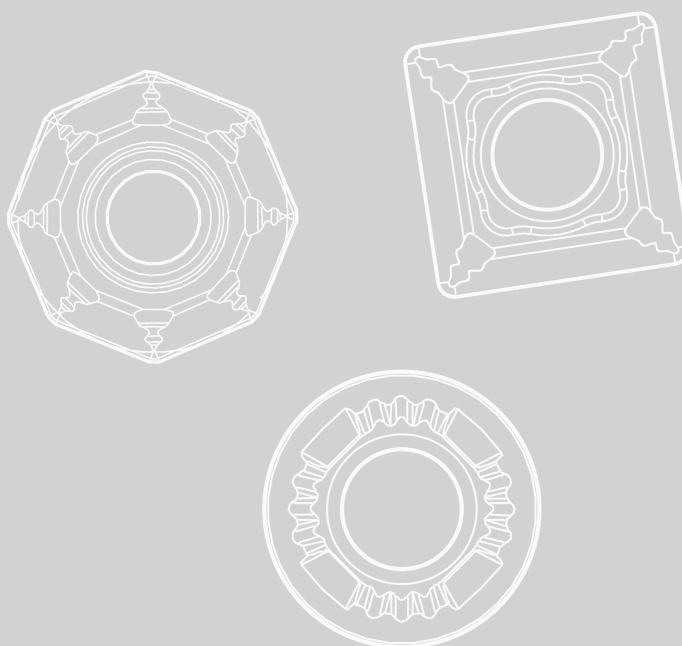


PŁYTKI DO FREZOWANIA

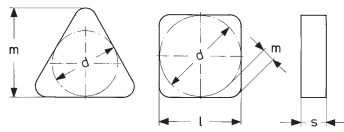
str.

rozdział:

| | |
|------|---------------------------------|
| D 64 | Oznaczenie płytek do frezowania |
| D 66 | Płytki do frezowania |
| D 72 | Płytki do frezów tarczowych |
| D 73 | Płytki do wiercenia |
| D 74 | Płytki podporowe |



FREZOWANIE – oznaczenie płytek (kod ISO)



S

P

K

N

12

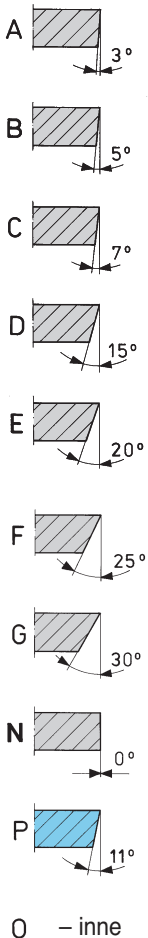
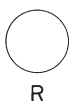
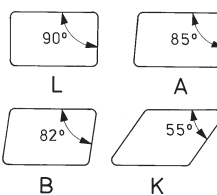
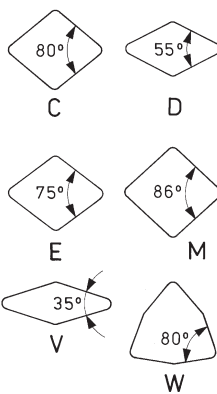
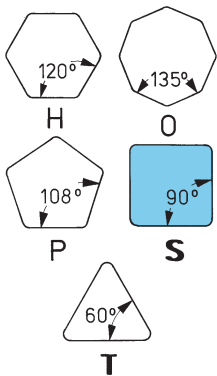
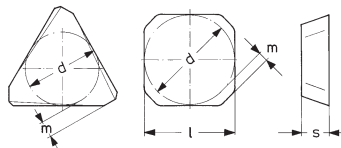
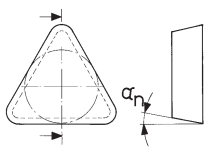
1. Kształt płytki i kąt naroża ϵ ,

