

# Stepless® Low Profile Clamps Type 3 / 168

Recommended for CVJ Boots

## Benefits

- Space-efficient design
- High Process Reliability
- Service-friendly
- Lightweight



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**Tolerance compensation:** provides a degree of compensation for component tolerances

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**360° StepLess®:** uniform 360° compression or uniform surface pressure

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**Low installed height:** minimum space requirement, low imbalance on rotating parts

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**Burr-free strip edges:** reduced risk of damage to parts being clamped

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**Load retaining hooks:** visual indication that clamp is correctly installed

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**Serviceability:** clamps are designed to open for service

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## FEATURES



## StepLess® Low Profile Clamps

### Type 3 / 168

#### TECHNICAL DATA OVERVIEW

##### Material

168 Stainless Steel, Material No. 1.4301 or UNS S30400

##### Size range

60.0 – 120.0 mm

##### Width × thickness

10.0 × 0.8 mm

##### Sizes

Customized to fit individual applications

#### PRODUCT DESCRIPTION

StepLess® Low-Profile Clamps Type 3 are produced with one standard width and thickness. The dimension of the material used was determined with respect to product design, radial force capability, typical applications and the need to maintain sealing and/or retaining properties under the specified conditions and environmental exposure.

When selecting the clamp diameter, the dimensions of the mating components on which the clamp is to be installed must be accurately established to enable effective clamping performance. The durometer of the ductile material and desired compressive value are significant factors when calculating the appropriate clamp diameter.

##### Edge condition

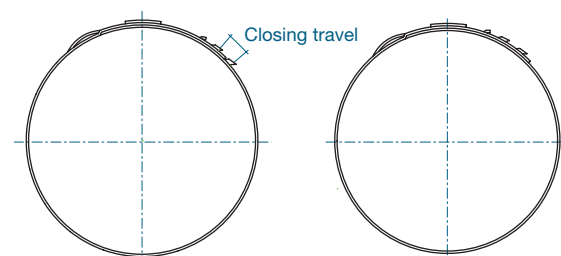
Stringent controls are maintained at the Oetiker strip processing facility, conditioning the slit material and forming a machined or rolled edge radius. This process reduces the potential for damage caused by sharp or square edges, when the clamp compresses adjacent material.

##### Tensioning tunnels

By using an Oetiker closing tool and applying it at the tensioning tunnels the clamp is reduced in diameter until the load-retaining hooks are engaged within the appropriate apertures. The diameter reduction of the clamp is proportional to the closing travel, but slightly influenced by the elongation of the oval-shaped tolerancecompensation elements during high loading installations.

The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{closing travel}}{\pi} = 8.8/\text{Pi} = 2.8$$



## PRODUCT DESCRIPTION

### StepLess® Design

The unique “tongue-in-groove design” was developed to assure that the inner circumference is free of steps or gaps that could be detrimental to the sealing ability of the clamp. During the clamp closing process, the tongue engagement increases in the groove, minimizing the reduced surface area, ensuring uniform compression or surface pressure over the full 360° of the assembled parts.

### Tolerance Compensation

The tolerance compensation element comes into effect when the nominal diameter of the closed clamp cannot be achieved due to adjacent components being at the upper levels of the tolerance range.

When the adjacent parts are designed with high durometer values, the oval-shaped, compensating elements can be elongated providing the closed interlock position is still achievable. For optimum performance, a clamp diameter should be selected based on the theoretical lower tolerance limits of the components. Then, when the higher dimensional assembly is encountered, the oval-shaped, tolerance compensation elements are elongated to absorb the increased diameter and allow for achievement of the interlock position.

The application configuration, the physical properties of the materials being sealed and the required retention, are all critical factors when determining the overall functionality of the connection.

### Note on ordering:

In contrast to ear clamps, StepLess® Low-Profile Clamps Type 3 are identified with the nominal closed diameter, e.g. 60.0 for a closed and installed diameter of 60.0 mm.

## ASSEMBLY

### Assembly Recommendations

The 168 Type 3 series clamps can be closed manually using a specially developed hand tool or a pneumatic pincer when large quantities are to be installed. To close the clamp, the tips of the pincer jaws must be inserted into the tensioning tunnels. Activating the pneumatic tool, or closing the hand tool, simultaneously draws the two features together, reducing the inside diameter of the clamp. To maintain this reduced diameter, the apertures are depressed over the load retaining hooks and the applied load exerted by the tool is released, enabling the hooks to locate in the appropriate apertures. As with other types of clamps, the sealing pressure beneath a clamp is a factor of the diameters and materials of the components under compression. The sealing properties of these clamps depend significantly on the opposing forces generated in the malleable material of parts being secured. Complete process monitoring, including 100% documentation, is available using the “Oetiker ELK 02 Electronically-Controlled Pneumatic Pincer”.

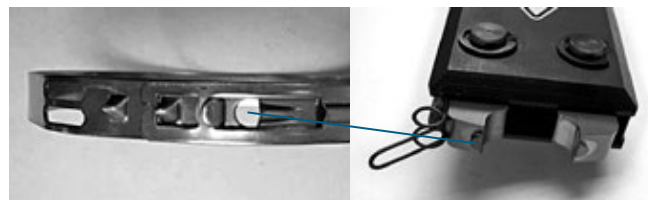
### Assembly Instructions

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that rotate in close proximity to adjacent components. The following list gives rotation diameters for various band sizes and product designs:

1. Insert the pincer jaw tips into the tensioning tunnels.



2. Ensure that the jaw with the longer jaw tip is oriented in direction of the free band end.



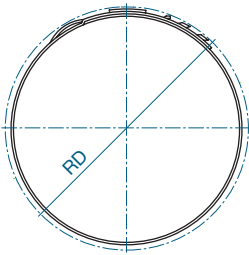
3. Close clamp until hooks engage. In case a pincer head without spring accessory, or hand-pincer, is used, the apertures must be depressed manually over the load retaining hooks. Release closing load.



## ASSEMBLY

### Rotation diameter

The StepLess® Low-Profile Clamps Type 3 have a low radial height, and were specifically developed for applications where space is restricted, while taking into account the need to accommodate the tolerances of parts being connected.



$$RD = \text{closed inside diameter} + 6.0 \text{ mm}$$

### Assembly Tools

#### Manual

Manual Closing tool	<b>14100115</b>
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#### Force Monitored

HO 5000 ME	Pincer head complete	<b>13900553</b>
	Replacement-jaw kit	<b>13900554</b>
	Spring accessory*	<b>13900305</b>
	Calibration adaptor ME	<b>13900306</b>
HO 5000 EL	Pincer head complete	<b>13900553</b>
	Replacement-jaw kit	<b>13900554</b>
	Spring accessory*	<b>13900305</b>
	Calibration adaptor EL	<b>13900307</b>

\* Spring accessory 13900305 must be ordered separately – it is not scope of supply of the pincer head 13900553.

#### Installation data

Material dimension	Size range	Maximum closing force
10 × 0.8 mm	60.0 – 120.0 mm	3500 N

## IMPORTANT NOTE

The closing force is intended as a guide, which may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend conducting functional tests with several assemblies.