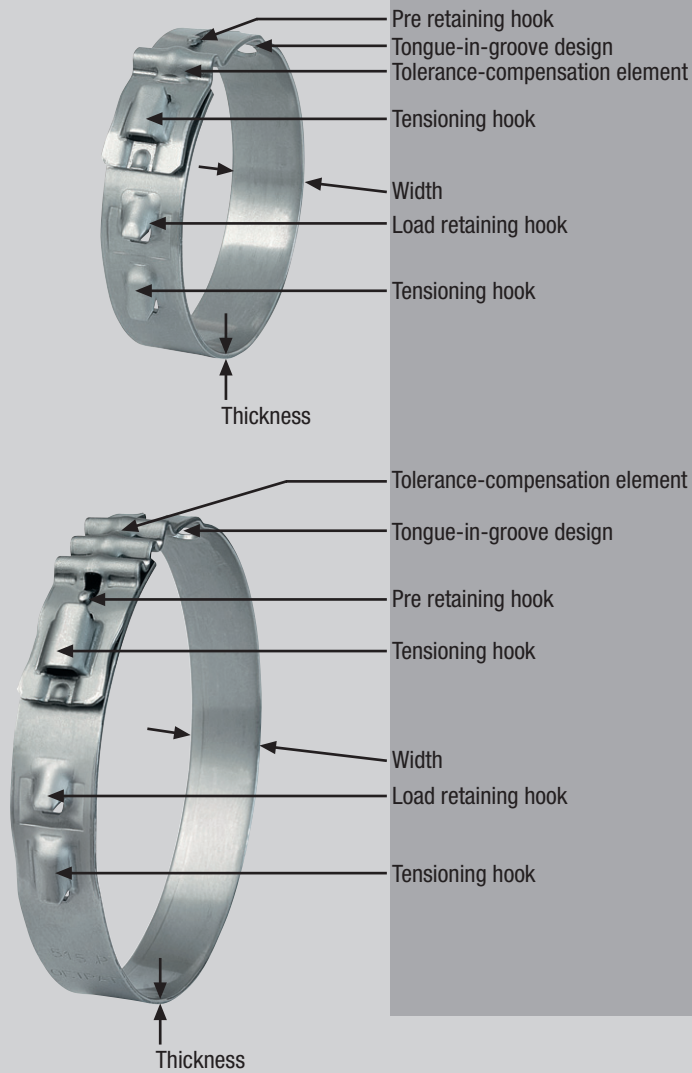


# OETIKER

## Technical Data Sheet

### Stepless® Low Profile Clamps 192

Product Group **192**



Connecting Technology



# Technical Data

## Stepless® Low Profile Clamps 192

Product Group **192**



OETIKER Stepless® Low Profile Clamps 192, with tolerance compensation feature accommodate dimensional variations in the parts being clamped, also when applying high radial forces. In addition, the flexible tolerance-compensation element, consisting of up to three convolutes in the strip material is designed to allow for minor diameter changes caused by temperature variations and/or the effects of vibration.

Besides rotating applications, OETIKER Stepless® Low Profile Clamps 192 are suitable for securing the dust covers on shock absorbers, cooling and heating systems, air-springing systems, etc. The Product Group 192 is customised for specific applications and is produced with small diameter graduations. They are installed using special OETIKER tooling to ensure optimum connections in numerous industrial applications.

#### Note on ordering:

Low Profile Clamps 192 are identified with the nominal closed diameter, e.g. 69.5 – for a closed diameter of 69.5 mm.

#### Material

– **192** Stainless Steel, Material no. 1.4301 / UNS S30400

Size range	Width x Thickness	Tol. Element
19.5 - 60.0 mm	10.0 x 0.8 mm	1-time
40.0 - 120.5 mm	10.0 x 0.8 mm	3-times

Available on request in 0.5 mm diameter graduations. Specific diameters can only be supplied when an appropriate minimum quantity is ordered.

#### Installation

See page 6.

