LES RÉFRIGÉRANTS APRÈS LE R-22 : SOYEZ AVERTIS

PAR

MARC GOSSELIN, ing.
vice-président
Fixair inc.

CLASSIFICATION DES RÉFRIGÉRANTS SELON LES FAMILLES :

➔ **CFC :**

R-11, **R-12**, R-13, R-13B1, R-14, R-113, R-114, R-115, R-400,R-500, **R-502**, R-503, R-12/R-114 ;

LA PRODUCTION/IMPORTATION EST TERMINÉE DEPUIS LE 31 DÉCEMBRE 1995. SEUL LES PRODUITS RECYCLÉS SONT ± DISPONIBLES, ILS SONT SOUVENT TRÈS RARE ET TRÈS COÛTEUX + LIMITATIONS DE RECHRAGE

➔ **HCFC :**

R-22, R-123, R-124, R-142B, **R-401A (MP39)**, **R-401B (MP-66)**, R-401C, R-402A (HP80), R-402B (HP81), R-403A, R-403B (ISCEON 69L), R-405A, **R-406A (GH612)**, **R-408A (FX10)**, **R-409A (FX56)**, R-409B, R-411A, R-411B, R-411C, R-412A, R-415A, **R-416A (FR-12)**, R-414A, **R-414B**, R-509A.

LA PRODUCTION/IMPORTATION A RALENTI EN 2004, ET RALENTIRA EN 2010, 2015 POUR SE TERMINER EN 2020 ET L'UTILISATION PAR LES MANUFACTURIERS SE TERMINERA EN 2010.

➔ **HFC :**

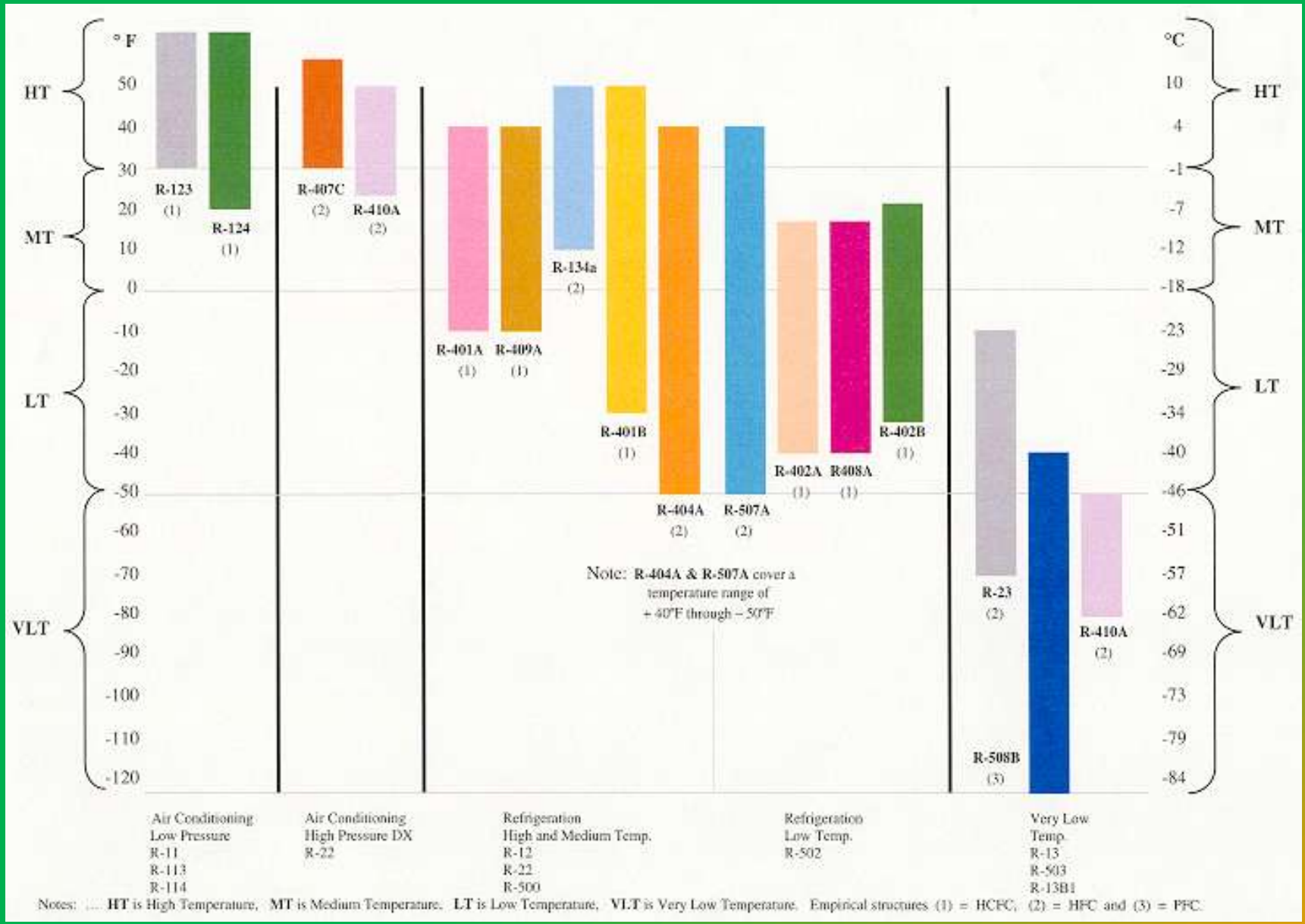
R-23, R-32, R-125, R-143A, R-152A, **R-134A**, R-236FA, **R-404A (FX70 ou HP62)**, R-407A (KLEA 60), R-407B (KLEA 61), **R-407C (KLEA 66 ou SUVA 9000)**, R-407D, R-407E, **R-410A (AZ20)**, R-413A, R-410B, R-417A (NU22), R-422A (ISCEON MO79), R-422B, (NU22B), R-422C (oneshotC),R-422D (ISCEON MO29), R-423A (ISCEON39TC), R-426A (RS-24), R-424A (RS-44), R-427A, R-428A (RS52), RS-25, R-434A (RS-45), R-438A (MO99), **R-507 (AZ50)**.

AUCUNE DATE DE FIN DE PRODUCTION.

➔ **HFO :**

HFO1234YF

LES RÉFRIGÉRANTS :



Notes: .... **HT** is High Temperature, **MT** is Medium Temperature, **LT** is Low Temperature, **VLT** is Very Low Temperature. Empirical structures (1) = HCFC, (2) = HFC and (3) = PFC.

LES RÉFRIGÉRANTS :

CLASSIFICATION DES RÉFRIGÉRANTS SELON CSA B52-1995

Groupe de frigorigène

Inflammabilité croissante ↑		
Inflammabilité supérieure	A3	B3
Inflammabilité inférieure	A2	B2
Propagation de la flamme nulle	A1	B1
	Toxicité inférieure	Toxicité supérieure

Toxicité croissante →

CLASSE A : TLV/TWA > 400 ppm ;
CLASSE B : TLV/TWA < 400 ppm ;
CLASSE 1 : PAS DE PROPAGATION DE LA FLAMME ;
CLASSE 2 : PROPAGATION DE LA FLAMME FLAIBLE ;
CLASSE 3 : PROPAGATION DE LA FLAMME ÉLÉVÉE.

LES CHOIX DE CONVERSION

"RÉFRIGÉRANTS DE TRANSITION"

CFC ⇨ HCFC

FAMILLE DU R-12

R-401A (MP39) ;
R-401B (MP66) : (remplace également le R-500, 50 HZ vs 60 HZ)
R-409A (FX56) ;
R-406A (GHG12) ;
R-416A (FR-12) ;
R-414B (HOT SHOT).

FAMILLE DU R-502

R-402A (HP80) ;
R-402B (HP81) ;
R-408A (FX10).

LES CHOIX DE CONVERSION

"RÉFRIGÉRANTS DE REMPLACEMENT"

CFC ⇨ HFC

FAMILLE DU R-12

R-134a ;
R-426A (RS24) ;
RS-25 (POUR REFROIDISSEUR CENTRIFUGE) ;
R-423A (ISCEON39TC).

FAMILLE DU R-502

R-404A (HP62/FX70) ;
R-507 (AZ50) ;
R-422A (ONE SHOT, ISCEON MO79) ;
R-422C (ONE SHOT) ;
R-428A (RS-52) ;
R-407A (KLEA 60).

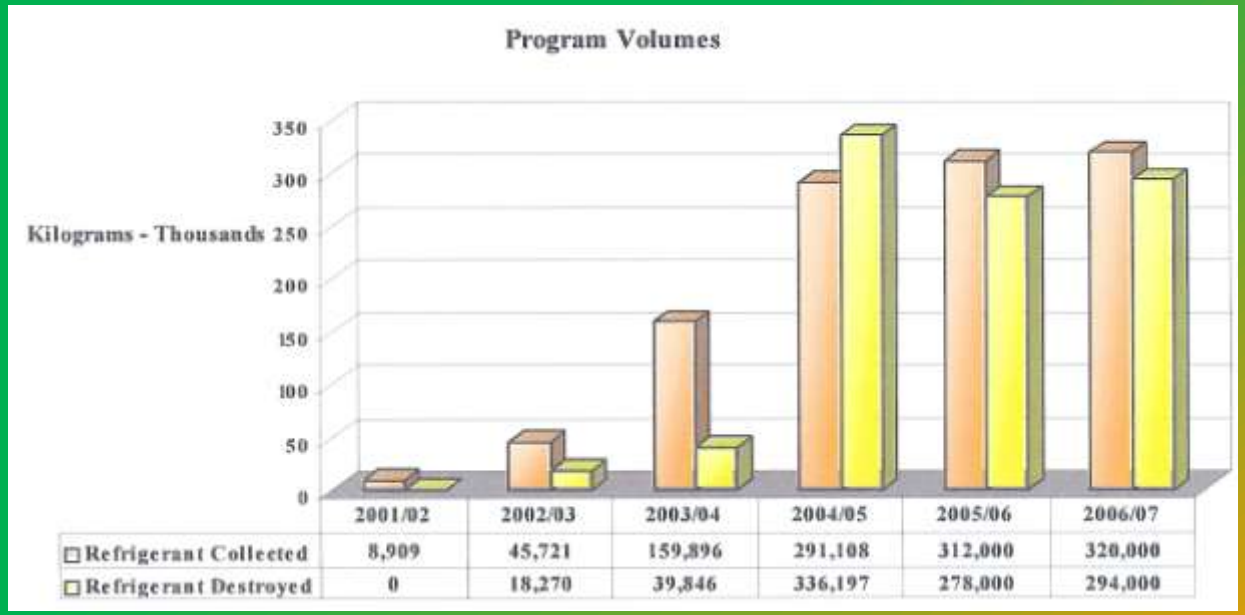
HISTORIQUE & DATES IMPORTANTES

PROGRAMME CANADIEN DE GESTION DES RÉFRIGÉRANTS (PCGR) :

➔1994 : PUBLICATION DU PROGRAMME CANADIEN DE LA PROTECTION DE LA COUCHE D'OZONE ;

➔2001 : DÉBUT DES ACTIVITÉS DU PROGRAMME CANADIEN DE GESTION DES RÉFRIGÉRANTS (PCGR), TAXE DE 1$/KG SUR TOUS LES HCFC VENDUES ;

➔2006 : REVISION DE LA TAXE ENVIRONNEMENTALE, TAXE DE 1,00$/kg ⇨ À 1,50$/kg (1IER JANVIER 2006) SUR TOUS LES HCFC VENDUES ;



RÈGLEMENT PROVINCIAL SUR LES HALOCARBURES :

➔ 1993 : ENTRÉE EN VIGUEUR DU RÈGLEMENT PROVINCIAL SUR LES SUBSTANCES APPAUVRISSANT LA COUCHE D'OZONE ;

➔ 2004 : ADOPTION DU RÈGLEMENT PROVINCIAL SUR LES HALOCARBURES ;

- ✓ 23 DÉCEMBRE 2004 : FIN DE LA RECHARGE AVEC DES CFC POUR LES APPAREILS DE CLIMATISATION/RÉFRIGÉRATION DE 4 KW (5 HP) ET MOINS ;
- ✓ 1IER JANVIER 2005 : FIN DE LA RECHARGE AVEC DES CFC POUR LES APPAREILS DE CLIMATISATION/RÉFRIGÉRATION DE 4 KW (5HP) À 22 KW (30HP) (commerciales, industrielles ou institutionnelles ;
- ✓ 1IER JANVIER 2005 : FIN DE LA RECHARGE AVEC DES CFC POUR LES REFROIDISSEURS SUITE À UNE RÉVISION GÉNÉRALE EFFECTUÉE OU RECOMMANDÉE PAR LE FABRICANT OU SUITE À UNE RÉPARATION OU DÉMONTAGE OU REMPLACEMENT DE COMPOSANTES ;
- ✓ 23 MARS 2005 : FIN DE LA RECHARGE AVEC DES CFC POUR LES APPAREILS DE RÉFRIGÉRATION DE TRANSPORT, INTERDIT DE RÉPARER, TRANSFORMER OU MODIFIER UN APPAREIL CONÇU POUR FONCTIONNER AVEC UN CFC SAUF POUR UNE CONVERSION ;
- ✓ 1IER JANVIER 2006 : FIN DE LA RECHARGE AVEC DES CFC POUR LES LES APPAREILS DE CLIMATISATION/RÉFRIGÉRATION D'UNE PUISSANCE ÉGALE OU SUPÉRIEURE À 22 KW (30HP) ;
- ✓ 1IER JANVIER 2015 : FIN DE LA RECHARGE AVEC DES CFC POUR LES REFROIDISSEURS ;

PROTOCOLE DE MONTRÉAL - RÉSUMÉ :

➔1974 : ON DÉCOUVRE QUE LES CFC CAUSE DES DOMMAGES À LA COUCHE D'OZONE ;
➔1985 : SIGNATURE DE LA CONVENTION DE VIENNE SUR LA PROTECTION DE LA COUCHE D'OZONE PAR 21 PAYS DE LA COMMUNAUTÉ EUROPÉENNE ;
➔1987 : RÉUNION DU PROTOCOLE DE MONTRÉAL, 54 PAYS PARTICIPANTS ET 6 PAYS OBSERVATEURS ;
➔1989 : ENTRÉE EN VIGUEUR DU PROTOCOLE DE MONTRÉAL, LES PRODUITS VISÉS SONT 5 CFC ET 3 HALLONS ;
➔1990 : RÉVISION DU PROTOCOLE DE MONTRÉAL À LONDRES, 106 PAYS PARTICIPANTS ;
➔1992 : ENTRÉE EN VIGUEUR DES AMENDEMENTS AU PROTOCOLE DE MONTRÉAL, L'INTERRUPTION TOTALE DE LA PRODUCTION DES CFC EST FIXÉE AU 31 DÉCEMBRE 1995 ET DES ÉCHÉANCES POUR LES HCFC ;
➔1994 : PUBLICATION DU PROGRAMME CANADIEN DE LA PROTECTION DE LA COUCHE D'OZONE ;
➔1995 : ARRÊT DE LA PRODUCTION ET DE L'IMPORTATION DES CFC AU CANADA ;
➔1996-97-99 : PROTOCOLE DE MONTRÉAL AMENDÉ À VIENNE-À MTL-À BEIJING ;
➔1997 : EN DÉCEMBRE 1997 38 PAYS S'OBLIGENT À ABAISSER LEUR ÉMISSIONS DE GAZ À EFFET DE SERRE ENTRE 2008 ET 2012 À DES NIVEAUX INFÉRIEURS DE 5,2% À CEUX DE 1990 = PROTOCOLE DE KYOTO ;

LES RÉFRIGÉRANTS :

22 LE JOURNAL DE MONTRÉAL | NOUVELLES | SAMEDI 22 SEPTEMBRE 2007

PROTECTION DE LA COUCHE D'OZONE

Accord historique à Montréal

MONTREAL | (AFP) La conférence de Montréal sur l'ozone est parvenue à un accord «historique» pour accélérer l'élimination de substances nocives pour la couche d'ozone et le climat, a annoncé hier soir un porte-parole de l'ONU.

«Nous avons un accord historique (...) Les pays développés et les pays en développement se sont mis d'accord pour une action accélérée sur les HCFC au bénéfice de la couche d'ozone et (de la lutte contre) les changements climatiques», a déclaré Nick Nuttal, porte-parole du Programme des Nations unies pour l'environnement.

Il a précisé que les détails de l'accord seraient annoncés aujourd'hui lors d'une conférence de presse à laquelle participeront le ministre canadien de l'Environnement John Baird et le directeur exécutif du PNUE, Achim Steiner.

La conférence des parties au protocole de Montréal, qui regroupe quelque 190 pays, avait commencé lundi avec comme principal objectif de parvenir à une accélération du calendrier d'élimination des HCFC, des substances nocives pour la couche d'ozone utilisées dans la réfrigération et la climatisation.

LE JOURNAL DE MONTRÉAL | NOUVELLES | DIMANCHE 23 SEPTEMBRE 2007

SOMMET SUR LE CLIMAT

Ban Ki-moon optimiste

PARIS | (AP) A la veille du sommet sur le climat organisé à son initiative à New York, le secrétaire général de l'ONU Ban Ki-moon se montre optimiste, évoquant «un rendez-vous historique pour la planète terre toute entière». Mais il reconnaît également que la volonté politique tend à manquer.

