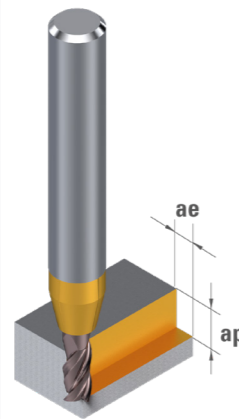


CONTORNATURA / SGROSSATURA

	VDI 3323	Ø D <sub>1</sub> 0.30 - 0.70		Ø D <sub>1</sub> 0.80 - 1.50		Ø D <sub>1</sub> 1.60 - 5.00		
		MD nudo Vc [m/min]	C-TOP Vc [m/min]	MD nudo Vc [m/min]	C-TOP Vc [m/min]	MD nudo Vc [m/min]	C-TOP Vc [m/min]	
		<b>P</b>	Acciaio non legato	1 - 5	30 - 50	50 - 150	120 - 280	
	Acciaio leggermente legato < 800 N/mm <sup>2</sup>	6 - 9	25 - 50	50 - 125	90 - 230			
	Acciaio fortemente legato > 800 N/mm <sup>2</sup> , acciaio inossidabile ferritico /martensitico	10 - 13	25 - 35	50 - 85	90 - 130			
<b>M</b>	Acciaio inossidabile austenitico < 700 N/mm <sup>2</sup>	14.1-14.2	25 - 50	50 - 150	100 - 230			
	Acciaio inox austenitico senza Ni/DUPLEX > 700 N/mm <sup>2</sup>	14.3-14.4	20 - 45	50 - 115	75 - 180			
<b>K</b>	Ghisa grigia < 250 HB	15 - 16	20 - 40	45 - 105	70 - 165	150 - 280		
	Ghisa nodulare, ghisa malleabile > 250 HB	17 - 20	15 - 35	30 - 50	40 - 90	50 - 150	60 - 140	110 - 250
<b>N</b>	Leghe Cu bronzo ottone con Pb	26	20 - 40	30 - 50	50 - 105	50 - 150	80 - 165	150 - 300
	Lega di rame difficile da lavorare	27 - 28	15 - 35	30 - 50	40 - 90	50 - 150	60 - 140	130 - 280
	Oro, argento	-	20 - 45	30 - 50	50 - 110	50 - 150	75 - 170	160 - 320
<b>S</b>	Leghe speciali nickel cobalto	31 - 35	15 - 30	40 - 80	60 - 120			
	Titanio e relative leghe	36 - 37	15 - 30	30 - 45	35 - 80	50 - 110	55 - 120	120 - 170



$$n \text{ [g/min]} = \frac{Vc \text{ [m/min]} \times 1000}{\pi \times D_1 \text{ [mm]}}$$

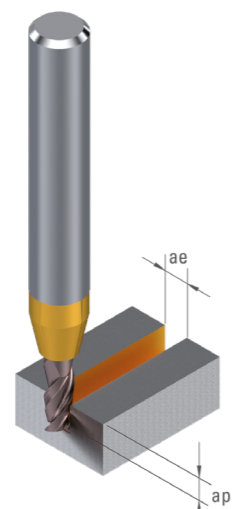
$$Vf \text{ [mm/min]} = n \text{ [g/min]} \times fz \text{ [mm]} \times Z$$

Avanzamento al dente fz [mm]

