Introduction

This guide will help you to use dampened boring bars (Silent Tools) to achieve the best possible results in internal turning.

Silent Tools dampened boring bars and adaptors make it possible to maintain good productivity and close tolerances in long tool overhangs.

With Silent Tools it is possible to successfully perform turning operations in overhangs beyond 4 x bar diameter ($dm_m$).

Symbols used in this guide

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ap$</td>
<td>depth of cut</td>
<td>mm</td>
</tr>
<tr>
<td>$\Delta ap$</td>
<td>radial infeed</td>
<td>mm</td>
</tr>
<tr>
<td>$dm_m$</td>
<td>mounting diameter</td>
<td>mm</td>
</tr>
<tr>
<td>$D_{th}$</td>
<td>major diameter of external thread</td>
<td>mm</td>
</tr>
<tr>
<td>$f_n$</td>
<td>feed per revolution</td>
<td>mm/r</td>
</tr>
<tr>
<td>$K_r$</td>
<td>entering angle</td>
<td>degree</td>
</tr>
<tr>
<td>$k_{c0.4}$</td>
<td>specific cutting force (chip thickness 0.4)</td>
<td>N/mm²</td>
</tr>
<tr>
<td>$m_c$</td>
<td>correction factor for actual chip thickness</td>
<td></td>
</tr>
</tbody>
</table>
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Symbols used in this guide</td>
<td>2</td>
</tr>
<tr>
<td>1. Product overview</td>
<td>4</td>
</tr>
<tr>
<td>2. Choice of tools</td>
<td>6</td>
</tr>
<tr>
<td>Dampened bars for higher productivity</td>
<td>7</td>
</tr>
<tr>
<td>Calculation of boring bar parameters</td>
<td>8</td>
</tr>
<tr>
<td>3. Silent Tools in different machine types</td>
<td>9</td>
</tr>
<tr>
<td>Turret and multi-task machines</td>
<td>10</td>
</tr>
<tr>
<td>Tool post</td>
<td>11</td>
</tr>
<tr>
<td>Cutting forces and directions</td>
<td>12</td>
</tr>
<tr>
<td>4. Set-up</td>
<td>14</td>
</tr>
<tr>
<td>Tool post clamping</td>
<td>14</td>
</tr>
<tr>
<td>Clamping of Silent Tools bars</td>
<td>17</td>
</tr>
<tr>
<td>Centre height setting tool</td>
<td>18</td>
</tr>
<tr>
<td>Set-up recommendations</td>
<td>19</td>
</tr>
<tr>
<td>5. Coolant requirements</td>
<td>20</td>
</tr>
<tr>
<td>6. Use of the product</td>
<td>22</td>
</tr>
<tr>
<td>3-pass method</td>
<td>22</td>
</tr>
<tr>
<td>Cut-off boring bar length</td>
<td>24</td>
</tr>
<tr>
<td>Moment calculation</td>
<td>25</td>
</tr>
<tr>
<td>Product data</td>
<td>26</td>
</tr>
<tr>
<td>7. Tips and hints</td>
<td>29</td>
</tr>
<tr>
<td>8. Extended offer</td>
<td>35</td>
</tr>
</tbody>
</table>
1. Product overview

The selection of boring bar material has a big impact on achieving the best production economy:

- Overhangs up to $10 \times dm_m$ are usually solved by applying a steel dampened boring bar to accomplish a sufficient process.
- Overhangs over $10 \times dm_m$ require a carbide reinforced dampened boring bar in order to reduce radial deflection and vibration.
Maximum recommended overhang

Internal turning is very sensitive to vibration. Minimize the tool overhang and select the largest possible tool size in order to obtain the best possible stability and accuracy.

- For internal turning with steel dampened boring bars, the first choice is bars of type 570-3C.
- For grooving and threading where the radial forces is higher than in turning, the recommended bar type is 570-4C.

The table below shows the maximum recommended overhang for different bar types.

