

# Technical Data Sheet

## Stepless® Ear Clamps

### Product Group 117 & 167

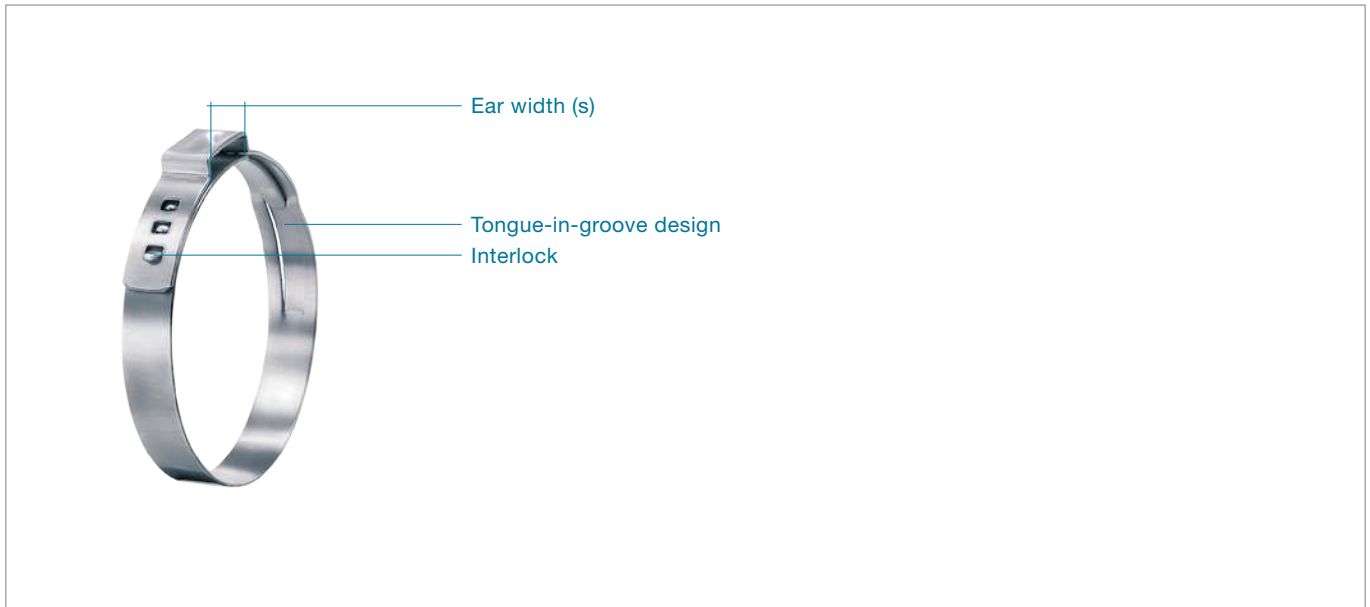
---



Connecting Technology



H.W. ECKHARDT  
CORPORATION  
ENGINEERED FASTENERS



Narrow band: concentrates transmission of clamping force, less weight

Stepless over 360°: uniform compression or uniform surface pressure

Clamp ear: compensates for component tolerances, adjustable surface pressure

Dimple: increases clamping force, spring-effect compensates for changes in diameter due to thermal expansion

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

## Stepless® Ear Clamps Product Group 117 & 167

### Material

PG 117 Galvanized or zinc-plated steel band

PG 167 Stainless Steel, Material no. 1.4301/UNS S30400

Optional alternative materials

Corrosion resistance according to DIN EN ISO 9227

PG 117 Zinc-plated steel band ≥ 96 h

PG 117 Galvanized steel band ≥ 144 h

PG 167 ≥ 1000 h

### Series PG 117

Size range	width x thickness
11.9 – 17.7 mm	7.0 x 0.6 mm
17.8 – 24.9 mm	7.0 x 0.8 mm

### Standard Series PG 167

Size range	width x thickness
6.5 – 11.8 mm	5.0 x 0.5 mm
11.9 – 120.5 mm	7.0 x 0.6 mm
21.0 – 120.5 mm	9.0 x 0.6 mm

### Heavy Duty Series PG 167

Size range	width x thickness
24.5 – 120.5 mm	10.0 x 0.8 mm
62.0 – 120.5 mm	10.0 x 1.0 mm

Some sizes are only available if an appropriate minimum quantity is ordered. Customer specific sizes available on request.

