



**HITACHI**

Hitachi, known worldwide as a main actor of the Room Air Conditioning market, has been launching R32 units since 2013, firstly in Japan. The Japanese Hitachi range has become 100% R32 in 2017.

Switching to R32 on the European Market is also an important step for environmental and legal reasons. This is why Hitachi is pleased to present « Dodai », the first Hitachi R32 model in Europe.

### - New Indoor unit design:

- The front cover can be removed in one piece in few easy steps.
- Installer can access to piping connections very simply.
- Easy maintenance: the fan motor can be changed in no time and the heat exchanger can remain in its place.

### - High Performances:

- Energy savings thanks to high seasonal performances:  
SEER: A++ / SCOP: A+
- Comfort for end user with high heating capacities even at low temperatures
- Very silent indoor and outdoor units
- Can be installed in all environments



Indoor unit reference		RAK-18PED	RAK-25PED	RAK-35PED	RAK-50PED
Outdoor unit reference		RAC-18WED	RAC-25WED	RAC-35WED	RAC-50WED
Nominal Cooling capacity	kW	2,00	2,50	3,50	5,00
Nominal Heating capacity	kW	2,50	3,40	4,20	6,00
Heating capacity at -7°C	kW	1,75	2,50	3,00	4,00
SEER		6,10	6,10	6,10	6,10
		A++	A++	A++	A++
SCOP		4,20	4,20	4,20	4,30
		A+	A+	A+	A+
IU Noise level cooling (sound pressure) (SL / L / M / H)	dB(A)	21 / 24 / 33 / 37	22 / 24 / 33 / 40	25 / 26 / 36 / 43	28 / 30 / 40 / 46
IU Noise level (sound power)	dB(A)	51	54	57	60
OU Noise level cooling (sound pressure)	dB(A)	45	47	48	50
OU Noise level (sound power)	dB(A)	59	61	62	64
IU Dimensions (H x W x D)	mm	280 x 780 x 215			
OU Dimensions (H x W x D)	mm	530 x 660 x 278	530 x 660 x 278	530 x 660 x 278	600 x 792 x 299
Piping diameter (Liq / Gas)	inch	1/4" / 3/8"	1/4" / 3/8"	1/4" / 3/8"	1/4" / 1/2"
Refrigerant		R32	R32	R32	R32
Current quantity of refrigerant	kg	0,530	0,530	0,700	0,930
Compressor		ROTARY	ROTARY	ROTARY	2 Cylinder Rotary

## Key notions : HFC, GHG, Eq CO<sub>2</sub>, GWP

Hydrofluorocarbons fluids (HFC) can be found in many every day products such as: refrigerators, freezers, air conditioning units, aerosols...HFCs are part of greenhouse gases (GHG). GHG are any of the gases whose absorption of solar radiation is responsible for the greenhouse effect (global warming), including carbon dioxide, methane, ozone, and the fluorocarbons.

All refrigerants do not have the same impact on the environment. In order to calculate the emissions of each of them, a reference that stands for a unit of measurement is used: the weight in CO<sub>2</sub> equivalent (eq CO<sub>2</sub>). To calculate the impact of each one on global warming: an indicator, the Global Warming potential (GWP), which gives the radiative properties of each fluid.



## Regulations

### F-Gas regulations:

F-Gases are man-made gases that can stay in the atmosphere for years. The European Union aims to reduce the environmental impact of fluorinated gases via regulations.

The F-gas Regulation:

1. Controls emissions of F-gases by requiring leak checking, proper servicing and maintenance of F-gas equipment and recovery of F-gases at end of life.
2. Introduces bans on the use of F-gases where less harmful alternatives are available.
3. Limits the total amount of F-gases that can be sold in the EU through phased reductions in imports.

The F-gas regulation concerns different categories of equipment's: domestic refrigeration and freezers, moveable air conditioners, stationary refrigeration equipment, multipack commercial refrigeration (>40kW except primary circuit in cascades), single split air conditioners (<3kg charge). Each category is impacted at different stages of the phase down plan.

