

# ISO 21922:2021-08 (E)

## Refrigerating systems and heat pumps - Valves - Requirements, testing and marking

| <b>Contents</b> |   | <b>Page</b> |
|-----------------|---|-------------|
|                 | Foreword.....   | v           |
|                 | Introduction.....   | vi          |
| <b>1</b>        | <b>Scope</b> .....  | <b>1</b>    |
| <b>2</b>        | <b>Normative references</b> .....   | <b>1</b>    |
| <b>3</b>        | <b>Terms and definitions</b> .....  | <b>1</b>    |
| <b>4</b>        | <b>List of symbols</b> .....  | <b>4</b>    |
| <b>5</b>        | <b>General requirements</b> .....   | <b>6</b>    |
|                 | 5.1 Installation and operation.....                                       | 6           |
|                 | 5.2 Components under pressure.....  | 6           |
|                 | 5.3 Excessive mechanical stress.....                                      | 7           |
|                 | 5.4 Tightness.....  | 7           |
|                 | 5.5 Functioning of hand-operated valves.....                              | 7           |
|                 | 5.6 Functioning of actuator-operated valves.....                          | 7           |
| <b>6</b>        | <b>Materials</b> .....  | <b>7</b>    |
|                 | 6.1 General.....  | 7           |
|                 | 6.1.1 Using metallic materials.....                                       | 7           |
|                 | 6.1.2 Using non-metallic materials.....                                   | 7           |
|                 | 6.2 Requirements for materials to be used for pressure bearing parts..... | 8           |
|                 | 6.3 Compatibility of connections.....                                     | 8           |
|                 | 6.4 Ductility.....  | 8           |
|                 | 6.5 Ageing.....   | 8           |
|                 | 6.6 Castings.....   | 8           |
|                 | 6.7 Forged and welded components.....                                     | 8           |
|                 | 6.8 Nuts, bolts and screws.....   | 8           |
|                 | 6.9 Spindles.....   | 9           |
|                 | 6.10 Glass materials.....   | 9           |
|                 | 6.11 Requirements for documentation.....                                  | 9           |
|                 | 6.12 Impact energy <i>KV</i> measurement on sub-sized specimens.....      | 10          |
| <b>7</b>        | <b>Design</b> .....   | <b>10</b>   |
|                 | 7.1 General.....  | 10          |
|                 | 7.2 Maximum allowable pressure.....                                       | 11          |
|                 | 7.3 Valve and valve assembly strength design.....                         | 11          |
|                 | 7.4 Bodies and bonnets.....   | 12          |
|                 | 7.5 Nuts, bolts, screws, fasteners and seals.....                         | 12          |
|                 | 7.6 Seat tightness.....   | 12          |
|                 | 7.6.1 General.....  | 12          |
|                 | 7.6.2 Seat tightness: type test.....                                      | 13          |
|                 | 7.7 Screwed spindles and shafts.....                                      | 14          |
|                 | 7.8 Design of glands.....   | 14          |
|                 | 7.9 Valve seats.....  | 15          |
|                 | 7.10 Caps.....  | 15          |
|                 | 7.11 Hand operated valves.....  | 16          |
|                 | 7.12 Corrosion protection.....  | 16          |
| <b>8</b>        | <b>Appropriate manufacturing procedures</b> .....                         | <b>16</b>   |
| <b>9</b>        | <b>Production testing</b> .....   | <b>17</b>   |

|                     |   |           |
|---------------------|---|-----------|
| 9.1                 | Strength pressure testing.....  | 17        |
| 9.2                 | Tightness testing.....  | 17        |
| 9.3                 | Seat sealing capacity.....  | 18        |
| 9.4                 | Caps.....   | 18        |
| <b>10</b>           | <b>Marking and additional information.....</b>  | <b>18</b> |
| 10.1                | General.....  | 18        |
| 10.2                | Marking.....  | 19        |
| 10.3                | Example how to mark the allowable limits of pressure and temperature.....   | 19        |
| 10.4                | Hand-operated regulating valves.....  | 19        |
| 10.5                | Caps.....   | 19        |
| <b>11</b>           | <b>Documentation.....</b>   | <b>20</b> |
| 11.1                | General.....  | 20        |
| 11.2                | Documentation for valves.....   | 20        |
| 11.3                | Additional documentation for valve assemblies.....  | 20        |
| <b>Annex A</b>      | <b>(normative) Procedure for the design of a valve by calculation.....</b>  | <b>21</b> |
| <b>Annex B</b>      | <b>(normative) Experimental design method for valves.....</b>   | <b>24</b> |
| <b>Annex C</b>      | <b>(normative) Determination of the allowable pressure at the maximum operating temperature.....</b>                                      | <b>28</b> |
| <b>Annex D</b>      | <b>(normative) Determination of the allowable pressure at minimum operating temperature — Requirements to avoid brittle fracture.....</b> | <b>29</b> |
| <b>Annex E</b>      | <b>(informative) Compilation of material characteristics of frequently used materials.....</b>  | <b>40</b> |
| <b>Annex F</b>      | <b>(informative) Justification of the individual methods.....</b>   | <b>60</b> |
| <b>Annex G</b>      | <b>(normative) Pressure strength verification of valve assemblies.....</b>  | <b>66</b> |
| <b>Annex H</b>      | <b>(normative) Determination of category for valves.....</b>  | <b>67</b> |
| <b>Annex I</b>      | <b>(informative) DN system.....</b>   | <b>72</b> |
| <b>Annex J</b>      | <b>(normative) Additional requirements — Sight glasses and indicators.....</b>  | <b>75</b> |
| <b>Annex K</b>      | <b>(normative) Compatibility screening test.....</b>  | <b>78</b> |
| <b>Annex L</b>      | <b>(informative) Stress corrosion cracking.....</b>   | <b>82</b> |
| <b>Annex M</b>      | <b>(normative) Method for sizing the operating element of hand-operated valves.....</b>   | <b>85</b> |
| <b>Bibliography</b> | <b>.....</b>  | <b>87</b> |