D413 / D433FN

# Twist Drills / High Performance Drills

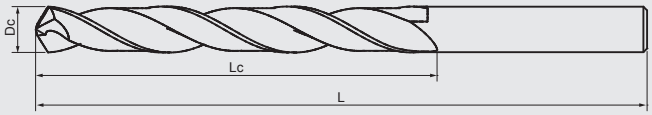
D413 118° X-type drill point design is easy for positioning.

Designed with sharp drill point.

D433FN 140° S-type drill point design with centring and positioning function, reduce axial drilling force.

Designed with high chip evacuating flutes.

Good wear resistance and lubricating effect with Nano multilayer coating.




VHM Carbide | 5XD | 2 | DIN 338

Suitable for drilling with 5XD depth.

D413 Application for drilling cast iron, aluminium, copper, plastic, composite materials...and etc.

D433FN Application for drilling steels below 48HRC, cast iron...and etc.

K N | Uncoated Bright | 118° | AL, Cu, PVC, CFRP

P H K | AlTiCrN FN | 140° | Steel <48HRC Stainless Cast Iron

## DIN 338 Standard Length

| Dc h7 | Lc mm | L mm | D413 Bright | D433FN AlTiCrN | |
|---|---|---|---|---|---|
| 1 | 12 | 34 | ● | ● | |
| 1.1 | 14 | 36 | ● | ● | |
| 1.2 | 16 | 38 | ● | ● | |
| 1.3 | 16 | 38 | ● | ● | |
| 1.4 | 18 | 40 | ● | ● | |
| 1.5 | 18 | 40 | ● | ● | |
| 1.6 | 20 | 43 | ● | ● | |
| 1.7 | 20 | 43 | ● | ● | |
| 1.8 | 22 | 46 | ● | ● | |
| 1.9 | 22 | 46 | ● | ● | |
| 2 | 24 | 49 | ● | ● | |
| 2.1 | 24 | 49 | ● | ● | |
| 2.2 | 27 | 53 | ● | ● | |
| 2.3 | 27 | 53 | ● | ● | |
| 2.4 | 30 | 57 | ● | ● | |
| 2.5 | 30 | 57 | ● | ● | |
| 2.6 | 30 | 57 | ● | ● | |
| 2.7 | 33 | 61 | ● | ● | |
| 2.8 | 33 | 61 | ● | ● | |
| 2.9 | 33 | 61 | ● | ● | |
| 3 | 33 | 61 | ● | ● | |
| 3.1 | 36 | 65 | ● | ● | |
| 3.2 | 36 | 65 | ● | ● | |
| 3.3 | 36 | 65 | ● | ● | |
| 3.4 | 39 | 70 | ● | ● | |
| 3.5 | 39 | 70 | ● | ● | |
| 3.6 | 39 | 70 | ● | ● | |
| 3.7 | 39 | 70 | ● | ● | |
| 3.8 | 43 | 75 | ● | ● | |
| 3.9 | 43 | 75 | ● | ● | |
| 4 | 43 | 75 | ● | ● | |
| 4.1 | 43 | 75 | ● | ● | |
| 4.2 | 43 | 75 | ● | ● | |
| 4.3 | 47 | 80 | ● | ● | |
| 4.4 | 47 | 80 | ● | ● | |
| 4.5 | 47 | 80 | ● | ● | |
| 4.6 | 47 | 80 | ● | ● | |
| 4.7 | 47 | 80 | ● | ● | |
| 4.8 | 52 | 86 | ● | ● | |
| 4.9 | 52 | 86 | ● | ● | |

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## Twist Drills / High Performance Drills

| **Dc** h7 | **Lc** mm | **L** mm | D413 Bright | D433FN AlTiCrN | |
|---|---|---|---|---|---|
| 5 | 52 | 86 | ● | ● | |
| 5.1 | 52 | 86 | ● | ● | |
| 5.2 | 52 | 86 | ● | ● | |
| 5.3 | 52 | 86 | ● | ● | |
| 5.4 | 57 | 93 | ● | ● | |
| 5.5 | 57 | 93 | ● | ● | |
| 5.6 | 57 | 93 | ● | ● | |
| 5.7 | 57 | 93 | ● | ● | |
| 5.8 | 57 | 93 | ● | ● | |
| 5.9 | 57 | 93 | ● | ● | |
| 6 | 57 | 93 | ● | ● | |
| 6.1 | 63 | 101 | ● | ● | |
| 6.2 | 63 | 101 | ● | ● | |
| 6.3 | 63 | 101 | ● | ● | |
| 6.4 | 63 | 101 | ● | ● | |
| 6.5 | 63 | 101 | ● | ● | |
| 6.6 | 63 | 101 | ● | ● | |
| 6.7 | 63 | 101 | ● | ● | |
| 6.8 | 69 | 109 | ● | ● | |
| 6.9 | 69 | 109 | ● | ● | |
| 7 | 69 | 109 | ● | ● | |
| 7.1 | 69 | 109 | ● | ● | |
| 7.2 | 69 | 109 | ● | ● | |
| 7.3 | 69 | 109 | ● | ● | |
| 7.4 | 69 | 109 | ● | ● | |
| 7.5 | 69 | 109 | ● | ● | |
| 7.6 | 75 | 117 | ● | ● | |
| 7.7 | 75 | 117 | ● | ● | |
| 7.8 | 75 | 117 | ● | ● | |
| 7.9 | 75 | 117 | ● | ● | |
| 8 | 75 | 117 | ● | ● | |
| 8.1 | 75 | 117 | ● | ● | |
| 8.2 | 75 | 117 | ● | ● | |
| 8.3 | 75 | 117 | ● | ● | |
| 8.4 | 75 | 117 | ● | ● | |
| 8.5 | 75 | 117 | ● | ● | |
| 8.6 | 81 | 125 | ● | ● | |
| 8.7 | 81 | 125 | ● | ● | |
| 8.8 | 81 | 125 | ● | ● | |
| 8.9 | 81 | 125 | ● | ● | |
| 9 | 81 | 125 | ● | ● | |
| 9.1 | 81 | 125 | ● | ● | |
| 9.2 | 81 | 125 | ● | ● | |
| 9.3 | 81 | 125 | ● | ● | |
| 9.4 | 81 | 125 | ● | ● | |
| 9.5 | 81 | 125 | ● | ● | |
| 9.6 | 87 | 133 | ● | ● | |
| 9.7 | 87 | 133 | ● | ● | |
| 9.8 | 87 | 133 | ● | ● | |
| 9.9 | 87 | 133 | ● | ● | |
| 10 | 87 | 133 | ● | ● | |
| 10.2 | 87 | 133 | ● | ● | |
| 10.5 | 87 | 133 | ● | ● | |
| 10.8 | 94 | 142 | ● | ● | |
| 11 | 94 | 142 | ● | ● | |
| 11.5 | 94 | 142 | ● | ● | |
| 12 | 101 | 151 | ● | ● | |
| 12.5 | 101 | 151 | ● | ● | |
| 13 | 101 | 151 | ● | ● | |