### Material thickness

Stepless® Ear Clamps are produced in nominal widths and thicknesses. The selected material dimensions for a specific application are based on the stress required to obtain an adequate seal or load.

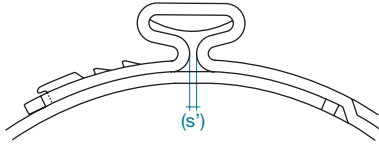
### Clamp ear (closing element)

Using tools designed or endorsed by Oetiker, the clamp is closed by drawing together the lower radii of the “ear”. The maximum diameter reduction is proportionate to the open “ear” width (s).

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

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

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.



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

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. The value of the outer diameter must be slightly above the average value of the diameter range of the clamp to be selected. A clamp can only be considered adequately closed when the ear width (s) has been reduced by at least 40%, and the correct closing force was used for assembly.

#### Block closure

Block closure means that, during the applied closing force, both ear shanks of one ear clamp touch each other. The closing force applied after the occurrence of block closure is absorbed by the block closure and not transferred to the parts being clamped. If a statement about the effective closing force acting on the parts being clamped during closure is required, a block closure should be avoided.

#### Mechanical interlock

The interlock is a mechanical system for joining the clamp ends to permit closure. Some interlock designs can be opened for radial installation prior to closure.

#### Assembly recommendations

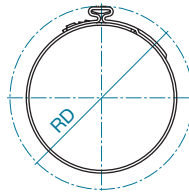
The clamp “ear” is deformed with a constant tool jaw force – this practice is referred to as “force priority closure”. This assembly method ensures that a uniform and repeatable stress is applied to the joint in addition to a consistent tensile force on the clamp interlock. Employing this methodology when closing a 167 series clamp will compensate for any component tolerance variations, and ensure that the clamp applies a constant radial force to the application. Fluctuations in component tolerances are absorbed by variations in the “ear” gap (s’). Clamp installation monitoring and process data collection are available by incorporating an “Electronically Controlled Pneumatic Power Tool” Oetiker ELK in the assembly process.

#### Closing force

The closing force must be chosen to give the required material compression or surface pressure and should be qualified by dimensional evaluation and experiment. The resistance against the clamp equals the applied force, so the closing force is greatly reduced when compressing a soft material. The table below gives the maximum applied closing force for clamp and material dimensions when compressing and sealing relatively hard synthetic materials.

#### Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that rotate in close proximity to adjacent components. Many factors can influence this final assembly diameter including compression, “ear” gap “s” and material thickness. It is recommended that all variables be considered and evaluated prior to specifying a rotating diameter.



#### Important

- The ear height is naturally given. 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.

## Installation data

Material dimensions (mm)	Size (mm)	Closing force max. (N)	Installation tools force-monitored <sup>1</sup> :			
			Manual	Pneumatic	Cordless	Electronically controlled
<b>PG 117</b>						
7 x 0.6	11.9 – 17.8	1100	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
7 x 0.8	18.0 – 24.9	1400	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
<b>PG 167</b>						
5 x 0.5	6.5 – 11.8	1000	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
5 x 0.6	18.5 – 100.0	1700	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
7 x 0.6	11.9 – 17.5	2100	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
	17.8 – 120.5	2400	HMK 01	HO ME 3000 – 4000	CP 01	HO EL 3000 – 4000
7 x 0.8	17.7 – 120.5	2800	-	HO ME 3000 – 4000	CP 01	HO EL 3000 – 4000
9 x 0.6	21.0 – 120.5	2800	-	HO ME 3000 – 4000	CP 01	HO EL 3000 – 4000
9 x 0.8	25.0 – 120.5	4100	Clamping tool and Torque wrench	HO ME 4000 – 7000	CP 01	HO EL 4000
10 x 0.6	21.0 – 120.5	2900	-	HO ME 4000 – 7000	CP 01	HO EL 4000 – 7000
10 x 0.8	24.5 – 120.5	5000	Clamping tool and Torque wrench	HO ME 5000 – 7000	CP 02	HO EL 5000 – 7000
10 x 1.0	60.0 – 120.5	7000 <sup>2</sup>	Clamping tool and Torque wrench	HO ME 7000	CP 02	HO EL 7000
12 x 1.0	40.0 – 120.5	8500 <sup>2</sup>	Clamping tool and Torque wrench	HO ME 7000	CP 03	HO EL 7000

For an alternative option, see our manual pincers on page 104

<sup>1</sup> Further information on page 84

<sup>2</sup> For closing forces  $\geq 7000$  N, with the HO 7000, an inlet pressure of  $> 5.5$  bar is required.