2. Kąt przyłożenia normalny α_n

3. Dokładność płytki

4. Kształt powierzchni natarcia i sposób mocowania płytki

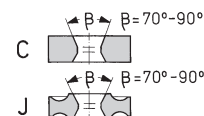
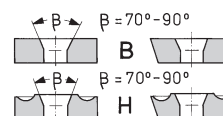
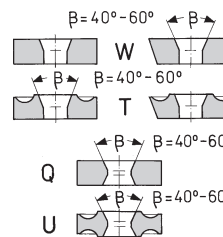
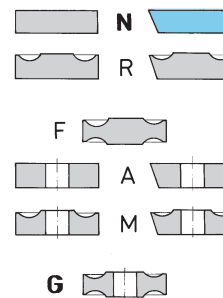
5. Długość boku płytki



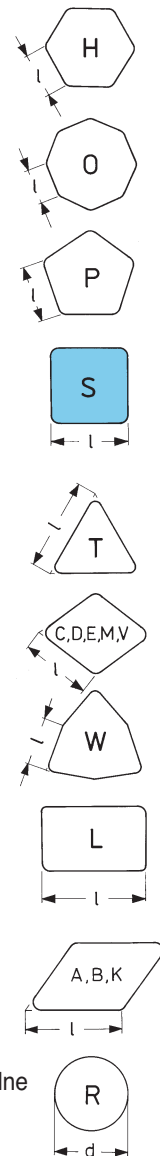
O – inne

Tolerancja (mm)

| l(d) | m | s |
|------------------------------|------------------------------|--------|
| ±0,025 | ±0,005 | ±0,025 |
| A ¹⁾ | | |
| ±0,013 | ±0,005 | ±0,025 |
| F ¹⁾ | | |
| ±0,025 | ±0,013 | ±0,025 |
| C ¹⁾ | | |
| ±0,013 | ±0,013 | ±0,025 |
| H | | |
| ±0,025 | ±0,025 | ±0,025 |
| E | | |
| ±0,025 | ±0,025 | ±0,13 |
| G | | |
| ±0,05 ±0,15 ²⁾ | ±0,005 | ±0,025 |
| J ¹⁾ | | |
| ±0,05 ±0,15 ²⁾ | ±0,013 | ±0,025 |
| K ¹⁾ | | |
| ±0,05 ±0,15 ²⁾ | ±0,025 | ±0,025 |
| L ¹⁾ | | |
| ±0,05 ±0,15 ²⁾ | ±0,08 ±0,20 ²⁾ | ±0,13 |
| M | | |
| ±0,05 ±0,15 ²⁾ | ±0,08 ±0,20 ²⁾ | ±0,025 |
| N | | |
| ±0,08 ±0,25 ²⁾ | ±0,13 ±0,38 ²⁾ | ±0,13 |
| U | | |

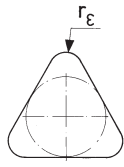


X – wykonanie specjalne



1) Odchyłki te stosuje się dla płytek szlifowanych ze ścinami
2) Wartości odchyłek (od-do) w zależności od wielkości „d”

FREZOWANIE – oznaczenie płytek (kod ISO)



7. Promień naroża r_ϵ

| | |
|--------|----------------------|
| Symbol | r_ϵ (mm) |
| 00 | <0,2 |
| 02 | 0,2 |
| 04 | 0,4 |
| 08 | 0,8 |
| 24 | 2,4 |
| x | inne |
| 00 | dla płytek okrągłych |
| MO | |

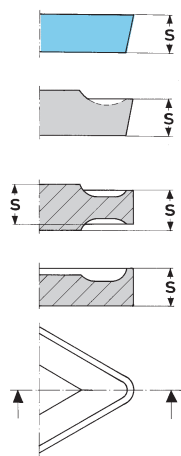
03

ED

S

R

6. Grubość płytki

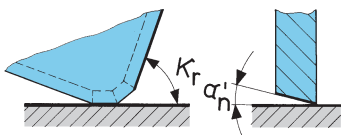


| Symbols | (mm) |
|-----------|-------------|
| 01 | 1,59 |
| T1 | 1,98 |
| 02 | 2,38 |
| 03 | 3,18 |
| T3 | 3,97 |
| 04 | 4,76 |
| 05 | 5,56 |
| 06 | 6,35 |
| 07 | 7,94 |
| 09 | 9,52 |
| 12 | 12,70 |

