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.

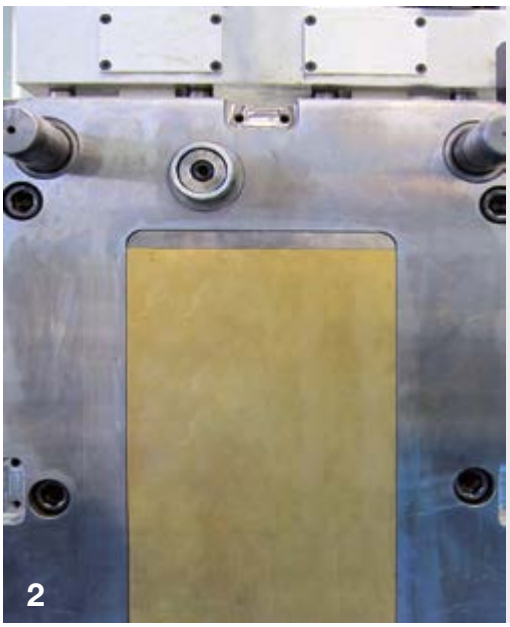
Maximum surface temperature difference between the two mold halves < 10°C, ideal < 5°C

*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

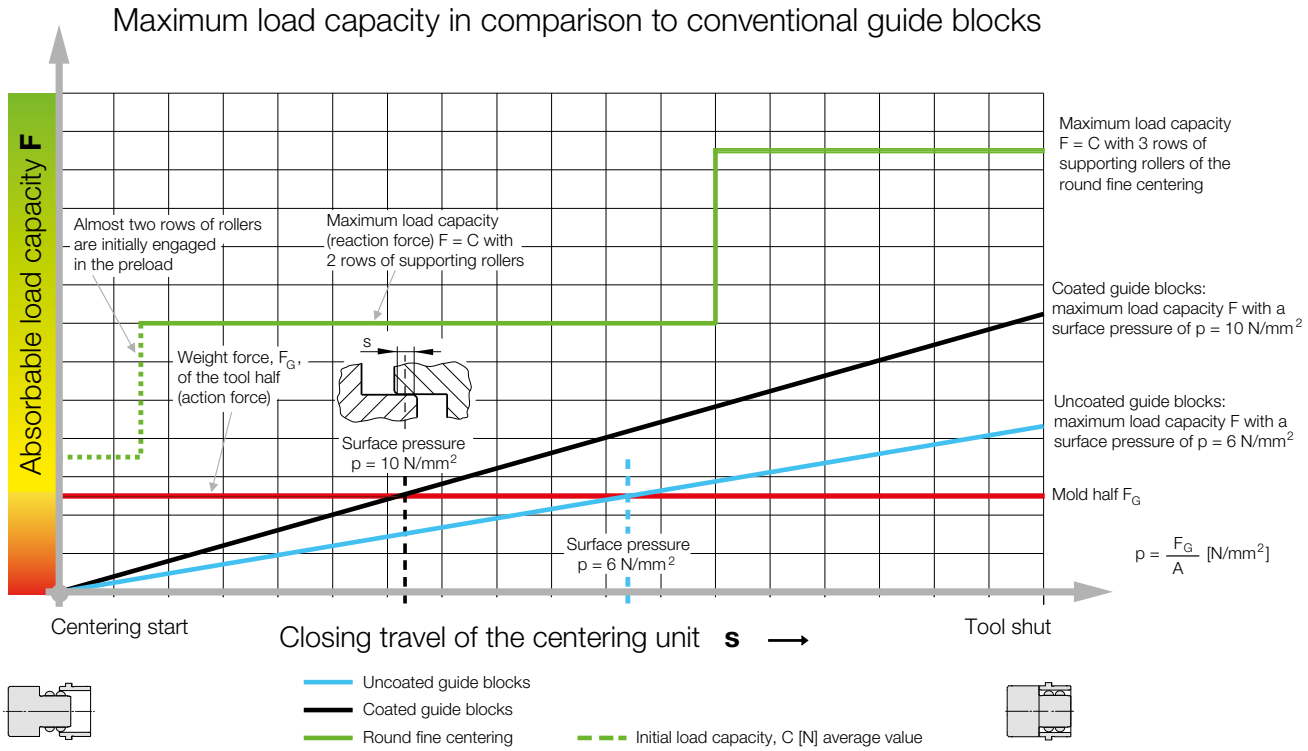
## Advantages

- 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**<br>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%<br>approx.<br>same size | 58%<br>greater<br>size | 118%<br>smaller<br>size |

