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EUROVENT 6/5

SAFETY REGULATIONS FOR ELECTRICITY, REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY AND REFRIGERATION SAFETY RULES, APPLICABLE TO AIR CONDITIONING UNITS IN VARIOUS EUROPEAN COUNTRIES

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INTRODUCTION

The variety of the national regulations in matters of electrical safety, distribution of electric energy, and refrigeration safety considerably prejudices commercial trade of air conditioning equipment between the European countries.

With the aim to give rise to a European concertation and to contribute in this way to the harmonization of these various regulations, Working Group 6, "AIR CONDITIONING" of EUROVENT has made an inquiry among the various European organizations and manufacturers concerned by these problems.

This inquiry, closed at the end of 1977, has made it possible to compile in this document the references of available documents, the addresses of the editing organizations, as well as some essential differences between the national documents and the international documents drawn up by IEC and ISO.

This volume and the constant evolution of the various legislations and regulations regarding the security of people involve, on the one hand, that the data included in this document shall in no way be considered as complete and, on the other hand, a constant improvement of their accuracy through an efficient cooperation of all concerned people.

English Version

INDEX OF COUNTRIES

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GERMANY

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations :

The following specifications are applicable for room air conditioners:

VDE 0720 Part 1	Specifications for electric heating apparatus for domestic use and similar purpose "General specifications"
VDE 0730 Part 1	Specifications for equipment with electromotor drive for domestic use and similar purposes "General specifications"
DIN IEC 335 Part 24/ VDE 0700 Part 24	Particular specifications for refrigerating equipment
VDE 0730 Part 2 (ZG)	Particular specifications for room air conditioners (in preparation)
VDE 0875	Specifications for interference suppression of apparatus machines and plants for rated frequencies between 0 and 10 kHz

For air conditioners which are beyond the scope of VDE 0730 Part 2 ZG, any air conditioner which does not constitute a structural unit, but which is assembled from several structural members of compontens, the following VDE rules are applicable:

VDE 0100	Specifications for the erection of high voltage plants with rated voltages not exceeding 1000 V
VDE 0108	Specifications for the erection and the operation of high voltage plants in assembly rooms, shops and department stores, sky scrapers, hotels and hospitals
VDE 0875	Specifications for interference suppression of apparatus machines and plants for rated frequencies between 0 and 10 kHz.

Further more, the following VDE rules are applicable for structural members if these belong to the plant:

VDE 0160	Specifications for the electronic equipment of high voltage plants.
DIN 57281/VDE 0281 DIN 57282/VDE 0282	Specifications for insulated power mains
VDE 0550	Specifications for small transformers
VDE 0560	Specifications for condensers
VDE 0606	Specifications for connecting material
VDE 0630	Specifications for apparatus switches
VDE 0631	Specifications for thermostats and temperature limiting devices
VDE 0660	Specifications for low-voltage equipment.

Published by: DEUTSCHE ELEKTROTECHNISCHE KOMMISSION
Fachnormenausschuss Elektrotechnik im DIN gemeinsam mit Vorschriftenausschuss des VDE – Geschaftsstelle Frankfurt
Stresemannallee 21, D-6000 Frankfurt/Main 70

For sale at: VDE-Verlag
Bismarkstrasse 33, D-1000 Berlin 12 (Charlottenburg)

1.2. Requirements that differ both from general and specific recommendations by ICE for each equipment:

In documents VDE 0720 and 0730, the requirements that differ from the ICE recommendations are indicated and commented, in a chapter at the end of each document.

All the VDE-rules specified under 1.1. for air conditioners are in process of revision so as to adapt them, as completely as possible, to the ICE publications 335-1, 2nd edition 1976, 335-2-24, 1st edition 1976 "Coolers" and 378, 1st edition 1972 "Air conditioners". Presently, a EC-Guideline is being prepared with a view to adapting VDE 0875 to the ICE-CISPR publication 14.

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors:

The technical conditions of connection (TAB) of the Electricity Boards authorize singlephase motors whose output does not exceed 1.4 kW. For motors of higher output a special authorization is required.

Heating installations which are part of an air conditioning plant may be connected without special authorization, if their output does not exceed 2 kW. For higher outputs a special authorization is required.

The starting up of the motor shall not entail any disturbance due to a voltage drop in the network (loop resistance read on the meter 0.2 Ohm for an aerial line and 0.4 Ohm in the calbe network).