Ø D <sub>1</sub> 0.30 - 0.50		Ø D <sub>1</sub> 0.50 - 0.80		Ø D <sub>1</sub> 0.80 - 1.60		Ø D <sub>1</sub> 1.60 - 3.00		Ø D <sub>1</sub> 3.00 - 5.00	
fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)
0.002 - 0.004	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.006	< 0.90 × Ø < 1.50 × Ø	0.005 - 0.012	< 0.90 × Ø < 1.50 × Ø	0.010 - 0.022	< 0.90 × Ø < 1.50 × Ø	0.018 - 0.036	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.003	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.010	< 0.90 × Ø < 1.50 × Ø	0.009 - 0.019	< 0.90 × Ø < 1.50 × Ø	0.016 - 0.032	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.003	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.010	< 0.90 × Ø < 1.50 × Ø	0.008 - 0.018	< 0.90 × Ø < 1.50 × Ø	0.015 - 0.030	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.003	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.010	< 0.90 × Ø < 1.50 × Ø	0.008 - 0.018	< 0.90 × Ø < 1.50 × Ø	0.015 - 0.030	< 0.90 × Ø < 1.50 × Ø
0.001 - 0.003	< 0.90 × Ø < 1.50 × Ø	0.002 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.009	< 0.90 × Ø < 1.50 × Ø	0.008 - 0.017	< 0.90 × Ø < 1.50 × Ø	0.014 - 0.028	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.007	< 0.90 × Ø < 1.50 × Ø	0.006 - 0.015	< 0.90 × Ø < 1.50 × Ø	0.012 - 0.028	< 0.90 × Ø < 1.50 × Ø	0.023 - 0.046	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.004	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.006	< 0.90 × Ø < 1.50 × Ø	0.005 - 0.013	< 0.90 × Ø < 1.50 × Ø	0.011 - 0.024	< 0.90 × Ø < 1.50 × Ø	0.020 - 0.040	< 0.90 × Ø < 1.50 × Ø
0.003 - 0.005	< 0.90 × Ø < 1.50 × Ø	0.005 - 0.009	< 0.90 × Ø < 1.50 × Ø	0.007 - 0.017	< 0.90 × Ø < 1.50 × Ø	0.014 - 0.032	< 0.90 × Ø < 1.50 × Ø	0.027 - 0.054	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.004	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.007	< 0.90 × Ø < 1.50 × Ø	0.006 - 0.014	< 0.90 × Ø < 1.50 × Ø	0.012 - 0.026	< 0.90 × Ø < 1.50 × Ø	0.022 - 0.044	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.004	< 0.90 × Ø < 1.50 × Ø	0.003 - 0.006	< 0.90 × Ø < 1.50 × Ø	0.005 - 0.013	< 0.90 × Ø < 1.50 × Ø	0.011 - 0.024	< 0.90 × Ø < 1.50 × Ø	0.020 - 0.040	< 0.90 × Ø < 1.50 × Ø
0.001 - 0.002	< 0.90 × Ø < 1.50 × Ø	0.002 - 0.003	< 0.90 × Ø < 1.50 × Ø	0.002 - 0.006	< 0.90 × Ø < 1.50 × Ø	0.005 - 0.011	< 0.90 × Ø < 1.50 × Ø	0.009 - 0.018	< 0.90 × Ø < 1.50 × Ø
0.002 - 0.004	< 0.90 × Ø < 1.50 × Ø	0.004 - 0.007	< 0.90 × Ø < 1.50 × Ø	0.006 - 0.014	< 0.90 × Ø < 1.50 × Ø	0.012 - 0.026	< 0.90 × Ø < 1.50 × Ø	0.022 - 0.044	< 0.90 × Ø < 1.50 × Ø

SCALANATURA

	VDI 3323	Ø D <sub>1</sub> 0.30 - 0.70		Ø D <sub>1</sub> 0.80 - 1.50		Ø D <sub>1</sub> 1.60 - 5.00		
		MD nudo Vc [m/min]	C-TOP Vc [m/min]	MD nudo Vc [m/min]	C-TOP Vc [m/min]	MD nudo Vc [m/min]	C-TOP Vc [m/min]	
		<b>P</b>	Acciaio non legato	1 - 5	25 - 50	50 - 150	100 - 240	
	Acciaio leggermente legato < 800 N/mm <sup>2</sup>	6 - 9	20 - 50	50 - 125	75 - 195			
	Acciaio fortemente legato > 800 N/mm <sup>2</sup> , acciaio inossidabile ferritico /martensitico	10 - 13	20 - 30	50 - 70	75 - 110			
<b>M</b>	Acciaio inossidabile austenitico < 700 N/mm <sup>2</sup>	14.1-14.2	20 - 50	50 - 125	85 - 195			
	Acciaio inox austenitico senza Ni/DUPLEX > 700 N/mm <sup>2</sup>	14.3-14.4	15 - 40	40 - 100	65 - 155			
<b>K</b>	Ghisa grigia < 250 HB	15 - 16	15 - 35	30 - 50	40 - 90	50 - 150	60 - 140	130 - 240
	Ghisa nodulare, ghisa malleabile > 250 HB	17 - 20	15 - 30	25 - 50	35 - 80	50 - 140	50 - 120	95 - 215
<b>N</b>	Leghe Cu bronzo ottone con Pb	26	20 - 35	30 - 50	45 - 90	50 - 150	70 - 140	130 - 255
	Lega di rame difficile da lavorare	27 - 28	15 - 35	30 - 50	35 - 80	50 - 150	50 - 120	110 - 240
	Oro, argento	-	15 - 30	30 - 50	40 - 95	50 - 150	65 - 145	135 - 270
<b>S</b>	Leghe speciali nickel cobalto	31 - 35	15 - 25	30 - 65	50 - 100			
	Titanio e relative leghe	36 - 37	10 - 25	25 - 35	30 - 65	50 - 95	45 - 100	100 - 145

