

Conditions imposed on working agents (Refrigerants)

Chemical properties:

- chemical stability in the whole range of presences and temperatures used;
- chemical inactivity against metallic and non-metallic materials in the installation, as well as against lubricating oil
- by mixing with air they should not become flammable or explosive.

Physical properties:

- high latent heat of vaporization;
- favorable saturation curve $p_s = f(t)$, leading to moderate prediction values and small compression ratios;
- low specific heat of the liquid;
- high specific heat of superheated vapors;
- small specific volume of vapors;
- low viscosity;
- high heat transfer coefficients;
- mutual insolubility of the refrigerant and lubricating oil;
- solubility of water in the refrigerant.

Physiological properties:

- to be harmless to the human body;
- not to infect, by leaks caused by leaks, the heat distribution medium, which in most cases are water or air.

Economic requirements:

- acceptable cost;
- easy procurement, easy and safe transport;
- thermal efficiency as high as possible - because it influences the value of the amount of heat supplied consumer, the economic efficiency of the installation.

Thermal agents used:

- Freon and ammonia, for heat pumps with mechanical vapor compression;
- hydroammoniac solution or lithium bromide solution with water, for heat pumps with absorption;
- water vapor, for the heat pump with ejection;
- air, for heat pumps with gas compression.

AmmoniaBenefits:

- high latent heat of vaporization;
- high thermal efficiency;
- high heat transfer coefficients;
- water solubility;
- low manufacturing cost;
- ease in detecting leaks.

Disadvantages:

- high toxicity;
- high condensing pressure and high compression ratio;
- corrosion of copper and its alloys;
- low solubility in lubricating oil.

FreonsBenefits:

- very low degree of danger (they are not toxic, neither flammable nor explosive);
- very good ability to dissolve oils;
- relatively low compression ratios;
- does not react with metals.

Disadvantages:

- high density (5-6 times higher than ammonia) which translates into high pressure losses;
- relatively low heat transfer coefficients;
- dissolves natural rubber and consequently seals (metal or fiber gaskets are used pressed).