The information provided in this data sheet is intended for reference purposes only and should not be considered a specification. OETIKER invites customers to submit samples with relevant application information, to determine the best suited clamp product and installation method.

#### Features

- Tolerance-compensation convolutes allow for variations in component tolerances
- Designed to allow for minor diameter changes caused by temperature variations and/or the effects of vibrations
- 360° Stepless® Design – no steps or overlaps in inner circumference
- Low installed height – minimum space requirement
- Minimal imbalance on rotating parts
- Specially formed strip edges reduce the risk of damage to the part being clamped
- Simple, safe installation

#### Installation tools

OETIKER supplies pincers for manual closure.



OETIKER recommends pneumatic pincers with electronic gauging, to ensure repeatable assembly and uniform closure, particularly for mass production applications.



The innovative “Electronically Controlled Pneumatic Power Tool OETIKER ELK 01” guarantees reliable installation with electronic monitoring of all necessary parameters. It practically eliminates the possibility of any unnoticed defective closures.



For further information, please see the OETIKER Tool Catalogue.

# Technical Data

# Stepless® Low Profile Clamps 192

Product Group **192**

**Item No.**      **Nominal, closed**  
**Ø (mm) \***      **Ø upon**  
**delivery (mm)**

**Item No.**      **Nominal, closed**  
**Ø (mm) \***      **Ø upon**  
**delivery (mm)**

**Item No.**      **Nominal, closed**  
**Ø (mm) \***      **Ø upon**  
**delivery (mm)**

## Tolerance compensation element 1-time

### Width 10 mm, thickness 0.8 mm

19200686	19.5	22.5
19200684	20	23
19200685	20.5	23.5
19200688	21	24
19200733	21.5	24.5
19200734	22	25
19200244	22.5	25.5
19200245	23	26
19200255	23.5	26.5
19200263	24	27
19200368	24.5	27.5
19200369	25	28
19200370	25.5	28.5
19200371	26	29
19200372	26.5	29.5
19200253	27	30
19200322	27.5	30.5
19200373	28	31
19200374	28.5	31.5
19200268	29	32
19200375	29.5	32.5
19200376	30	33
19200377	30.5	33.5
19200378	31	34
19200379	31.5	34.5
19200380	32	35
19200381	32.5	35.5
19200333	33	36
19200335	33.5	36.5
19200382	34	37
19200383	34.5	37.5
19200332	35	38
19200384	35.5	38.5
19200385	36	39
19200386	36.5	39.5
19200358	37	40
19200387	37.5	40.5
19200388	38	41
19200389	38.5	41.5
19200390	39	42
19200391	39.5	42.5
19200392	40	43
19200393	40.5	43.5
19200394	41	44
19200395	41.5	44.5
19200396	42	45
19200397	42.5	45.5
19200398	43	46
19200399	43.5	46.5

## Tolerance compensation element 1-time

### Width 10 mm, thickness 0.8 mm

19200400	44	47
19200401	44.5	47.5
19200402	45	48
19200403	45.5	48.5
19200404	46	49
19200405	46.5	49.5
19200406	47	50
19200407	47.5	50.5
19200408	48	51
19200409	48.5	51.5
19200410	49	52
19200411	49.5	52.5
19200412	50	53
19200413	50.5	53.5
19200414	51	54
19200415	51.5	54.5
19200416	52	55
19200417	52.5	55.5
19200418	53	56
19200419	53.5	56.5
19200420	54	57
19200421	54.5	57.5
19200422	55	58
19200423	55.5	58.5
19200424	56	59
19200425	56.5	59.5
19200426	57	60
19200427	57.5	60.5
19200428	58	61
19200429	58.5	61.5
19200430	59	62
19200431	59.5	62.5
19200432	60	63

Optionally available with enlarged as-supplied diameter (greater closing travel).

\* Without affecting the tolerance-compensation element (free state). The availability of individual diameters may require a sufficient minimum quantity.