2.2. Special requirements relative to maximum permissible output of three phase motors

Three phase motors connected to 380 V:

a) direct connection with current displacement rotor not exceeding 5.5 kW
b) star-delta connection not exceeding 11.0 kW
c) connection by means of a device which limits the starting current to twice the rated output of the motors not exceeding 15.0 kW

At the rated output, the starting current of three phase motors should not exceed:

4 times the rated current for less than 5.5 kW
3 times the rated current for less than 11.0 kW
2 times the rated current for less than 15.0 kW

2.3. Possible exceptions and address of authorities issuing these:

The local Electricity Boards
Further information: Vereinigung Deutscher Elektrizitatswerke
Stresemannallee 23, D-6000 Frankfurt 70

3. REFRIGERATION SAFETY RULES

3.1. Document reference and address of the editing organizations:

VGB 20	Regulations for prevention of accidents "Refrigeration Plants"
Published by:	Berufsgenossenschaft Nahrungsmittel und Gaststätten Steubenstrasse 46, D-6800 Mannheim
For sale at:	Carl Heymanns Verlag KG Gereonstrasse 18-32, D-5000 Köln
DIN 2405	Marking of pipes in refrigeration plants
DIN 8905, Sheet 1 + 2	Ducts for refrigeration plants
Published by:	Fachnormenausschuss KÄLTETECHNIK Deutsches Institut für Normung e.V. Kamekestrasse 2-8, D-5000 Köln
For sale at:	Beuth-Vertrieb GmbH Burggrafenstrasse 4-7, 1000 Berlin 30

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group 1 refrigerant according to the refrigeration system and to classification of room occupancy:

The regulations for prevention of accidents "Refrigeration Plants" VGB 20 complies with the ISO Recommendation R 1662. The only difference is that the occupancies A, B, C, D have been put together to one category M and that no ventilation for the rooms of category A is required. The occupancy O is identical with the occupancy E (see next page table 1 "Maximum charge of refrigerant for a refrigeration plant according to the category of occupancy").

Occupancy "M" comprises buildings, closed parts of buildings or spaces in the open air, which are often occupied by people not acquainted with the establishment or where persons are restricted in their movement, and residential apartment for example: prisons, hospitals, homes for aged, lecture halls, theatres, public buildings, small shops and department stores, recreation grounds, restaurants, hotels, offices, living quarters, etc. ...

Occupancy "O" comprises buildings, closed parts of buildings and spaces in the open air where unauthorized persons have no accesss. For example: manufacturing premises, laboratories, machinery rooms, storerooms and other places for the performance of work without direct communication with occupancy "M".

Refrigerant of group 1

When using a refrigerant of group 1 a danger for the personal exists only then when the quantity c (kg/m^3) indicated in table 2 for the refrigerant used may be exceed when the filling charge is liberated. This quantity does not comply with the values "MAK" (maximum concentration at the working place), which are based on eight hours of work. For premises which are intended for being occupied by people, the maximum refrigerant charge (kg) of the plant is calculated by multiplying the quantity c (kg/m^3) with the volume (m^3) of the space, in which the refrigerant can effuse when liberating. Refrigerant of group 1 are heavier than air and can effuse in lower parts. A rise in concentration may occur near the floor when the air is at rest.

In case of forced air central cooling, the volume of all supplied spaces may only be taken for the space volume, if the volume of air supplied to each of these spaces cannot be reduced to less than 25 % of its highest values.

Should pipelines cross rooms of occupancy "M" and if the ratio between filling charge and the volume of the room of occupancy "M" is higher than the maximum concentration, the pipelines should be laid in sealed ducts vented to a space where the other parts of the refrigeration plant are located, or to atmosphere.

TABLE 1: MAXIMUM CHARGE OF REFRIGERANT FOR A REFRIGERATION PLANT ACCORDING TO THE CATEGORY OF OCCUPANCY

<table>
<tr><td colspan="2">Refrigerant group</td><td colspan="2">1</td><td colspan="4">2</td><td colspan="2">3</td></tr>
<tr><td colspan="2">Refrigerating system</td><td>Direct and indirect open system</td><td>Indirect vented open and indirect closed system</td><td colspan="3">direct, indirect open and indirect vented open system</td><td>indirect closed system</td><td>direct system</td><td>indirect system</td></tr>
<tr><td rowspan="4">Occupancy M</td><td>located without special machinery room</td><td>c* kg per m³ of room</td><td>c kg per m³ of room</td><td colspan="3">absorbers up to 2 5 kg only</td><td></td><td colspan="2">o kg</td></tr>
<tr><td>located on the high pressure side either in a machinery room (§17) or in the open air</td><td>c kg per m³ of room on the low pressure side or, in case of air-cooled equipment, of the volume of supplied rooms</td><td>no restrictions</td><td colspan="3">absorbers up to 2.5 kg only</td><td></td><td colspan="2">0 kg</td></tr>
<tr><td rowspan="2">all refrigerant-circulating parts are located either in the machinery room (§ 17) or in the open air</td><td rowspan="2">c kg per m³ of room on the low pressure side or, in case of air cooled equipment, of the volume of supplied rooms</td><td rowspan="2">no restrictions</td><td colspan="4">below the 1st underground floor absorber up to 2 5 kg</td><td colspan="2" rowspan="2">0 kg</td></tr>
<tr><td colspan="2">absorbers up to 2 5 kg only</td><td>on the high pressure side on the 1st underground floor or on upper floors</td><td>with direct communication to rooms of occupancy M 250 kg
without direct communication to rooms of occupancy M and with access from outside no restrictions</td></tr>
<tr><td rowspan="3">Occupancy O</td><td rowspan="2">located without special machinery room</td><td colspan="2">in underground floors c kg per m³ of rooms</td><td colspan="4">below the 1st underground floor 2.5 kg</td><td colspan="2" rowspan="2">on underground floors 0 kg
on upper floors 2 5 kg</td></tr>
<tr><td colspan="2">in upper floors no restriction</td><td>on the 1st underground floor and on upper floor</td><td>10 kg
for a room occupancy less than 1 person/10 m² and marked emergency exists 50 kg</td></tr>
<tr><td>located on the high pressure side either in a machinery room (§17) or in the open air</td><td colspan="2">no restriction</td><td colspan="4">below the 1st underground floor 2 5 kg</td><td colspan="2">on underground floors 0 kg
on upper floors 25 kg</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>on the high pressure side on the 1st underground floor or on upper floors</td><td>50 kg
for a room occupancy less than 1 person/10 m² and marked emergency exits from the occupancy on the low pressure side no restrictions</td><td>on the high pressure side on the 1st underground floor or on upper floors</td><td>no restrictions</td><td colspan="2"></td></tr>
<tr><td>all refrigerant circulating parts are located either in the open air or in a special machinery room</td><td colspan="2">no restriction</td><td colspan="4">on the 1st underground floors and on upper floors no restrictions</td><td colspan="2">on upper floors no restrictions</td></tr>
</table>

