

# DIN 13277:2022-05 (E)

## Refrigerators and freezers for laboratory and medical applications - Terminology, requirements, testing

---

<b>Contents</b>	<b>Page</b>
Foreword .....	4
1 Scope .....	5
2 Normative references .....	6
3 Terms and definitions.....	6
4 Requirements .....	9
4.1 General .....	9
4.1.1 Gross volume .....	9
4.1.2 Usable volume .....	9
4.1.3 Installation dimensions .....	9
4.1.4 Interior space and interior fittings.....	9
4.1.5 Latching system for appliance door/flap and lid.....	9
4.1.6 Appliance door and lid seal.....	10
4.1.7 Installation and set-up.....	10
4.2 Safety requirements.....	10
4.2.1 Stability.....	10
4.2.2 Switch-on indicator .....	10
4.2.3 Usable-space temperature and product temperature .....	10
4.2.4 Monitoring of the product temperature .....	11
4.2.5 Temperature rise inside in case of power failure.....	13
4.2.6 Noise emission .....	13
4.2.7 Automatic defrosting .....	13
4.2.8 Appliance insulation / condensation formation .....	13
4.2.9 Relative duty cycle / needed capacity .....	13
4.3 Hygienic requirements.....	13
5 Testing .....	14
5.1 General .....	14
5.1.1 General test conditions .....	14
5.1.2 Dimensions.....	16
5.1.3 Gross volume .....	16
5.1.4 Usable volume .....	16
5.1.5 Loading capacity of the storage surfaces.....	16
5.1.6 Latching system for appliance door/flap and lid.....	16
5.1.7 Appliance door seal and lid seal.....	16
5.2 Safety requirements.....	17
5.2.1 General .....	17
5.2.2 Usable-space temperature and product temperature .....	17
5.2.3 Appliance insulation / condensation formation .....	24
5.2.4 Relative duty cycle / needed capacity.....	24
5.2.5 Standard energy consumption.....	25
6 Test report.....	25
7 Labelling.....	26

<b>Annex A (informative) Exemplary method for product temperature testing of loaded blood bank refrigerators and loaded plasma storage appliances</b> .....	27
<b>A.1 Loaded appliance</b> .....	27
<b>A.1.1 General</b> .....	27
<b>A.1.2 Test bags</b> .....	27
<b>A.1.3 Loading of plasma storage appliances</b> .....	27
<b>A.1.4 Loading of blood bank refrigerators</b> .....	29
<b>A.1.5 Reference body</b> .....	31
<b>A.2 Testing the product temperature with loading</b> .....	32
<b>A.2.1 Testing the temperature distribution during a defrosting process for forced-air appliances</b> .....	32
<b>A.2.2 Testing the temperature distribution while opening the appliance door/lid/flap</b> .....	32
<b>A.2.3 Testing the temperature curve in case of power failure</b> .....	32
<b>Annex B (informative) Schematic overview of important terms for temperature testing</b> .....	33
<b>Bibliography</b> .....	34

## Figures

<b>Figure 1 — Example of a suitable reference body set-up</b> .....	12
<b>Figure 2 — Partitions to reduce air circulation (top view)</b> .....	15
<b>Figure 3 — Overview of measuring planes</b> .....	17
<b>Figure 4 — Arrangement and position of measurement points</b> .....	18
<b>Figure 5 — Distances from storage surfaces and wall limits</b> .....	19
<b>Figure 6 — Test evaluation</b> .....	20
<b>Figure A.1 — Arrangement of test bags for loading upright plasma storage appliances</b> .....	28
<b>Figure A.2 — Arrangement of test bags for loading horizontal plasma storage appliances with and without appliance step</b> .....	29
<b>Figure A.3 — Arrangement of test bags for loading upright blood bank refrigerators</b> .....	30
<b>Figure A.4 — Arrangement of test bags for loading horizontal blood bank refrigerators with and without appliance step</b> .....	31
<b>Figure B.1 — Schematic overview of important terms for temperature testing</b> .....	33

## Tables

<b>Table 1 — Storage applications of refrigerating and freezing storage appliances</b> .....	5
<b>Table 2 — Usable-space temperature range (measured with measuring body defined in 3.9) and product temperature range (measured with reference body defined in 3.16) of the refrigerating appliance in steady-state operation</b> .....	11
<b>Table 3 — List of all required tests and test requirements and related subclauses in this document</b> .....	14
<b>Table 4 — Limit temperature (measured in the reference body defined in 3.16) of the refrigerating appliance in case of power failure</b> .....	23