## Tolerance compensation element 3-times

### Width 10 mm, thickness 0.8 mm

19200454	40	44.5
19200455	40.5	45
19200350	41	45.5
19200352	41.5	46
19200456	42	46.5
19200457	42.5	47
19200458	43	47.5
19200459	43.5	48
19200460	44	48.5
19200461	44.5	49
19200462	45	49.5
19200463	45.5	50
19200464	46	50.5
19200465	46.5	51
19200466	47	51.5
19200467	47.5	52
19200468	48	52.5
19200469	48.5	53
19200470	49	53.5
19200471	49.5	54
19200472	50	54.5
19200473	50.5	55
19200474	51	55.5
19200339	51.5	56
19200340	52	56.5
19200475	52.5	57
19200476	53	57.5
19200477	53.5	58
19200478	54	58.5
19200479	54.5	59
19200480	55	59.5
19200481	55.5	60
19200482	56	60.5
19200483	56.5	61
19200484	57	61.5
19200485	57.5	62
19200486	58	62.5
19200487	58.5	63
19200488	59	63.5
19200489	59.5	64
19200490	60	64.5
19200491	60.5	65
19200492	61	65.5
19200493	61.5	66
19200494	62	66.5
19200495	62.5	67
19200496	63	67.5
19200341	63.5	68
19200342	64	68.5

# Technical Data

## Stepless® Low Profile Clamps 192

Product Group **192**



**Item No.**      **Nominal, closed**  
**Ø (mm) \***

**Ø upon delivery (mm)**

**Item No.**      **Nominal, closed**  
**Ø (mm) \***

**Ø upon delivery (mm)**

**Item No.**      **Nominal, closed**  
**Ø (mm) \***

**Ø upon delivery (mm)**

### Tolerance compensation element 3-times

#### Width 10 mm, thickness 0.8 mm

19200497	64.5	69
19200498	65	69.5
19200499	65.5	70
19200500	66	70.5
19200501	66.5	71
19200502	67	71.5
19200503	67.5	72
19200504	68	72.5
19200505	68.5	73
19200506	69	73.5
19200507	69.5	74
19200508	70	74.5
19200509	70.5	75
19200510	71	75.5
19200511	71.5	76
19200512	72	76.5
19200513	72.5	77
19200514	73	77.5
19200515	73.5	78
19200516	74	78.5
19200517	74.5	79
19200518	75	79.5
19200519	75.5	80
19200520	76	80.5
19200521	76.5	81
19200522	77	81.5
19200523	77.5	82
19200524	78	82.5
19200525	78.5	83
19200526	79	83.5
19200527	79.5	84
19200528	80	84.5
19200529	80.5	85
19200530	81	85.5
19200531	81.5	86
19200532	82	86.5
19200533	82.5	87
19200534	83	87.5
19200535	83.5	88
19200536	84	88.5
19200537	84.5	89
19200538	85	89.5
19200539	85.5	90
19200540	86	90.5
19200541	86.5	91
19200542	87	91.5
19200543	87.5	92
19200544	88	92.5
19200545	88.5	93

### Tolerance compensation element 3-times

#### Width 10 mm, thickness 0.8 mm

19200546	89	93.5
19200547	89.5	94
19200548	90	94.5
19200362	90.5	95
19200549	91	95.5
19200550	91.5	96
19200551	92	96.5
19200552	92.5	97
19200553	93	97.5
19200554	93.5	98
19200555	94	98.5
19200556	94.5	99
19200557	95	99.5
19200558	95.5	100
19200559	96	100.5
19200560	96.5	101
19200561	97	101.5
19200562	97.5	102
19200563	98	102.5
19200564	98.5	103
19200565	99	103.5
19200566	99.5	104
19200567	100	104.5
19200568	100.5	105
19200569	101	105.5
19200570	101.5	106
19200571	102	106.5
19200572	102.5	107
19200573	103	107.5
19200343	103.5	108
19200348	104	108.5
19200574	104.5	109
19200575	105	109.5
19200576	105.5	110
19200577	106	110.5
19200578	106.5	111
19200579	107	111.5
19200580	107.5	112
19200581	108	112.5
19200582	108.5	113
19200583	109	113.5
19200584	109.5	114
19200585	110	114.5
19200586	110.5	115
19200587	111	115.5
19200588	111.5	116
19200589	112	116.5
19200590	112.5	117
19200591	113	117.5