**Important note**

These figures are intended as a guide, they may vary depending on the type and tolerances of parts being clamped. To ensure optimum clamp selection, we recommend making functional tests with several assemblies.

## Order information PG 117

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
<b>Galvanized steel band</b>				<b>Zinc-plated steel band</b>			
Band width 7 mm, thickness 0.6 mm (706)				Band width 7 mm, thickness 0.6 mm (706)			
11701202	011.9-706	8	9.4 – 11.9	11700583	011.9-706	8	9.4 – 11.9
11701081	012.3-706	8	9.8 – 12.3	11700584	012.3-706	8	9.8 – 12.3
11701100	012.8-706	8	10.3 – 12.8	11700585	012.8-706	8	10.3 – 12.8
11701061	013.3-706	8	10.8 – 13.3	11700586	013.3-706	8	10.8 – 13.3
11701101	013.8-706	8	11.3 – 13.8	11700587	013.8-706	8	11.3 – 13.8
11701102	014.0-706	8	11.5 – 14	11700588	014.0-706	8	11.5 – 14
11701108	014.5-706	8	12 – 14.5	11700568	014.5-706	8	12 – 14.5
11701062	014.8-706	8	12.3 – 14.8	11700589	014.8-706	8	12.3 – 14.8
11701109	015.3-706	8	12.8 – 15.3	11700569	015.3-706	8	12.8 – 15.3
11701063	015.7-706	8	13.2 – 15.7	11700570	015.7-706	8	13.2 – 15.7
11701103	016.2-706	8	13.7 – 16.2	11700571	016.2-706	8	13.7 – 16.2
11701119	016.6-706	8	14.1 – 16.6	11700572	016.6-706	8	14.1 – 16.6
11701110	016.8-706	8	14.3 – 16.8	11700590	016.8-706	8	14.3 – 16.8
11701064	017.0-706	8	14.5 – 17	11700591	017.0-706	8	14.5 – 17
11701065	017.5-706	8	15 – 17.5	11700573	017.5-706	8	15 – 17.5
<b>Band width 7 mm, thickness 0.8 mm (708)</b>				<b>Band width 7 mm, thickness 0.8 mm (708)</b>			
11700780	017.8-708	10	14.6 – 17.8	11700547	017.8-708	10	14.6 – 17.8
11701099	018.0-708	10	14.8 – 18	11700592	018.0-708	10	14.8 – 18
11701083	018.5-708	10	15.3 – 18.5	11700576	018.5-708	10	15.3 – 18.5
11701091	019.2-708	10	16 – 19.2	11700593	019.2-708	10	16 – 19.2
11701092	019.8-708	10	16.6 – 19.8	11700594	019.8-708	10	16.6 – 19.8
11701066	021.0-708	10	17.8 – 21	11700595	021.0-708	10	17.8 – 21
11701067	022.6-708	10	19.4 – 22.6	11700548	022.6-708	10	19.4 – 22.6
11701130	023.5-708	10	20.3 – 23.5	11700596	023.5-708	10	20.3 – 23.5
11701069	024.1-708	10	20.9 – 24.1	11700549	024.1-708	10	20.9 – 24.1

