AGATHON
SWITZERLAND

Round Fine Centering for the mold construction

The development

Advantages

- Durability: for mass production
- Backlash-free for very precise mold alignment
- Shorter cycle times
- High initial load capacity at centering start
- No noticeable wear: can be used in clean rooms
- Lower total cost
- Excellent design freedom

Innovation
Precision and Durability

patent pending

How it is applied...

Round Fine Centering with preloaded roller units (patent pending) for demanding injection molding applications. Suitable for mass production and providing very precise mold tool alignment – the pre-centering enables the plates to gently close (synchronous closed), the injection-molded parts are removed from the mold without any damage.

Perfectly suited for clean room production environments and high precision multi cavity applications, etc.

Depending on the application and space available, two or more units can be used. The unique concept of the Round Fine Centering units provides the design engineer with the freedom of choosing the arrangement and number of units to be used.

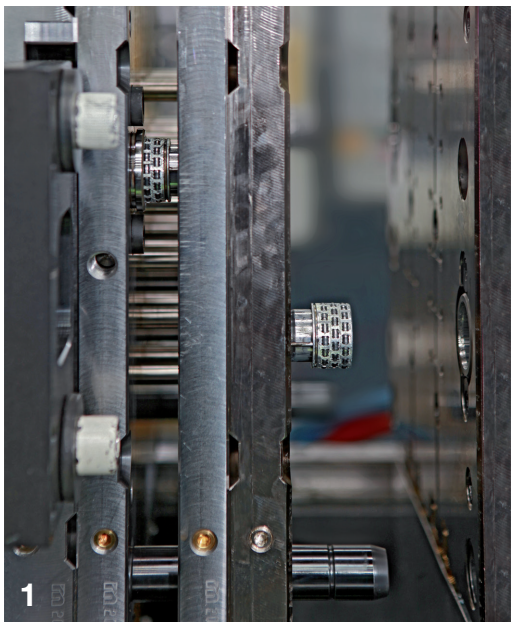
Maximum surface temperature difference between the two mold halves < 10°C, ideal < 5°C

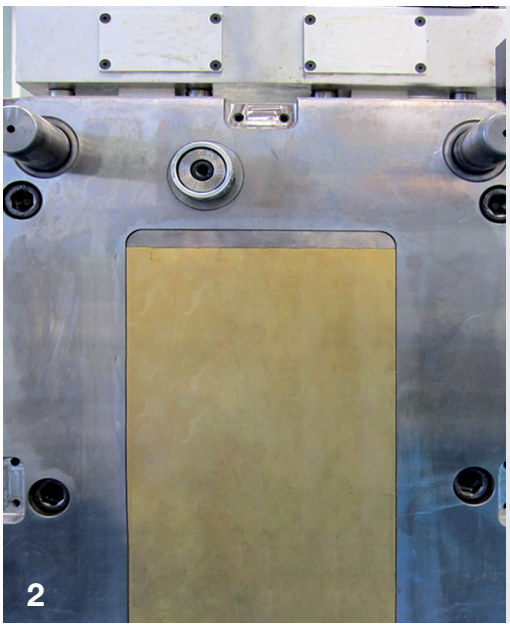
Round Fine Centering

Application examples:

