# CLEAN REFRIGERANTS

FOR
ENVIRONMENTAL SAFETY



**Han Young Technochem Co., Ltd**
http://www.technochem.co.kr

# 냉매설비분야

## HCR-290

### (R22 대체냉매)



■중대형 에어컨 및 냉장고
■공장기계 및 산업기계, 상업용 쇼케이스 호텔, 병원, 백화점등 대형건물의 칠러

| 구 분 | | HCR-290 | HCFC-22 |
|---|---|---|---|
| 1. 분자량 | | 44.1 | 86.48 |
| 2. 비등점(℃) | | -42.1 | -40.76 |
| 3. 0℃에서의 기화열(kj/kg) | | 342 | 234.12 |
| 4. 안정성 | 열적 안정성 | 안정적 | 안정적 |
| | 화학적 안정성 | 안정적 | 안정적 |
| 5. 부식성 | | 없음 | 없음 |
| 6. 가연성(하한 & 상한, %) | | 2.2~9.5 | 없음 |
| 7. 자연발화온도(℃) | | 470 | 없음 |
| 8.독성 | | 없음 | 없음 |
| 9. O,D,P(오존파괴지수 I) | | 0 | 0 |
| 10. G.W.P(지구온난화지수) | | 3이하 | 1,500 |
| 11. 윤활유 | | 미네랄 | 미네랄 |
| 12. 비중 | | 0.508 | 1.91 |
| 13. 포장단위 | | CAN-200g<br>실린더-5kg,10kg, 50kg, 450kg,<br>벌크-10,000kg | |

## HCR-290 특징

오존파괴지수가 "0"이고 지구온난화지수가 "3" 이하인 환경 친화적 냉매입니다. R22 를 사용하던 기기의 변경의 없이 그대로 대체하여 사용할 수 있습니다.

(다만, 대형칠러는 가스켓만을 교환하여 사용할 수 있습니다.)

미네랄오일과 사용이 가능합니다.

R22 에 비해 50%의 충전으로도 충분한 경제적인 유지가 가능합니다.

R22 에 비해 2.5% 이상의 냉동능력이 있으면 15%~20% 에너지 절감효과가 있습니다.

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## 냉매설비분야

# HCR-600a(R-600a)

## (High purity isobutan-99.5%, 99.9%, 99.99%)



### Applicable Machines

Refrigerant for
small and medium air conditioners and refrigerators
Propellant for medicines,
cosmetics, perfumes, sprays and cleaners

| Property | | HCR-600a | HCFC-22 |
|---|---|---|---|
| 1. Molecular Mass | | 58.12 | 86.48 |
| 2. Boiling Temperature (℃) | | -11.76 | -40.76 |
| 3. Heat of Vaporization at 0 ℃(kj/kg) | | 355.7 | 234.12 |
| 4. Stabilities | Thermal | Stable | Stable |
| | Chemical | Stable | Stable |
| 5. Erosive | | No | No |
| 6. Flammability(LFF & UFL, %) | | 1.8-8.4 | None |
| 7. Auto ignition Temperature(℃) | | 462 | None |
| 8. Toxity | | No | No |
| 9. O.D.P(Ozone Depletion Potential) | | 0 | 0 |
| 10. G.W.P(Global Warming Potential) | | 3 max | 1,500 |
| 11. Lubricant | | Mineral | Mineral |
| 12. Specific Gravity | | 0.56 | 1.19 |
| 13. Packing method | | CAN-200g<br>실린더-5kg,10kg, 50kg, 450kg,<br>벌크-10,000kg | |

HCR-600a is widely used refrigerant in EU countries, especially in Germany. Very low ODP and GWP is the major advantage of this refrigerant.

Therefore, HCR-600a is preferred refrigerant for refrigerators supplied to EU countries. Bosch and Siemens have used HCR-600a for many applications and other refrigerator manufacturers follow.

Hanyoung Technochem possesses a licensed technology to elevate the purity of isobutan to optimize the efficiency of HCR-600a.

HCR-600a has been used in Korea for refrigerators to be shipped to EU countries.