<table>
<thead>
<tr>
<th>Bar type</th>
<th>Turning</th>
<th>Grooving</th>
<th>Threading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel boring bars</td>
<td>4 ( dm_m )</td>
<td>3 ( dm_m )</td>
<td>3 ( dm_m )</td>
</tr>
<tr>
<td>Carbide boring bars</td>
<td>6 ( dm_m )</td>
<td>5 ( dm_m )</td>
<td>5 ( dm_m )</td>
</tr>
<tr>
<td>Steel dampened boring bars</td>
<td>10 ( dm_m )</td>
<td>5 ( dm_m )*</td>
<td>5 ( dm_m )*</td>
</tr>
<tr>
<td>Carbide reinforced dampened boring bars</td>
<td>14 ( dm_m )</td>
<td>7 ( dm_m )</td>
<td>7 ( dm_m )</td>
</tr>
</tbody>
</table>

* 570-4C bars
2. Choice of tools

The design and dimensions of the component decide the diameter and length of the boring bar.

- First choice for best clamping rigidity is the Coromant Capto® coupling or split sleeves.
- Select the largest possible bar diameter for the application to achieve the best possible stability.
- The diameter of the bore and the length needed to reach the bottom will indicate what type of boring bar should be used.

Clearance between the boring bar and the inside of the bore is extremely important for chip evacuation and radial deflection. See the Main catalogue under $D_{\text{min}}$ (minimum bore diameter) for recommendations.

Example
For bore diameter 100 mm the applicable bar is 80 mm. This gives enough clearance for chip evacuation and will eliminate any damage of the tool.
Dampened bars for higher productivity

Use a dampened steel bar or a dampened carbide bar to:

- Achieve higher productivity at less than maximum bar overhangs.
- Improve the hole tolerance and surface finish.
- Reduce the number of passes.

Example
The table below shows an example of how the higher static stiffness of a carbide boring bar makes it possible to:

- Take larger depth of cut.
- Increase the feed.
- Reduce the number of passes.
- Reduce the cutting time.

<table>
<thead>
<tr>
<th>Overhang</th>
<th>Bar material</th>
<th>( a_p ), mm/rev</th>
<th>( f_n ), mm/rev</th>
<th>Bore length, mm</th>
<th>N.O.P*</th>
<th>Cutting time, min</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 x ( dm_m )</td>
<td>Dampened steel</td>
<td>1.5</td>
<td>0.15</td>
<td>300</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>
| 8 x \( dm_m \) | Dampened carbide reinforced | 2.5               | 0.25             | 300             | 3      | 7
t

*Number of passes
Calculation of boring bar load

The load on a boring bar is mainly dependent on the depth of cut, the feed and the workpiece material. Maximum load for each boring bar is listed on page 26-28 and marked on each tool.

In turning, the tangential force $F_t$ can be calculated with formula 1.

$$F_t = k_{c0.4} \times \left( \frac{0.4}{f_n \times \sin \theta} \right)^{m_c} \times f_n \times a_p$$

$k_{c0.4}$: Specific cutting force at feed 0.4 mm/r. See Main catalogue for $k_{c0.4}$ value.

$m_c$: Constant, depending on the material. Use 0.29 as general value.

For entering angle $\theta$ 75° or longer, $\sin \theta \approx 1$. Use the simplified formula 2.

$$F_t = k_{c0.4} \times \left( \frac{0.4}{f_n} \right)^{0.29} \times f_n \times a_p$$

A rule of thumb; $F_t$ should not exceed 90% of maximum load stated for the bar used.
3. Silent Tools in different machine types

For all types of machines it is very important that the component and set-up are stable and rigid since vibration can be transferred to the boring bar. On larger bars, the weight of the bar itself can cause the tool post and set-up to become unstable.

- Consider boring bar diameter and length.
- Decide machine type and size.