### Tolerance compensation element 3-times

#### Width 10 mm, thickness 0.8 mm

19200592	113.5	118
19200593	114	118.5
19200594	114.5	119
19200595	115	119.5
19200596	115.5	120
19200597	116	120.5
19200598	116.5	121
19200599	117	121.5
19200600	117.5	122
19200601	118	122.5
19200602	118.5	123
19200603	119	123.5
19200604	119.5	124
19200605	120	124.5
19200606	120.5	125

\* Without affecting the tolerance-compensation element (free state). The availability of individual diameters may require a sufficient minimum quantity.

# Technical Data

# Stepless® Low Profile Clamps 192

Product Group **192**



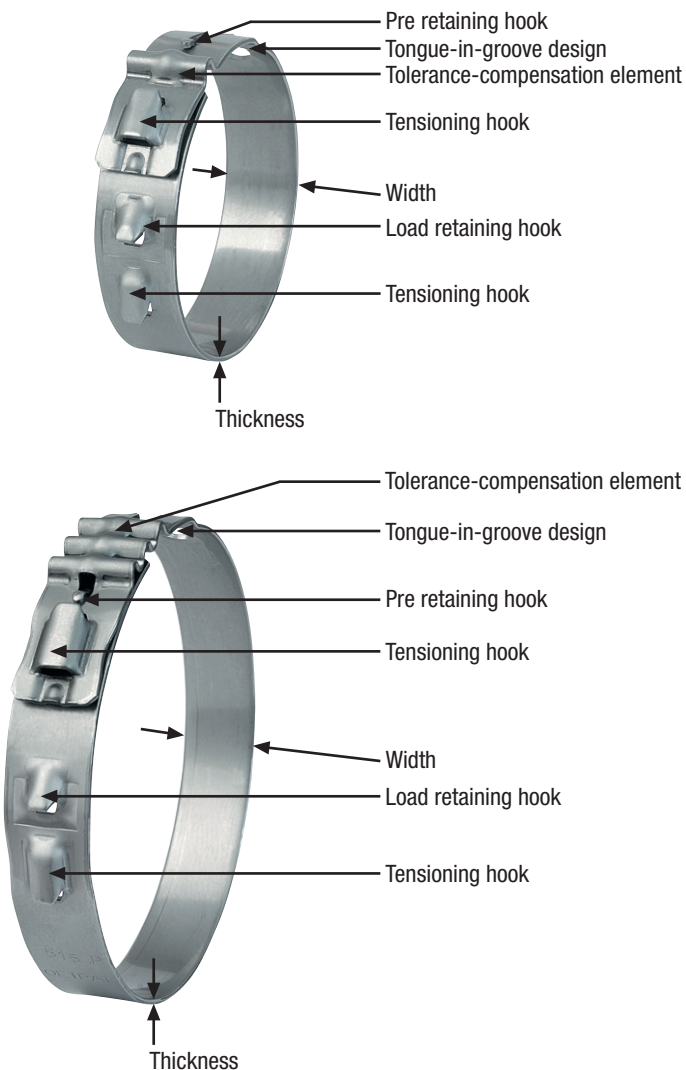
## 1.0 Material

OETIKER Stepless® Low Profile Clamps 192 are made from an austenitic grade of stainless steel. The primary composition being material no. 1.4301 / UNS S30400, an 18% chromium, 8% nickel alloy. The chemical composition and mechanical properties provide an exceptional combination of toughness and ductility, which are essential for clamp installation and performance. In addition, this material offers excellent resistance to a wide variety of corrosive environments.

