

Technical specifications

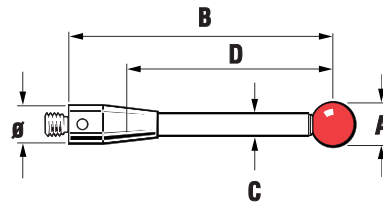
Ball material properties

Stylus type	Material	Grade	Deviation from spherical form	Structure	Composition	Purity	Density	Hardness	Compression strength	Bending strength	Fracture toughness K1c
			(µm)	-	(wt%)	(%)	(g/cm ³)	HV	(MPa)	(MPa)	(MN/m ^{3/2})
AL ₂ O ₃ Ruby balls	Synthetic ruby monocrystalline	Grade 5*	0.13	mono	99% AL ₂ O ₃	99.90	3.90	1800	2100	390	1
Silicon nitride balls	Hard pressed Si ₃ N ₄	Grade 5*	0.13	poly	Si ₃ N ₄	90	3.0-3.2	1600	3000	1000	6
Zirconia oxide balls	Sintered ZrO ₂	Grade 5*	0.13	poly	ZrO ₂	90-95	6.05	1200	2000	700-1100	10
Alumina hollow balls	White ceramic sintered alumina AL ₂ O ₃	-	1	poly	AL ₂ O ₃	99.80	3.8-3.9	1570	-	-	-
Silver steel discs	Silver steel	-	1	-	-	-	8	450	-	-	-
Silver steel simple cylinder	Silver steel	-	Roundness 4 µm	-	-	-	8	200	-	-	-
Ruby ball ended cylinder	Synthetic ruby	Ball: Grade 5*	Ball deviation from spherical form : 0.13 Concentricity: Ball/cylinder 4 µm	mono	99% AL ₂ O ₃	99.90	3.90	1800	2100	390	1
Tungsten carbide ball ended cylinder	Tungsten carbide	-	+ 20 µm end radius	-	92-93.5% WC 6.5-8% CO	14.8	14.95	1550	6000	-	-
Silver steel simple pointer	Silver steel	-	Cone angle 30°	-	-	-	8	300	-	-	-
Tungsten carbide radius end pointer	Tungsten carbide	-	Cone angle 30°	-	92-93.5% WC 6.5-8% CO	99.90	15	1550	6000	-	-
Aluminium hollow balls	Al. alloy 6082-T6	-	30 µm	-	95.2-98.3% AL	-	2.7	95	-	-	-

* Refers to DIN-5401, ISO 3290 and AFBMA 3290 ball grade standards.
* Grade 3 sphericity balls are available on request.

Extension material properties

Material	Coeff. of expansion @25°C
Stainless steel	16x10 ⁻⁶ /°C
Tungsten carbide	5x10 ⁻⁶ /°C
White ceramic sintered alumina	8.1x10 ⁻⁶ /°C
Carbon fibre	-0.4x10 ⁻⁶ /°C
Titanium	9.2x10 ⁻⁶ /°C
Ruby	4.5x10 ⁻⁶ /°C
Silicon nitride	3.2x10 ⁻⁶ /°C
Zirconia	10.5x10 ⁻⁶ /°C



- A** Ball diameter
- B** Overall length
- C** Stem diameter
- D** Effective working length
- Ø M2 = 3 mm
- Ø M3 = 4 mm
- Ø M4 = 7 mm
- Ø M5 = 10 mm

M2 styli and extensions quick reference guide*

Ruby ball / stainless steel stem

Ball diameter	1.0 (0.04)	1.5 (0.06)	2.0 (0.08)	2.5 (0.10)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)	6.0 (0.24)	8.0 (0.32)
Length 10 mm	A-5000-7806	A-5000-7802	A-5000-7807	A-5000-7803	A-5000-3604	A-5000-4154	A-5000-4155	A-5000-4156	A-5000-4158
20 mm	–	–	A-5000-3603	A-5000-7804	A-5000-4160	A-5000-4161	–	–	–

Ruby ball / tungsten carbide stem

Ball diameter	0.3 (0.012)	0.5 (0.02)	0.7 (0.03)	1.0 (0.04)	1.5 (0.06)	2.0 (0.08)	2.5 (0.10)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)
Length 10 mm	A-5000-7800	A-5000-7805	A-5000-7801	A-5003-1325	–	–	–	–	–	–
20 mm	–	A-5003-1345	A-5003-0577	SEE DRAWING	A-5003-0034	A-5003-3822	A-5003-1896	A-5003-0938	A-5003-1029	A-5003-0046
30 mm	–	–	–	A-5000-8663	A-5003-0035	A-5003-0036	A-5003-0038	A-5003-0040	A-5003-0043	A-5003-0047
40 mm	–	–	–	–	–	A-5003-0037	A-5003-0039	A-5003-0041	A-5003-0044	A-5003-0048
50 mm	–	–	–	–	–	–	–	A-5003-0042	A-5003-0045	A-5003-0049