*Dampened 300 mm CoroTurn SL quick change boring bar with overhang 10 x \( dm_m \)*
Turret and multi-task machines

Due to the design of the turret in a CNC lathe or the flexibility of a multi-task machine, the rigidity is usually reduced.

• Small turret widths reduce the ratio between the clamping length and the bar diameter on larger cylindrical boring bars and consequently reduce the set-up stability.

• Improve the stability by applying a long design tool holder and sleeve to increase the clamping length. Recommended clamping length minimum $4 \times dm_m$.

The Coromant Capto coupling can also be a solution on a turret lathe or multi-task machine. This minimizes the need for long sleeves and will result in a stable set-up with additional quick-change benefits.

Dampened boring bar set-up in a turret or multi-task machine
Tool post

Compared to turret lathes, a flat-bed lathe with a tool post can often be more rigid and stable. This results in the capability of holding larger and longer boring bars. The limitation of the machine in this case can be the tool post, the size of the machine and the rigidity in its design.

The stability of the machine slides and gibs is an important factor for achieving good results when holding large Silent Tools boring bars with long overhangs.

The weight increases dramatically with increased bar size:
- Diameter 100 mm = 88 kg
- Diameter 120 mm = 140 kg

Split holder for 300 mm bar diameter. Distance between the cross slides is 1200 mm ($4 \times d_m$).
Cutting forces and directions

Conventional set-ups will risk overloading the boring bar and the tool post because the bar weight and the cutting force will act in the same direction. The result is instability and vibration tendencies because the tool post binds to the gibbs.

By adding a counterweight, the downward force through the tool post is balanced over the gibbs resulting in a smoother machining process.
If the bar is placed upside down the cutting forces will be directed in the opposite direction to the gravity force. The counterweight may not be needed, depending on cutting data.

**Common set-up**
Running the bar conventionally generates cutting forces that push the insert downwards.

**Alternative set-up**
Running the bar upside down changes the direction of the cutting forces which improves the stability. This can also improve chip evacuation.
4. Set-up

Clamping in the machine is most important for successful machining with Silent Tools boring bars. Both when it comes to clamping of the tool post in the machine and to clamping the bar.

**Tool post clamping**

For best results, the tool post clamping should be with large gibbs designed with the cross gibbs wide apart, equal or wider than the clamping length, $4 \times d_{m}$. 

![Diagram showing clamping length and gib span]
The best tool post design is an A-frame where the bar is mounted directly over and in between the slides of the machine.

A less stable set-up is where the bar is hanging out and away from the most stable part of the machine. This set-up could cause instability and vibration when using large boring bars.
CoroTurn SL customer case story

Total application solution for a long overhang.

Bar design:
- Steel dampened boring bar
- 125 mm (5”) bar diameter
- Overhang 10 x $dm_m$
- Boring bar and clamp holder for the tool post designed by Sandvik Coromant.
- Existing flat bed lathe retrofitted according to an A-frame tool post designed to hold the bar.

Result
Unique clamping design provides a stable set-up and vibration free machining.
Clamping of Silent Tools bars

- Ensure maximum contact around the entire circumference by using a split sleeve holder. Recommended clamping tolerance is ISO H7.
- Split bushing material minimum 45HRC to avoid permanent deformation.
- Never use screws in direct contact with the bar shank.

Ensure required strength in critical parts of the clamping
Centre height setting tool

- Quick and simple method to accurately ensure correct centre height setting of the cutting edge.
- For all cylindrical CoroTurn SL bars.

1. Attach the setting tool to the serrated edge of the cylindrical boring bar.

2. Twist the boring bar to the right position.

3. The bar is parallel when the bubble is in centre position.
Set-up recommendations, summary

Clamping of bar:
• Use a clamping length of minimum 4 x $dm_m$.
• Use split sleeve mounting for maximum clamping contact.
• Use the most suitable boring bar for the operation.

Centre height:
• Double-check the centre height to ensure the correct cutting angle. Use a centre height setting tool.

