StepLess® Ear Clamps
Product Group 117 & 167

Reliable Connections

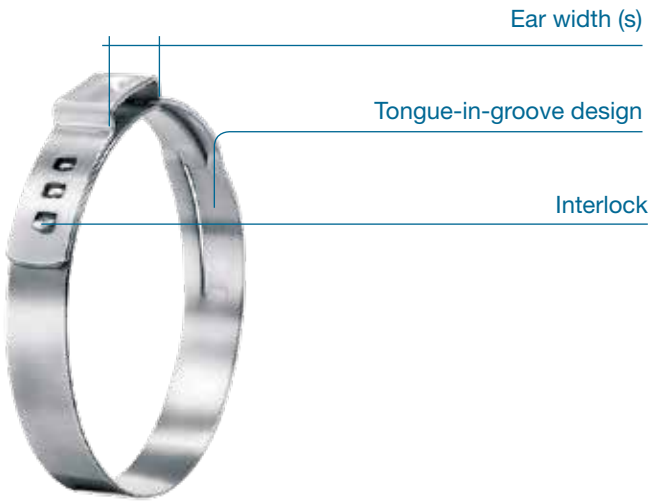
Recommended for various Automotive and Industrial Applications

Benefits

- Uniform compression
- Fast and easy installation
- Tolerances compensation
- Wide range of band diameter & width options

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

FEATURES



StepLess® Ear Clamps Product Group 117 & 167

TECHNICAL DATA OVERVIEW

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 Galfan steel band ≥ 144 h
PG 167 ≥ 1000 h

Series PG 117	
Size range	**width × thickness**
11.9 – 17.7 mm	7.0 × 0.6 mm

Standard Series PG 167	
Size range	**width × thickness**
6.5 – 11.8 mm	5.0 × 0.5 mm
11.9 – 120.5 mm	7.0 × 0.6 mm
21.0 – 120.5 mm	9.0 × 0.6 mm

Heavy Duty Series PG 167	
Size range	**width × thickness**
24.5 – 120.5 mm	10.0 × 0.8 mm
62.0 – 120.5 mm	10.0 × 1.0 mm

PRODUCT DESCRIPTION

Material thickness

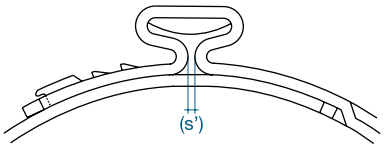
Stepless® Ear Clamps are produced in nominal widths and thicknesses. The selected material dimensions for a specific application are based on the stress required to obtain an adequate seal or load.

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:

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



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.

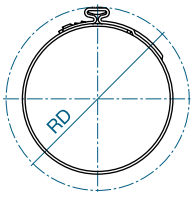
Mechanical interlock
The interlock is a mechanical system for joining the clamp ends to permit closure. Some interlock designs can be opened for radial installation prior to closure.

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.

Complete process monitoring, including 100% documentation is available using the Electronically controlled pneumatic pincer ELK.

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[1]: Manual	Pneumatic	Cordless	Electronically controlled
PG 117						
7.0 x 0.6	11.9 – 17.8	1100	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
PG 167						
5.0 x 0.5	6.5 – 11.8	1000	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
5.0 x 0.6	18.5 – 100.0	1700	HMK 01/S01	HO ME 2000 – 4000	CP 01	HO EL 2000 – 4000
7.0 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
7.0 x 0.8	17.7 – 120.5	2800	–	HO ME 3000 – 4000	CP 01	HO EL 3000 – 4000
9.0 x 0.6	21.0 – 120.5	2800	–	HO ME 3000 – 4000	CP 01	HO EL 3000 – 4000
9.0 x 0.8	25.0 – 120.5	4100	Clamping tool	HO ME 4000 – 7000	CP 01	HO EL 4000
			and Torque wrench			
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	HO ME 5000 – 7000	CP 02	HO EL 5000 – 7000
			and Torque wrench			
10 x 1.0	60.0 – 120.5	7000[2]	Clamping tool	HO ME 7000	CP 02	HO EL 7000
			and Torque wrench			
12 x 1.0	40.0 – 120.5	8500[2]	Clamping tool	HO ME 7000	CP 03	HO EL 7000
			and Torque wrench			