* see table 2

TABLE 2: PERMISSIBLE CHARGE OF REFRIGERANT FOR A REFRIGERATION PLANT ACCORDING TO THE LOCATION

Group	Number according to DIN 8962	Chemical name	Chemical formula	Quantity of calculation c for table 1 (kg/m^3)
1	R 11	Trichlorofluoromethane	CCl_3F	0,570
	R 12	Dichlorofluoromethane	CCl_2F_2	0,500
	R 13	Chlorotrifluoromethane	$CClF_3$	0,440
	R 13 B 1	Bromotrifluoromethane	$CBrF_3$	0,610
	R 21	Dichlorofluoromethane	$CHCl_2F$	0,100
	R 22	Chlorodifluoromethane	$CHClF_2$	0,360
	R 113	Trichlorofluoroethane	$C_2Cl_3F_3$	0,185
	R 144	Dichlorotetrafluoroethane	$C_2Cl_2F_4$	0,720
	R 115	Chloropentafluoroethane	C_2ClF_5	0,640
	R C 318	Ocotofluorocyclobutane	C_4F_8	0,800
	R 500	R 12 73,8 % + R 152 a 26,2 %		0,410
	R 502	R 22 48,8 % + R 115 51,2 %		0,460
	CO_2	Carbon dioxide		Non combustible

Table 2 is identical with table 5 of R 1662 with the exception of the value for carbon dioxide.

3.2.2 Maximum charge of group 1 refrigerant above which it is mandatory to fit a pressure safety devices:

For refrigeration plants using refrigerants of group 1 not exceeding 10 kg and refrigerants of group 2 not exceeding 2.5 kg no safety devices are required if their design ensured that the permissible working pressure cannot be exceeded.

Plants that comply with these requirements are plants with intrinsic safety i.e. that due to its size, the compressor cannot produce a pressure exceeding the permissible pressure of the parts located downstream, for example due to a harmful space or to little power. The parts under pressure of a refrigeration plant are then so dimensioned that they resist to working pressures corresponding to a temperature of 55°C.

For refrigeration plants using a charge of refrigerant of group 1 not exceeding 100 kg and for which the volume flow rate of the compressor does not exceed 50 m^3/h a type-tested pressure switch will be sufficient as a pressure safety device on condition that its parts under pressure are resistant to the saturated vapour pressures of the refrigerant at the following temperatures:

A – 55°C for the high pressure side of the plant for air-cooled condensers

B – 43°C for the high pressure side of the plant water-cooled condensers

C – 32°C for the low pressure side of the plant.

If these temperatures may be exceeded during operation or a standstill, the higher temperature is to be taken as a reference, i.g. in the case of hot gas derivation or operation of heat pumps. These standard temperatures are not mandatorily the real temperatures.

When the determinations of the working pressure are based on low pressures of saturated vapour, refrigerating plants should be equipped with safety valves or bursting devices.

The other refrigerating plants should be equipped with excessive pressure safety devices. These must be so designed and adjusted that the permissible working pressure cannot be exceeded by more than 10 % in any part of the plant.

Any putting out of adjustment of the excessive safety devices by incompetent persons should be impossible.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels.

Pressure vessels should undergo an acceptance test when the product of pressure (in bar) and capacity (in liter) exceeds the figure 200.

According to VGB 20 "Refrigerating plants" special regulations for construction and testing are applicable to built-in pressure vessels.

Should be submitted to tests carried out under the supervision of competent persons any vessel located in the refrigerant circuit such as oil separators, intercoolers, headers, liquid separators, generator, absorber and the tubular exchangers, if the product of p (in bars) and v (in litres) exceeds the figure 200, once the volume of any built-in element such as tubular exchangers, etc. deducted. In the case of vessels having a double envelope such as generators in absorption plants, etc. the heating envelope is considered as a pressure vessel.

Are not governed by these regulations, pressure vessels for heat-transferring liquids, brine, water and added or built-in parts of tubular exchangers such as pipes, reversing flaps, etc. are also excluded manifolds mounted on coils or other tubular exchangers, which are designed to discharge the refrigerant, indifferently if they are welded to the systems or flanged.