Boring bar deflection:
• Depending on the cutting depth $a_p$ and feed $f_n$, the insert geometry and radius, the entering angle, the material being machined, the bar size and overhang, varying amounts of deflection will occur.
• If finish machining, a measuring cut and/or a semi-finishing cut may be required to ensure that the desirable tolerance is achieved.
5. Coolant requirements

Pressure and direction
Insert cutting zone:

- Use coolant on the cutting edge to ensure low cutting temperature and improve the tool life.
- For tools equipped with SL quick change heads, adjustment of the coolant nozzles needs to be done manually, to ensure coolant hits the cutting edge.

Adjustment of nozzles:

- Use a hexagon key to turn the coolant flow on or off.
- Use the same hexagon key to adjust the direction of the nozzle.

Coolant flow
For internal turning, the coolant supply is important to keep the cutting temperature down and to ensure good chip evacuation.

In general, use tools with integrated coolant.
The flow and volume of coolant becomes important to evacuate chips out of deep bores when machining long overhangs.

Coolant can be applied through the rear of the boring bar using common size connectors with British Standard Pipe (BSP) threaded fittings. Sandvik Coromant dampened boring bars are equipped with a pre-threaded coolant intake hole $D_{th}$, see tables on page 26-28.

**High Pressure Coolant (HPC)**

Using HPC results in shorter chips which can be easily evacuated. The unique coolant nozzles designed for 70 bar (1000 psi) make it possible for the coolant to be directed precisely at the cutting edge.

Due to the precise direction of the coolant flow, the HPC cutting heads can be utilized for benefits even at lower pressure.
6. Use of the product

3-pass method
Method for achieving high accuracy in internal turning with slender boring bars where the deflection of the bar affects the obtained diameter.

Example:

1: Enter the desired finished dia
   40.000

2: Measure the dia before the first pass
   37.000

3: Run the first pass. The programmed dia is:
   \[ 37.000 + \frac{(40.000 - 37.000)}{3} = 38.000 \]

4: Measure the dia before second pass:
   37.670

5: Run the second pass. The programmed dia is:
   \[ 38.000 + \frac{(40.000 - 37.670)}{2} = 39.165 \]

6: Measure the dia before third pass:
   38.825

7: Run the third pass. The programmed dia is:
   \[ 40.000 + 39.165 - 38.825 = 40.340 \]

8: Measure the final dia:
   40.020

   Deviation: 0.020
Template for 3-pass method

Copy this template and fill in your own values to make a 3-pass calculation.

Template:

1: Enter the desired finished dia

2: Measure the dia before the first pass

3: Run the first pass. The programmed dia is:

4: Measure the dia before second pass:

5: Run the second pass. The programmed dia is:

6: Measure the dia before third pass:

7: Run the third pass. The programmed dia is:

8: Measure the final dia:

Deviation:
Cut off boring bar length

The most simple example of a special adaption is shortening a standard bar.

In a Silent Tools boring bar the built in dampening mechanism is limiting the minimum length after cut-off.

$\text{Bar diameter } dm \text{, mm}$

570-3C bars, short design

<table>
<thead>
<tr>
<th>$l_1$, mm</th>
<th>$l_1\text{min, mm}$</th>
<th>$l_1$, mm</th>
<th>$l_1\text{min, mm}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>156</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>125</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>255</td>
<td>155</td>
<td>330</td>
</tr>
<tr>
<td>32</td>
<td>320</td>
<td>190</td>
<td>416</td>
</tr>
<tr>
<td>40</td>
<td>408</td>
<td>240</td>
<td>528</td>
</tr>
<tr>
<td>50</td>
<td>518</td>
<td>305</td>
<td>668</td>
</tr>
<tr>
<td>60</td>
<td>628</td>
<td>380</td>
<td>808</td>
</tr>
</tbody>
</table>

Modification of dampened Silent Tools 570-3C bars.