7. Kształt naroża płytki ze ścinami

Pierwsza litera określa kąt przystawienia K_r

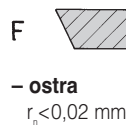
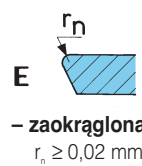
Druga litera określa normalny kąt przyłożenia ścinu krawędzi skrawającej pomocniczej α'_n



| Symbol | K_r |
|----------|--------------|
| A | = 45° |
| D | = 60° |
| E | = 75° |
| F | = 85° |
| P | = 90° |
| Z | = inne |

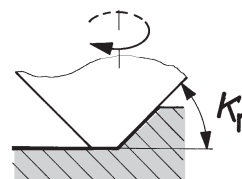
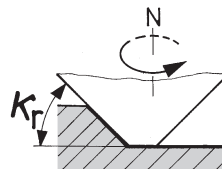
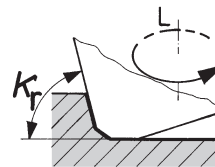
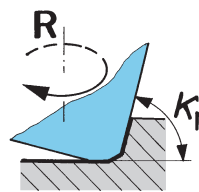
| Symbol | α'_n |
|----------|--------------|
| A | = 3° |
| B | = 5° |
| C | = 7° |
| D | = 15° |
| E | = 20° |
| F | = 25° |
| G | = 30° |
| N | = 0° |
| P | = 11° |
| Z | = inne |

8. Postać krawędzi skrawającej

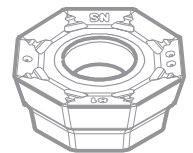


Symbole dodatkowe

9. Kierunek skrawania



10. Symbol ustalony przez producenta np. geometria łamacza wiórów



| d (mm) | Płytki okrągłe |
|--------|----------------|
| | R |
| 5,0 | 05 |
| 6,0 | 06 |
| 8,0 | 08 |
| 9,525 | 09 |
| 10,0 | 10 |
| 12,0 | 12 |
| 12,70 | 12 |
| 15,875 | 15 |
| 16,0 | 16 |
| 19,05 | 19 |
| 20,0 | 20 |
| 25,0 | 25 |
| 25,4 | 25 |
| 31,75 | 31 |
| 32,0 | 32 |

| l (d) (mm) | Tolerancje mm | | | | |
|-------------|-----------------------|---------------------|-------|-------|-------|
| | for l (d) | | for m | | |
| | Dokładność płytki | | | | |
| | J,K,L,M,N | U | M i N | U i M | M |
| | Kształt płytki | | | | |
| | H,O,P,S,T,C,D,E,M,W,R | H,O,P,S,T,C,E,N,W,R | D | | |
| 4,76 | | | | | |
| 5,56 | | | | | |
| 6,35 (6) | ±0,05 | ±0,08 | ±0,08 | ±0,13 | ±0,11 |
| 7,94 (8) | | | | | |
| 9,525 (10) | | | | | |
| 12,7 (12) | ±0,08 | ±0,13 | ±0,13 | ±0,20 | ±0,15 |
| 15,875 (16) | | | | | |
| 19,05 (20) | ±0,10 | ±0,18 | ±0,15 | ±0,27 | ±0,18 |
| 25,4 (25) | ±0,13 | ±0,25 | ±0,18 | ±0,38 | |
| 31,75 (32) | ±0,15 | ±0,25 | ±0,20 | ±0,38 | |

