

DIN EN ISO 11120:2015-05 (E)

Gas cylinders - Refillable seamless steel tubes of water capacity between 150 l and 3000 l - Design, construction and testing (ISO 11120:2015)

Contents	Page
Foreword	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Symbols	7
5 Inspection and testing	8
6 Materials	8
6.1 General requirements	8
6.2 Controls on chemical composition	9
6.3 Heat treatment	10
6.4 Mechanical properties	10
6.5 Failure to meet test requirements	10
7 Design	11
7.1 Calculation of cylindrical shell thickness	11
7.2 Design of tube ends	11
7.3 Design drawing	12
8 Construction and workmanship	12
8.1 General	12
8.2 Surface imperfections	12
8.3 Ultrasonic examination	12
8.4 End closure (fitting)	12
8.5 Dimensional tolerances	12
8.5.1 Out-of-roundness	12
8.5.2 Outside diameter	12
8.5.3 Straightness	13
8.5.4 Eccentricity	13
8.5.5 Length	13
8.5.6 Water capacity	13
8.5.7 Mass	13
9 Type approval procedure	14
9.1 General requirements	14
9.2 Prototype tests	14
9.3 Type approval test report	15
9.4 Type approval certificate	15
10 Batch tests	15
10.1 General requirements	15
10.2 Mechanical tests	15
10.2.1 General requirements	15
10.2.2 Tensile test	16

10.2.3	Impact testing	16
10.3	Interpretation of results	16
11	Tests on every tube	16
11.1	General	16
11.2	Hydraulic test	17
11.2.1	Proof pressure test	17
11.2.2	Volumetric expansion test	17
11.3	Hardness testing	17
11.4	Visual inspection	18
11.5	Dimensional inspection	18
11.5.1	Thickness	18
11.5.2	Diameter and length	18
11.5.3	Water capacity and mass	18
11.5.4	Neck threads and openings	18
11.6	Ultrasonic non-destructive test	18
12	Special requirements for tubes for embrittling gases	19
12.1	General	19
12.2	Materials	19
12.3	Design	19
12.4	Construction and workmanship	19
12.4.1	General	19
12.4.2	Surface imperfections	19
12.5	Mechanical tests	20
12.5.1	Tensile and impact tests	20
12.5.2	Hardness test	20
13	Inspection certificate	20
14	Marking	21
Annex A (informative) Typical chemistry groupings for seamless steel tubes		22
Annex B (normative) Ultrasonic examination		23
Annex C (informative) Description and evaluation of manufacturing imperfections and conditions for rejection of seamless steel tubes at time of final inspection by the manufacturer		28
Annex D (informative) Acceptance certificate		34
Annex E (informative) Type approval certificate		36
Annex F (informative) Bend stress calculation		37
Bibliography		38