1 Fine centering for guiding the ejector plate and centering of the main separation level.

2 Upgrade from conventional guide block to round fine centering.





Advantages

standard 7990/7992

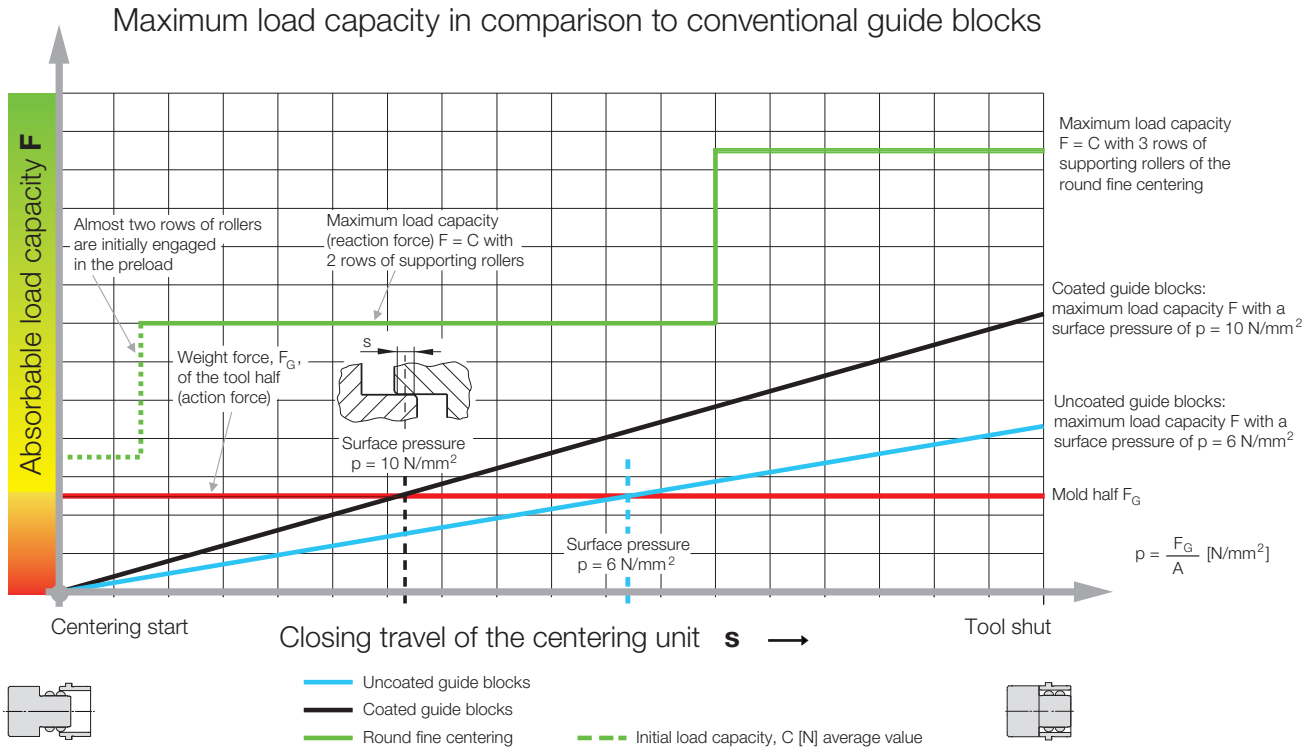
Advantages

- Thanks to a precise axial positioning of the roller cage at the centering start almost *two rows of rollers are simultaneously* engaged in the preload – this guarantees a *high initial load capacity* and a *long cycle life*. The initial load capacity with two rows of rollers engaged is equivalent to 16 rows of balls.
- Low wear due to rolling centering. The conventional guide block system creates very high surface pressure during initial engagement (up to a *sufficient overlap*), this promotes rapid wear of the two centering surfaces. Especially at *centering start* (line contact), the surface pressure "p" exceeds the permissible value (p_{per}) *several times*.
- The lifespan of the unit can be extended by rotating the centering unit by 120° to 180° at the time.
- Heat resistant up to approx. 150° C (302° Fahrenheit).
- Lower total cost, low manufacturing cost of the cylindrical location bore.
- Little to no maintenance, they can be used with minimal lubrication.
- Excellent design freedom.

Cost comparison with conventional guide blocks...

