DIN EN 16901:2017-04 (E)

Ice-cream feezers - Classification, requirements and test conditions

Contents

Page

European foreword 5

1 Scope 6

2 Normative references 6

3 Terms and definitions 6
3.1 General 6
3.2 Parts of ice-cream freezers 6
3.3 Physical aspects and dimensions 7
3.4 Definitions relating to performance characteristics 8
3.5 Definitions related to test environment 8

4 Symbols 9

5 Classification and requirements 9
5.1 Classification 9

Table 1 -- Classification according to temperature 9
5.2 Requirements 10
5.2.1 Construction 10
5.2.2 Materials 10
5.2.3 Refrigerating system 11
5.2.4 Electrical components 11
5.2.5 Operating characteristics 12

6 Tests 13
6.1 General 13

Table 2 -- Test summary 13
6.2 Tests outside test room 13
6.2.1 General 13
6.2.2 Seal test for lids 13
6.2.3 Test on durability of lid 14

Figure 1 -- Durability of lid 14
6.2.4 Linear dimensions, areas and volumes 14
6.3 Tests inside test room 15
6.3.1 General 15
6.3.2 Test room conditions 15

Table 3 -- Test room climate classes 16
6.3.3 Test packages and life-time 16

Table 4 -- Dimensions and mass of test packages 17

Figure 2 -- Thermal characteristics of test packages 18

Table 5 -- Temperature and specific enthalpy of test packages 19

Table 6 -- Temperature and increase in specific enthalpy of test packages 19

Figure 3 -- M-Package 20

Table 7 -- Temperature and specific enthalpy of filler packages 21

Table 8 -- Temperature and increase in specific enthalpy of filler packages 21

Figure 4 -- Thermal characteristics of filler packages 22
6.3.4 Instruments, measuring equipment and measuring expanded measurement uncertainty . 22
6.3.5 Preparation of test ice cream freezer 22

Figure 5 -- Ice cream location within the test room 23

Figure 6 -- Condensing air with test room air flow, or across, but not opposed the test room air flow 24

Figure 7 -- Air movement 25

Figure 8 -- Climate measuring point for ice cream freezer 25

Figure 9 -- Glass lid ice cream freezer with flat base deck with and without tubes laid at the base ... 27

Figure 10 -- Glass lid ice cream freezer with stepped base deck with and without tubes laid at the base 28

Figure 11 -- Tests on ice cream freezers with lights or without lights 29
6.3.6 Test on ice cream freezers 30

Figure 12 -- Relevant temperature curve of M-packages 31

Figure 13 -- Arithmetic mean temperature of M-packages 32

Figure 14 -- Condensation code 33

Table 9 -- Temperature rise time conditions for C1 34

7 Test report 34
7.1 Tests outside test room 34

Table 10 -- Linear dimensions, areas and volumes 35
7.2 Tests inside test room 35

Table 11 -- Conditions for tests inside test room 35

Table 12 -- Ice cream freezer preparation for tests inside test room 35

Table 13 -- Temperature test for tests inside test room 36

Table 14 -- Water vapour condensation test 36

Table 15 -- Electrical energy consumption test 36

Table 16 -- Specific energy consumption 37

8 Marking 37
8.1 Load limit 37

Figure 15 -- Load limit markings 37

Figure 16 -- Dimensions of load limit line 37

Figure 17 -- Different positions for the load limit 38
8.2 Marking plate 38

8.3 Information to be supplied by the manufacturer 38

Annex A (informative) Ice-cream freezer families 40

Table A.1 -- Ice cream freezer families 40

Annex B (normative) Net volume calculation 41

Annex C (normative) Equivalent volume calculation 42

Annex D (normative) TDA calculation 43

D.1 General 43
D.2 Calculation of TDA 43

Figure D.1 -- Horizontal, open, wall-site and island cabinets 44

Figure D.2 -- Horizontal, open, island cabinets 45

Annex E (informative) Test for absence of odour and taste 46

E.1 Preparation and testing 46
E.1.1 Ambient temperature 46
E.1.2 Cleaning 46
E.1.3 Thermostat setting 46
E.1.4 Samples 46
E.1.5 Test period 46
E.2 Examination of samples 47
E.2.1 Conditions 47
E.2.2 Evaluation 47

Annex F (normative) Performance and energy rating of ice cream freezers 48

F.1 Scope 48
F.2 Standard rating conditions for ice cream freezers 48
F.3 Specific energy consumption (SEC) for ice cream freezers 48

Annex ZA (informative) Relationship between this European Standard and the ecodesign requirements of Commission Draft Ecodesign Regulation DG ENER LOT12 aimed to be covered 49

Table ZA.1 -- Correspondence between this European Standard and Commission Draft Ecodesign Regulation DG ENER LOT12 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for refrigerated commercial display cabinets and Commission's standardization request `M/495' 49

Bibliography 50