For alternatives, see Oetiker TDS of hand tools or power tools

[1] Further information on www.oetiker.com

[2] For closing forces ≥ 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)
Galvanized steel band			
Band width 7 mm, thickness **0.6 mm (706)**			
11701202	011.9-706	8	9.4 – 11.9
11701081	012.3-706	8	9.8 – 12.3
11701100	012.8-706	8	10.3 – 12.8
11701061	013.3-706	8	10.8 – 13.3
11701101	013.8-706	8	11.3 – 13.8
11701102	014.0-706	8	11.5 – 14.0
11701108	014.5-706	8	12.0 – 14.5
11701062	014.8-706	8	12.3 – 14.8
11701109	015.3-706	8	12.8 – 15.3
11701063	015.7-706	8	13.2 – 15.7
11701103	016.2-706	8	13.7 – 16.2
11701119	016.6-706	8	14.1 – 16.6
11701110	016.8-706	8	14.3 – 16.8
11701064	017.0-706	8	14.5 – 17.0
11701065	017.5-706	8	15.0 – 17.5
Zinc-plated steel band			
Band width 7 mm, thickness **0.6 mm (706)**			
11700583	011.9-706	8	9.4 – 11.9
11700584	012.3-706	8	9.8 – 12.3
11700585	012.8-706	8	10.3 – 12.8
11700586	013.3-706	8	10.8 – 13.3
11700587	013.8-706	8	11.3 – 13.8
11700588	014.0-706	8	11.5 – 14.0
11700568	014.5-706	8	12.0 – 14.5
11700589	014.8-706	8	12.3 – 14.8
11700569	015.3-706	8	12.8 – 15.3
11700570	015.7-706	8	13.2 – 15.7
11700571	016.2-706	8	13.7 – 16.2
11700572	016.6-706	8	14.1 – 16.6
11700590	016.8-706	8	14.3 – 16.8
11700591	017.0-706	8	14.5 – 17.0
11700573	017.5-706	8	15.0 – 17.5

ORDER INFORMATION PG 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 5 mm, thickness **0.5 mm (505R)**			
16702488	006.5-505R	4	5.3 – 6.5
16700001	007.0-505R	4	5.8 – 7.0
16700002	008.0-505R	4	6.8 – 8.0
16700003	008.7-505R	5.5	7.0 – 8.7
16702491	009.0-505R	5.5	7.3 – 9.0
16700004	009.5-505R	5.5	7.8 – 9.5
16700005	010.0-505R	5.5	8.3 – 10
16700006	010.5-505R	5.5	8.8 – 10.5
16702492	010.9-505R	5.5	9.2 – 10.9
16700007	011.3-505R	5.5	9.6 – 11.3
16700008	011.8-505R	5.5	10.1 – 11.8
Band width 7 mm, thickness **0.6 mm (706R)**			
16702951	011.9-706R	8	9.4 – 11.9
16700009	012.3-706R	8	9.8 – 12.3
16702493	012.8-706R	8	10.3 – 12.8
16700010	013.3-706R	8	10.8 – 13.3
16700011	013.8-706R	8	11.3 – 13.8
16700012	014.0-706R	8	11.5 – 14
16702864	014.2-706R	8	11.7 – 14.2
16700013	014.5-706R	8	12 – 14.5
16700014	014.8-706R	8	12.3 – 14.8
16700015	015.3-706R	8	12.8 – 15.3
16700016	015.7-706R	8	13.2 – 15.7
16702998	016.0-706R	8	13.5 – 16
16702494	016.2-706R	8	13.7 – 16.2
16702495	016.6-706R	8	14.1 – 16.6
16702496	016.8-706R	8	14.3 – 16.8
16700017	017.0-706R	8	14.5 – 17
16702497	017.5-706R	8	15 – 17.5
16700018	017.8-706R	10	14.6 – 17.8
16700019	018.0-706R	10	14.8 – 18
16700020	018.5-706R	10	15.3 – 18.5

