lang

1281 WB Kurz
1291 WB Lang

PLUS - FUTURE
beschichtet



Typ
N

- Universal einsetzbar für sämtliche Werkstoffe. **Höhere Schnittleistung** dank **3 Schneiden**. Zum Fräsen von Keilnuten in Passung P9. **Speziell preisgünstig!**
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



PLUS - FUTURE

1281 W 1281 WB



PLUS - FUTURE

1291 W 1291 WB

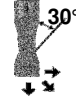
| Best.-Nr. 1281W... 1281WB... 1291W... 1291WB... | Thermo | Al | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < | Stahl < | INOX | Ti + Cu | GG (G) | Uni-versal | 1281 W Kurz | 1281 WB Kurz beschichtet | 1291 W Lang | 1291 WB Lang beschichtet |
|---|------------------|--------------|-------------------|--------------|--------------|---------|---------|--------|---------|--------|------------|-------------|--------------------------|-------------|--------------------------|
| | Ø e ₈ | Schneidlänge | Schaft-Ø | Gesamtlänge | Z | 1281 W | 1281 WB | 1291 W | 1291 WB | | | | | | |
| ..0100 | 1 | 2 | 6 | 34 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0150 | 1.5 | 3 | 6 | 34 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0180 | 1.8 | 3 | 6 | 34 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0200 | 2 | 4 | 6 | 35 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| | 2 | 7 | 6 | 38 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0230 | 2.3 | 4 | 6 | 35 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0250 | 2.5 | 5 | 6 | 36 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0250 | 2.5 | 8 | 6 | 39 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0280 | 2.8 | 5 | 6 | 36 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0300 | 3 | 5 | 6 | 36 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| | 3 | 8 | 6 | 39 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0330 | 3.3 | 6 | 6 | 37 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0350 | 3.5 | 6 | 6 | 37 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0350 | 3.5 | 10 | 6 | 41 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| | 3.8 | 7 | 6 | 38 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0400 | 4 | 7 | 6 | 38 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0400 | 4 | 11 | 6 | 42 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0430 | 4.3 | 7 | 6 | 38 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0450 | 4.5 | 7 | 6 | 38 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| | 4.5 | 11 | 6 | 42 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0480 | 4.8 | 8 | 6 | 39 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0500 | 5 | 8 | 6 | 39 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0500 | 5 | 13 | 6 | 44 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0550 | 5.5 | 8 | 6 | 39 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0550 | 5.5 | 13 | 6 | 44 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| | 5.75 | 8 | 6 | 39 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0600 | 6 | 8 | 6 | 39 | 3 | 6.- | 10.- | --- | --- | | | | | | |
| ..0600 | 6 | 13 | 6 | 44 | 3 | --- | --- | 7.- | 11.- | | | | | | |
| ..0650 | 6.5 | 10 | 8 | 42 | 3 | 7.- | 12.- | --- | --- | | | | | | |
| ..0650 | 6.5 | 16 | 8 | 48 | 3 | --- | --- | 8.- | 13.- | | | | | | |
| ..0700 | 7 | 10 | 8 | 42 | 3 | 7.- | 12.- | --- | --- | | | | | | |
| | 7 | 16 | 8 | 48 | 3 | --- | --- | 8.- | 13.- | | | | | | |
| ..0750 | 7.5 | 10 | 8 | 42 | 3 | 7.- | 12.- | --- | --- | | | | | | |
| ..0750 | 7.5 | 16 | 8 | 48 | 3 | --- | --- | 8.- | 13.- | | | | | | |
| ..0800 | 8 | 11 | 8 | 43 | 3 | 7.- | 12.- | --- | --- | | | | | | |
| | 8 | 19 | 8 | 51 | 3 | --- | --- | 8.- | 13.- | | | | | | |
| ..0850 | 8.5 | 11 | 10 | 48 | 3 | 9.- | 14.- | --- | --- | | | | | | |
| ..0850 | 8.5 | 19 | 10 | 56 | 3 | --- | --- | 10.- | 15.- | | | | | | |
| ..0900 | 9 | 11 | 10 | 48 | 3 | 9.- | 14.- | --- | --- | | | | | | |
| | 9 | 19 | 10 | 56 | 3 | --- | --- | 10.- | 15.- | | | | | | |
| ..0950 | 9.5 | 11 | 10 | 48 | 3 | 9.- | 14.- | --- | --- | | | | | | |
| ..1000 | 10 | 13 | 10 | 50 | 3 | 9.- | 14.- | --- | --- | | | | | | |
| | 10 | 22 | 10 | 59 | 3 | --- | --- | 10.- | 15.- | | | | | | |
| ..1200 | 12 | 16 | 12 | 58 | 3 | 13.- | 20.- | --- | --- | | | | | | |
| ..1600 | 16 | 19 | 16 | 64 | 3 | 20.- | 30.- | --- | --- | | | | | | |
| ..2000 | 20 | 22 | 20 | 78 | 3 | 31.- | 45.- | --- | --- | | | | | | |

HSSE-Co 8 Langlochfräser / Bohrnutenfräser

1001 W Kurz
1021 W Lang

DIN 327
M42-Co 8

1001 WB Kurz **PLUS - FUTURE**
1021 WB Lang beschichtet



Typ
N



- Universal einsetzbar für sämtliche Werkstoffe sowie zum Fräsen von Keilnuten in Passung P9.

Höchstleistung mit PLUS - FUTURE -Beschichtung.



| Thermo Plast Alu | Alu | Alu Guss 10% BI | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1001 W | 1001 WB | 1021 W | 1021 WB |
|------------------------|------|--------------------------|-----------------|------------------|------------------|------------------|--------|---------------|-----------|----------------|--------|---------------------|--------|---------------------|
| | | | | | | | | | | | Kurz | Kurz beschichtet | Lang | Lang beschichtet |
| Best.-Nr. | Ø | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1001 W | 1001WB | 1021 W | 1021WB | | | | | |
| 1001w... | 1 | 2.5 | 6 | 47 | 2 | 11.- | 15.- | --- | --- | | | | | |
| 1001wb... | 1.5 | 3 | 6 | 47 | 2 | 11.- | 15.- | --- | --- | | | | | |
| 1021w... | 2 | 4 | 6 | 48 | 2 | 9.- | 14.- | --- | --- | | | | | |
| 1021wb... | 2.5 | 5 | 6 | 49 | 2 | 9.- | 14.- | --- | --- | | | | | |
| | 2.8 | 5 | 6 | 49 | 2 | 8.- | 14.- | --- | --- | | | | | |
| | 3 | 5 | 6 | 49 | 2 | 9.- | 13.- | --- | --- | | | | | |
| | 3 | 8 | 6 | 56 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 3.5 | 6 | 6 | 50 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 3.5 | 10 | 6 | 59 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 3.8 | 7 | 6 | 51 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 4 | 7 | 6 | 51 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 4 | 11 | 6 | 63 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 4.5 | 7 | 6 | 51 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 4.5 | 11 | 6 | 63 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 4.8 | 8 | 6 | 52 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 5 | 8 | 6 | 52 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 5 | 13 | 6 | 68 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 5.5 | 8 | 6 | 52 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 5.5 | 13 | 6 | 68 | 2 | --- | --- | 12.- | 19.- | | | | | |
| | 5.75 | 8 | 6 | 52 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 6 | 8 | 6 | 52 | 2 | 8.- | 13.- | --- | --- | | | | | |
| | 6 | 13 | 6 | 68 | 2 | --- | --- | 12.- | 18.- | | | | | |
| | 6.5 | 10 | 10 | 60 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 6.5 | 16 | 10 | 80 | 2 | --- | --- | 19.- | 26.- | | | | | |
| | 6.75 | 10 | 10 | 60 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 7 | 10 | 10 | 60 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 7 | 16 | 10 | 80 | 2 | --- | --- | 19.- | 26.- | | | | | |
| | 7.5 | 10 | 10 | 60 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 7.75 | 11 | 10 | 61 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 8 | 11 | 10 | 61 | 2 | 11.- | 16.- | --- | --- | | | | | |
| | 8 | 19 | 10 | 88 | 2 | --- | --- | 18.- | 24.- | | | | | |
| | 8.5 | 11 | 10 | 61 | 2 | 12.- | 17.- | --- | --- | | | | | |
| | 8.5 | 19 | 10 | 88 | 2 | --- | --- | 21.- | 27.- | | | | | |
| | 9 | 11 | 10 | 61 | 2 | 12.- | 16.- | --- | --- | | | | | |
| | 9 | 19 | 10 | 88 | 2 | --- | --- | 21.- | 27.- | | | | | |
| | 9.5 | 11 | 10 | 61 | 2 | 12.- | 16.- | --- | --- | | | | | |
| | 10 | 13 | 10 | 63 | 2 | 12.- | 16.- | --- | --- | | | | | |
| | 10 | 22 | 10 | 95 | 2 | --- | --- | 19.- | 25.- | | | | | |
| | 11 | 13 | 12 | 70 | 2 | 15.- | 22.- | --- | --- | | | | | |
| | 12 | 16 | 12 | 73 | 2 | 15.- | 22.- | --- | --- | | | | | |
| | 12 | 26 | 12 | 110 | 2 | --- | --- | 22.- | 31.- | | | | | |
| | 13 | 16 | 12 | 73 | 2 | 17.- | 25.- | --- | --- | | | | | |
| | 14 | 16 | 12 | 73 | 2 | 17.- | 25.- | --- | --- | | | | | |
| | 14 | 26 | 12 | 110 | 2 | --- | --- | 34.- | 44.- | | | | | |
| | 15 | 16 | 12 | 73 | 2 | 22.- | 32.- | --- | --- | | | | | |
| | 16 | 19 | 16 | 79 | 2 | 22.- | 32.- | --- | --- | | | | | |
| | 16 | 32 | 16 | 123 | 2 | --- | --- | 36.- | 49.- | | | | | |
| | 17 | 19 | 16 | 79 | 2 | 26.- | 40.- | --- | --- | | | | | |
| | 18 | 19 | 16 | 79 | 2 | 26.- | 40.- | --- | --- | | | | | |
| | 18 | 32 | 16 | 123 | 2 | --- | --- | 47.- | 62.- | | | | | |
| | 19 | 19 | 16 | 79 | 2 | 32.- | 49.- | --- | --- | | | | | |
| | 20 | 22 | 20 | 88 | 2 | 32.- | 49.- | --- | --- | | | | | |
| | 20 | 38 | 20 | 141 | 2 | --- | --- | 51.- | 67.- | | | | | |
| | 22 | 22 | 20 | 88 | 2 | 52.- | 69.- | --- | --- | | | | | |
| | 22 | 38 | 20 | 141 | 2 | --- | --- | 76.- | 100.- | | | | | |
| | 24 | 26 | 25 | 102 | 2 | 54.- | 77.- | --- | --- | | | | | |
| | 25 | 26 | 25 | 102 | 2 | 57.- | 83.- | --- | --- | | | | | |
| | 25 | 45 | 25 | 166 | 2 | --- | --- | 86.- | 116.- | | | | | |
| | 26 | 26 | 25 | 102 | 2 | 67.- | 101.- | --- | --- | | | | | |
| | 28 | 26 | 25 | 102 | 2 | 68.- | 106.- | --- | --- | | | | | |
| | 30 | 26 | 25 | 102 | 2 | 85.- | 124.- | --- | --- | | | | | |
| | 32 | 32 | 32 | 112 | 2 | 89.- | 142.- | --- | --- | | | | | |

1001 W

1001 WB

1021 W

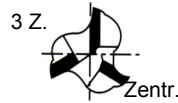
1021 WB

HSSE-Co 8 3-Schneiden-Schlichtfräser

1041 W Kurz
1051 W Lang

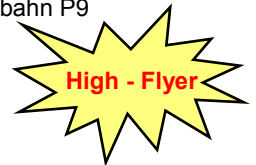
DIN 844
M42-Co 8

1041 WB Kurz **PLUS - FUTURE**
1051 WB Lang beschichtet



Typ
N

- Universal einsetzbar für sämtliche Werkstoffe, auch für Keilbahn P9 verwendbar. Höhere Schnittleistung dank 3 Schneiden.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



1041 W 1041 WB



1051 W 1051 WB

| Thermo Plast Alu | Alu | Alu Guss 10% BI | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1041 W Kurz | 1041 WB Kurz beschichtet | 1051 W Lang | 1051 WB Lang beschichtet |
|---|---------------------|--------------------------|--------------------|--------------------|---------------------|---------------------|---------|---------------|-----------|----------------|----------------|--------------------------------|----------------|--------------------------------|
| | | ○ | ● | ● | ○ | | ○ | | ○ | ● | | | | |
| Best.-Nr. 1041w... 1041wb... 1051w... 1051wb... | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1041 W | 1041 WB | 1051 W | 1051 WB | | | | | |
| ..0150 | 1.5 | 7 | 6 | 51 | 3 | 11.- | 16.- | --- | --- | | | | | |
| ..0200 | 2 | 7 | 6 | 51 | 3 | 11.- | 16.- | --- | --- | | | | | |
| ..0250 | 2.5 | 8 | 6 | 52 | 3 | 11.- | 18.- | --- | --- | | | | | |
| ..0300 | 3 | 8 | 6 | 52 | 3 | 11.- | 16.- | --- | --- | | | | | |
| ..0300 | 3 | 12 | 6 | 56 | 3 | --- | --- | 15.- | 20.- | | | | | |
| ..0350 | 3.5 | 10 | 6 | 54 | 3 | 11.- | 18.- | --- | --- | | | | | |
| ..0400 | 4 | 11 | 6 | 55 | 3 | 9.- | 14.- | --- | --- | | | | | |
| ..0400 | 4 | 19 | 6 | 63 | 3 | --- | --- | 15.- | 20.- | | | | | |
| ..0450 | 4.5 | 11 | 6 | 55 | 3 | 9.- | 17.- | --- | --- | | | | | |
| ..0500 | 5 | 13 | 6 | 57 | 3 | 9.- | 14.- | --- | --- | | | | | |
| ..0500 | 5 | 24 | 6 | 68 | 3 | --- | --- | 15.- | 20.- | | | | | |
| ..0550 | 5.5 | 13 | 6 | 57 | 3 | 9.- | 17.- | --- | --- | | | | | |
| ..0600 | 6 | 13 | 6 | 57 | 3 | 9.- | 14.- | --- | --- | | | | | |
| ..0600 | 6 | 24 | 6 | 68 | 3 | --- | --- | 15.- | 20.- | | | | | |
| ..0650 | 6.5 | 16 | 10 | 66 | 3 | 16.- | 22.- | --- | --- | | | | | |
| ..0700 | 7 | 16 | 10 | 66 | 3 | 14.- | 18.- | --- | --- | | | | | |
| ..0700 | 7 | 30 | 10 | 80 | 3 | --- | --- | 21.- | 29.- | | | | | |
| ..0750 | 7.5 | 16 | 10 | 66 | 3 | 16.- | 24.- | --- | --- | | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 3 | 14.- | 18.- | --- | --- | | | | | |
| ..0800 | 8 | 38 | 10 | 88 | 3 | --- | --- | 21.- | 29.- | | | | | |
| ..0850 | 8.5 | 19 | 10 | 69 | 3 | 18.- | 24.- | --- | --- | | | | | |
| ..0900 | 9 | 19 | 10 | 69 | 3 | 16.- | 19.- | --- | --- | | | | | |
| ..0900 | 9 | 38 | 10 | 88 | 3 | --- | --- | 21.- | 29.- | | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 3 | 16.- | 19.- | --- | --- | | | | | |
| ..1000 | 10 | 45 | 10 | 95 | 3 | --- | --- | 21.- | 29.- | | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 3 | 16.- | 24.- | --- | --- | | | | | |
| ..1200 | 12 | 53 | 12 | 110 | 3 | --- | --- | 26.- | 36.- | | | | | |
| ..1400 | 14 | 26 | 12 | 83 | 3 | 22.- | 31.- | --- | --- | | | | | |
| ..1400 | 14 | 53 | 12 | 110 | 3 | --- | --- | 38.- | 49.- | | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 3 | 26.- | 38.- | --- | --- | | | | | |
| ..1600 | 16 | 63 | 16 | 123 | 3 | --- | --- | 40.- | 54.- | | | | | |
| ..1800 | 18 | 32 | 16 | 92 | 3 | 36.- | 48.- | --- | --- | | | | | |
| ..1800 | 18 | 63 | 16 | 123 | 3 | --- | --- | 52.- | 69.- | | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 3 | 38.- | 56.- | --- | --- | | | | | |
| ..2000 | 20 | 75 | 20 | 141 | 3 | --- | --- | 57.- | 75.- | | | | | |
| ..2200 | 22 | 38 | 20 | 104 | 3 | 63.- | 83.- | --- | --- | | | | | |
| ..2200 | 22 | 75 | 20 | 141 | 3 | --- | --- | 85.- | 111.- | | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 3 | 58.- | 88.- | --- | --- | | | | | |
| ..2500 | 25 | 90 | 25 | 166 | 3 | --- | --- | 96.- | 129.- | | | | | |
| ..2800 | 28 | 45 | 25 | 121 | 3 | 128.- | 172.- | --- | --- | | | | | |

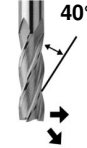
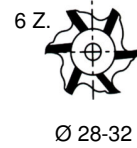
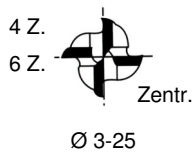


HSSE-Co 8 Schlichtfräser

1071 W Kurz
1081 W Lang

DIN 844
M42-Co 8

1071 WB Kurz **PLUS - FUTURE**
1081 WB Lang beschichtet



Typ
N

- Universal einsetzbar für sämtliche Werkstoffe.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



