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**SPECS &
INFORMATION**

Technical Data Sheet

Stepless® Low Profile Clamps

Product Group 168



Connecting Technology



Reusability: can be repeatedly opened and re-installed

360° Stepless®: uniform 360° compression or uniform surface pressure

Low installed height: minimum space requirement, low imbalance on rotating parts

Load retaining hooks: visual indication that clamp is correctly installed

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

Stepless® Low Profile Clamps Product Group 168

Material

PG 168 Stainless steel material No. 1.4301 or UNS S30400

Alternative materials available on request.

Corrosion resistance according to DIN EN ISO 9227

PG 168 ≥ 1000 h

Series

Nominal diameter	width x thickness
10.5 – 19.0 mm	9.0 x 0.5 mm
19.5 – 110.0 mm	7.0 x 0.6 mm
25.0 – 110.0 mm	9.0 x 0.6 mm
60.0 – 120.5 mm	10.0 x 0.6 mm

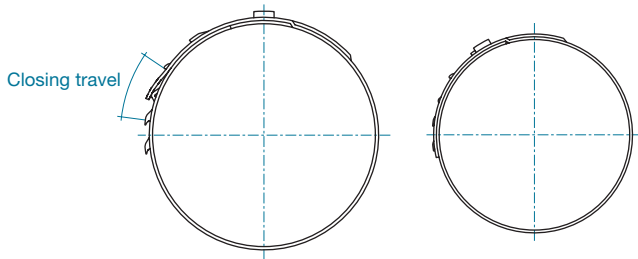
Some sizes are only available if an appropriate minimum quantity is ordered.

Stepless® Low Profile Clamps are produced in several nominal widths and thicknesses. The dimensions of the material used for 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 hardness of the soft material and the desired compression are important factors when calculating the appropriate clamp diameter.

Tensioning hook and tunnel

The tensioning hook and tunnel have been developed to withstand a maximum closing force of 2000 N. With the use of an Oetiker installation tool, the clamp is reduced in diameter until the interlock position is achieved. The diameter reduction of the clamp is proportional to the closing travel. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{closing travel}}{\pi}$$



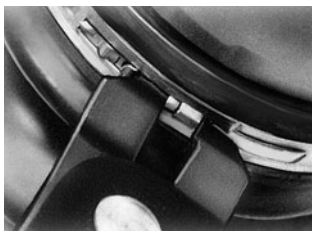
Assembly Recommendations

Using a hand tool, or a pneumatic tool specifically designed for high volume production, locate the jaw tips in the tensioning hook and tunnel.

Activating the pneumatic tool, or closing the hand tool, simultaneously draws the two features together, reducing the inside diameter of the clamp. To maintain this reduced diameter, the apertures are depressed over the load retaining hooks and the applied load exerted by the tool is released, so that the hooks engage in the appropriate apertures.

The Stepless® Low Profile Clamp provides a constant, accurate, inside diameter after installation, but, unlike Stepless® Ear Clamps PG 167, will not compensate for variations in component tolerance or accommodate the effects of thermal expansion.

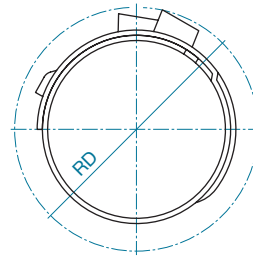
The sealing pressure beneath the clamp is dependent on the compression factor established when determining the appropriate clamp diameter and the resistance to thermal “set” of the soft material.



Complete process monitoring, including 100% documentation is available using the Electronically Controlled pneumatic power tool Oetiker 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. The following list gives rotation diameters for various band sizes and product designs:



- RD for 905RWW = inside diameter +7.2 mm
- RD for 706R = inside diameter +6.0 mm
- RD for 906R = inside diameter +6.0 mm
- RD for 1006R = inside diameter +6.3 mm

Reuseability

Oetiker Stepless® Low Profile Clamps are reusable. They can be repeatedly opened and reinstalled – for example in the automotive industry at maintenance and service intervals. They can be installed both axially and radially.

