

Technical Data Sheet

ToothLock® Ear Clamp

293



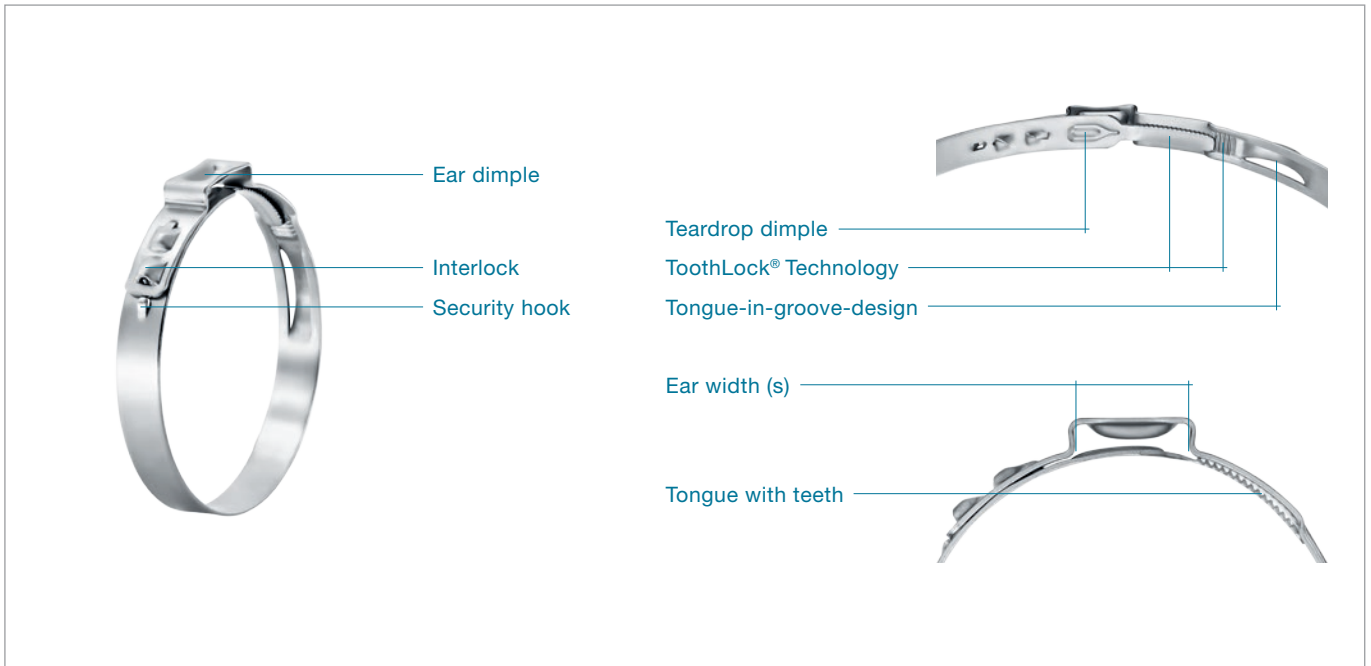
ToothLock®



StepLess®



Connecting Technology



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

360° Stepless®: uniform compression, powerful all-round seal

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

ToothLock® Ear Clamp 293



Target applications

Air Induction 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.

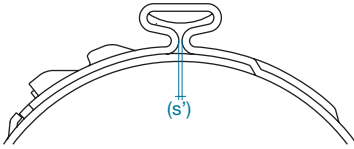
Security hook

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:

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



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

Clamp Sizing

The following applies as a guideline: 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.

