

| Insert designation | Grade | l  | s    | r   | Catalog Nr. | Page |
|--------------------|-------|----|------|-----|-------------|------|
| VBMT 110304 NN     | LT 10 | 11 | 3,76 | 0,4 | T0001460    | 84   |
| VBMT 160404 NN     | LT 10 | 16 | 4,76 | 0,4 | T0000070    | 85   |
| VBMT 160408 NN     | LT 10 | 16 | 4,76 | 0,8 | T0000071    | 86   |

**NN** All Purpose Chipbreaker

| Application Guide | Super Finishing | Finishing | Semi Finishing | Roughing | Interrupted Cut |
|-------------------|-----------------|-----------|----------------|----------|-----------------|
| VBMT 110304 NN    |                 |           |                |          |                 |
| VBMT 160404 NN    |                 |           |                |          |                 |
| VBMT 160408 NN    |                 |           |                |          |                 |

VBMT

35° shape inserts, with positive rake angle. Suitable for internal and external Copying operations of complex geometries.

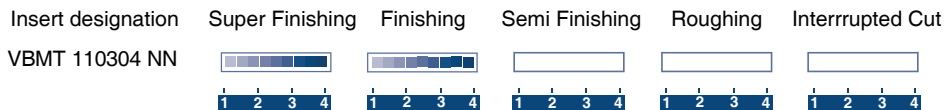
- 1 Not Recommended
- 2 Acceptable
- 3 Recommended
- 4 Excellent



Machining Recommendation Guide - Please see Pg. 8



| Material Group              | Group No | Material Examples*  | Brinell hardness    | d.o.c [mm] |     | feed [mm/rev] |      | A max [mm <sup>2</sup> ] | V <sub>c</sub> [m/min] |            | Optimal cutting conditions |      |
|-----------------------------|----------|---|---------------------|------------|-----|---------------|------|--------------------------|------------------------|------------|----------------------------|------|
|                             |          |   |                     | min        | max | min           | max  |                          | min                    | max        | d.o.c                      | feed |
| Low Carbon Steel            | 1        | Ck15, Ck45<br>1020, 1045  | 150                 | 0.10       | 2.0 | 0.08          | 0.20 | 0.36                     | 180                    | 350        | 1.0                        | 0.18 |
|                             |          |   | 180                 |            | 2.0 |               | 0.18 |                          |                        | 280        |                            |      |
|                             |          |   | 210                 |            | 2.0 |               | 0.16 |                          |                        | 250        |                            |      |
| Alloy Steel                 | 2        | 42 CrMo 4<br>St 50-2<br>Ck60<br>1060<br>4140                          | 180                 | 0.10       | 2.0 | 0.08          | 0.18 | 0.29                     | 120                    | 280        | 1.0                        | 0.15 |
|                             |          |   | 230                 |            | 2.0 |               | 0.18 |                          |                        | 250        |                            |      |
|                             |          |   | 280                 |            | 1.5 | 0.16          | 210  |                          |                        |            |                            |      |
|                             |          |   | 320                 |            | 1.5 | 0.14          | 180  |                          |                        |            |                            |      |
| High Alloy Steel            | 3        | X40 CrMoV 5 1<br>H 13<br>40 NiCrMo 6<br>4340<br>S 2-10-1-8<br>HSS M42 | 220                 | 0.10       | 2.0 | 0.08          | 0.16 | 0.24                     | 70                     | 190        | 1.0                        | 0.12 |
|                             |          |   | 280                 |            | 1.5 |               | 0.14 |                          |                        | 150        |                            |      |
|                             |          |   | 320                 |            | 1.5 |               | 0.13 |                          |                        | 130        |                            |      |
|                             |          |   | 350                 |            | 1.5 |               | 0.13 |                          |                        | 100        |                            |      |