### 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.

## 2.0 Clamp Design



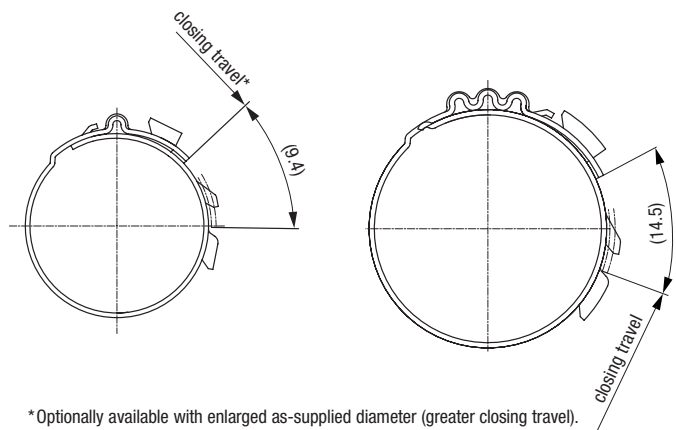
OETIKER Stepless® Low Profile Clamps 192 are produced in nominal band dimensions. The dimensions of the material used within the standard range are determined taking into account the required radial force, the nature of the application and the need to maintain sealing and /or retaining properties under 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.

### Tensioning hooks

The tensioning hooks are the closing elements of the Stepless® Low Profile Clamp 192. An OETIKER closing tool engages in the tensioning hooks, and tool operation reduces the diameter until the condition is reached at which the internal contour of the tensioning hook on the overlapping end of the clamp engages automatically in the load-retaining hook.

The diameter reduction of the clamp is substantially proportional to the closing travel, but subject to slight variations, depending on the degree to which tolerance compensation is required and the required radial force. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. } \emptyset \text{ Reduktion} = \frac{\text{closing travel}}{\pi}$$



### 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.

The result is the effective clamping and sealing of a variety malleable materials, regardless of the composition or dimensional variation.

# Technical Data

## Stepless® Low Profile Clamps 192

Product Group **192**

### Tolerance compensation

The tolerance-compensation convolutes are activated when the compressed diameter of the application is greater than the nominal diameter of the clamp. When the resistance against the clamp exceeds the strength of the formed convolutes, elongation occurs to enable successful engagement of the tensioning and retaining hooks.

The flexible effect of the convolutes has the potential to accommodate diameter changes due to the effects of temperature changes and vibration.

As a rule, the nominal diameter of an OETIKER Stepless® Low Profile Clamp 192 should be selected to enable the optimum hose or seal compression at the minimum assembly diameter. In the event of a maximum assembly installation, the convolutes must be capable of elongating to absorb the diameter increase while maintaining the ability to achieve the interlock engagement, taking into account the maximum permitted pincer force and the amount of elongation the convolutes can withstand. The capability of the tolerance-compensation element, the properties and dimensional tolerance of the materials being joined all directly affect the overall functionality of the connection.

### 3.0 Assembly Recommendations

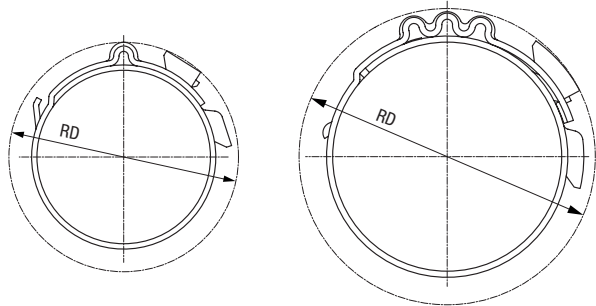
These clamps can be installed using manual pincers especially developed to be compatible for this clamp design, or alternatively pneumatic pincers for high volume installations. To close a clamp, the pincer jaws must be engaged within both tensioning hooks. By operating the pneumatic tool or closing the manual pincer, the simultaneous movement of the two tensioning hooks reduces the diameter of the Stepless® Low Profile Clamp 192 until the effective closed diameter is achieved. The geometry of the Stepless® Low Profile Clamp 192 is such that, on reaching this position, the internal contour of the tensioning hook on the overlapping end of the clamp engages automatically in the load retaining hook.