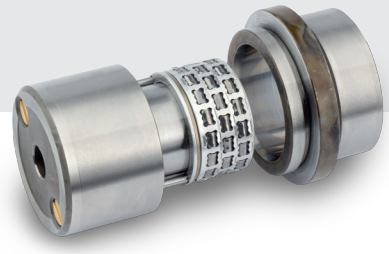
Cost for first fitting Number of guide blocks compared to round fine centering	**4[1] to 4**	**4[1] to 2**	**4[1] to 6**
Purchase price of the centering and machining costs for the location pockets	93% approx. same size	58% greater size	118% smaller size

[1] *Number of conventional guide blocks* *100% = conventional guide block*

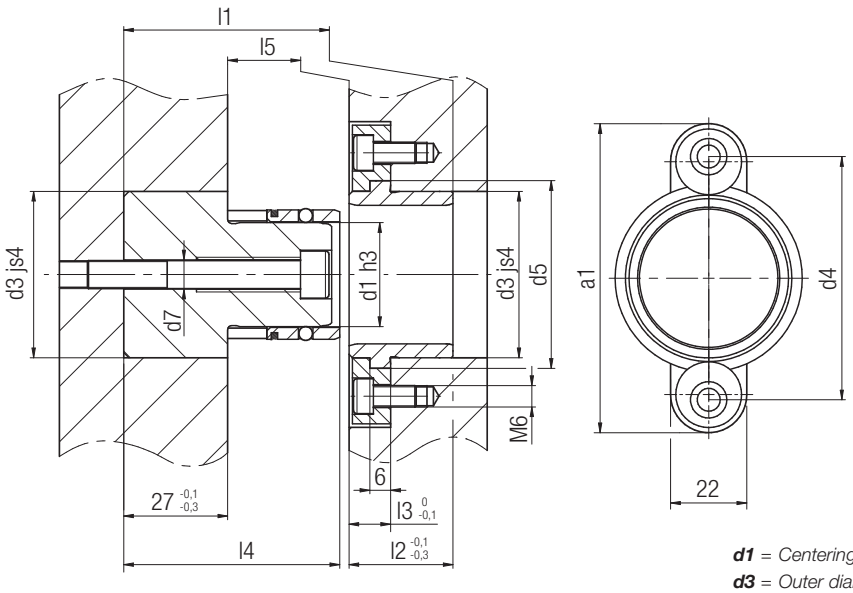


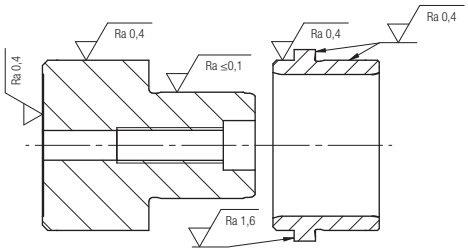
Standard 7990

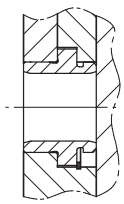
actual



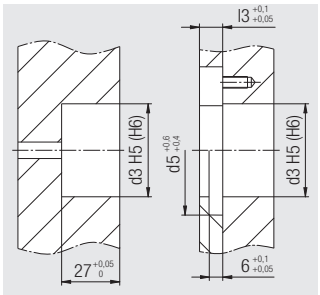
Material of the guide elements: 100Cr6 – 1.3505, hardened 62 - 64 HRC;
d1 ≤ 25 mm, centering pillar: 16MnCr5, hardened 61 - 63 HRC.







Bush can be installed on both sides



Installation situation

d1 = *Centering pillar, diameter tolerance ISO h3, superfinish ground*
d3 = *Outer diameter of the centering pillar and flanged bush to fit js4/H5(H6)*
d4 = *Reference diameter for clamps (clamps A-8001.000.001), mounting thread: M6x18*
d5 = *Outer diameter of the flanged bush*
a1 = *Installation space required for the clamps, alternative arrangement: 120°*
d7 = *Center hole for mounting the guide pillar, including auxiliary thread for easy removal*
l1 = *Nominal length of the centering unit in the fully closed position*
l2 = *Total length of the centering bush*
l3 = *Installation depth of the centering bush*
l4 = *Total length of the centering pillar*
l5 = *Total working length of the guide*

