

# Comparative Study with Tec Froid

R404A and R407A in water cooler application



## Purpose of the study

The purpose is to compare the operation of a water cooling installation using the R-404A for refrigerant and one using the R-407A with the same operating parameters. The cooler's

capacity is 1000 litres per hour from 20 to 1°C with the possibility of storing ice.

## Presentation of the refrigeration installation

This installation is an OEGLACE type pressurized iced feedwater cooler manufactured by Tec Froid.

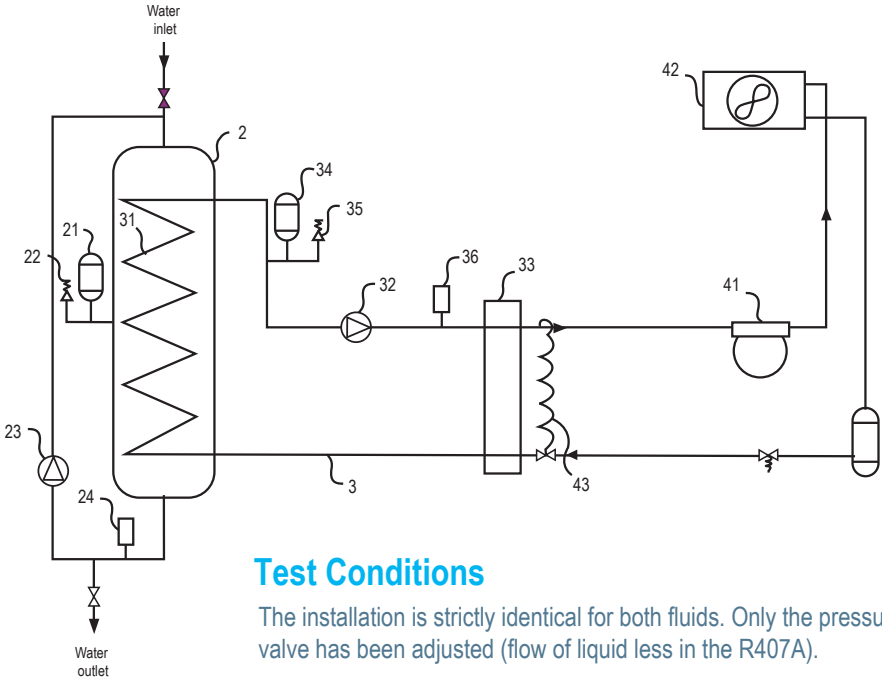
The water to be cooled is stored in a pressurized stainless steel tank from the feed network, it is also distributed at the pressure of this network. This tank is fitted with a coiled tube fed by glycol water (33% MPG) at a nominal rate of -8/-4°C.

This closed circuit allows pollution from the exterior (bacteria,

micro-organisms, dust, foreign bodies, etc.) to be excluded. The use of glycol feedwater allows the departmental sanitary regulations to be complied with, which prohibit the cooling of a feedwater in direct exchange by a refrigerant.

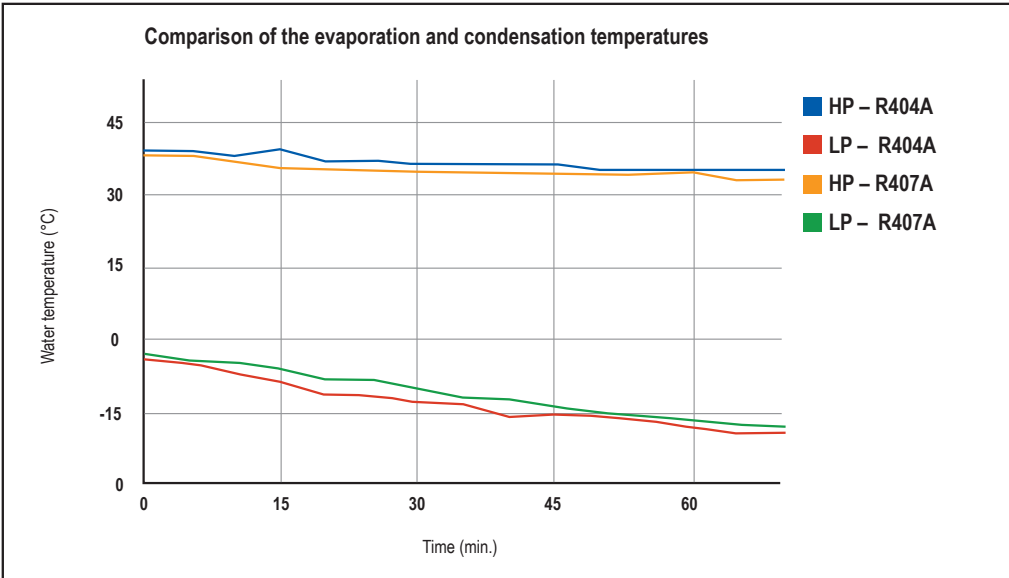
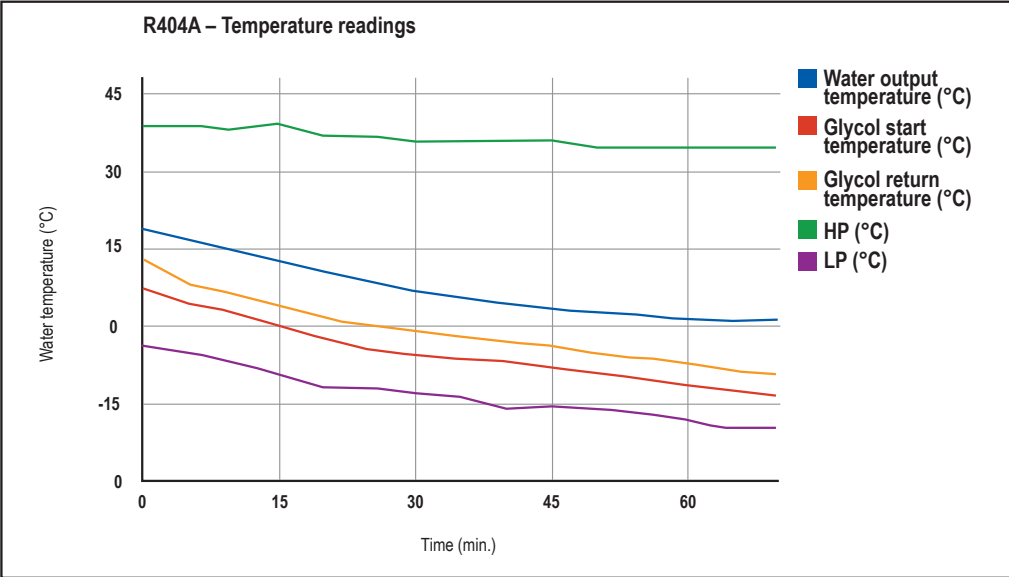
An air condensing cooler cools the MPG in a plate exchanger. Two pumps are fitted to the cooler, the first providing the circulation for the MPG, the second mixes the water in the tank.

