

ToothLock® Ear Clamp

293

Recommended for Air Intake Systems

Benefits

- Outstanding clamping performance
- Strong sealing qualities
- Reliable assembly
- Worker-friendly installation



360° StepLess® Technology: uniform 360° compression and uniform surface pressure

ToothLock® Technology: very high and permanent compression rates, outstanding expansion resistance

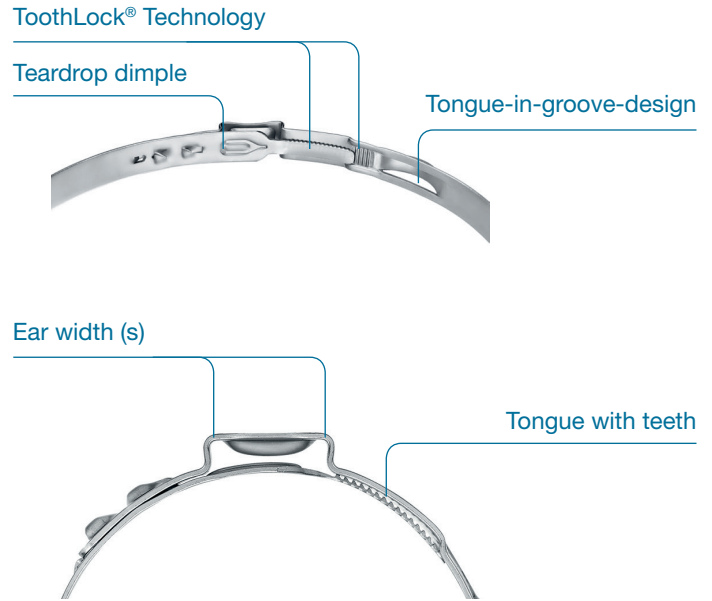
Enlarged ear width (17 mm): enhanced clearance for easy assembly, extended diameter range

Security hook: prevents unintended opening during transport

Closed interlock: smooth outer contour supports injury-free installation

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

FEATURES



ToothLock® Ear Clamp 293

TECHNICAL DATA OVERVIEW

Target applications

Air Intake Systems
 Other applications upon verification by Oetiker.

Material

Stainless steel, material no. 1.4301/UNS S30400

Corrosion resistance according to DIN EN ISO 9227

≥ 1000 hours

Series

Size range	Width x thickness	Ear width
40.0 – 120.5 mm	10.0 x 1.0 mm	17 mm

Sizes

Diameter graduation 0.5 mm
 Some sizes are only available if an appropriate minimum quantity is ordered.

ToothLock®

Interlocked with its teeth, the distinctive “ToothLock®” feature offers extremely high and permanent compression rates and outstanding expansion resistance – strong enough for the toughest connections. It also supports shock and vibration resistance and helps the clamp to withstand thermal stress. The ToothLock® is designed as a self-locking mechanism and increases the performance due to the low spring back rate. With its multiple tooth-locking positions, it compensates component tolerances.

Security hook

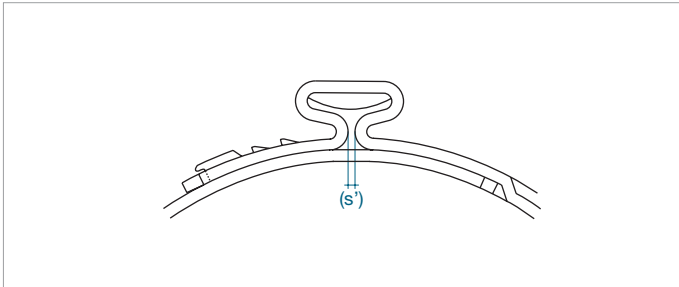
The security hook securely holds the clamp geometry together during transportation.

Clamp ear (closing element)

Using tools designed by Oetiker, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportional to the open “ear” width (s). The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{Ear width (s)}}{\pi} = \frac{17 \text{ mm}}{\pi} = 5.4 \text{ mm}$$

Clamp ear (closing element)



! The above sketch shows the appearance of a closed “ear” (s); it does not necessarily indicate an effective closed assembly.

APPROACH

To determine the correct clamp diameter, push the hose onto the attaching material, (e.g. the nipple), and then measure the outer diameter of the hose. Select a clamp whose average value of the size range is slightly greater than the hose’s outer diameter. To ensure full ToothLock® engagement and a sufficient closure of the clamp the nominal diameter has to be reduced by at least 2.2 mm (> 40% of the original ear width) and the correct closing force has to be applied during assembly.

ASSEMBLY

Recommendations

The clamp’s ear should be closed at a uniform rate not exceeding the recommended maximum closing force. This will ensure clamp tension remains constant without overloading individual components of the assembly being joined, and of the clamps. Oetiker calls this installation method “force priority”. Force priority ensures that tolerance compensating of the clamp remains functional for every installation. This insures the resulting radial force remain approximately the same for every assembly, independent of any component’s dimensional fluctuation. If Oetiker’s ELK electronically controlled pneumatic pincers are used in force priority mode, installations can be monitored to ensure repeatable installations are achieved at the proper force.