Receivers which can be shut off on both sides, i.e. which comprise shut-off devices with a fixed hand-wheel without protecting cap should be equipped with a safety device for excessive rise in pressure.

Heating jackets should be equipped with a safety valve and a pressure gauge with a red locating mark indicating the highest permissible working pressure.

For the calculation of the strength of pressure vessels, the maximum permissible working pressure and test pressure are indicated in table 5 unless higher working pressures are specified as i.g. for heat pump plants.

The specifications with respect to materials, calculations, construction and outfitting are laid down in the AD-guidelines.

Published by:	Arbeitsgemeinschaft Druckbehälter im VdTÜV Huyssenallee 54-56, D-4300 Essen
For sale at:	Carl Heymanns Verlag KG Gereonstraße 18-32, D-5000 Köln

(See also Appendix)

BELGIUM

1. SAFETY REGULATIONS FOR ELECTRICITY

The IEC recommendations are applicable. There are no national regulations available for air conditioning equipment.

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

The regulations are made by the elctricity boards.

3. REFRIGERATION SAFETY RULES

The recommendation ISO R 1662 is applicable. There are no national regulations available for air conditioning equipment.

(See also Annexe)

FRANCE

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations:

NF C 73-150	Safety rules for electric equipment of air-conditioners
NF C 73-150	Specification for safety of household electrical appliances
NF C 73-200	Specification for safety of household electrical heating appliances.
NFC 32-1 / NFC 32-2	for rubber or PVC insulated cords
NF C 61	for switches, fuses and plugs.
Published by:	Union Technique de l'Electricite (U.T.E.) 12 place des Etats Unis, F-75783 Paris (Cedex 16)

1.2. Requirements that differ both from general and specific recommendation by IEC for each equipment

None.

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors:

NF C 15.100 — Electrical low voltage equipment
Part 5 – Chapter 55 – Section 552 – Clause 552.2
– Choice and utilization of the equipment – Motors –
– Limitation of troubles due to the starting up of motors
– Motors directly supplied by a public network.

Single phase motors:	Maximum starting up current 45 A	
Three phase motors:	Maximum starting up current 60 A	
Single phase motor 220 V	Maximum rated output (mechanical motor output power)	1.4 kW
Three phase motor 380V	Maximum rated output (mechanical motor output power)	
	– direct starting up at full voltage	5,5 kW
	– starting up at reduced voltage (star/delta starter)	11,0 kW

Beyond the beformentioned starting up current, the motor supply is subject to the previous agreement by the electric supply company.

Published by:	Union Technique de l'Electricite (U.T.E.) 12 place des Etats Unis, F-75783 Paris Cedex 19

2.2. Special requirements relative to maximum permissible output of three phase motors

NF C 15.100	Electrical low voltage equipment (see 2.1)

2.3. Possible exceptions and address of authorities issuing these:

Local board of E.D.F.

3. REFRIGERATION SAFETY RULES

3.1. Document reference, and address of the editing organizations:

NF E 35.400	Safety regulations for refrigerating plants
NF E 35.403	Safety regulations for the refrigerating part of airconditioners
Published by:	Association Française Normalisation (AFNOR) Tour Europe, Cedex 7, F-92080 La Defense

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group 1 refrigerant according to the refrigeration system and to classification of room occupancy:

None.

3.2.2. Maximum charge of group 1 refrigerant above which it is mandatory to fit a pressure safety device:

25 kg according to document NF E 35.400.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels:

According to document NF E 35.400 any refrigerant-containing part of a refrigeration system other than:

- compressors,
- pipes and their fittings,
- controls.

Pressure vessels whose maximum working pressure may exceed 4 bars and in which the product of this pressure (in bar) and the capacity (in liter) is greater than 80 should, under the supervision of a competent person, undergo the test defined under clause 5 of the amended decree of January 18, 1943, at a pressure corresponding to twice the maximum working pressure. The maximum stress at any point shall not exceed the quarter of the bursting point.

This does not apply to heat exchangers made up of drawn pipings connected to headers whose external diameter is less than 90 mm, if the mechanical stress at any point does not exceed 1/6 of the bursting point.

(See also Appendix)

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRICAL ENERGY

2.1. Special Requirements relating to maximum permissible output of single phase motors:

In accordance with BS 3456 Part I, paragraph 10.2, the following is quoted:

The rated input of portable appliances shall not exceed 3 kW.

Thus motors should not exceed 3 kW (1 phase and 3 phase).

For motors contained in fixed appliances there is no stated maximum premissible output but reference must be made to·

a) The local District Electrical Authority to obtain Electricity Supply Restrictions or Limitations

b) The I.E.E. Regulations for the Electrical equipment of buildings in order to comply with the regulations listed.

In particular, these regulations specify permissible volt drop allowable at the motor terminals, and the fitment of suitable protective devices.

2.2. Special requirements relative to maximum permissible output of three phase motors:

As in 2.1., but in addition reference to local authorities should also be made for rules governing starting of 3 phase motors and the use of Star/Delta Starters etc. dependent on output of motors.