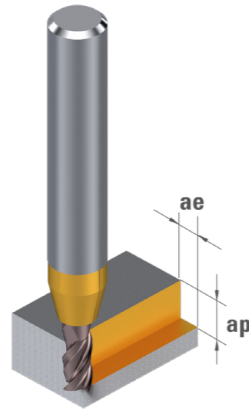


Avanzamento al dente fz [mm]

Ø D <sub>1</sub> 0.30 - 0.50		Ø D <sub>1</sub> 0.50 - 0.80		Ø D <sub>1</sub> 0.80 - 1.60		Ø D <sub>1</sub> 1.60 - 3.00		Ø D <sub>1</sub> 3.00 - 5.00	
fz	ap (mm)	fz	ap (mm)	fz	ap (mm)	fz	ap (mm)	fz	ap (mm)
0.0015 - 0.0030	< 0.50 × Ø	0.003 - 0.005	< 1.00 × Ø	0.004 - 0.010	< 1.50 × Ø	0.008 - 0.018	< 1.50 × Ø	0.015 - 0.030	< 1.50 × Ø
0.0014 - 0.0028	< 0.50 × Ø	0.002 - 0.004	< 1.00 × Ø	0.004 - 0.009	< 1.50 × Ø	0.007 - 0.017	< 1.50 × Ø	0.014 - 0.028	< 1.50 × Ø
0.0013 - 0.0026	< 0.50 × Ø	0.002 - 0.004	< 1.00 × Ø	0.003 - 0.008	< 1.50 × Ø	0.007 - 0.016	< 1.50 × Ø	0.013 - 0.026	< 1.50 × Ø
0.0013 - 0.0026	< 0.50 × Ø	0.002 - 0.004	< 1.00 × Ø	0.003 - 0.008	< 1.50 × Ø	0.007 - 0.016	< 1.50 × Ø	0.013 - 0.026	< 1.50 × Ø
0.0012 - 0.0024	< 0.25 × Ø	0.002 - 0.004	< 0.50 × Ø	0.003 - 0.008	< 1.00 × Ø	0.007 - 0.015	< 1.00 × Ø	0.012 - 0.024	< 1.00 × Ø
0.0020 - 0.0040	< 0.50 × Ø	0.003 - 0.006	< 1.00 × Ø	0.005 - 0.013	< 1.50 × Ø	0.011 - 0.024	< 1.50 × Ø	0.020 - 0.040	< 1.50 × Ø
0.0017 - 0.0034	< 0.50 × Ø	0.003 - 0.005	< 1.00 × Ø	0.004 - 0.011	< 1.50 × Ø	0.009 - 0.020	< 1.50 × Ø	0.017 - 0.034	< 1.50 × Ø
0.0023 - 0.0046	< 0.50 × Ø	0.004 - 0.007	< 1.00 × Ø	0.006 - 0.015	< 1.50 × Ø	0.012 - 0.028	< 1.50 × Ø	0.023 - 0.046	< 1.50 × Ø
0.0018 - 0.0036	< 0.50 × Ø	0.003 - 0.006	< 1.00 × Ø	0.005 - 0.012	< 1.50 × Ø	0.010 - 0.022	< 1.50 × Ø	0.018 - 0.036	< 1.50 × Ø
0.0017 - 0.0034	< 0.50 × Ø	0.003 - 0.005	< 1.00 × Ø	0.004 - 0.011	< 1.50 × Ø	0.009 - 0.020	< 1.50 × Ø	0.017 - 0.034	< 1.50 × Ø
0.0008 - 0.0016	< 0.50 × Ø	0.001 - 0.002	< 0.25 × Ø	0.002 - 0.005	< 0.50 × Ø	0.004 - 0.009	< 1.00 × Ø	0.008 - 0.016	< 1.00 × Ø
0.0018 - 0.0036	< 0.25 × Ø	0.003 - 0.006	< 1.00 × Ø	0.005 - 0.012	< 1.50 × Ø	0.010 - 0.022	< 1.50 × Ø	0.018 - 0.036	< 1.50 × Ø