Article	d1	d3	d4	d5	a1	d7	l1	l2	l3	l4	l5	C, C_0 [N] - Indicative value
7990.015.049	15	28	52	36	69	6.8	49.5	22.5	12	51.5	~14	Entry (C): 1400 Closed (C_0): 4700
7990.025.054	25	40	64	48	81	8.5	54	27	12	55.5	~18	Entry (C): 2150 Closed (C_0): 10800
7990.032.057	32	48	70	54	87	8.5	57	30	12	59.5	~20	Entry (C): 2750 Closed (C_0): 13800

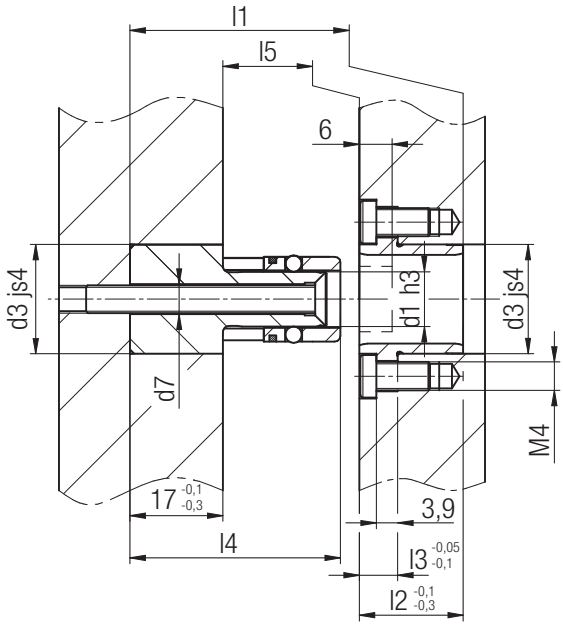
C = dynamic load rating in N – Initial load capacity

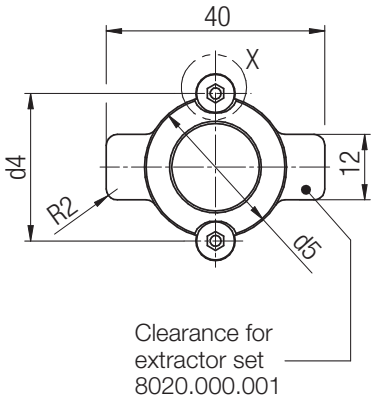
C_0 = static load rating in N – Tool fully closed

Standard 7992

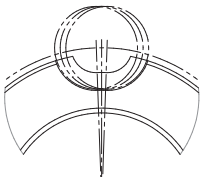
actual

Material of the guide elements: 100Cr6 – 1.3505, hardened 62 - 64 HRC;
d1 = 10 mm, centering pillar: 16MnCr5, hardened 61 - 63 HRC.

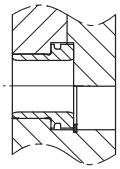




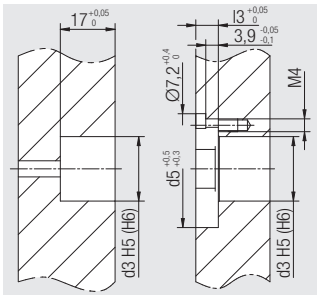
Detail X
with press fit:
bush is offset installable



d1 = *Centering pillar, diameter tolerance ISO h3, superfinish ground*
d3 = *Outer diameter of the centering pillar and flanged bush to fit js4/H5(H6)*
d4 = *Reference diameter for mounting elements (cylindrical screws A-02157050, M4x10)*
d5 = *Outer diameter of the flanged bush*
d7 = *Center hole for mounting the guide pillar, including auxiliary thread for easy removal*
l1 = *Nominal length of the centering unit in the fully closed position*
l2 = *Total length of the centering bush*
l3 = *Installation depth of the centering bush*
l4 = *Total length of the centering pillar*
l5 = *Total working length of the guide*



Bush can be installed on both sides



Installation situation

Article	d1	d3	d4	d5	d7	l1	l2	l3	l4	l5	C, C_0 [N] - Indicative value
7992.010.036	10	20	27	26	5.2	36	19	7	38.5	~11	Entry (C): 630 Closed (C_0): 1050