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냉매설비분야

# HCR-22a(R-433b)
## (Replacement for R-22)



### Applicable Machines

Refrigerant for medium and large
air conditioners, industrial refrigerators,
and commercial show-cases,
large air conditioning system for ho
tels, hospitals, department-stores

| Property | | HCR-22a | HCFC-22 |
|---|---|---|---|
| 1. Molecular Mass | | 44.49 | 86.48 |
| 2. Boiling Temperature (℃) | | -42.7 | -40.76 |
| 3. Heat of Vaporization at 0℃(kj/kg) | | 324.95 | 234.12 |
| 4. Stabilities | Thermal | Stable | Stable |
| | Chemical | Stable | Stable |
| 5. Erosive | | No | No |
| 6. Flammability(LFF & UFL, %) | | 3.2~9.5 | None |
| 7. Auto ignition Temperature(℃) | | 520 | None |
| 8. Toxity | | No | No |
| 9. O.D.P(Ozone Depletion Potential) | | 0 | 0 |
| 10. G.W.P(Global Warming Potential) | | 3 max | 1,500 |
| 11. Lubricant | | Mineral | Mineral |
| 12. Specific Gravity | | 0.505 | 1.19 |
| 13. Packing | | CAN-200g<br>실린더-5kg, 10kg, 50kg, 450kg,<br>벌크-10,000kg | |

## Benfits of HCR-22a

**1. Economics**
HCR-22a costs 40 % of R-22 and saves power for compressors by 15-30%.

**2. Safety**
HCR-22a has been used for many applications in Southeast Asia and accepted and proven as a safe refrigerant at the market. Compressor noise level is lower.

**3. Environment friendly**
HCR-22a refrigerant as a mixture of hydrocarbons reduces global warming and ozone depletion and meets the international standards as an environment friendly refrigerant.

**4. Lubricants compatibility**
HCR-22a decomposes no lubricant and is compatible with any kind of lubricants used.
HCR-22a can be used with current lubricants without change.

**5. Compatible with R-22**
HCR-22a can substitute and replenish the existing R-22 with no modification of the machine.

**6. Refrigeration efficiency**
Lower specific gravity (42%) of HCR-22a reduces the weight of the refrigerant required for the same duty. Power saving for the cycles is expected 15- 30%.

**7. Higher pressure, easier injection**
The higher injection pressure eases the job.

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## 냉매설비분야

# HCR-134a(R-436a)

## (Replacement for R-12 or R-134a)



### Applicable Machines

Refrigerant for
automobile air conditioners,vending machines, sm all and medium sized room air conditioners,and w ater purifiers

| Property | | HCR-134a | HCFC-12 | HFC-134a |
|---|---|---|---|---|
| 1. Molecular Mass | | 57.9 | 120.93 | 102.03 |
| 2. Boiling Temperature (℃) | | -34.5 | -29.8 | -26.5 |
| 3. Heat of Vaporization at 0 ℃(kj/kg) | | 367 | 149.8 | 198.7 |
| 4. Stabilities | Thermal | Stable | Stable | Stable |
| | Chemical | Stable | Stable | Stable |
| 5. Erosive | | No | No | No |
| 6. Flammability(LFF & UFL, %) | | 3.7~9.5 | None | None |
| 7. Auto ignition Temperature(℃) | | 540 | None | None |
| 8. Toxity | | No | No | No |
| 9. O.D.P(Ozone Depletion Potential) | | 0 | 1 | 0 |
| 10. G.W.P(Global Warming Potential) | | 3 max | 8,100 | 1,300 |
| 11. Lubricant | | Mineral/Ester | Mineral | Ester |
| 12. Specific Gravity | | 0.531 | 1.31 | 1.21 |
| 13. Packing | | CAN-200g<br>실린더-5kg,10kg, 50kg, 450kg,<br>벌크-10,000kg | | |

## Benfits of HCR-134a

**1. Economics**
HCR-134a costs 40 % of R-12 & R-134a and saves power for compressors by 15-30%.

**2. Safety**
HCR-134a has been used for more than 800 thousand car aircons since 1997 in Korea and accepted/proven as a safe refrigerant at the market. Compressor noise level is lower.

**3. Environment friendly**
HCR-134a refrigerant as a mixture of hydrocarbons reduces global warming and ozone depletion and meets the international standards as an environment friendly refrigerant.

**4. Lubricants compatibility**
HCR-134a decomposes no lubricant and is compatible with any kind of lubricants of esters and mineral oils. HCR-134a can be used with current lubricants without change.

**5. Compatible with R-12 and R-134A**
HCR-134a can substitute and replenish the existing R-12 or R-134a with no modification of the machine.

**6. Refrigeration efficiency**
Lower specific gravity (41%-44%) of HCR-134a reduces the weight of the refrigerant required for the same duty. Power saving for the cycles is expected 15- 30%.

