

# DIN EN ISO 12216:2023-02 (E)

Small craft - Windows, portlights, hatches, deadlights and doors - Strength and watertightness requirements (ISO 12216:2020 + Amd 1:2022) (includes Amendment :2022)

---

<b>Contents</b>	<b>Page</b>
European foreword.....	4
<b>A1</b> European foreword to Amendment A1 <b>A1</b> .....	5
<b>A1</b> Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2013/53/EU aimed to be covered <b>A1</b> .....	6
Foreword .....	7
<b>A1</b> Foreword to Amendment 1 <b>A1</b> .....	9
<b>1</b> Scope.....	10
<b>2</b> Normative references .....	10
<b>3</b> Terms and definitions .....	10
<b>3.1</b> General definitions of openings and their coverings .....	11
<b>3.2</b> Devices covering an opening.....	11
<b>3.3</b> Plate of an appliance .....	11
<b>3.4</b> Specific appliances.....	12
<b>3.5</b> Areas definition .....	13
<b>3.6</b> Plate end-connections .....	15
<b>3.7</b> Types of glass.....	15
<b>3.8</b> Watertightness.....	15
<b>3.9</b> Other general definitions .....	16
<b>4</b> General requirements .....	18
<b>4.1</b> Requirements of other International Standards .....	18
<b>4.2</b> Strength of appliances.....	18
<b>4.3</b> Watertightness of appliances .....	18
<b>4.3.1</b> Minimum degree of watertightness .....	18
<b>4.3.2</b> Additional requirements for appliances related to watertightness.....	18
<b>5</b> Plate materials .....	19
<b>5.1</b> General.....	19
<b>5.2</b> Acrylic sheet materials.....	19
<b>5.3</b> Glass .....	19
<b>5.3.1</b> Restrictions of usage .....	19
<b>6</b> Specific requirements of appliances .....	19
<b>6.1</b> Plate end connection and location.....	19
<b>6.1.1</b> Simply supported plates.....	19
<b>6.1.2</b> Semi-fixed plates .....	20
<b>6.2</b> Fastening requirements .....	20
<b>6.2.1</b> Fastening of plates and frames.....	20
<b>6.2.2</b> Fastening of semi-fixed plates .....	21
<b>6.2.3</b> Fastening of glued plates .....	21
<b>6.2.4</b> Stiffeners and attachments.....	21
<b>6.3</b> Special requirements.....	21
<b>6.3.1</b> Appliances fitted in area I .....	21
<b>6.3.2</b> Appliances fitted in area IIa .....	23
<b>6.3.3</b> Flush deck companionway opening sill heights.....	24
<b>6.3.4</b> Sliding appliances .....	25

6.3.5	Washboards .....	26
6.3.6	Securing system .....	26
6.3.7	Deadlights .....	26
6.3.8	Multihull escape hatches .....	26
6.3.9	Prefabricated appliances .....	27
6.3.10	Appliance systems (composite appliances).....	27
7	Strength assessment.....	27
7.1	Assessment methods for appliances strength.....	27
7.2	Monolithic plates — Direct calculation methods.....	27
7.2.1	Monolithic semi-fixed plates — Direct calculation method.....	27
7.2.2	Selection of monolithic plate thickness.....	28
7.2.3	Plate aspect-ratio coefficients, $k_r$ and $k_f$ .....	29
7.2.4	Design pressure.....	30
7.2.5	Pressure reduction factor.....	30
7.2.6	Curvature coefficient.....	30
7.2.7	Flexural strength and modulus of elasticity .....	31
7.2.8	Safety factor and minimum plate thickness.....	31
7.2.9	Monolithic simply supported on 2 sides — Direct calculation .....	32
7.2.10	Monolithic simply supported on 3 sides — Direct calculation .....	32
7.3	Laminated glass — Direct calculation.....	33
7.4	Advanced calculation method.....	34
7.5	Pressure test assessment method .....	34
Annex A	(informative) Location areas of appliances above $W_{LREF}$ .....	35
Annex B	(informative) Types of plate edge connection .....	37
Annex C	(normative) Unsupported plate dimensions.....	39
Annex D	(normative) Test methods.....	41
D.1	General .....	41
D.2	Pressure and watertightness tests .....	41
D.2.1	Pressure test for watertight appliances (watertightness degree 2) .....	41
D.2.2	Watertightness tests.....	42
D.3	Test or calculation for mechanical links .....	44
D.4	Gluing tests.....	45
D.4.1	General .....	45
D.4.2	Inside pressure test .....	45
D.4.3	Separation test.....	46
Annex E	(normative) High-impact-resistance glass .....	48
Annex F	(informative) Precalculated tables .....	49
F.1	Mechanical properties of typical materials .....	49
F.2	Use of pre-calculated tables.....	49
Bibliography	.....	79