C = dynamic load rating in N – Initial load capacity

C_0 = static load rating in N – Tool fully closed

Determination
Number of fine centering units

practical

Calculation example

F_G = m x g = 500kg x 9.81m/s² = 4905N

$Cent_n = \frac{F_G}{C} = \frac{4905N}{1400N}$ = 3.5 = **4** x **A-7990.015.049**

C_n = **4** x C = **4** x 1400N = 5600N > when **4** centering units are used **A-7990.015.049**

A-7990.015.049

$Cent_n = \frac{F_G}{C} = \frac{4905N}{2150N}$ = 2.3 = **3** x **A-7990.025.054**

C_n = **3** x C = **3** x 2150N = 6450N > when **3** centering units are used **A-7990.025.054**

A-7990.025.054

Initial load capacity C = Average value of almost two rows of supporting rollers

Legend:

F_G = *Weight force of a tool half = m x g [N]*

$Cent_n$ = *Determination of the number of fine centering units*

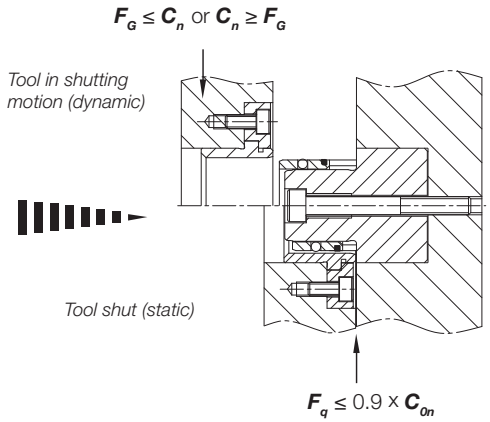
C = *dynamic load rating of the individual fine centering units = initial load capacity [N], (see Agathon Data sheet, pages 4 and 5)*

$C_n = C_1 + C_2 + C_3 + ... + C_X$ *load rating sum of all fine centering units used [N]*

C_0 = *static load rating of the individual fine centering units, in state Tool shut [N], (see Agathon Data sheet, pages 4 and 5)*

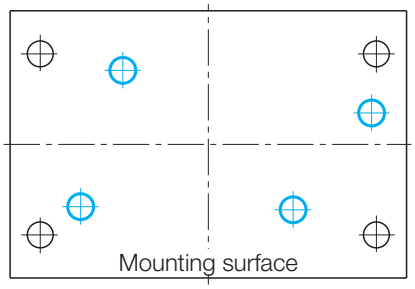
$C_{0n} = C_{01} + C_{02} + C_{03} + ... + C_{0X}$ *load rating sum of all fine centering units used [N]*

$F_q = C_{0n}$ = *Lateral force by sliding the tool halves, caused by too small holding force [N]*



Mounting surface for the Round Fine Centering unit

Depending on the application, two or more fine centering units can be used. The unique concept of the Round Fine Centering units provides the design engineer with the freedom of choosing the arrangement and the number of units to be used.



Excellent design freedom

- *Main guide*
- *Can be freely arranged*
- *Mounting surface*

Fitting accuracy and Characteristics

safe

Fitting accuracy, machining the mounting holes

Position accuracy:
Mounting holes for pillar and bush must be within a maximum position deviation of 0.005mm. The coordination of the slide elements must be accordingly performed in closed tool, so that no radial forces influence on the centering.

Perpendicularity:
Bush and pillar axis must be within a maximum position deviation of 0.005mm per 100mm, to the mold split line.

Installation depth:
The flatness of all axis bearing surfaces of the holes for the centering units should not vary by more than 0.05mm.

Characteristics

Offset:
The Round Fine Centering system (Standard 7990/7992) can correct an offset within the mold of up to 0.15mm. However it is advisable to prealign the mold halves to within < 0.05mm, using the main sliding guides / pillars.