«La négociation officielle commencera en décembre à Bali, mais avant cela je voulais renforcer la prise de conscience et souligner l'urgence du sujet afin que les 150 pays qui seront présents puissent faire état de leur volonté politique et de leurs engagements. Car nous avons les ressources, les innovations technologiques et les financements, ce qui manque énormément c'est la volonté politique», constate-t-il dans un entretien au *Journal du Dimanche*.

BAN KI-MOON
Historique

Réchauffement climatique

L'objectif de ce sommet est de mobiliser la communauté internationale sur la question du réchauffement climatique, avant que ne s'ouvre à Bali les négociations sur le «régime post-Kyoto», le protocole de lutte contre le réchauffement climatique adopté en 1997 prenant fin en 2012.

«Il nous faut une réponse globale à long terme, avec un leadership fort des pays industrialisés dans le domaine des réductions d'émissions et des incitations technologiques, mais aussi la participation active des pays en développement», plaide Ban Ki-moon, souhaitant «un accord d'ensemble d'ici 2009».

PROTOCOLE DE MONTRÉAL FÊTE SON 20e ANNIVERSAIRE :

➔ IL A PERMIS DE METTRE UN TERME À LA PRODUCTION ET UTILISATION DE PLUS DE 95% DES SUBSTANCES APPAUVRISSANT LA COUCHE D'OZONE À L'ÉCHELLE MONDIALE ;

➔ LE PROTOCOLE DE MONTRÉAL CIBLAIT D'ABORD EN 1987 LA FIN DE LA PRODUCTION ET DE L'IMPORTATION DES CFC. LES HCFC ONT ÉTÉ MIS AU POINT POUR REMPLACER LES CFC, CEPENDANT LES HCFC FONT PARTIS DES SUBSTANCES APPAUVRISSANT LA COUCHE D'OZONE ET C'EST À LEUR TOUR D'ÊTRE CIBLÉS PAR LE PROTOCOLE DE MONTRÉAL.

➔L'ENSEMBLE DES PAYS DE LA PLANÈTE L'ONT RATIFIÉ (191) À L'EXCEPTION DE CINQ D'ENTRE EUX: L'IRAK, LE TIMOR EST, L'ANDORRE, SAINT MARIN ET LE VATICAN.

➔ SUITE AU PROTOCOLE DE MONTRÉAL, PLUS DE CINQ GIGATONNES D'ÉQUIVALENT CO2 ONT DÉJÀ ÉTÉ ÉLIMINÉES REPRÉSENTANT PLUS DE 25% DES ÉMISSIONS MONDIALES DE GAZ À EFFET DE SERRE « GES » DEPUIS 1990. CECI CORRESPOND À CINQ FOIS L'OBJECTIF DE RÉDUCTION DE « GES » AU TITRE DU PROTOCOLE DE KYOTO.

➔ LA CHINE, LE PLUS IMPORTANT ET UTILISATEUR DE HCFC DE LA PLANÈTE, A DU MÊME COUP FAIT LA PREUVE DEVANT LA COMMUNITÉ INTERNATIONALE DE SA VOLONTÉ DE FAIRE PROGRESSER LA LUTTE CONTRE DEUX DES PLUS IMPORTANTS PROBLÈMES ENVIRONNEMENTAUX DE LA PLANÈTE, L'AMINCISSEMENT DE LA COUCHE D'OZONE ET LE RÉCHAUFFEMENT DU CLIMAT.

PROTOCOLE DE MONTRÉAL - RÉSUMÉ : SUITE

- **2007 : LE 16 MARS 2007 LES USA SOUMETTENT UNE PROPOSITION POUR ACCÉLÉRER L'ÉLIMINATION DES HCFC ;**
- **2007 : LE 21 SEPTEMBRE 2007 ENTENTE HISTORIQUE SUR L'ACCÉLÉRATION DES SUBSTANCES APPAUVRISSANT LA COUCHE D'OZONE ;**

  - ✓ **IMPORTATION ET CONSOMMATION DE HCFC :**
  - **2004 : 35 % DE RÉDUCTION** P/R À LA RÉFÉRENCE **;**
  - **2010 : 75 % DE RÉDUCTION** P/R À LA RÉFÉRENCE **+ FIN DES NOUVELLES UNITÉS PRÉ-CHARGÉES AUX HCFC ;**
  - **2015 : 90 % DE RÉDUCTION** P/R À LA RÉFÉRENCE **+ CONFIRMATION DE LA DISPONIBILITÉ DE HCFC APRÈS 2020 POUR LE SERVICE ;**
  - **2020 : 99,5 % DE RÉDUCTION P/R À LA RÉFÉRENCE DONC 0.5% POUR LE SERVICE SEULEMENT JUSQU'EN 2030 (SI ACCEPTÉ EN 2015!) ;**
  - **2030 : FIN DE LA PRODUCTION ET DE L'IMPORTATION DE TOUS LES HCFC ;**

RÉFÉRENCE = 2.8% DE LA CONSOMMATION DE CFC EN 1989 + 100% DE LA CONSOMMATION DE HCFC EN 1989.

PLUS DE 95% DES APPAREILS DE CLIMATISATION RÉSIDENTIELS ET COMMERCIALES ET PLUS DE 50% DES UNITÉS DE RÉFRIGÉRATION COMMERCIALES FONCTIONNENT AVEC UN HCFC AU CANADA.

LES RÉFRIGÉRANTS :

LE JOURNAL DE MONTRÉAL | NOUVELLES | MERCREDI 28 NOVEMBRE 2007

CO_2 EN 5 MIN

La pollution ne s'arrête

L'Observatoire Mauna Loa (OML), à Hawaï, mesure le taux de dioxyde de carbone dans l'atmosphère de façon continue depuis novembre 1957. Cette mesure — la plus ancienne — a découlé de la crainte croissante de scientifiques qui prévoyaient que les émanations de gaz auraient un impact sur le climat.

OBSERVATIONS DANS L'AI

L'OML est situé dans un lieu éloigné où l'air est pur. La végétation et l'activité humaine y sont aussi pratiquement nulles. Ces conditions en font un endroit idéal pour la surveillance des particules qui peuvent causer des changements climatiques dans l'atmosphère.

- Altitude : 3 350
- Air frais et sans
- Le seul site con États-Unis
- Organisations Institut d'océan Scripps, Admin nationale des o l'atmosphère

PROTOCOLE DE MONTRÉAL : UN SIGNAL POSITIF

Le succès du Protocole de Montréal montre que la communauté internationale est capable de résoudre les problèmes environnementaux.

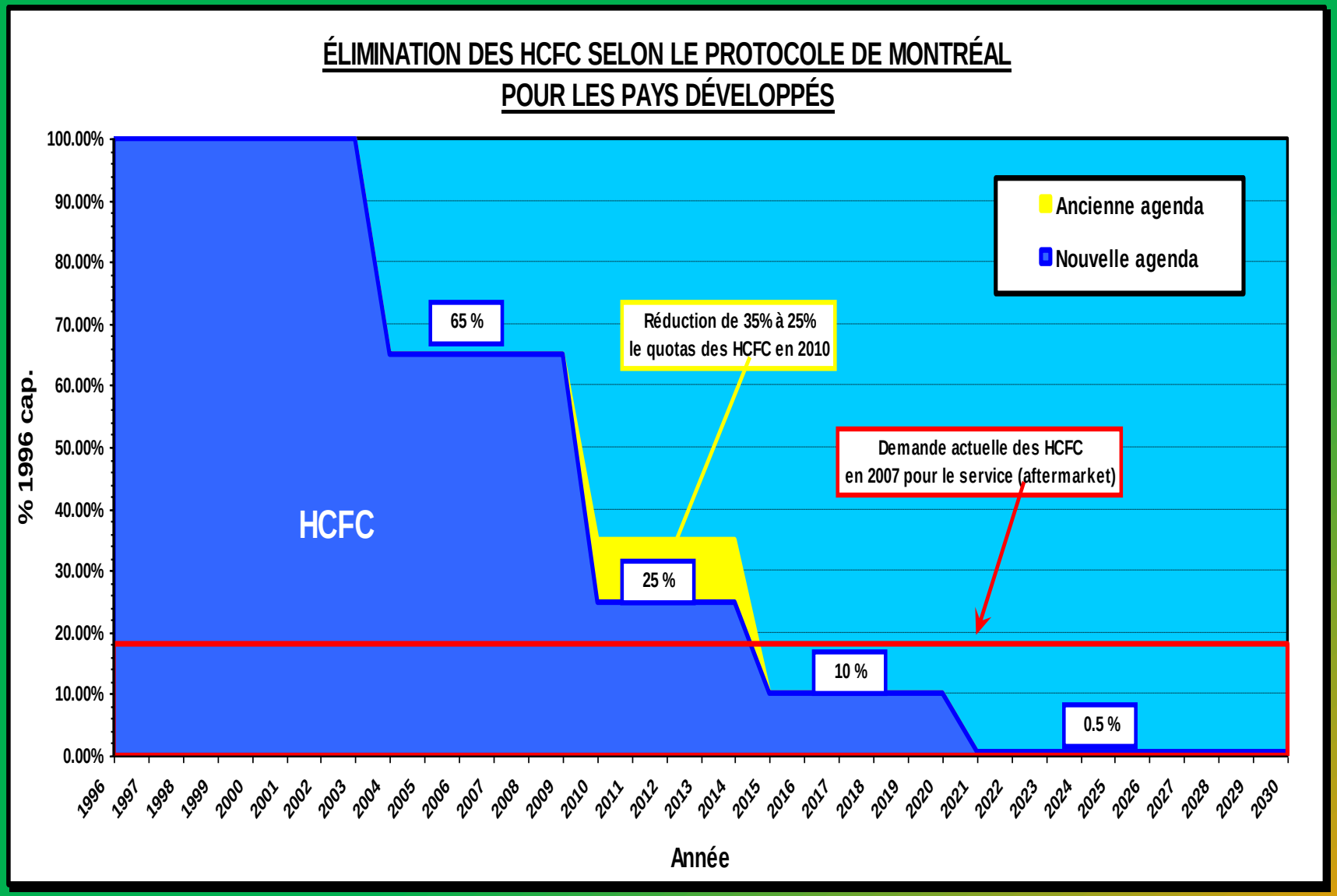
- Grâce aux réductions des chlorofluorocarbures, la couche d'ozone retrouvera son état de 1980 entre 2055 et 2065.
- La tâche n'est cependant pas achevée : il était prévu d'éliminer les hydrochlorofluorocarbures, les principaux substituts des chlorofluorocarbures, d'ici à 2020 pour les pays industrialisés et 2040 pour les pays en voie de développement.

Le niveau de CO_2 augmente de 0,53 % ou deux parts par million chaque année depuis 1958.

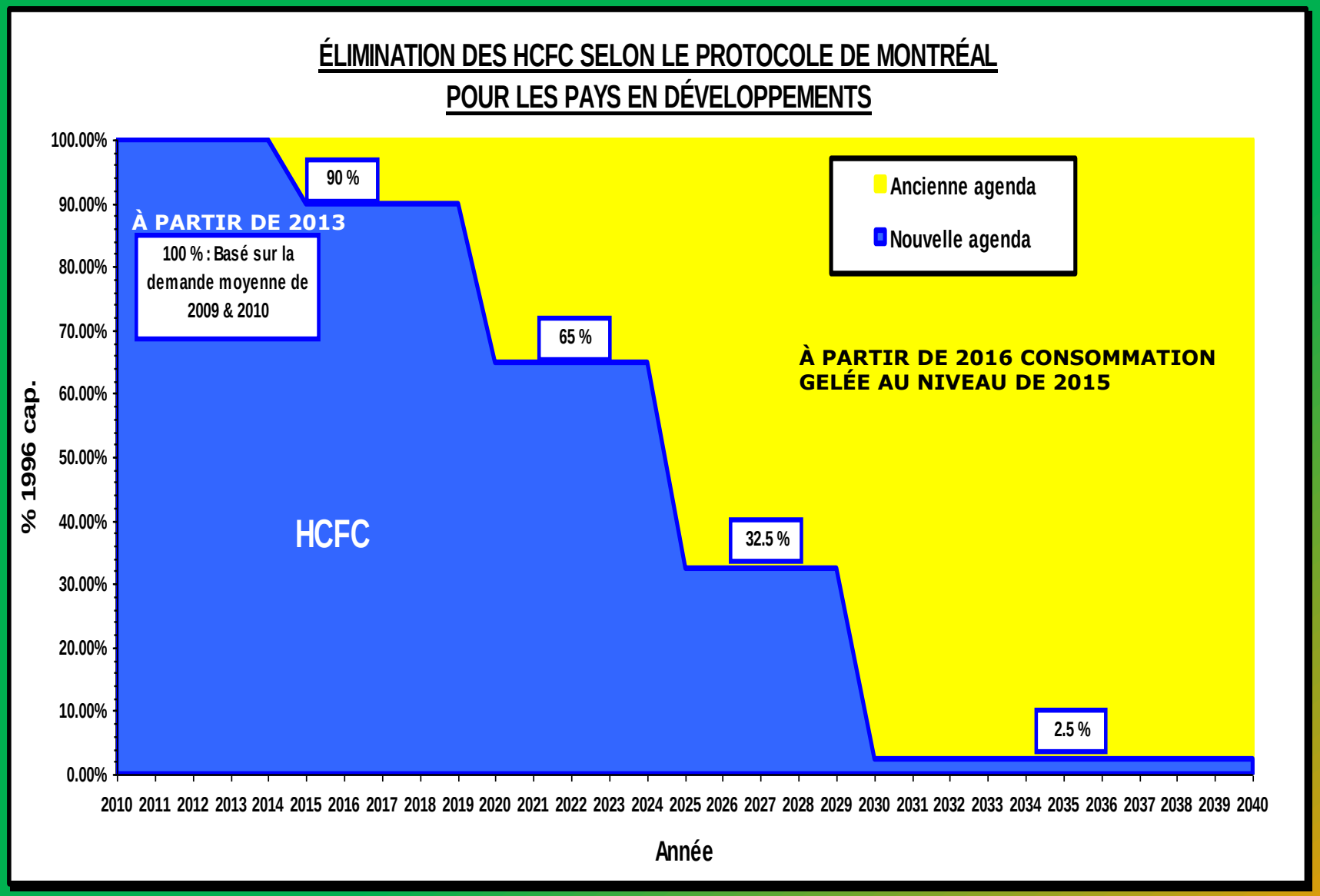
Niveaux de CO_2 dans l'atmosphè

Appelés « Keeling Curve » d'après le Dr Charles « Dave Keeling, le scientifique qui démarré le projet à l'âge d ans.

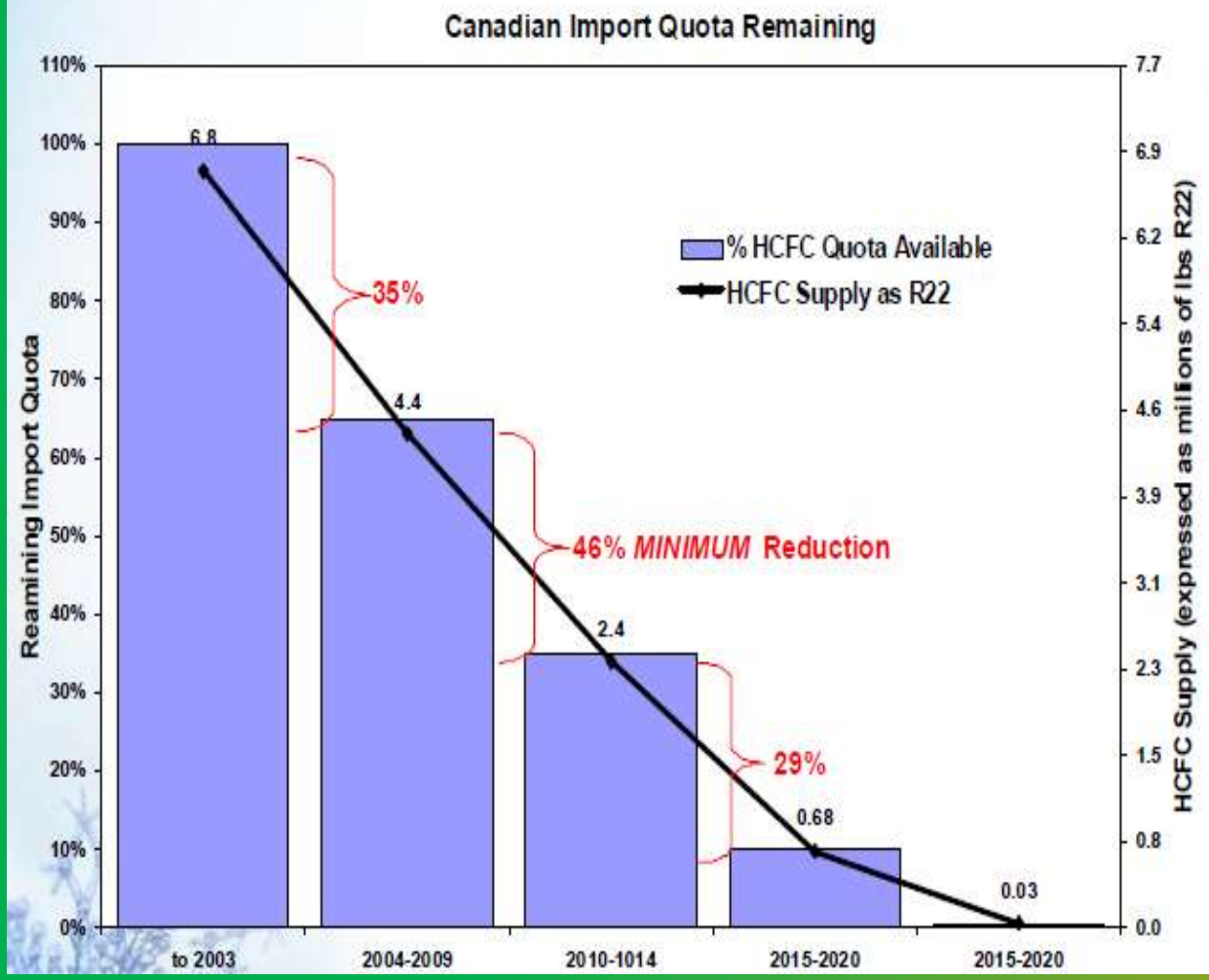
LES RÉFRIGÉRANTS :



LES RÉFRIGÉRANTS :



R-22 is Going Away!