PLUS - FUTURE

1071 W 1071 WB



PLUS - FUTURE

1081 W 1081 WB

| Best.-Nr. 1071w... 1071wb... 1081w... 1081wb... | Ø es | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1071 W | 1071 WB | 1081 W | 1081 WB |
|---|---------|-------------------|--------------|------------------|---|--------|---------------------|--------|---------------------|
| | | | | | | Kurz | Kurz beschichtet | Lang | Lang beschichtet |
| ..0300 | 3 | 8 | 6 | 52 | 4 | 10.- | 13.- | --- | --- |
| ..0300 | 3 | 12 | 6 | 56 | 4 | --- | --- | 12.- | 16.- |
| ..0350 | 3.5 | 10 | 6 | 54 | 4 | 10.- | 13.- | --- | --- |
| ..0350 | 3.5 | 15 | 6 | 59 | 4 | --- | --- | 12.- | 16.- |
| ..0400 | 4 | 11 | 6 | 55 | 4 | 10.- | 13.- | --- | --- |
| ..0400 | 4 | 19 | 6 | 63 | 4 | --- | --- | 12.- | 16.- |
| ..0450 | 4.5 | 19 | 6 | 63 | 4 | --- | --- | 12.- | 16.- |
| ..0500 | 5 | 13 | 6 | 57 | 4 | 10.- | 13.- | --- | --- |
| ..0500 | 5 | 24 | 6 | 68 | 4 | --- | --- | 12.- | 16.- |
| ..0600 | 6 | 13 | 6 | 57 | 4 | 10.- | 13.- | --- | --- |
| ..0600 | 6 | 24 | 6 | 68 | 4 | --- | --- | 12.- | 16.- |
| ..0700 | 7 | 16 | 10 | 66 | 4 | 13.- | 17.- | --- | --- |
| ..0700 | 7 | 30 | 10 | 80 | 4 | --- | --- | 17.- | 24.- |
| ..0800 | 8 | 19 | 10 | 69 | 4 | 13.- | 16.- | --- | --- |
| ..0800 | 8 | 38 | 10 | 88 | 4 | --- | --- | 17.- | 24.- |
| ..0900 | 9 | 19 | 10 | 69 | 4 | 13.- | 17.- | --- | --- |
| ..0900 | 9 | 38 | 10 | 88 | 4 | --- | --- | 17.- | 24.- |
| ..1000 | 10 | 22 | 10 | 72 | 4 | 13.- | 16.- | --- | --- |
| ..1000 | 10 | 45 | 10 | 95 | 4 | --- | --- | 17.- | 24.- |
| ..1100 | 11 | 22 | 12 | 79 | 4 | 18.- | 22.- | --- | --- |
| ..1100 | 11 | 45 | 12 | 102 | 4 | --- | --- | 23.- | 32.- |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 17.- | 22.- | --- | --- |
| ..1200 | 12 | 53 | 12 | 110 | 4 | --- | --- | 23.- | 32.- |
| ..1300 | 13 | 26 | 12 | 83 | 4 | 22.- | 28.- | --- | --- |
| ..1400 | 14 | 26 | 12 | 83 | 4 | 26.- | 32.- | --- | --- |
| ..1400 | 14 | 53 | 12 | 110 | 4 | --- | --- | 34.- | 44.- |
| ..1600 | 16 | 32 | 16 | 92 | 4 | 25.- | 32.- | --- | --- |
| ..1600 | 16 | 63 | 16 | 123 | 4 | --- | --- | 36.- | 49.- |
| ..1800 | 18 | 32 | 16 | 92 | 4 | 35.- | 44.- | --- | --- |
| ..1800 | 18 | 63 | 16 | 123 | 4 | --- | --- | 47.- | 62.- |
| ..2000 | 20 | 38 | 20 | 104 | 4 | 40.- | 49.- | --- | --- |
| ..2000 | 20 | 75 | 20 | 141 | 4 | --- | --- | 49.- | 66.- |
| ..2200 | 22 | 38 | 20 | 104 | 6 | 50.- | 70.- | --- | --- |
| ..2200 | 22 | 75 | 20 | 141 | 6 | --- | --- | 76.- | 99.- |
| ..2400 | 24 | 90 | 25 | 166 | 6 | --- | --- | 85.- | 114.- |
| ..2500 | 25 | 45 | 25 | 121 | 6 | 64.- | 88.- | --- | --- |
| ..2500 | 25 | 90 | 25 | 166 | 6 | --- | --- | 85.- | 115.- |
| ..2800 | 28 | 45 | 25 | 121 | 6 | 94.- | 128.- | --- | --- |
| ..3000 | 30 | 45 | 25 | 121 | 6 | 98.- | 140.- | --- | --- |
| ..3200 | 32 | 53 | 32 | 133 | 6 | 112.- | 172.- | --- | --- |

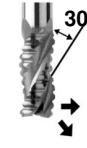
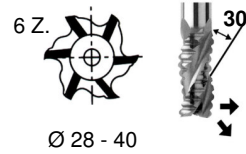
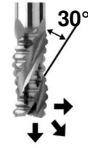
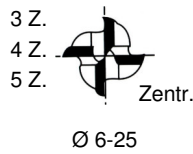


HSSE-Co 8 Feinschruppfräser

1211 W Kurz
1221 W Lang

DIN 844
M42-Co 8

1211 WB Kurz **PLUS - FUTURE**
1221 WB Lang beschichtet



Typ
 HR



PLUS - FUTURE

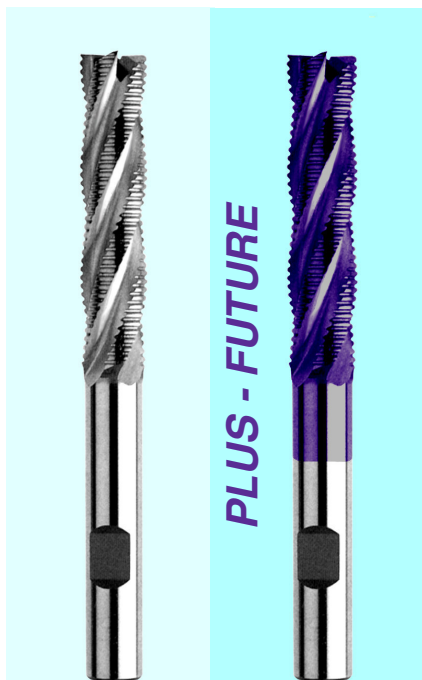
1211 W

1211

- Universal einsetzbar für sämtliche Werkstoffe.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Thermo Plast Alu | Alu Guss 10% | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- ver- sal | 1211 W | 1211 WB | 1221 W | 1221 WB |
|------------------------|---------------------|--------------------|--------------------|---------------------|---------------------|-------|---------------|-----------|---------------------|--------|---------------------|--------|---------------------|
| | | | | | | | | | | Kurz | Kurz beschichtet | Lang | Lang beschichtet |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Best.-Nr. | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1211W | 1211 WB | 1221 W | 1221 WB | | | | |
| 1211w... | | | | | | | | | | | | | |
| 1211wb... | | | | | | | | | | | | | |
| 1221w... | | | | | | | | | | | | | |
| 1221wb... | | | | | | | | | | | | | |
| ..0600 | 6 | 13 | 6 | 57 | 4 | 23.- | 28.- | --- | --- | | | | |
| ..0600 | 6 | 24 | 6 | 68 | 3 | --- | --- | 31.- | 35.- | | | | |
| ..0700 | 7 | 30 | 10 | 80 | 3 | --- | --- | 45.- | 52.- | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 4 | 26.- | 31.- | --- | --- | | | | |
| ..0800 | 8 | 38 | 10 | 88 | 4 | --- | --- | 39.- | 44.- | | | | |
| ..0900 | 9 | 38 | 10 | 88 | 3 | --- | --- | 46.- | 53.- | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 4 | 26.- | 31.- | --- | --- | | | | |
| ..1000 | 10 | 45 | 10 | 95 | 4 | --- | --- | 39.- | 44.- | | | | |
| ..1100 | 11 | 45 | 12 | 102 | 4 | --- | --- | 48.- | 58.- | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 36.- | 41.- | --- | --- | | | | |
| ..1200 | 12 | 53 | 12 | 110 | 4 | --- | --- | 48.- | 58.- | | | | |
| ..1300 | 13 | 53 | 12 | 110 | 4 | --- | --- | 57.- | 67.- | | | | |
| ..1400 | 14 | 26 | 12 | 83 | 4 | 41.- | 48.- | --- | --- | | | | |
| ..1400 | 14 | 53 | 12 | 110 | 4 | --- | --- | 52.- | 62.- | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 4 | 45.- | 52.- | --- | --- | | | | |
| ..1600 | 16 | 63 | 16 | 123 | 4 | --- | --- | 55.- | 67.- | | | | |
| ..1800 | 18 | 32 | 16 | 92 | 4 | 53.- | 62.- | --- | --- | | | | |
| ..1800 | 18 | 63 | 16 | 123 | 4 | --- | --- | 68.- | 84.- | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 4 | 59.- | 71.- | --- | --- | | | | |
| ..2000 | 20 | 75 | 20 | 141 | 4 | --- | --- | 87.- | 103.- | | | | |
| ..2200 | 22 | 75 | 20 | 141 | 5 | --- | --- | 100.- | 123.- | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 5 | 106.- | 126.- | --- | --- | | | | |
| ..2500 | 25 | 90 | 25 | 166 | 5 | --- | --- | 119.- | 146.- | | | | |
| ..2800 | 28 | 90 | 25 | 166 | 6 | --- | --- | 172.- | 202.- | | | | |
| ..3000 | 30 | 45 | 25 | 121 | 6 | 132.- | 172.- | --- | --- | | | | |
| ..3000 | 30 | 90 | 25 | 166 | 6 | --- | --- | 178.- | 214.- | | | | |
| ..3200 | 32 | 53 | 32 | 133 | 6 | 154.- | 194.- | --- | --- | | | | |
| ..3200 | 32 | 106 | 32 | 186 | 6 | --- | --- | 194.- | 252.- | | | | |
| ..4000 | 40 | 125 | 32 | 217 | 6 | --- | --- | 314.- | 368.- | | | | |



PLUS - FUTURE

1221 W

1221 WB



Pulverstahl – Bohrnutenfräser

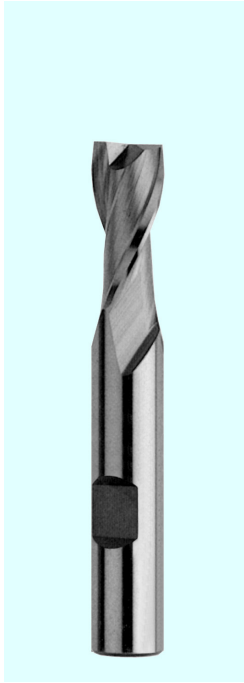
ASP

1900 W

DIN 327
M42-Co 8

1900 WB

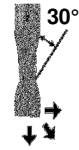
PLUS - FUTURE
beschichtet



1900 W



1900 WB

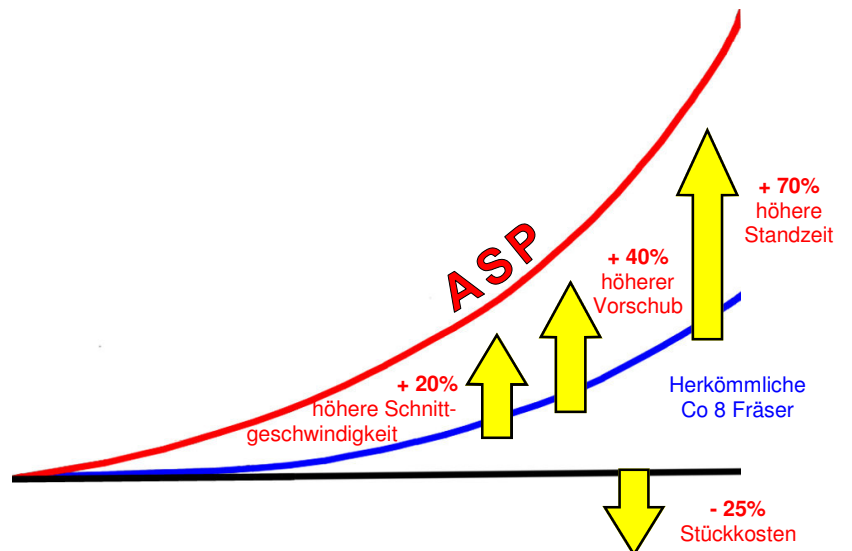


Typ
N

- Universal einsetzbar für sämtliche Werkstoffe sowie zum Fräsen von Keilnuten in Passung P9.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Best.-Nr. 1900w... 1900wb... | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | Stahl < 60HRC | Stahl < 67HRC | INOX | Ti + Cu | GC (G) | Uni- versal | 1900 W | 1900 WB |
|------------------------------------|-------------------------|-------------------|-----------------|------------------|------------------|------------------|------------------|------|---------------|-----------|----------------|--------|---------|
| | ○ | ● | ● | ○ | ● | ● | ● | ○ | ○ | ○ | ○ | | |
| | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | | | | | | | | |
| ..0300 | 3 | 5 | 6 | 49 | 2 | 14.- | | 20.- | | | | | |
| ..0400 | 4 | 7 | 6 | 51 | 2 | 14.- | | 20.- | | | | | |
| ..0500 | 5 | 8 | 6 | 52 | 2 | 14.- | | 20.- | | | | | |
| ..0600 | 6 | 8 | 6 | 52 | 2 | 14.- | | 20.- | | | | | |
| ..0700 | 7 | 10 | 10 | 60 | 2 | 18.- | | 24.- | | | | | |
| ..0800 | 8 | 11 | 10 | 61 | 2 | 18.- | | 24.- | | | | | |
| ..0900 | 9 | 11 | 10 | 61 | 2 | 21.- | | 27.- | | | | | |
| ..1000 | 10 | 13 | 10 | 63 | 2 | 21.- | | 27.- | | | | | |
| ..1100 | 11 | 13 | 12 | 70 | 2 | 24.- | | 32.- | | | | | |
| ..1200 | 12 | 16 | 12 | 73 | 2 | 24.- | | 32.- | | | | | |
| ..1300 | 13 | 16 | 12 | 73 | 2 | 29.- | | 38.- | | | | | |
| ..1400 | 14 | 16 | 12 | 73 | 2 | 29.- | | 38.- | | | | | |
| ..1500 | 15 | 16 | 12 | 73 | 2 | 39.- | | 51.- | | | | | |
| ..1600 | 16 | 19 | 16 | 79 | 2 | 39.- | | 51.- | | | | | |
| ..1800 | 18 | 19 | 16 | 79 | 2 | 49.- | | 64.- | | | | | |
| ..2000 | 20 | 22 | 20 | 88 | 2 | 52.- | | 70.- | | | | | |



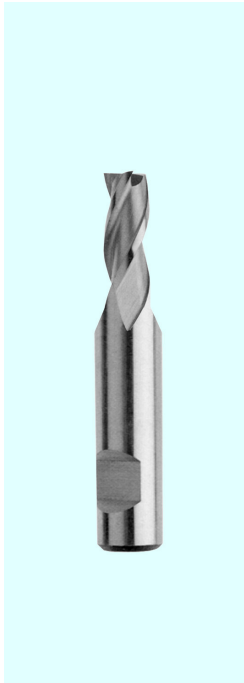
Pulverstahl - 3-Schneiden-Fräser

ASP

1910 W

1910 WB

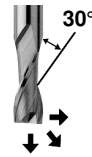
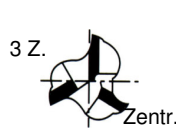
PLUS - FUTURE
beschichtet



1910 W



1910 WB



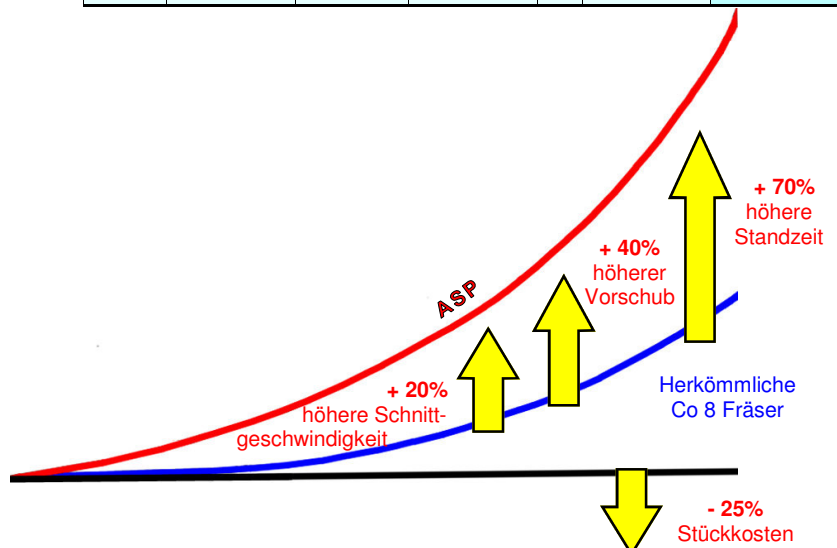
Typ
N

- Universal einsetzbar für sämtliche Werkstoffe.
Höhere Schnittleistung dank **3 Schneiden**.
Zum Fräsen von Keilnuten in Passung P9.
Speziell preisgünstig!