2.3. Possible exceptions and addresses of authorities issuing these:

Local District Electricity Board.

3. REFRIGERATION SAFETY RULES

3.1. Document reference and address of the editing organisations

BS 4434 – Part 1	Specification for the Requirements of Refrigeration Safety
BS 3456 – Part 2	Specification for the Safety of Household Electrical Appliances With particular reference to: Section 2.3.4. – Room Air Conditioners and Section 2.3.9. – Humidifiers
Published by:	The British Standards Institution (B.S.I.) 2 Park Street, London W1A 2BS

3.2. Special requirements that differ from ISO Recommendation R 1662:

3.2.1. *Maximum charge of Group 1 Refrigerant according to classification of room occupancy:*

Under OCCUPANCY in ISO 1662 the word "should" is replaced in BS 4434 by the word "shall" thus implying it is mandatory. In all other considerations, it is in agreement.

Note: BS 4434 was modelled on publication ISO R 1662. It is envisaged that ISO R 1662 will be revised to become an International Standard.

GREAT BRITAIN

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organisations

BS 3456 Parts 1, 2 and 101	Specification for Safety of Household Electrical Appliances With particular reference to Part 2, section 2.3.4. Room Air Conditioners.

In addition, the following specifications apply generally to individual components used within the Air Conditioning Equipment and the supply connections to the unit:

I.E.E.	Regulations for the Electrical Equipment of Buildings
Published by:	Institute of Electrical Engineers (I.E.E.) Savoy Place, London W.C. 2

Consumer Protection No. 1336 – 1975

Published by:	H.M. Stationery Office High Holborn, London W1 V6HB
BS 1363 - 13 A	Plugs, switched and unswitched Socket Outlets and Boxes
BS 2757	Classification of Insulating Materials for Electrical Machinery and Apparatus on the Basis of Thermal Stability in Service
BS 3042	Standard Test Fingers and Probes for Checking Protection against Electrical, Mechanical, and Thermal Hazard.
BS 3535	Safety Isolating Transformers for Industrial and Domestic Purposes
BS 4491	Appliance Couplers for Household and Similar Purposes
BS 5267	Capacitors for Single Phase A.C. Motors.
BS 6500	Insulated flexible cords
BS 775 (1)	Electrical Contactors for Voltages up to and including 1000 V a.c. and 1200 V d.c. .
BS 4434 (2)	Requirements for Refrigeration Safety
Published by:	The British Standards Institution (B.S.I.) 2 Park Street, London W1A 2BS

1.2. Requirements that differ both from general and specific recommendations by I.E.C. for each equipment:

The main differences in requirements between BS 3456, parts 1, 2 and 101 are as stated on page 7 of I.E.C. publication 335-1 second edition 1976.

BS rules are under revision to adapt them as closely as possible to I.E.C. 335-1 via Technical Committee I.E.C. SC 61 C and D and subcommittee LEL/161/26.

3.2.2. Maximum charge of Group 1 Refrigerant above which it is mandatory to fit a pressure safety device:

1. Pressures at which relief devices have to be fitted as stated in BS 4434 are the same as stated in ISO R 1662.

2. Application of pressure relief devices as stated in BS 4434 is as follows.

Pressure limiting devices shall be provided on all systems containing more than 9 kg of refrigerant and an all systems that are so constructed that the pressure imposing element is capable of producing a pressure in excess of the maximum working pressure.

Pressure limiting devices may be omitted from unit systems containing not more than 1,5 kg of Group 1 Refrigerant and in which the operating pressure developed in the system cannot create a stress exceeding one fifth of the ultimate strength of the system.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels:

Definition as stated in ISO R 1662 complies with definition as stated in BS 4434 but BS 4434 also includes liquid refrigerant pumps.

ITALY

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations

C.E.I. 107-40	Household electrical appliances and similar equipment General safety regulations
C.E.I. 107-34	Safety regulations for room air conditioners
C.E.I. 11-8V2	Specifications for earthing
C.E.I. P 287	Regulation for factory assembled electric control centers for voltage not over 1000 V.
Published by:	Comitato Elettrotecnico Italiano (C.E.I.) Viale Monza 259, I-201 26 Milano

There are no specific rules for the electric wiring of air conditioners.

1.2. Requirements that differ both from general and specific recommendations by IEC for each equipment:

No

C.E.I. 107-34 agrees with the IEC Standard 378

C.E.I. 107-40 agrees with the CENELEC Standard ND 251 (E.E.II).

C.E.I. P 287 agrees with the IEC Standard 439

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors:

There are no regulations which limit the output of single phase motors.

2.2. Special requirements relative to maximum permissible output of three phase motors:

There are no regulations which limit the output of three phase motors.