CANADA – Important Facts:

- Minimum additional 46% supply reduction- January 1st, 2010.
- No cross over between refrigeration and "all-other uses" segments
- R-22 equipment will no longer be imported or manufactured in Canada

LES RÉFRIGÉRANTS :

IL MANQUERA 27.6 MILLIONS DE LBS EN 2010
(9200 INSTALLATIONS À 3000 LBS CH.)

THE EPA ANNOUNCES 2010 PROPOSED R-22 SUPPLY LEVELS

The Proposal:

The EPA recently announced its proposal for R-22 supply for the 2010 through 2014 period. In its proposal, the EPA predicts 137.8 M lbs. of R-22 service demand in 2010. The proposal allows 110.2 M lbs. of new R-22 supply in 2010, creating a 27.6 M lbs. supply gap.

The EPA is estimating that reclaimed R-22 will be the source to fill the gap for residential and commercial equipment owners requiring service on R-22 systems.

In addition, the EPA announced a pre-charged equipment proposal. In the proposal the EPA would ban the sale or distribution of pre-charged air-conditioning and refrigeration products and components containing R-22 that were manufactured on or after January 1, 2010.

What this means to you:

The proposed EPA rule allows for limited production of R-22 to service existing air conditioning and refrigeration equipment.

In order to protect your company and your customers, consider the following steps:

1. Discuss R-22 availability issues with your local wholesaler.
2. Take steps to learn and understand how to install HFC based systems that use refrigerants such as R-410A (AZ-20), R-404A and R-507 (AZ-50).
3. Collect and return reclaimed R-22.
4. Honeywell's Generations® reclaim program offers a responsible and economical choice for R-22 reclaim. Contact a Honeywell Genetron Wholesaler for program details.

www.genetron.com

Honeywell

LES RÉFRIGÉRANTS :

R-22 Shortfall Projected in 2010

Supply for R-22 is decreasing

In 2010, R-22 service demand will exceed allowed virgin R-22 supply by 275 million pounds. This projection is based upon the latest EPA demand projections and recent proposed allowance rule. The next significant hydrochlorofluorocarbon (HCFC) stepdown will occur on January 1, 2010, as a result of the more aggressive phasedown of HCFCs agreed to under the Montreal Protocol. The 2010 HCFC consumption cap, including R-22, was reduced to 25% of the original cap (versus previous 35%).

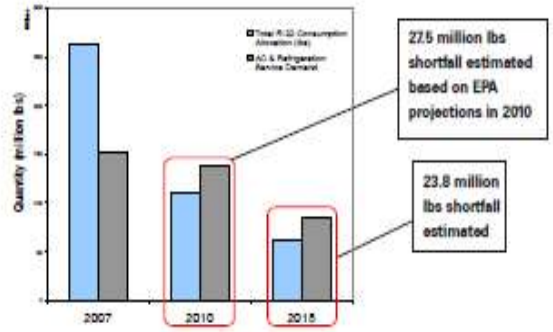
Demand for R-22 remains strong

- Transition to new equipment with refrigerant alternatives like R-410A has been slower than anticipated.
- The 13 SEER minimum Seasonal Energy Efficiency Ratio adopted in 2006 increased the charge size for R-22 residential air conditioning units by 15 to 40%.

R-22 Estimates based upon EPA Projections in lbs

2010 Supply estimate adjusted to EPA Proposed Allowance Rule*	110 Million
2010 Demand estimate from U.S. Projected Servicing Needs**	137 Million

Estimated US R-22 Supply Demand for AC & Refrigeration



*Based on December 22, 2008 EPA Allocation Draft Proposal to set HCFC limits to meet phasedown caps under the Montreal Protocol.
**"The U.S. Phaseout of HCFCs: Projected Servicing Needs in the U.S. Air Conditioning and Refrigeration Sector," June 2008

DuPont™ ISCEON®

DUPONT
The miracles of science™

Dealers, service contractors and equipment owners should be taking appropriate action now, including implementing a refrigerant management plan to transition away from R-22

A refrigerant management plan should include:

1. Repair all leaks
2. Recover and reclaim
3. Retrofit existing equipment to alternative refrigerants such as DuPont™ ISCEON® MO29® or MO79
4. Recommend new equipment with non-ozone depleting refrigerants such as DuPont™ Suva® 410A

DuPont Refrigerants Reclaim Program details

As a product steward, DuPont Refrigerants is committed to provide products and services to assist our industry to move away from HCFCs, in particular R-22, to environmentally sustainable solutions like DuPont™ ISCEON®. DuPont has a reclaim program available to our network of refrigerant distributors. This program allows them an opportunity to offer services to take back used refrigerants from their customers. Our program is designed to be easy, convenient, and reliable.

With the accelerated phaseout of HCFCs, demand will likely exceed supply in 2010 and reclaimed R-22 will become a vital part of supply.

To find the DuPont Authorized Refrigerant Reclaim Center nearest you, call 877-MNAGE-22 (877-662-4322) or visit refrigerants.dupont.com/manage22

Action you can take now

Stay up-to-date on EPA rules and regulations

Evaluate options to retrofit existing equipment from R-22 that offer:

- no ozone depletion
- lowest total cost of ownership
- energy efficiency
- low environmental impact

Recommend new equipment with alternative refrigerants

Recover all refrigerants and return through a certified reclaim program

Contact your DuPont Refrigerants Distributor for recommendations concerning alternative refrigerants readily available for retrofit

LES RÉFRIGÉRANTS :

FACTEURS EXPLICANTS L'AUGMENTATION DU PRIX DU R-22:

➔ EN JANVIER 2003, LES ÉTATS-UNIS LIMITENT ET CONTRÔLENT LA PRODUCTION ET L'IMPORTATION DU R-22, PAR L'INTERMÉDIAIRE D'UNE AGENCE NOMMÉE « EPA (ENVIRONMENTAL PROTECTION AGENCY) ». UNE AMMENDE PEUT ATTEINDRE 12474$/LIVRE POUR CEUX QUI DÉPASSENT LES LIMITES PERMISES. EN 2007, AMMENDEMENT AU PROTOCOLE DE MTL RETRAIT ACCÉLÉRÉ EN 2010 = 75 %.

SOMMAIRE : PRODUCTION ET IMPORTATION DU R-22 LIMITÉES

➔ EN 2006, LE DÉPARTEMENT DE L'ÉNERGIE AUX USA, OBLIGE LES MANUFATURIERS D'ÉQUIPEMENTS NEUFS À AVOIR UN MINIMUM 13 SEER, POUR LES ÉQUIPEMENTS D'A/C DE 5 TONNES ET MOINS, CE QUI ENGENDRE DES ÉQUIPEMENTS QUI PEUVENT EMMAGASINER PLUS DE R-22. LA DEMANDE DE R-22 A AUGMENTÉ DE 25-35% CHEZ LES MANUFACTURIERS.

SOMMAIRE : AUGMENTATION DE LA DEMANDE DU R-22

➔LE R-22 N'A PAS AUGMENTÉ DEPUIS ± 20 ANS. EN TENANT COMPTE L'INFLUATION LE R-22 SE VEND AUJOURD'HUI À 45% EN BAS DE 1985 CEPENDANT LES COÛTS DE MATIÈRE PREMIÈRE EUX ONT GRIMPÉ EN FLÈCHE (ACIER-cylindre, ESSENCE-transport, ÉNERGIE-production du R-22, AUGMENTATION DE LA MATIÈRE CHIMIQUE POUR LA FABRICATION DS LES DRNIERS 2 ANS CHLOROCARBONS+FLORSPAR=HYDROFLUORIC ACID)

SOMMAIRE : AUGMENTATION DES COÛTS DE PRODUCTION, DE TRANSPORT ET D'EMBALLAGE

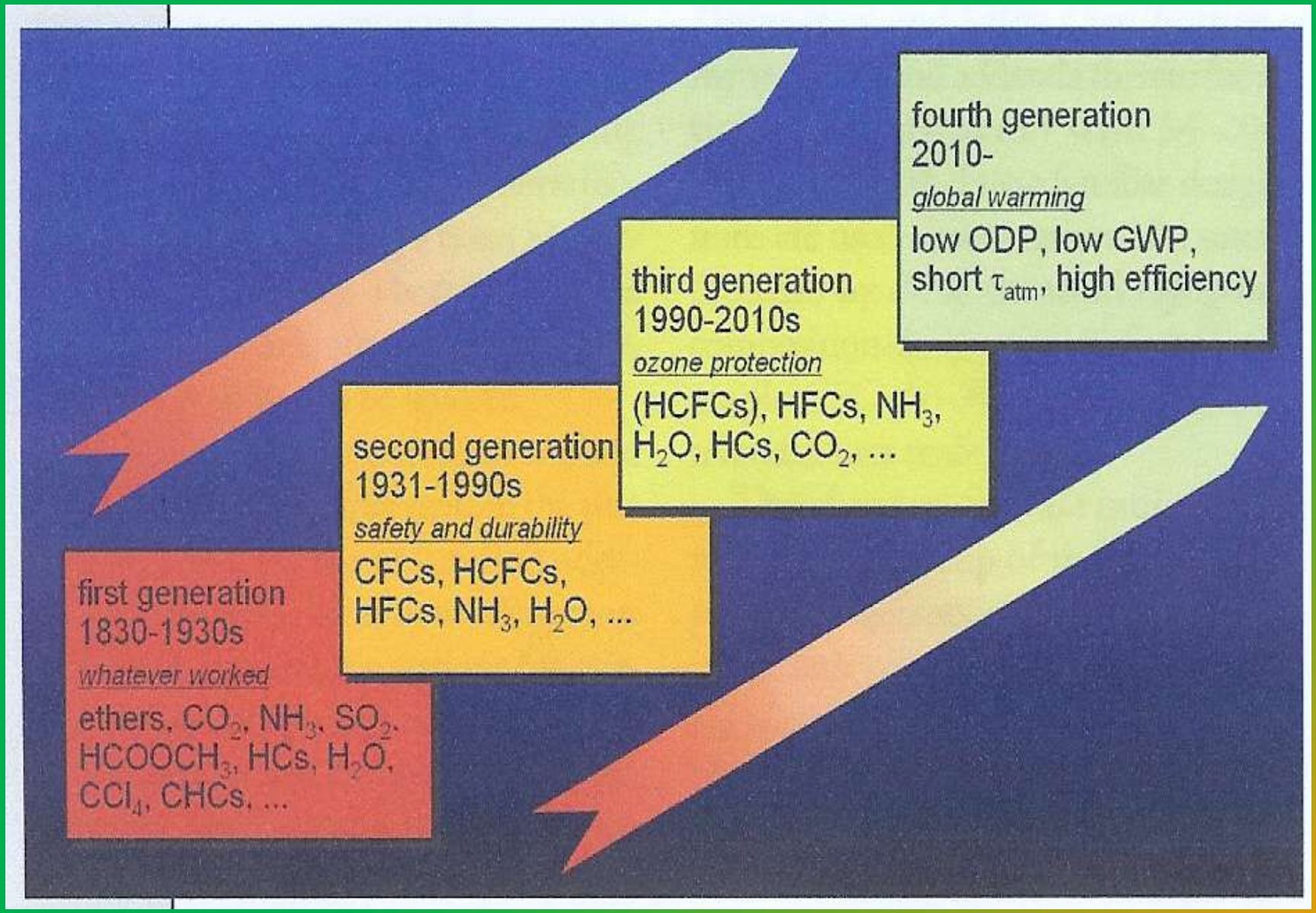
➔LE 1IER JANVIER 2006 TAXE ENVIRONNEMENTALE DE 1,00$/kg ⇨ À 1,50$/kg SUR TOUS LES HCFC VENDUS ;

➔DEPUIS 2003, LE PRIX DU R-22 A AUGMENTÉ D'UNE FACON SIGNIFICATIVE ET IL VA AUGMENTÉ D'AVANTAGE DANS LES PROCHAINS MOIS & ANNÉES.

SOMMAIRE : CONTRÔLE DE LA PRODUCTION ET DE L'IMPORTATION + DEMANDE PLUS ÉLVÉE + COÛT D'APPROVISIONNEMENT PLUS ÉLEVÉS = COÛTS BEAUCOUP PLUS ÉLEVÉS À L'UTILISATEUR

PRÉAPARER PAR : MARC GOSSELIN, ing.

LES RÉFRIGÉRANTS :



DÉBUT D'UN PHASE OUT DES HFC

Parties to the Montreal Protocol Delay Decision on HFCs Until 2010

At their meetings in Egypt in early November, the Parties to the Montreal Protocol agreed to delay a decision on including a phasedown of HFCs under the protocol until their next meeting in 2010. The rationale for the delay was to await the results of the Climate Change meetings being held in Copenhagen in early December. The European Union, China and India were the key members who voiced their opposition to moving forward with the HFC issue at this time. The United States, Canada, and Mexico had submitted a proposal to the Montreal Protocol on September 15, 2009 that would bring HFCs under the Protocol and initiate a phasedown commencing in 2013.

HRAI representatives and members participated in an Environment Canada stakeholder consultation on the US/Canada/Mexico HFC proposal on Wednesday October 21, 2009. The objective of the consultation was to discuss details of the proposal and hear comments from the stakeholders in advance of the meetings in Egypt. The key concerns expressed by those in attendance included alternatives to HFCs not being commercially available and the negative impact of the proposed phasedown of HFCs on end users who are currently looking at new HFC equipment. The stakeholders also expressed concerns about the method to be used to establish the baseline consumption figure for HFCs and the system for allocating rights for HFCs if this proposal is adopted by Canada.

For more information, contact Warren Heeley at 1-800-267-3321 ext. 227 or e-mail warren.heeley@hrai.ca.

(Source : HRAI Contractors link de novembre 2009, www.HRAI.ca)

LES RÉFRIGÉRANTS DE REMPLACEMENT vs R-22

APRÈS LE R-22 ?

R-22 (HCFC)

RÉFRIGÉRANTS DE TRANSITION - HCFC

AUCUN

RÉFRIGÉRANTS DE REMPLACEMENT - HFC

- **R-407C (KLEA66, SUVA9000), R-410A (AZ20), R-417A (NU22, ISCEON MO59), R-422A (ISCEON MO79, ONE SHOT), R-422B (NU22B), R-422C, R-422D (GENETRON, ISCEON MO29), R-424A (RS-44), R-427A, R-428A (RS-52), , R-434A (RS-45), R-438A (MO99), DURACOOL 22a® ;**

Synonymes Commerciaux du R-410A :

AZ20, SUVA 9100, Forane 410A, Puron®, Environ®, EnvirOmax™, Clearaire™, Prozone®, Earthwise™, Ultron™

R-22

R-407C (KLEA 66, SUVA 9000) : HFC

- ➔ COMPOSITION : R-134A/R-125/R-32 (52/25/23)
- ➔ REMPLACE LE R-22 ;
- ➔ APPLICATION MOYENNE TEMPÉRATURE, CLIMATISATION RÉSIDENTIELLE ET COMMERCIALE ;
- ➔ T° DE REFOULEMENT PLUS BASSE QUE LE R-22 DE -15 À -8° F ;
- ➔ PRESSION DE REFOULEMENT PLUS ÉLEVÉE QUE LE R-22 DE 15 À 40# ;
- ➔ GLISSEMENT ÉLEVÉ ± 12° F ;
- ➔ CLASSÉ « A1 » ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : -2% À + 3% ;
- ➔ EFFICACITÉ ÉNERGÉTIQUE vs R-22 : -7% À +3% ;
- ➔ COMPATIBLE AVEC L'HUILE POE SEULEMENT.