- Höchstleistung mit **PLUS - FUTURA** - Beschichtung.



| Best.-Nr. 1910w... 1910wb... | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | Stahl < 60HRC | Stahl < 67HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1910 W | 1910 WB |
|------------------------------------|----------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|------|---------------|-----------|----------------|--------|---------|
| | ○ | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | 1910 W | 1910 WB |
| | Ø e8 | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | | | | | | | 1910 W | 1910 WB |
| ..0200 | 2 | 7 | 6 | 38 | 3 | | | | | | | 11.- | 15.- |
| ..0250 | 2,5 | 8 | 6 | 39 | 3 | | | | | | | 11.- | 15.- |
| ..0300 | 3 | 8 | 6 | 39 | 3 | | | | | | | 11.- | 15.- |
| ..0350 | 3,5 | 10 | 6 | 41 | 3 | | | | | | | 11.- | 15.- |
| ..0400 | 4 | 11 | 6 | 42 | 3 | | | | | | | 11.- | 15.- |
| ..0450 | 4,5 | 11 | 6 | 42 | 3 | | | | | | | 11.- | 15.- |
| ..0500 | 5 | 13 | 6 | 44 | 3 | | | | | | | 11.- | 15.- |
| ..0550 | 5,5 | 13 | 6 | 44 | 3 | | | | | | | 11.- | 15.- |
| ..0600 | 6 | 13 | 6 | 44 | 3 | | | | | | | 11.- | 15.- |
| ..0650 | 6,5 | 16 | 8 | 48 | 3 | | | | | | | 13.- | 19.- |
| ..0700 | 7 | 16 | 8 | 48 | 3 | | | | | | | 13.- | 19.- |
| ..0750 | 7,5 | 16 | 8 | 48 | 3 | | | | | | | 13.- | 19.- |
| ..0800 | 8 | 19 | 8 | 51 | 3 | | | | | | | 13.- | 19.- |
| ..0850 | 8,5 | 19 | 10 | 56 | 3 | | | | | | | 17.- | 23.- |
| ..0900 | 9 | 19 | 10 | 56 | 3 | | | | | | | 17.- | 23.- |
| ..0950 | 9,5 | 20 | 10 | 56 | 3 | | | | | | | 17.- | 23.- |
| ..1000 | 10 | 22 | 10 | 59 | 3 | | | | | | | 17.- | 23.- |



Pulverstahl - Schlichtfräser

ASP

2000 W ASP

DIN 844
M42-Co 8

2000 WB ASP **PLUS - FUTURE**
beschichtet



2000 W



2000 WB

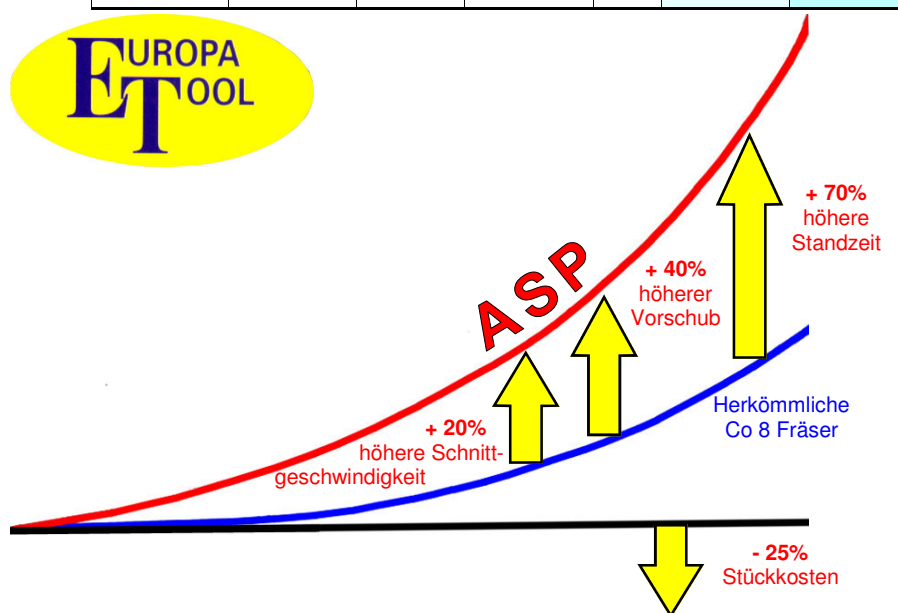


Typ
N

- Mit diesem **Pulverstahl-Hochleistungswerkzeug** senken Sie Ihre Stückkosten um **mindestens 25 %**. Besonders geeignet für hochlegierte sowie rostfreie Stähle, aber auch zum Trockenfräsen. Die Schnittgeschwindigkeit kann wesentlich erhöht werden (siehe Grafik unten).
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Best.-Nr. 2000w... 2000wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 2000 W | 2000 WB |
|------------------------------------|-------------------------|-------------------|----------------------------|--------------------|--------------------|---------------------|---------------------|---------|---------------|-----------|----------------|--------|---------|
| | ○ | ○ | ○ | ● | ● | ○ | ○ | ○ | ○ | ○ | ● | | |
| | Ø k ₁₀ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 2000 W | | 2000 WB | | | | | |
| ..0300 | 3 | 8 | 6 | 52 | 4 | 13.- | 17.- | | | | | | |
| ..0400 | 4 | 11 | 6 | 55 | 4 | 13.- | 17.- | | | | | | |
| ..0500 | 5 | 13 | 6 | 57 | 4 | 13.- | 17.- | | | | | | |
| ..0600 | 6 | 13 | 6 | 57 | 4 | 13.- | 17.- | | | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 4 | 16.- | 20.- | | | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 4 | 18.- | 22.- | | | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 24.- | 29.- | | | | | | |
| ..1400 | 14 | 26 | 12 | 83 | 4 | 36.- | 43.- | | | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 6 | 38.- | 46.- | | | | | | |
| ..1800 | 18 | 32 | 16 | 92 | 6 | 48.- | 58.- | | | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 6 | 49.- | 59.- | | | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 6 | 98.- | 125.- | | | | | | |

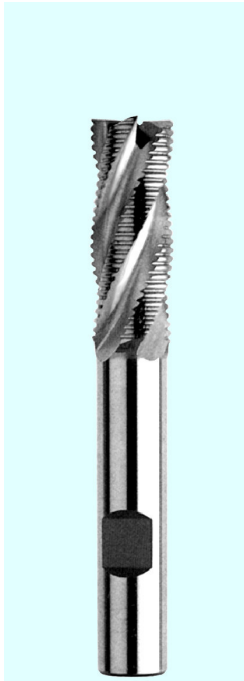


Pulverstahl - Feinschruppfräser

ASP

2010 W ASP

2010 WB ASP **PLUS - FUTURE** beschichtet



2010 W



2010 WB



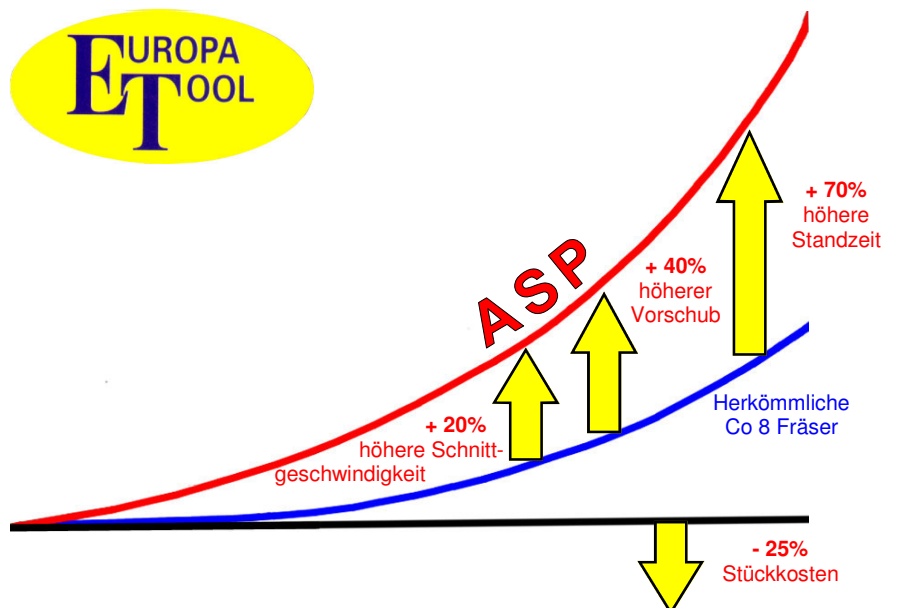
Typ

HR

- Mit diesem **Pulverstahl-Hochleistungswerkzeug** senken Sie Ihre Stückkosten um **mindestens 25 %**. Besonders geeignet für hochlegierte sowie rostfreie Stähle, aber auch zum Trockenfräsen. Die Schnittgeschwindigkeit kann wesentlich erhöht werden (siehe Grafik unten).
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Best.-Nr. 2010w... 2010wb... | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | Stahl < 60HRC | Stahl < 67HRC | INOX | Ti > 850N | GG (G) | Uni- versal | 2010 W | 2010 WB |
|------------------------------------|------------------|----------------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|------|-----------------|-----------|----------------|--------|---------|
| | Ø | Ø | ● | ● | ○ | ● | ● | ● | ● | ○ | ● | ● | | |
| | js ₁₂ | | Schneid- länge | | | Schaft- Ø | | Gesamt- länge | | Z | | | 2010 W | 2010 WB |
| ..0600 | 6 | | 13 | | 6 | | 57 | | 4 | | | | 26.- | 31.- |
| ..0800 | 8 | | 19 | | 10 | | 69 | | 4 | | | | 30.- | 35.- |
| ..1000 | 10 | | 22 | | 10 | | 72 | | 5 | | | | 31.- | 36.- |
| ..1200 | 12 | | 26 | | 12 | | 83 | | 5 | | | | 41.- | 47.- |
| ..1400 | 14 | | 26 | | 12 | | 83 | | 5 | | | | 47.- | 54.- |
| ..1600 | 16 | | 32 | | 16 | | 92 | | 5 | | | | 56.- | 64.- |
| ..1800 | 18 | | 32 | | 16 | | 92 | | 5 | | | | 59.- | 69.- |
| ..2000 | 20 | | 38 | | 20 | | 104 | | 5 | | | | 75.- | 88.- |
| ..2200 | 22 | | 38 | | 20 | | 104 | | 5 | | | | 88.- | 108.- |
| ..2500 | 25 | | 45 | | 25 | | 121 | | 6 | | | | 111.- | 132.- |
| ..3000 | 30 | | 45 | | 25 | | 121 | | 6 | | | | 158.- | 198.- |

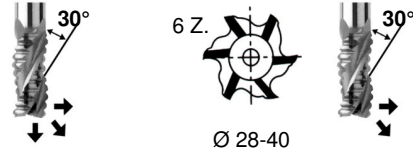
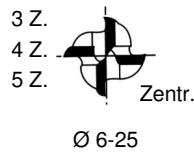


HSSE-Co 8 Schruppfräser

1181 W Kurz
1191 W Lang

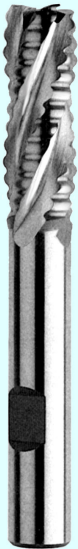
DIN 844
M42-Co 8

1181 WB Kurz **PLUS - FUTURE**
1191 WB Lang beschichtet



Typ
NR

- Universal einsetzbar für sämtliche Werkstoffe.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



PLUS - FUTURE



1181 W

1181 WB



PLUS - FUTURE



1191 W

1191 WB

| Best.-Nr. 1181w... 1181wb... 1191w... 1191wb... | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1181 W | 1181 WB | 1191 W | 1191 WB |
|---|---------------------|-------------------|--------------|------------------|---|--------|---------------------|--------|---------------------|
| | | | | | | Kurz | Kurz beschichtet | Lang | Lang beschichtet |
| ..0600 | 6 | 13 | 6 | 57 | 4 | 22.- | 27.- | --- | --- |
| ..0600 | 6 | 24 | 6 | 68 | 3 | --- | --- | 29.- | 34.- |
| ..0700 | 7 | 16 | 10 | 66 | 4 | 28.- | 34.- | --- | --- |
| ..0700 | 7 | 30 | 10 | 80 | 3 | --- | --- | 44.- | 52.- |
| ..0800 | 8 | 19 | 10 | 69 | 4 | 26.- | 31.- | --- | --- |
| ..0800 | 8 | 38 | 10 | 88 | 3 | --- | --- | 38.- | 44.- |
| ..0900 | 9 | 19 | 10 | 69 | 4 | 31.- | 36.- | --- | --- |
| ..0900 | 9 | 38 | 10 | 88 | 3 | --- | --- | 47.- | 55.- |
| ..1000 | 10 | 22 | 10 | 72 | 4 | 28.- | 33.- | --- | --- |
| ..1000 | 10 | 45 | 10 | 95 | 4 | --- | --- | 39.- | 45.- |
| ..1100 | 11 | 22 | 12 | 79 | 4 | 38.- | 46.- | --- | --- |
| ..1100 | 11 | 45 | 12 | 102 | 4 | --- | --- | 49.- | 59.- |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 34.- | 40.- | --- | --- |
| ..1200 | 12 | 53 | 12 | 110 | 4 | --- | --- | 46.- | 56.- |
| ..1300 | 13 | 26 | 12 | 83 | 4 | 36.- | 44.- | --- | --- |
| ..1300 | 13 | 53 | 12 | 110 | 4 | --- | --- | 64.- | 75.- |
| ..1400 | 14 | 26 | 12 | 83 | 4 | 38.- | 46.- | --- | --- |
| ..1400 | 14 | 53 | 12 | 110 | 4 | --- | --- | 52.- | 63.- |
| ..1500 | 15 | 26 | 12 | 83 | 4 | 46.- | 56.- | --- | --- |
| ..1500 | 15 | 53 | 12 | 110 | 4 | --- | --- | 69.- | 83.- |
| ..1600 | 16 | 32 | 16 | 92 | 4 | 46.- | 56.- | --- | --- |
| ..1600 | 16 | 63 | 16 | 123 | 4 | --- | --- | 54.- | 70.- |
| ..1700 | 17 | 32 | 16 | 92 | 4 | 54.- | 66.- | --- | --- |
| ..1700 | 17 | 63 | 16 | 123 | 4 | --- | --- | 79.- | 93.- |
| ..1800 | 18 | 32 | 16 | 92 | 4 | 49.- | 61.- | --- | --- |
| ..1800 | 18 | 63 | 16 | 123 | 4 | --- | --- | 69.- | 86.- |
| ..1900 | 19 | 32 | 16 | 92 | 4 | 62.- | 75.- | --- | --- |
| ..1900 | 19 | 63 | 16 | 123 | 4 | --- | --- | 99.- | 117.- |
| ..2000 | 20 | 38 | 20 | 104 | 4 | 59.- | 72.- | --- | --- |
| ..2000 | 20 | 75 | 20 | 141 | 4 | --- | --- | 84.- | 102.- |
| ..2200 | 22 | 38 | 20 | 104 | 5 | 72.- | 93.- | --- | --- |
| ..2200 | 22 | 75 | 20 | 141 | 5 | --- | --- | 99.- | 125.- |
| ..2400 | 24 | 45 | 25 | 121 | 5 | 89.- | 115.- | --- | --- |
| ..2400 | 24 | 90 | 25 | 166 | 5 | --- | --- | 128.- | 158.- |
| ..2500 | 25 | 45 | 25 | 121 | 5 | 89.- | 115.- | --- | --- |
| ..2500 | 25 | 90 | 25 | 166 | 5 | --- | --- | 118.- | 148.- |
| ..2600 | 26 | 90 | 25 | 166 | 6 | --- | --- | 172.- | 212.- |
| ..2800 | 28 | 45 | 25 | 121 | 6 | 114.- | 144.- | --- | --- |
| ..2800 | 28 | 90 | 25 | 166 | 6 | --- | --- | 164.- | 204.- |
| ..3000 | 30 | 45 | 25 | 121 | 6 | 129.- | 163.- | --- | --- |
| ..3000 | 30 | 90 | 25 | 166 | 6 | --- | --- | 172.- | 208.- |
| ..3200 | 32 | 53 | 32 | 133 | 6 | 148.- | 190.- | --- | --- |
| ..3200 | 32 | 106 | 32 | 186 | 6 | --- | --- | 182.- | 232.- |
| ..3600 | 36 | 53 | 32 | 133 | 6 | 194.- | 244.- | --- | --- |
| ..3600 | 36 | 106 | 32 | 186 | 6 | --- | --- | 224.- | 274.- |
| ..3800 | 38 | 63 | 32 | 155 | 6 | 226.- | 284.- | --- | --- |
| ..3800 | 38 | 125 | 32 | 217 | 6 | --- | --- | 298.- | 358.- |
| ..4000 | 40 | 63 | 32 | 155 | 6 | 232.- | 290.- | --- | --- |
| ..4000 | 40 | 125 | 32 | 217 | 6 | --- | --- | 316.- | 376.- |



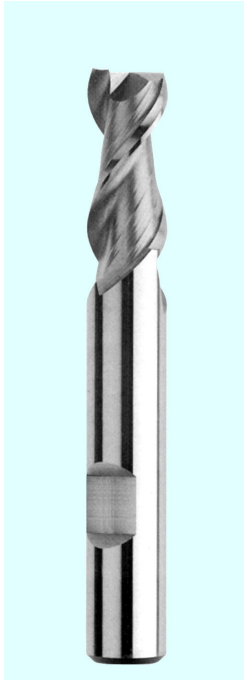
HSSE-Co 8 ALU-Schlichtfräser

1311 W

DIN 844
M42-Co 8

1311 WB *EXTREM - SPEED - ALU*

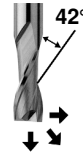
beschichtet



1311 W



1311 WB



Typ
N

- Eintauchen und Längsfräsen von Keilnuten P9 sowie für sämtliche ALU- und NE-Metalle.
- Höchstleistung mit **EXTREM - SPEED - ALU** - Beschichtung.

| Best-Nr. 1311w... 1311wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1311 W | 1311 WB |
|-----------------------------------|-------------------------|-------------------|----------------------------|--------------------|--------------------|---------------------|---------------------|---------|---------------|-----------|----------------|--------|---------|
| | ○ | ● | ● | | | | | | ● | | | | |
| | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1311 W | | 1311 WB | | | | | |
| ..0400 | 4 | 11 | 6 | 55 | 2 | 14.- | 17.- | | | | | | |
| ..0450 | 4,5 | 11 | 6 | 55 | 2 | 14.- | 17.- | | | | | | |
| ..0500 | 5 | 13 | 6 | 57 | 2 | 14.- | 17.- | | | | | | |
| ..0550 | 5,5 | 13 | 6 | 57 | 2 | 14.- | 17.- | | | | | | |
| ..0600 | 6 | 13 | 6 | 57 | 2 | 14.- | 17.- | | | | | | |
| ..0650 | 6,5 | 16 | 10 | 66 | 2 | 21.- | 25.- | | | | | | |
| ..0700 | 7 | 16 | 10 | 66 | 2 | 22.- | 26.- | | | | | | |
| ..0750 | 7,5 | 16 | 10 | 66 | 2 | 24.- | 28.- | | | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 2 | 19.- | 23.- | | | | | | |
| ..0850 | 8,5 | 19 | 10 | 69 | 2 | 24.- | 28.- | | | | | | |
| ..0900 | 9 | 19 | 10 | 69 | 2 | 24.- | 28.- | | | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 2 | 19.- | 23.- | | | | | | |
| ..1100 | 11 | 22 | 12 | 79 | 2 | 28.- | 32.- | | | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 2 | 24.- | 28.- | | | | | | |
| ..1300 | 13 | 26 | 12 | 83 | 2 | 32.- | 38.- | | | | | | |
| ..1400 | 14 | 26 | 12 | 83 | 2 | 32.- | 38.- | | | | | | |
| ..1500 | 15 | 26 | 12 | 83 | 2 | 38.- | 48.- | | | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 2 | 34.- | 44.- | | | | | | |
| ..1700 | 17 | 32 | 16 | 92 | 2 | 48.- | 60.- | | | | | | |
| ..1800 | 18 | 32 | 16 | 92 | 2 | 48.- | 60.- | | | | | | |
| ..1900 | 19 | 32 | 16 | 92 | 2 | 59.- | 77.- | | | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 2 | 59.- | 77.- | | | | | | |
| ..2100 | 21 | 38 | 20 | 104 | 2 | 84.- | 104.- | | | | | | |
| ..2200 | 22 | 38 | 20 | 104 | 2 | 86.- | 106.- | | | | | | |
| ..2300 | 23 | 38 | 20 | 104 | 2 | 86.- | 108.- | | | | | | |
| ..2400 | 24 | 45 | 25 | 121 | 2 | 86.- | 110.- | | | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 2 | 88.- | 119.- | | | | | | |