CONTORNATURA / FINITURA

	VDI 3323	Ø D <sub>1</sub> 0.30 - 0.70		Ø D <sub>1</sub> 0.80 - 1.50		Ø D <sub>1</sub> 1.60 - 5.00	
		MDnudo Vc [m/min]	C-TOP Vc [m/min]	MDnudo Vc [m/min]	C-TOP Vc [m/min]	MDnudo Vc [m/min]	C-TOP Vc [m/min]
<b>P</b>	Acciaio non legato	1 - 5	30 - 50	50 - 150	150 - 350		
	Acciaio leggermente legato < 800 N/mm <sup>2</sup>	6 - 9	30 - 50	50 - 150	110 - 290		
	Acciaio fortemente legato > 800 N/mm <sup>2</sup> , acciaio inossidabile ferritico /martensitico	10 - 13	30 - 40	50 - 105	110 - 160		
<b>M</b>	Acciaio inossidabile austenitico < 700 N/mm <sup>2</sup>	14.1-14.2	30 - 50	50 - 150	130 - 290		
	Acciaio inox austenitico senza Ni/DUPLEX > 700 N/mm <sup>2</sup>	14.3-14.4	25 - 50	50 - 150	90 - 230		
<b>K</b>	Ghisa grigia < 250 HB	15 - 16	25 - 50	50 - 150	90 - 210	190 - 350	
	Ghisa nodulare, ghisa malleabile > 250 HB	17 - 20	20 - 45	50 - 150	50 - 150	80 - 180	140 - 310
<b>N</b>	Leghe Cu bronzo ottone con Pb	26	25 - 50	50 - 150	50 - 150	100 - 210	190 - 380
	Lega di rame difficile da lavorare	27 - 28	20 - 45	50 - 150	50 - 150	80 - 180	160 - 350
	Oro, argento	-	25 - 50	50 - 150	50 - 150	90 - 210	200 - 400
<b>S</b>	Leghe speciali nickel cobalto	31 - 35	20 - 40	50 - 135	80 - 150		
	Titanio e relative leghe	36 - 37	20 - 40	45 - 150	50 - 110	70 - 150	150 - 210



$$n \text{ [g/min]} = \frac{Vc \text{ [m/min]} \times 1000}{\pi \times D_1 \text{ [mm]}}$$

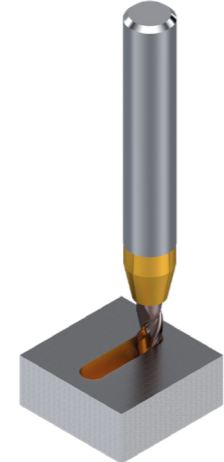
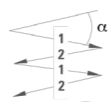
$$Vf \text{ [mm/min]} = n \text{ [g/min]} \times fz \text{ [mm]} \times Z$$

Avanzamento al dente fz [mm]