LES RÉFRIGÉRANTS :

R-22

R-422A (ISCEON MO79, ONESHOT) : HFC

- ➔ COMPOSITION : R-134A/R-125/R-600A (11.5/85.1/3.4)
- ➔ REMPLACE LE R-22, R-502, R-408A, R-402A, R-402B ;
- ➔ APPLICATION MOYENNE ET BASSE TEMPÉRATURE ;
- ➔ T° DE REFOULEMENT PLUS BASSE QUE LE R-22 DE -67 À -39° F;
- ➔ CLASSÉ « A1 » ;
- ➔ COPELAND : APPROUVÉ POUR COMPRESSEURS DISCUS SEULEMENT ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : + 29% BT° & +0% MT° ;
- ➔ EFFICACITÉ ÉNERGÉTIQUE vs R-22 : + 13% BT° & -8% MT° ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-502 : - 1% BT° & -6% MT° ;
- ➔ EFFICACITÉ ÉNERGÉTIQUE vs R-502 : -4% BT° & -8% MT° ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

R-422D (ISCEON MO29 & GENETRON® 422D) : HFC

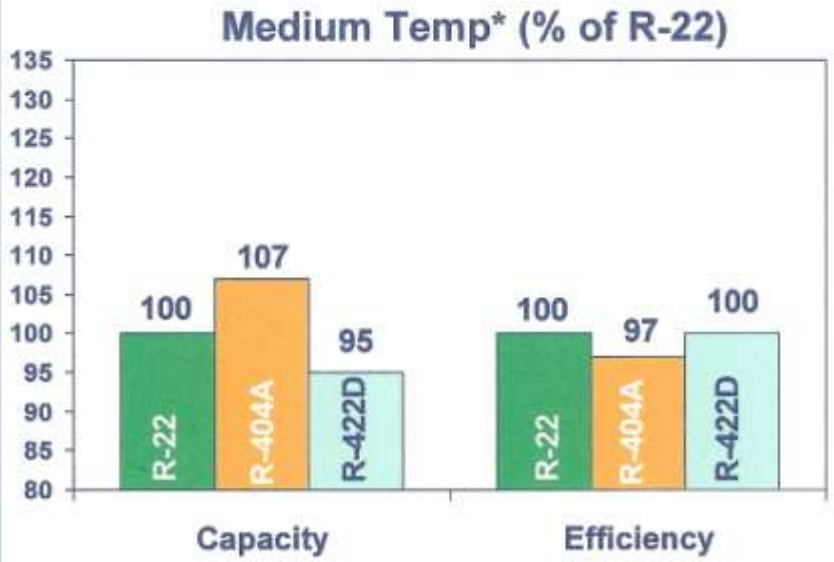
- ➔ COMPOSITION : R-134A/R-125/R-600A (31.5/65.1/3.4)
- ➔ REMPLACE LE R-22 ;
- ➔ APPLICATION MOYENNE ET BASSE TEMPÉRATURE ;
- ➔ T° DE REFOULEMENT PLUS BASSE QUE LE R-22 DE -64 À -33° F ;
- ➔ CLASSÉ « A1 » ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : + 8% BT° & -5% MT° ;
- ➔ EFFICACITÉ ÉNERGÉTIQUE vs R-22 : + 14% BT° & +0% MT° ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

PRÉAPARER PAR : MARC GOSSELIN, ing.

LES RÉFRIGÉRANTS :

PRÉAPARER PAR : MARC GOSSELIN, ing.

Refrigerant's Performance vs R-22
In Practical System



- R-404A Provides Increased Capacity In Both MT & LT
  - Superior Choice For New Equipment
- R-422D Provides Adequate Capacity Making It A Good Alternative Retrofit Option
  - Possibly No TXV Change Required

EMERSON

LES RÉFRIGÉRANTS :

Fixair 30

Copeland

Refrigerants/Lubricants Approved For Use In Copeland® Brand Compressors

	Refrigerants	Similar To	Application		Lubricant Choices			Comments
			Retrofit	New	Preferred	Alternate #1	Alternate #2	
Ozone Depleting	CFC R-12		LM	LM	MIN	AB & MIN		Phased Out In 1996
	CFC R-502		LM	LM	MIN	AB & MIN	POE	Phased Out In 1996
	HCFC R-22		LMH	LMH	MIN	AB & MIN	POE	Phaseout By 2020
Interims	HCFC R-401B	R-12	LM	N/A	AB & MIN	POE & MIN	POE	Service Only Suva® MP66
	HCFC R-402A	R-502	LM	N/A	AB & MIN	POE & MIN	POE	Service Only Suva® HP80
	HCFC R-402B[2]	R-502	LM	N/A	AB & MIN	POE & MIN	POE	Service Only Suva® HP81
	HCFC R-408A	R-502	LM	N/A	AB & MIN	POE & MIN	POE	Service Only FX10
	HCFC R-409A	R-12	LM	N/A	AB & MIN	POE & MIN	POE	Service Only FX56
Non-Ozone Depleting	HFC R-404A	R-502	LM	LM	POE			Suva® HP62, Forane® FX70
	HFC R-507	R-502	LM	LM	POE			Genetron® AZ50
	HFC R-407C	R-22	MH	MH	POE			Suva® 9000/KLEA 66
	HFC R-422A/D	R-22	LM	N/A	POE	MIN	AB	Discus Only Aftermarket Replacement
	HFC R-410A			MH	POE			Genetron® AZ20/Suva® 9100**
Copeland Screw™ Compressors Only	HFC R-407C		MH		SOLEST 170			
	HFC R-507		LMH		SOLEST 170			
	HFC R-404A		LMH		SOLEST 170			
	HCFC R-22		MH		CP4214 320			SC Models Only
	HCFC R-22		LMH		CP4214 150 or Ultra A100EP			SH Models Only

Legend:
MIN = Mineral Oil (Copeland® 46BWMO[1], Crompton Suniso 3GS, Chevron/Texaco Capella WF32 and Calumet RO15)
AB = Alkyl Benzene (Shrieve Zerol 200 TD, Soltex AB200A, Crompton Suniso AKB200A or Fuchs Reniso SP46)
POE = Copeland® brand Ultra 22 CC, Copeland® brand Ultra 32 CC, Copeland® brand Ultra 32-3MAF, Mobil EAL™ Arctic 22 CC or Uniqema RL32-3MAF
POE & MIN = Minimum 50% POE
AB & MIN = Minimum 50% Alkyl Benzene (Shell 22-12 or Fuchs Reniso Triton MS46)
L = Low temperature application
M = Medium temperature application
H = High temperature application

For specific product availability and performance data refer to Emerson Climate Technologies, Inc. Sales Literature

*Refrigerant Changeover Guidelines
**New equipment only
[1]For R-22, this oil is factory charged for use on Copeland Scroll™ A/C applications and is equivalent to Crompton Suniso 3GS.
[2]Ice machine applications only

Refer to the following Application Bulletins for additional information:
4-1295 HFC-134a Refrigerant Guidelines
27-1308, 27-1309 and 27-1322 for Copeland Screw™ Compressors
25-1177 Safe Handling Of Compressed Gases
17-1233 Non-Standard Application of Copeland® Brand Compressors
93-02 CFC-12 To R-401A*
93-03 CFC-12 To R-401B*
93-04 CFC-12 To HFC-134a*
93-05 R-502 To R-402A/R-408A*
94-15 R-502 To R-404A/R-507*
95-14 R-22 To R-407C*

MSDS sheets are available at EmersonClimate.com.

Compressor nameplates identify both the oil type and oil amount.
MIN = Mineral Oil
POE= Polyol Ester Oil
AB = Alkylbenzene

EMERSON. Climate Technologies

LES RÉFRIGÉRANTS :

R-422A (HFC) : ISCEON MO79

DuPont™ ISCEON® 9 Series

REFRIGERANTS

Product Information Bulletin

DuPont™ ISCEON® MO79

ISCEON® MO79 is an easy-to-use, non-ozone depleting HFC refrigerant for replacing R-22, R-502, and HCFC-containing refrigerant blends (e.g., HP80, HP81, R-408A) in low-temperature commercial and industrial direct expansion refrigeration systems (can also be used for medium temperature). ISCEON® MO79 is compatible with traditional and new lubricants, in most cases no change of lubricant type during retrofit is required. ISCEON® MO79 is an easier retrofit option than R-404A.

ASHRAE #: R-422A

Applications

- Low temperature commercial and industrial direct expansion refrigeration (can also be used for medium temperature):
  - Food service
  - Supermarket display cases
  - Food storage and processing
  - Ice machines

Benefits

- Provides easy, quick cost-effective retrofits:
  - Replaces: R-22, R-502, and HCFC-containing blends (e.g., HP80, HP81, R-408A)
  - Easier retrofit than R-404A and R-507
- Non-ozone-depleting HFC
  - Not subject to phase-out under the Montreal Protocol
- Compatible with AB, MO and POE lubricants
  - In most cases, no change of lubricant type is needed
- Enables continued use of existing equipment
- Non-flammable. ASHRAE safety classification: A1
- U.S. EPA SNAP listed for a broad range of refrigeration applications
- Significantly lower discharge temperature than R-22
  - Likely to prolong compressor life
- Provides improved cooling capacity over R-22 at many operating conditions with up to +30% at low temperature conditions
- Low toxicity (similar to R-22, R-502 and R-404A)
- 20% lower Global Warming Potential (GWP) than R-404A and R-507
- After retrofit, can be topped off during service without removing the entire refrigerant charge

Expected Performance After Retrofit

(Based on field experience, calorimeter testing and thermodynamic property data).

ISCEON® MO79 provides improved cooling capacity and energy efficiency over R-22 in many systems, especially at low temperature conditions. It also provides comparable cooling capacity and energy efficiency to R-404A. Actual performance depends on a number of system design and operating conditions. ISCEON® MO79 operates at significantly lower discharge temperatures vs. R-22.

DUPONT

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LES RÉFRIGÉRANTS :

Fixair (30)

R-422A (HFC) : ONESHOT

ONE SHOT™
The Direct Replacement of Choice!

ONE SHOT REPLACES THESE REFRIGERANTS R-502, R-22, R-507A, R-404A, R-402A & B, AND R-408A!

The "One Shot" Solution

One Shot is a non-ozone depleting, HFC blend, which can be used to replace R-502 in low and medium temperature applications, R-22 in low temperature applications, and even in systems originally designed for R-404A and R-507A. One Shot provides adequate oil return in mineral oil based systems without any significant engineering changes. System tests have shown that One Shot provides superior performance over both R-404A and R-507A, while being 20% less global warming. One Shot is, by far, the most practical long-term option for low temperature applications on the market today!

THE PROBLEM

R-502 was introduced to the ACR industry in 1952 and was the low temperature refrigerant of choice until the ban on CFC production went into effect in 1994. The rapid phase out of R-502 forced the industry into providing equally rapid solutions.

The transitional HCFC blends, R-402A and R-408A, compared well to R-502. However, the move away from HCFCs has become increasingly popular as a result of governmental crackdowns and long-term market uncertainty, i.e. pricing and availability.

With pressure mounting on the U.S. and other developed countries to reduce green house gas emissions, more emphasis is being placed on the global warming potential (GWP) of HFCs than ever before.

For the most part, low temperature HFC replacements have been limited to R-404A and R-507A. Both of these products have a relatively high GWP, when compared to other mainstream HFCs. And due to their dependency on POE oil, converting a system to these products can be a costly and inconvenient process.

JUST THE FACTS!

- ✔ Higher Capacity & COP than R-404A & R-507A
- ✔ 20% Lower Global Warming Potential
- ✔ Lower Compression Ratio Than R-404A and R-507A
- ✔ Compatible with MO, AB, and POE Based Oils
- ✔ Zero Ozone Depletion Potential, Nontoxic and Nonflammable
- ✔ Suitable for New and Existing Equipment
- ✔ Can Be Topped Off Repeatedly
- ✔ HFC Leak Detectors Suitable for Use with One Shot

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ICOR International
Making your life easier

• *Producers and Distributors of Environmentally Friendly Refrigerants* •

LES RÉFRIGÉRANTS :

R-422D (HFC)

Genetron® 422D is a non-ozone-depleting HFC-based refrigerant for replacement of HCFC-22 in low– and medium–temperature refrigeration systems. Genetron 422D is a blend refrigerant suitable for direct expansion evaporators. It should not be used in systems that employ flooded evaporators.

Physical Properties

Chemical Formula and Composition

Component	Formula	Weight %
HFC-134a	CF_3CH_2F	31.5
HFC-125	CF_3CHF_2	65.1
Isobutane	$CH(CH_3)_3$	3.4

Average molecular weight* 109.9
Boiling point (bubble point) @ 1atm (°F)* . . . . . -45.76
Critical temperature (°F)* 175.2
Critical pressure (psia)* 566.22
Critical density (lb/ft³)* 33.008
Saturated liquid density @ 80°F (lb/ft³)* 70.87
Heat of vaporization @ boiling point (btu/lb)* 81.78
Specific heat of liquid @ 80°F (btu/lb·°F) 0.35
Specific heat of vapor @ constant pressure, Cp @ 1atm and 80°F (btu/lb·°F)* 0.20
Flammable range, % volume in air . . . . . none
ASHRAE/ANSI Standard 34 . . . . . A1

*Values from Refprop 7.0 (NIST)

Applications

Examples of low– and medium–temperature commercial refrigeration applications include:

- Supermarket display cases
- Food preservation and food processing
- Ice machines

Features

- Can replace HCFC-22 in many cases without having to change compressor lubricant.
- May be used with alkyl benzene (AB), mineral oil (MO), and polyolester (POE) lubricants. If inadequate oil return is observed for AB or MO, addition of POE may be needed.
- Genetron 422D can, in most cases, be used with existing HCFC-22 thermostatic expansion valves. Larger valves may be needed in cases where the R-22 valve is near its maximum capacity.
- Lower discharge temperature than HCFC-22 which may extend compressor longevity.
- Non-ozone-depleting HFC refrigerant.
- ASHRAE classification A1 (low toxicity, non-flammable per ASTM E-681 method).
- Allows for use of existing equipment.

Retrofit Performance

Genetron® 422D has been evaluated in laboratory tests using typical commercial refrigeration systems. Based on these laboratory tests, subsequent field trials, and theoretical thermodynamic cycle calculations, the following observations were made:

Genetron 422D should be suitable for use with MO or AB in most commercial systems. If adequate oil return is not achieved, addition of POE should be considered.

Capacity and energy efficiency at low– and medium–temperature tends to be lower than HCFC-22. If the present R-22 system was at its maximum capacity during design conditions, additional capacity may be needed (such as upsizing compressor sizes).

Genetron 422D mass flow is higher compared to HCFC-22. Existing HCFC-22 TXVs may be acceptable in many cases. If the existing valve was near it maximum capacity for HCFC-22, a larger valve may be needed when retrofitting to Genetron 422D.

As with any retrofit, consideration should be given to the age of seals and gaskets. Over time, sealing devices may experience compression set, thermal set, and extraction. Aged sealing devices may not perform adequately after retrofitting service. Seal replacement may be required in some cases.

PRÉAPARER PAR : MARC GOSSELIN, ing.

LES RÉFRIGÉRANTS :

R-422D (HFC) : ISCEON MO29

DuPont™ ISCEON® 9 Series

REFRIGERANTS

Product Information Bulletin

DuPont™ ISCEON® MO29

ISCEON® MO29 (R-422D) is an easy-to-use, non-ozone depleting HFC refrigerant for replacing R-22 in medium temperature direct expansion (DX) refrigeration applications (can also be used for low temperature), including commercial supermarket systems, and in stationary DX air conditioning applications, including DX water chillers. ISCEON® MO29 is compatible with traditional and new lubricants; in most cases, no change of lubricant type during retrofit is required.

ASHRAE #: R-422D

Applications

- Medium temperature commercial and industrial DX refrigeration (can also be used for low temperature):
  - Food service
  - Supermarket display cases
  - Food storage and processing
  - Ice machines
- Residential and commercial AC
  - Best choice for DX water chillers

Benefits

- Provides easy, quick, cost-effective retrofits – easier retrofit than R-404A, R-507, and R-407C
- Non-ozone-depleting HFC
  - Not subject to phase-out under the Montreal Protocol
- Compatible with AB, MO and POE lubricants
  - In most cases, no change of lubricant type is needed
- Field testing has been successful in many systems with no TXV change – superheat adjustment may be required
  - An assessment of TXV loading is required to determine if TXV change is required
- Enables continued use of existing equipment
- Non-flammable. ASHRAE safety classification: A1
- Significantly lower discharge temperature than R-22
  - Likely to prolong compressor life
- Low toxicity (similar to R-22)
- 30% lower Global Warming Potential (GWP) vs. R-404A and R-507
- After retrofit, can be topped off during service without removing the entire refrigerant charge

Expected Performance After Retrofit

(Based on field experience, calorimeter testing and thermodynamic property data. Actual results may vary due to system design and operating conditions.)

Broad field experience has shown that ISCEON® MO29 provides similar cooling capacity and energy efficiency to R-22 in most systems, while operating at significantly lower compressor discharge temperature. Actual performance depends on system design and operating conditions.