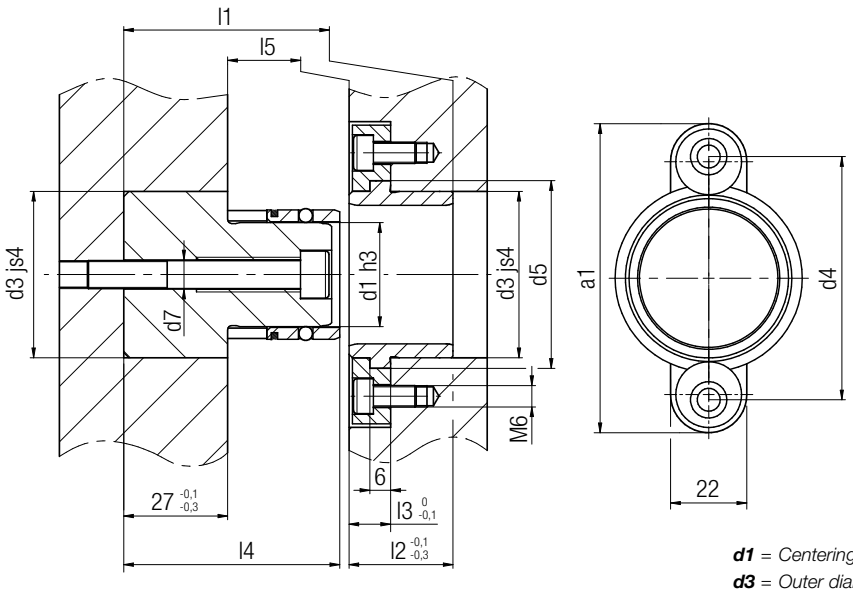
[1] *Number of conventional guide blocks* *100% = conventional guide block*

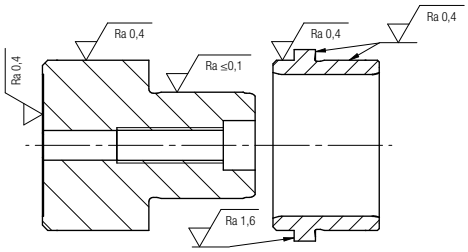


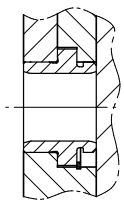
# Standard 7990

actual

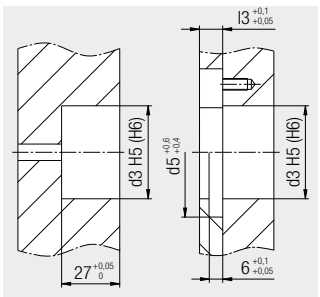
Material of the guide elements: 100Cr6 – 1.3505, hardened 62 - 64 HRC;
d1 ≤ 25 mm, centering pillar: 16MnCr5, hardened 61 - 64 HRC.



*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<br>Closed ($C_0$): 4700 |
| 7990.025.054 | 25 | 40 | 64 | 48 | 81 | 8.5 | 54 | 27 | 12 | 55.5 | ~18 | Entry (C): 2150<br>Closed ($C_0$): 10800 |
| 7990.032.057 | 32 | 48 | 70 | 54 | 87 | 8.5 | 57 | 30 | 12 | 59.5 | ~20 | Entry (C): 2750<br>Closed ($C_0$): 13800 |

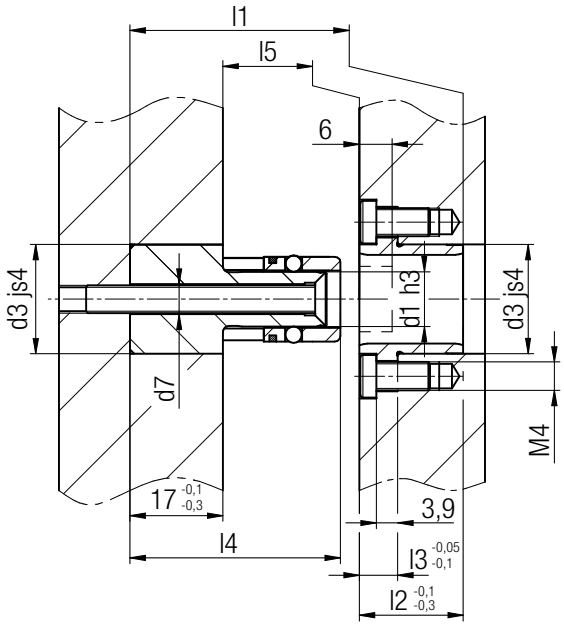
*C = dynamic load rating in N – Initial load capacity*