Gases (HFC's) concerned by F-Gas phase down:

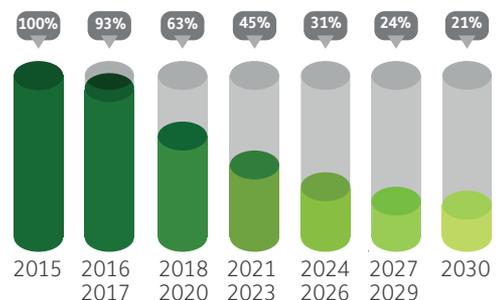
Refrigerant	GWP	For 1kg=Teq CO <sub>2</sub>
R410A	2088	0.001 tonnes x 2088 = <b>2.088 Teq CO<sub>2</sub></b>
R407C	1770	0.001 tonnes x 1770 = <b>1.77 Teq CO<sub>2</sub></b>
R32	675	0.001 tonnes x 675 = <b>0.675 Teq CO<sub>2</sub></b>
R134A	1430	0.001 tonnes x 1430 = <b>1.43 Teq CO<sub>2</sub></b>

### HFC Phase-down:

The target of the HFC Phase-Down plan is to divide by 5 global emissions of GHGs before 2030, starting from 2015.

In order to comply with phase down requirements, heat pump manufacturers will use more and more HFC's with low GWP. The current market trend is that heat pump manufacturers choose R32 (GWP 675) to substitute R410A (GWP 2088).

F-Gas Phase Down plan



	RAC-25WED	RAC-25WEC	Impact
Refrigerant	<b>R32</b>	<b>R410A</b>	-
GWP	675	2088	- <b>67%</b>
Refrigerant Qty	0,53 kg 0,00053 T	0,72kg 0,00072 T	- <b>26%</b>
Enviromental impact	<b>0,357 TCO<sub>2</sub>e</b>	<b>1,50 TCO<sub>2</sub>e</b>	- <b>76%</b>

R32 environmental impact (TeqCO<sub>2</sub>) is 4 times inferior to R410A.



## R32 benefits

### R32:

R32 is a well known refrigerant in the AC market. Indeed, we have been using R32 for many years since it composes R410A by 50%. It is a **more efficient and environmentally friendly** alternative to R410A since its GWP is of 675 compared to 2088 for R410A, so it is in line with F-Gas target for 2025.

### Over 14 million of R32 units are installed in the world!

R32 has a number of other attributes which make it an attractive alternative, including:

- R32 has high efficiency
  - Especially in cooling
  - One class rise for SEER & SCOP for Hitachi RAK-PED models.
- R32 charge is around 30% less than R410A charge
- Reduced system pipe size
  - Possible to have more compact models.

### R32 is a safe refrigerant to use.

International Standard ISO 817:2014, segregates the flammability of refrigerants into 4 categories as follows:

- no flame propagation (Class 1) also called Non Flammable
  - lower flammability (Class 2L) also called Mildly Flammable
  - flammable (Class 2) also called Flammable
  - higher flammability (Class 3) also called Highly Flammable
- R32 falls into the "lower flammability" category.

R32 is rated as A2L – there is a low risk of accidents due to toxicity (A), and low risk of flammability (2L).

	Lower Toxicity	Higher Toxicity
Higher flammability	<b>A3</b> R1270 (Propane) / R170 (Ethane)	<b>B3</b>
Low flammability	<b>A2</b> R161 (Ethyl Fluoride) / R41 (Methyl fluoride)	<b>B2</b> R717 (Ammonia)
Lower flammability	<b>A2L*</b> R32 (Difluoromethane)	<b>B2L*</b>
No flame propagation	<b>A1</b> R744 (Carbon dioxide) / R410A	<b>B1</b>

\*A2L and B2L are lower flammability refrigerants with a maximum burning velocity of <10cm/s – Classification according to ASHRAE34 & ISO817

There have been concerns surrounding the fact that R32 gas is partly flammable, however, this gas is extremely difficult to ignite.