|                             |          |   | 400                 | 0.10       | 1.3 | 0.05          | 0.11 | 0.12                     | 50                     | 90         | 0.9                        | 0.10 |
|                             |          |   | 480                 |            | 1.2 |               | 0.09 | 0.10                     | 40                     | 80         | 0.7                        | 0.08 |
| 550                         | 1.0      | 0.08  | 0.08                | 30         | 70  | 0.6           | 0.07 |                          |                        |            |                            |      |
| Austenitic Stainless Steel  | 4        | X5 CrNi 18 9<br>304   | 210 to 250          | 0.10       | 2.0 | 0.08          | 0.16 | 0.22                     | 170                    | 270        | 1.0                        | 0.15 |
|                             | 5        | X2 CrNiMo 17 2 2<br>316   | 230 to 270          |            | 1.8 | 0.08          | 0.14 | 0.17                     | 160                    | 210        | 1.0                        | 0.12 |
|                             | 6        | X6 CrNiMoTi 17 12 2<br>316 Ti Duplex / Nitronic                       | -----               |            | 1.5 | 0.08          | 0.13 | 0.14                     | 70                     | 150        | 1.0                        | 0.12 |
| Ferritic Stainless Steel    | 7        | X8 Cr 7<br>430  | Annealed            | 0.10       | 2.0 | 0.08          | 0.16 | 0.20                     | 170                    | 250        | 1.0                        | 0.15 |
| Martensitic Stainless Steel | 8        | X15 Cr 13<br>410  | Annealed<br>Treated | 0.10       | 2.0 | 0.08          | 0.16 | 0.20                     | 170<br>120             | 250<br>190 | 1.0                        | 0.15 |
| Grey Cast Iron              | 9        | GG 20   | 140 to 230          | 0.10       | 2.0 | 0.06          | 0.18 | 0.38                     | 170                    | 250        | 1.0                        | 0.18 |
|                             |          | GG 25   |                     |            |     |               |      | 0.36                     |                        | 230        |                            |      |
|                             |          | GG 30   |                     |            |     |               |      | 0.36                     |                        | 210        |                            |      |
| Nodular Cast Iron           | 10       | GGG 40  | 210                 | 0.10       | 2.0 | 0.06          | 0.16 | 0.29                     | 120                    | 230        | 1.0                        | 0.15 |
|                             |          | GGG 50  | 260                 |            |     |               |      | 0.24                     |                        | 190        |                            |      |
|                             |          | GGG 70  | 310                 |            |     |               |      | 0.24                     |                        | 150        |                            |      |
|                             |          | G-X260NiCr42  | 450                 |            |     |               |      | 0.10                     |                        | 1.0        |                            |      |
| Nickel Based Alloys         | 11       | Inconel 625   | -----               | 0.10       | 1.5 | 0.08          | 0.14 | 0.14                     | 25                     | 35         | 1.0                        | 0.12 |
|                             |          | Inconel 718   | -----               |            |     |               |      | 0.14                     | 28                     | 40         |                            |      |
|                             |          | Hastelloy C   | -----               |            |     |               |      | 0.17                     | 40                     | 65         |                            |      |
| Titanium Based Alloys       | 12       | TiAl 6 V4   | -----               | 0.10       | 1.5 | 0.08          | 0.14 | 35                       | 60                     | 1.0        | 0.14                       |      |
|                             |          | T40   | -----               |            |     |               | 0.13 | 0.14                     | 28                     | 40         | 1.0                        | 0.12 |