2.3. Possible exceptions and address of authorities issuing these:

Responsable for the disbribution of electric energy is:

Ente Nazionale per l'Energia Elettrica (E.N.E.I.)
Via G.B. Martini 3, I-00100 Roma

3. REFRIGERATION SAFETY RULES

3.1. Document reference, and address of the editing organizations

Volume VSR	Rules for checking the stability of pressure vessels
Volume M	Permissible materials for the construction of pressure vessels
Volume S	Welding rules
Volume E	Exemptions from certain controls and tests.
Published by:	Associatione Nazionale Controllo Combustione (ANCC) Via Urbana 167, I-00100 Roma

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group 1 refrigerant according to the refrigeration system and to classification of room occupancy:

No.

3.2.2. Maximum charge of group 1 refrigerant above which it is mandatory to fit a pressure safety devices

There are no limits for the refrigerant charge but for the volumetric capacity of pressure vessels. Vessels whose capacity is less than 25 litres are constructed and equipped with safety devices according to the ANCC regulations (volumes VSR – M – S) under the sole responsibility of the manufacturer. Pressure vessels whose capacity exceeds 25 litres should be tested by ANCC and be equipped with pressure relief valves (volume E – chapter E.1.D.).

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels

Compressors, heat exchanger batteries, pipings and valves are not considered as pressure vessels. Those pressure vessels whose capacity is less than 25 litres should be constructed in accordance with the ANCC regulations, but testing by ANCC is not mandatory. Vessels with a capacity of less than 1000 litres and a design pressure of less than 25 bar which are part of a factory-assembled refrigerating unit must be checked by an ANCC inspector only during manufacturing (see E.1.B.4 volume E). No periodical check on site is required during the whole life of the machine. Those pressure vessels whose capacity and design pressure exceed the abovementioned values have to undergo periodical yearly checks on site (see E.1.B.5 Volume E.)

(See also Appendix)

NETHERLANDS

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations :

NEN 1010	Wiring regulation for low tension installations not exceeding 500 V
Published by:	Nederlands Normalisatie Instituut afd. Verkoop (NNI) Polakweg 5, Rijswijk (ZH)
	- Connection conditions
Published by	The Electricity Boards.
Note:	National regulations are in process of preparation (shall be issued in the beginning of 1978).
	Specifications of approved electrotechnical products Issued yearly.
Published by:	N.V. KEMA Utrechtseweg 310, Arnhem

1.2. Requirements that differ both from general and specific recommendations by IEC for each equipment:

The CEN (Dutch Electrotechnical Committee), member of CENELEC, harmonizes the standards with the IEC and CEE publications.

For instance, the IEC publication 378, 1st edition 1972 "Safety requirements for the electrical equipment of room air conditioners" has been adopted as a Dutch Standard NEN-10 378 in October 1974.

The IEC publications 335-1, 2nd edition 1976 and 3352, 1st. edition 1970 are in process of adoption.

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors:

Commutator motors and induction motors: rated output $\leqslant 0.75$ kW

Other motors: rated output $\leqslant 0.4$ kW

Motors with a higher output must be connected to three phase current.

2.2. Special requirements relative to maximum permissible output of three phase motors:

The starting up conditions for motors equipped with a squirrel cage rotor are the following

Max. rated output:	direct on line starting	1.5 kW
	star-delta starting	4.0 kW
	star-delta starting $I_a \leqslant 2.5 \cdot I_n$	8,0 kW
	starting transformer; with the agreement of the Electricity Boards star-delta starting on condition that $I_a \leqslant 2.5 \cdot I_n$	8,0 kW

2.3. Possible exceptions and address of authorities issuing these:

The Electricity Boards

Note: Exceptional authorizations regarding 2.1. and 2.2. are issued by the Electricity Boards if any disturbing variations in voltage may occur in the supply network when commutating.

3. REFRIGERATION SAFETY RULES

3.1. Document reference, and address of the editing organizations:

NEN 3380	Safety requirements for refrigerating plants
Published by:	Nederlands Normalisatie Instituut afd. Verkoop (NNI) Polakweg 5, Rijswijk (ZH)

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group 1 refrigerant according to the refrigeration system and to classification of room occupancy

None. The classifications of room occupation and concentration limits agree with tables 1 and 5 of ISO R 1662.

3.2.2. Maximum charge of group 1 refrigerant above which it is mandatory to fit a pressure safety device:

Any refrigerating plant with positive displacement compressors should be protected by means of a pressure safety device and a pressure-limiting device, if sewpt volume is larger than 85 m^3/h or shaft power is larger than 10 kW. The pressure limiting device also applies to smaller positive displacement compressors which can be shut off on the high pressure side.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels:

The definition agrees with that given in ISO R 1662, part IV, clause 46.1.

(See also Appendix)

SWEDEN

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations

The basic regulation concerning electric safety is:

KFS 1960 Nr. 8 — The Swedish Regulations for Design and Maintenance of Electrical Installations

Published by: The Swedish Industrial Board

For sale at: Svenska Elverksföreningen
Box 6405, S-11382 Stockholm

Based on KFS 1960 Nr. 8, detailed rules and test methods for different electric components are published by SEMKO (The Swedish Approval Body for electric equipment).

SEMKO
Box 30049, S-11382 Stockholm

1.2. Requirements that differ both from general and specific recommendations by IEC for each equipment:

None.

2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors

As a general rule, 1 kW is the maximum output of a single phase motor. Rules of this kind are published by "Svenska Elverksföreningen" the association of the local electricity boards in Sweden.

