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Ammonia Safety Standard in North America 北美氨制冷的安全标准

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United States

美国

- ASHRAE 15 – Safety Standard For Refrigeration System
ASHRAE 15-制冷剂的安全标准
- International Mechanical Code
国际机械标准

Canada

加拿大

- CSA B52 – Mechanical Safety Code
CSAB52—机械安全标准

Machinery Room requirement – General 机房要求—通用

- Enough space for proper service and maintenance
预留足够的服务和维护的空间
- Access to the machinery room shall be restricted to authorized person only
严格控制机房人员的出入，仅允许相关负责人进入。
- Doors open outward, self-closing and not open to public area
机房门向外开，有自动关闭装置，门打开的方向不要朝向公众区域。
- Refrigeration Vapor Detector
制冷剂探测器
- Explosion protection – apparatus to produce open flame shall not be installed
防爆装置—设备会产生明火，以此严禁安装。

Machinery Room Ventilation 机房通风

- Air inlets shall located near machinery, discharge to outdoors does not cause any inconvenience or danger.
通风口应靠近设备，将气体排放到室外不会引起任何不便或危险。
- Fan switches shall be installed inside and outside the machinery room.
风扇的开关应安装机房的室内及室外。
- Minimum Ventilation
最小通风量
 - 2.54L/s/m² of machinery area or
设备房应为2.54 L/s/m²
 - Volume required to prevent a maximum temperature rise above ambient greater than 10C
通风量应满足机房上空的温度升高最高不会超过10C

Continued.....
继续

Machinery Room Ventilation – continued 机房通风-（续）

- Ventilation in case of Leaks or ruptures Refrigerant charges of 7000kg or less
通风是为了防止制冷剂泄漏或管道断裂，充入的制冷剂应为7000kg或稍少些。

$$Q = 70 \times G^{0.5}$$

- Refrigerant charges greater than 7000kg
当充入的制冷剂超过7000kg 时

$$Q = 16 \times G^{2/3}$$

Where

注

Q = airflow, L/s

Q = 空气的流量, L/S

G = mass of refrigerant, in kg

G = 制冷剂量, 单位: 千克

Machinery Room requirement – Special 机房的要求—特殊情况下

- No flame-producing device or hot service over 427C
无可产生明火的装置或者是温度超过427C的情况
- At least one exit door open to outside
至少一个出口，门向外打开
- One hour fire resistive construction
建筑需耐火1小时
- Vapor detector to activate machinery room ventilation system and alarm
冷媒探测器可以激活机房的通风系统及报警系统
- Emergency switch outside machinery room to shut down refrigeration system
机房外的紧急按钮可以关闭机房的制冷设备。

Overpressure protection 过压保护

- Pressure vessel under 0.085m³ that can be shut off by valves from all other parts of the system shall be protected by a pressure-relief device except pressure vessel under 152mm inside diameter
除了内径小于152mm的压力容器，其他小于0.085m³并且可被系统内其他部分的截止阀关闭的压力容器，应被安全阀装置保护。
- Pressure vessel over 0.085m³ must install pressure relief valve
压力容器超过 0.085m³ 时必须安装安全阀

Continued.....
继续

Overpressure protection 过压保护

- Pressure relief device required capacity for pressure vessel:
泄压装置需达到压力容器的要求如下:

$$C = fDL$$

Where

注:

C = minimum required discharge capacity of the pressure-relief device, kg of air per minute

C= 泄压装置最小的释放容量为每分钟/kg 气体

f = a factor based on the type of refrigerant
(R717 = 2.5)

f = 此因素会因制冷剂种类的不同而变化

D = outside diameter of the vessel, m

D = 容器的外径, m

L = length of the vessel, m

L= 容器的长度, m

Refrigerant Discharge

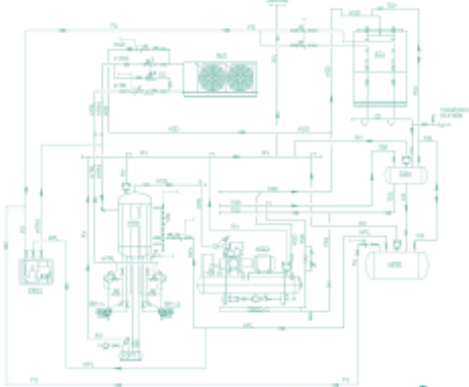
制冷剂的释放

- Atmosphere
大气
- Discharge to the atmosphere shall not less than 4.6m above the adjoining ground level and not less than 7.6m from any window, ventilation opening or exit in any building.
排放到大气中的氨，其排放高度不得低于周边地面的4.6m，不得低于任何窗口、建筑的通风口或出口处7.6m。
- A tank containing 8 kg of water for each kg of ammonia
每千克的氨可以与容器中的8 kg 的水混合。
 - 1 hour from largest relief device
1小时可以从最大的泄压容器中释放出去
 - Water prevent from freezing
水的作用是防止冻结
 - Contain water and ammonia without overflowing
容器中水与氨的混合液体不要溢出。

Maintenance 维护

- Pressure relief valves shall be replaced no longer than five years intervals
每5年内需要更换一次安全阀
- Pressure limiting devices shall be tested at least once every 12 months
限压装置需至少12个月检测一次
- Other Safety devices shall be tested at least once every 12 months
其他安全装置需至少12个月检测一次
- Leak detectors shall be tested at least once every 12 months
泄漏检测装置需至少12个月检测一次
- Power and control electrical terminations every 12 months
电源及控制端子需每12个月检测一次

American National Standard for **ANSI Z39.1**
Developing Operating Procedures for Closed-Circuit
Ammonia Mechanical Refrigerating Systems



Approved by the
American National
Standards Institute
August 21, 2013



IIAR

American National Standard for **ANSI Z39.12**
Ammonia Refrigeration Valves



Approved by the
American National
Standards Institute
July 16, 2013



American National Standard For **ANSI Z39.13-2008 (retitled Addendum A)**
Equipment, Design, and Installation of Closed-Circuit
Ammonia Mechanical Refrigerating Systems



Approved
by the
American
National
Standards
Institute
June 7, 2008

Supersedes
ANSI Z39.13-1980

Amended and
Approved by the
American National
Standards Institute
August 4, 2013



American National Standard for **ANSI Z39.14**
Start-up and Commissioning of Closed Circuit
Ammonia Refrigeration Systems



Approved by the
American National
Standards Institute
July 31, 2012





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