Ø D <sub>1</sub> 0.30 - 0.50		Ø D <sub>1</sub> 0.50 - 0.80		Ø D <sub>1</sub> 0.80 - 1.60		Ø D <sub>1</sub> 1.60 - 3.00		Ø D <sub>1</sub> 3.00 - 5.00	
fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)	fz	ae ap (mm)
0.002-0.004	< 0.30 × Ø < 1.50 × Ø	0.003-0.006	< 0.30 × Ø < 1.50 × Ø	0.005-0.012	< 0.30 × Ø < 1.50 × Ø	0.010-0.022	< 0.30 × Ø < 1.50 × Ø	0.018-0.036	< 0.30 × Ø < 1.50 × Ø
0.002-0.003	< 0.30 × Ø < 1.50 × Ø	0.003-0.005	< 0.30 × Ø < 1.50 × Ø	0.004-0.010	< 0.30 × Ø < 1.50 × Ø	0.009-0.019	< 0.30 × Ø < 1.50 × Ø	0.016-0.032	< 0.30 × Ø < 1.50 × Ø
0.002-0.003	< 0.30 × Ø < 1.50 × Ø	0.003-0.005	< 0.30 × Ø < 1.50 × Ø	0.004-0.010	< 0.30 × Ø < 1.50 × Ø	0.008-0.018	< 0.30 × Ø < 1.50 × Ø	0.015-0.030	< 0.30 × Ø < 1.50 × Ø
0.002-0.003	< 0.30 × Ø < 1.50 × Ø	0.003-0.005	< 0.30 × Ø < 1.50 × Ø	0.004-0.010	< 0.30 × Ø < 1.50 × Ø	0.008-0.018	< 0.30 × Ø < 1.50 × Ø	0.015-0.030	< 0.30 × Ø < 1.50 × Ø
0.001-0.003	< 0.30 × Ø < 1.50 × Ø	0.002-0.005	< 0.30 × Ø < 1.50 × Ø	0.004-0.009	< 0.30 × Ø < 1.50 × Ø	0.008-0.017	< 0.30 × Ø < 1.50 × Ø	0.014-0.028	< 0.30 × Ø < 1.50 × Ø
0.002-0.005	< 0.30 × Ø < 1.50 × Ø	0.004-0.007	< 0.30 × Ø < 1.50 × Ø	0.006-0.015	< 0.30 × Ø < 1.50 × Ø	0.012-0.028	< 0.30 × Ø < 1.50 × Ø	0.023-0.046	< 0.30 × Ø < 1.50 × Ø
0.002-0.004	< 0.30 × Ø < 1.50 × Ø	0.003-0.006	< 0.30 × Ø < 1.50 × Ø	0.005-0.013	< 0.30 × Ø < 1.50 × Ø	0.011-0.024	< 0.30 × Ø < 1.50 × Ø	0.020-0.040	< 0.30 × Ø < 1.50 × Ø
0.003-0.005	< 0.30 × Ø < 1.50 × Ø	0.005-0.009	< 0.30 × Ø < 1.50 × Ø	0.007-0.017	< 0.30 × Ø < 1.50 × Ø	0.014-0.032	< 0.30 × Ø < 1.50 × Ø	0.027-0.054	< 0.30 × Ø < 1.50 × Ø
0.002-0.004	< 0.30 × Ø < 1.50 × Ø	0.004-0.007	< 0.30 × Ø < 1.50 × Ø	0.006-0.014	< 0.30 × Ø < 1.50 × Ø	0.012-0.026	< 0.30 × Ø < 1.50 × Ø	0.022-0.044	< 0.30 × Ø < 1.50 × Ø
0.002-0.004	< 0.30 × Ø < 1.50 × Ø	0.003-0.006	< 0.30 × Ø < 1.50 × Ø	0.005-0.013	< 0.30 × Ø < 1.50 × Ø	0.011-0.024	< 0.30 × Ø < 1.50 × Ø	0.020-0.040	< 0.30 × Ø < 1.50 × Ø
0.001-0.002	< 0.30 × Ø < 1.50 × Ø	0.002-0.003	< 0.30 × Ø < 1.50 × Ø	0.002-0.006	< 0.30 × Ø < 1.50 × Ø	0.005-0.011	< 0.30 × Ø < 1.50 × Ø	0.009-0.018	< 0.30 × Ø < 1.50 × Ø
0.002-0.004	< 0.30 × Ø < 1.50 × Ø	0.004-0.007	< 0.30 × Ø < 1.50 × Ø	0.006-0.014	< 0.30 × Ø < 1.50 × Ø	0.012-0.026	< 0.30 × Ø < 1.50 × Ø	0.022-0.044	< 0.30 × Ø < 1.50 × Ø

