Honeywell

Guide to Alternative Genetron® Refrigerants

Commercial and residential air-conditioning long-term replacements

ASHRAE#	Trade Name	Type	Replaces	Typical Lubricant[a]	Applications	Comments
R-134a	134a	Single Component Fluid HFC	R-12 R-500	Synthetic (POE, PVE, etc.)	New Equipment Retrofits Automotive AC	Used in screw and centrifugal chillers
R-245fa	245fa	Single Component Fluid HFC	R-11 R-123	Synthetic (POE, PVE, etc.)	New Centrifugal chillers	Equipment redesign. Suitable for Organic Rankine Cycle and as Heat Transfer Fluid
R-407C (125/32/134a) (25%/23%/52%)	407C	Blend HFC (high glide)	R-22	Synthetic (POE, PVE, etc.)	New Equipment Retrofits	Best retrofit alternative to R-22. Close performance match with lower efficiency .
R-410A (125/32) (50%/50%)	410A	Azeotropic mixture HFC (near zero glide)	R-22	Synthetic (POE, PVE, etc.)	New Equipment NOT FOR RETROFITTING	High pressure and efficiency than R-22. Requires equipment redesign.
R-417A (125/134a/600) (46.6%/50%/3.4%)	Isceon 59	Blend HFC/HC (high glide)	R-22 R-500	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene in some applications	New Equipment Retrofits	Lower cooling capacity than R-22 Mineral Oil return issues with suction line accumulators and receivers
R-290	Propane	Single Component Fluid	R-12 R-22	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene	New Equipment	R-22 close performance match. High flammability. Required secondary loop for safety issues for Room AC

Low and medium temperature commercial refrigeration interim HCFC based replacements [b]

ASHRAE#	Trade Name	Type	Replaces	Typical Lubricant[a]	Applications	Comments
R-401A (22/152a/124) (53%/13%/34%)	MP39	Blend HCFC/HFC (moderate glide)	R-12	Alkylbenzene Synthetic (POE, PVE, etc.) Mineral oil	Med Temp Retrofits[c]	No oil change needed in most cases. Best for applications with suction temperature > -18°C
R-401B (22/152a/124) (61%/11%/28%)	MP66	Blend HCFC/HFC (moderate glide)	R-12 R-500	Alkylbenzene Synthetic (POE, PVE, etc.) Mineral oil	Air Conditioners, dehumidifiers and Transport Low Temp Refrigeration Retrofits[c]	Best for low temp R-12 and R-500 retrofit applications. No oil change needed in most cases
R-409A (22/124/142b) (60%/25%/15%)	409A	Blend (high glide) HCFC	R-12	Alkylbenzene Synthetic (POE, PVE, etc.) Mineral oil	Low and Med Temp Retrofits[c]	Good broad range R-12 substitute. No oil change needed in most cases. Higher capacity than R-12.
R-402A (22/125/290) (38%/60%/2%)	HP80	Blend HCFC/HFC/HC (low glide)	R-502	Alkylbenzene Synthetic (POE, PVE, etc.)	Low and Med Temp Retrofits	Higher discharge pressure than R-502.Use either synthetic oil or blend of AB/MO with AB>50%
R-402B (22/125/290) (60%/38%/2%)	HP81	Blend HCFC/HFC/HC (low glide)	R-502	Alkylbenzene Synthetic (POE, PVE, etc.)	Ice machines	Niche refrigerant.
R-408A (22/125/143a) (47%/7%/46%)	408A	Blend HCFC/HFC (low glide)	R-502	Alkylbenzene Synthetic (POE, PVE, etc.)	Low and Med Temp Retrofits	Higher discharge pressure than R-502.Use either synthetic oil or blend of AB/MO with AB>50%

Very low temperature commercial refrigeration long-term replacements

ASHRAE#	Trade Name	Type	Replaces	Typical Lubricant[a]	Applications	Comments
R-23	23	Single Component Fluid HFC	R-13 R-503	Synthetic (POE, PVE, etc.)	New equipment Retrofits	Higher discharge pressure than R-13
R-508A (23/116) (39%/61%)	508A	Azeotrope HFC (no glide)	R-13 R-503	Synthetic (POE, PVE, etc.)	New equipment Retrofits	Lower discharge pressure than R-23. Good performance match to R-503

Low and medium temperature commercial refrigeration long-term replacements

ASHRAE#	Trade Name	Type	Replaces	Typical Lubricant[(a)]	Applications	Comments
R-404A (125/143a/134a) (44%/52%/4%)	404A	Blend HFC (small glide)	R-502 R-22	Synthetic (POE, PVE, etc.)	New equipment Retrofits	Close match to R-502. Higher efficiency than R-22 at low temperature.
R-507 (125/143a) (50%/50%)	AZ-50 507	Azeotrope HFC (no glide)	R-502 R-22 R-402A R-408A	Synthetic (POE, PVE, etc.)	New equipment Retrofits	Close match to R-502. Slightly higher pressure and efficiency than R-404A. Higher efficiency than R-22 at low temperature.
R-134a	134a	Single Component Fluid HFC	R-12	Synthetic (POE, PVE, etc.)	New equipments	Performs well in small hermetic systems
R-417A (125/134a/600) (46.6%/50%/3.4%)	Isceon 59	Blend HFC/HC (high glide)	R-22	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene in some applications	New Equipment Retrofits	Lower cooling capacity than R-22 Equipment with suction line accumulators and receivers should use synthetic oils to avoid oil return issues
R-422A (125/134a/600) (85.1%/11.5 %/3.4%)	Isceon 79	Blend HFC/HC (high glide)	R-502 R-22	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene	New Equipment Retrofits	Similar performance to R-404A. Equipment with suction line accumulators and receivers should use synthetic oils to avoid oil return issues
R-290	Propane	Single Component Fluid	R-12 R-22 R-502	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene	New Equipment	High flammability.
R-600a	Iso-butane	Single Component Fluid	R-12 R-500	Synthetic (POE, PVE, etc.) Mineral Oil and Alkylbenzene	New Equipment	High flammability. Used in domestic refrigeration as alternative to R-134a
R-717	Ammonia – NH3	Single Component Fluid	R-12 R-22	Synthetic (POE, PAG) Mineral Oil (PAO) Alkylbenzene	New Equipment	High efficiency and capacity. High toxicity. Mild flammability. High discharge temperature. Corrosive against Cu and Zn
R-744	Carbon Dioxide – CO2	Single Component Fluid	R-12 R-22 R-502	Synthetic (POE, PAG, etc.)	New Equipment	Very high pressure. Lower efficiency than HFCs. Requires system redesign and dedicated components

(a) Check with the compressor manufacturer for their recommended lubricant.
(b) Interim replacements contain HCFCs, which are scheduled for phase-out under the EC Regulation 2037/2000 by beginning 2010.
(c) Not recommended for automotive air-conditioning.

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