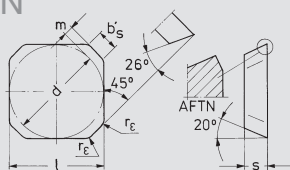
Uzupełnienie do punktu 3

Uzupełnienie do punktu 5

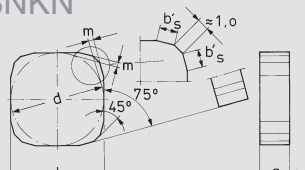
| (mm) | Symbol literowy określający kształt płytki | | | | | | | | | | | | | |
|--------|--|----|----|-----------|----|----|----|----|----|----|----|--|--|--|
| | H | O | P | S | T | C | D | E | M | V | W | | | |
| 4,76 | - | - | - | 04 | 08 | 04 | 05 | 04 | 04 | 08 | - | | | |
| 5,56 | - | - | - | 05 | 09 | 05 | 06 | 05 | 05 | 09 | 03 | | | |
| 6,35 | 03 | 02 | 04 | 06 | 11 | 06 | 07 | 06 | 06 | 11 | 04 | | | |
| 7,94 | 04 | 03 | 05 | 07 | 13 | 08 | 09 | 08 | 07 | 13 | 05 | | | |
| 9,525 | 05 | 04 | 07 | 09 | 16 | 09 | 11 | 09 | 09 | 16 | 06 | | | |
| 12,70 | 07 | 05 | 09 | 12 | 22 | 12 | 15 | 13 | 12 | 22 | 08 | | | |
| 15,875 | 09 | 06 | 11 | 15 | 27 | 16 | 19 | 16 | 15 | 27 | 10 | | | |
| 19,05 | 11 | 07 | 13 | 19 | 33 | 19 | 23 | 19 | 19 | 33 | 13 | | | |
| 25,40 | 14 | 10 | 18 | 25 | 44 | 25 | 31 | 26 | 25 | 44 | 17 | | | |
| 31,75 | 18 | 13 | 23 | 31 | 54 | 32 | 38 | 32 | 31 | 54 | 21 | | | |

SEAN
SEGN
SEKN
SEKR
SNKN
SNHN

SEKN



SNKN



| | Oznaczenie | l=d (mm) | s (mm) | r _e (mm) | m (mm) | b' _s (mm) | gatunki | | | | | | | | |
|--|--|------------------------------------|------------------------------|------------------------------|------------------------------|----------------------------------|------------------|-------|-------|------------------|------|------|------------------|------------------|------------------|
| | | | | | | | CVD | | | PVD | | | HW | | |
| | | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S |
| | 12 SEAN 1203AFTN ¹⁾ SEAN 1203AFN 15 SEAN 1504AFTN ²⁾ SEAN 1504AFN | 12,70 12,70 15,875 15,875 | 3,18 3,18 4,76 4,76 | 1,20 1,20 1,20 1,20 | 1,50 1,50 2,15 2,15 | ~2,30 ~2,30 ~2,30 ~2,30 | ○ ○ ○ ○ | | | | | | | ○ ○ ● ○ | ○ ○ ○ ○ |
| | 09 SEGN 090308 12 SEGN 120304 SEGN 120312 | 9,525 12,70 12,70 | 3,18 3,18 3,18 | 0,80 0,40 1,20 | 1,644 2,466 2,137 | – – – | | | | | | | | ○ ● ● | |
| | 12 SEKN 1204AZN SEKN 1204AZTN ³⁾ | 12,70 12,70 | 4,76 4,76 | 1,20 1,20 | 1,55 1,55 | ~2,30 ~2,30 | | | | ○ ○ | | | ○ ● | ○ | |
| | 12 SEKN 1203AFTN ⁴⁾ SEKN 1203AFN 15 SEKN 1504AFTN ⁵⁾ SEKN 1504AFN | 12,70 12,70 15,875 15,875 | 3,18 3,18 4,76 4,76 | 2,40 2,40 2,40 2,40 | 1,50 1,50 2,15 2,15 | ~1,60 ~1,60 ~1,60 ~1,60 | ○ ○ ○ ○ | | ○ | ● ● ● ○ | | | ● ○ ○ ○ | ○ | |
| | 12 SEKR 1203AFN | 12,70 | 3,18 | 2,40 | 1,50 | ~1,60 | ● | | | ● | | | ○ | ○ | |
| | 12 SNKN 1204ENN | 12,70 | 4,76 | – | 0,80 | ~1,50 | | | | | | | ● | ○ | ○ |
| | 12 SNHN 1204ENEN 15 SNHN 1504ENEN | 12,70 15,875 | 4,76 4,76 | – – | 0,95 1,30 | ~1,50 ~1,50 | ○ ○ | | | ○ ● | | | ○ ○ | ○ | |