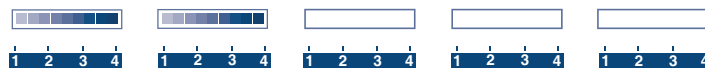


| Material Group              | Group No | Material Examples*  | Brinell hardness | d.o.c [mm] |     | feed [mm/rev] |      | A max [mm <sup>2</sup> ] | V <sub>c</sub> [m/min] |            | Optimal cutting conditions |      |      |
|-----------------------------|----------|---|------------------|------------|-----|---------------|------|--------------------------|------------------------|------------|----------------------------|------|------|
|                             |          |   |                  | min        | max | min           | max  |                          | min                    | max        | d.o.c                      | feed |      |
| Low Carbon Steel            | 1        | Ck15, Ck45 1020, 1045   | 150              | 0.20       | 3.0 | 0.11          | 0.23 | 0.60                     | 180                    | 350        | 2.0                        | 0.18 |      |
|                             |          |   | 180              |            | 2.5 |               | 0.20 |                          |                        | 0.48       |                            |      | 280  |
|                             |          |   | 210              |            | 2.5 |               | 0.18 |                          |                        | 0.48       |                            |      | 250  |
| Alloy Steel                 | 2        | 42 CrMo 4<br>St 50-2<br>Ck60<br>1060<br>4140                          | 180              | 0.20       | 2.5 | 0.11          | 0.20 | 0.48                     | 120                    | 280        | 2.0                        | 0.15 |      |
|                             |          |   | 230              |            | 2.5 |               | 0.20 |                          |                        | 0.40       |                            |      | 250  |
|                             |          |   | 280              |            | 2.0 | 0.09          | 0.18 | 0.40                     |                        | 210        |                            |      |      |
|                             |          |   | 320              |            | 2.0 |               | 0.16 | 0.32                     |                        | 180        |                            |      |      |
| High Alloy Steel            | 3        | X40 CrMoV 5 1<br>H 13<br>40 NiCrMo 6<br>4340<br>S 2-10-1-8<br>HSS M42 | 220              | 0.20       | 2.5 | 0.09          | 0.18 | 0.40                     | 70                     | 190        | 2.0                        | 0.12 |      |
|                             |          |   | 280              |            | 2.5 |               | 0.16 |                          |                        | 0.40       |                            |      | 150  |
|                             |          |   | 320              |            | 2.0 |               | 0.14 |                          |                        | 0.28       |                            |      | 130  |
|                             |          |   | 350              |            | 2.0 |               | 0.14 |                          |                        | 0.24       |                            |      | 100  |
|                             |          |   | 400              | 0.20       | 1.8 | 0.05          | 0.12 | 0.20                     |                        | 50         | 90                         | 1.7  | 0.11 |
|                             |          |   | 480              |            | 1.5 |               | 0.10 | 0.17                     |                        | 40         | 80                         | 1.4  | 0.09 |
| 550                         | 1.4      | 0.08  | 0.13             | 30         | 70  | 1.2           | 0.07 |                          |                        |            |                            |      |      |
| Austenitic Stainless Steel  | 4        | X5 CrNi 18 9 304  | 210 to 250       | 0.20       | 2.5 | 0.10          | 0.18 | 0.32                     | 170                    | 270        | 2.0                        | 0.15 |      |
|                             | 5        | X2 CrNiMo 17 2 2 316  | 230 to 270       |            | 2.0 | 0.09          | 0.16 | 0.24                     | 160                    | 210        | 2.0                        | 0.12 |      |
|                             | 6        | X6 CrNiMoTi 17 12 2 316 Ti Duplex / Nitronic                          | -----            |            | 2.0 | 0.09          | 0.14 | 0.20                     | 70                     | 150        | 2.0                        | 0.12 |      |
| Ferritic Stainless Steel    | 7        | X8 Cr 7 430   | Annealed         | 0.20       | 2.0 | 0.11          | 0.18 | 0.28                     | 170                    | 250        | 2.0                        | 0.15 |      |
| Martensitic Stainless Steel | 8        | X15 Cr 13 410   | Annealed Treated | 0.20       | 2.0 | 0.11          | 0.18 | 0.28                     | 170<br>120             | 250<br>190 | 2.0                        | 0.12 |      |
| Grey Cast Iron              | 9        | GG 20   | 140 to 230       | 0.20       | 3.0 | 0.08          | 0.20 | 0.64                     | 170                    | 250        | 2.0                        | 0.18 |      |
|                             |          | GG 25   |                  |            |     |               |      | 0.60                     |                        | 230        |                            |      |      |
|                             |          | GG 30   |                  |            |     |               |      | 0.60                     |                        | 210        |                            |      |      |
| Nodular Cast Iron           | 10       | GGG 40  | 210              | 0.20       | 2.5 | 0.08          | 0.18 | 0.48                     | 120                    | 230        | 2.0                        | 0.15 |      |
|                             |          | GGG 50  | 260              |            |     |               |      | 0.40                     |                        | 190        |                            |      |      |
|                             |          | GGG 70  | 310              |            |     |               |      | 0.40                     |                        | 150        |                            |      |      |
|                             |          | G-X260NiCr42  | 450              |            |     |               |      | 0.20                     |                        | 1.5        |                            |      | 0.05 |
| Nickel Based Alloys         | 11       | Inconel 625   | -----            | 0.20       | 2.0 | 0.10          | 0.16 | 0.24                     | 25                     | 35         | 2.0                        | 0.12 |      |
|                             |          | Inconel 718   | -----            |            |     |               |      | 0.24                     | 28                     | 40         |                            |      |      |
|                             |          | Hastelloy C   | -----            |            |     |               |      | 0.28                     | 40                     | 65         |                            |      |      |
| Titanium Based Alloys       | 12       | TiAl 6 V4   | -----            | 0.20       | 2.0 | 0.09          | 0.16 | 0.28                     | 35                     | 60         | 2.0                        | 0.14 |      |
|                             |          | T40   | -----            |            |     |               | 0.14 | 0.24                     | 28                     | 40         | 2.0                        | 0.12 |      |

**VBMT**

Insert designation Super Finishing Finishing Semi Finishing Roughing Interrupted Cut