DISCESA IN RAMPA

	VDI 3323	Ø D <sub>1</sub> 0.30 - 0.70		Ø D <sub>1</sub> 0.80 - 1.50		Ø D <sub>1</sub> 1.60 - 5.00	
		MDnudo Vc [m/min]	C-TOP Vc [m/min]	MDnudo Vc [m/min]	C-TOP Vc [m/min]	MDnudo Vc [m/min]	C-TOP Vc [m/min]
<b>P</b>	Acciaio non legato	1 - 5	25 - 50	50 - 125	100 - 190		
	Acciaio leggermente legato < 800 N/mm <sup>2</sup>	6 - 9	20 - 40	50 - 100	75 - 155		
	Acciaio fortemente legato > 800 N/mm <sup>2</sup> , acciaio inossidabile ferritico /martensitico	10 - 13	20 - 25	50 - 60	75 - 90		
<b>M</b>	Acciaio inossidabile austenitico < 700 N/mm <sup>2</sup>	14.1-14.2	20 - 40	50 - 100	85 - 155		
	Acciaio inox austenitico senza Ni/DUPLEX > 700 N/mm <sup>2</sup>	14.3-14.4	15 - 30	40 - 80	65 - 120		
<b>K</b>	Ghisa grigia < 250 HB	15 - 16	15 - 35	30 - 50	40 - 90	50 - 125	60 - 140
	Ghisa nodulare, ghisa malleabile > 250 HB	17 - 20	15 - 30	25 - 45	35 - 80	50 - 110	50 - 120
<b>N</b>	Leghe Cu bronzo ottone con Pb	26	20 - 35	30 - 50	45 - 90	50 - 135	70 - 140
	Lega di rame difficile da lavorare	27 - 28	15 - 35	30 - 50	35 - 80	50 - 125	50 - 120
	Oro, argento	-	15 - 30	30 - 50	40 - 95	50 - 145	65 - 145
<b>S</b>	Leghe speciali nickel cobalto	31 - 35	15 - 20	30 - 50	30 - 50	50 - 80	50 - 80
	Titanio e relative leghe	36 - 37	10 - 25	25 - 35	30 - 65	50 - 75	45 - 100



Avanzamento al dente fz [mm]

Ø D <sub>1</sub> 0.30 - 0.50		Ø D <sub>1</sub> 0.50 - 0.80		Ø D <sub>1</sub> 0.80 - 1.60		Ø D <sub>1</sub> 1.60 - 3.00		Ø D <sub>1</sub> 3.00 - 5.00	
fz	α (°)	fz	α (°)	fz	α (°)	fz	α (°)	fz	α (°)
0.0010-0.0020	< 30°	0.002-0.003	< 30°	0.003-0.006	< 30°	0.005-0.012	< 30°	0.010-0.020	< 30°
0.0009-0.0018	< 30°	0.001-0.003	< 30°	0.002-0.006	< 30°	0.005-0.011	< 30°	0.009-0.018	< 30°
0.0008-0.0016	< 30°	0.001-0.003	< 30°	0.002-0.005	< 30°	0.004-0.010	< 30°	0.008-0.016	< 30°
0.0008-0.0016	< 30°	0.001-0.003	< 30°	0.002-0.005	< 30°	0.004-0.010	< 30°	0.008-0.016	< 30°
0.0008-0.0016	< 15°	0.001-0.003	< 15°	0.002-0.005	< 15°	0.004-0.010	< 15°	0.008-0.016	< 15°
0.0013-0.0026	< 30°	0.002-0.004	< 30°	0.003-0.008	< 30°	0.007-0.015	< 30°	0.013-0.026	< 30°
0.0011-0.0022	< 30°	0.002-0.003	< 30°	0.003-0.007	< 30°	0.006-0.013	< 30°	0.011-0.022	< 30°
0.0015-0.0030	< 35°	0.002-0.005	< 35°	0.004-0.010	< 35°	0.008-0.018	< 35°	0.015-0.030	< 35°
0.0012-0.0024	< 35°	0.002-0.004	< 35°	0.003-0.008	< 35°	0.006-0.014	< 35°	0.012-0.024	< 35°
0.0011-0.0022	< 35°	0.002-0.003	< 35°	0.003-0.007	< 35°	0.006-0.013	< 35°	0.011-0.022	< 35°
0.0005-0.0010	< 8°	0.001-0.002	< 8°	0.001-0.003	< 8°	0.003-0.006	< 8°	0.005-0.010	< 8°
0.0012-0.0024	< 15°	0.002-0.004	< 15°	0.003-0.008	< 15°	0.006-0.014	< 15°	0.012-0.024	< 15°