Krawędź ze ścinem

¹⁾ T = 0,15 x 20°

²⁾ T = 0,15 x 20°

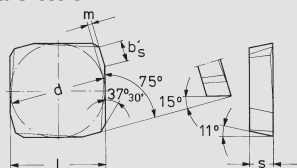
³⁾ T = 0,20 x 25°

⁴⁾ T = 0,15 x 20°

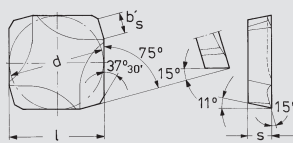
⁵⁾ T = 0,15 x 20°

SPAN
SPKN
SPKR
LPKN

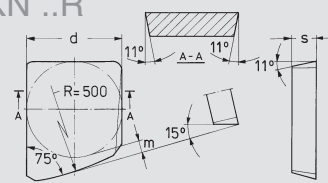
SPKN ..R



SPKR ..R



LPKN ..R



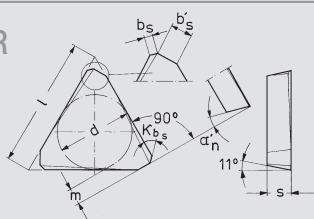
| | Oznaczenie | l=d (mm) | s (mm) | m (mm) | b's (mm) | gatunki | | | | | | | | | | | | | |
|--|--------------------------------|-------------|-----------|-----------|-------------|---------|-------|-------|------|------|------|------|-------|------|------|------|--|--|--|
| | | | | | | CVD | | | PVD | | | HW | | | | | | | |
| | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S | H15X | H20S | | | |
| | 12 SPAN 1203EDR | 12,70 | 3,18 | 0,88 | ~1,40 | | | | | | | | | | | | | | |
| | 15 SPAN 1504EDR | 15,875 | 4,76 | 1,26 | ~1,40 | | | | | | | | | | | | | | |
| | 12 SPKN 1203EDR | 12,70 | 3,18 | 0,88 | ~1,40 | | | | | | | | | | | | | | |
| | SPKN 1203EDL | 12,70 | 3,18 | 0,92 | ~1,40 | | | | | | | | | | | | | | |
| | 15 SPKN 1504EDR | 15,875 | 4,76 | 1,26 | ~1,40 | | | | | | | | | | | | | | |
| | SPKN 1504EDL | 15,875 | 4,76 | 1,26 | ~1,40 | | | | | | | | | | | | | | |
| | 12 SPKN 1203EDTR ¹⁾ | 12,70 | 3,18 | 0,90 | ~1,40 | | | | | | | | | | | | | | |
| | 12 SPKR 1203EDR | 12,70 | 3,18 | - | ~1,40 | | | | | | | | | | | | | | |
| | SPKR 1203EDL | 12,70 | 3,18 | - | ~1,40 | | | | | | | | | | | | | | |
| | 12 SPKR 1203EDR-PR1 | 12,70 | 3,18 | 0,872 | ~1,60 | | | | | | | | | | | | | | |
| | Oznaczenie | d (mm) | s (mm) | m (mm) | | | | | | | | | | | | | | | |
| | 12 LPKN 1203ZZR | 12,70 | 3,18 | 0,96 | | | | | | | | | | | | | | | |

