

JOHNSON CONTROLS REFRIGERANT GUIDE





How to deal with your R22 system



Five options

Solution	What to do	Consequences	System effects	Cost implications
1. Do nothing (Keep the R22 refrigerant and system)	<ul style="list-style-type: none"> Ignore future problems 	<ul style="list-style-type: none"> Expensive as only regenerated R22 is available High risk of shut-down of plant/process due to lack of available recycled R22 refrigerant 	<ul style="list-style-type: none"> None The plant contains ozone depleting material 	<ul style="list-style-type: none"> No short-term costs Very expensive to top up R22 after 2009
2. Replacement of only R22 refrigerant with another synthetic refrigerant (Drop-in solution)	<ul style="list-style-type: none"> No change of lubricant (in theory) Change shaft seal Change O-rings 	<ul style="list-style-type: none"> Minimal change right now High risk of leakage and complete break-down 	<ul style="list-style-type: none"> Drop in capacity and efficiency Increased operating costs High global warming potential Uncertain future/new restrictions 	<ul style="list-style-type: none"> Low short-term costs Higher operating costs (lower efficiency)
3. Replacement of R22 with another synthetic refrigerant (Retrofit solution)	<ul style="list-style-type: none"> Change lubricant, shaft seals, O-rings and other sealing in the entire plant Re-calculate motors Check pressures and controls settings 	<ul style="list-style-type: none"> Time-consuming procedure Can be changed to suit any application Lower risk of leakage 	<ul style="list-style-type: none"> Lower efficiency Higher operating costs High global warming potential (F-Gas) Uncertain future (new restrictions on synthetic refrigerants?) 	<ul style="list-style-type: none"> Medium short-term costs
4. Replacement of R22 system with new synthetic HFC refrigerant system	<ul style="list-style-type: none"> Change to new system 	<ul style="list-style-type: none"> Higher reliability Short installation time High global warming impact Good match for the capacity 	<ul style="list-style-type: none"> Good performance with lower operating costs than with R22 Uncertain future (new restrictions on synthetic refrigerants?) High global warming potential (F-Gas) 	<ul style="list-style-type: none"> Higher short-term investment costs
5. Replacement of R22 system with new natural refrigerant system	<ul style="list-style-type: none"> Change to new system 	<ul style="list-style-type: none"> Safe solution with no impact on the environment High efficiency and lowest power consumption Optimal match for the capacity 	<ul style="list-style-type: none"> Optimal performance at lowest operating costs Lowest environmental impact Long-term solution 	<ul style="list-style-type: none"> Higher short-term investment costs

R22 conversion

Area of use	Small office and domestic	Medium to large office chillers	Industrial systems	Commercial systems
Typical design examples:				
Typical capacity range	1 – 15kW	15 – 800kW	300 – 6000kW	10 – 800kW
Typical leak rate	1 – 5%	5 – 20%	5 – 20%	10 – 40%
Last legal date of installation with R22	30. Jun 2002 Heat pumps 31. Dec 2003	Below 100 kW 30. Jun 2002 Above 100 kW 31. Dec 2000	31. Dec 2000	Below 100 kW 30. Jun 2002 Above 100 kW 31. Dec 2000
Typical expected service life	12 years	15 years	25 years	12 years
Typical conversion solution from R22	R417A R422D R427A	R407C (+10°C → -5°C) R404A/R507 (-5°C → -35°C)	R407C (+10°C → -5°C) R404A/R507 (-5°C → -35°C)	R404A R422D
Negative influence on capacity	No	No	Yes	Yes
Negative influence on coefficient of performance (COP)	Yes	Yes	Yes	Yes
Complexity of conversion	Low	Medium	High	High
What has to be done	Recover the R22 Charge new blend Adjust the controls	Check expansion valves Check the liquid line size Change lubricant Recover the R22 Adjust the controls	Check pressure levels and safety valves Check oil separator Check motor size Check heat exchangers Change shaft seals and gaskets Change the lubricant at least twice Recover the R22 Adjust controls	Check pressure levels and safety valves Check oil separator Check motor size Check heat exchangers Change shaft seals and gaskets Change the lubricant at least twice Recover the R22 Adjust controls

Retrofit plan