Note on ordering

In contrast to ear clamps, Stepless® Low Profile Clamps are identified with the nominal closed diameter, e.g. 195 for a closed and installed diameter of 19.5 mm.

Material dimensions	Manual pincer*	Recommended pneumatic pincer**
9 x 0.5 mm	14100030	HO 3000
7 x 0.6 mm	14100030	HO 3000
9 x 0.6 mm	14100030	HO 3000
10 x 0.6 mm	14100030	HO 3000

* 14100030 Manual pincer for Stepless® Low Profile Clamps 7 mm, 9mm and 10 mm wide

** With appropriate pincer head

Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)	Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.5 mm (905RWV)				Band width 7 mm, thickness 0.6 mm (706R)			
16800561	0105-905RWV	13.3	10.5	16800312	0765-706R	80.9	76.5
16800562	0110-905RWV	13.8	11	16800313	0770-706R	81.4	77
16800563	0115-905RWV	14.3	11.5	16800314	0775-706R	81.9	77.5
16800564	0120-905RWV	14.8	12	16800315	0780-706R	82.4	78
16800565	0125-905RWV	15.3	12.5	16800316	0785-706R	82.9	78.5
16800566	0130-905RWV	15.8	13	16800317	0790-706R	83.4	79
16800567	0135-905RWV	16.3	13.5	16800318	0795-706R	83.9	79.5
16800568	0140-905RWV	16.8	14	16800319	0800-706R	84.4	80
16800569	0145-905RWV	17.3	14.5	16800320	0805-706R	84.9	80.5
16800570	0150-905RWV	17.8	15	16800321	0810-706R	85.4	81
16800571	0155-905RWV	18.3	15.5	16800322	0815-706R	85.9	81.5
16800572	0160-905RWV	18.8	16	16800323	0820-706R	86.4	82
16800573	0165-905RWV	19.3	16.5	16800324	0825-706R	86.9	82.5
16800574	0170-905RWV	19.8	17	16800325	0830-706R	87.4	83
16802321	0175-905RWV	20.3	17.5	16800326	0835-706R	87.9	83.5
16800575	0180-905RWV	20.8	18	16800327	0840-706R	88.4	84
16803070	0185-905RWV	21.3	18.5	16800328	0845-706R	88.9	84.5
16800576	0190-905RWV	21.8	19	16800329	0850-706R	89.4	85
Band width 7 mm, thickness 0.6 mm (706R)				16800330	0855-706R	89.9	85.5
16800278	0600-706R	64.4	60	16800331	0860-706R	90.4	86
16800279	0605-706R	64.9	60.5	16800332	0865-706R	90.9	86.5
16800281	0610-706R	65.4	61	16800333	0870-706R	91.4	87
16800282	0615-706R	65.9	61.5	16800334	0875-706R	91.9	87.5
16800283	0620-706R	66.4	62	16800335	0880-706R	92.4	88
16800284	0625-706R	66.9	62.5	16800336	0885-706R	92.9	88.5
16800285	0630-706R	67.4	63	16800337	0890-706R	93.4	89
16800286	0635-706R	67.9	63.5	16800338	0895-706R	93.9	89.5
16800287	0640-706R	68.4	64	16800339	0900-706R	94.4	90
16800288	0645-706R	68.9	64.5	16800340	0905-706R	94.9	90.5
16800289	0650-706R	69.4	65	16800341	0910-706R	95.4	91
16800290	0655-706R	69.9	65.5	16800342	0915-706R	95.9	91.5
16800291	0660-706R	70.4	66	16800343	0920-706R	96.4	92
16800292	0665-706R	70.9	66.5	16800344	0925-706R	96.9	92.5
16800293	0670-706R	71.4	67	16800345	0930-706R	97.4	93
16800294	0675-706R	71.9	67.5	16800346	0935-706R	97.9	93.5
16800295	0680-706R	72.4	68	16800347	0940-706R	98.4	94
16800296	0685-706R	72.9	68.5	16800348	0945-706R	98.9	94.5
16800297	0690-706R	73.4	69	16800349	0950-706R	99.4	95
16800298	0695-706R	73.9	69.5	16800350	0955-706R	99.9	95.5
16800299	0700-706R	74.4	70	16800351	0960-706R	100.4	96
16800300	0705-706R	74.9	70.5	16800352	0965-706R	100.9	96.5
16800301	0710-706R	75.4	71	16800353	0970-706R	101.4	97
16800302	0715-706R	75.9	71.5	16800354	0975-706R	101.9	97.5
16800303	0720-706R	76.4	72	16800355	0980-706R	102.4	98
16800304	0725-706R	76.9	72.5	16800356	0985-706R	102.9	98.5
16800305	0730-706R	77.4	73	16800357	0990-706R	103.4	99
16800306	0735-706R	77.9	73.5	16800358	0995-706R	103.9	99.5
16800307	0740-706R	78.4	74	16800359	1000-706R	104.4	100
16800308	0745-706R	78.9	74.5	16800360	1005-706R	104.9	100.5
16800309	0750-706R	79.4	75	16800361	1010-706R	105.4	101
16800310	0755-706R	79.9	75.5	16800362	1015-706R	105.9	101.5
16800311	0760-706R	80.4	76	16800363	1020-706R	106.4	102
				16800364	1025-706R	106.9	102.5
				16800365	1030-706R	107.4	103

Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
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Band width 7 mm, thickness 0.6 mm (706R)

16800366	1035-706R	107.9	103.5
16800367	1040-706R	108.4	104
16800368	1045-706R	108.9	104.5
16800369	1050-706R	109.4	105
16800370	1055-706R	109.9	105.5
16800371	1060-706R	110.4	106
16800372	1065-706R	110.9	106.5
16800373	1070-706R	111.4	107
16800374	1075-706R	111.9	107.5
16800375	1080-706R	112.4	108
16800376	1085-706R	112.9	108.5
16800377	1090-706R	113.4	109
16800378	1095-706R	113.9	109.5
16800379	1100-706R	114.4	110

Band width 7 mm, thickness 0.6 mm (706R)

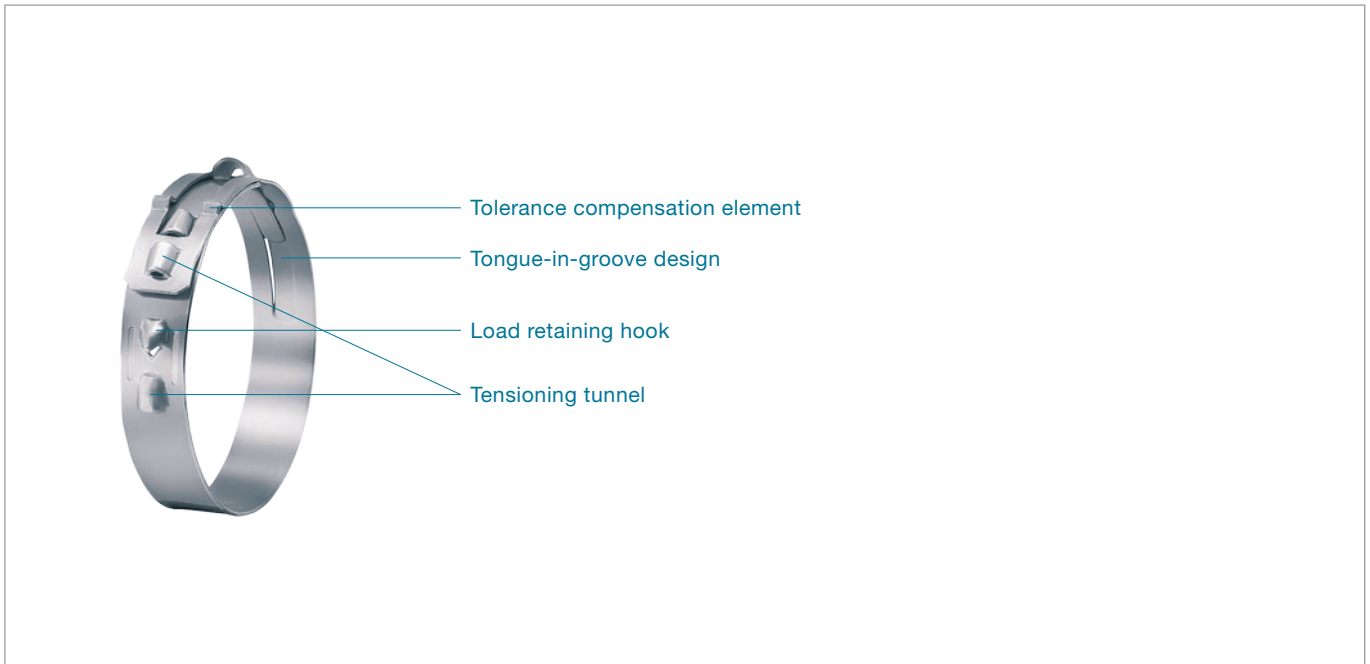
In the diameter range 19.5 mm to 59.5 mm, these clamps are available in 0.5 mm steps on request.