Krawędź ze ścinem

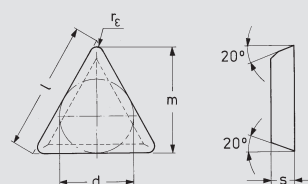
¹⁾ T = 0,35 x 10°

TPKN
TEGN

TPKN ..R



TEGN



| | Oznaczenie | l (mm) | d (mm) | s (mm) | m (mm) | b _s (mm) | b' _s (mm) | K _{p,s} (°) | α' _n (°) | gatunki | | | | | | | | | | | | |
|--|--|--------------|----------------|--------------|-----------|------------------------|-------------------------|-------------------------|------------------------|---------|-------|-------|------|------|------|------|-------|------|------|------|---|---|
| | | | | | | | | | | CVD | | | PVD | | | HW | | | | | | |
| | | | | | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S | H15X | H20S | | |
| | 16 TPKN 1603PPR-A | 16,5 | 9,525 | 3,18 | 2,40 | ~1,00 | ~1,20 | 30 | 11 | | | | | | | | | | | | | ○ |
| | 22 TPKN 2204PDR TPKN 2204PDTR ¹⁾ | 22,0 22,0 | 12,70 12,70 | 4,76 4,76 | 3,48 | ~0,70 | ~1,40 | 45 | 15 | ○ | | | | ● | | | | ● | ○ | ○ | ○ | ○ |
| | Oznaczenie | l (mm) | d (mm) | s (mm) | m (mm) | r _e (mm) | | | | | | | | | | | | | | | | |
| | 11 TEGN 110304 | 11 | 6,35 | 3,18 | 9,128 | 0,4 | | | | | | | | | | | | | | | | ○ |
| | 16 TEGN 110308 | 11 | 6,35 | 3,18 | 8,731 | 0,8 | | | | | | | | | | | | | | | | ○ |
| | 16 TEGN 160308 | 16,5 | 9,525 | 3,18 | 13,494 | 0,8 | | | | | | | | | | | | | | | | ○ |

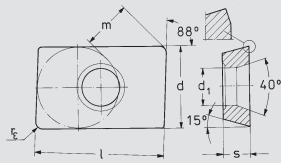
Krawędź ze ścinem

¹⁾ T = 0,20 x 20°

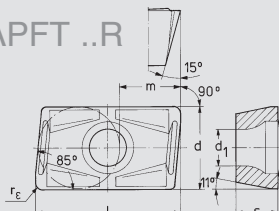
D

ADMT
ADMW
APFT
APKW
CCMX
RPHT

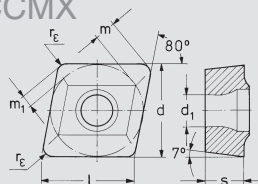
ADMW ..R



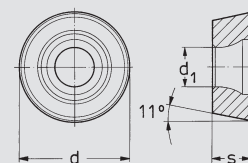
APFT ..R



CCMX



RPHT



| Oznaczenie | l (mm) | d (mm) | s (mm) | r _ε (mm) | d ₁ (mm) | m (mm) | gatunki | | | | | | | | | | | | | |
|------------|--------|--------|--------|---------------------|---------------------|--------|---------|-------|-------|------|------|------|------|-------|------|------|------|--|--|--|
| | | | | | | | CVD | | | PVD | | | HW | | | | | | | |
| | | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S | H15X | H20S | | | |
| | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|--|----|---|----|-------|------|-----|-----|-------|--|--|--|--|--|--|--|--|--|--|--|--|
| | 15 | ADMT 150308TR ¹⁾ | 15 | 9,525 | 3,18 | 0,8 | 4,4 | 5,683 | | | | | | | | | | | | |
| | 15 | ADMW 150308R ADMW 150308TR ²⁾ | 15 | 9,525 | 3,18 | 0,8 | 4,4 | 5,683 | | | | | | | | | | | | |
| | 16 | APFT 1604PDTR ³⁾ | 17 | 9,525 | 4,76 | 0,8 | 4,4 | 7,21 | | | | | | | | | | | | |
| | 16 | APFT 1604PDTR-PM1 | 17 | 9,525 | 5,56 | 0,8 | 4,4 | 7,21 | | | | | | | | | | | | |
| | 16 | APKW 160430TR ⁴⁾ APKW 160450R | 17 | 9,525 | 4,76 | 3,0 | 4,4 | 6,03 | | | | | | | | | | | | |