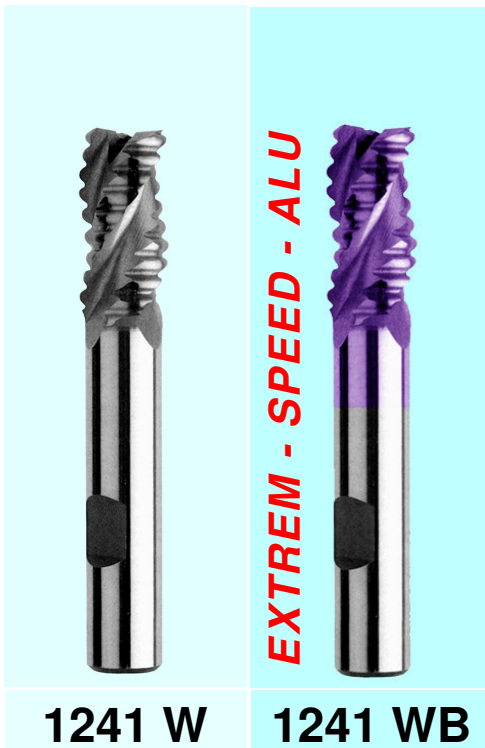
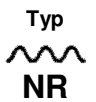
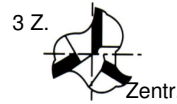
HSSE-Co 8 ALU-Schrupfräser

1241 W

DIN 844
M42-Co 8

1241 WB **EXTREM - SPEED - ALU**

beschichtet



- Hohe Zerspanungsleistung mit grossen Spanräumen; für alle ALU- und NE-Metalle.
- Höchstleistung mit **EXTREM - SPEED - ALU** - Beschichtung.

| Best.-Nr. 1241w... 1241wb... | Thermo Plast. Alu | | Alu Guss > 10% Si | | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1241 W | 1241 WB |
|------------------------------------|-------------------|----|-------------------|-----|--------------|--------------|---------------|---------------|--------|---------|---------|------------|--------|---------|
| | ● | ● | ● | ● | | | | | ○ | ○ | | | | |
| Ø js ₁₂ | Schneid-länge | | Schaft-Ø | | Gesamt-länge | | Z | | 1241 W | | 1241 WB | | | |
| ..0600 | 6 | 13 | 6 | 57 | 3 | 36.- | 39.- | | | | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 3 | 36.- | 38.- | | | | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 3 | 36.- | 39.- | | | | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 3 | 46.- | 51.- | | | | | | | |
| ..1400 | 14 | 26 | 12 | 83 | 3 | 56.- | 62.- | | | | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 3 | 59.- | 66.- | | | | | | | |
| ..1800 | 18 | 32 | 16 | 92 | 3 | 72.- | 81.- | | | | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 3 | 84.- | 96.- | | | | | | | |
| ..2200 | 22 | 38 | 20 | 104 | 3 | 118.- | 136.- | | | | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 3 | 146.- | 164.- | | | | | | | |
| ..3000 | 30 | 45 | 25 | 121 | 3 | 198.- | 227.- | | | | | | | |

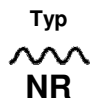
HSSE-Co 8 ALU-Schrupfräser lang

1251 W

DIN 844
M42-Co 8

1251 WB **EXTREM - SPEED - ALU**

beschichtet



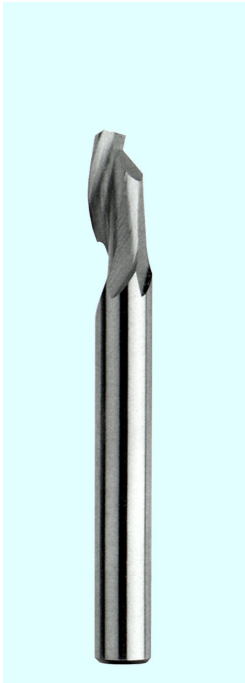
- Hohe Zerspanungsleistung mit grossen Spanräumen; für alle ALU- und NE-Metalle.
- Höchstleistung mit **EXTREM - SPEED - ALU** - Beschichtung.

| Best.-Nr. 1251w... 1251wb... | Thermo Plast. Alu | | Alu Guss > 10% Si | | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1251 W | 1251 WB |
|------------------------------------|-------------------|----|-------------------|-----|--------------|--------------|---------------|---------------|--------|---------|---------|------------|--------|---------|
| | ● | ● | ● | ● | | | | | ○ | ○ | | | | |
| Ø js ₁₂ | Schneid-länge | | Schaft-Ø | | Gesamt-länge | | Z | | 1251 W | | 1251 WB | | | |
| ..1000 | 10 | 45 | 10 | 95 | 3 | 43.- | 47.- | | | | | | | |
| ..1200 | 12 | 53 | 12 | 110 | 3 | 53.- | 59.- | | | | | | | |
| ..1400 | 14 | 53 | 12 | 110 | 3 | 73.- | 79.- | | | | | | | |
| ..1600 | 16 | 63 | 16 | 123 | 3 | 78.- | 86.- | | | | | | | |
| ..1800 | 18 | 63 | 16 | 123 | 3 | 98.- | 109.- | | | | | | | |
| ..2000 | 20 | 75 | 20 | 141 | 3 | 108.- | 122.- | | | | | | | |
| ..2200 | 22 | 75 | 20 | 141 | 3 | 164.- | 178.- | | | | | | | |
| ..2500 | 25 | 90 | 25 | 166 | 3 | 188.- | 209.- | | | | | | | |
| ..3000 | 30 | 90 | 25 | 166 | 3 | 263.- | 297.- | | | | | | | |

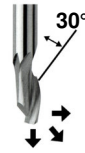
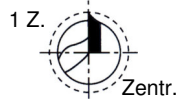
HSSE-Co 5 Einzahnfräser ALU

1353

1363



1353



Typ
N



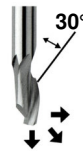
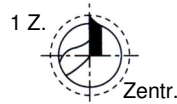
- Zum Fräsen von Schlitzern an Türen und Fenstern aus Aluminium oder Kunststoff.
Für ELU-, Haffner- und ROTOX-Maschinen.

| | | | |
|-------------------|-----|-------------------|-------------|
| Thermo Plast. Alu | Alu | Alu Guss > 10% Si | 1353 |
| ● | ● | ● | |

| Best.-Nr. 1353... | Ø js ₁₄ | Schneidlänge | Schaft-Ø | Gesamtlänge | Zähne | |
|-------------------|--------------------|--------------|----------|-------------|-------|------|
| | 1353 | | | | | |
| ..0300 | 3 | 12 | 8 | 60 | 1 | 12.- |
| ..0400 | 4 | 12 | 8 | 60 | 1 | 12.- |
| ..0500 | 5 | 14 | 8 | 60 | 1 | 12.- |
| ..0600 | 6 | 14 | 8 | 60 | 1 | 12.- |
| ..0800 | 8 | 14 | 8 | 80 | 1 | 14.- |
| ..1000 | 10 | 14 | 8 | 80 | 1 | 18.- |



1363



Typ
N



lange Ausführung

| | | | |
|-------------------|-----|-------------------|-------------|
| Thermo Plast. Alu | Alu | Alu Guss > 10% Si | 1363 |
| ● | ● | ● | |

| Best.-Nr. 1363... | Ø js ₁₄ | Schneidlänge | Ø D2 Nutzlänge | Schaft-Ø | Gesamtlänge | Zähne | |
|-------------------|--------------------|--------------|----------------|----------|-------------|-------|------|
| | 1363 | | | | | | |
| ..0500080 | 5 | 16 | 4.7 x 45 | 8 | 80 | 1 | 17.- |
| ..0500100 | 5 | 40 | 5.0 x 40 | 8 | 100 | 1 | 24.- |
| ..0600090 | 6 | 16 | 5.8 x 45 | 8 | 90 | 1 | 25.- |
| ..0800100 | 8 | 30 | 7.5 x 70 | 8 | 100 | 1 | 28.- |
| ..0800120 | 8 | 18 | 7.5 x 70 | 8 | 120 | 1 | 32.- |
| ..1000120 | 10 | 18 | 9.7 x 80 | 10 | 120 | 1 | 36.- |



ASP + HSS-E Co8 Schafffräser im Probeset



ASP

Pulverstahl - Feinschruppfräser

Ø 6 8 10 12 16 20
4 + 5 Zähne

Art.-Nr. 2910 Fr. 259.-

PLUS - FUTURE-
beschichtet
Art.-Nr. 2910 B Fr. 301.-



HSSE-Co 8

Mini-3-Schneiden-Fräser, lang

Ø 2 3 4 5 6 8
3 Zähne

Art.-Nr. 1260 Fr. 43.-

PLUS - FUTURE -
beschichtet
Art.-Nr. 1260 B Fr. 68.-

Weitere HSS-E Co8 Schafffräser - Sets

| Set à 6 Stk. | Zähne | Art. - Nr. Preis CHF | |
|--|-------|----------------------|--------------------------------------|
| | | | PLUS - FUTURE- beschichtet |
| Alu-Schlichtfräser Ø 6/8/10/12/16/20 mm | 2 | 1262 169.- | 1262 B 212.- |
| Langlochfräser Ø 6/8/10/12/16/20 mm | 2 | 1264 85.- | 1264 B 148.- |
| Schlichtfräser Ø 6/8/10/12/16/20 mm | 3 | 1266 119.- | 1266 B 169.- |
| Schlichtfräser Ø 6/8/10/12/16/20 mm | 4 | 1268 118.- | 1268 B 148.- |
| Feinschruppfräser Ø 6/8/10/12/16/20 mm | 3 + 4 | 1270 215.- | 1270 B 254.- |
| Schruppfräser Ø 6/8/10/12/16/20 mm | 3 + 4 | 1272 215.- | 1272 B 259.- |
| ASP -Schlichtfräser Ø 6/8/10/12/16/20 mm | 4 + 6 | 2002 158.- | 2002 B 193.- |

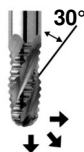
HSSE-Co 8 Schrupp-Radiusfräser **PLUS - FUTURE**

1271 W

DIN 844
M42-Co 8

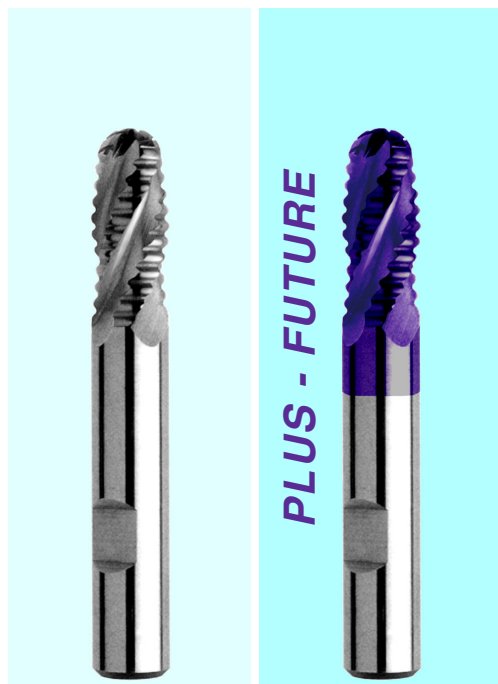
1271 WB

beschichtet



Typ
NR

- Universal einsetzbar für sämtliche Werkstoffe, vorwiegend für Werkzeug- und Formenbau
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung



1271 W

1271 WB

| Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1271 W | 1271 WB |
|------------------------------|--------|-------------------|--------------|--------------|---------------|---------------|---------|---------|--------|------------|--------|---------|
| | | | ● | ● | | | ● | | ● | ● | | |
| Best.-Nr. 1271w... 1271wb... | Ø js12 | Schneid-länge | Schaft-Ø | Gesamt-länge | Zähne | 1271 W | 1271 WB | | | | | |
| ..0800 | 8 | 19 | 10 | 69 | 3 | 49.- | 51.- | | | | | |
| ..1000 | 10 | 22 | 10 | 72 | 3 | 49.- | 52.- | | | | | |
| ..1200 | 12 | 26 | 12 | 83 | 4 | 53.- | 59.- | | | | | |
| ..1600 | 16 | 32 | 16 | 92 | 4 | 69.- | 76.- | | | | | |
| ..2000 | 20 | 38 | 20 | 104 | 4 | 86.- | 98.- | | | | | |
| ..2500 | 25 | 45 | 25 | 121 | 4 | 128.- | 146.- | | | | | |

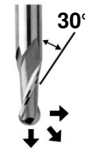
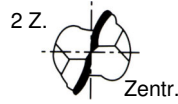


HSSE-Co 8 Radiusfräser

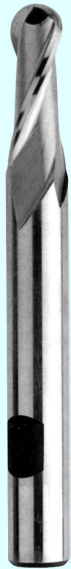
1121 W Kurz
1141 W Lang

DIN 327
M42-Co 8

1121 WB Kurz **PLUS - FUTURE**
1141 WB Lang beschichtet



Typ
N



PLUS - FUTURE

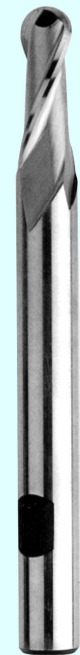


1121 W

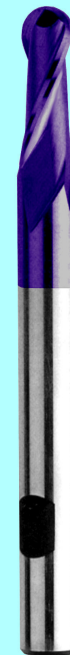
1121

- Universal einsetzbar für sämtliche Werkstoffe, vorwiegend für Werkzeug- und Formenbau.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.

High - Flyer



PLUS - FUTURE



1141 W

1141

| Thermo Plast Alu | Alu | Alu Guss 10% | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- ver- sal | 1121 W Kurz | 1121 WB Kurz beschichtet | 1141 W Lang | 1141 WB Lang beschichtet |
|---|---------------------|--------------------|--------------------|--------------------|---------------------|---------------------|--------|---------------|-----------|---------------------|----------------|--------------------------------|----------------|--------------------------------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | |
| Best.-Nr. 1121w... 1121wb... 1141w... 1141wb... | Ø e ₈ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1121W | 1121WB | 1141W | 1141WB | | | | | |
| ..0300 | 3 | 5 | 6 | 49 | 2 | 14.- | 18.- | --- | --- | | | | | |
| ..0300 | 3 | 8 | 6 | 56 | 2 | --- | --- | 19.- | 24.- | | | | | |
| ..0350 | 3.5 | 6 | 6 | 50 | 2 | 14.- | 18.- | --- | --- | | | | | |
| ..0400 | 4 | 7 | 6 | 51 | 2 | 14.- | 18.- | --- | --- | | | | | |
| ..0400 | 4 | 11 | 6 | 63 | 2 | --- | --- | 19.- | 24.- | | | | | |
| ..0450 | 4.5 | 7 | 6 | 51 | 2 | 14.- | 18.- | --- | --- | | | | | |
| ..0500 | 5 | 8 | 6 | 52 | 2 | 14.- | 18.- | --- | --- | | | | | |
| ..0500 | 5 | 13 | 6 | 68 | 2 | --- | --- | 19.- | 24.- | | | | | |
| ..0550 | 5.5 | 8 | 6 | 52 | 2 | 15.- | 19.- | --- | --- | | | | | |
| ..0600 | 6 | 8 | 6 | 52 | 2 | 15.- | 19.- | --- | --- | | | | | |
| ..0600 | 6 | 13 | 6 | 68 | 2 | --- | --- | 19.- | 24.- | | | | | |
| ..0700 | 7 | 10 | 10 | 60 | 2 | 20.- | 26.- | --- | --- | | | | | |
| ..0800 | 8 | 11 | 10 | 61 | 2 | 16.- | 22.- | --- | --- | | | | | |
| ..0800 | 8 | 19 | 10 | 88 | 2 | --- | --- | 21.- | 27.- | | | | | |
| ..0900 | 9 | 11 | 10 | 61 | 2 | 22.- | 28.- | --- | --- | | | | | |
| ..1000 | 10 | 13 | 10 | 63 | 2 | 17.- | 23.- | --- | --- | | | | | |
| ..1000 | 10 | 22 | 10 | 95 | 2 | --- | --- | 26.- | 32.- | | | | | |
| ..1200 | 12 | 16 | 12 | 73 | 2 | 21.- | 27.- | --- | --- | | | | | |
| ..1200 | 12 | 26 | 12 | 110 | 2 | --- | --- | 29.- | 39.- | | | | | |
| ..1300 | 13 | 16 | 12 | 73 | 2 | 29.- | 37.- | --- | --- | | | | | |
| ..1300 | 13 | 26 | 12 | 110 | 2 | --- | --- | 37.- | 48.- | | | | | |
| ..1400 | 14 | 16 | 12 | 73 | 2 | 26.- | 34.- | --- | --- | | | | | |
| ..1400 | 14 | 26 | 12 | 110 | 2 | --- | --- | 33.- | 44.- | | | | | |
| ..1500 | 15 | 16 | 12 | 73 | 2 | 36.- | 46.- | --- | --- | | | | | |
| ..1500 | 15 | 26 | 12 | 110 | 2 | --- | --- | 42.- | 56.- | | | | | |
| ..1600 | 16 | 19 | 16 | 79 | 2 | 31.- | 41.- | --- | --- | | | | | |
| ..1600 | 16 | 32 | 16 | 123 | 2 | --- | --- | 42.- | 56.- | | | | | |
| ..1700 | 17 | 19 | 16 | 79 | 2 | 44.- | 56.- | --- | --- | | | | | |
| ..1800 | 18 | 19 | 16 | 79 | 2 | 40.- | 52.- | --- | --- | | | | | |
| ..1800 | 18 | 32 | 16 | 123 | 2 | --- | --- | 49.- | 66.- | | | | | |
| ..1900 | 19 | 19 | 16 | 79 | 2 | 48.- | 62.- | --- | --- | | | | | |
| ..2000 | 20 | 22 | 20 | 88 | 2 | 43.- | 57.- | --- | --- | | | | | |
| ..2000 | 20 | 38 | 20 | 141 | 2 | --- | --- | 58.- | 78.- | | | | | |
| ..2200 | 22 | 22 | 20 | 88 | 2 | 59.- | 82.- | --- | --- | | | | | |



