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USE OF HYDROCARBON REFRIGERATING AGENTS IN FREON-12 REPLACEMENTS

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Abstract:
The article is devoted to the use of ozone-friendly refrigerants (ammonia) in the ventilation of large objects.

Keywords: Ozone-friendly refrigerants, ASHRAE

American Society of Engineers in Heating, Cooling and Air Conditioning (ASHRAE). ASHRA has issued a statement on ammonia refrigerant, which is presented below:

ASHRAE believes that the continued use of ammonia is necessary for food storage and air conditioning. ASHRAE will promote a variety of programs to protect the economic benefits of ammonia refrigerant while to ensure ASHRAE's risk management will:

1. Promote authoritative information on ammonia workshops and publications.
2. Continue research on ammonia topics such as circulation, application, emission management and control.
3. Maintain and develop standards and guidelines for the practical and safe use of ammonia.
4. Provide programs and publications on innovative plans and the use of ammonia.
5. Advise government and officials with information on ammonia

The British standard BS 4434, 1995 and the ASHRAE 34, 1997 standard were reclassified by groups of refrigerants and ammonia, and are now classified as category B2. There used to be three groups (A.V.S) while there are six (A1, A2, A3, B1, B2, B3).

Category B2 means that ammonia can be used at a cost of up to 500 kg in direct, closed systems, even for hospitals, theatres, supermarkets, schools, lecture halls, hotels, dwellings and restaurants.

"Senit" and "T-Building Copenhagen" (Senit)

This plant uses ammonia piston compressors with a welded heat exchanger for the vaporizer. When using welded heat exchangers, the consumption of the refrigerant is reduced significantly. Thus, the management of the refrigerant and the danger due to a possible leak is minimized.

Welded heat exchangers have opened unlimited opportunities for professionals for various use of air conditioning where previously the use of ammonia was not thought of.

Interference with the use of ammonia needs careful understanding and consideration of all this in terms of design and installation of enterprises. Here are some typical examples, let us take a look at the properties of ammonia compared to other refrigerants.

Ammonia is found on the ground as well as water. It is a combination of two natural components called nitrogen and hydrogen. There are no chemicals involved in it. Our body produces 1/10 ounces of ammonia daily. Our liver regularly converts ammonia into our body and maintains the normal RN balance needed to sustain life.

With a large amount of ammonia there is irritation in the eyes, nose and respiratory organs.

Fire.

Ammonia is extremely highly flammable and under normal conditions is a stable structure.

Ammonia will thermally disintegrate at temperatures in excess of 450^0C, ammonia vapor is flammable only at very high concentrations in the atmosphere.

The lower limit is 15% by volume of 9.2% of (by) weight.

The upper limit is 30.2% by volume of 20.1% of (by) weight.

Ammonia mixing with air does not ignite at temperatures below 651 degrees Celsius in a sealed iron flask.

Ammonia is classified by the U.S. Department of Transportation and the U.S. Coast Guard as non-flammable

compressed gas for transportation. Ammonia installations do not require special fire retardant electrical products like methane or propane, which are classified as flammable refrigerants.

Affordability and cost

Under normal atmospheric pressure, ammonia is a colorless, sharp gas. No 717. The 700 group identifies as "inorganic structure" and 17 to the molecular mass of ammonia.

Thermodynamic properties

1. Table 1 shows that the ammonia refrigerant requires a smaller compressor volume for the same output of other refrigerants.
2. The energy consumption for ammonia is also the smallest compared to other refrigerants.
3. The ammonia ratio is better than that of other refrigerants.
4. The compression refrigeration temperatureis higher than the ammonia

Table 1

	Pressure condensation evaporation Kg/cm2 A	pressure Condensate Kg/cm2 A	coefficient Compression	Comp Dispe Liler/sec	Powerful 100 kWz	SOR Temp. unloading.
ammonia	2.41	11.89	4.94	0.463	0.207	4.84 98
R22	3.03	12.26	4.03	0.476	0.210	4.75 53
R12	1.862	7.581	4.07	0.784	0.213	4.69 38
R134a	1.631	7.850	4.81	0.812	0.226	4.42 43

15 to 30 **degrees**Celsius **questions**
(Per kW)

Tsubkov (W/m2 K)

The numbers in Table 1 show the persistent advantage of ammonia Higher heat exchange rate means smaller vaporizers and refrigerators for the difference of a given temperature between the refrigerant and the external liquid.

Alternatively, if we accommodate large vaporizers and refrigerators, the corresponding evaporation temperatures to maintain the same conditions will be higher and the same capacitor temperatures (for the same radiator temperatures) will be lower: thus increasing cycle efficiency and action factor.

Issue 2: **Tsubkov (W/m2 K)**

	ammonia	HFC
Seal outside pipes	7500-11000	1700-2800
Seal inside pipes	4200-8500	1400-2000
Boiling outside pipes	2300-4500	1400-2000
Boiling inside pipes (fluid circulation)Density is lighter than air	3100-5000	1500-2800

As for the greenhouse effect of ammonia. Global warming is generated in two ways:

- Direct-by leakage of the refrigerant into the atmosphere when working and leaking into the system (including waste) during the full cycle of the system - expressed in the equivalent of CO2 emission.
- The question is quincy because of the energy used in the zenith-2. For this reason, the total equivalent of a heat index (TEWI) is that of a current plus energy consumption.