Svenska Elverksforeningen
Box 6405, S-11382 Stockholm

2.2. Special requirements relative to maximum permissible output of three phase motors:

None.

2.3. Possible exceptions and address of authorities issuing these:

Such exceptions are dealt with by the local electricity boards.

3. REFRIGERATION SAFETY RULES

3.1. Document reference and address of the editing organizations

"Kylnormer"

Published by: Svenska Kyltekniska Föreningen
Hovslagargatan 5, S-11148 Stockholm

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group 1 refrigerant according to the refrigeration system and to classification of room occupancy

See general comment concerning 3.2.

3.2.2. Maximum charge of group 1 refrigerant above which it is mandatory to fit a pressure safety device:

See general comment concerning 3.2.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels:

See general comment concerning 3.2.

General comment concerning 3.2.:

The requirements of "Kylnormer" differ little from ISO R 1662 in its essential parts.

SWITZERLAND

1. SAFETY REGULATIONS FOR ELECTRICITY

1.1. Document reference and address of the editing organizations:

A) The following documents are applicable to industrial use:

- Regulations for domestic type equipment published by the Schweizerischer Elektrotechnischer Verein (HV), SEV 1000.1974
- The relevant regulations of the competent cantonal and communal authorities (building insurances and fire police)

B) The following documents are applicable to electrical components of refrigerators and air conditioning units for domestic use:

- List of electrical installation materials and equipment for low voltage up to 1000 V which must be submitted to test of the 2nd edition of the safety mark regulations, SEV 1001.1970. In Switzerland refrigerators and deep freezers up to 350 litres as well as air conditioners for domestic use must be tested in accordance with these regulations".
- Provisional safety regulations for equipment designed for cooling, TP 212/9C, for refrigerators and deep-freezers with built-in refrigerating compressor. They apply equally to deep-freeze and refrigerated show-cases, cooled food and drink automates as well as air conditioning units with refrigerating compressors for domestic use.
- Provisional safety regulations for heating equipment for domestic and industrial use, TP 211/11C, for equipment with absorption cooling.

C) The following documents are also applicable:

- Publication SEV 3153-1.1972, SEV rules, electrical components of machine tools.
  1st part: electrical components of machines for general use.
  1st edition (1965) of CEI Publication 204-1 with Modification 1 (1967) and Supplement 204-1A (1969).
- Publication SEV 3311.1977, SEV rules, CEI Publication 204-1B, Appendix C, "Courant maximal admissible dans les conducteurs et câbles isolés au polychlorure de vinyle et leur protection contre les courts-circuits".
- Publication SEV 3312.1977, SEV rules, CEI Publication 204-1C, Appendix E, "Exemples de plans, schémas, tableaux et instructions".
- Communication No. 6 of the Eidgenössisches Starkstrominspektorat, SEV 1000.1974, published in SEV Bulletin 1971, No. 16, page 799.
- Communication No. 16 of the Eidgenössisches Starkstrominspektorat, SEV 1000.1974, published in SEV Bulletin 1974, No. 20, page 1519.
- Communication No. ... of the Eidgenössisches Starkstrominspektorat, published in SEV Bulletin .... (in preparation).

1.2. Requirements that differ from the general and specific regulations recommended by IEC:

It is not possible to list the acceptable variations that differ from the above documents.

NOTE:
The provisional safety regulations TP 212/9C and TP 211/11C will be replaced at a later date for the concerned equipments by the CEI Publication 335-2-24 (1976), "Sécurité des appareils électrodomestiques et analogues, Deuxième partie: Règles particulières pour les réfrigérateurs et les congélateurs", (when CENELEC will have taken them over), and by the 2nd edition of the CEI Publication 378, "Règles de sécurité pour l'équipement électrique des conditionneurs d'air de pièce", which must be published by CEI.

Publisher: Schweizerischer Elektrotechnischer Verein (SEV)
Seefeldstraße 301
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Control body: Schweizerischer Elektrotechnischer Verein (SEV)
Materialprüfanstalt
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Postfach
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2. REGULATIONS REGARDING THE DISTRIBUTION OF ELECTRIC ENERGY

2.1. Special requirements relative to maximum permissible output of single phase motors:

The regulations of the competent Electricity Board are applicable.

2.2. Special requirements relative to maximum permissible output of three phase motors:

The output limit for the direct starting of three phase motors is set by the respective Electricity Boards.

2.3. Any exceptional permits and address of authorities who grant them:

The competent Electricity Boards.