ORDER INFORMATION PG 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 7 mm, thickness **0.6 mm (706R)**			
16700110	019.2-706R	10	16.0 – 19.2
16702498	019.8-706R	10	16.6 – 19.8
16700024	021.0-706R	10	17.8 – 21.0
16700026	022.6-706R	10	19.4 – 22.6
16700028	023.5-706R	10	20.3 – 23.5
16700029	024.1-706R	10	20.9 – 24.1
16700031	025.6-706R	10	22.4 – 25.6
16700033	027.1-706R	10	23.9 – 27.1
16700035	028.6-706R	10	25.4 – 28.6
16702047	030.1-706R	10	26.9 – 30.1
16700039	030.8-706R	10	27.6 – 30.8
16705637	031.6-706R	10	28.4 – 31.6
16704967	033.1-706R	10	29.9 – 33.1
16704169	034.6-706R	10	31.4 – 34.6
16705134	036.1-706R	10	32.9 – 36.1
16704963	037.6-706R	10	34.4 – 37.6
16705000	038.1-706R	10	34.9 – 38.1
16705322	039.6-706R	10	36.4 – 39.6
16705989	041.0-706R	10	37.8 – 41.0
16705828	042.5-706R	10	39.3 – 42.5
16703640	044.0-706R	10	40.8 – 44.0
16704685	045.5-706R	10	42.3 – 45.5
16705181	047.0-706R	10	43.8 – 47.0
16704968	048.5-706R	10	45.3 – 48.5
16706325	050.0-706R	10	46.8 – 50.0
16704687	051.5-706R	10	48.3 – 51.5
16705323	053.0-706R	10	49.8 – 53.0
16703053	054.5-706R	10	51.3 – 54.5
16704688	056.0-706R	10	52.8 – 56.0
16703054	057.5-706R	10	54.3 – 57.5
16704689	059.0-706R	10	55.8 – 59.0
16704896	060.5-706R	10	57.3 – 60.5
16703055	062.0-706R	10	58.8 – 62.0
16707160	063.5-706R	10	60.3 – 63.5
16705708	065.0-706R	10	61.8 – 65.0
16705086	066.5-706R	10	63.3 – 66.5
16704690	068.0-706R	10	64.8 – 68.0
16706640	069.5-706R	10	66.3 – 69.5
16705475	071.0-706R	10	67.8 – 71.0
16707567	072.5-706R	10	69.3 – 72.5
16704721	074.0-706R	10	70.8 – 74.0
16705655	075.5-706R	10	72.3 – 75.5

Band width 7 mm, thickness **0.6 mm (706R)**			
16703767	077.0-706R	10	73.8 – 77.0
16705459	078.5-706R	10	75.3 – 78.5
16709057	080.0-706R	10	76.8 – 80.0
16703763	081.5-706R	10	78.3 – 81.5
16703245	083.0-706R	10	79.8 – 83.0
16705392	084.5-706R	10	81.3 – 84.5
16703262	086.0-706R	10	82.8 – 86.0
16709058	087.5-706R	10	84.3 – 87.5
16706418	089.0-706R	10	85.8 – 89.0
16703815	090.5-706R	10	87.3 – 90.5
16703199	092.0-706R	10	88.8 – 92.0
16703689	093.5-706R	10	90.3 – 93.5
16703838	095.0-706R	10	91.8 – 95.0
16703836	096.5-706R	10	93.3 – 96.5
16709059	098.0-706R	10	94.8 – 98.0
16709060	099.5-706R	10	96.3 – 99.5
16702444	101.0-706R	10	97.8 – 101.0
16703768	102.5-706R	10	99.3 – 102.5
16703769	104.0-706R	10	100.8 – 104.0
16709061	105.5-706R	10	102.3 – 105.5
16709062	107.0-706R	10	103.8 – 107.0
16709063	108.5-706R	10	105.3 – 108.5
16709064	110.0-706R	10	106.8 – 110.0
16709065	111.5-706R	10	108.3 – 111.5
16709066	113.0-706R	10	109.8 – 113.0
16709067	114.5-706R	10	111.3 – 114.5
16709068	116.0-706R	10	112.8 – 116.0
16709069	117.5-706R	10	114.3 – 117.5
16707226	119.0-706R	10	115.8 – 119.0
16706230	120.5-706R	10	117.3 – 120.5

ORDER INFORMATION PG 167

Item No.	Ref. No.	Ear width inside (mm)	Size range (mm)
Band width 9 mm, thickness **0.6 mm (906R)**			
16709194	021.0-906R	10	17.8 – 21.0
16709195	022.6-906R	10	19.4 – 22.6
16705906	023.5-906R	10	20.3 – 23.5
16708908	024.1-906R	10	20.9 – 24.1
16709196	025.6-906R	10	22.4 – 25.6
16709197	027.1-906R	10	23.9 – 27.1
16709198	028.6-906R	10	25.4 – 28.6
16707087	030.1-906R	10	26.9 – 30.1
16709199	030.8-906R	10	27.6 – 30.8
16709070	031.6-906R	10	28.4 – 31.6
16709071	033.1-906R	10	29.9 – 33.1
16709072	034.6-906R	10	31.4 – 34.6
16707327	036.1-906R	10	32.9 – 36.1
16708398	037.6-906R	10	34.4 – 37.6
16707847	038.1-906R	10	34.9 – 38.1
16707933	039.6-906R	10	36.4 – 39.6
16707934	041.0-906R	10	37.8 – 41.0
16708509	042.5-906R	10	39.3 – 42.5
16707371	044.0-906R	10	40.8 – 44.0
16707848	045.5-906R	10	42.3 – 45.5
16707935	047.0-906R	10	43.8 – 47.0
16708937	048.5-906R	10	45.3 – 48.5
16709074	050.0-906R	10	46.8 – 50.0
16709075	051.5-906R	10	48.3 – 51.5
16709076	053.0-906R	10	49.8 – 53.0
16709077	054.5-906R	10	51.3 – 54.5
16709078	056.0-906R	10	52.8 – 56.0
16709079	057.5-906R	10	54.3 – 57.5
16709081	059.0-906R	10	55.8 – 59.0
16707289	060.5-906R	10	57.3 – 60.5
16708097	062.0-906R	10	58.5 – 62.0
16709082	063.5-906R	10	60.3 – 63.5
16706262	065.0-906R	10	61.8 – 65.0
16709083	066.5-906R	10	63.3 – 66.5
16707630	068.0-906R	10	64.8 – 68.0
16707724	069.5-906R	10	66.3 – 69.5
16709085	071.0-906R	10	67.8 – 71.0
16708638	072.5-906R	10	69.3 – 72.5
16709086	074.0-906R	10	70.8 – 74.0
16709087	075.5-906R	10	72.3 – 75.5
16709088	077.0-906R	10	73.8 – 77.0
16709089	078.5-906R	10	75.3 – 78.5