When a 570-3C short design bar is cut-off to minimum length, the clamping length must not exceed $3 \times dm$ to avoid clamping over the dampening mechanism.

For 570-4C bars, clamping over the damping mechanism is allowed.

<table>
<thead>
<tr>
<th>Bar diameter $dm$, mm</th>
<th>570-4C bars, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>$l_1$</td>
<td>$l_1\text{min}$</td>
</tr>
<tr>
<td>40</td>
<td>330</td>
</tr>
<tr>
<td>50</td>
<td>430</td>
</tr>
<tr>
<td>60</td>
<td>510</td>
</tr>
</tbody>
</table>
Moment calculation

When using Silent Tools bars in machines with automatic tool change (ATC) it is important to control that the moment given by the tool is within the specification that can be found on the machine or in the machine documentation.

For a bar with cutting head mounted, the moment $M$ can be calculated as:

$$M = g \times ((m_{\text{bar}} \times \text{COG}_{\text{bar}}) + (m_{\text{head}} \times \text{COG}_{\text{head}}))$$

$\text{COG} = \text{centre of gravity}$

$g = \text{the gravity constance} \approx 9.8$ kg/m

$m_{\text{bar}}/m_{\text{head}} = \text{the weight of the bar and the head respectively}$

For long boring bars, $\text{COG}_{\text{head}} \approx \text{length of the bar} \ l_1$

For cutting heads: Use $m_{\text{head}}$:

- CoroTurn SL dia. 16-60 mm $\approx 0.3$ kg
- CoroTurn SL-QC $\approx 0.5$ kg

**Example:**

Bar: C6-SL3C32352-CR

- Weight of bar, $m_{\text{bar}}$: 3.5 kg
- $\text{COG}_{\text{bar}}$: 0.15 m
- Weight of head, $m_{\text{head}}$: $\approx 0.3$ kg
- $\text{COG}_{\text{head}} \approx \text{Length of bar, } l_1$: 0.352 m

$$M = 9.8 \times ((3.5 \times 0.15) + (0.3 \times 0.352)) \approx 6.2 \text{ Nm}$$

Note. Even if the weight of the head is small, the additional moment is not negligible due to the long overhang.

During tool change the tool acceleration will give an extra addition to the forces. It is strongly recommended to slow down the tool changing process if the tool weight or moment is close to the machine limits or consider performing a manual tool change.
**Metric steel bars, product data**

<table>
<thead>
<tr>
<th>Article</th>
<th>Rec. overhang, mm</th>
<th>$D_{th}$</th>
<th>Min rec. clamping length, mm</th>
<th>Centre of gravity (COG), mm</th>
<th>Weight, kg</th>
<th>Max load (with SL), N</th>
<th>Max temp, C</th>
<th>Min length, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>570-3C 80 880</td>
<td>0-560*</td>
<td>G3/4”</td>
<td>320</td>
<td>440</td>
<td>32</td>
<td>7000</td>
<td>75</td>
<td>360</td>
</tr>
<tr>
<td>570-3C 80 1200</td>
<td>0-800*</td>
<td>G3/4”</td>
<td>320</td>
<td>605</td>
<td>44</td>
<td>7000</td>
<td>75</td>
<td>360</td>
</tr>
<tr>
<td>570-3C 100 1100</td>
<td>0-700*</td>
<td>G3/4”</td>
<td>400</td>
<td>540</td>
<td>65</td>
<td>8000</td>
<td>75</td>
<td>415</td>
</tr>
<tr>
<td>570-3C 100 1500</td>
<td>0-1000*</td>
<td>G3/4”</td>
<td>400</td>
<td>750</td>
<td>88</td>
<td>8000</td>
<td>75</td>
<td>415</td>
</tr>
<tr>
<td>570-3C 120 1900-80R/L</td>
<td>840-1200</td>
<td>G3/4”</td>
<td>480</td>
<td>940</td>
<td>150</td>
<td>8000</td>
<td>75</td>
<td>**</td>
</tr>
<tr>
<td>570-3C 150 2400-80R/L</td>
<td>1050-1500</td>
<td>G3/4”</td>
<td>600</td>
<td>1180</td>
<td>250</td>
<td>8000</td>
<td>75</td>
<td>**</td>
</tr>
<tr>
<td>570-3C 200 3200-80R/L</td>
<td>1400-2000</td>
<td>G1”</td>
<td>800</td>
<td>1600</td>
<td>600</td>
<td>8000</td>
<td>75</td>
<td>**</td>
</tr>
<tr>
<td>570-3C 250 4000-80R/L</td>
<td>1750-2500</td>
<td>G1”</td>
<td>1000</td>
<td>1950</td>
<td>1000</td>
<td>8000</td>
<td>75</td>
<td>**</td>
</tr>
</tbody>
</table>