| Oznaczenie | l (mm) | d (mm) | s (mm) | r _ε (mm) | d ₁ (mm) | m (mm) | m ₁ (mm) | gatunki | | | | | | | | | | | |
|------------|--------|-------------|--------|---------------------|---------------------|--------|---------------------|---------|-------|-------|------|------|------|------|-------|------|------|------|--|
| | | | | | | | | CVD | | | PVD | | | HW | | | | | |
| | | | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S | H15X | H20S | |
| | 06 | CCMX 060204 | 6,4 | 6,35 | 2,38 | 0,4 | 2,5 | 1,543 | 0,848 | | | | | | | | | | |
| | 08 | CCMX 080308 | 8,1 | 7,94 | 3,18 | 0,8 | 2,9 | 1,765 | 0,970 | | | | | | | | | | |
| | 09 | CCMX 09T308 | 9,7 | 9,525 | 3,97 | 0,8 | 3,4 | 2,206 | 1,212 | | | | | | | | | | |
| | 12 | CCMX 120408 | 12,9 | 17,70 | 4,76 | 0,8 | 3,8 | 3,088 | 1,697 | | | | | | | | | | |

| Oznaczenie | d (mm) | s (mm) | d ₁ (mm) | gatunki | | | | | | | | | | |
|------------|--------|----------------------------|---------------------|---------|-------|-------|------|------|------|------|-------|------|------|------|
| | | | | CVD | | | PVD | | | HW | | | | |
| | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T | H10S | H15X | H20S |
| | 08 | RPHT 0803MOT ⁵⁾ | 3,4 | | | | | | | | | | | |
| | 10 | RPHT 10T3MOT ⁶⁾ | 4,4 | | | | | | | | | | | |
| | 12 | RPHT 1204MO | 4,4 | | | | | | | | | | | |

Krawędź ze ścinem

¹⁾ T = 0,10 x 30°

²⁾ T = 0,15 x 20°

³⁾ T = 0,40 x 90°

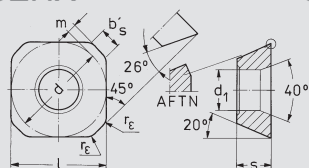
⁴⁾ T = 0,20 x 20°

⁵⁾ T = 0,14 x 7°

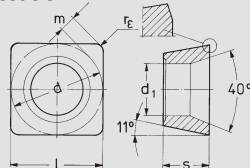
⁶⁾ T = 0,12 x 7°

SEHX
SPMT
SPMW
SPMX
TCMT

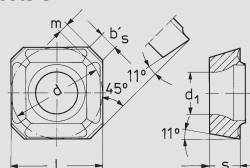
SEHX



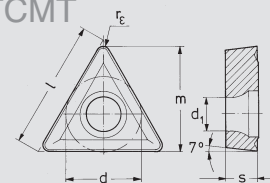
SPMW



SPMX



TCMT



| | Oznaczenie | l=d (mm) | s (mm) | r _E (mm) | d ₁ (mm) | m (mm) | b' _s (mm) | gatunki | | | | | | | |
|--|--|----------------|----------------|------------------------|------------------------|------------------------|-------------------------|---------|-------|-------|------|------|------|--------|-------|
| | | | | | | | | CVD | | | PVD | | | HW | |
| | | | | | | | | NMP20 | NMK20 | NMK30 | N210 | N250 | N300 | N350 | SM25T |
| | 12 SEHX 1204AFTN ¹⁾ SEHX 1204AFN | 12,70 12,70 | 4,76 4,76 | 1,20 1,20 | 5,70 5,70 | 1,50 1,50 | ~2,30 ~2,30 | ○ ● | | | | | | ● ● | ● |
| | 12 SPMW 120408 SPMW 120408T ¹⁾ | 12,70 12,70 | 4,76 4,76 | 0,8 0,8 | 5,5 5,5 | 2,301 2,301 | – – | ○ | | | | | | ● ● | ● |
| | 06 SPMX 0602AP 09 SPMX 0903AP | 6,35 9,525 | 2,38 3,18 | – – | 2,5 3,4 | 0,825 1,25 | ~1,0 ~1,45 | ○ | | | ○ | | | ○ | |
| | Oznaczenie | l (mm) | d (mm) | s (mm) | r _E (mm) | d ₁ (mm) | m (mm) | | | | | | | | |
| | 16 TCMT 16T304 TCMT 16T308 | 16,5 16,5 | 9,525 9,525 | 3,97 3,97 | 0,4 0,8 | 4,4 4,4 | 13,891 13,494 | ○ | | | | | | ○ ○ | ○ |
| | 22 TCMT 220408-11 | 22,0 | 12,70 | 4,76 | 0,8 | 5,5 | 18,256 | ○ | | | | | | ● | ○ |