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Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 10 mm, thickness 1.0 mm (1010R)				29300082	058.0-1010R	17	52.6 – 58
29300011	040.0-1010R	17	34.6 – 40	29300084	058.5-1010R	17	53.1 – 58.5
29300013	040.5-1010R	17	35.1 – 40.5	29300086	059.0-1010R	17	53.6 – 59
29300015	041.0-1010R	17	35.6 – 41	29300088	059.5-1010R	17	54.1 – 59.5
29300017	041.5-1010R	17	36.1 – 41.5	29300090	060.0-1010R	17	54.6 – 60
29300019	042.0-1010R	17	36.6 – 42	29300092	060.5-1010R	17	55.1 – 60.5
29300021	042.5-1010R	17	37.1 – 42.5	29300094	061.0-1010R	17	55.6 – 61
29300023	043.0-1010R	17	37.6 – 43	29300096	061.5-1010R	17	56.1 – 61.5
29300025	043.5-1010R	17	38.1 – 43.5	29300098	062.0-1010R	17	56.6 – 62
29300027	044.0-1010R	17	38.6 – 44	29300100	062.5-1010R	17	57.1 – 62.5
29300029	044.5-1010R	17	39.1 – 44.5	29300102	063.0-1010R	17	57.6 – 63
29300031	045.0-1010R	17	39.6 – 45	29300104	063.5-1010R	17	58.1 – 63.5
29300033	045.5-1010R	17	40.1 – 45.5	29300106	064.0-1010R	17	58.6 – 64
29300035	046.0-1010R	17	40.6 – 46	29300108	064.5-1010R	17	59.1 – 64.5
29300037	046.5-1010R	17	41.1 – 46.5	29300110	065.0-1010R	17	59.6 – 65
29300039	047.0-1010R	17	41.6 – 47	29300112	065.5-1010R	17	60.1 – 65.5
29300041	047.5-1010R	17	42.1 – 47.5	29300114	066.0-1010R	17	60.6 – 66
29300043	048.0-1010R	17	42.6 – 48	29300116	066.5-1010R	17	61.1 – 66.5
29300045	048.5-1010R	17	43.1 – 48.5	29300118	067.0-1010R	17	61.6 – 67
29300047	049.0-1010R	17	43.6 – 49	29300120	067.5-1010R	17	62.1 – 67.5
29300049	049.5-1010R	17	44.1 – 49.5	29300000	068.0-1010R	17	62.6 – 68
29300051	050.0-1010R	17	44.6 – 50	29300123	068.5-1010R	17	63.1 – 68.5
29300053	050.5-1010R	17	45.1 – 50.5	29300125	069.0-1010R	17	63.6 – 69
29300055	051.0-1010R	17	45.6 – 51	29300003	069.5-1010R	17	64.1 – 69.5
29300057	051.5-1010R	17	46.1 – 51.5	29300001	070.0-1010R	17	64.6 – 70
29300059	052.0-1010R	17	46.6 – 52	29300004	070.5-1010R	17	65.1 – 70.5
29300061	052.5-1010R	17	47.1 – 52.5	29300009	071.0-1010R	17	65.6 – 71
29300063	053.0-1010R	17	47.6 – 53	29300010	071.5-1010R	17	66.1 – 71.5
29300065	053.5-1010R	17	48.1 – 53.5	29300132	072.0-1010R	17	66.6 – 72
29300067	054.0-1010R	17	48.6 – 54	29300005	072.5-1010R	17	67.1 – 72.5
29300069	054.5-1010R	17	49.1 – 54.5	29300006	073.0-1010R	17	67.6 – 73
29300071	055.0-1010R	17	49.6 – 55	29300136	073.5-1010R	17	68.1 – 73.5
29300073	055.5-1010R	17	50.1 – 55.5	29300138	074.0-1010R	17	68.6 – 74
29300002	056.0-1010R	17	50.6 – 56	29300140	074.5-1010R	17	69.1 – 74.5
29300076	056.5-1010R	17	51.1 – 56.5	29300142	075.0-1010R	17	69.6 – 75
29300078	057.0-1010R	17	51.6 – 57	29300144	075.5-1010R	17	70.1 – 75.5
29300080	057.5-1010R	17	52.1 – 57.5	29300146	076.0-1010R	17	70.6 – 76
				29300148	076.5-1010R	17	71.1 – 76.5