HSSE-Co 8 Schlichtfräser extra lang

1091 W

M42-Co 8

1091 WB

PLUS - FUTURE
beschichtet



Typ
N



- Universal einsetzbar für sämtliche Werkstoffe; speziell lange Ausführung für Arbeiten an tiefliegenden und schwer erreichbaren Stellen.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Best.-Nr. 1091w... 1091wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1091 W | 1091 WB |
|------------------------------------|-------------------------|-------------------|-------------------------|------------------|-----------------|------------------|------------------|---------|---------------|-----------|----------------|--------|---------|
| | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ● | | |
| | Ø k ₁₀ | Schneid- länge | Schaft- Ø | Gesamt- länge | Z | 1091 W | | 1091 WB | | | | | |
| ..0600 | 6 | 60 | 6 | 110 | 4 | 69.- | | 91.- | | | | | |
| ..0800 | 8 | 60 | 10 | 110 | 4 | 86.- | | 117.- | | | | | |
| ..1000 | 10 | 70 | 10 | 120 | 4 | 94.- | | 121.- | | | | | |
| ..1200 | 12 | 100 | 12 | 160 | 4 | 106.- | | 139.- | | | | | |
| ..1400 | 14 | 130 | 12 | 190 | 4 | 129.- | | 186.- | | | | | |
| ..1600 | 16 | 150 | 16 | 210 | 4 | 149.- | | 196.- | | | | | |
| ..1800 | 18 | 180 | 16 | 240 | 4 | 259.- | | 369.- | | | | | |
| ..2000 | 20 | 180 | 20 | 240 | 4 | 291.- | | 405.- | | | | | |

Schlicht-Fräser kurz

1161 W

1161 WB

PLUS - FUTURE

beschichtet

HSSE-Co 8 -

Schrupp-Fräser kurz

1171 W

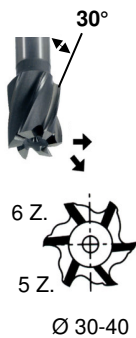
1171 WB

PLUS - FUTURE

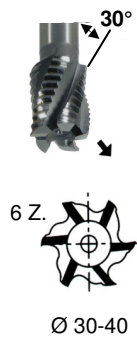
beschichtet



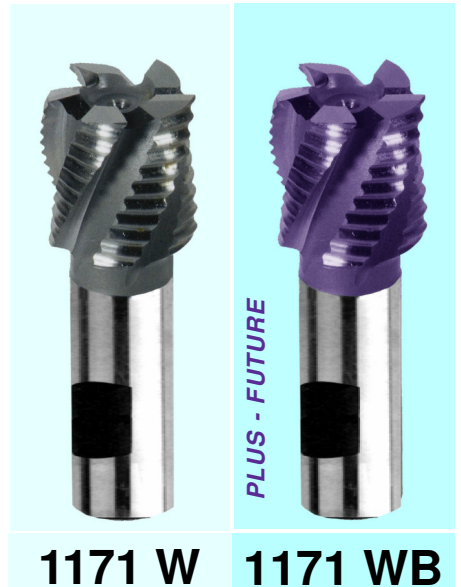
Typ
N



Typ
NR



- Sehr stabiler HSS-Fräser!
- Durch die kurze Ausladung auch auf älteren Maschinen sehr hohe



1171 W

1171 WB

| Best.-Nr. 1161w... 1161wb... | Ø | SL | Schaft- Ø | Ges.- L | Z | Schlicht | | Best.-Nr. 1171w... 1171wb... | Ø | SL | Schaft- Ø | Ges.- L | Z | Schrupp | |
|------------------------------------|----|----|--------------|------------|---|----------|---------|------------------------------------|----|----|--------------|------------|---|---------|---------|
| | | | | | | 1161 W | 1161 WB | | | | | | | 1171 W | 1171 WB |
| | | | | | | ..3000 | 30 | | | | | | | 30 | 20 |
| ..3500 | 35 | 30 | 20 | 90 | 6 | 134.- | 184.- | ..3500 | 35 | 30 | 20 | 90 | 6 | 174.- | 224.- |
| ..4000 | 40 | 32 | 25 | 95 | 8 | 165.- | 223.- | ..4000 | 40 | 32 | 25 | 95 | 8 | 238.- | 296.- |
| ..5000 | 50 | 36 | 32 | 100 | 8 | 295.- | 355.- | ..5000 | 50 | 36 | 32 | 100 | 8 | 348.- | 396.- |



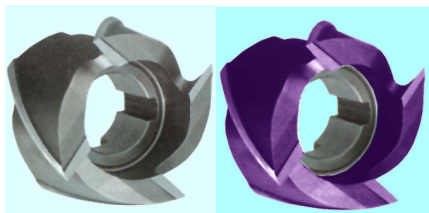
| | | | | | |
|---|----------------------|---|--|--|--|
| HSSE-Co 8 Walzenstirnfräser-Schlicht | | | HSSE-Co 8 Walzenstirnfräser ALU | | |
| 1421 | DIN 1880 M42-Co 8 | 1421 B <i>PLUS - FUTURE</i> beschichtet | 1431 | 1431 B <i>EXTREM - SPEED - ALU</i> beschichtet | |



1421

1421 B

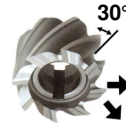
PLUS - FUTURE



1431

1431 B

EXTREM - SPEED - ALU

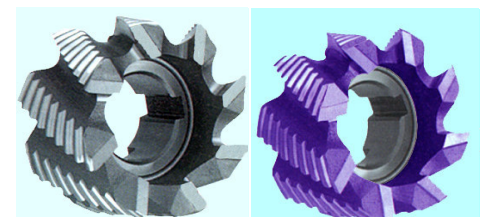


Typ
N

- Universal einsetzbar für sämtliche Werkstoffe.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung, und speziell für schwer zerspanbare und rostfreie Stähle.
- Speziell geeignet für ALU und sämtliche NE-Metalle; extra grosse Spanräume.
- Höchstleistung mit **EXTREM - SPEED - ALU** - Beschichtung.

| | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | INOX | Ti + Cu | GG (G) | Uni-versal | 1421 | 1421 B | 1431 | 1431 B |
|--|-------------------|---------|-------------------|--------------|--------------|---------------|-------|---------|--------|------------|------|--------|------|--------|
| Best.-Nr. 1421... 1421b... 1431... 1431b... | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | | | | |
| Ø k ₁₂ | Breite | Bohrung | Z 1421 | Z 1431 | | | | | | | | | | |
| ..04000 | 40 | 32 | 16 | 6 | 4 | 79.- | 104.- | 68.- | 138.- | | | | | |
| ..05000 | 50 | 36 | 22 | 8 | 4 | 112.- | 167.- | 82.- | 168.- | | | | | |
| ..06300 | 63 | 40 | 27 | 8 | 5 | 146.- | 201.- | 114.- | 224.- | | | | | |
| ..08000 | 80 | 45 | 27 | 10 | 6 | 218.- | 306.- | 194.- | 342.- | | | | | |
| ..10000 | 100 | 50 | 32 | 10 | 7 | 358.- | 476.- | 284.- | 528.- | | | | | |
| ..12500 | 125 | 56 | 40 | 14 | - | 498.- | 673.- | - | - | | | | | |

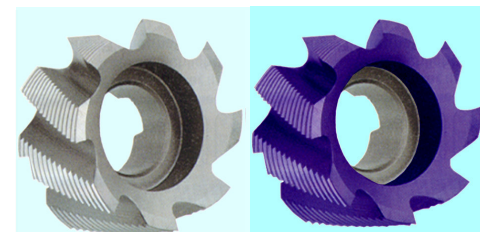
| | | | | | |
|--|----------------------|---------------|--|---|--|
| HSSE-Co 8 Walzenstirnfräser-Schrupp | | | HSSE-Co 8 Walzenstirnfräser-Feinschrupp | | |
| 1441 | DIN 1880 M42-Co 8 | 1441 B | 1451 | 1451 B <i>PLUS - FUTURE</i> beschichtet | |



1441

1441 B

PLUS - FUTURE



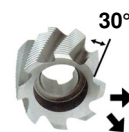
1451

1451 B

PLUS - FUTURE



Typ
NR



Typ
HR

- Universal einsetzbar für sämtliche Werkstoffe.
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung, und speziell für schwer zerspanbare und rostfreie Stähle.

| | Alu Guss > 10% S | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1441 Schrupp | 1441 B Schrupp | 1451 Feinschrupp | 1451 B Feinschrupp |
|--|------------------|--------------|--------------|---------------|---------------|-------|---------|--------|------------|--------------|----------------|------------------|--------------------|
| Best.-Nr. 1441... 1441b... 1451... 1451b... | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Ø k ₁₂ | Breite | Bohrung | Z 1441 | Z 1451 | | | | | | | | | |
| ..04000 | 40 | 32 | 16 | 6 | 8 | 118.- | 143.- | 118.- | 143.- | | | | |
| ..05000 | 50 | 36 | 22 | 6 | 8 | 138.- | 193.- | 138.- | 193.- | | | | |
| ..06300 | 63 | 40 | 27 | 8 | 10 | 198.- | 253.- | 198.- | 253.- | | | | |
| ..08000 | 80 | 45 | 27 | 8 | 10 | 334.- | 412.- | 334.- | 412.- | | | | |
| ..10000 | 100 | 50 | 32 | 10 | 12 | 418.- | 536.- | 418.- | 536.- | | | | |
| ..12500 | 125 | 56 | 40 | 12 | 12 | 598.- | 773.- | 598.- | 773.- | | | | |

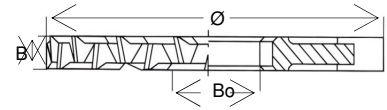
HSSE Scheibenfräser

kreuzverzahnt

1470

1470 B

PLUS - FUTURE
beschichtet



- Universal einsetzbar für sämtliche Werkstoffe. 3-seitig schneidend; damit wird beim Schlitzfräsen eine genaue und saubere Oberfläche erzielt.



PLUS - FUTURE

| Best.-Nr. 1470... 1470b... | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | INOX | Uni- versal | 1470 | 1470 B |
|----------------------------------|-----|-------------------------|-----------------|-----------------|------------------|-------|----------------|------|--------|
| | ○ | ● | ● | ○ | ○ | ○ | ● | | |
| | Ø | Breite | Bohrung | Z | | | | | |
| ..0500160 | 50 | 1,6 | 16 | 24 | 78.- | 114.- | | | |
| ..0500200 | 50 | 2 | 16 | 24 | 79.- | 115.- | | | |
| ..0500250 | 50 | 2,5 | 16 | 24 | 82.- | 118.- | | | |
| ..0500300 | 50 | 3 | 16 | 24 | 83.- | 119.- | | | |
| ..0500350 | 50 | 3,5 | 16 | 22 | 98.- | 134.- | | | |
| ..0630160 | 63 | 1,6 | 22 | 28 | 65.- | 101.- | | | |
| ..0630200 | 63 | 2 | 22 | 28 | 62.- | 98.- | | | |
| ..0630250 | 63 | 2,5 | 22 | 28 | 62.- | 98.- | | | |
| ..0630300 | 63 | 3 | 22 | 28 | 64.- | 100.- | | | |
| ..0630400 | 63 | 4 | 22 | 28 | 64.- | 100.- | | | |
| ..0630500 | 63 | 5 | 22 | 28 | 70.- | 106.- | | | |
| ..0800160 | 80 | 1,6 | 27 | 32 | 80.- | 128.- | | | |
| ..0800200 | 80 | 2 | 27 | 32 | 76.- | 124.- | | | |
| ..0800250 | 80 | 2,5 | 27 | 32 | 76.- | 124.- | | | |
| ..0800300 | 80 | 3 | 27 | 32 | 80.- | 128.- | | | |
| ..0800350 | 80 | 3,5 | 27 | 32 | 98.- | 146.- | | | |
| ..0800400 | 80 | 4 | 27 | 32 | 87.- | 135.- | | | |
| ..0800500 | 80 | 5 | 27 | 32 | 90.- | 138.- | | | |
| ..0800600 | 80 | 6 | 27 | 32 | 98.- | 284.- | | | |
| ..1000160 | 100 | 1,6 | 32 | 36 | 103.- | 151.- | | | |
| ..1000200 | 100 | 2 | 32 | 36 | 98.- | 146.- | | | |
| ..1000250 | 100 | 2,5 | 32 | 36 | 99.- | 147.- | | | |
| ..1000300 | 100 | 3 | 32 | 36 | 101.- | 149.- | | | |

| Best.-Nr. 1470... 1470b... | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | INOX | Uni- versal | 1470 | 1470 B |
|----------------------------------|-----|-------------------------|-----------------|-----------------|------------------|-------|----------------|------|--------|
| | ○ | ● | ● | ○ | ○ | ○ | ● | | |
| | Ø | Breite | Bohrung | Z | | | | | |
| ..1000350 | 100 | 3,5 | 32 | 36 | 126.- | 174.- | | | |
| ..1000400 | 100 | 4 | 32 | 36 | 110.- | 158.- | | | |
| ..1000500 | 100 | 5 | 32 | 36 | 118.- | 166.- | | | |
| ..1000600 | 100 | 6 | 32 | 36 | 128.- | 176.- | | | |
| ..1000800 | 100 | 8 | 32 | 36 | 157.- | 205.- | | | |
| ..1250200 | 125 | 2 | 32 | 40 | 119.- | 178.- | | | |
| ..1250250 | 125 | 2,5 | 32 | 40 | 123.- | 182.- | | | |
| ..1250300 | 125 | 3 | 32 | 40 | 130.- | 189.- | | | |
| ..1250350 | 125 | 3,5 | 32 | 40 | 136.- | 195.- | | | |
| ..1250400 | 125 | 4 | 32 | 40 | 143.- | 202.- | | | |
| ..1250500 | 125 | 5 | 32 | 40 | 160.- | 219.- | | | |
| ..1250600 | 125 | 6 | 32 | 40 | 173.- | 232.- | | | |
| ..1250800 | 125 | 8 | 32 | 32 | 221.- | 280.- | | | |
| ..1251000 | 125 | 10 | 32 | 32 | 247.- | 306.- | | | |
| ..1600200 | 160 | 2 | 40 | 48 | 187.- | 285.- | | | |
| ..1600250 | 160 | 2,5 | 40 | 48 | 187.- | 285.- | | | |
| ..1600300 | 160 | 3 | 40 | 48 | 183.- | 281.- | | | |
| ..1600350 | 160 | 3,5 | 40 | 48 | 193.- | 291.- | | | |
| ..1600400 | 160 | 4 | 40 | 48 | 192.- | 290.- | | | |
| ..1600500 | 160 | 5 | 40 | 48 | 214.- | 312.- | | | |
| ..1600600 | 160 | 6 | 40 | 48 | 228.- | 326.- | | | |
| ..1600800 | 160 | 8 | 40 | 36 | 264.- | 362.- | | | |
| ..1601000 | 160 | 10 | 40 | 36 | 296.- | 394.- | | | |
| ..1601200 | 160 | 12 | 40 | 36 | 358.- | 456.- | | | |

HSSE Scheibenfräser

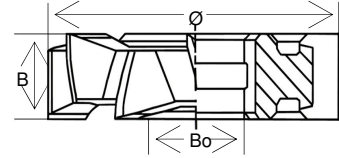
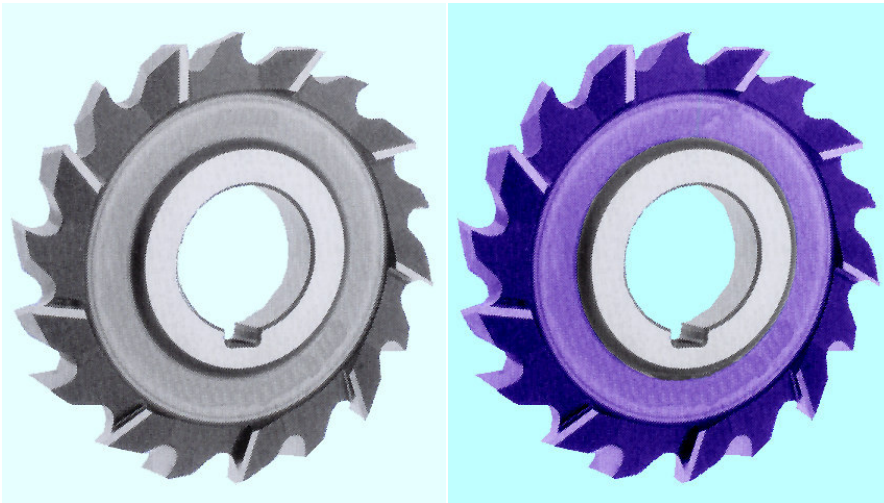
kreuzverzahnt

1480

1480 B

PLUS - FUTURE

beschichtet



PLUS - FUTURE

- Universal einsetzbar für sämtliche Werkstoffe. Für tiefe Schlitze. 3-seitig schneidend.