VBMT 160404 NN



| Material Group              | Group No | Material Examples*  | Brinell hardness    | d.o.c [mm] |      | feed [mm/rev] |      | A max [mm <sup>2</sup> ] | V <sub>c</sub> [m/min] |            | Optimal cutting conditions |      |
|-----------------------------|----------|---|---------------------|------------|------|---------------|------|--------------------------|------------------------|------------|----------------------------|------|
|                             |          |   |                     | min        | max  | min           | max  |                          | min                    | max        | d.o.c                      | feed |
| Low Carbon Steel            | 1        | Ck15, Ck45<br>1020, 1045  | 150                 | 0.50       | 5.0  | 0.21          | 0.45 | 1.8                      | 180                    | 350        | 3.0                        | 0.35 |
|                             |          |   | 180                 |            | 5.0  |               | 0.45 |                          |                        | 300        |                            |      |
|                             |          |   | 210                 |            | 4.0  |               | 0.40 |                          |                        | 250        |                            |      |
| Alloy Steel                 | 2        | 42 CrMo 4<br>St 50-2<br>Ck60<br>1060<br>4140                          | 180                 | 0.50       | 5.0  | 0.21          | 0.40 | 1.2                      | 120                    | 280        | 3.0                        | 0.30 |
|                             |          |   | 230                 |            | 4.0  |               | 0.40 |                          |                        | 250        |                            |      |
|                             |          |   | 280                 |            | 4.0  | 0.35          | 210  |                          |                        |            |                            |      |
|                             |          |   | 320                 |            | 3.5  | 0.35          | 180  |                          |                        |            |                            |      |
| High Alloy Steel            | 3        | X40 CrMoV 5 1<br>H 13<br>40 NiCrMo 6<br>4340<br>S 2-10-1-8<br>HSS M42 | 220                 | 0.50       | 4.0  | 0.18          | 0.40 | 1.2                      | 70                     | 190        | 2.5                        | 0.28 |
|                             |          |   | 280                 |            | 4.0  |               | 0.40 |                          |                        | 150        |                            |      |
|                             |          |   | 320                 |            | 3.0  |               | 0.35 |                          |                        | 130        |                            |      |
|                             |          |   | 350                 |            | 3.0  |               | 0.35 |                          |                        | 100        |                            |      |
|                             |          |   | 400                 | 2.5        | 0.30 | 90            |      |                          |                        |            |                            |      |
|                             |          |   | 480                 | 2.0        | 0.25 | 80            |      |                          |                        |            |                            |      |
| 550                         | 1.7      | 0.20  | 70                  |            |      |               |      |                          |                        |            |                            |      |
| Austenitic Stainless Steel  | 4        | X5 CrNi 18 9<br>304   | 210 to 250          | 0.50       | 5.0  | 0.20          | 0.40 | 1.0                      | 170                    | 270        | 3.0                        | 0.35 |
|                             | 5        | X2 CrNiMo 17 2 2<br>316   | 230 to 270          |            | 4.0  | 0.18          | 0.35 | 0.8                      | 160                    | 210        | 3.0                        | 0.32 |
|                             | 6        | X6 CrNiMoTi 17 12 2<br>316 Ti Duplex / Nitronic                       | -----               |            | 4.0  | 0.18          | 0.35 | 0.6                      | 70                     | 150        | 2.5                        | 0.28 |
| Ferritic Stainless Steel    | 7        | X8 Cr 7<br>430  | Annealed            | 0.50       | 4.0  | 0.22          | 0.35 | 0.9                      | 170                    | 250        | 3.0                        | 0.32 |
| Martensitic Stainless Steel | 8        | X15 Cr 13<br>410  | Annealed<br>Treated | 0.50       | 4.0  | 0.22          | 0.35 | 0.9                      | 170<br>120             | 250<br>190 | 3.0                        | 0.32 |
| Grey Cast Iron              | 9        | GG 20   | 140 to 230          | 0.50       | 5.0  | 0.15          | 0.60 | 2.0                      | 170                    | 250        | 3.0                        | 0.35 |
|                             |          | GG 25   |                     |            |      |               |      | 1.8                      |                        | 230        |                            |      |
|                             |          | GG 30   |                     |            |      |               |      | 1.8                      |                        | 210        |                            |      |
| Nodular Cast Iron           | 10       | GGG 40  | 210                 | 0.50       | 5.0  | 0.15          | 0.50 | 1.5                      | 120                    | 230        | 3.0                        | 0.30 |
|                             |          | GGG 50  | 260                 |            |      |               |      | 1.3                      |                        | 190        |                            |      |
|                             |          | GGG 70  | 310                 |            |      |               |      | 1.2                      |                        | 150        |                            |      |
|                             |          | G-X260NiCr42  | 450                 |            |      |               |      | 0.4                      |                        | 30         |                            |      |
| Nickel Based Alloys         | 11       | Inconel 625   | -----               | 0.50       | 3.0  | 0.20          | 0.35 | 0.7                      | 25                     | 35         | 2.0                        | 0.28 |
|                             |          | Inconel 718   | -----               |            |      |               |      | 0.7                      | 28                     | 40         |                            |      |
|                             |          | Hastelloy C   | -----               |            |      |               |      | 0.8                      | 40                     | 65         |                            |      |
| Titanium Based Alloys       | 12       | TiAl 6 V4   | -----               | 0.50       | 3.0  | 0.18          | 0.35 | 35                       | 60                     | 2.0        | 0.30                       |      |
|                             |          | T40   | -----               |            |      |               | 0.30 | 28                       | 40                     | 2.0        | 0.28                       |      |