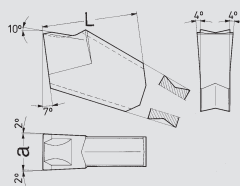
Krawędź ze ścinem

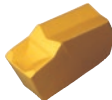
¹⁾ T = 0,15 x 20°

FREZOWANIE – płytki do frezów tarczowych

LFMX

LFMX ..N

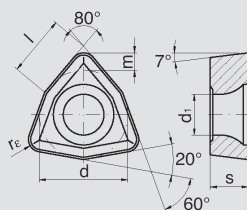



| | Oznaczenie | a (mm) | L (mm) | gatunki | | | |
|---|------------|-----------|-----------|---------|-------|------|------|
| | | | | PVD | HW | | |
| | | | | N435 | SM25T | H15X | H20S |
|  | 3 LFMX 3N | 3,1 | 11,0 | ● | ○ | ○ | ○ |
| | 4 LFMX 4N | 4,1 | 11,0 | ○ | ○ | ○ | ○ |
| | 5 LFMX 5N | 5,1 | 11,0 | ○ | ○ | ○ | ○ |

D

WCMX


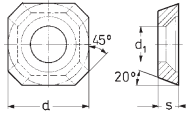
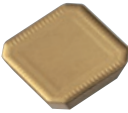

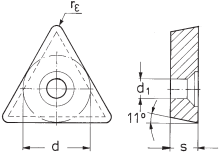
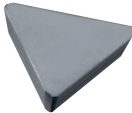
WCMX



| | Oznaczenie | l (mm) | d (mm) | s (mm) | r _e (mm) | d _r (mm) | m (mm) | gatunki | | | | | | | | | | | |
|---|----------------|-----------|-----------|-----------|------------------------|------------------------|-----------|---------|-------|-------|------|------|-------|------|------|------|--|--|--|
| | | | | | | | | CVD | | PVD | | HW | | | | | | | |
| | | | | | | | | NMP20 | NMK20 | NMK30 | N250 | N300 | SM25T | H10S | H15X | H20S | | | |
|  | 03 WCMX 030208 | 3,47 | 5,56 | 2,38 | 0,8 | 2,56 | 1,104 | | | | | | | | | | | | |
| | 04 WCMX 040208 | 4,0 | 6,35 | 2,38 | 0,8 | 2,8 | 1,323 | | | | | | | | | | | | |
| | 05 WCMX 050308 | 5,07 | 7,94 | 3,18 | 0,8 | 3,4 | 1,765 | | | | | | | | | | | | |
| | 06 WCMX 06T308 | 6,14 | 9,525 | 3,97 | 0,8 | 3,8 | 2,205 | | | | | | | | | | | | |

D

FREZOWANIE – płytki podporowe

| Płytki podporowe | | d (mm) | s (mm) | r _e (mm) | d ₁ (mm) | Długość boku płytki | | |
|---|---------------|-----------|-----------|------------------------|------------------------|--|--------|---|
|  | 220.13-621-12 | 10,30 | 3,18 | - | 4,20 |  | 12,7 |  SEKR SEAN SEKN |
| | 220.13-624-15 | 12,20 | 3,18 | - | 4,20 | | 15,875 | |
|  | 175.11-624 | 10,85 | 3,18 | 0,60 | 4,20 |  | 22,0 |  TPKN TPUN TPGN |

D