Instructions

For proper assembly, position the pincer jaws onto “ear” of the clamp. Close the pincer jaws to compress the ear of the clamp. This reduces the diameter of the ToothLock® Ear Clamp. The tool can be removed once the pincer jaws open after the ear is clamped.

To ensure full ToothLock® engagement and a sufficient closure of the clamp, the nominal diameter has to be reduced by at least 2.2 mm (minimum diameter reduction) and the correct closing force has to be applied during assembly.

Closing force

As a matter of principle, the closing force selection is closely related to the desired compression or surface pressure of the material to be assembled. The resistance against the clamp corresponds to the applied force, so that the defined closing force is significantly reduced if soft materials are compressed. The maximum closing force is displayed in the table below, it specifically refers to thermoplastics.



Nominal diameter reduction with correct closing force

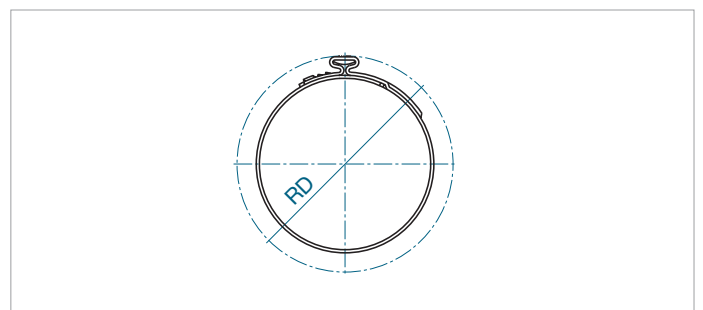
Block closure

Block closure is when the installation force fully closes the ear, resulting in both ear legs touching (vertical members between the ear dimple and clamp radius). When this occurs the installation force is absorbed by compressing the legs rather than transferring the installation forces to the parts being clamped. If installation forces are going to be measured, a block closure must be avoided.

Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications which require a rotation within a limited open space. It changes, depending on the resulting ear gap. Maximum rotation diameter must be determined with application specific tests.

$$RD = \text{closed diameter} + 19.6 \text{ mm}$$



Important

- The ear height is a natural result of ear deformation. Do not influence the ear height, neither by changing the ear gap nor with built-in hold-down devices in installation tools.
- Single tool stroke closure only, do not apply secondary crimping force.

ASSEMBLY TOOLS

Manual

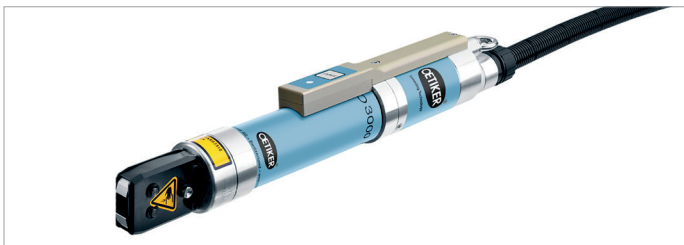
Clamping tool 293	Item no. 14100379
Torque wrench	Item no. 14100098



Clamping tool with torque wrench

Mechanical or electronically controlled

HO 7000 ME w/o pincer head	Item no. 13900230
Pincer head HO-10.5-21.2 ME	Item no. 13900851
HO 7000 ELT w/o pincer head	Item no. 13900341
Pincer head HO-10.5-21.2 EL	Item no. 13900879
HO 10000 ELT w/o pincer head	Item no. 13900879
Pincer head HO-10.5-21.2 EL HO-10000	Item no. 13900854
Jaw replacement kit	Item no. 13900853



Electronically Controlled Pneumatic Pincer with extended trigger

Installation data

Material dimension	Size range	Ear width	Maximum closing force
10 x 1.0 mm	40.0 – 120.5 mm	17 mm	7500 N*

* For closing forces ≥ 7000 N, with the HO 7000 pneumatic pincer, an inlet pressure of > 6.6 bar is required.

Selection of pincer types

CP 20 version	CP 20 sets with pincer heads*	CP sets without pincer head*
CP 20 (AUS)	13900971	13901315
CP 20 (EU)	13900969	13901313
CP 20 (UK)	13900972	13901316
CP 20 (US)	13900970	13901314

Replacement jaws

Jaw replacement kit	13900853
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* to suit regional power plug

This 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.

Cordless Clamp Pincer Oetiker CP 20

Closing force range: 3500 N-10000 N*
External dimensions: 425 x 82 x 124 mm
Weight: 3100 g**
Closing time: 3-4 seconds

- * Adjustable closing force range, depending upon pincer head used.
Closing force can be determined by:
- CAL 01
 - SKM 02 (limited usability - up to max. 7500 N)
- ** incl. 1 x 2 Ah battery and standard pincer head



Cordless Clamp Pincer Oetiker CP 20

Selection of pincer heads

Pincer heads	CP 20
Jaw width	10.5 mm
Opening gap	21.2 mm
For ear width*	17 mm
Item no.	13900994

* measured on the inside