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

In the diameter range 25 mm to 110 mm, these clamps are available in 0.5 mm steps on request.

Band width 10 mm, thickness 0.6 mm (1006R)

In the diameter range 60 mm to 120.5 mm, these clamps are available in 0.5 mm steps on request.



Tolerance compensation: provides a degree of compensation for component tolerances

Reusability: can be repeatedly opened and re-installed

360° Stepless®: uniform 360° compression or uniform surface pressure

Low installed height: minimum space requirement, low imbalance on rotating parts

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

Stepless® Low Profile Clamps with tolerance compensation Product Group 168

Material

PG 168 Stainless steel, material no. 1.4301/UNS S30400

Alternative materials on request.

Corrosion resistance according to DIN EN ISO 9227

PG 168 ≥ 1000 h

Series

Nominal diameter	width x thickness
19.5 – 110.0 mm	9.0 x 0.6 mm

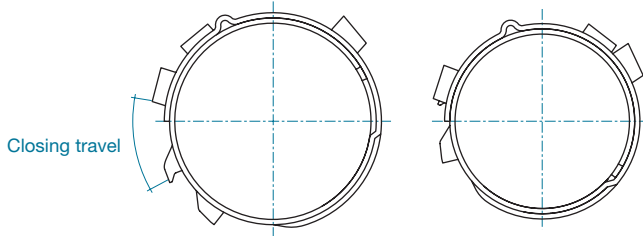
Some sizes are only available if an appropriate minimum quantity is ordered. Stepless® Low Profile Clamps with tolerance compensation are available in one standard band dimension.

When selecting the clamp diameter, the dimensions of mating components on which the clamp is to be installed must be accurately established to enable effective clamping. The durometer hardness of the soft material and desired compression are important factors when determining the appropriate clamp diameter.

Tensioning tunnels

The tensioning tunnels have been developed to withstand a maximum closing force of 2000 N. By using an Oetiker closing tool and applying it at the tensioning tunnels, the clamp is reduced in diameter until the load-retaining hook is located within the tunnel and engages with the leading edge. The diameter reduction of the clamp is proportional to the closing travel, but slightly influenced by elongation of the tolerance-compensation element under high loads. The theoretical maximum reduction in diameter is given by the formula:

$$\text{Max. diameter reduction} = \frac{\text{closing travel}}{\pi}$$



Tolerance compensation

The tolerance-compensating elements come into effect when the nominal diameter of the closed clamp cannot be achieved due to adjacent components being at the upper levels of the tolerance range. When parts being clamped have high durometer hardness values, the compensating element can be fully elongated providing the closed position is still achievable.