Ruby ball / ceramic stem

Ball diameter	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)	6.0 (0.24)
Length 30 mm	A-5003-4177	A-5003-1370	A-5003-4779	A-5003-4780
50 mm	A-5003-0064	A-5003-0065	A-5003-0066	A-5003-0470

Ruby ball / carbon fibre stem

Ball diameter	4.0 (0.16)	5.0 (0.20)	6.0 (0.24)
Length 30 mm	A-5003-4241	A-5003-4781	A-5003-4782
50 mm	A-5003-2285	A-5003-2286	A-5003-2287
75 mm	A-5003-4784	A-5003-4785	A-5003-4786
100 mm	A-5003-2289	A-5003-2290	A-5003-2291

Stylus extensions

Length	5.0 (0.20)	10.0 (0.40)	20.0 (0.80)	30.0 (1.19)	40.0 (1.58)	50.0 (1.97)	70.0 (2.76)	90.0 (3.55)
Stainless steel	M-5000-7634	M-5000-3647	M-5000-3648	M-5000-4162	M-5000-7779	–	–	–
Ceramic	–	–	–	A-5003-0070	A-5003-0071	A-5003-0072	–	–
Carbon fibre	–	–	–	–	A-5003-2280	A-5003-2281	A-5003-2282	A-5003-2283

* These are a selection of the most popular styli

M3 styli and extensions quick reference guide*

Ruby ball / stainless steel stem

Ball diameter	1.0 (0.04)	2.0 (0.08)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)
Length 21 mm	A-5000-3551	A-5000-3552	A-5000-3553	A-5000-7606	A-5000-7630
31 mm	–	–	–	A-5000-3554	A-5000-7648

Ruby ball / tungsten carbide stem

Ball diameter	0.5 (0.02)	1.5 (0.06)	2.0 (0.08)	2.5 (0.10)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)
Length 21 mm	A-5000-7632	A-5003-0050	–	A-5003-0054	–	–	–
30 mm	–	A-5003-0051	A-5003-0052	A-5003-0055	A-5003-0057	–	–
40 mm	–	–	A-5003-0053	A-5003-0056	A-5003-0058	A-5003-0060	A-5003-0062
50 mm	–	–	–	–	A-5003-0059	A-5003-0061	A-5003-0063

Ruby ball / ceramic stem

Ball diameter	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)
Length 50 mm	A-5003-0067	A-5003-0068	A-5003-0069

Ruby ball / carbon fibre stem

Ball diameter	6.0 (0.24)	8.0 (0.32)
Length 75 mm	A-5003-4860	A-5003-4861
100 mm	A-5003-4862	A-5003-4863

Stylus extensions

Length	10.0 (0.40)	20.0 (0.80)	35.0 (1.38)	50.0 (1.97)	70.0 (2.76)
Stainless steel	M-5000-7633	M-5000-3592	M-5000-3593	–	–
Ceramic	–	–	–	A-5003-0075	–
Carbon fibre	–	–	–	A-5003-4864	A-5003-4865

These styli are also available with specialist ball materials – see Section 7

*These are a selection of the most popular styli

M4 styli and extensions quick reference guide*

Ruby ball / stainless steel stem

Ball diameter	1.0 (0.04)	2.0 (0.08)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)	6.0 (0.24)	8.0 (0.32)
Length 10 mm	–	–	–	–	A-5003-3550	–	–
20 mm	A-5000-7545	A-5000-7547	A-5000-7549	A-5000-7551	SEE DRAWING	A-5000-7555	A-5000-7557
30 mm	–	–	–	–	A-5000-6352	–	–
50 mm	–	–	–	–	A-5000-7521	–	–
100 mm	–	–	–	–	A-5000-7522	–	–

Ruby ball / tungsten carbide stem

Ball diameter	1.0 (0.04)	2.0 (0.08)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)	6.0 (0.24)
Length 20 mm	A-5003-4792	A-5003-2932	A-5003-4793	A-5003-4794	A-5003-4795	A-5003-4796
50 mm	–	A-5003-4797	A-5003-3680	A-5003-4799	A-5003-4800	A-5003-4801

Ruby ball / ceramic stem

Ball diameter	5.0 (0.20)	6.0 (0.24)	8.0 (0.32)
Length 50 mm	A-5003-0235	A-5000-3709	A-5000-7795
75 mm	A-5003-0236	A-5003-2764	A-5003-4802
100 mm	A-5000-9761	A-5000-3712	A-5000-7796

