13 rue de Chanteloup 95100 ARGENTEUIL - FRANCE - Tél : 01 39 80 52 00 - Fax : 01 39 80 50 03

TOOLING BALLS Type D

With tooling balls it is possible to determine with great precision the position of reference points on mechanical parts or machines.

They are fitted into tooling holes. Once put into place, the centre of the tooling ball determines a "zero point" from which it is possible to determine dimensions or measurements in all directions in space.
Tooling balls are made up of a tungsten carbide spherical top soldered onto a hardened and ground steel shaft (see diagram). The sphere diameter (ØD), the shaft diameter (ØB), the coaxility of the sphere and shaft, and the distance (A) between the collar and the centre of the sphere are determined with great precision.
In many applications, mechanical sensors come into contact with the spheres but the tungsten carbide gives them long-lasting resistance.

Here are the main fields in which tooling balls are used:

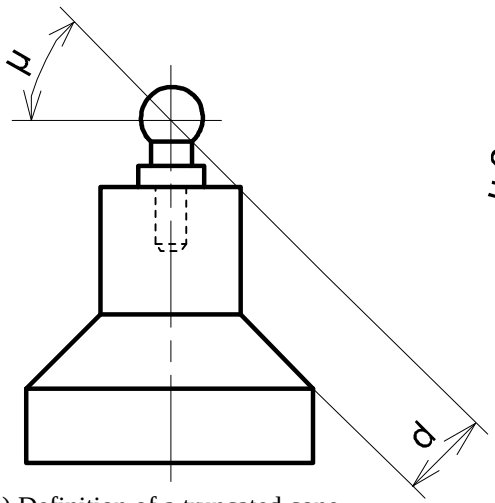
- mechanical design and drawing : they determine points from which measurements are made and avoid adding up tolerances.

- Precision tooling : as they are palpable points, parts can easily be put into place and centered on machines

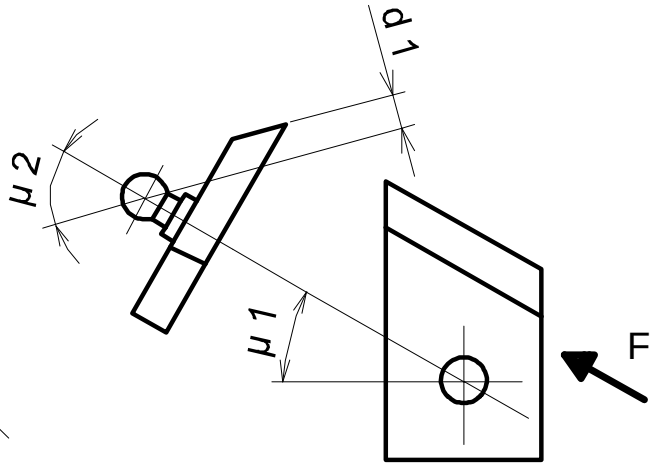
- Contol and metrology : as they are placed in tooling holes it is easy to take down dimensions in every direction in space, either by means of mechanical contact (with the help of comparators, measuring columns or measuring machines) or by means of electric contact, the whole tooling ball being conductive.

Advantage over measuring rods
Taking down dimensions with a measuring rod fitted in a tooling hole is particularly difficult when dealing with complex-shaped parts as the axis of the hole must be perpendicular to the dimension being taken down. It is much easier with a tooling ball as a sphere does not offer a privileged direction.

Examples of uses



a) Definition of a truncated cone



b) Part with two slopes

These two simple examples show how tooling balls are used. In order to tool or control part b) in the usual way, two tooling holes would be necessary, one of them oblique, which would bring problems and added up inaccuracies.

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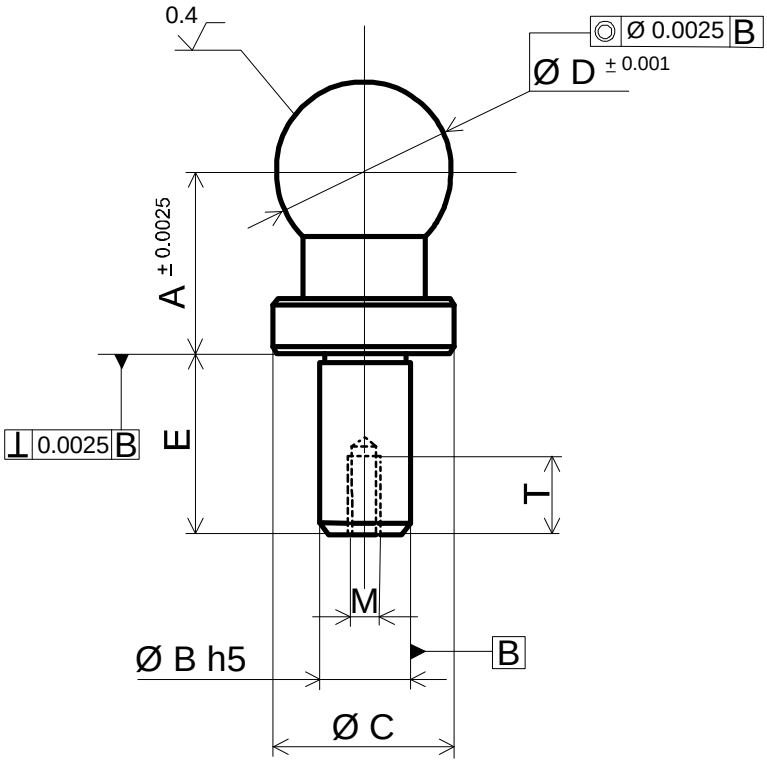
Technical description

a) standard model



Reference	ØD	A	ØB	ØC	E	M	T
D2	2.000	3	2	4	5		
D2.65	2.650	3	2	4	5		
D3	3.000	4	3	5.5	6		
D3.5	3.500	4	3	5.5	6		
D4	4.000	4	3	5	6		
D5	5.000	5	3	5.5	6		
D5.5	5.500	5.5	3	5.5	6		
D6	6.000	6	3	6	6		
D6.35	6.350	5.08	3.175	6.35	9		
D7	7.000	8	4	8	8	2	5
D8	8.000	8	4	8	8	2	5
D9.525	9.525	7.62	4.76	9.5	11.5	3	7
D10	10.000	10	5	10	10	3	7
D12	12.000	12	6	12	12	3	7
D12.7	12.700	10.16	6.35	12.7	14	3	7
D14.8	14.800	14.8	6	14	13.2	3	7
D16	16.000	16	8	15	15	3	7
D20	20.000	20	10	18	18	4	10

(all dimensions in mm)

b) special models

Any other model can be made on request, for example:

- models with a male thread at the end of the shaft
- models without a collar