Criteria that need to be gathered in order to create ignition are very specific. Combustion will not occur unless three conditions, in specific quantities or with sufficient energy are met:

- Refrigerant concentration
- Constant oxygen
- An ignition source

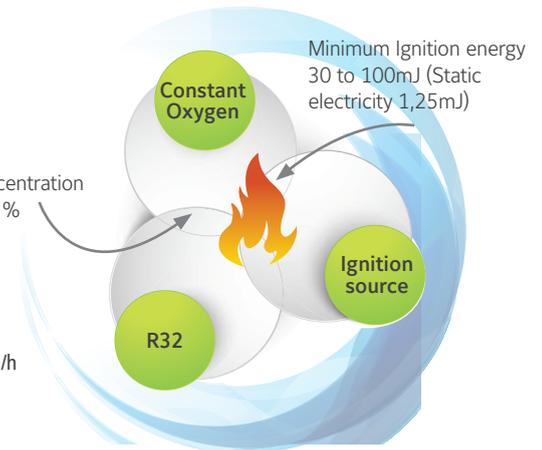
In the rare case a fire were to start, R32 burns at a slower speed than walking pace, at 6.7cm/s:



Walk speed 5 Km/h

**R 32** → Combustion speed 6,7 cm/s = 0,24 Km/h

Refrigeration concentration area 14 to 30 vol % (0,3 to 0,6kg/m<sup>3</sup>)



**EN378:** is a safety standard which is directly applicable to all countries in the European Union. It refers to Refrigerating Systems and Heat Pumps & the continuous leak monitoring of the system. EN378 Safety and Environmental Requirements require the installation of fixed leak monitors in refrigeration and air-conditioning machinery rooms. It includes the special requirement to ensure safety in air-conditioned spaces in Category A occupancy buildings if a sudden leak into an occupied space would exceed specified concentrations.

**Category A buildings:** include those that have restricted movement such as dwellings, residential institutions (hotels, hospitals, prisons, schools) and public places such as courts, theatres, public transport termini, supermarkets, restaurants, etc. Installation of appropriate gas leak detectors in such buildings should meet the requirement of EN378.

Due to classification A2L and EN378 standards, there are currently limitations in the use of R32 in specific applications. Nevertheless, in order to stick with phase-down plan, EN378 is under revision and new directives should soon be known.



## Impact for installers

### Storage & Transport of R32:

All flammable refrigerants under the current regulations in the European Union must be handled under strict restriction including the storage and the transportation process.

Transport of lower flammable refrigerants is only allowed for a limited quantity and only if the refrigerant is transported directly from pick-up to worksite:

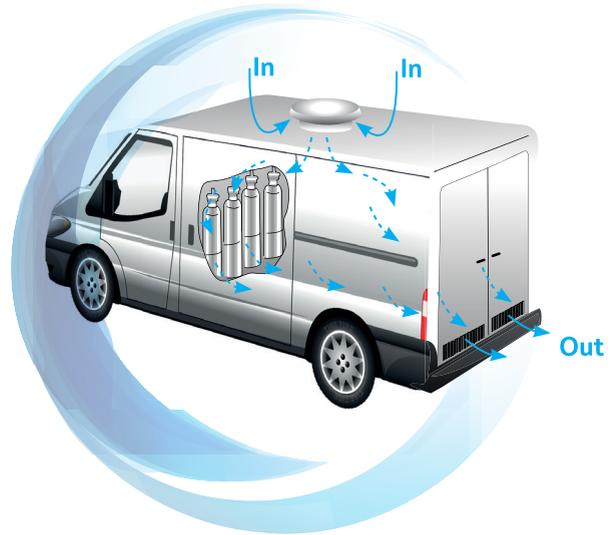
- Less than 12kg per unit for flammable refrigerants
- Less than 333kg transported in total for R32
- Less than 1000kg transported in total for loads mixing R410A & R32

Use preferably an open air truck, but ensure proper ventilation if the truck is enclosed.

### R32 & Installation:

Thermal properties & pressure being approximately the same for both gases, installation procedure only slightly varies from R410A to R32.

It is possible to reuse existing piping: when decommissioning the old system the Installer should pump down, recycling both the R410A refrigerant and oil and thoroughly clean the existing piping. Most tools used for R410A can also be used for R32:



## No change

\*pictures of tools are just an example.



Electric gas leak detector



Cylinder cap



Flexibles



Pipe cutter



Vacuum pump



Flaring tool



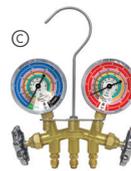
Weighing instrument



Pipe bender



Torque wrench



### Gauge manifolds

Can be used for R410A and R32 but with reajustements. Different if joint manifold but commonif electronic manifold.



### Recovery bottle

Must be adapted to refrigerant.



### Refrigerant recovery system

Can be shared if it has been certified by the manufacturers to be supporting the relevant HFCs.

## To adapt