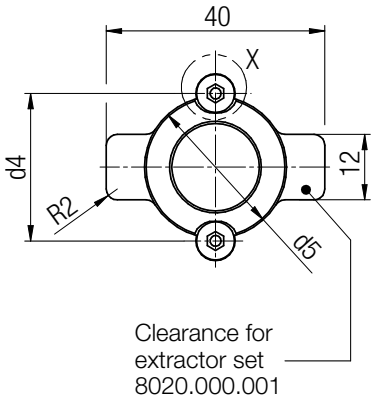
*$C_0$ = static load rating in N – Tool fully closed*

# Standard 7992

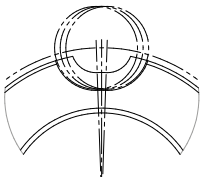
actual

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

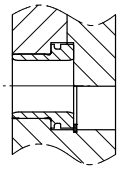


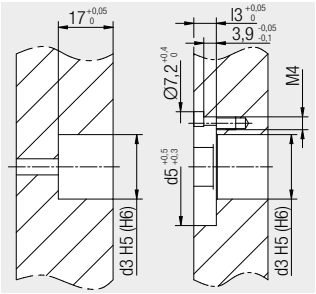

**Detail X**
with press fit:
bush is offset installable



***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<br>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*

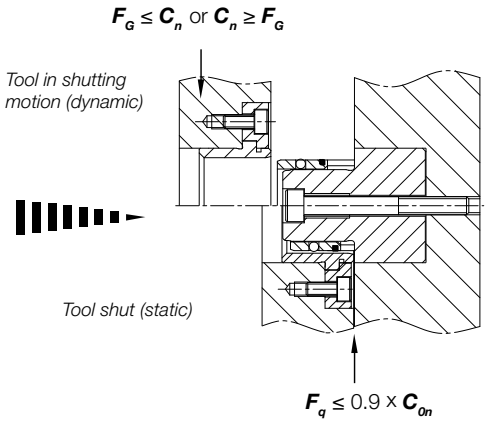
**C** = *dynamic load rating of the individual fine centering units = initial load capacity [N], (see Agathon Data sheet, pages 4 and 5)*

$C_n = C_1 + C_2 + C_3 + ... + C_X$ *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)*

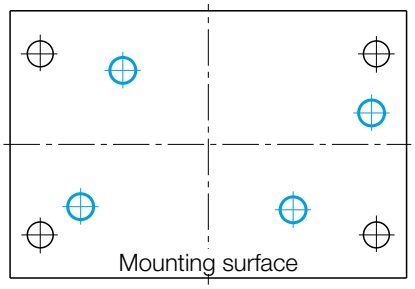
$C_{0n} = C_{01} + C_{02} + C_{03} + ... + C_{0X}$ *load rating sum of all fine centering units used [N]*

$F_q = C_{0n}$ = *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.

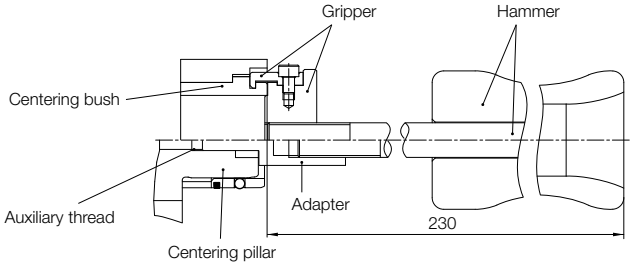
**Temperature differences:**
Mold tools which run both halves at the same temperature show very small differences in surface extension and an overloading of the Round Fine Centering system will be avoided. The potential of different tool expansion in homogenous tempered tool halves is small – and are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

28.10.2013 / F0109612 / Subject to technical modifications

AGATHON
SWITZERLAND

**AGATHON AG,** Normalien
CH-4512 BELLACH
SWITZERLAND
Tel +41 (0)32 617 4501 (CH)
Tel +41 (0)32 617 4502 (export)
Fax +41 (0)32 617 4701
normalien@agathon.ch
www.agathon.ch