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R-22

R-417A (ISCEON MO59 & NU-22) : HFC

- ➔ COMPOSITION : R-134A/R-125/R-600 (50/46.6/3.4)
- ➔ REMPLACE LE R-22 ;
- ➔ APPLICATION RÉFRIGÉRATION MOYENNE TEMPÉRATURE, CLIMATISATION RÉSIDENTIELLE, COMMERCIALE ET POUR LES REFROIDISSEURS ;
- ➔ PRESSION & T° DE REFOULEMENT PLUS BASSE QUE LE R-22 ;
- ➔ CLASSÉ « A1 » ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : - 5% À -20% ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

LES RÉFRIGÉRANTS :

R-417A (HFC)

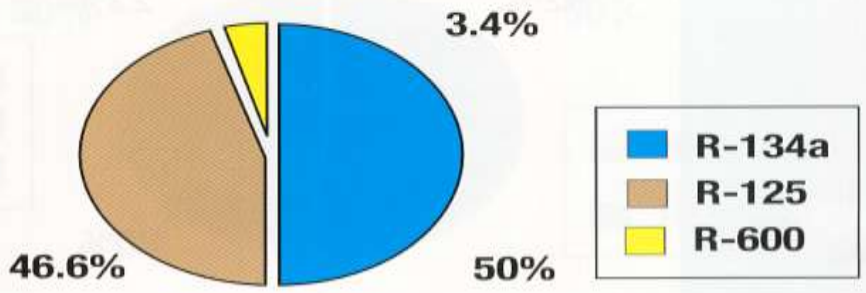
NU-22™

ASHRAE designation: R-417A
ASHRAE safety classification: A1
Brand names: NU-22
Application: R-22 DIRECT REPLACEMENT ***(not for use in centrifugal/flooded evaporator systems)***

The Facts

- Very Low TEWI
- Zero ODP
- Up to 10% energy reduction compared to R-22
- Can be topped off repeatedly
- Can be used in both new and existing R-22 based systems with the least amount of system or production line modifications. This will expedite the removal of HCFCs from the market cycle.
- Requires no oil change when servicing existing R-22 systems, therefore reducing the amount of waste oil handling and disposal
- Slight loss in refrigerating capacity compared to R-22

** Remember – an oil change is only required if the service condition dictates.*



• producers and distributors of environmentally safe refrigerants •

LES RÉFRIGÉRANTS :

R-417A (HFC)

DuPont™ ISCEON® 9 Series

REFRIGERANTS

Product Information Bulletin

DuPont™ ISCEON® MO59

ISCEON® MO59 is an easy-to-use, non-ozone-depleting HFC retrofit refrigerant for R-22 in direct expansion stationary air conditioning (AC) and medium-temperature commercial refrigeration systems. ISCEON® MO59 is compatible with traditional and new lubricants, in most cases no change of lubricant type during retrofit is required.

ASHRAE #: R-417A

Applications

- Residential and commercial air conditioning
  - **Note:** for water chillers ISCEON® MO29 is recommended
- Medium temperature commercial refrigeration
  - Food service
  - Supermarket display cases
  - Food storage and processing

Benefits

- Provides easy, quick cost-effective retrofits
- Non-ozone-depleting HFC
  - Not subject to phase-out under the Montreal Protocol
- Compatible with AB, MO and POE lubricants
  - In most cases, no change of lubricant type is needed
- Enables continued use of existing equipment
- Non-flammable. ASHRAE safety classification: A1 (same as R-22)
- US EPA SNAP accepted for a broad range of AC and refrigeration applications
- UL classified
- Lower discharge pressure and temperature than R-22
  - Likely to prolong compressor life
- Low toxicity (similar to R-22)
- Has been in commercial use since 1997
- Can be topped off during service without removing the entire refrigerant charge

Expected Performance After Retrofit

(Based on field experience, calorimeter testing and thermodynamic property data).

Broad field experience has shown that ISCEON® MO59 provides performance that meets customer requirements in most properly retrofitted systems. ISCEON® MO59 provides required cooling capacity in most systems; however, some systems may experience reduced capacity. ISCEON® MO59 has been shown to offer energy savings in some systems. Actual performance depends on system design and operating conditions.

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LES RÉFRIGÉRANTS :

R-22

R-422B (NU-22B) : HFC

- ➔ COMPOSITION : R-134A/R-125/R-600A (42/55/3)
- ➔ REMPLACE LE R-22 ET LE R-417A (ISCEON MO59 ET NU-22) ;
- ➔ APPLICATION MOYENNE TEMPÉRATURE ET CLIMATISATION ;
- ➔ PRESSION D'OPÉRATION SIMILAIRE AU R-22 ;
- ➔ CLASSÉ « A1 » ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-417A : PLUS ÉLEVÉE ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

R-422C (ONE SHOT©) :

- ➔ COMPOSITION : R-134A/R-125/R-600 (15/82/3)
- ➔ REMPLACE LE R-22, R-502, R-408A, R-422A, R-402A, R-402B, R-408A ;
- ➔ APPLICATION RÉFRIGÉRATION MOYENNE ET BASSE TEMPÉRATURE ;
- ➔ CLASSÉ « A1 » ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : ± ÉGALE ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

R-422B (NU-22B)
(HFC)

NU-22™ B — R422B

System Requirements

1. System must be designed for use with R-22, R-417A or R-407C, free of leaks and in sound operating condition.
2. NU-22B (R422B) is designed for use in systems utilizing direct expansion metering, i.e. TXV, orifice, cap tube. Before using NU-22B (R422B) in a flooded system contact TECH 2 TECH at 866-433-8324.
3. The system should be operating within its design capacity. Converting to NU-22B (R422B) will not increase system capacity. Consult TECH 2 TECH at 866-433-8324 before converting any system with pre-existing capacity problems.
4. The system should be charged with the proper type and amount of lubricant, as required by the original equipment and component manufacturer.

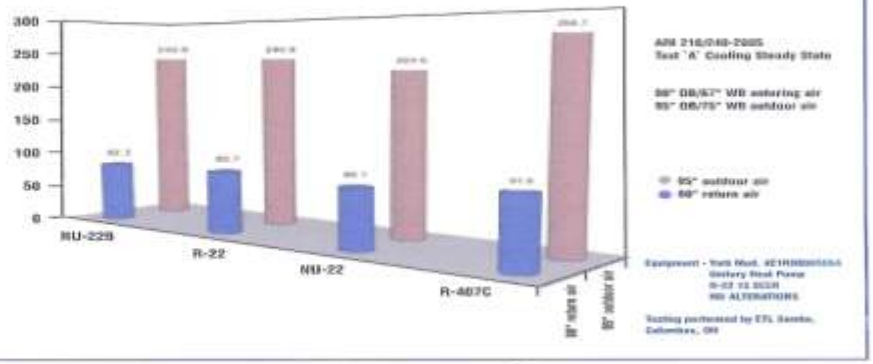
NU-22B (R422B) IS ANOTHER QUALITY PRODUCT FROM THE DISTRIBUTORS OF HOT SHOT® (R414B) & ONE SHOT® (R422A).

Distributed By:

Physical Properties

Molecular Weight	@ 1 atm.	108.5 g/mol
Bubble Point	@ 1 atm.	-40.5° F (-40.5° C)
Dew Point		-32.2° F (-35.6° C)
Critical Temperature		186.3° F (85.7° C)
Critical Pressure		590.3 psia
Boiling Point		-40.5° F (-40.5° C)
Density of Liquid	@ 25°C	73.3 lb/cf
Density (Saturated Vapor)	@ NBP	.2959 lb/cf
Heat of Vaporization	@ NBP	80.5 btu/lb
ASHRAE Standard 34	Designation	R-422B
ASHRAE Standard 34	Safety Designation	A1
Max. Exposure Limits	Recommended	1000 ppm
Ozone Depletion Potential	Relative to CFC 11 = 1.0	0
Global Warming Potential		2080
Manufacturing Specification	Max. Moisture	0.001% vol
	Max. Noncondensable	1.5% vol
	Max. High Boiling Impurities	0.01% vol
Components:		
Pentafluoroethane	CAS 354-33-6	CF_3CHF_2
1,1,1,2 – tetrafluoroethane	CAS 811-97-2	CF_3CH_2F
Iso-butane	CAS 75-28-5	C_4H_{10}

Operational Pressures Comparison - PSIG



ALLTEMP www.alltemp.ca enviro REFRIGERANTS

Tech 2 Tech Refrigerant Related Diagnostic Support 866-433-8324

Making Your Life Easier!

LES RÉFRIGÉRANTS :

LES RÉFRIGÉRANTS :

R-422C (HFC)

ONE SHOT®(C)

Charging Procedure

EASE OF USE

As is with all 400 series blends (zeotropes), it is vital that the refrigerant leaves the cylinder as a liquid when charging.

Charging at the liquid service valve is prefarred. However, if this isn't possible, slowly charge the system through the suction port with the system operating. Use a quick charge device to ensure the liquid is flashed to saturated vapor before entering the system.

Charge System:

Remove ***LIQUID ONLY*** from One Shot®(C) cylinder. When initially charging system, One Shot®(C) can be added directly into the receiver tank or high-pressure side of the system with compressor off. Charge ratios for One Shot®(C) will vary depending on system design and application. The total charge of One Shot®(C) will average 3% less than R-22, 10% more than R-404A and 5% less than R-502 by weight.

Run System:

Check pressures, subcooling, and superheat temperatures. Use One Shot®(C) P/T chart. If additional One Shot®(C) needs to be added, do so in 5% increments and ***DO NOT*** exceed 115% of the original charge. If system performance is inadequate, call ICOR TECH2TECH support at 866-433-8324.

Sight Glass Info:

Don't clear the sight glass. Zeotropic blends will "flash" by nature. A clear glass usually indicates an overcharged system.

Properly Label System:

Avoid mixing refrigerants by properly labeling your system. For One Shot®(C) system ID labels, call the ICOR TECH2TECH support hotline at 866-433-8324.

Oil Compatibility

EASE OF USE

One Shot®(C) provides adequate oil return in low temperature applications when using any standard system oil. **NO UNNECESSARY OIL CHANGE IS REQUIRED TO USE ONE SHOT®(C).**

The ability to return oil is determined by a combination of factors. Piping design, refrigerant velocities, type of refrigerant, system application, and oil selection will all directly affect overall system performance.

Physical Data

Properties:		Quality:	
Molecular Weight	113.41 g/mol	Max. Moisture	10ppm v/v H_2O Max
Bubble Point	-50.7°F @ 1 atm.		
Dew Point	-45.1°F @ 1 atm.		
Critical Temperature	168.9°F	Max. Non-condensable (in the vapor phase)	1.5% v/v
Critical Pressure	568.5 psia.		
Boiling Point	-50.7 to -45.1°F		
Density (Liquid @ 68°F)	73.0 lb/ft3	Max. High Boiling Impurities	0.01% v/v max
Density (Vapor @ 1 atm)	0.391 lb/ft3		
Heat of Vaporization @ 60°F	79.2 kJ/kg		
ASHRAE Designation	R-422C		
ASHRAE Safety Classification	A1		
Max. Exposure Limits	1000ppm (4200mg/m3) (long term exposure limit)		
ODP	0		
GWP	3033 [3100 - IPPC 2001]		

For further Sales and Technical Assistance, please call our ICOR TECH2TECH Team

866-433-8324 or tech2tech@icorinternational.com

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R-22

R-424A (RS44) : HFC

- ➔ COMPOSITION : R-134A/R-125/R-601A/R-600A (47/50/3)
- ➔ REMPLACE LE R-22 ;
- ➔ APPLICATION RÉFRIGÉRATION MOYENNE TEMPÉRATURE, CLIMATISATION RÉSIDENTIELLE ET COMMERCIALE ;
- ➔ PRESSION ET T° DE REFOULEMENT PLUS BASSE QUE LE R-22 ;
- ➔ CLASSÉ « A1 » ;
- ➔ COP PLUS ÉLEVÉ QUE LE R-22 ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : ± ÉGALE ;
- ➔ COMPATIBLE AVEC L'HUILE MO, AB ET POE.

LES RÉFRIGÉRANTS :

R-424A (HFC)

SELECTION GUIDE FOR RETROFITTING R-22 EQUIPMENT

Suva® HP62 (R-404A) **Suva® 407C** **Suva® 507**

There is no one best alternative refrigerant for all R-22 equipment. The following information is provided to you for the alternative refrigerants DuPont recommends for retrofitting your present system. Consult appropriate retrofit guidelines. DuPont recommends that all leaks be identified and repaired prior to or during the retrofit.

BENEFITS

R-404A and R-507

- Higher cooling capacity at evaporator temperatures below 30°F
- Higher energy efficiency at evaporator temperatures below 10°F
- Requires POE lubricant
- Lower compressor discharge temperature than R-22
- Good for systems with direct-expansion or flooded evaporators
- Extensive global use in commercial refrigeration since 1993

BENEFITS

R-407C

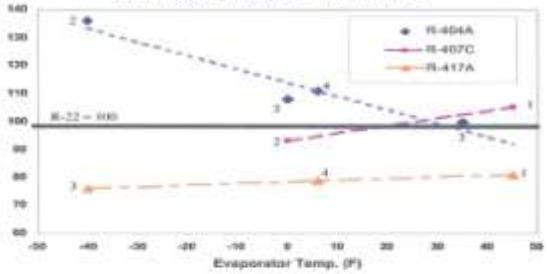
- Suitable for common direct-expansion system
- Tends to separate in flooded heat exchangers impacting performance
- Closest match to R-22 cooling capacity and energy efficiency above 20°F

1 Performance Options – All temperatures reflect evaporator temperatures.

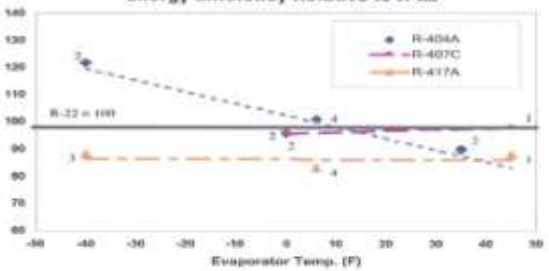
20°F OR BELOW
R-404A
R-507

ABOVE 20°F
R-407C
R-404A
R-507

Cooling Capacity Relative to R-22



Energy Efficiency Relative to R-22



COOLING CAPACITY COMPARED TO R-22

Evaporator Temp	R-404A	R-407C	R-417A
–40°F	+36%	—	–24%
0°F	+8%	–7%	—
5°F	+11%	+5%	–21%
45°F	—	+5%	–19%

ENERGY EFFICIENCY COMPARED TO R-22

Evaporator Temp	R-404A	R-407C	R-417A
–40°F	+22%	—	–12%
0°F	–4%	–4%	—
5°F	+1%	—	–17%
45°F	—	–2%	–12%

Testing Details:
1 Tests performed at Larson Laboratory of the Joint Center for Energy Management at University of Colorado at Boulder, 1999
2 Tests performed at DuPont Fluorochemicals Laboratories in Wilmington, DE, 1994
3 Test performed at Keio University in Yokohama, Japan, 2000
4 Test performed at U.S. commercial bakery operation, Summer 2002

General Notes
Data on R-417A included for comparative purposes.

www.suva.dupont.com • 800-235-SUVA

R-22

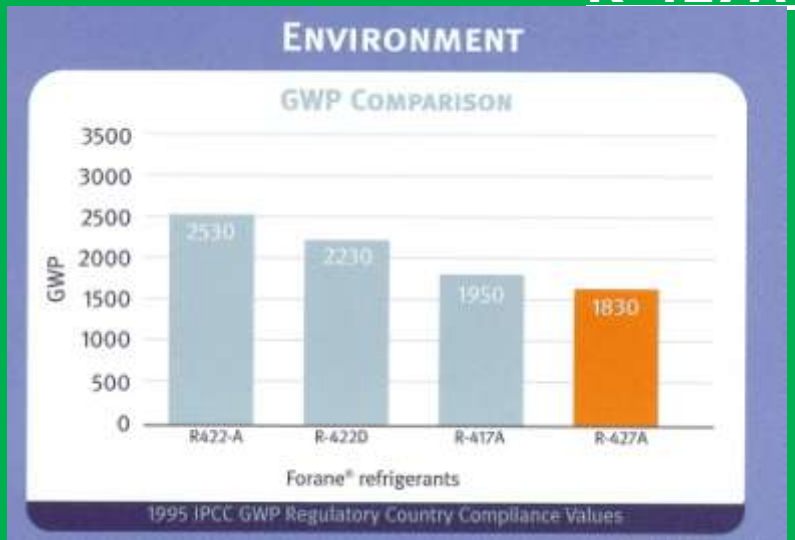
R-427A (FX100) : HFC

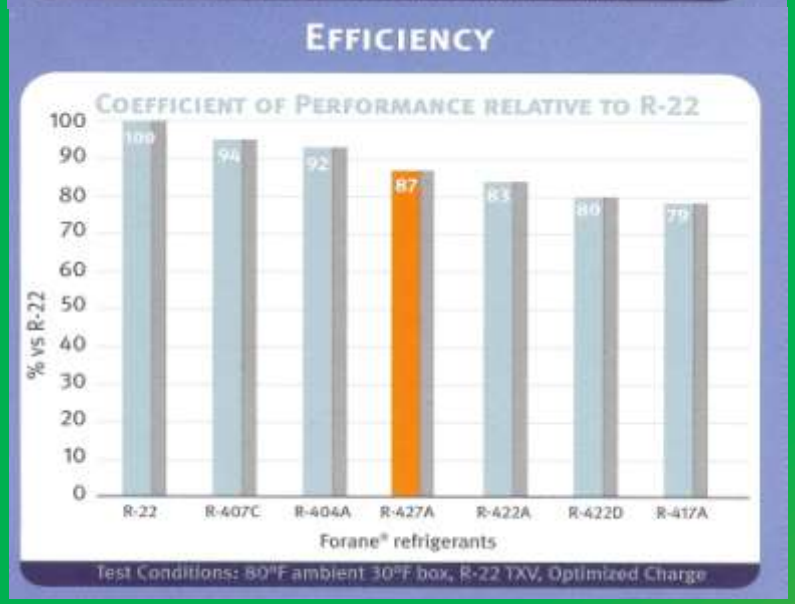
- ➔ COMPOSITION : R-134A/R-125/R-32/R-143a (50/25/15/10)
- ➔ REMPLACE LE R-22 ;
- ➔ NE CONTIENT AUCUN HYDROCARBURE ;
- ➔ T° DE REFOULEMENT PLUS BASSE QUE LE R-22 DE ± -18° F ;
- ➔ CLASSÉ « A1 » ;
- ➔ UTILISÉ DEPUIS 2004 EN EUROPE ;
- ➔ WALMART ARKANSAS CONVERSION AU R-427A ;
- ➔ CAPACITÉ DE REFROIDISSEMENT vs R-22 : - 13% MT° ;
- ➔ COP vs R-22 : - 13% MT° ;
- ➔ REQUIERT UN CHANGEMENT D'HUILE À LA POE ;
- ➔ COMPATIBLE AVEC MÉLANGE D'HUILE POE/MO ET POE/AB.

