

DIN EN 378-2:2018-04 (E)

Refrigerating systems and heat pumps - Safety and environmental requirements - Part 2: Design, construction, testing, marking and documentation

Contents		Page
European foreword.....		5
Introduction		7
1	Scope.....	8
2	Normative references.....	8
3	Terms, definitions and abbreviated terms	12
4	Significant hazards	13
5	Safety requirements.....	13
5.1	General safety and environmental requirements.....	13
5.1.1	General.....	13
5.1.2	Hazards to persons, property and environment	13
5.2	Safety requirements for components and piping.....	13
5.2.1	General requirements	13
5.2.2	Specific requirements.....	15
5.3	Miscellaneous components	16
5.3.1	Materials.....	16
5.3.2	Testing.....	18
5.3.3	Marking.....	20
5.3.4	Documentation.....	20
6	Requirements for assemblies	21
6.1	General.....	21
6.2	Design and construction	22
6.2.1	General.....	22
6.2.2	Determination of the maximum allowable pressure	22
6.2.3	Piping.....	25
6.2.4	Shut off devices	30
6.2.5	Protection devices	31
6.2.6	Application of protection devices	31
6.2.7	Indicating and measuring instruments (monitoring)	39
6.2.8	Liquid slugging in compressors	40
6.2.9	Electrical requirements.....	40
6.2.10	Protection against hot surfaces.....	40
6.2.11	Protection against moving parts	40
6.2.12	Vibration and drop test.....	40
6.2.13	Transport test.....	43
6.2.14	Protection against fire and explosion hazards.....	43
6.2.15	Requirements for ventilated enclosures.....	45
6.2.16	Electromagnetic compatibility and fields (EMC, EMF).....	45
6.2.17	Noise	46
6.3	Testing.....	46
6.3.1	Tests.....	46
6.3.2	Strength pressure test.....	46
6.3.3	Tightness test.....	47
6.3.4	Test of the complete refrigerating system before putting it into operation	49
6.4	Marking and documentation.....	50

6.4.1	General	50
6.4.2	Marking	50
6.4.3	Documentation	52
Annex A (normative) Additional requirements for refrigerating systems containing R-717		55
A.1	Systems with a refrigerant charge above 50 kg.....	55
A.2	Systems with a refrigerant charge above 3 000 kg.....	55
A.3	Pumps	55
Annex B (normative) Determination of category for components and refrigerating system assemblies		56
B.1	General	56
B.2	Classification of the refrigerant.....	56
B.3	Determine the maximum allowable pressure of the assembly	56
B.4	Determine the state (liquid or gas) of the refrigerant	56
B.5	Determination of category of components.....	56
B.5.1	General	56
B.5.2	Pressure vessels and piping.....	56
B.5.3	Safety accessories	60
B.5.4	Joining of pressure equipment	60
B.6	Determination of category of the assembly	63
Annex C (normative) Requirements for intrinsic safety test		64
C.1	General	64
C.2	Determination of the maximum pressure during abnormal operation	64
C.2.1	Determination of the pressure at the high pressure side (PHIS)	64
C.2.2	Determination of the pressure at the low pressure side (PLIS)	64
C.2.3	Determination of PHIS and PLIS for reversible heat pumps	65
C.3	Strength pressure test.....	65
C.4	Test results.....	65
Annex D (normative) List of significant hazards		66
Annex E (informative) Assessment of assemblies for compliance with directive 2014/68/EU.....		67
Annex F (informative) Examples for arrangement of pressure relief devices in refrigerating systems.....		68
Annex G (informative) Checklist for external visual inspection of the installation		71
Annex H (informative) Stress corrosion cracking		73
H.1	Introduction.....	73
H.2	Stress corrosion in copper	73
H.3	Stress corrosion in steel.....	73
H.4	Factors that influence stress corrosion cracking.....	74

H.4.1	General.....	74
H.4.2	Yield strength	74
H.4.3	Temperature.....	74
H.4.4	Oxygen content	74
H.4.5	Water content.....	74
H.4.6	Age of equipment	74
H.4.7	Avoiding stress corrosion cracking.....	75
H.4.8	Conclusions	75
Annex I (informative)	Leak simulation test for A2L, A2, A3, B2L, B2, B3 refrigerants	76
Annex J (informative)	Commissioning procedure.....	78
Annex K (informative)	Information on effective ignition sources	79
Annex ZA (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2014/68/EU	81
Annex ZB (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	83
Bibliography.....		85