

DIN EN 12168:2011-08 (E)

Copper and copper alloys - Hollow rod for free machining purposes

Contents		Page
Foreword		4
Introduction		6
1 Scope		7
2 Normative references		7
3 Terms and definitions		7
4 Designations		8
4.1 Material		8
4.1.1 General		8
4.1.2 Symbol		8
4.1.3 Number		9
4.2 Material condition		9
4.3 Product		9
5 Ordering information		10
6 Requirements		12
6.1 Composition		12
6.2 Mechanical properties		12
6.3 Resistance to dezincification		12
6.4 Residual stress level		12
6.5 Dimensions and tolerances		12
6.5.1 Diameter or width across-flats		12
6.5.2 Tolerance on wall thickness		12
6.5.3 Eccentricity		12
6.5.4 Shape tolerances		13
6.5.5 Straightness		13
6.5.6 Length		13
6.5.7 Corner radii		13
6.5.8 Twist of polygonal hollow rod		13
7 Sampling		14
7.1 General		14
7.2 Analysis		14
7.3 Mechanical tests		14
7.4 Dezincification resistance and stress corrosion resistance tests		14
8 Test methods		15
8.1 Analysis		15
8.2 Tensile test		15
8.2.1 General		15
8.2.2 Location of test pieces		15
8.2.3 Shape and size of test pieces		15
8.2.4 Procedure for testing		15
8.2.5 Determination of results		15
8.3 Hardness test		16
8.4 Dezincification resistance test		16
8.5 Stress corrosion resistance test		16

8.6	Retests	16
8.6.1	Analysis, tensile, hardness and dezincification resistance tests	16
8.6.2	Stress corrosion resistance test	16
8.7	Rounding of results	16
9	Declaration of conformity and inspection documentation	17
9.1	Declaration of conformity	17
9.2	Inspection documentation	17
10	Marking, packaging, labelling	17
Annex A (normative) Determination of mean depth of dezincification		28
A.1	Introduction	28
A.2	Procedure	28
A.3	Expression of results	28
Bibliography		30
Figures Figure 1 -- Examples of hollow rod cross-sections		8
Figure 2 -- Measurement of twist of polygonal hollow rod		14
Figure A.1 -- Example of contiguous fields		29
Tables Table 1 -- Composition of low alloyed copper alloys		17
Table 2 -- Composition of copper-zinc alloys		18
Table 3 -- Composition of copper-zinc-lead alloys		19
Table 4 -- Composition of complex copper-zinc alloys		20
Table 5 -- Mechanical properties of low alloyed copper alloys		21
Table 6 -- Mechanical properties of copper-zinc alloys		22
Table 7 -- Mechanical properties of copper-zinc-lead alloys		23
Table 8 -- Mechanical properties of complex copper-zinc alloys		24
Table 9 -- Tolerances on external diameter or width across-flats		25
Table 10 -- Tolerances on wall thickness		25
Table 11 -- Tolerances on diameter of the bore		25
Table 12 -- Tolerances on eccentricity		26
Table 13 -- Tolerances on straightness of hollow rod		26
Table 14 -- Tolerances on length of hollow rod		26
Table 15 -- Corner radii for hollow rod with square, hexagonal or octagonal external shape		26
Table 16 -- Maximum twist for hollow rod with square, hexagonal or octagonal external shape		27
Table 17 -- Sampling rate		27