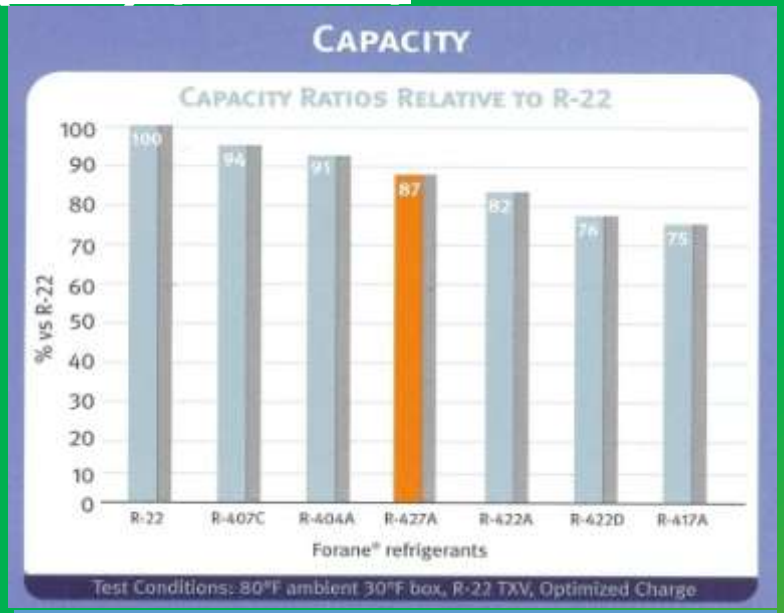
LES RÉFRIGÉRANTS :

LES RÉFRIGÉRANTS :

R-427A (HFC) (ARKÉMA)







Oil Return

- Oil return is good despite a high level of residual mineral or alkylbenzene oil.
- Only one oil change to POE oil. No flushing is required

Performance

- Better efficiency than most R-22 retrofit refrigerants.
- Comparable capacity versus R-22
- Discharge temperatures can be as much as 18°F lower than R-22 with **Forane® 427A refrigerant.**

PRÉAPARER PAR : MARC GOSSELIN, ing.

LES RÉFRIGÉRANTS :

R-428A (HFC)

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- Refrigerant Services Inc
- Resource Separations
- Contact Information

RS-52 Data Files

- Physical Properties
- New Refrigerant
- Physical Data & Retrofit
- Q&A
- Materials Compatibility
- Thermodynamic Tables
- Pressure-Enthalpy Chart
- Pressure Temperature
- Safety Data

RS-52 (R428A)

Zero ODP replacement for R22 & R502 & ozone depleting blends & compatible with all lubricants

RS-52 is a non ozone depleting near azeotropic refrigerant blend which can replace R22, R502 and the interim ozone depleting blends (eg R402A, R403B, R408A etc) without the need to change the existing lubricant or make any changes to the system other than adjustment to the expansion device in some cases. RS-52 is targeted towards lower temperature applications.

RS-52 is compatible with all lubricants including both the traditional oils such as mineral and alkylbenzene oils and also the new synthetic poyol ester lubricants. Converting to RS-52 is a straightforward process which avoids a costly and often technically unsatisfactory retrofit (eg draining the oil from the system replacing the seals etc).

RS-52 is a capacity match for R502 and has a temperature glide of less than 1° C. RS-52 can also replace R22 in systems which are rated for R502. RS-52 is suitable for use in flooded systems.

Performance Characteristics

- Close performance match for R502
- Can replace R22 in low temperature applications
- Compatible with MO, AB & POE lubricants
- Lower discharge temperatures
- Near azeotropic blend
- Suitable for new & existing equipment
- Capacity match for R502
- Low temperature glide < 1°C
- Zero Ozone Depletion Potential
- Non flammable

R-434A (HFC)

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RS-45 (R434A)

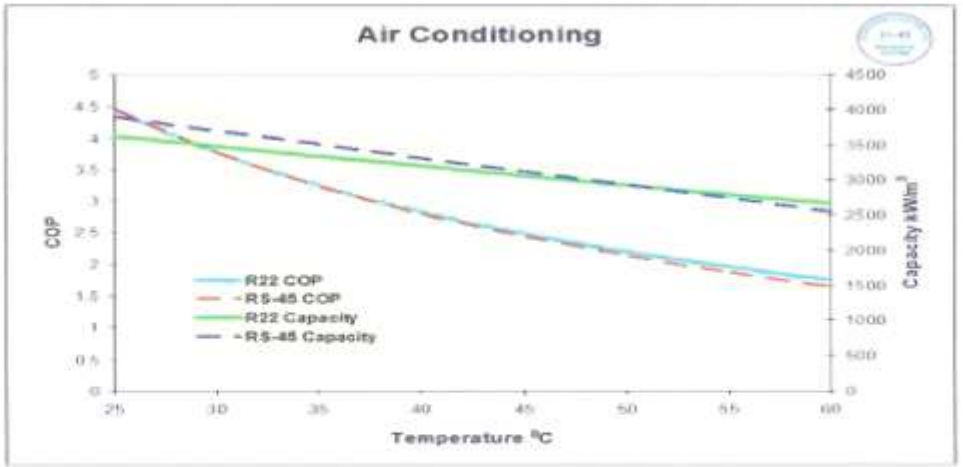
Zero ODP replacement for R22 in new and existing systems and compatible with all lubricants

RS-45 with its high cooling capacity compliments RS-44 (R424A), and is compatible with all types of lubricants. RS-45 replaces R22 in both refrigeration & air conditioning applications. With its low glide (one third of R407C), RS-45 can be used in a wide range of applications. RS-45 provides Original Equipment Manufacturers with an alternative to R407C but without the problems associated with a low glide.

RS-45 is compatible both with the traditional mineral and alkylbenzene oils, and also the new polyol ester lubricants. Consquently, R22 can be replaced by RS-45 in both new equipment & in retrofit situations offering considerable cost savings, where the cost of converting to alternatives such as R407C is either prohibitively expensive or technically unsatisfactory (or both).

RS-45 Data Files

- Questions & Answers
- New Refrigerant
- Physical Data & Retrofit
- Physical Properties
- Materials compatibility
- Thermodynamic Tables
- Comparative Table
- RS-44 & RS-45 Summary
- Pressure Temperature
- PE Diagram



Performance Characteristics

- Suitable in OEM & retrofit applications
- Close match for R22 in cooling capacity

LES RÉFRIGÉRANTS :

R-438A (MO99) (HFC)

DuPont™ ISCEON® MO99™

Product Information Bulletin

ISCEON® MO99™ is the first versatile R22 retrofit refrigerant for replacing R-22 in direct expansion (DX) air conditioning and refrigeration systems.

ISCEON® MO99 refrigerant, invented and patented by DuPont, combines R-22 pressure - enthalpy characteristics with mineral oil compatibility in a unique HFC refrigerant that can be used to replace R-22 over a wide range of evaporator temperatures. ISCEON® MO99 is compatible with traditional and new lubricants; in most cases, no change of lubricant type during retrofit is required.

Applications

- Commercial Air Conditioning
  - Roof Top Units
  - Indoor Packaged Units
  - DX Chillers
  - Split Systems
- Residential Air Conditioning
- Refrigeration (Low and Medium Temperature)
  - Self Contained Systems
  - Condensing Units
  - Rack Systems

Benefits

- Lower retrofit costs versus HFC/POE options
  - No expansion valve or line set changes
  - Eliminates disruptive oil changes
    - Compatible with AB, MO and POE lubricants
  - Minimizes time spent on control set point adjustments and subsequent service calls
- Not subject to phaseout under the Montreal Protocol and the U.S. Clean Air Act
- 42% lower Global Warming Potential (GWP) than R-404A

ISCEON® MO99 Compressor Calorimeter Performance Compared to R-22 at Refrigeration and Air Conditioning Conditions

Performance with subcooling based on thermocycle calculations from calorimeter data and do not include heat transfer effects

	Low Temperature* -25°F evaporator 105°F condenser 65°F return gas with 10°F subcooling	Medium Temperature 20°F evaporator 120°F condenser 65°F return gas with 10°F subcooling	A/C & High Temperature 45°F evaporator 115°F condenser 65°F return gas with 15°F subcooling
Discharge Temperature, °F	-22	-45	-31
Discharge Pressure, psi	+3	+6	+5

+ is increase and - is decrease for ISCEON® MO99 vs. R-22
*R-22 assumes demand cooling with low temp discharge temperature of 275°F

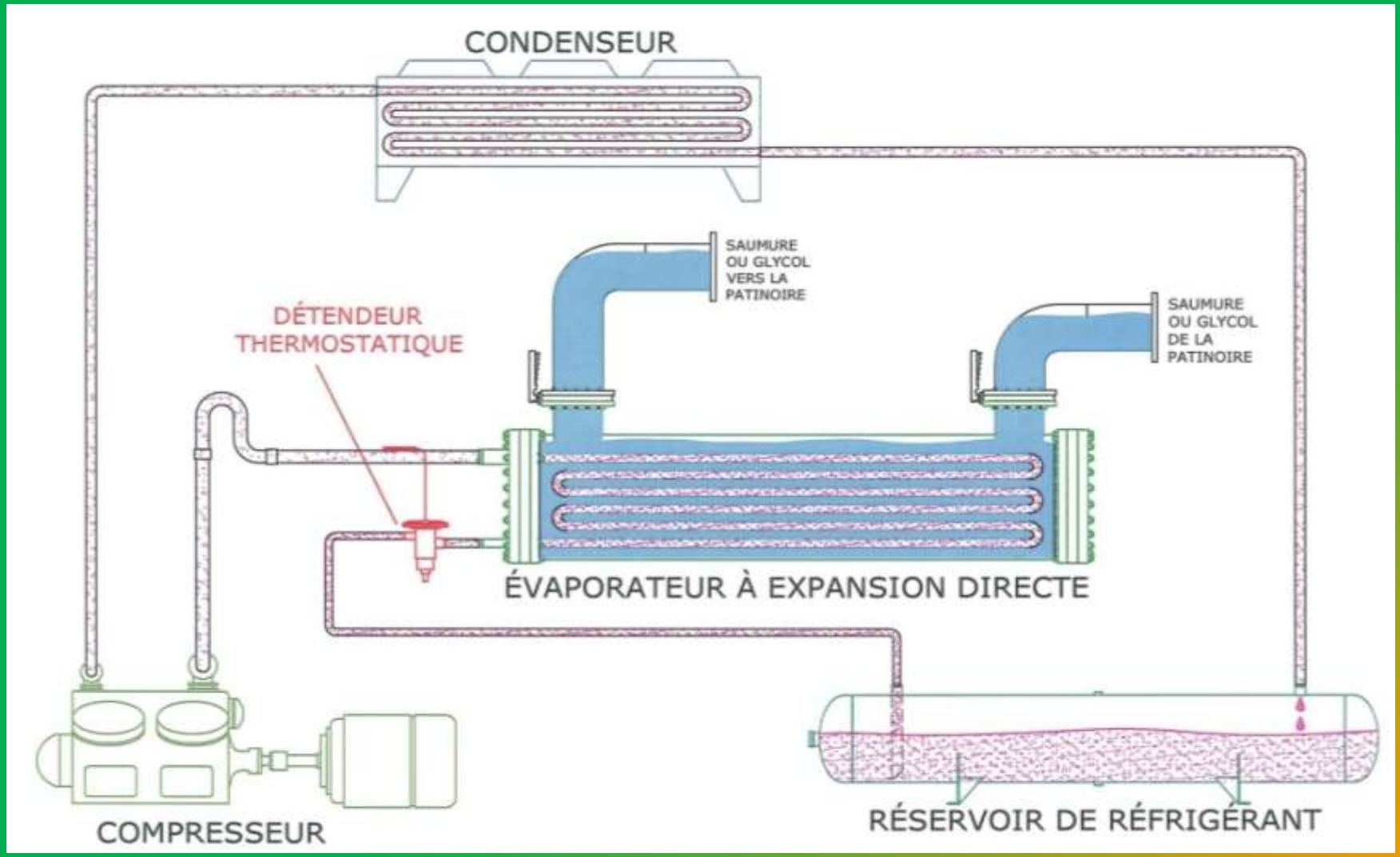
LES CHOIX

LES RÉFRIGÉRANTS :

- ***APPLICATIONS DU R-12*** :
  - NOUVEAUX SYSTÈMES :
    - BASSE TEMPÉRATURE : R-134a, R-404A, R-507 ;
    - MOYENNE TEMPÉRATURE : R-134a, R-404A, R-507 ;
  - SYSTÈMES EXISTANTS :
    - BASSE TEMPÉRATURE : R-401B (MP66), R-409A, R-414B, R-426A (RS-24), R-134a ;
    - MOYENNE TEMPÉRATURE : R-409A, R-414B, R-416A, R-401A (MP39), R-426A (RS-24), R-134A ;
- ***APPLICATIONS DU R-22*** :
  - NOUVEAUX SYSTÈMES : R-134A, R-404A, R-407C, R-410A, R-507, R-717, R-744 ;
  - SYSTÈMES EXISTANTS : R-407C, R-417A, R-422A, R-422B, R-422C, R-422D, R-424A, R-434A, R-427A, R-438A… OU ÀCONSERVER, VOIR LES PERFORMANCES DES NOUVEAUX RÉFRIGÉRANTS ;
- ***APPLICATIONS DU R-502*** :
  - NOUVEAUX SYSTÈMES :
    - BASSE TEMPÉRATURE : R-404A, R-507, R-717, R-744 ;
    - MOYENNE TEMPÉRATURE : R-404A, R-507, R-717, R-744 ;
  - SYSTÈMES EXISTANTS :
    - BASSE TEMPÉRATURE : R-408A (FX10), R-422A, R-428A, R-404A, R-507 ;
    - MOYENNE TEMPÉRATURE : R-408A (FX10), R-422A, R-428A,R-404A, R-507 ;

Aréna : système expansion directe

Changement du réfrigérant et de l'huile. Une analyse complète du système est requise afin de vérifier la compatibilité des composantes.