| Best.-Nr. 1480... 1480b... | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | INOX | Uni- versal | 1480 | 1480 B |
|----------------------------------|-----|----------------------------|--------------------|--------------------|---------------------|-------|----------------|------|--------|
| | ○ | ○ | ● | ● | ○ | ○ | ● | | |
| | Ø | Breite | Bohrung | Z | | | | | |
| ..0500400 | 50 | 4 | 16 | 12 | 63.- | 93.- | | | |
| ..0500500 | 50 | 5 | 16 | 12 | 62.- | 93.- | | | |
| ..0500600 | 50 | 6 | 16 | 12 | 65.- | 95.- | | | |
| ..0500800 | 50 | 8 | 16 | 12 | 70.- | 101.- | | | |
| ..0501000 | 50 | 10 | 16 | 12 | 76.- | 107.- | | | |
| ..0630400 | 63 | 4 | 22 | 12 | 70.- | 101.- | | | |
| ..0630500 | 63 | 5 | 22 | 12 | 72.- | 103.- | | | |
| ..0630600 | 63 | 6 | 22 | 12 | 74.- | 104.- | | | |
| ..0630800 | 63 | 8 | 22 | 12 | 82.- | 112.- | | | |
| ..0631000 | 63 | 10 | 22 | 12 | 92.- | 122.- | | | |
| ..0631200 | 63 | 12 | 22 | 12 | 97.- | 127.- | | | |
| ..0800400 | 80 | 4 | 27 | 14 | 87.- | 127.- | | | |
| ..0800500 | 80 | 5 | 27 | 14 | 92.- | 133.- | | | |
| ..0800600 | 80 | 6 | 27 | 14 | 97.- | 138.- | | | |
| ..0800800 | 80 | 8 | 27 | 14 | 100.- | 141.- | | | |
| ..0801000 | 80 | 10 | 27 | 14 | 109.- | 150.- | | | |
| ..0801200 | 80 | 12 | 27 | 14 | 118.- | 159.- | | | |
| ..1000400 | 100 | 4 | 32 | 14 | 117.- | 158.- | | | |

| Best.-Nr. 1480... 1480b... | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | INOX | Uni- versal | 1480 | 1480 B |
|----------------------------------|-----|----------------------------|--------------------|--------------------|---------------------|-------|----------------|------|--------|
| | ○ | ○ | ● | ● | ○ | ○ | ● | | |
| | Ø | Breite | Bohrung | Z | | | | | |
| ..1000500 | 100 | 5 | 32 | 14 | 118.- | 159.- | | | |
| ..1000600 | 100 | 6 | 32 | 14 | 126.- | 167.- | | | |
| ..1000800 | 100 | 8 | 32 | 14 | 138.- | 178.- | | | |
| ..1001000 | 100 | 10 | 32 | 14 | 151.- | 192.- | | | |
| ..1001200 | 100 | 12 | 32 | 14 | 167.- | 207.- | | | |
| ..1250600 | 125 | 6 | 32 | 16 | 178.- | 229.- | | | |
| ..1250800 | 125 | 8 | 32 | 16 | 201.- | 252.- | | | |
| ..1251000 | 125 | 10 | 32 | 16 | 201.- | 252.- | | | |
| ..1251200 | 125 | 12 | 32 | 16 | 216.- | 266.- | | | |
| ..1600600 | 160 | 6 | 40 | 18 | 274.- | 358.- | | | |
| ..1600800 | 160 | 8 | 40 | 18 | 275.- | 359.- | | | |
| ..1601000 | 160 | 10 | 40 | 18 | 302.- | 385.- | | | |
| ..1601200 | 160 | 12 | 40 | 18 | 321.- | 405.- | | | |
| ..1601400 | 160 | 14 | 40 | 18 | 355.- | 439.- | | | |
| ..2001200 | 200 | 12 | 40 | 24 | 490.- | 615.- | | | |
| ..2001400 | 200 | 14 | 40 | 24 | 529.- | 654.- | | | |
| ..2001600 | 200 | 16 | 40 | 24 | 570.- | 696.- | | | |
| ..2002000 | 200 | 20 | 40 | 24 | 676.- | 801.- | | | |

HSSE - Co8 Schlitzfräser

1482 W

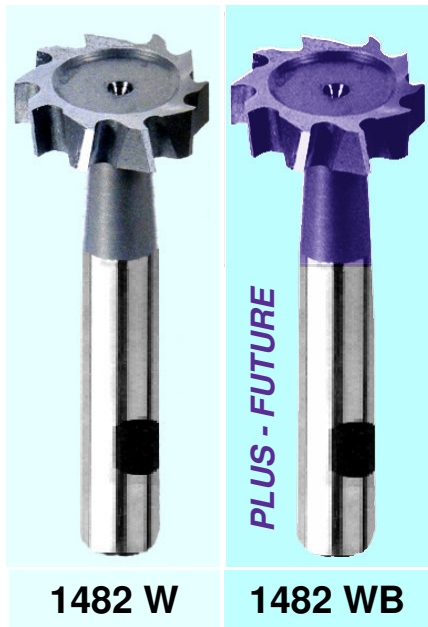
1482 WB **PLUS - FUTURE**

beschichtet



High - Flyer

- Universal einsetzbar, am Umfang schneidend, seitlich freigeschliffen, kreuzverzahnt.
- Höchstleistung mit **PLUS - FUTURE** Beschichtung, speziell für schwer zerspanbare und rostfreie Stähle.



1482 W

1482 WB

Best.-Nr.
1482w...
1482wb...

| Best.-Nr. 1482w... 1482wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1482 W | | 1482 WB | | | |
|------------------------------------|-------------------|-----|-------------------|--------------|--------------|---------------|---------------|------|---------|--------|------------|------------|----------|--------------|----|--------|---------|
| | | | | | | | | | | | | Ø x B | Schaft-Ø | Gesamt-länge | Z | 1482 W | 1482 WB |
| ..0750015 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 7,5 x 1,5 | 6 | 50 | 6 | 29.- | 38.- |
| ..0750020 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 7,5 x 2 | 6 | 50 | 6 | 29.- | 38.- |
| ..1050020 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 10,5 x 2 | 6 | 50 | 6 | 29.- | 38.- |
| ..1050025 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 10,5 x 2,5 | 6 | 50 | 6 | 29.- | 38.- |
| ..1050030 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 10,5 x 3 | 6 | 50 | 6 | 29.- | 38.- |
| ..1350020 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 13,5 x 2 | 10 | 56 | 8 | 33.- | 43.- |
| ..1350030 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 13,5 x 3 | 10 | 56 | 8 | 33.- | 43.- |
| ..1350040 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 13,5 x 4 | 10 | 56 | 8 | 33.- | 43.- |
| ..1650030 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 16,5 x 3 | 10 | 56 | 8 | 39.- | 51.- |
| ..1650040 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 16,5 x 4 | 10 | 56 | 8 | 39.- | 51.- |
| ..1650050 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 16,5 x 5 | 10 | 56 | 8 | 39.- | 51.- |
| ..1950030 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 19,5 x 3 | 10 | 56 | 8 | 44.- | 63.- |
| ..1950040 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 19,5 x 4 | 10 | 56 | 8 | 44.- | 63.- |
| ..1950050 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 19,5 x 5 | 10 | 56 | 8 | 44.- | 63.- |
| ..2250040 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 22,5 x 4 | 10 | 56 | 8 | 52.- | 78.- |
| ..2250050 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 22,5 x 5 | 10 | 56 | 8 | 52.- | 78.- |
| ..2250060 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 22,5 x 6 | 10 | 56 | 8 | 52.- | 78.- |
| ..2550040 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 25,5 x 4 | 10 | 56 | 8 | 60.- | 92.- |
| ..2550050 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 25,5 x 5 | 10 | 56 | 8 | 60.- | 92.- |
| ..2550060 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 25,5 x 6 | 10 | 56 | 8 | 60.- | 92.- |
| ..2550080 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 25,5 x 8 | 10 | 56 | 8 | 60.- | 92.- |
| ..2850060 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 28,5 x 6 | 10 | 56 | 8 | 70.- | 102.- |
| ..2850080 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 28,5 x 8 | 10 | 56 | 8 | 70.- | 102.- |
| ..3250060 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 32,5 x 6 | 10 | 56 | 10 | 83.- | 125.- |
| ..3250070 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 32,5 x 7 | 10 | 56 | 10 | 83.- | 125.- |
| ..3250080 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 32,5 x 8 | 10 | 56 | 10 | 83.- | 125.- |
| ..4550100 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 45,5 x 10 | 12 | 63 | 10 | 119.- | 166.- |

HSSE - Co8 - T - Nutenfräser

1483 W

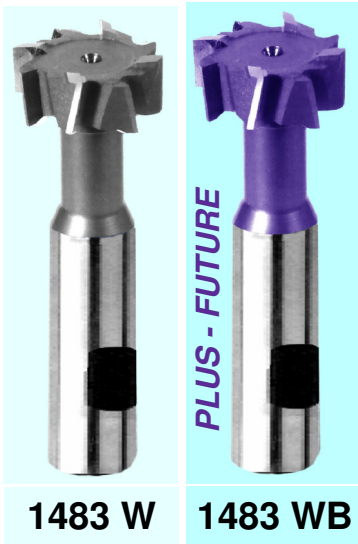
1483 WB **PLUS - FUTURE**

beschichtet

- am Umfang und seitlich schneidend
- kreuzverzahnt



High - Flyer



1483 W

1483 WB

Best.-Nr.
1483w...
1483wb...

| Best.-Nr. 1483w... 1483wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1483 W | | 1483 WB | | | |
|------------------------------------|-------------------|-----|-------------------|--------------|--------------|---------------|---------------|------|---------|--------|------------|----------|----------|--------------|---|--------|---------|
| | | | | | | | | | | | | Ø x B | Schaft-Ø | Gesamt-länge | Z | 1483 W | 1483 WB |
| ..1250060 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 12,5 x 6 | 10 | 57 | 6 | 46.- | 57.- |
| ..1600080 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 16 x 8 | 10 | 62 | 6 | 54.- | 68.- |
| ..1800080 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 18 x 8 | 12 | 70 | 6 | 61.- | 77.- |
| ..1900090 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 19 x 9 | 12 | 70 | 6 | 63.- | 83.- |
| ..2100090 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 21 x 9 | 12 | 74 | 6 | 61.- | 91.- |
| ..2200100 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 22 x 10 | 12 | 74 | 6 | 63.- | 93.- |
| ..2500110 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 25 x 11 | 16 | 82 | 6 | 72.- | 103.- |
| ..2800120 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 28 x 12 | 16 | 85 | 6 | 82.- | 122.- |
| ..3200140 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 32 x 14 | 16 | 90 | 8 | 96.- | 142.- |
| ..3600160 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 36 x 16 | 25 | 103 | 8 | 121.- | 175.- |
| ..4000180 | ○ | ○ | ● | ● | ● | ● | ● | ● | ○ | ○ | ● | 40 x 18 | 25 | 108 | 8 | 155.- | 221.- |

HSSE - Co8 Winkelfräser 45°/60°

1484 W
45°

1484 WB
EXTREM - SPEED beschichtet

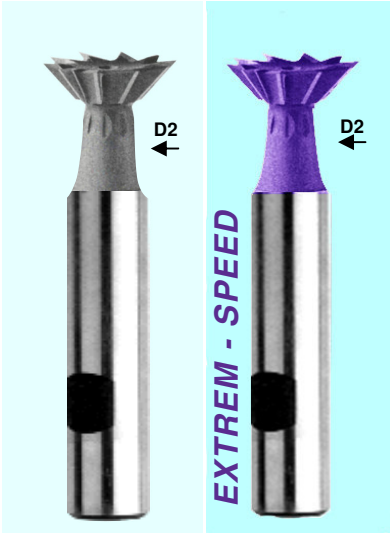
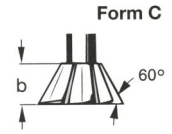
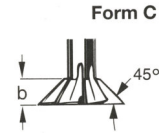
1485 W
60°

1485 WB
EXTREM - SPEED beschichtet

Form C



DIN 1833



- Form C am Umfang + stirnseitig schneidend
- Höchstleistung mit *EXTREM - SPEED* - Beschichtung

| Best.-Nr. 1484w... 1484wb... 1485w... 1485wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1484 W 45° | 1484 WB 45° | 1485 W 60° | 1485 WB 60° |
|---|-------------------|------|---------------------------|--------------|--------------|---------------|---------------|------|---------|--------|------------|------------|-------------|------------|-------------|
| | ○ | ○ | ○ | ● | ● | ● | ● | ● | ○ | ○ | ○ | | | | |
| | Ø | Ø D2 | Schneidenbreite 45° 60° | | Schaft-Ø | Ges.-länge | Z | | | | | 1484 W | 1484 WB | 1485 W | 1485 WB |
| ..1600 | 16 | 6 | 4 | 6,3 | 12 | 60 | 10 | 32.- | | | | 42.- | 42.- | 32.- | 32.- |
| ..2000 | 20 | 7.8 | 5 | 8 | 12 | 63 | 10 | 38.- | | | | 45.- | 45.- | 38.- | 38.- |
| ..2500 | 25 | 9 | 6,3 | 10 | 16 | 67 | 10 | 48.- | | | | 67.- | 67.- | 48.- | 48.- |
| ..3200 | 32 | 15 | 8 | 12,5 | 16 | 71 | 12 | 71.- | | | | 95.- | 95.- | 71.- | 71.- |

1484 W **1484 WB** 45°

1485 W **1485 WB** 60°



1486 W
45°

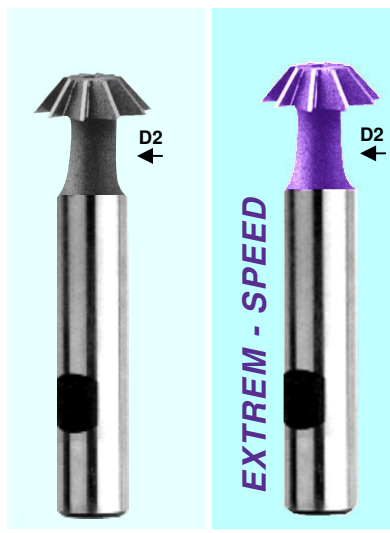
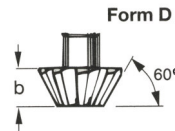
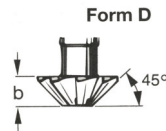
1486 WB
EXTREM - SPEED beschichtet

1487 W
60°

1487 WB
EXTREM - SPEED beschichtet

Form D

DIN 1833



- Form D nur am Umfang schneidend
- Höchstleistung mit *EXTREM - SPEED* - Beschichtung

| Best.-Nr. 1486w... 1486wb... 1487w... 1487wb... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni-versal | 1486 W 45° | 1486 WB 45° | 1487 W 60° | 1487 WB 60° |
|---|-------------------|------|---------------------------|--------------|--------------|---------------|---------------|------|---------|--------|------------|------------|-------------|------------|-------------|
| | ○ | ○ | ○ | ● | ● | ● | ● | ● | ○ | ○ | ○ | | | | |
| | Ø | Ø D2 | Schneidenbreite 45° 60° | | Schaft-Ø | Ges.-länge | Z | | | | | 1486 W | 1486 WB | 1487 W | 1487 WB |
| ..1600 | 16 | 8.2 | 4 | 6,3 | 12 | 60 | 10 | 31.- | | | | 41.- | 41.- | 31.- | 31.- |
| ..2000 | 20 | 10.5 | 5 | 8 | 12 | 63 | 10 | 36.- | | | | 49.- | 49.- | 36.- | 36.- |
| ..2500 | 25 | 11.5 | 6,3 | 10 | 16 | 67 | 10 | 46.- | | | | 65.- | 65.- | 46.- | 46.- |
| ..3200 | 32 | 15 | 8 | 12,5 | 16 | 71 | 12 | 70.- | | | | 94.- | 94.- | 70.- | 70.- |

1486 W **1486 WB** 45°

1487 W **1487 WB** 60°

HSSE - Co8 - Viertelkreisfräser

1488 WR

1488 WBR

PLUS - FUTURE

beschichtet

- Universal einsetzbar zum Kanten abrunden
- Höchstleistung mit **PLUS - FUTURE** - Beschichtung.



| Best.-Nr. 1488wr... 1488wbr... | Thermo Plast. Alu | Alu | Alu Guss > 10% Si | Stahl < 750N | Stahl < 900N | Stahl < 1400N | Stahl < 55HRC | INOX | Ti + Cu | GG (G) | Uni- versal | 1488 WR | 1488 WBR |
|--------------------------------------|-------------------------|-----|----------------------------|--------------------|--------------------|---------------------|---------------------|---------|---------------|-----------|----------------|------------|-------------|
| | ○ | ○ | ○ | ● | ● | | | ○ | ○ | ○ | ● | | |
| | R | Ø | | Schaft- Ø | Gesamtlänge | | Z | 1488 WR | | 1488 WBR | | | |
| ..0100 | 1 | 8 | | 10 | 60 | | 4 | 33.- | | 40.- | | | |
| ..0150 | 1,5 | 9 | | 10 | 60 | | 4 | 43.- | | 50.- | | | |
| ..0200 | 2 | 10 | | 10 | 60 | | 4 | 33.- | | 40.- | | | |
| ..0250 | 2,5 | 11 | | 10 | 60 | | 4 | 43.- | | 54.- | | | |
| ..0300 | 3 | 12 | | 12 | 60 | | 4 | 38.- | | 49.- | | | |
| ..0350 | 3,5 | 13 | | 12 | 60 | | 4 | 51.- | | 62.- | | | |
| ..0400 | 4 | 14 | | 12 | 60 | | 4 | 42.- | | 53.- | | | |
| ..0450 | 4,5 | 15 | | 12 | 60 | | 4 | 56.- | | 70.- | | | |
| ..0500 | 5 | 16 | | 12 | 60 | | 4 | 46.- | | 60.- | | | |
| ..0550 | 5,5 | 19 | | 16 | 67 | | 4 | 59.- | | 73.- | | | |
| ..0600 | 6 | 20 | | 16 | 67 | | 4 | 50.- | | 64.- | | | |
| ..0650 | 6,5 | 21 | | 16 | 71 | | 4 | 69.- | | 83.- | | | |
| ..0700 | 7 | 22 | | 16 | 71 | | 4 | 70.- | | 84.- | | | |
| ..0750 | 7,5 | 23 | | 16 | 71 | | 4 | 72.- | | 86.- | | | |
| ..0800 | 8 | 24 | | 16 | 71 | | 4 | 72.- | | 86.- | | | |
| ..0850 | 8,5 | 28 | | 25 | 85 | | 4 | 89.- | | 111.- | | | |
| ..0900 | 9 | 28 | | 25 | 85 | | 4 | 82.- | | 104.- | | | |
| ..0950 | 9,5 | 28 | | 25 | 85 | | 4 | 86.- | | 104.- | | | |
| ..1000 | 10 | 28 | | 25 | 85 | | 4 | 86.- | | 104.- | | | |
| ..1050 | 10,5 | 32 | | 25 | 90 | | 4 | 102.- | | 126.- | | | |
| ..1100 | 11 | 32 | | 25 | 90 | | 4 | 102.- | | 126.- | | | |
| ..1200 | 12 | 34 | | 25 | 90 | | 4 | 102.- | | 126.- | | | |
| ..1400 | 14 | 44 | | 25 | 100 | | 6 | 136.- | | 166.- | | | |
| ..1500 | 15 | 46 | | 25 | 100 | | 6 | 179.- | | 209.- | | | |
| ..1600 | 16 | 48 | | 25 | 100 | | 6 | 198.- | | 230.- | | | |
| ..1800 | 18 | 52 | | 32 | 112 | | 6 | 216.- | | 260.- | | | |
| ..2000 | 20 | 56 | | 32 | 112 | | 6 | 256.- | | 300.- | | | |



HSSE - Co - Winkelfräser

1490 45°

1491 60°

1490 B 45°

1491 B 60°

| | | | | | | |
|-----|-------------|-------|-------|-------|------|----------------|
| Alu | Alu Guss | Stahl | Stahl | Stahl | INOX | Uni- versal |
| ○ | ○ | ● | ● | ○ | ○ | ● |

Best.-Nr.