For optimum performance, a clamp diameter should be selected based on the theoretical lower tolerance limits of the components. Then, when the larger dimensional assembly is encountered, the tolerance compensation element is elongated to absorb the increased diameter and allow the load-retaining hook to engage in the tensioning tunnel. The application configuration, the physical properties of the materials being sealed and the required retention, are all critical factors when determining the overall functionality of the connection

Assembly Recommendations

These clamps can be closed manually using a specially developed hand tool, or a pneumatic pincer when large quantities are to be installed. To close the clamp, the tips of the pincer jaws must be inserted in the tensioning tunnel at the end of the overlap and in the tunnel next to the load-retaining hook. Operation of the closing tool reduces the diameter of the clamp to the position at which engagement of the closing hook occurs.

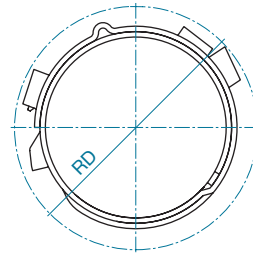
The design of Stepless® Low Profile Clamps with tolerance compensation is such that the inner contour of the tensioning tunnel on the end of the overlap, automatically engages with the load retaining hook when the correct position is achieved. In contrast to Stepless® low-profile clamps without tolerance compensation, they have the ability to accommodate minor variations in component tolerances during assembly and absorb diameter changes due to thermal expansion and contraction within the range of the compensating element.

As with other types of clamp, the sealing pressure beneath a clamp is a factor of the diameters and materials of the components under compression. The sealing properties of these clamps depends significantly on the opposing forces generated in the soft material of parts being secured, and the pre-loading of the tolerance-compensation element.

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

Rotation diameter

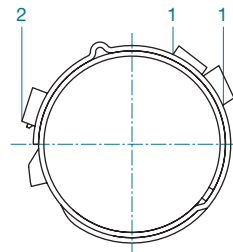
The Stepless® Low Profile Clamp with tolerance compensation has a low radial height, and was specifically developed for applications where space is restricted, while taking into account the need to accommodate the tolerances of parts being connected.



RD for 906RT8 = inside diameter +7.4 mm

Reusability

Oetiker Stepless® Low Profile Clamps with tolerance compensation are reusable to a limited extent. They can be repeatedly opened and reinstalled – for example in the automotive industry at maintenance and service intervals. They can be installed both axially and radially. To open a clamp, the pincer must be fitted to the two tunnels (1) and squeezed. The applied force has the effect of slightly reducing the diameter of the clamp, enabling the hook to disengage from the tensioning tunnel (2) on the overlapping end.



Note on ordering

In contrast to ear clamps, Stepless® Low Profile Clamps are identified with the nominal closed diameter, e.g. 195 for a closed and installed diameter of 19.5 mm.

Material dimensions	Manual pincer*	Recommended pneumatic pincer**
9 x 0.6 mm	14100109	HO 3000

* 14100109 Manual pincer for Stepless® Low Profile Clamps with tolerance compensation