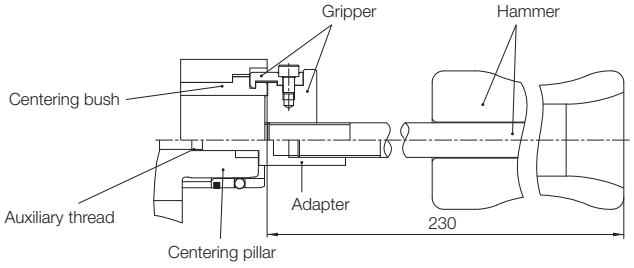
Temperature differences:
Mold tools which run both halves at the same temperature show very small differences in surface extension and an overloading of the Round Fine Centering system will be avoided. The potential of different tool expansion in homogenous tempered tool halves is small – and are ideal applications for Round Fine Centering units.

Centering units:
Centering bush and pillar are manufactured to very accurate tolerances and matched to one another. It is important that the two are always installed together as a pair.
Solutions for multi-component tools on request.

Application for multi-component procedure:
Must be noted in the purchasing text - limited quantities are available.
However, this procedure can slightly reduce the unit lifetime.

Removal

The centering pillar can be easily removed using conventional extractors or a sliding hammer, by means of the auxiliary thread.



Using the AGATHON extractor kit, available for all sizes, the centering pillar can be removed via adapter and the centering bush via gripper.

Article	Notes
8020.000.001	Case with extractor kit for all sizes including hammer

contact us...

Quality
Precision
Innovation.

Agency close to you:
http://www.agathon.ch/en/standard-parts/agencies/agencies.asp

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AGATHON
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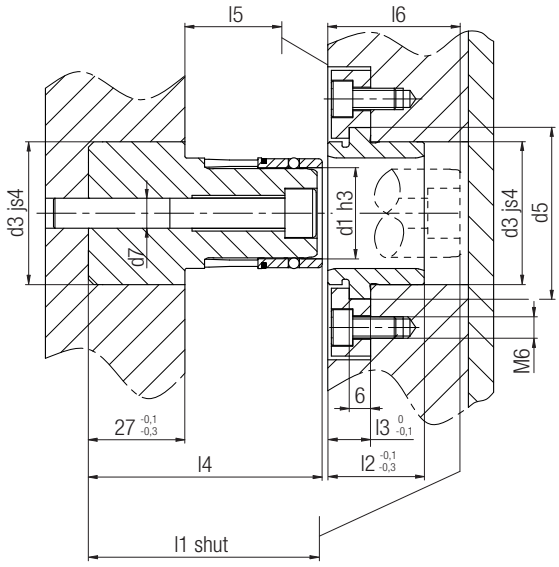
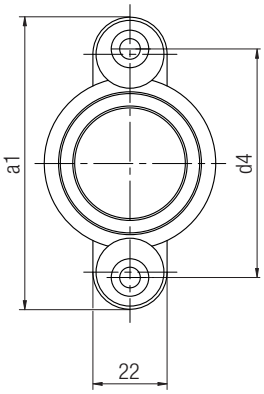
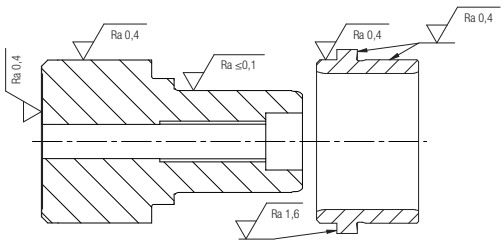
Agathon Centering Standard 7993

