

DIN SPEC 91411:2022-08 (E)

Requirements for the technical representation of magnetic measurement scales in design drawings

Contents		Page
Foreword		4
Introduction		6
1 Scope		9
2 Normative references		9
3 Terms and definitions		9
4 Abstract		27
5 Requirements for drawings of measurement scales		27
5.1 Application of magnetic measurement scales		27
5.2 Overview		28
5.2.1 General		28
5.2.2 Dipole magnets		28
5.2.3 Multipole magnets		28
5.2.4 Magnetic scales		29
5.2.5 Track types and track lengths		30
6 Characterization of magnetic measurement scales		33
6.1 General test conditions		33
6.2 Definition of accuracy		33
6.2.1 Introduction		33
6.2.2 Accuracy		33
6.2.3 Deviation		34
6.2.4 Step		34
6.2.5 Accuracy class		34
6.2.6 Presentation of the different forms of deviation		34
6.2.7 Accuracy of multipole scales		34
7 Required data for drawings		36
Annex A (informative) Example drawings		39
Bibliography		44
Figures		
Figure 1 -- Value chain for magnetic measurement scales		6
Figure 2 -- Taxonomy of magnetic measurement scales		8
Figure 3 --Linear scale terminology		12
Figure 4 -- Rotational scale terminology		12
Figure 5 -- Magnetic working distance and mechanical working distance		15
Figure 6 -- Sensor position (o)		16
Figure 7 -- Sensor position ()		16

Figure 8 -- Sensor position ()	16
Figure 9 -- Sensor position ()	17
Figure 10 -- Start pole offset	18
Figure 11 -- Flux density curve	20
Figure 12 -- Nominal track location, orthogonal	21
Figure 13 -- Track width and nominal track width	23
Figure 14 -- Nominal pole length	24
Figure 15 -- Nominal pole angle	25
Figure 16 -- Track location and pole location	26
Figure 17 -- Pole location deviation and pole length deviation	27
Figure 18 -- Incremental single track	30
Figure 19 -- Reference track	30
Figure 20 -- Distance-coded reference tracks	31
Figure 21 -- Pseudo-random code track	31
Figure 22 -- Tilted-edge poles	31
Figure 23 -- Incremental track with reference track	32
Figure 24 -- Incremental track with distance-coded reference track	32
Figure 25 -- Vernier tracks	32
Figure 26 -- Pseudo-random code with incremental track	32
Figure A.1 -- Drawing example for rotational scale	40
Figure A.2 -- Drawing example for linear scale (elastomer-bound ferrite) -- Variant 1	41
Figure A.3 -- Drawing example for linear scale (elastomer-bound ferrite) -- Variant 2	42
Figure A.4 -- Drawing example for linear scale (hard ferrite)	43
 Tables	
Table 1 --Conventions for the representation of magnetic properties	7
Table 2 -- Track designation for the linear scale in Figure 3	12
Table 3 -- Track designation for the rotational scale in Figure 4	12
Table 4 -- Pole pattern for bit pattern 011100	31
Table 5 -- Example of an evaluation overview (I)	35
Table 6 -- Example of an evaluation overview (II) -- pole location deviations and pole length deviations	35
Table 7 -- Track data table	37
Table 8 -- Pole data table (with example values)	38