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

## Order information PG 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 5 mm, thickness 0.5 mm (505R)				Band width 7 mm, thickness 0.6 mm (706R)			
16702488	006.5-505R	4	5.3 – 6.5	16700054	042.5-706R	10	39.3 – 42.5
16700001	007.0-505R	4	5.8 – 7	16700055	044.0-706R	10	40.8 – 44
16700002	008.0-505R	4	6.8 – 8	16700056	045.5-706R	10	42.3 – 45.5
16700003	008.7-505R	5.5	7 – 8.7	16700057	047.0-706R	10	43.8 – 47
16702491	009.0-505R	5.5	7.3 – 9	16700058	048.5-706R	10	45.3 – 48.5
16700004	009.5-505R	5.5	7.8 – 9.5	16700059	050.0-706R	10	46.8 – 50
16700005	010.0-505R	5.5	8.3 – 10	16700060	051.5-706R	10	48.3 – 51.5
16700006	010.5-505R	5.5	8.8 – 10.5	16700061	053.0-706R	10	49.8 – 53
16702492	010.9-505R	5.5	9.2 – 10.9	16700062	054.5-706R	10	51.3 – 54.5
16700007	011.3-505R	5.5	9.6 – 11.3	16700063	056.0-706R	10	52.8 – 56
16700008	011.8-505R	5.5	10.1 – 11.8	16700064	057.5-706R	10	54.3 – 57.5
Band width 7 mm, thickness 0.6 mm (706R)				16700065	059.0-706R	10	55.8 – 59
16702951	011.9-706R	8	9.4 – 11.9	16700066	060.5-706R	10	57.3 – 60.5
16700009	012.3-706R	8	9.8 – 12.3	16700067	062.0-706R	10	58.8 – 62
16702493	012.8-706R	8	10.3 – 12.8	16700068	063.5-706R	10	60.3 – 63.5
16700010	013.3-706R	8	10.8 – 13.3	16700069	065.0-706R	10	61.8 – 65
16700011	013.8-706R	8	11.3 – 13.8	16700070	066.5-706R	10	63.3 – 66.5
16700012	014.0-706R	8	11.5 – 14	16700071	068.0-706R	10	64.8 – 68
16702864	014.2-706R	8	11.7 – 14.2	16700072	069.5-706R	10	66.3 – 69.5
16700013	014.5-706R	8	12 – 14.5	16700073	071.0-706R	10	67.8 – 71
16700014	014.8-706R	8	12.3 – 14.8	16700074	072.5-706R	10	69.3 – 72.5
16700015	015.3-706R	8	12.8 – 15.3	16700075	074.0-706R	10	70.8 – 74
16700016	015.7-706R	8	13.2 – 15.7	16700076	075.5-706R	10	72.3 – 75.5
16702998	016.0-706R	8	13.5 – 16	16700077	077.0-706R	10	73.8 – 77
16702494	016.2-706R	8	13.7 – 16.2	16700078	078.5-706R	10	75.3 – 78.5
16702495	016.6-706R	8	14.1 – 16.6	16700079	080.0-706R	10	76.8 – 80
16702496	016.8-706R	8	14.3 – 16.8	16700080	081.5-706R	10	78.3 – 81.5
16700017	017.0-706R	8	14.5 – 17	16700081	083.0-706R	10	79.8 – 83
16702497	017.5-706R	8	15 – 17.5	16700082	084.5-706R	10	81.3 – 84.5
16700018	017.8-706R	10	14.6 – 17.8	16700083	086.0-706R	10	82.8 – 86
16700019	018.0-706R	10	14.8 – 18	16700084	087.5-706R	10	84.3 – 87.5
16700020	018.5-706R	10	15.3 – 18.5	16700085	089.0-706R	10	85.8 – 89
16700110	019.2-706R	10	16 – 19.2	16700086	090.5-706R	10	87.3 – 90.5
16702498	019.8-706R	10	16.6 – 19.8	16700087	092.0-706R	10	88.8 – 92
16700024	021.0-706R	10	17.8 – 21	16700088	093.5-706R	10	90.3 – 93.5
16700026	022.6-706R	10	19.4 – 22.6	16700089	095.0-706R	10	91.8 – 95
16700028	023.5-706R	10	20.3 – 23.5	16700090	096.5-706R	10	93.3 – 96.5
16700029	024.1-706R	10	20.9 – 24.1	16700091	098.0-706R	10	94.8 – 98
16700031	025.6-706R	10	22.4 – 25.6	16700092	099.5-706R	10	96.3 – 99.5
16700033	027.1-706R	10	23.9 – 27.1	16700093	101.0-706R	10	97.8 – 101
16700035	028.6-706R	10	25.4 – 28.6	16700094	102.5-706R	10	99.3 – 102.5
16702047	030.1-706R	10	26.9 – 30.1	16700095	104.0-706R	10	100.8 – 104
16700039	030.8-706R	10	27.6 – 30.8	16700096	105.5-706R	10	102.3 – 105.5
16700040	031.6-706R	10	28.4 – 31.6	16700097	107.0-706R	10	103.8 – 107
16700042	033.1-706R	10	29.9 – 33.1	16700098	108.5-706R	10	105.3 – 108.5
16700044	034.6-706R	10	31.4 – 34.6	16700099	110.0-706R	10	106.8 – 110
16700046	036.1-706R	10	32.9 – 36.1	16700100	111.5-706R	10	108.3 – 111.5
16700048	037.6-706R	10	34.4 – 37.6	16700101	113.0-706R	10	109.8 – 113
16700050	038.1-706R	10	34.9 – 38.1	16700102	114.5-706R	10	111.3 – 114.5
16700052	039.6-706R	10	36.4 – 39.6	16700103	116.0-706R	10	112.8 – 116
16700053	041.0-706R	10	37.8 – 41	16700104	117.5-706R	10	114.3 – 117.5
				16700105	119.0-706R	10	115.8 – 119
				16700106	120.5-706R	10	117.3 – 120.5