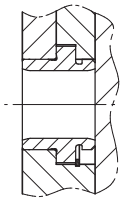
Novelty –
For highest demands

Longer centering stroke, ideal for high temperature applications

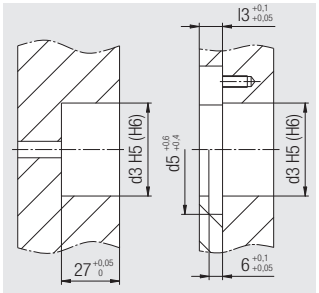








Bush can be installed on both sides



Installation situation

d1 = Centering pillar, diameter tolerance ISO h3, superfinish ground
d3 = Outer diameter of the centering pillar and flanged bush to fit js4/H5(H6)
d4 = Reference diameter for clamps (clamps A-8001.000.001), mounting thread: M6x18
d5 = Outer diameter of the flanged bush
a1 = Installation space required for the clamps, alternative arrangement: 120°
d7 = Center hole for mounting the guide pillar, including auxiliary thread for easy removal
l1 = Nominal length of the centering unit in the fully closed position
l2 = Total length of the centering bush
l3 = Installation depth of the centering bush
l4 = Total length of the centering pillar
l5 = Total working length of the guide
l6 = Pillar insertion depth

Material of the bushes, rollers: 100Cr6 – 1.3505, hardened 62 - 64 HRC; Centering pillar: 16MnCr5, hardened 61 - 63 HRC.

Artikel	d1	d3	d4	d5	a1	d7	l1	l2	l3	l4	l5	l6	C, C_0 [N] - Indicative value
7993.015.059	15	28	52	36	69	6.8 / M6	59	22.5	12	61	23	32	Entry (C): 1400 Shut (C_0): 4700
7993.025.064	25	40	64	48	81	8.5 / M8	64	27	12	65.5	28	37	Entry (C): 2150 Shut (C_0): 10800

C = dynamic load rating in N – Initial load capacity

C_0 = static load rating in N – Tool fully shut

Agathon Centering Standard 7993

New features / advantages

- The new designed 7993 series of standard parts features a centering stroke l5 increased by more than 50%. As a result, it is now possible to also eject higher injection-molded parts in a gentle and precise manner
- The new 7993 series of standard parts is nearly 100% compatible with the original 7990 standard part. Exception: In closed condition, the pillar protrudes over the bush end; therefore, some clearance must be prepared behind the bush
- Very low abrasion and low wear: The brass roller cage as well as new design features eliminate almost all mechanical wear – the centering devices are therefore suitable for clean room applications
- Thanks to the brass cage, the centering may be cleaned with various cleaning methods
- Temperature-resistant, approx. 170 °C
- For further advantages of the rolling round fine centering, please refer to the 7990/7992 standard parts

These combined new features provide a significantly higher centering capacity and allow a much wider range of applications.

Applications

- Centering of main separation plane and individual centering of cavities, guiding the ejection plate, plate guide for ventilation stroke
- Centering of hybrid injection molds
- Tool centering on the machine plate of the injection molding machine
- Deep-drawing and fine-blanking punching applications
- General machine applications requiring a zero-centering respectively backlash-free guide

The Universal – 7990

- Centering at main separation
- Guiding of ejection plate
- Guiding of ventilation stroke
- Centering of tool on the injection molding machine plate

For smaller applications – 7992

- Centering of individual cavities
- Centering at main separation on small tools
- Further developed for volume production

Short stroke – 7995

- Mold construction: guidance of ejector stroke
- General mechanical engineering: for recurring sequences with short stroke, the pillar does not exit the preload – or constant short stroke application