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Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
29300150	077.0-1010R	17	71.6 – 77	29300236	099.0-1010R	17	93.6 – 99
29300008	077.5-1010R	17	72.1 – 77.5	29300238	099.5-1010R	17	94.1 – 99.5
29300007	078.0-1010R	17	72.6 – 78	29300240	100.0-1010R	17	94.6 – 100
29300154	078.5-1010R	17	73.1 – 78.5	29300242	100.5-1010R	17	95.1 – 100.5
29300156	079.0-1010R	17	73.6 – 79	29300244	101.0-1010R	17	95.6 – 101
29300158	079.5-1010R	17	74.1 – 79.5	29300246	101.5-1010R	17	96.1 – 101.5
29300160	080.0-1010R	17	74.6 – 80	29300248	102.0-1010R	17	96.6 – 102
29300162	080.5-1010R	17	75.1 – 80.5	29300250	102.5-1010R	17	97.1 – 102.5
29300164	081.0-1010R	17	75.6 – 81	29300252	103.0-1010R	17	97.6 – 103
29300166	081.5-1010R	17	76.1 – 81.5	29300254	103.5-1010R	17	98.1 – 103.5
29300168	082.0-1010R	17	76.6 – 82	29300256	104.0-1010R	17	98.6 – 104
29300170	082.5-1010R	17	77.1 – 82.5	29300258	104.5-1010R	17	99.1 – 104.5
29300172	083.0-1010R	17	77.6 – 83	29300260	105.0-1010R	17	99.6 – 105
29300174	083.5-1010R	17	78.1 – 83.5	29300262	105.5-1010R	17	100.1 – 105.5
29300176	084.0-1010R	17	78.6 – 84	29300264	106.0-1010R	17	100.6 – 106
29300178	084.5-1010R	17	79.1 – 84.5	29300266	106.5-1010R	17	101.1 – 106.5
29300180	085.0-1010R	17	79.6 – 85	29300268	107.0-1010R	17	101.6 – 107
29300182	085.5-1010R	17	80.1 – 85.5	29300270	107.5-1010R	17	102.1 – 107.5
29300184	086.0-1010R	17	80.6 – 86	29300272	108.0-1010R	17	102.6 – 108
29300186	086.5-1010R	17	81.1 – 86.5	29300274	108.5-1010R	17	103.1 – 108.5
29300188	087.0-1010R	17	81.6 – 87	29300276	109.0-1010R	17	103.6 – 109
29300190	087.5-1010R	17	82.1 – 87.5	29300278	109.5-1010R	17	104.1 – 109.5
29300192	088.0-1010R	17	82.6 – 88	29300280	110.0-1010R	17	104.6 – 110
29300194	088.5-1010R	17	83.1 – 88.5	29300282	110.5-1010R	17	105.1 – 110.5
29300196	089.0-1010R	17	83.6 – 89	29300284	111.0-1010R	17	105.6 – 111
29300198	089.5-1010R	17	84.1 – 89.5	29300286	111.5-1010R	17	106.1 – 111.5
29300200	090.0-1010R	17	84.6 – 90	29300288	112.0-1010R	17	106.6 – 112
29300202	090.5-1010R	17	85.1 – 90.5	29300290	112.5-1010R	17	107.1 – 112.5
29300204	091.0-1010R	17	85.6 – 91	29300292	113.0-1010R	17	107.6 – 113
29300206	091.5-1010R	17	86.1 – 91.5	29300294	113.5-1010R	17	108.1 – 113.5
29300208	092.0-1010R	17	86.6 – 92	29300296	114.0-1010R	17	108.6 – 114
29300210	092.5-1010R	17	87.1 – 92.5	29300298	114.5-1010R	17	109.1 – 114.5
29300212	093.0-1010R	17	87.6 – 93	29300300	115.0-1010R	17	109.6 – 115
29300214	093.5-1010R	17	88.1 – 93.5	29300302	115.5-1010R	17	110.1 – 115.5
29300216	094.0-1010R	17	88.6 – 94	29300304	116.0-1010R	17	110.6 – 116
29300218	094.5-1010R	17	89.1 – 94.5	29300306	116.5-1010R	17	111.1 – 116.5
29300220	095.0-1010R	17	89.6 – 95	29300308	117.0-1010R	17	111.6 – 117
29300222	095.5-1010R	17	90.1 – 95.5	29300310	117.5-1010R	17	112.1 – 117.5
29300224	096.0-1010R	17	90.6 – 96	29300312	118.0-1010R	17	112.6 – 118
29300226	096.5-1010R	17	91.1 – 96.5	29300314	118.5-1010R	17	113.1 – 118.5
29300228	097.0-1010R	17	91.6 – 97	29300316	119.0-1010R	17	113.6 – 119
29300230	097.5-1010R	17	92.1 – 97.5	29300318	119.5-1010R	17	114.1 – 119.5
29300232	098.0-1010R	17	92.6 – 98	29300320	120.0-1010R	17	114.6 – 120
29300234	098.5-1010R	17	93.1 – 98.5	29300322	120.5-1010R	17	115.1 – 120.5

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.

Assembly 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.

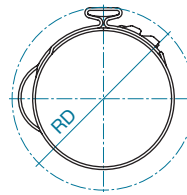
Block closure

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, either by changing the ear gap or 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. 13900852
HO 10000 ELT w/o pincer head	Item No. 13900879
Pincer head HO-10.5-21.2 EL HO-10000	Item No. 13900854
Replacement Jaw Kit	Item No. 13900853



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.

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.

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