1490...

1490b...

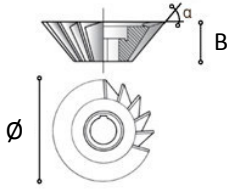
..05000

..06300

..08000

..10000

| Ø | Winkel a ± 25' | Breite B | Boh- rung | Zähne | 1490 | 1490 B |
|-----|-------------------|-------------|--------------|-------|-------|--------|
| 50 | 45° | 13 | 13 | 16 | 113.- | 158.- |
| 63 | 45° | 18 | 16 | 16 | 151.- | 198.- |
| 80 | 45° | 22 | 22 | 18 | 238.- | 292.- |
| 100 | 45° | 28 | 28 | 20 | 406.- | 468.- |



Best.-Nr.

1491...

1491b...

..05000

..06300

..08000

..10000

| Ø | Winkel a ± 25' | Breite B | Boh- rung | Zähne | 1491 | 1491 B |
|-----|-------------------|-------------|--------------|-------|-------|--------|
| 50 | 60° | 16 | 13 | 16 | 113.- | 158.- |
| 63 | 60° | 20 | 16 | 16 | 151.- | 198.- |
| 80 | 60° | 25 | 22 | 18 | 238.- | 292.- |
| 100 | 60° | 32 | 27 | 20 | 406.- | 468.- |

HSSE - Co - Prismenfräser

1493 45°

1494 60°

1495 90°

1493B 45°

1494B 60°

1495B 90°

| | | | | | | |
|-----|-------------|-------|-------|-------|------|----------------|
| Alu | Alu Guss | Stahl | Stahl | Stahl | INOX | Uni- versal |
| ○ | ○ | ● | ● | ○ | ○ | ● |

Best.-Nr.

1493...

1493b...

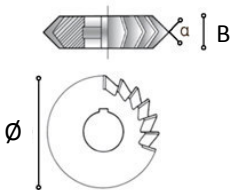
..05000

..06300

..08000

..10000

| Ø | Winkel a ± 25' | Breite B | Boh- rung | Zähne | 1493 | 1493 B |
|-----|-------------------|-------------|--------------|-------|-------|--------|
| 50 | 45° | 8 | 16 | 16 | 95.- | 135.- |
| 63 | 45° | 10 | 22 | 18 | 129.- | 164.- |
| 80 | 45° | 12 | 27 | 18 | 193.- | 248.- |
| 100 | 45° | 18 | 32 | 20 | 277.- | 347.- |



Best.-Nr.

1494...

1494b...

..05000

..06300

..08000

..10000

| Ø | Winkel a ± 25' | Breite B | Boh- rung | Zähne | 1494 | 1494 B |
|-----|-------------------|-------------|--------------|-------|-------|--------|
| 50 | 60° | 10 | 16 | 16 | 103.- | 141.- |
| 63 | 60° | 14 | 22 | 18 | 137.- | 188.- |
| 80 | 60° | 18 | 27 | 18 | 198.- | 252.- |
| 100 | 60° | 25 | 32 | 20 | 302.- | 386.- |

Best.-Nr.

1495...

1495b...

..05000

..06300

..08000

..10000

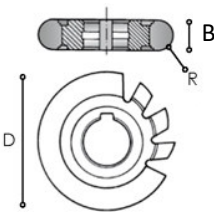
| Ø | Winkel a ± 25' | Breite B | Boh- rung | Zähne | 1495 | 1495 B |
|-----|-------------------|-------------|--------------|-------|-------|--------|
| 50 | 90° | 14 | 16 | 16 | 107.- | 148.- |
| 63 | 90° | 20 | 22 | 18 | 147.- | 198.- |
| 80 | 90° | 22 | 27 | 18 | 218.- | 274.- |
| 100 | 90° | 32 | 32 | 20 | 324.- | 436.- |

HSSE - Co - Halbkreisfräser, konvex

1497

1497 B

| | | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------|
| Alu | Alu Guss | Stahl | Stahl | Stahl | INOX | Uni- versal | Best.-Nr. 1497... |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | 1497b... |



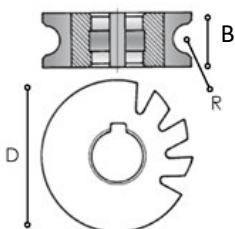
| | Radius | Ø | Breite B | Boh- rung | Zähne | 1497 | 1497 B |
|--------|--------|-----|-------------|--------------|-------|-------|--------|
| ..0100 | 1 | 50 | 2 | 16 | 14 | 83.- | 118.- |
| ..0150 | 1.5 | 50 | 3 | 16 | 14 | 87.- | 126.- |
| ..0200 | 2 | 50 | 4 | 16 | 14 | 89.- | 129.- |
| ..0250 | 2.5 | 63 | 5 | 22 | 12 | 95.- | 132.- |
| ..0300 | 3 | 63 | 6 | 22 | 12 | 100.- | 135.- |
| ..0350 | 3.5 | 63 | 7 | 22 | 12 | 115.- | 154.- |
| ..0400 | 4 | 63 | 8 | 22 | 12 | 120.- | 162.- |
| ..0450 | 4.5 | 63 | 9 | 22 | 12 | 126.- | 168.- |
| ..0500 | 5 | 63 | 10 | 22 | 12 | 131.- | 174.- |
| ..0550 | 5.5 | 80 | 11 | 27 | 12 | 154.- | 196.- |
| ..0600 | 6 | 80 | 12 | 27 | 12 | 154.- | 198.- |
| ..0800 | 8 | 80 | 16 | 27 | 12 | 187.- | 236.- |
| ..1000 | 10 | 100 | 20 | 32 | 12 | 249.- | 328.- |

HSSE - Co - Halbkreisfräser, konkav

1499

1499 B

| | | | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Alu | Alu Guss | Stahl | Stahl | Stahl | INOX | Uni- versal |
| <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



| | Radius | Ø | Breite B | Boh- rung | Zähne | 1499 | 1499 B |
|--------|--------|-----|-------------|--------------|-------|-------|--------|
| ..0100 | 1 | 50 | 6 | 16 | 14 | 106.- | 138.- |
| ..0150 | 1.5 | 50 | 8 | 16 | 14 | 111.- | 147.- |
| ..0200 | 2 | 50 | 9 | 16 | 14 | 110.- | 149.- |
| ..0250 | 2.5 | 63 | 10 | 22 | 12 | 113.- | 151.- |
| ..0300 | 3 | 63 | 12 | 22 | 12 | 130.- | 168.- |
| ..0400 | 4 | 63 | 16 | 22 | 12 | 156.- | 208.- |
| ..0500 | 5 | 63 | 20 | 22 | 12 | 177.- | 234.- |
| ..0600 | 6 | 80 | 24 | 27 | 12 | 220.- | 286.- |
| ..0800 | 8 | 80 | 32 | 27 | 12 | 322.- | 396.- |
| ..1000 | 10 | 100 | 36 | 32 | 12 | 430.- | 528.- |

Übersicht der Werkstoffgruppen

| Gruppe A | | Gruppe B | | Gruppe C | |
|--|---|--|--|--|--|
| Automaten-, Bau-, Einsatz-, Nitrier-, Vergütungs-, unlegierte Werkzeugstähle | | Chemisch beständige und warmfeste Stähle, legierte + rostfreie Werkzeugstähle | | Chemisch beständige Stähle, legierte Stähle, Kaltarbeits-, Schnellarbeits-, Ventil- + rostfreie Stähle | |
| 1.0037 1.0050 1.0060 1.0401 1.0402 1.0501 1.0503 1.0601 1.1730 1.1141 1.1178 1.1180 1.1191 1.0711 1.0718 1.0737 1.0726 1.0727 1.0416 1.0443 | St 37-2 St 50-2 St 60-2 Plexiglas Polyamid C 15 C 22 C 35 C 45 C 60 C 45 W Ck 15 Ck 30 Ck 35 Ck 45 9 S 20 9 S MnPb 28 9 S MnPb 36 35 S 20 45 S 20 Gg 15 Gg 20 Gg 25 Gs-40 Gs-45 | 1.1167 1.2510 1.2842 1.7131 1.2344 1.2363 1.4006 1.4034 1.4057 1.4113 1.4551 1.4340 1.7220 1.7225 1.7262 1.8159 1.8507 | 36 Mn 5 100 MnCr W 4 90 MnCrV 16 MnCr 5 X 40 CrMo V 51 X 100 CrMo V 51 X 10 Cr 13 X 40 Cr 13 X 22 CrNi 17 X 6 CrNi 17 X 10 CrNi 18-9 G-X 40 CrNi 27-4 34 CrMo 4 42 CrMo 4 15 CrMo 5 50 Cr V 4 34 CrAlMo 5 Gg 30 Gg 35 Gg 40 | 1.2080 1.2083 1.2316 1.2379 1.2436 1.2767 1.4306 1.4404 1.4541 1.4550 1.4571 1.2312 1.6582 1.6747 1.7147 1.7707 1.3265 1.3343 1.3505 | X 210 Cr 12 (RCC) X 40 Cr 13 X 36 CrMo 17 X 155 Cr VMb 12 1 X 210 CrW 12 X 45 NiCrMo 4 X 2 CrNi 18 9 X 2 CrNiMo 18 10 X 10 CrNiTi 189 (V4A) X 10 CrNiNb 18 9 X 6 CrNiMoTi 17 12 2 40 CrMn Mo 586 34 CrNiMo 6 30 NiCrMo 16-6 20 MNCr 5 40 CrMo V 9 S 18 1-2-10 S 6-5-2 (DMo 5) 100 Cr 6 |
| Gruppe D | | Gruppe E | | Gruppe F | |
| Schwer zerspanbare Materialien, hochwarmfeste Stähle, Ti- und Ni-Legierungen | | Kupfer / Messing, Kupferlegierungen | | Aluminium- und Magnesiumlegierungen | |
| 1.4401 1.4980 2.4631 2.4632 3.7024 3.7164 2.4632 2.4606 2.4654 2.4603 | X 5 CrNiMo 18 12 X 5 NiCr Ti 26 15 NiCr 20 TiAl NiCr 20 Co 18 Ti Titan TiAl6V4-900 N/mm ² Nimonic Inconel Waspaloy Hastelloy X | | Albarnit Bakelit CuSi 2 NmF 34 CuSn 6 ZnF 77 CuZn 20 Pb 2 CuZn 40 Pb 2 Degolan E-Cu 57 F 20 Ferrozell Novotex Poystyrol Pertinax SF-CuF 20 Ultramid | 3.0305 3.0515 3.0525 3.0615 3.1325 3.1355 3.3308 3.3315 3.3555 3.4365 3.5812 3.5912 | Al 99 AlMn 1 AlMn 1 Mg 0.5 AlMgSiPb AlCuMg 1 AlCuMg Al99,9Mg 0.5 W8 AlMg 1 AlMg 5 AlZnMgCu 1 GMgAl 8 Zn 1 G-MgAl9 Zn 1 AlCuMgPb AlMnW 9 AlZnMg 1 GD-MgAl 9 Zn 1 MgAl 6 Zn MgMn 2 |

Berechnung von Schnittwerten

V_c = Schnittgeschwindigkeit
 n = Umdrehung pro min.
 V_f = Vorschub pro min.
 Z = Zähnezahl

\varnothing_c = Fräserdurchmesser
 S = Vorschub pro Umdrehung
 f_z = Vorschub pro Zahn

Formel

$$V_c = \frac{3,14 \times \varnothing_c \times n}{1000}$$

$$n = \frac{V_c \times 1000}{3,14 \times \varnothing_c}$$

$$S = \frac{V_f}{n}$$

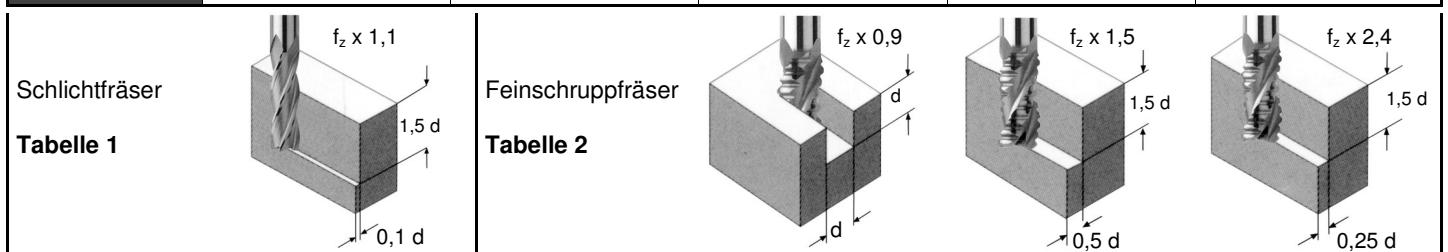
$$f_z = \frac{V_f}{n \times z}$$

$$V_f = n \times z \times f_z$$

Empfohlene Schnittgeschwindigkeiten für Plus Future

ASP - Pulver - HSS - Fräser - HSS-X-XENIX

| | | | | | | | | | | | | |
|--------------------|--|----------------|---------------|----------------|--------------|----------------------------|----------------|----------------|-----------|--|--|-------|
| Werkstoff | Automaten-, Bau-, Einsatz-, Nitrier-, Vergütungs-, unlegierte Werkzeugstähle | | | | | | | | | | bis 700 N/mm ² , Gg < 100 HB | |
| Gruppe A | 1.0037 | St 37-2 | 1.0401 | C 15 | 1.1730 | C 45 W | 1.0711 | 9 S 20 | | | | Gg 15 |
| | 1.0050 | St 50-2 | 1.0402 | C 22 | 1.1141 | Ck 15 | 1.0718 | 9 S MnPb 28 | | | | Gg 20 |
| | 1.0060 | St 60-2 | 1.0501 | C 35 | 1.1178 | Ck 30 | 1.0737 | 9 S MnPb 36 | | | | Gg 25 |
| | | Plexiglas | 1.0503 | C 45 | 1.1180 | Ck 35 | 1.0726 | 35 S 20 | 1.0416 | | | Gs-40 |
| | | Polyamid | 1.0601 | C 60 | 1.1191 | Ck 45 | 1.0727 | 45 S 20 | 1.0443 | | | Gs-45 |
| Werkstoff | Chemisch beständige und wärmefeste Stähle, legierte + rostfreie Werkzeugstähle | | | | | | | | | | bis 1100 N/mm ² , Gg > 200 HB | |
| Gruppe B | 1.1167 | 36 Mn 5 | 1.2344 | X 40 CrMo V 51 | 1.4057 | X 22 CrNi 17 | 1.7220 | 34 CrMo 4 | 1.8507 | | 34 CrAlMo 5 | |
| | 1.2510 | 100 MnCr W 4 | 1.2363 | X100CrMoV51 | 1.4113 | X 6 CrMo 17 | 1.7225 | 42 CrMo 4 | | | Gg 30 | |
| | 1.2842 | 90 MnCrV | 1.4006 | X 10 Cr 13 | 1.4551 | X 10 CrNi 18-9 | 1.7262 | 15 CrMo 5 | | | Gg 35 | |
| | 1.7131 | 16 MnCr 5 | 1.4034 | X 40 Cr 13 | 1.4340 | GX40CrNi274 | 1.8159 | 50 Cr V 4 | | | Gg 40 | |
| | | | | | | | | | | | | |
| Werkstoff | Chemisch beständige Stähle, legierte Stähle, Kaltarbeits-, Schnellarbeits-, Ventil- + rostfreie Stähle | | | | | | | | | | bis 1400 N/mm ² | |
| Gruppe C | 1.2080 | X210Cr12(ROCC) | 1.2436 | X 210 CrW 12 | 1.4541 | X10CrNi18(9)(4A) | 1.6582 | 34 CrNiMo 6 | 1.3265 | | S 18 1-2-10 | |
| | 1.2083 | X 40 Cr 13 | 1.2767 | X 45 NiCrMo 4 | 1.4550 | X 10 CrNiNb 18 9 | 1.6747 | 30 NiCrMo 16-6 | 1.3343 | | S6-5-2(DMo5) | |
| | 1.2316 | X 36 CrMo 17 | 1.4306 | X 2 CrNi 18 9 | 1.4571 | X6CrNiMoTi17122 | 1.7147 | 20 MnCr 5 | 1.3505 | | 100 Cr 6 | |
| | 1.2379 | X15CrNi121 | 1.4404 | X2CrNiMo1810 | 1.2312 | 40 CrMn Mo 586 | 1.7707 | 30 CrMo V 9 | | | | |
| | | | | | | | | | | | | |
| Werkstoff | Schwer zerspanbare Materialien, hochwärmefeste Stähle, Ti- und Ni-Legierungen | | | | | | | | | | | |
| Gruppe | 1.4401 | X5CrNiMo1812 | 2.4631 | NiCr 20 TiAl | 3.7024 | Titan | 2.4632 | Nimonic | 2.4654 | | Waspaloy | |
| | 1.4980 | X5NiCrTi2615 | 2.4632 | NiCr20Co18Ti | 3.7164 | TiAl6V4900Nmm ² | 2.4606 | Inconel | 2.4603 | | Hastelloy X | |
| Werkstoff | Kupfer/Messing, Kupferlegierungen | | | | | | | | | | | |
| Gruppe E | Albamat | | CuSn 6 ZnF 77 | | Degolan | | Novotex | | SF-CuF 20 | | | |
| | Bakelit | | CuZn 20 Pb 2 | | E-Cu 57 F 20 | | Polystyrol | | Ultramid | | | |
| | CuSi 2 MnF 34 | | Cu Zn 40 Pb 2 | | Ferrozell | | Pertinax | | | | | |
| Werkstoff | Alu-Guss, ausgehärtetes Alu | | | | | | | | | | | |
| Gruppe F | 3.0305 | Al 99 | 3.1325 | AlCuMg 1 | 3.3555 | AlMg 5 | AlCuMgPb | | MgAl 6 Zn | | | |
| | 3.0515 | AlMn 1 | 3.1355 | AlCuMg 2 | 3.4365 | AlZnMgCu 1 | AlMnW 9 | | MgMn 2 | | | |
| | 3.0525 | AlMn 1 Mg 0.5 | 3.3308 | Al99,9Mg0.5 W8 | 3.5812 | G-MgAl 8 Zn 1 | AlZnMg 1 | | | | | |
| | 3.0615 | AlMgSiPb | 3.3315 | AlMg 1 | 3.5912 | G-MgAl 9 Zn 1 | GD-MgAl 9 Zn 1 | | | | | |
| | | | | | | | | | | | | |