Ruby ball / carbon fibre stem

Ball diameter	6.0 (0.24)	8.0 (0.32)
Length 50 mm	A-5003-1436	–
100 mm	A-5003-1358	–
150 mm	A-5003-1255	–
200 mm	A-5003-1075	–
300 mm	–	A-5003-3461

Stylus extensions

Length	10.0 (0.41)	15.0 (0.60)	20.0 (0.79)	30.0 (1.19)	50.0 (1.97)	100.0 (3.94)
Stainless steel	M-5000-7583	M-5000-7584	M-5000-7585	M-5000-7586	–	–
Ceramic	–	–	–	A-5000-7754	A-5000-7755	A-5000-7727

These styli are also available with specialist ball materials – see Section 7

*These are a selection of the most popular styli

M5 styli and extensions quick reference guide*

Ruby ball / tungsten carbide stem

Ball diameter	0.3 (0.012)	0.5 (0.02)	0.7 (0.03)	1.0 (0.04)	1.5 (0.06)	2.0 (0.08)	2.5 (0.10)	3.0 (0.12)	4.0 (0.16)	5.0 (0.20)
Length 20 mm	A-5003-5201	A-5003-5202	A-5003-5203	A-5003-5204	A-5003-5205	A-5003-5206	A-5003-5207	A-5003-5208	A-5003-5209	A-5003-5210
30 mm	A-5003-5211	A-5003-5212	A-5003-5213	A-5003-5214	A-5003-5215	A-5003-5216	A-5003-5217	A-5003-5218	A-5003-5219	A-5003-5220
40 mm	–	–	–	–	A-5003-5221	A-5003-5222	A-5003-5223	A-5003-5224		
50 mm	A-5003-5225	A-5003-5226	A-5003-5227	A-5003-5228	A-5003-5229	SEE DRAWING	A-5003-5232	A-5003-5234	A-5003-5235	A-5003-5236
75 mm	A-5003-5240	A-5003-5241	A-5003-5242	A-5003-5243	A-5003-5244	–	–	A-5003-5253	SEE DRAWING	SEE DRAWING
100 mm	–	–	–	–	–	–	A-5003-5254			

Ruby ball / carbon fibre stem

Ball diameter	2.5 (0.10)	6.0 (0.24)	8.0 (0.32)	10.0 (0.40)
Length 20 mm	–	–	–	–
30 mm	–	–	–	–
40 mm	–	–	–	–
50 mm	–	A-5003-5237	A-5003-5238	A-5003-5239
75 mm	–	A-5003-5250	A-5003-5251	A-5003-5252
100 mm	–	SEE DRAWING	SEE DRAWING	SEE DRAWING
150 mm	–	A-5003-5265	A-5003-5266	A-5003-5267
200 mm	–	A-5003-5268	A-5003-5269	A-5003-5270
300 mm	–	A-5003-5271	A-5003-5272	A-5003-5273

Stylus extensions

Length	10.0 (0.41)	20.0 (0.79)	30.0 (1.19)	40.0 (1.58)	50.0 (1.97)	60.0 (2.37)	70.0 (2.76)	80.0 (3.15)	90.0 (3.55)	100.0 (3.94)
CF/Titanium (Ø11 mm)	–	–	–	A-5003-4953	A-5003-4954	A-5003-4955	A-5003-4956	A-5003-4957	A-5003-4958	A-5003-4959
CF/Titanium (Ø20 mm)	–	–	–	A-5003-4993	A-5003-4994	A-5003-4995	–	A-5003-4996	–	A-5003-4997
Stainless steel	A-5003-0839	A-5003-0840	A-5003-5282	–	A-5003-5283	–	–	–	–	A-5003-0844
Aluminium tube	–	–	–	–	A-5003-5285	–	–	–	–	A-5003-0831

Length	120.0 (4.76)	150.0 (5.91)	180.0 (7.09)	200.0 (7.88)	250.0 (9.85)	300.0 (11.82)	400.0 (15.76)	500.0 (19.70)	600.0 (23.64)
CF/Titanium (Ø11 mm)	A-5003-4960	A-5003-4961	A-5003-4962	A-5003-4963	A-5003-4964	A-5003-4965	A-5003-4966	–	–
CF/Titanium (Ø20 mm)	A-5003-4998	A-5003-4999	A-5003-5000	A-5003-5001	A-5003-5002	A-5003-5003	A-5003-5004	A-5003-5005	A-5003-5006
Stainless steel	–	–	–	–	–	–	–	–	–
Aluminium tube	–	–	–	A-5003-0833	–	–	–	–	–

These styli are also available with specialist ball materials – see Section 7

*These are a selection of the most popular styli