Band width 9 mm, thickness **0.6 mm (906R)**			
16709090	080.0-906R	10	76.8 – 80.0
16709091	081.5-906R	10	78.3 – 81.5
16708804	083.0-906R	10	79.8 – 83.0
16709092	084.5-906R	10	81.3 – 84.5
16709093	086.0-906R	10	82.8 – 86.0
16709094	087.5-906R	10	84.3 – 87.5
16709095	089.0-906R	10	85.8 – 89.0
16709096	090.5-906R	10	87.3 – 90.5
16709097	092.0-906R	10	88.8 – 92.0
16708695	093.5-906R	10	90.3 – 93.5
16708706	095.0-906R	10	91.8 – 95.0
16709200	096.5-906R	10	93.3 – 96.5
16708265	098.0-906R	10	94.8 – 98.0
16707709	099.5-906R	10	96.3 – 99.5
16709098	101.0-906R	10	97.8 – 101.0
16709099	102.5-906R	10	99.3 – 102.5
16709101	104.0-906R	10	100.8 – 104.0
16709102	105.5-906R	10	102.3 – 105.5
16709103	107.0-906R	10	103.8 – 107.0
16709104	108.5-906R	10	105.3 – 108.5
16709106	110.0-906R	10	106.8 – 110.0
16709107	111.5-906R	10	108.3 – 111.5
16709108	113.0-906R	10	109.8 – 113.0
16709109	114.5-906R	10	111.3 – 114.5
16709110	116.0-906R	10	112.8 – 116.0
16709111	117.5-906R	10	114.3 – 117.5
16709112	119.0-906R	10	115.8 – 119.0
16709113	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.

PEX CONNECTING SOLUTIONS FOR MARKETS COMPLIANT WITH STANDARD ASTM[1] F877/F2098

PG 167 PEX (conform to ASTM F 877/2098)
The specified clamps are suitable for fast and secure connections of PEX[2] 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[3] 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.

[1] ASTM = American Society for Testing and Materials
[2] PEX = Polyethylene cross-linked
[3] NSF = National Sanitation Foundation

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

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 F877/2098) with PEX pipes, the clamps must be completely closed. Clamps shall be installed using the tools and calibration methods recommended by the clamp manufacturer.

INSTALLATION DATA

PEX tube (inch[1])	Material dimension (mm)	Size (mm)	Closing force max. (N)	Installation tools not force-monitored, manual[2]	Installation tools force-monitored[2]: Pneumatic	Cordless
3/8	7 x 0.6	13.3	2200	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 20
1/2	7 x 0.8	17.5	3900	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 20
5/8	7 x 0.8	20.8	3900	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 20
3/4	9 x 0.8	23.3	5000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000	CP 20
1	10 x 1.0	29.6	7000	2-Handle Ratchet Pincer and 3-Handle Ratchet Pincer	HO ME 5000 – 7000	CP 20

[1] 1 inch (Zoll) = 25.4 mm
[2] Further information on www.oetiker.com

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

Standard PEX clamp item no.	PEXGrip® clamp item no.	Ref. No.	Ear width (mm)	PEX tube (inch[1])
16703334	**167**08503	13.3 – 706 R	8	3/8
16703335	**167**07872	17.5 – 708 R	10	1/2
16705571	**167**08504	20.8 – 708 R	10	5/8
16703336	**167**07955	23.3 – 908 R	10	3/4
16704150	**167**08152	29.6 –1010 R	10	1