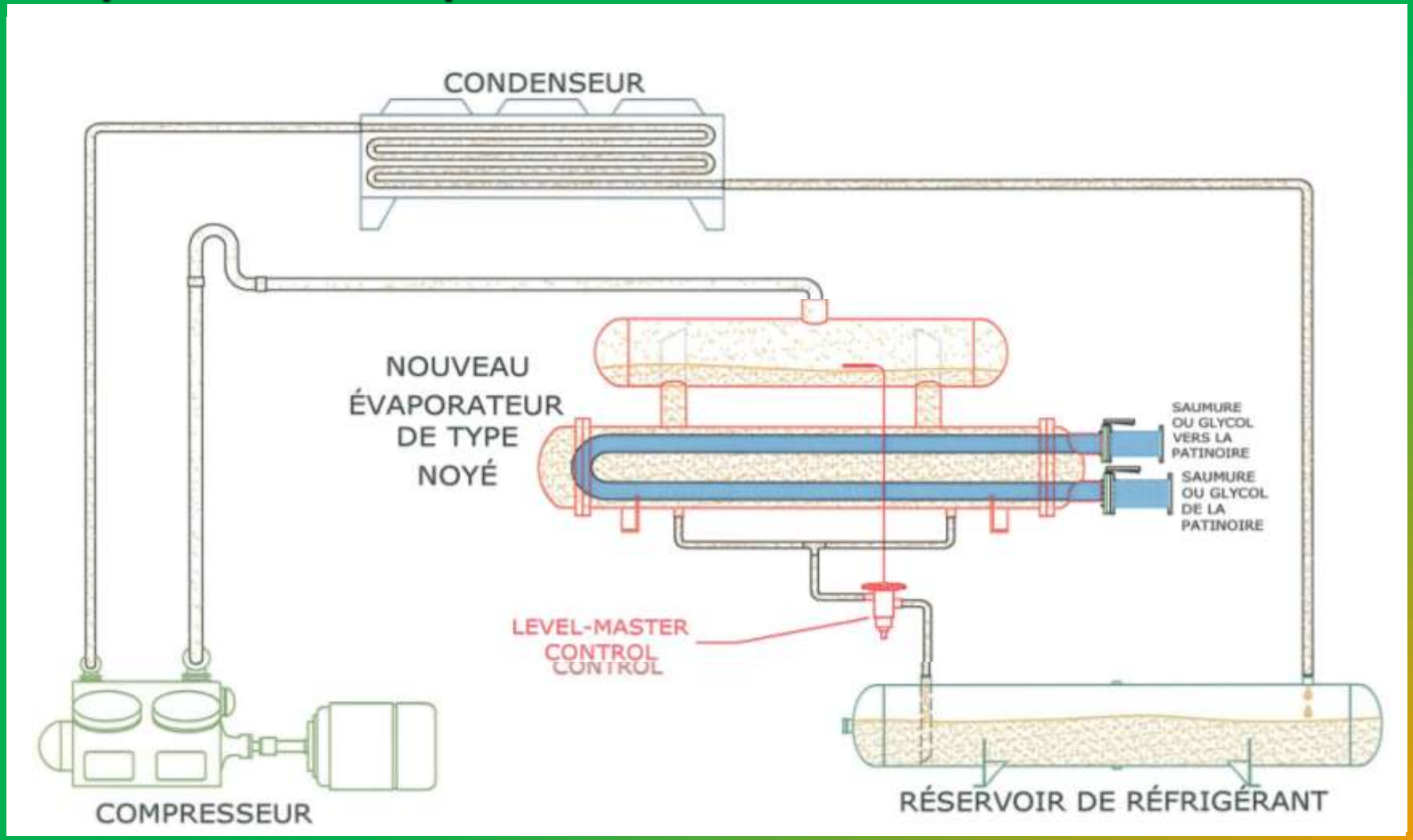
LES RÉFRIGÉRANTS :

Aréna : système expansion directe

1. ***CONVERSION DU R-22 VERS UN RÉFRIGÉRANT HFC DE SERVICE :***
   - *R-417a, R-422a, R-422b, R-422c, R-422d, R-424a, R-427a, R-434a , R-438a ;*
   - *Il faut vérifier la compatibilité des composantes du système ;*
   - *± 1 Changement d'huile requis à l'huile POE ;*
   - *Changement des filtres ;*
2. ***CONVERSION DU R-22 AU R-404A/R-507 :***
   - *Réfrigérants utilisés par les manufacturiers R-404a, R-507 ;*
   - *Il faut vérifier la compatibilité des composantes du système ;*
     - *Compresseur : généralement à conserver ;*
     - *Condenseur : généralement à conserver ;*
     - *Tuyauterie : ± à remplacer ;*
     - *Refroidisseur : risque élevé de devoir le remplacer ;*
     - *Détendeur : à remplacer.*
   - *Plusieurs changements d'huile requis à l'huile POE ;*
   - *Changement des filtres ;*
3. ***CONVERSION DU R-22 À L'AMMONIAC :***
   - *Remplacement des équipements.*

Aréna : système R-22 de type noyé (Flooded)

On se doit de changer l'évaporateur, ainsi que le réfrigérant et l'huile. Une analyse complète du système est requise afin de vérifier la compatibilité des composantes.



Aréna : système R-22 de type noyé (Flooded)

1. ***CONVERSION DU R-22 VERS UN RÉFRIGÉRANT HFC DE SERVICE :***
   - *Impossible puisque réfrigérant mélange (blend)*

2. ***CONVERSION DU R-22 AU R-404A/R-507 :***
   - *Impossible puisque réfrigérant mélange (blend)*
   - *Possible, si on remplace le refroidisseur ;*
   - *Possibilité de modifications majeures aux systèmes ;*

3. ***CONVERSION DU R-22 À L'AMMONIAC :***
   - *Remplacement des équipements.*

APPLICATIONS AU NIVEAU DES REFROIDISSEURS :

Application	Réfrigérants utilisés avant le protocole de Montréal	Réfrigérants de transition depuis le protocole de Montréal	Conception nouveaux systèmes en 2007
Centrifuge	R-11 (CFC)	R-123 (HCFC)	R-134a (HFC)
Centrifuge	R-22 (HCFC)	À conserver ?	R-134a (HFC)
Centrifuge	R-12 & R-500 (CFC)	R-134a (HFC)	R-134a (HFC)
Vis, réciproque et scroll	R-22 (HCFC)	À conserver ?	R-134a (HFC), R-407C (HFC) R-410A (HFC)

LES RÉFRIGÉRANTS :

RÉFRIGÉRANTS DE REMPLACEMENT DU R-22								
# ASHRAE	MARQUE DE COMMERCE	RÉFRIGÉRANTS DS LE MÉLANGE	% MÉLANGE	CAP. Vs R-22	HUILE COMPATIBLE	APPLICATION	CLASSIFICATION	GWP
R-407C	KLEA66, SUVA 9000	R-134a/R-125/R-32	52/25/23	0%	POE	HT' / MT'	A1	1600
R-410A	GENETRON AZ20, SUVA 9100, PURON	R-125/R-32	50/50	+40%	POE	HT'/VLT'	A1	1725
R-417A	NU22, ISCEON MO59	R-134a/R-125/R-600	50/46.6/3.4	-5% À -20%	MO/AB/POE	HT' / MT'	A1	1950
R-422A	ISCEON MO79, ONE SHOT	R-134a/R-125/R-600a	11.5/85.1/3.4	+10% À +30% (LT') IDENTIQUE (-18%) (MT')	MO/AB/POE	MT' / LT'	A1	2530
R-422B	NU22B	R-134a/R-125/R-600a	42/55/3	± IDENTIQUE ? PLUS ÉLEVÉ vs R-417A (NU22)	MO/AB/POE	HT'/MT'/LT'	A1	2080
R-422C	ONE SHOT ©	R-134a/R-125/R-600a	15/82/3	± ÉGALE	MO/AB/POE	MT' / LT'	A1	3033
R-422D	GENETRON 422D, ISCEON MO29	R-134a/R-125/R-600a	65.1/31.5/3.4	-5% (-24%)	MO/AB/POE	HT' / MT'	A1	2230
R-424A	RS44	R-134a/R-125/BUTANE/ISO-PENTANE	47/50/3	± ÉGALE	MO/AB/POE	HT'/MT'/LT'	A1	2011
R-427A	FORANE 427A (FX100)	R-134a/R-125/R-32/R-143a	50/25/15/10	± ÉGALE (-13%)	1 CHGT D'HUILE = POE	HT'/MT'/LT'	A1	1830
R-428A	RS52	R-143a/R-125/R-290/R-600a	20/77.5/0.6/1.9	ÉGALE AU R-502 REMPLACE LE R-22 EN LT'	MO/AB/POE	LT'	?	3100
R-434A	RS45	?	?	± ± 5-10%	MO/AB/POE	HT'/MT'/LT'	?	2652
R-438A	MO99	R-32/R-125/R-134a/n-butane/i-pentane	8.5/45/44.2/1.7/0.6	± ÉGALE	MO/AB/POE	HT'/MT'/LT'	A1	1890
DURACOOL 22a		HYDROCARBURE					A3	

GWP : ***R-12=8500, R-22=1700, R-502=5260, R-404A=3260, R-507=3300, R-410A=1730, R-134a=1300.***

PRÉAPARER PAR : MARC GOSSELIN, ing.

AUTRES RÉFRIGÉRANTS

R-717 : AMMONIAC

- PERFORMANCE DE ± + 15% vs RÉFRIGÉRANTS SYNTHÉTIQUES ;
- INSTALLATION INDUSTRIELLE ;
- COÛT PEU ÉLEVÉ DU RÉFRIGÉRANT ;
- EXIGENCES DU B52 PLUS SÉVÈRES ;
- LOI ET RÈGLEMENT SUR LES MÉCANICIENS MACHINES FIXES ;
- SOUDEURS QUALIFIÉS HAUTE PRESSION ;
- PAS D'IMPACT SUR L'ENVIRONNEMENT, GWP=0, ODP=0 ;
- NORMES DE SANTÉ SÉCURITÉ ;
- B2.

R-744 : CO_2

- P @ 80' F = 969 # (vs 152# R-717), P @ -50' F = 118# (vs 7.7# R-717) ;
- T'CRITIQUE = 87.7'F, PRESSION ÉLEVÉE, SYSTÈME COÛTEUX ;
- IDÉAL POUR SYSTÈME EN CASCADE AVEC UN AUTRE SYSTÈME DE RÉFRIGÉRATION POUR LE REJET DE CHALEUR ;
- GWP = 1, ODP=0 ;
- COÛT PEU ÉLEVÉ DU RÉFRIGÉRANT ;
- A1 ;

LES HYDROCARBURES :R-744 :

- R-600, R-600A, R-170, R-290, etc.(Butane, isobutane, éthane, propane, etc.
- UTILISATION LIMITÉE PAR LE B52.

LES HYDROCARBURES EN RÉFRIGÉRATION DOMESTIQUE EN AMÉRIQUE ?

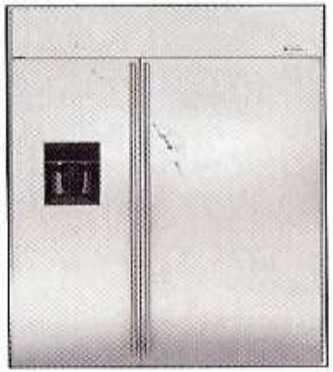
GE Asks EPA for Approval

Isobutane Refrigerator for U.S.?

LOUISVILLE, Ky.—Isobutane is widely used in household refrigerators in Europe and parts of Asia, but not in the U.S. because of perceived safety issues. This could change in 2010.

GE has requested that the U.S. Environmental Protection Agency (EPA) approve isobutane for refrigerators. It would be the first time in the U.S. that a hydrocarbon has been used as a substitute for HCFC-based refrigerants, and the first time a refrigerator using a hydrocarbon has been built and sold in the U.S.

According to a GE press release, the company hopes to introduce in early 2010 a new GE Monogram hydrocarbon refrigerator. The Monogram will use cyclopentane, another hydrocarbon, as the insulation foam-blowing agent to replace commonly used HFC foam-blowing agents.



GE refrigerator.

GE says the environmental benefits of the GE Monogram would be significant.

"The approval will pave the way for the use of low-GWP refrigeration technology in the U.S. to help address global warming challenges. A refrigerator with lower GWP emissions will allow consumers to reduce their carbon footprint," said Kevin Nolan, vice president of technology for GE Appliances.

"Our goal is to deliver a new GE Monogram refrigerator that will be ENERGY STAR® qualified, and that will conform to GE and third-party safety standards for the use of hydrocarbon refrigerants."

COCA-COLA CHOISIT LES HYDROCARBURES ET LE CO2

Coke switching to greener machines

Atlanta Business Chronicle

The Coca-Cola Co. is going green with its coolers and vending machines.

View Larger

The Atlanta-based beverage giant said Thursday all of its new vending machines and coolers will be hydrofluorocarbon-free (HFC-free) by 2015. Coca-Cola uses two HFC-free solutions -- Hydrocarbon refrigeration is used in smaller refrigeration equipment and carbon dioxide is used in larger equipment.

The transition to HFC-free refrigeration will cut the equipment's direct greenhouse gas emissions by 99 percent. Coca-Cola and its bottling partners have some 10 million coolers and vending machines around the world and cutting the use of HFCs in these machines will be like taking more than 11 million cars off the road for one year, the company said.

"Climate change is real and the time to act on solutions is now," said Muhtar Kent, chairman and CEO of Coca-Cola. "Greenpeace has played a critical role in raising our awareness about the need for natural refrigeration. Our announcement today demonstrates a commitment to use our influence in the marketplace to drive innovation and help shape a low-carbon future."

Atlanta-based Coca-Cola (NYSE: KO) said it has spent more than $50 million in research and development to advance the use of climate-friendly cooling technologies. In 2010 alone, it and its bottling partners will buy at least 150,000 units of HFC-free equipment.

LES RÉFRIGÉRANTS :

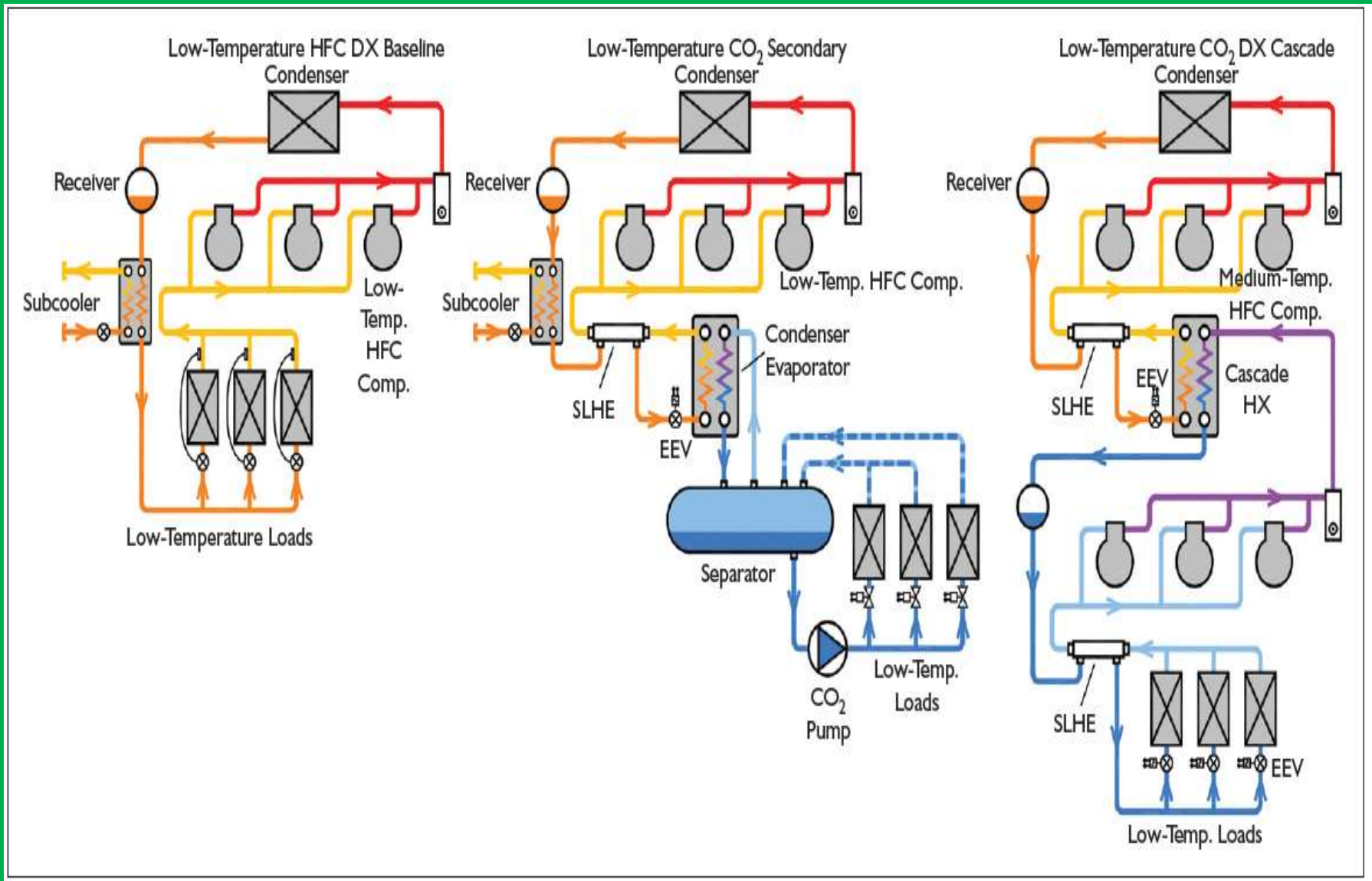


Figure 3: Basic piping configuration of three low-temperature systems under analysis.