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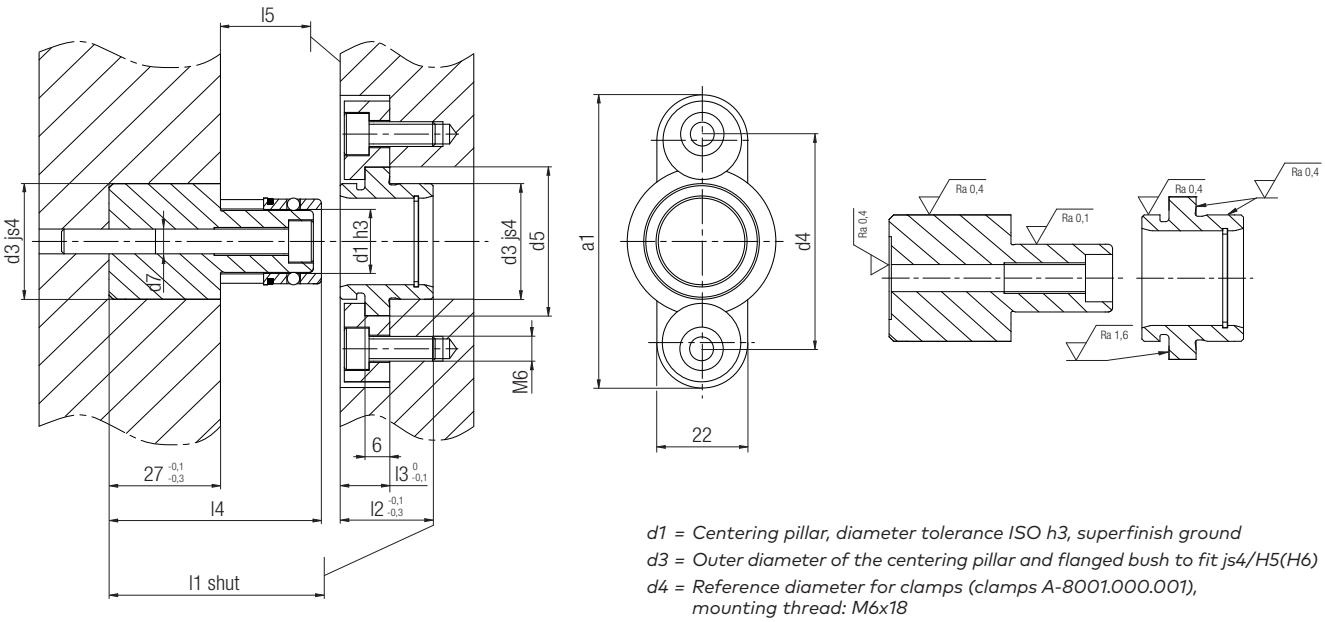
Agathon Centering Standard 7995

Novelty – Guidance of short stroke applications

For guiding applications where not exiting the bushing



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d4 = Reference diameter for clamps (clamps A-8001.000.001), mounting thread: M6x18
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l1 = Nominal length of the centering unit in the fully closed position
l2 = Total length of the centering bush
l3 = Installation depth of the centering bush
l4 = Total length of the centering pillar
l5 = Total working length of the guide

Material of the bushes, rollers: 100Cr6 – 1.3505, hardened 62 - 64 HRC; Centering pillar: 16MnCr5, hardened 61 - 63 HRC.

Article	d1	d3	d4	d5	a1	d7	l1	l2	l3	l4	l5	C, C_0 [N] - Indicative value
7995.015.049	15	28	52	36	69	6.8 / M6	49.5	22.5	12	51.5	~14	Entry (C): 1400 Closed (C_0): 4700
7995.025.054	25	40	64	48	81	8.5 / M8	54	27	12	55.5	~18	Entry (C): 2150 Closed (C_0): 10800

C = dynamic load rating in N – Initial load capacity

C_0 = static load rating in N – Tool fully shut

Agathon Centering Standard 7995

New features

- The bushing is equipped with a stop. As a result, the centering pillar with roller cage does not necessarily have to exit the preload during each cycle. That is, the cage remains in the intended position at all times
- Otherwise, the short-stroke standard 7995 corresponds 100% to the original standard 7990. The bushing can not be installed on both sides, see installation diagram on page 1

Applications

- Mold construction: guidance of ejector stroke
- General mechanical engineering: for recurring sequences with short stroke, the pillar does not exit the preload – or constant short stroke application

The Universal – 7990

- Centering at main separation
- Guiding of ejection plate
- Guiding of ventilation stroke
- Centering of tool on the injection molding machine plate

For smaller applications – 7992

- Centering of individual cavities
- Centering at main separation on small tools
- Further developed for volume production

For the highest demands – 7993

- Ideal for high cleanroom demands
- High temperature applications
- Long guided centering stroke for perfect ejection of molded parts
- No restrictions regarding cleaning methods

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