Please refer to page 300 for parameters.

## Cutting Conditions

D412
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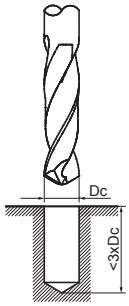
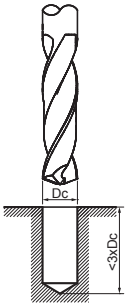
D433FN

| | | D412 | | D430FN | | D413 | | D433FN | |
|---|---|---|---|---|---|---|---|---|---|
| | |  | |  | |  | |  | |
| | | cutting speed Vc (m/min) | feed per tooth fz(mm) | cutting speed Vc (m/min) | feed per tooth fz(mm) | cutting speed Vc (m/min) | feed per tooth fz(mm) | cutting speed Vc (m/min) | feed per tooth fz(mm) |
| P | Carbon Steel Materials | | | | | | | | |
| | GR1 Carbon Steel | | | 80 | 0.023xDc | | | 80 | 0.023xDc |
| | GR2 <24HRC Low-alloyed Steel | | | 80 | 0.023xDc | | | 80 | 0.023xDc |
| | GR3 <30HRC Hi-alloyed Steel | | | 70 | 0.021xDc | | | 70 | 0.021xDc |
| H | Hardened Steel Materials | | | | | | | | |
| | GR4 30~38HRC Hardened Steel | | | 50 | 0.020xDc | | | 50 | 0.020xDc |
| | GR5 38~48HRC Hardened Steel | | | 40 | 0.015xDc | | | 40 | 0.015xDc |
| M | Stainless Steel Materials | | | | | | | | |
| | GR8-1 Ferritic、Martensitic | | | | | | | | |
| | GR8-2 Austenitic | | | | | | | | |
| | GR8-3 Austenitic-ferritic | | | | | | | | |
| | GR8-4 Austenitic-ferritic Heat-resistant | | | | | | | | |
| K | Cast Lron Materials | | | | | | | | |
| | GR9-1 Grey cast iron | 40 | 0.008xDc | 80 | 0.023xDc | 40 | 0.008xDc | 80 | 0.023xDc |
| | GR9-2 Nodular cast iron | 40 | 0.008xDc | 80 | 0.023xDc | 40 | 0.008xDc | 80 | 0.023xDc |
| N | Aluminium Steel Materials | | | | | | | | |
| | GR10-1 Wrought Aluminium alloys | 200 | 0.01xDc | | | 200 | 0.01xDc | | |
| | GR10-2 Aluminium cast alloys <10% | 200 | 0.01xDc | | | 200 | 0.01xDc | | |
| | GR10-3 Aluminium cast alloys >10% | 180 | 0.01xDc | | | 180 | 0.01xDc | | |
| | Copper Steel Materials | | | | | | | | |
| | GR11-1 Pure Copper | 60 | 0.01xDc | | | 60 | 0.01xDc | | |
| | GR11-2 Brass | 60 | 0.01xDc | | | 60 | 0.01xDc | | |
| | GR11-2 Bronze | 60 | 0.01xDc | | | 60 | 0.01xDc | | |
| | Copper Steel Materials | | | | | | | | |
| | GR12 Plastics | 100 | 0.01xDc | | | 100 | 0.01xDc | | |
| | GR13 FRP CFRP Composite Material | 80 | 0.01xDc | | | 80 | 0.01xDc | | |

All cutting data serve for orientation only and should be adapted individually to the technical conditions on location
1. Please work with good rigidity / high precision facilities and collet chuck.
2. Please choose proper cutting fluid.
3. The cutting data is reference value only. Please adjust it according to your real working conditions.
4. If RPM is lower the reference value, the Feed rate (fz) and RPM should be reduced by the same proportion.
5. If vibration occurs during cutting, please reduce cutting parameter.