COMPRESSEUR SCROLL COPELAND AU CO2 :

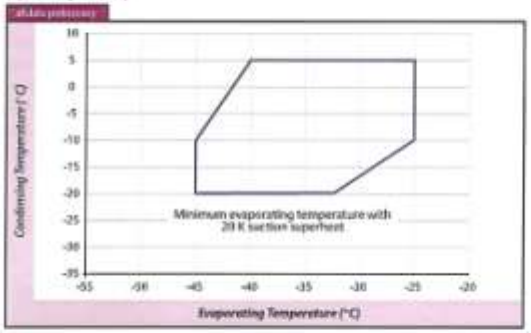
Scroll Compressors for R744 (CO_2) Low Temperature Refrigeration
Safeguarding your product and our environment

Copeland Scroll

Model Overview

Model	Nominal Horse Power hp	Cooling Capacity at 100% kW[1]	Displacement m3/h	Net Weight kg	Motor Code 400/3/50
ZO 34 K3E	1.9	8.0	4.1	31.0	TFD
ZO 45 K3E	2.6	11.0	5.4	32.0	TFD
ZO 58 K3E	3.4	14.0	6.5	34.0	TFD
ZO 104 KCE	6.0	25.0	11.7	48.0	TFD

Operating Envelope



For more details, see www.eCopeland.com

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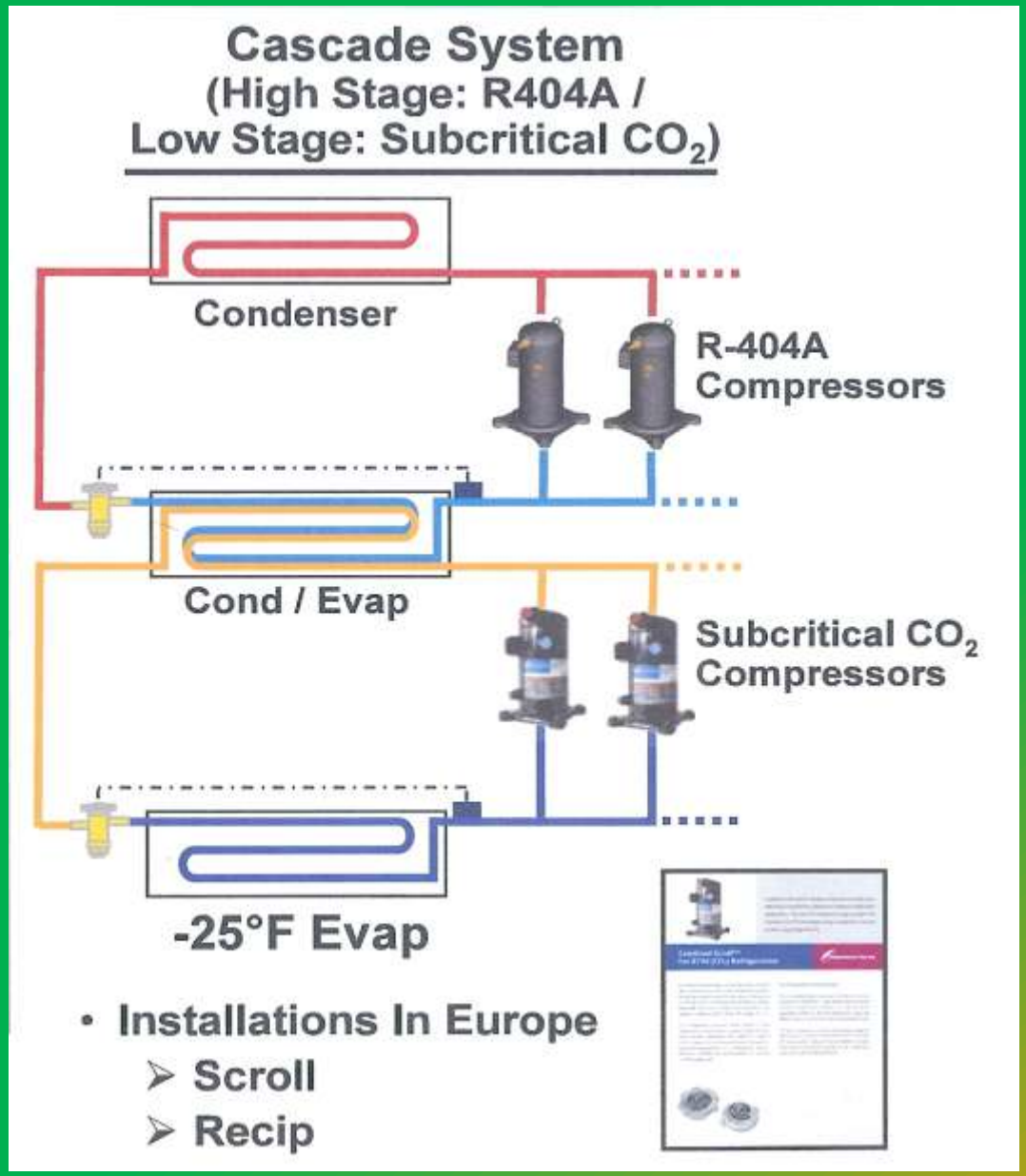

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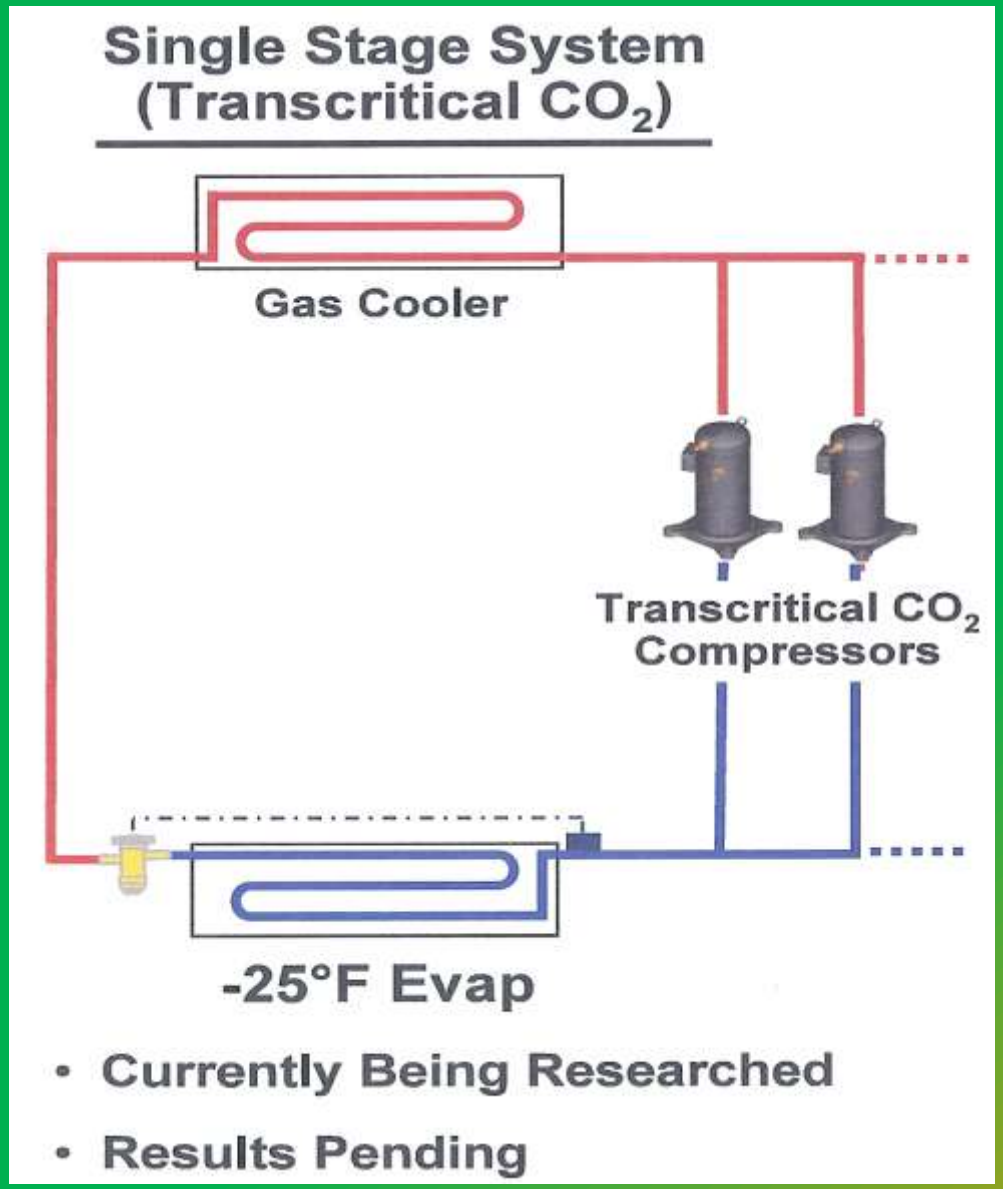

LES RÉFRIGÉRANTS :

CANMET Energy Technology Centre (CETC) Weekly Report
WEEK ENDING MARCH 9, 2007

Rapport hebdomadaire du Centre de la technologie
de l'énergie de CANMET (CTEC)
SEMAINE SE TERMINANT LE 9 mars, 2007

CETC-VARENNES AND LOBLAW INC. SIGN AN AGREEMENT FOR THE DEMONSTRATION OF CO_2 AS SECONDARY REFRIGERANT IN A SUPERMARKET IN SCARBOROUGH

CETC-Varennes and Loblaw Inc. signed an agreement to demonstrate the benefits of using CO_2 as secondary refrigerant in low temperature display cases in a new supermarket in Scarborough (Ontario). This will be the first utilisation of CO_2 as refrigerant in Canada, and represents a major breakthrough in refrigeration in Canada. The expected results are a 20% reduction of the building's energy consumption, a 95% reduction of synthetic refrigerant leaks and a 50% reduction of GHG emissions compared to a conventional supermarket.

In this project, CETC-Varennes provides technical support and will perform the monitoring and performance analysis of the new supermarket. CETC-Varennes also works with the Canadian Standards Association (CSA) to adapt the refrigeration codes (CSA B51 and B52) and with the Technical Standards & Safety Authority of Ontario (TSSA)for commercial refrigeration using CO_2.

This project, championed by CETC-Varennes, follows a successful R&D project supported by PERD. This demonstration is financially supported by the TEAM program and the Refrigeration Action Program for Buildings (RAPB), managed by CETC-Varennes.

Opening of the new supermarket is planned for November 2007.

Contact: Michel Poirier – Tel: 450-652-5521

LES RÉFRIGÉRANTS :

EN 2007 : UN « JOINT VENTURE » ENTRE HONEYWELL ET DUPONT AFIN DE DÉVELOPPER UN RÉFRIGÉRANT AVEC LOW GWP. EN 2011, EN EUROPE IL SERA INTERDIT D'UTILISER R-134a DS LA CLIMATISATION AUTOMOBILE AVEC UN CALENDRIER D'ÉLIMINATION ALLANT JUSQU'EN 2017, LE RÉFRIGÉRANT DEVRA AVOIR UN GWP < 150 Kg CO_2 équ.

EN 2005, DEUX CHOIX : R-152a OU CO_2 . AUJOURD'HUI LE HFO-1234yf AVEC GWP=4 AYANT ± LES MÊMES PERFORMANCES QUE LE R-134a.

17 MILLIONS DE VOITURES SONT FABRIQUÉES EN EUROPE PAR ANNÉE.

À LA FIN DE 2007 BMW, DAIMLER ET VOLKSWAGEN ONT CHOISI LE CO2

Honeywell

Honeywell Refrigerants Europe

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News Releases

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DuPont, Honeywell Announce Refrigerants Global Joint Development Agreement

Low Global Warming Refrigerants for Automobiles Provide More Sustainable Solutions for Air Conditioning Systems

WILMINGTON, Del., and MORRIS TOWNSHIP, N.J., March 29, 2007 – DuPont and Honeywell (NYSE: HON) today announced a global joint development agreement to accelerate the development and commercialization of next generation, low global warming refrigerants for the automotive air conditioning industry. The new refrigerants would enable automakers to meet new regulations in Europe that require the use of low global warming potential (GWP) refrigerants in mobile air conditioning (AC) applications. Today's automotive air conditioners use hydrofluorocarbon (HFC)-134a. The new regulation is scheduled to take effect in 2011 for new model automobiles, with the transition complete by 2017.

Under the agreement, DuPont and Honeywell will jointly identify, develop, test and qualify new low GWP refrigerants that are cost-effective alternatives to other technologies being considered by the auto industry. Automakers are currently evaluating mobile AC systems that use such technologies. Ideally, automakers are seeking a commercially viable fluorinated gas solution that is compatible with conventional HFC-134a mobile air conditioning system technology and offers a more cost-effective industry transition versus CO2 technology.

"Honeywell has a proven track record of developing refrigerant technologies to meet industry and customer requirements," said Terrence Hahn, vice president and general manager for Honeywell's Fluorine Products business. "We look forward to providing a near drop-in replacement that reduces the need for costly system redesign for the automotive industry. For the consumer, we will provide an environmentally friendlier, low-GWP solution without sacrificing comfort or reliability."

"DuPont science and innovation helped ease the transition from chlorofluorocarbons to alternative products for both industry and society. Now we are quickly responding to the global automotive industry's request for new refrigerants with lower global warming potential that offer a strong balance of benefits for safety, performance and cost-effectiveness," said Cynthia C. Green, vice president and general manager – DuPont Fluoroproducts. "By leveraging DuPont and Honeywell resources, we can expedite product qualification and commercialization to provide a new global industry solution in time to meet regulations and effect an accelerated reduction in greenhouse gas emissions around the world."

DuPont and Honeywell plan to share resources, investment and technology as part of the agreement. The companies will work closely with the automotive industry to qualify a low GWP alternative by mid-2007. According to industry estimates, there are more than 400 million cars with air conditioning systems globally, with each system using between one to two pounds of refrigerant. Air conditioning systems utilizing fluorine-based refrigerants, such as those Honeywell and DuPont are seeking to develop, are more energy efficient than CO2-based air conditioning systems, particularly at high ambient temperature conditions. Based on a test conducted by DuPont comparing mobile AC systems utilizing DuPont's low GWP replacement refrigerant and CO2, widespread utilization of a fluorine-based refrigerant could lead to worldwide emissions reduction equivalent to 230 million gallons of fuel per year by 2017.

Honeywell International is a $31 billion diversified technology and manufacturing leader, serving customers worldwide with aerospace products and services; control technologies for buildings, homes and industry; automotive products; turbochargers; and specialty materials. Based in Morris Township, N.J., Honeywell's shares are traded on the New York, London and Chicago Stock Exchanges. It is one of the 30 stocks that make up the Dow Jones Industrial Average and is also a component of the Standard & Poor's 500 Index. For additional information, please visit www.honeywell.com.

Honeywell Specialty Materials, based in Morristown, N.J., is a $4.6 billion, global leader in providing customers with high-performance specialty materials, including fluorine products; specialty films and additives; advanced fibers and composites; intermediates; specialty chemicals; electronic materials and chemicals; and technologies and materials for petroleum refining.

DuPont is a leading supplier of refrigerants, using science and technology, market knowledge and global reach to provide sustainable materials and solutions to enhance personal comfort, enable food preservation improve industrial processing and reduce environmental footprints. DuPont – one of the first companies to publicly establish environmental goals 16 years ago – has broadened its sustainability commitments beyond internal footprint reduction to include market-driven targets for both revenue and research and development investment. The goals are tied directly to business growth, specifically to the development of safer and environmentally improved new products for key global markets. DuPont is a science-based products and services company. Founded in 1802, DuPont puts science to work by creating sustainable solutions essential to a better, safer, healthier life for people everywhere. Operating in more than 70 countries, DuPont offers a wide range of innovative products and services for markets including agriculture and food; building and construction; communications; and transportation.

PRÉAPARER PAR : MARC GOSSELIN, ing.

FLUIDES SECONDAIRES

- PROPYLÈNE GLYCOL ;
- ÉTHYLÈNE GLYCOL ;
- SAUMURE ;
- MÉTHANOL ;
- CO_2
- ETC…
  - SYSTÈME SOUVENT PLUS COÛTEUX ;
  - COMPLEXITÉ DES DÉGIVRAGES ;
  - ÉCHANGEUR DE CHALEUR SOUVENT PLUS GROS ;
  - EFFICACITÉ DES COMPRESSEURS DIMINUÉE P/R À L'AJOUT D'ÉCHANGEURS INTERMÉDIAIRES ;
  - RÉDUCTION DES CHARGES DE RÉFRIGÉRANT ;
  - FACILITÉ AU NIVEAU DE LA RÉCUPÉRATION DE CHALEUR ;

EN CONCLUSION

L'INDUSTRIE DU TRAITEMENT D'AIR ET DU FROID A EU UNE ATTITUDE RESPONSABLE FACE AUX CHANGEMENTS AUXQUELS ELLE A ÉTÉ CONFRONTÉE. ELLE DEVRA AVOIR CETTE MÊME ATTITUDE VIS-À-VIS D'AUTRES CHANGEMENTS ET NOTAMMENT CEUX QUI CONCERNENT LE CLIMAT. LA CAPACITÉ D'INNOVATION TECHNOLOGIQUE DOIT ENCORE ÊTRE UTILISÉE PLEINEMENT ET J'ENCOURAGE L'INDUSTRIE À SE MOBILISER POUR FAIRE FACE À CE DÉFI !

FAISONS LE POUR NOS ENFANTS

RÉF. SYLVIE LEMMET – RPF 958