The surface pressure generated is fundamentally dependent on the selection criteria as related to the diameter and materials of the parts being clamped. Sealing performance is derived mainly from the restoring force of the compressed elastic material combined with tension from the tolerance-compensation elements.

Complete process monitoring, including 100% documentation is available using the "Electronically Controlled Pneumatic Power Tool OETIKER ELK 01".

### 4.0 Rotation diameter

The rotation diameter (RD) of an assembled clamp can be critical design information for applications that turn within close proximity of adjacent components.



Accurate Information regarding rotation diameter can be provided upon request.

Material-dimension	Manual closure tool*	Recommended pneumatic pincer**
10.0 x 0.8 mm	14100134	HO 5000 EL / HO 7000 EL

\* 14100134 Manual pincer for Stepless® Low Profile Clamps 192.

\*\* With appropriate pincer head – please see Tool Catalogue and closing force setting. Please provide us with appropriate sample parts and comprehensive information about the application.

The addresses of all OETIKER companies and agencies are included on our website.

[www.oetiker.com](http://www.oetiker.com)



Connecting Technology

OETIKER has been developing connecting technology for over 60 years. OETIKER products are manufactured by its own companies in line with ISO/TS 16949 and sold worldwide in over 40 countries. Numerous patents are proof of continuous innovation.

Headquarters  
SWITZERLAND  
 **Hans Oetiker AG**  
**Maschinen- und**  
**Apparatefabrik**  
Oberdorfstrasse 21  
CH-8812 Horgen (Zürich)  
Tel. +41 44 728 55 55  
Fax +41 44 728 55 15  
e-mail info@ch.oetiker.com

## OETIKER International

OETIKER INTERNATIONAL			
<b>AUSTRIA</b>	3423 St. Andrä-Wördern	Tel. +43 22 42 33 994-0	info@at.oetiker.com
<b>BELGIUM</b>	9070 Heusden/Destelbergen (Gent)	Tel. +32 9 252 25 55	info@be.oetiker.com
<b>CANADA</b>	Alliston, Ontario L9R 1W7	Tel. +1 705 435 4394	info@ca.oetiker.com
<b>P.R. CHINA</b>	Tianjin 300400	Tel. +86 22 26 97 11 83	info@cn.oetiker.com
<b>CZECH REPUBLIC</b>	37833 Nová Bystrice	Tel. +420 384 386513	info@cz.oetiker.com
<b>FRANCE</b>	77348 Pontault-Combault Cedex	Tel. +33 1 60 29 90 39	info@fr.oetiker.com
<b>GERMANY</b>	79346 Emdingen a.K. 78727 Oberndorf a.N.	Tel. +49 76 42 6 84-0 Tel. +49 74 23 87 70-0	info@de.oetiker.com info@allert.oetiker.com
<b>HUNGARY</b>	9800 Vasvár	Tel. +36 94 370 630	info@hu.oetiker.com
<b>INDIA</b>	400071 Mumbai	Tel. +91 22 2529 1824	info@in.oetiker.com
<b>JAPAN</b>	Yokohama 224-0032	Tel. +81 45 949 3151	info@jp.oetiker.com
<b>NETHERLANDS</b>	6716 BT Ede	Tel. +31 318 63 71 71	info@nl.oetiker.com
<b>SLOVAKIA</b>	90851 Holic	Tel. +421 34 66 83 368	info@sk.oetiker.com
<b>SPAIN</b>	11500 El Puerto de Santa María (Cádiz)	Tel. +34 956 86 04 40	info@es.oetiker.com
<b>U.K.</b>	Horsham, Sussex, RH13 5PX	Tel. +44 1403 26 04 78	info@uk.oetiker.com
<b>USA</b>	Marlette, Michigan, 48453-0217	Tel. +1 989 635 3621	info@us.oetiker.com