*) For diameter 80 mm and 100 mm, clamping over the damping mechanism is allowed.

**) Contact your Sandvik Coromant representative.
Inch steel bars, product data

<table>
<thead>
<tr>
<th>Article</th>
<th>Rec. overhang, inch</th>
<th>$D_{th}$</th>
<th>Min rec. clamping length, inch</th>
<th>Centre of gravity (COG), inch</th>
<th>Weight, lb</th>
<th>Max load (with SL), N</th>
<th>Max temp, C</th>
<th>Min length, inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>A570-3C D48 33</td>
<td>0-22.1* (0-560)</td>
<td>G3/4”</td>
<td>12.0 (305)</td>
<td>16.5 (410)</td>
<td>61.7 (28)</td>
<td>7000</td>
<td>75</td>
<td>24.8 (630)</td>
</tr>
<tr>
<td>A570-3C D48 45</td>
<td>0-31.5 (0-800)</td>
<td>G3/4”</td>
<td>12.0 (305)</td>
<td>22.6 (565)</td>
<td>83.8 (38)</td>
<td>7000</td>
<td>75</td>
<td>24.8 (630)</td>
</tr>
<tr>
<td>A570-3C D64 44</td>
<td>0-27.6 (0-700)</td>
<td>G3/4”</td>
<td>16.0 (406.4)</td>
<td>17.8 (560)</td>
<td>154.3 (70)</td>
<td>8000</td>
<td>75</td>
<td>16.3 (415)</td>
</tr>
<tr>
<td>A570-3C D64 60</td>
<td>0-39.4 (0-1000)</td>
<td>G3/4”</td>
<td>16.0 (406.4)</td>
<td>25.6 (760)</td>
<td>205.0 (93)</td>
<td>8000</td>
<td>75</td>
<td>16.3 (415)</td>
</tr>
<tr>
<td>A570-3C D80 75R/L</td>
<td>35.0-47.2 (890-1200)</td>
<td>G3/4”</td>
<td>20.0 (508)</td>
<td>37.9 (930)</td>
<td>341.7 (155)</td>
<td>8000</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>A570-3C D96 95R/L</td>
<td>41.9-59.1 (1065-1500)</td>
<td>G3/4”</td>
<td>24.0 (609.6)</td>
<td>48.3 (1170)</td>
<td>584.2 (265)</td>
<td>8000</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>A570-3C D128 126R/L</td>
<td>55.9-78.7 (1420-2000)</td>
<td>G1”</td>
<td>32.0 (812.8)</td>
<td>63.4 (1600)</td>
<td>1340.0 (635)</td>
<td>8000</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>A570-3C D160 157R/L</td>
<td>70.1-98.4 (1780-2500)</td>
<td>G1”</td>
<td>40.0 (1016)</td>
<td>80.3 (1975)</td>
<td>2281.7 (1035)</td>
<td>8000</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

Values in parentheses concerns Metric values.
*) Contact your Sandvik Coromant representative.
## Carbide reinforced bar, product data