TEWI - MASS refrig't X GWP refrig't

Where : GWP - Global Warming Refrigerant Potential Related**to C**2 (GWP C2- I)

α - C2 emissions per kW of energy

INTERVIEWER - Energy consumption (kW per year)

L - Number of years.

Global thermal potential (GWP) ammonia is zero and has no direct greenhouse effect.

Very good thermodynamic properties of ammonia and lack of direct greenhouse effect leads to a more favorable balance of the overall equivalent of the thermal index of ammonia system compared to other refrigerants.

Emissions of organic gases and ammonia are not expected to have significant large-scale effects on air quality through the replacement of ARVs in refrigeration and air conditioning.

What are the most important findings for the refrigeration sector.

Refrigerants are most likely to contribute to direct GHG emissions. The refrigeration sector is divided into the following sub-sectors:

- household refrigeration equipment,
- Food processing
- Food processing
- Refrigeration;
- transport refrigeration equipment.

In this regard, on the one hand, in order to implement the program, and on the other hand to pick up for the conditions of our Republic chill, with a refrigerant with cheap, produced in our country good thermodynamic properties, such as ammonia. The Demonstration Object was chosen by the Republican Scientific Center for Emergency Medical Care because the Uzbek "Rules" prohibited the use of chillers filled with ammonia. Specialists of the Department of "Industrial Ecology" were asked by the management of the RNCMP to use in exchange for chillers fueled ozone-hazardous R22, explaining that at present in a number of countries established production of chillers in which a small amount of ammonia is refueled. Introduction of such chillers at THES facilities:

1) People can sleep
2) There may be people with limited mobility
3) There may be an uncontrolled number of people, all of whom are not aware of individual security measures.

At first glance, it seems unsafe. Specialists of the Department of "Industrial Ecology" studied all possible negative moments in the hospital from a chiller filled with ozone-safe ammonia, but fire-explosive and toxic. In favor of the introduction of ammonia-fuelled chiller in the RNCMP, the ammonia-fuelled chiller was developed in contrast to the "Rules" of the Interstate Standard OF GOST EN378-1-2015, which under certain conditions allowed the use of ammonia chillers in hospitals. The named standard was prepared by the Russian Union of Refrigeration Industries. Introduced by the technical committee on standardization No. 271 "Refrigeration installations" of the Russian Federation. Adopted by the Eurasian Council for Standardization of Meterology and Certification.

Ten representatives of the post-Soviet countries, including representatives of Uzstandard, voted for the adoption. In the Republic of Uzbekistan, the state of the country has been operating since 2017. Hospitals, as well as prisons, stadiums, theatres, supermarkets, schools, railway stations, hotels, restaurants belong to public premises category A. in public premises category A mandatory conditions of use of chiller in a closed intermediate system.

EMERGENCY MEDICINE SYSTEM RUZ.

After the decision to introduce the RNCMP chiller operating on ammonia, the equivalent capacity of the previous chillers working on R22 by the staff of the UNDP-GEF project. "Initial implementation of the accelerated reduction in the use of ICFCs in the region of transition countries - Uzbekistan" was studied the market of suppliers of ammonia chillers.

The Danish production of The Chillpac brand was more acceptable in price and quantity of ammonia. Two chillers with a capacity of 850 kW each were purchased and installed. The chillers are filled with 20 kg of ammonia - only 40 kg per 2 chillers. For comparison, the 1,200 kwhet vegetable storage system, which was launched in 2011 in the Sereli district of Tashkent, was fueled by 6 tons of R717. The full equivalent contribution to the greenhouse effect (TEWJ) plays an important role in the installed installation. TEWJ is an indicator for assessing the greenhouse effect by combining the direct contribution from the release of the refrigerant into the atmosphere and the indirect contribution from emissions of carbon dioxide and other gases generated by the energy required to operate the refrigeration system during its life.

Using TEWJ is possible to identify the most effective ways to reduce the actual effects of the refrigeration system on the greenhouse effect. The main areas of this are:

1) Minimizing the requirements for the size of the refrigerant system refueling.
2) Designing/selecting a refrigeration system and refrigerant that is best suited to meet the request for a specific cooling system.
3) Optimization of the system to improve the efficiency of electricity use (applying the best combinations and design uses of the elements of the system used to reduce energy consumption).

In the process of introducing chillers working on ammonia, all these conditions are met. As an example, if ammonia is compared to Freon 22, ammonia has a heat of 328 kcal per kg, while Freon has 22 56 kcal per kg, the difference is significant. As for the harm caused by the environmental chilling agents, the global warming rate is 0 GWP, and Freon 22 has 1,700. The ozone-depleting ratio of ammonia is 0, in Freon 22 it is 0.50.

Ammonia is produced in three cities of the Republic: Chirchik, Navoi, Fergana.

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