| Empfohlene Schnittgeschwindigkeiten für ASP Schafffräser | | | | | | | | | | | |
|--|--------------------------------------|-------------------------|-------|-------|-------|------|------|-------|------|------|------|
| Gruppe | Schnittgeschwindigkeit Vc (m/min) | Fräser-Ø | | | | | | | | | |
| | | Vorschub pro Zahn fz mm | | | | | | | | | |
| | | Ø 6 | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 18 | Ø 20 | Ø 25 | Ø 30 |
| A | 70-90 | 0.014 | 0.029 | 0.045 | 0.067 | 0.07 | 0.09 | 0.095 | 0.10 | 0.08 | 0.08 |
| B | 45-65 | 0.014 | 0.029 | 0.045 | 0.067 | 0.07 | 0.09 | 0.095 | 0.10 | 0.08 | 0.08 |
| C | 35-45 | 0.013 | 0.02 | 0.03 | 0.054 | 0.06 | 0.07 | 0.075 | 0.09 | 0.07 | 0.07 |
| D | 25-35 | 0.012 | 0.02 | 0.03 | 0.054 | 0.06 | 0.07 | 0.075 | 0.09 | 0.07 | 0.07 |
| E | 150-200 | 0.05 | 0.06 | 0.09 | 0.13 | 0.14 | 0.13 | 0.135 | 0.14 | 0.17 | 0.19 |
| F | 300-400 | 0.05 | 0.06 | 0.09 | 0.13 | 0.14 | 0.13 | 0.135 | 0.14 | 0.17 | 0.19 |

| Empfohlene Schnittgeschwindigkeiten für ASP Feinschruppfräser | | | | | | | | | | | |
|---|--------------------------------------|-------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Gruppe | Schnittgeschwindigkeit Vc (m/min) | Fräser-Ø | | | | | | | | | |
| | | Vorschub pro Zahn fz mm | | | | | | | | | |
| | | Ø 6 | Ø 8 | Ø 10 | Ø 12 | Ø 14 | Ø 16 | Ø 18 | Ø 20 | Ø 25 | Ø 30 |
| A | 65-85 | 0.010 | 0.015 | 0.012 | 0.027 | 0.022 | 0.039 | 0.032 | 0.032 | 0.042 | 0.042 |
| B | 40-60 | 0.010 | 0.015 | 0.012 | 0.027 | 0.022 | 0.039 | 0.032 | 0.032 | 0.042 | 0.042 |
| C | 30-40 | 0.009 | 0.013 | 0.019 | 0.025 | 0.029 | 0.022 | 0.022 | 0.032 | 0.032 | 0.032 |
| D | 20-30 | 0.009 | 0.013 | 0.019 | 0.025 | 0.029 | 0.031 | 0.022 | 0.032 | 0.032 | 0.032 |
| E | 120-160 | 0.02 | 0.03 | 0.065 | 0.07 | 0.084 | 0.08 | 0.09 | 0.10 | 0.10 | 0.11 |
| F | 220-320 | 0.023 | 0.035 | 0.045 | 0.057 | 0.05 | 0.07 | 0.07 | 0.08 | 0.09 | 0.10 |

Empfohlene Schnittgeschwindigkeiten für HSSE - Fräser

| | | Nutfräser | | | | | | | | | | Schlichtfräser | | | | | | | | Schruppfräser | | | | | | | | | | |
|--|----------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|
| Gruppe A | | Werkstoff: Automaten-, Bau-, Einsatz-, Nitrier-, Vergütungs-, unlegierte Werkzeugstähle | | | | | | | | | | | | | | | | | | | | bis 700 N/mm ² , Gg < 100 HB | | | | | | | | |
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 25 - 30 | f _z | 0.003 | 0.007 | 0.013 | 0.23 | 0.035 | 0.045 | 0.065 | 0.085 | 0.095 | 0.098 | 0.005 | 0.006 | 0.009 | 0.014 | 0.023 | 0.027 | 0.034 | 0.038 | 0.043 | 0.046 | 0.006 | 0.009 | 0.015 | 0.019 | 0.027 | 0.034 | 0.038 | 0.043 | 0.046 |
| | n | 4400 | 2200 | 1400 | 1000 | 88000 | 68000 | 53000 | 43000 | 28000 | 26000 | 2200 | 1400 | 1000 | 88000 | 68000 | 53000 | 43000 | 33000 | 28000 | 26000 | 1400 | 1000 | 88000 | 68000 | 53000 | 43000 | 33000 | 28000 | 26000 |
| | V _f | 45 | 46 | 56 | 69 | 90 | 94 | 104 | 101 | 75 | 70 | 55 | 42 | 44 | 58 | 66 | 62 | 63 | 84 | 83 | 75 | 42 | 44 | 58 | 66 | 62 | 63 | 70 | 69 | 67 |
| Plus Future V _c 60 - 80 | f _z | 0.005 | 0.009 | 0.015 | 0.025 | 0.045 | 0.055 | 0.075 | 0.095 | 0.105 | 0.108 | 0.007 | 0.008 | 0.011 | 0.016 | 0.025 | 0.029 | 0.036 | 0.042 | 0.046 | 0.047 | 0.008 | 0.011 | 0.017 | 0.021 | 0.029 | 0.036 | 0.042 | 0.046 | 0.048 |
| | n | 11400 | 5800 | 3900 | 2900 | 2400 | 1900 | 1500 | 1200 | 77000 | 70000 | 5800 | 3900 | 2900 | 2400 | 1900 | 1500 | 1200 | 92000 | 77000 | 70000 | 23900 | 2900 | 2400 | 1900 | 1500 | 1200 | 92000 | 77000 | 70000 |
| | V _f | 113 | 114 | 143 | 175 | 230 | 238 | 263 | 249 | 188 | 180 | 137 | 106 | 112 | 147 | 167 | 157 | 154 | 216 | 207 | 200 | 106 | 112 | 147 | 167 | 157 | 154 | 180 | 173 | 165 |

| Gruppe B | | Chemisch beständige und warmfeste Stähle, legierte + rostfreie Werkzeugstähle | | | | | | | | | | | | | | | | | | | | bis 1100 N/mm ² , Gg > 200 HB | | | | | | | | |
|--|----------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 20 - 25 | f _z | 0.003 | 0.007 | 0.013 | 0.023 | 0.034 | 0.044 | 0.065 | 0.080 | 0.085 | 0.086 | 0.004 | 0.005 | 0.008 | 0.013 | 0.018 | 0.024 | 0.030 | 0.033 | 0.036 | 0.038 | 0.005 | 0.008 | 0.013 | 0.018 | 0.024 | 0.030 | 0.033 | 0.036 | 0.038 |
| | n | 3300 | 1600 | 1000 | 88000 | 68000 | 48000 | 43000 | 33000 | 23000 | 21000 | 1600 | 1000 | 88000 | 68000 | 48000 | 43000 | 33000 | 28000 | 23000 | 20000 | 1000 | 88000 | 68000 | 48000 | 43000 | 33000 | 28000 | 23000 | 20000 |
| | V _f | 34 | 34 | 42 | 52 | 62 | 62 | 79 | 75 | 57 | 50 | 34 | 26 | 32 | 39 | 42 | 45 | 43 | 61 | 56 | 50 | 26 | 32 | 39 | 42 | 45 | 43 | 51 | 46 | 42 |
| Plus Future V _c 50 - 60 | f _z | 0.005 | 0.009 | 0.015 | 0.025 | 0.036 | 0.046 | 0.075 | 0.090 | 0.095 | 0.095 | 0.006 | 0.007 | 0.010 | 0.015 | 0.020 | 0.026 | 0.032 | 0.035 | 0.038 | 0.040 | 0.007 | 0.010 | 0.015 | 0.020 | 0.026 | 0.032 | 0.035 | 0.038 | 0.040 |
| | n | 8100 | 4100 | 2800 | 2100 | 1700 | 1300 | 1100 | 82000 | 57000 | 54000 | 4100 | 2800 | 2100 | 1700 | 1300 | 1100 | 82000 | 67000 | 57000 | 54000 | 2800 | 2100 | 1700 | 1300 | 1100 | 82000 | 67000 | 57000 | 54000 |
| | V _f | 98 | 80 | 102 | 115 | 140 | 146 | 175 | 170 | 124 | 120 | 80 | 65 | 72 | 90 | 100 | 100 | 100 | 133 | 122 | 120 | 65 | 72 | 90 | 100 | 100 | 100 | 110 | 102 | 120 |

| Gruppe C | | Chemisch beständige Stähle, legierte Stähle, Kaltarbeits-, Schnellarbeits-, Ventil- + rostfreie Stähle | | | | | | | | | | | | | | | | | | | | bis 1400 N/mm ² | | | | | | | | |
|--|----------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 10 - 16 | f _z | 0.002 | 0.006 | 0.011 | 0.015 | 0.025 | 0.035 | 0.55 | 0.75 | 0.084 | 0.086 | 0.005 | 0.006 | 0.009 | 0.014 | 0.019 | 0.024 | 0.032 | 0.035 | 0.039 | 0.042 | 0.006 | 0.009 | 0.014 | 0.019 | 0.024 | 0.032 | 0.035 | 0.039 | 0.039 |
| | n | 2300 | 1100 | 78000 | 58000 | 48000 | 38000 | 28000 | 23000 | 13000 | 10000 | 1100 | 78000 | 58000 | 48000 | 38000 | 28000 | 23000 | 18000 | 13000 | 10000 | 78000 | 58000 | 48000 | 38000 | 28000 | 23000 | 18000 | 13000 | 10000 |
| | V _f | 18 | 21 | 24 | 30 | 40 | 40 | 49 | 50 | 32 | 28 | 29 | 22 | 24 | 30 | 32 | 31 | 33 | 43 | 35 | 30 | 22 | 24 | 30 | 32 | 31 | 33 | 36 | 29 | 25 |
| Plus Future V _c 12 - 35 | f _z | 0.004 | 0.008 | 0.013 | 0.025 | 0.035 | 0.045 | 0.065 | 0.085 | 0.090 | 0.095 | 0.007 | 0.008 | 0.011 | 0.016 | 0.021 | 0.026 | 0.034 | 0.037 | 0.041 | 0.042 | 0.008 | 0.011 | 0.016 | 0.021 | 0.026 | 0.034 | 0.037 | 0.041 | 0.042 |
| | n | 4200 | 2200 | 1500 | 1100 | 82000 | 72000 | 52000 | 42000 | 32000 | 25000 | 2200 | 1500 | 1100 | 82000 | 72000 | 52000 | 42000 | 37000 | 32000 | 28000 | 1500 | 1100 | 82000 | 72000 | 52000 | 42000 | 37000 | 32000 | 27000 |
| | V _f | 31 | 37 | 42 | 50 | 64 | 70 | 82 | 80 | 64 | 50 | 50 | 39 | 40 | 48 | 56 | 52 | 53 | 76 | 70 | 70 | 39 | 40 | 48 | 56 | 52 | 53 | 63 | 59 | 68 |

| Gruppe D | | Schwer zerspanbare Materialien, hochwarmfeste Stähle, Ti- und Ni-Legierungen | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 3 - 12 | f _z | 0.001 | 0.005 | 0.009 | 0.015 | 0.027 | 0.034 | 0.054 | 0.065 | 0.069 | 0.080 | 0.005 | 0.006 | 0.010 | 0.014 | 0.021 | 0.027 | 0.034 | 0.036 | 0.042 | 0.044 | 0.006 | 0.010 | 0.015 | 0.019 | 0.027 | 0.034 | 0.036 | 0.042 | 0.044 |
| | n | 1300 | 68000 | 48000 | 33000 | 28000 | 23000 | 16000 | 12000 | 8000 | 6000 | 68000 | 48000 | 33000 | 28000 | 23000 | 16000 | 12000 | 9000 | 8000 | 6000 | 48000 | 33000 | 28000 | 23000 | 16000 | 12000 | 9000 | 8000 | 6000 |
| | V _f | 7 | 10 | 13 | 17 | 21 | 22 | 25 | 23 | 18 | 15 | 17 | 14 | 15 | 19 | 22 | 20 | 20 | 24 | 26 | 26 | 14 | 15 | 19 | 22 | 20 | 20 | 20 | 22 | 22 |
| Plus Future V _c 5 - 30 | f _z | 0.003 | 0.007 | 0.011 | 0.021 | 0.029 | 0.036 | 0.056 | 0.067 | 0.072 | 0.075 | 0.007 | 0.008 | 0.012 | 0.016 | 0.023 | 0.029 | 0.036 | 0.038 | 0.044 | 0.045 | 0.008 | 0.012 | 0.017 | 0.021 | 0.029 | 0.036 | 0.038 | 0.044 | 0.045 |
| | n | 2600 | 1300 | 82000 | 62000 | 52000 | 42000 | 32000 | 27000 | 17000 | 15000 | 1300 | 82000 | 62000 | 52000 | 42000 | 32000 | 27000 | 22000 | 17000 | 15000 | 82000 | 62000 | 52000 | 42000 | 32000 | 27000 | 22000 | 17000 | 15000 |
| | V _f | 13 | 18 | 20 | 29 | 35 | 35 | 42 | 41 | 27 | 22 | 29 | 22 | 26 | 32 | 35 | 34 | 35 | 44 | 39 | 40 | 22 | 26 | 32 | 35 | 34 | 35 | 37 | 32 | 40 |

| Gruppe E | | Kupfer/Messing, Kupferlegierungen | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------------|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 40 - 70 | f _z | 0.004 | 0.008 | 0.019 | 0.031 | 0.045 | 0.060 | 0.095 | 0.125 | 0.175 | 0.190 | 0.009 | 0.014 | 0.022 | 0.034 | 0.038 | 0.045 | 0.055 | 0.065 | 0.085 | 0.090 | 0.013 | 0.023 | 0.034 | 0.038 | 0.045 | 0.055 | 0.065 | 0.085 | 0.090 |
| | n | 8700 | 4300 | 2800 | 2100 | 1700 | 1400 | 1000 | 88000 | 58000 | 42000 | 4300 | 2800 | 2100 | 1700 | 1400 | 1000 | 88000 | 68000 | 58000 | 48000 | 2800 | 2100 | 1700 | 1400 | 1000 | 88000 | 68000 | 58000 | 48000 |
| | V _f | 110 | 100 | 145 | 175 | 225 | 243 | 275 | 290 | 270 | 250 | 130 | 120 | 150 | 190 | 180 | 165 | 160 | 150 | 160 | 160 | 120 | 150 | 190 | 180 | 165 | 160 | 150 | 160 | 160 |
| Plus Future V _c 80 - 150 | f _z | 0.006 | 0.010 | 0.021 | 0.033 | 0.055 | 0.070 | 0.105 | 0.135 | 0.165 | 0.190 | 0.011 | 0.016 | 0.024 | 0.036 | 0.045 | 0.055 | 0.065 | 0.075 | 0.095 | 0.100 | 0.015 | 0.025 | 0.036 | 0.045 | 0.055 | 0.065 | 0.075 | 0.095 | 0.100 |
| | n | 15100 | 7700 | 5100 | 3900 | 3100 | 2600 | 2000 | 1600 | 1100 | 1000 | 7700 | 5100 | 3900 | 3100 | 2600 | 2000 | 1600 | 1300 | 1100 | 1100 | 5100 | 3900 | 3100 | 2600 | 2000 | 1600 | 1300 | 1100 | 1100 |
| | V _f | 188 | 170 | 250 | 300 | 375 | 408 | 475 | 490 | 450 | 390 | 300 | 290 | 350 | 430 | 400 | 380 | 360 | 500 | 540 | 460 | 280 | 350 | 430 | 400 | 380 | 360 | 420 | 450 | 500 |

| Gruppe F | | Aluminium + Magnesiumlegierungen | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|----------------|----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Schnittmeter | Ø | 2 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 30 | 32 | 4 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | 30 | 32 |
| unbeschichtet V _c 200 - 300 | f _z | 0.003 | 0.007 | 0.013 | 0.024 | 0.035 | 0.045 | 0.075 | 0.105 | 0.165 | 0.180 | 0.006 | 0.007 | 0.013 | 0.019 | 0.028 | 0.036 | 0.045 | 0.055 | 0.070 | 0.072 | 0.007 | 0.014 | 0.019 | 0.028 | 0.037 | 0.045 | 0.055 | 0.070 | 0.072 |
| | n | 39900 | 19900 | 13200 | 9900 | 7900 | 6500 | 4900 | 3900 | 2600 | 2100 | 19900 | 13200 | 9900 | 7900 | 6500 | 4900 | 3900 | 3100 | 2600 | 2100 | 13200 | 9900 | 7900 | 6500 | 4900 | 3900 | 3100 | 2600 | 2100 |
| | V _f | 385 | 400 | 500 | 625 | 800 | 825 | 1.0 | 1.1 | 1.15 | 1.2 | 420 | 320 | 420 | 500 | 580 | 550 | 600 | 570 | 600 | 620 | 320 | 420 | 500 | 580 | 550 | 600 | 580 | 610 | 630 |
| Plus Future V _c 300 - 600 | f _z | 0.005 | 0.009 | 0.015 | 0.026 | 0.045 | 0.055 | 0.085 | 0.115 | 0.175 | 0.190 | 0.008 | 0.009 | 0.015 | 0.021 | 0.030 | 0.038 | 0.055 | 0.065 | 0.080 | 0.085 | 0.009 | 0.016 | 0.022 | 0.030 | 0.039 | 0.055 | 0.065 | 0.080 | 0.085 |
| | n | 63800 | 32100 | 21300 | 16100 | 12800 | 10700 | 8100 | 6500 | 4300 | 4100 | 32100 | 21300 | 16100 | 12800 | 10700 | 8100 | 6500 | 5200 | 4300 | 4100 | 21300 | 16100 | 12800 | 10700 | 8100 | 6500 | 5200 | 4300 | 4100 |
| | V _f | 600 | 640 | 745 | 1.0 | 1.25 | 1.33 | 1.6 | | | | | | | | | | | | | | | | | | | | | | |