**7. Higher pressure, easier injection**
The higher injection pressure eases the job.

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## 냉매설비분야

# HCR-502a(R-433a)

## (Replacement for R-22 and R-502a)



### Applicable Machines

Refrigerant for ultimately low temperature,
cold storages & warehouses,
refrigerator trucks
and commercial show-cases.

| Property | | HCR-502a | HCFC-22 | HFC-502a |
|---|---|---|---|---|
| 1. Molecular Mass | | 43.6 | 86.48 | 111.63 |
| 2. Boiling Temperature (℃) | | -45.02 | -40.76 | -45.3 |
| 3. Heat of Vaporization at 0 ℃(kj/kg) | | 371.14 | 234.12 | 147.03 |
| 4. Stabilities | Thermal | Stable | Stable | Stable |
| | Chemical | Stable | Stable | Stable |
| 5. Erosive | | No | No | No |
| 6. Flammability(LFF & UFL, %) | | 3.2~9.5 | None | None |
| 7. Auto ignition Temperature(℃) | | 520 | None | None |
| 8. Toxity | | No | No | No |
| 9. O.D.P(Ozone Depletion Potential) | | 0 | 0 | 0 |
| 10. G.W.P(Global Warming Potential) | | 3max | 1,500 | 6,200 |
| 11. Lubricant | | Mineral | Mineral | Mineral |
| 12. Specific Gravity | | 0.507 | 1.19 | 1.07 |
| 13. Packing | | CAN-200g<br>실린더-5kg,10kg, 50kg, 450kg,<br>벌크-10,000kg | | |

## Benfits of HCR-502a

### 1. Economics

HCR-502a costs 50 % of R-22 & R-502a and saves power for compressors by 15-30%.

### 2. Safety

HCR-502a has been used for many applications and accepted and proven as a safe refrigerant at the market. Compressor noise level is lower.

### 3. Environment friendly

HCR-502a refrigerant as a mixture of hydrocarbons reduces global warming and ozone depletion and meets the international standards as an environment friendly refrigerant.

### 4. Lubricants compatibility

HCR-502a decomposes no lubricant and is compatible with any kind of lubricants used.
HCR-502a can be used with current lubricants without change.

### 5. Compatible with R-22 and R-502

HCR-502a can substitute and replenish the existing R-22 & R-502a with no modification of the machine

### 6. Refrigeration efficiency

Lower specific gravity (43%-47%) of HCR-502a reduces the weight of the refrigerant required for the same duty. Power saving for the cycles is expected 15- 30%.

### 7. Higher pressure, easier injection

The higher injection pressure eases the job.

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# HCR-134a Injection Procedure

## Preparation

1) Handling flammables, any ignition source must be removed and work place should be well ventilated before/during injecting refrigerant.

2) Air conditioner stays in operations to confirm the machine operating condition below before injecting refrigerant.

- Check if compressor pressure shows normal or not. (Please refer to recommended pumping pressure).
- Check if condenser and cooling fan are normal or not. (High pressure hints out of order).
- Check if the temperature sensor is correct or not, and confirm the room temperature and on/off state temperature of the compressor.
- Check if the purification filter is blocked or not, and if bypass between cold/warm side is leaked or not.

## Injection of Refrigerant



**1) Injection by Weight** (by use of an electronic scale)

The required quantity of refrigerant recommended according to vehicle model is injected.

HCR-134a is lighter, so just inject 44 % of R-134a or 41 % of R-12. Be careful not to overcharge it.

* Please confirm the pressure reaches as recommended below or not.



**2) Injection by Volume** (injection by use of volumetric cylinder)

Estimate the required quantity of refrigerant injection at 25 ℃ recommended according to vehicle model and adjust the thermal expansion factor by the table.

(e.g. 500 cc at 25 ℃ is equal to 500/0.967, 517 cc at 35 ℃)

● Temperature Conversion Table

| Temperature(℃) | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|---|---|---|
| Conversion Value | 1.061 | 1.049 | 1.034 | 1.022 | 1.011 | 1 | 0.996 | 0.967 |

Refrigerant Injection Quantity = Refrigerant Injection Quantity recommended according to vehicle model /Temperature Conversion Value

* Please confirm the pressure reaches as recommended below or not.



**3) Injection by Pressure** (Injection by use of a manifold pressure gage)

- Open the high pressure valve of manifold, after evacuation, to be 50 PSI. Then start the air conditioner and adjust the injection amount by ensuring the high/low pressure as per the recommended pressure at the table below. Finally confirm if cooling is enough or not after expansion valve and in the car.

● Pressure indication of the manifold gauges by air conditioner operating condition

| Pressure | High pressure(PSI) | Low pressure(PSI) | Note |
|---|---|---|---|
| Normal | 200~300 | 20~25 | Summer |
| Normal | 180 | 15~25 | Spring, Fall |
| Insufficient refrigerant injected | 130~160 | 10 | |
| Excessive refrigerant injected | 270 | 35 | |
| Refrigerant contaminated by air | 355 | 35 | |
| Refrigerant contaminated by moisture | 100~230 | 20 | |

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## HC Refrigerants



## Refrigerants manufacturing plant



Refrigerants (Environ
ment-friendly refrigerant)


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