<table>
<thead>
<tr>
<th>Article</th>
<th>Rec. overhang, mm</th>
<th>$D_{th}$</th>
<th>Min rec. clamping length, mm</th>
<th>Centre of gravity (COG), mm</th>
<th>Weight, kg</th>
<th>Max load (with SL), N</th>
<th>Max temp, C</th>
<th>Min length, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>570-3C 25 380 CR</td>
<td>264-300</td>
<td>G1/8”</td>
<td>100</td>
<td>189</td>
<td>1.7</td>
<td>1100</td>
<td>75</td>
<td>120</td>
</tr>
<tr>
<td>570-3C 25 430 CR</td>
<td>339-350</td>
<td>G1/8”</td>
<td>100</td>
<td>214</td>
<td>2.0</td>
<td>1000</td>
<td>75</td>
<td>120</td>
</tr>
<tr>
<td>570-3C 32 480 CR</td>
<td>337-384</td>
<td>G1/4”</td>
<td>128</td>
<td>234</td>
<td>3.8</td>
<td>1900</td>
<td>75</td>
<td>170</td>
</tr>
<tr>
<td>570-3C 32 544 CR</td>
<td>406-448</td>
<td>G1/4”</td>
<td>128</td>
<td>266</td>
<td>4.2</td>
<td>1600</td>
<td>75</td>
<td>170</td>
</tr>
<tr>
<td>570-3C 40 608 CR</td>
<td>431-480</td>
<td>G3/8”</td>
<td>160</td>
<td>305</td>
<td>6.9</td>
<td>3100</td>
<td>75</td>
<td>180</td>
</tr>
<tr>
<td>570-3C 40 688 CR</td>
<td>511-560</td>
<td>G3/8”</td>
<td>160</td>
<td>351</td>
<td>7.8</td>
<td>2600</td>
<td>75</td>
<td>180</td>
</tr>
<tr>
<td>570-3C 50 760-40 CR</td>
<td>523-600</td>
<td>G1/2”</td>
<td>200</td>
<td>403</td>
<td>12.6</td>
<td>4300</td>
<td>75</td>
<td>195</td>
</tr>
<tr>
<td>570-3C 50 861-40 CR</td>
<td>623-701</td>
<td>G1/2”</td>
<td>200</td>
<td>432</td>
<td>15.4</td>
<td>3700</td>
<td>75</td>
<td>195</td>
</tr>
<tr>
<td>570-3C 60 920-40 CR</td>
<td>380-720</td>
<td>G3/4”</td>
<td>240</td>
<td>479</td>
<td>21.3</td>
<td>7000</td>
<td>75</td>
<td>235</td>
</tr>
<tr>
<td>570-3C 60 1040-40 CR</td>
<td>380-840</td>
<td>G3/4”</td>
<td>240</td>
<td>524</td>
<td>25.5</td>
<td>6700</td>
<td>75</td>
<td>235</td>
</tr>
<tr>
<td>C6-SL3C25280CR</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>96</td>
<td>2.0</td>
<td>1100</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C6-SL3C32352CR</td>
<td>384</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>3.5</td>
<td>1900</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C6-SL3C40448CR</td>
<td>480</td>
<td>-</td>
<td>-</td>
<td>185</td>
<td>4.6</td>
<td>3100</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C8-SL3C25280CR</td>
<td>300</td>
<td>-</td>
<td>-</td>
<td>66</td>
<td>3.0</td>
<td>1100</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C8-SL3C32352CR</td>
<td>384</td>
<td>-</td>
<td>-</td>
<td>123</td>
<td>4.5</td>
<td>1900</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C8-SL3C40448CR</td>
<td>480</td>
<td>-</td>
<td>-</td>
<td>174</td>
<td>6.3</td>
<td>3100</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C8-SL3C50568CR-40R</td>
<td>600</td>
<td>-</td>
<td>-</td>
<td>250</td>
<td>10.8</td>
<td>4300</td>
<td>75</td>
<td>-</td>
</tr>
<tr>
<td>C8-SL3C60688CR-40R</td>
<td>720</td>
<td>-</td>
<td>-</td>
<td>322</td>
<td>17.5</td>
<td>7000</td>
<td>75</td>
<td>-</td>
</tr>
</tbody>
</table>
7. Tips and hints

General

• If the oil in the dampened bar has become too viscose due to long storage or transportation in low temperatures, knock gently on the bar with a rubber hammer.