## Order information PG 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)	Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
----------	----------	-----------------------	-----------------	----------	----------	-----------------------	-----------------

## Band width 9 mm, thickness 0.6 mm (906R)

16706383	021.0-906R	10	17.8 – 21
16707693	022.6-906R	10	19.4 – 22.6
16707694	023.5-906R	10	20.3 – 23.5
16707695	024.1-906R	10	20.9 – 24.1
16707696	025.6-906R	10	22.4 – 25.6
16707533	027.1-906R	10	23.9 – 27.1
16707697	028.6-906R	10	25.4 – 28.6
16707698	030.1-906R	10	26.9 – 30.1
16707517	030.8-906R	10	27.6 – 30.8
16707488	031.6-906R	10	28.4 – 31.6
16703913	033.1-906R	10	29.9 – 33.1
16707641	034.6-906R	10	31.4 – 34.6
16704715	036.1-906R	10	32.9 – 36.1
16707494	037.6-906R	10	34.4 – 37.6
16707645	038.1-906R	10	34.9 – 38.1
16707306	039.6-906R	10	36.4 – 39.6
16707300	041.0-906R	10	37.8 – 41
16703914	042.5-906R	10	39.3 – 42.5
16707301	044.0-906R	10	40.8 – 44
16704719	045.5-906R	10	42.3 – 45.5
16707536	047.0-906R	10	43.8 – 47
16707479	048.5-906R	10	45.3 – 48.5
16707304	050.0-906R	10	46.8 – 50
16707480	051.5-906R	10	48.3 – 51.5
16707537	053.0-906R	10	49.8 – 53
16707477	054.5-906R	10	51.3 – 54.5
16707700	056.0-906R	10	52.8 – 56
16707701	057.5-906R	10	54.3 – 57.5
16707540	059.0-906R	10	55.8 – 59
16707372	060.5-906R	10	57.3 – 60.5
16707702	062.0-906R	10	58.5 – 62
16707703	063.5-906R	10	60.3 – 63.5
16707518	065.0-906R	10	61.8 – 65
16707542	066.5-906R	10	63.3 – 66.5
16707357	068.0-906R	10	64.8 – 68
16707688	069.5-906R	10	66.3 – 69.5
16707041	071.0-906R	10	67.8 – 71
16707704	072.5-906R	10	69.3 – 72.5
16707705	074.0-906R	10	70.8 – 74
16707404	075.5-906R	10	72.3 – 75.5
16703915	077.0-906R	10	73.8 – 77
16707366	078.5-906R	10	75.3 – 78.5
16707405	080.0-906R	10	76.8 – 80
16707543	081.5-906R	10	78.3 – 81.5
16707545	083.0-906R	10	79.8 – 83
16707706	084.5-906R	10	81.3 – 84.5
16707707	086.0-906R	10	82.8 – 86
16707708	087.5-906R	10	84.3 – 87.5
16707384	089.0-906R	10	85.8 – 89
16707710	090.5-906R	10	87.3 – 90.5
16707547	092.0-906R	10	88.8 – 92
16707325	093.5-906R	10	90.3 – 93.5
16703916	095.0-906R	10	91.8 – 95