** With appropriate pincer head

Order information

Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)	Item No.	Ref. No.	Ø upon delivery (mm)	Ø nominal, closed (mm)
Band width 9 mm, thickness 0.6 mm (906RT8)				Band width 9 mm, thickness 0.6 mm (906RT8)			
16802113	0195-906RT8	22	19.5	16802170	0480-906RT8	50.5	48
16802114	0200-906RT8	22.5	20	16802171	0485-906RT8	51	48.5
16802115	0205-906RT8	23	20.5	16802172	0490-906RT8	51.5	49
16802116	0210-906RT8	23.5	21	16802173	0495-906RT8	52	49.5
16802117	0215-906RT8	24	21.5	16802174	0500-906RT8	52.5	50
16802118	0220-906RT8	24.5	22	16802175	0505-906RT8	53	50.5
16802119	0225-906RT8	25	22.5	16802176	0510-906RT8	53.5	51
16802120	0230-906RT8	25.5	23	16802177	0515-906RT8	54	51.5
16802121	0235-906RT8	26	23.5	16802178	0520-906RT8	54.5	52
16802122	0240-906RT8	26.5	24	16802179	0525-906RT8	55	52.5
16802123	0245-906RT8	27	24.5	16802180	0530-906RT8	55.5	53
16802124	0250-906RT8	27.5	25	16802181	0535-906RT8	56	53.5
16802125	0255-906RT8	28	25.5	16802182	0540-906RT8	56.5	54
16802126	0260-906RT8	28.5	26	16802183	0545-906RT8	57	54.5
16802127	0265-906RT8	29	26.5	16802184	0550-906RT8	57.5	55
16802128	0270-906RT8	29.5	27	16802185	0555-906RT8	58	55.5
16802129	0275-906RT8	30	27.5	16802186	0560-906RT8	58.5	56
16802130	0280-906RT8	30.5	28	16802187	0565-906RT8	59	56.5
16802131	0285-906RT8	31	28.5	16802188	0570-906RT8	59.5	57
16802132	0290-906RT8	31.5	29	16802189	0575-906RT8	60	57.5
16802133	0295-906RT8	32	29.5	16802190	0580-906RT8	60.5	58
16802134	0300-906RT8	32.5	30	16802191	0585-906RT8	61	58.5
16802135	0305-906RT8	33	30.5	16802192	0590-906RT8	61.5	59
16802136	0310-906RT8	33.5	31	16801880	0595-906RT8	62	59.5
16802137	0315-906RT8	34	31.5	16802193	0600-906RT8	62.5	60
16802138	0320-906RT8	34.5	32	16802194	0605-906RT8	63	60.5
16802139	0325-906RT8	35	32.5	16802195	0610-906RT8	63.5	61
16802140	0330-906RT8	35.5	33	16802196	0615-906RT8	64	61.5
16802141	0335-906RT8	36	33.5	16802197	0620-906RT8	64.5	62
16802142	0340-906RT8	36.5	34	16802198	0625-906RT8	65	62.5
16802143	0345-906RT8	37	34.5	16802199	0630-906RT8	65.5	63
16802144	0350-906RT8	37.5	35	16802200	0635-906RT8	66	63.5
16802145	0355-906RT8	38	35.5	16802201	0640-906RT8	66.5	64
16802146	0360-906RT8	38.5	36	16802202	0645-906RT8	67	64.5
16802147	0365-906RT8	39	36.5	16801881	0650-906RT8	67.5	65
16802148	0370-906RT8	39.5	37	16802203	0655-906RT8	68	65.5
16802149	0375-906RT8	40	37.5	16802204	0660-906RT8	68.5	66
16802150	0380-906RT8	40.5	38	16802205	0665-906RT8	69	66.5
16802151	0385-906RT8	41	38.5	16802206	0670-906RT8	69.5	67
16802152	0390-906RT8	41.5	39	16802207	0675-906RT8	70	67.5
16802153	0395-906RT8	42	39.5	16802208	0680-906RT8	70.5	68
16802154	0400-906RT8	42.5	40	16802209	0685-906RT8	71	68.5
16802155	0405-906RT8	43	40.5	16802210	0690-906RT8	71.5	69
16802156	0410-906RT8	43.5	41	16802211	0695-906RT8	72	69.5
16802157	0415-906RT8	44	41.5	16802212	0700-906RT8	72.5	70
16802158	0420-906RT8	44.5	42	16802213	0705-906RT8	73	70.5
16802159	0425-906RT8	45	42.5	16802214	0710-906RT8	73.5	71
16802160	0430-906RT8	45.5	43	16802215	0715-906RT8	74	71.5
16802161	0435-906RT8	46	43.5	16802216	0720-906RT8	74.5	72
16802162	0440-906RT8	46.5	44	16802217	0725-906RT8	75	72.5
16802163	0445-906RT8	47	44.5	16802218	0730-906RT8	75.5	73
16802164	0450-906RT8	47.5	45	16802219	0735-906RT8	76	73.5
16802165	0455-906RT8	48	45.5	16802220	0740-906RT8	76.5	74
16802166	0460-906RT8	48.5	46	16802221	0745-906RT8	77	74.5
16802167	0465-906RT8	49	46.5	16802222	0750-906RT8	77.5	75
16802168	0470-906RT8	49.5	47	16802223	0755-906RT8	78	75.5
16802169	0475-906RT8	50	47.5	16802224	0760-906RT8	78.5	76

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



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