• For best performance, clean all male and female parts and lubricate with oil at least once a year.

  Lubricant should also be applied to the screws when needed.

• Replace worn or exhausted screws and washers.

• Dampened bars can become deformed due to the thin wall thickness. When assembling, ensure that the bars are held correctly.

• Always check the clamping when working with Silent Tools products.

• Use a torque wrench to get correct screw-tightening.
Internal turning

Reduce the risk of vibration:

- Choose the largest possible bar diameter with the smallest possible overhang.
- Use recommended clamping length, minimum $4 \times dm_m$.

- Use an entering angle close to 90° to direct the cutting forces axially.
- Use an insert nose radius smaller than the cutting depth.

- Ensure sufficient $a_p$ and $f_n$ to avoid vibration due to friction during cutting.
- An $a_p$ and $f_n$ which is too high can cause vibration through tool deflection.
- Inserts with positive basic shape and positive geometry are recommended to minimize tool deflection.
Internal turning

Insert point angle:

- Choose insert shape dependent on the entering angle and accessibility requirements of the tool.
- In general, the largest possible point angle should be used to maximize insert strength and reliability. However, a large point angle needs more machining power and has a higher tendency to vibrate due to a large cutting edge engaged in the cut.

- A small insert point angle can improve tool stability as possible radial movements give less variation in chip area and cutting force.

Wiper inserts

- For better surface finish and higher productivity.
- Require very stable conditions to be successful.
- Give higher cutting forces.

General recommendations when using wipers:

- Increase the feed.
- Reduce the nose radius.
Internal turning

Chip evacuation:

- Use a tool holder with integrated coolant.
- Insert geometries that give short and spiral formed chips are recommended.
- Consider alternative tool paths if chip formation needs to be improved.
- Up side-down cutting units permit improved chip evacuation.
- Increase coolant flow, redirect nozzles or utilize high pressure coolant (HPC) to minimize re-cutting of the chips.
- Ensure that there is enough room for the chips between bar and hole. Otherwise, the tool can press the chips onto the surface and damage the component and the tool.
Internal grooving and profiling

Reduce risk of vibration:

- Set-up should have the shortest possible overhang with the lightest cutting geometry possible.
- Use a smaller insert and make several cuts instead of one.
- Start from outside and make overlapping cuts inwards for best chip evacuation.
- A finishing operation can be a side turning motion. Start from inside and turn outwards.
- Ramping/turning can be used for improved chip control and may reduce vibration.
- Use right- or left-hand style inserts to direct the chips when roughing.

- Machine large-width grooves using several insertions with a narrower insert (illustration A).
- End with a finishing cut (illustration B).
Internal threading

Reduce risk of vibration:
- Use modified flank infeed.
- Infeed per pass should not exceed 0.2 mm and never be less than 0.06 mm.
- Final pass always with infeed.
- Use a sharp geometry for lowest cutting forces.

Chip evacuation:
- Use modified flank infeed to lead the spiral chips towards the opening of the hole.
- Use inside out feed direction for best chip control.
- Use coolant for best chip evacuation.
- Use a chip-breaking geometry.
8. Extended offer

Sandvik Coromant’s standard boring bars represent a good platform for optimized solutions and high productivity. However, sometimes a engineered solution is desirable.

Special versions of dampened boring bars are often tapered, elliptical and/or curved, with the mounting adapted to the machine, or bars with overhang of up to $14 \times dm_m$.

For more information about our extended offer, contact your Sandvik Coromant representative.