## Band width 9 mm, thickness 0.6 mm (906R)

16707548	096.5-906R	10	93.3 – 96.5
16707242	098.0-906R	10	94.8 – 98
16707711	099.5-906R	10	96.3 – 99.5
16707713	101.0-906R	10	97.8 – 101
16707714	102.5-906R	10	99.3 – 102.5
16707385	104.0-906R	10	100.8 – 104
16703918	105.5-906R	10	102.3 – 105.5
16707715	107.0-906R	10	103.8 – 107
16706709	108.5-906R	10	105.3 – 108.5
16707716	110.0-906R	10	106.8 – 110
16707717	111.5-906R	10	108.3 – 111.5
16707718	113.0-906R	10	109.8 – 113
16707719	114.5-906R	10	111.3 – 114.5
16707178	116.0-906R	10	112.8 – 116
16707179	117.5-906R	10	114.3 – 117.5
16707720	119.0-906R	10	115.8 – 119
16707276	120.5-906R	10	117.3 – 120.5

## Band width 10 mm, thickness 0.8 mm (1008R)

In the diameter range 24.5 mm to 120.5 mm, these clamps are available in 0.5 mm steps on request.

## Band width 10 mm, thickness 1.0 mm (1010R)

In the diameter range 62 mm to 120.5 mm, these clamps are available in 0.5 mm steps on request.

Other diameters available on request.

The data in this catalog are based on many years experience. They are intended for reference, not as design specifications.

PEX connecting solutions for markets compliant with Standard ASTM<sup>1</sup> F877/F2098

PG 167 PEX (conform to ASTM F 877/2098)

The specified clamps are suitable for fast and secure connections of PEX<sup>2</sup> pipes in the plumbing field. The clamp design ensures tamper detection. The clamp sizes are solely intended for PEX applications with corresponding inch sizes. The robust interlock design, specifically developed for PEX applications leads to even higher radial loads of the clamp.

NSF<sup>3</sup> Product listing:

Complies with NSF product listing cNSFus-PW

ASTM F877 / F2098 Standard:

Complies with ASTM F2098 stainless steel clamps for use with ASTM F1807 or F2159 insert fittings.

**Warning:**

- In high chloride water conditions, use only plastic fittings
- Do not install in contact with concrete
- Use only ASTM F1807 or F2159 insert fittings with Oetiker clamps

**Assembly Recommendations**

For the correct assembly of the PG 167 PEX (conform to ASTM F 877/2098) with PEX pipes, the clamps must be completely closed. When using ratchet pincers, these only open when the clamp is completely closed.

<sup>1</sup> ASTM = American Society for Testing and Materials

<sup>2</sup> PEX = Polyethylene cross-linked

<sup>3</sup> NSF = National Sanitation Foundation

For additional information, please refer to ASTM International Standards Worldwide and the NSF Organization.

Installation data

PEX tube (inch <sup>1</sup> )	Material dimensions (mm)	Size (mm)	Closing force max. (N)	Installation tools not force-monitored, manual <sup>2</sup>	Installation tools force-monitored <sup>2</sup> :	
					Pneumatic	Cordless
3/8	7 x 0.6	13.3	2200	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 3000	CP 01
1/2	7 x 0.8	17.5	3900	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 02
5/8	7 x 0.8	20.8	3900	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 02
3/4	9 x 0.8	23.3	5000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 02
1	10 x 1.0	29.6	7000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000 – 7000	CP 02

<sup>1</sup> 1 inch (Zoll) = 25.4 mm

<sup>2</sup> Further information on page 84

**Important note**

The specifications of ASTM Standard F2098 must be met. When using force-monitored closing tools, the clamp must be verified as being correctly (completely) closed.

Order information

Item No.	Ref. No.	Ear width (mm)	PEX Size range (inch)
16703334	13.3 – 706 R	8	3/8
16703335	17.5 – 708 R	10	1/2
16705571	20.8 – 708 R	10	5/8
16703336	23.3 – 908 R	10	3/4
16704150	29.6 – 1010 R	10	1