3. REFRIGERATION SAFETY RULES

3.1. Document reference and address of the editing organizations

Up to date the following VSM standards have been published:

VSM 53110	Scope – Preliminary examination for construction and agreement for the erection of pressure vessels
VSM 53120	Refrigerants – Definitions, symbols, danger classes
VSM 53124	Refrigerants – Purity requirements
VSM 53130	Requirements regarding the refrigerant-circulating parts with respect to their location
VSM 53140	Process of cooling and refrigerant circuit.
VSM 53150	Design pressure / construction pressure / test pressure – leakage test and acceptance test
VSM 53151	Plant acceptance and inspection
VSM 53152	Guidelines for the design and construction of pressure vessels – generalities, calculations, inspection appertures
VSM 53165	Metals for temperatures down to -120°C
VSM 53171	Safety devices
VSM 53180	Operation and maintenance

Control body: Schweizerischer Verein für Druckbehälterüberwachung
Plattenstraße 77
CH-8032 Zürich

Published by: Verein Schweizerischer Maschinen-Industrieller (VSM)
VSM-Normenkommission
Kirchenweg 4, CH-8032 Zürich

3.2. Special requirements that differ from the ISO Recommendation R 1662:

3.2.1. Maximum charge of group I refrigerant according to the refrigeration system and to classification of room occupancy

VSM 53130:

General:
Refrigerating plants and their various parts should comply with well defined regulations according to the use of the rooms in which they are installed. The rules specified in chapters 2 to 6 are not applicable to refrigerating plants containing less than 25 kg of refrigerant nor 10 kg for the rooms specified unter 2.1., on condition that in both cases the refrigerant is non-flammable and not very toxic (refrigerants of danger classes 11, 12 and 13 according to standard VSM 53120). For medical and surgical treatment rooms, the charge of the abovementioned refrigerants may exceed 10 kg, in this event a special authorization should be asked for by indicating the reasons (direct cooling).

3.2.2. Maximum charge of group I refrigerant above which it is mandatory to fit a pressure safety device:

VSM 53171

3.1 – Any plant equipped with pressure vessels whose pressure exceeds 2 at and for which the product of the vessel volume in m^3 and the design pressure in at exceeds the figure 1 requires a safety device. In this case, fusible plugs may be used as a safety device, if the vessel is so designed that, at the fusion temperature of the fusible plugs, the burst temperature of the vessels is 2.5 times the starting pressure corresponding to the saturated vapour pressure of the refrigerant.

3.2.3. Definition of components of the refrigeration system which are considered as pressure vessels:

VSM 53110

2.5 – The use of pressure vessels such as condensers, evaporators and separators, whose pressure esceeds 2 at (excessive pressure see VSM 53150) requires an agreement, if the product of the vessel volume in m^3 and the design pressure in at exceeds the figure 3, and if the internal diameter of the vessel or the tubings exceeds 175 mm. The volume of appliances mounted inside the vessels can be taken into account (exceptions see par. 2.6).

2.6 – On the premises specified in VSM 53130, par. 2.2 (these are premises open to the public for visits, stay, meetings, shows, sports, etc. ..., i.e. shops, meeting rooms, theatres and pictures, covered sports grounds) the use of pressure vessels (constructed according to VSM 53130, par. 3.2), whose pressure exceeds 2 at (excessive pressure see VSM 53150) requires an agreement, if the product of the vessel volume, in m^3, and the design pressure, in at, exceeds the figure 3 (even if the internal diameter of the tubing is less than 175 mm).

(See also Appendix.)

APPENDIX

REGULATIONS REGARDING PRESSURE VESSELS

Country	WEST GERMANY	BELGIUM	FRANCE	ITALY	NETHERLANDS	SWITZERLAND
Is testing required?	Yes	No homogeneous regulation	Yes	Yes	No	Yes
Who carries out the test?	Technischer Überwachungsverein (TÜV)	various organizations the user has to request the acceptance test	Service des Mines	Associatione Nationale per il Controllo della Combustione (ANCC)	Stoomweezen ou Lloyd's on request	Schweizerischer Verein für Druckbehälteruberwachung (SVDB)
What pressure vessels must be tested?	p x v ⩾ 200 (bar x litre)		p x v ⩾80 (bar x litre)	⩾ 25 litres		> 2 bar, if v x p ⩾3 (m^3 x bar) or ϕ > 175 mm
Special mention regarding coil type pressure vessels	when made of tubes, test not mandatory		Test not mandatory for tube ϕ < 90 mm	⩾ 25 l Test required		for ϕ < 175 mm test not mandatory; no exception for plants designed for being installed in department stores or premises of similar occupation category
Design pressure	Saturated vapour low pressure 32°C high pressure Wc 43°C high pressure Ac 55°C		Pressures at saturation temperatures low pressure 25°C high pressure Wc 40°C high pressure Ac 50°C	saturated vapour pressure + 35°C + 20%		Low pressure: saturation pressure at + 30°C, high pressure: highest pressure reached x factor for pressure margin and an additional pressure margin
Test pressure	1,3 x design pressure	1,5 x design pressure	1 5 x design pressure, repeat test after 10 years 2 0 x design pressure without repeat test	< 10 bar 1,5 x design pressure 10-20 bar design pressure + 5 bar > 20 bar 1,25 x design pressure	1 4 x design pressure	< 4,3 bars 2 x design pressure ⩾ 4,3 bars. 1,3 x design pressure + 3 bars
Calculated following	AD-Merkblatter	the manufacturer has to prove that the equipment is resistant to twice the test pressure	SNCT code de construction	ANCC - Rules		VSM - standard

Revised inquiry made by CECOMAF 1974 Wc = Water cooling Ac = Air cooling

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