# Refrigerating diagram of the cooler

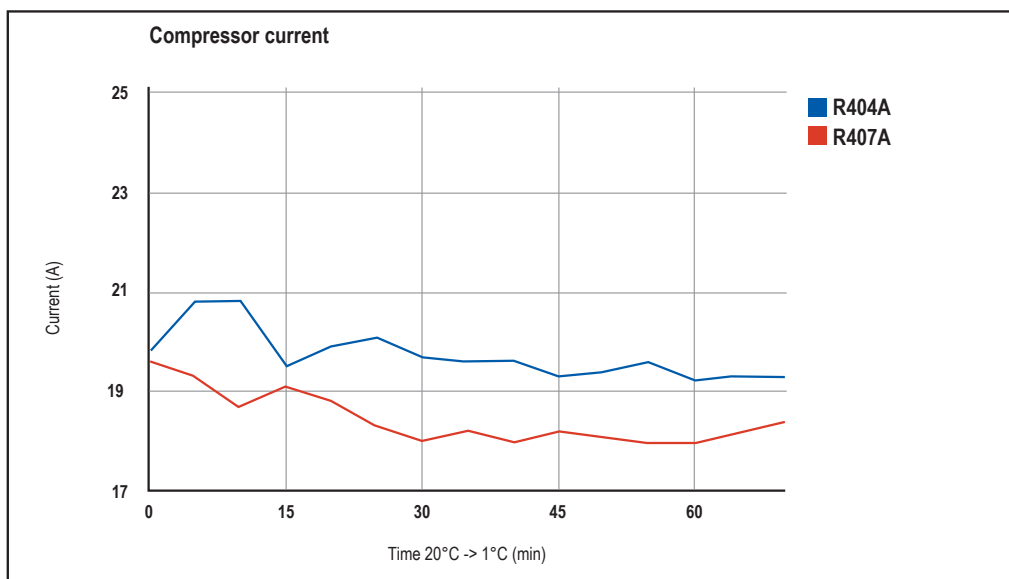
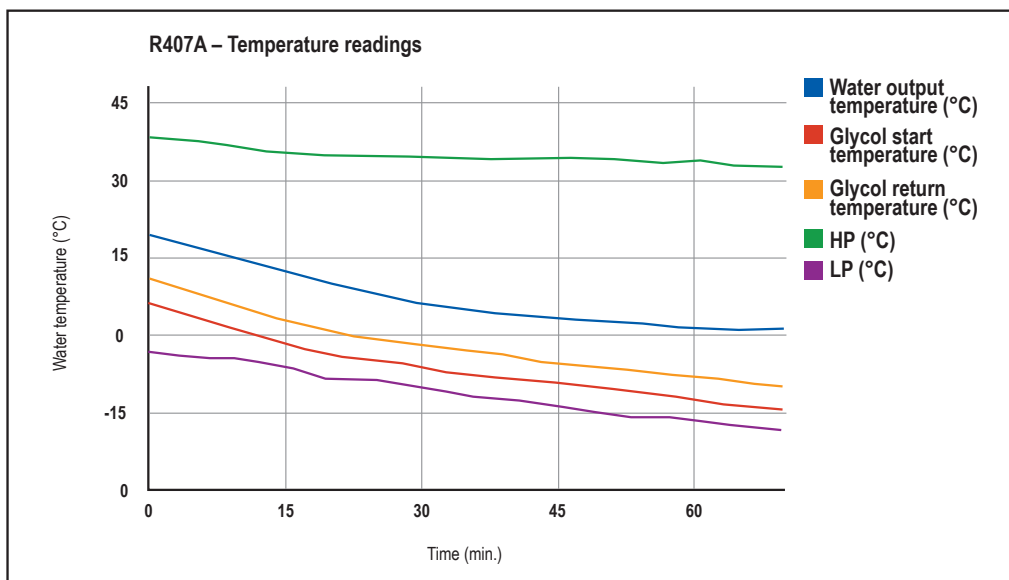
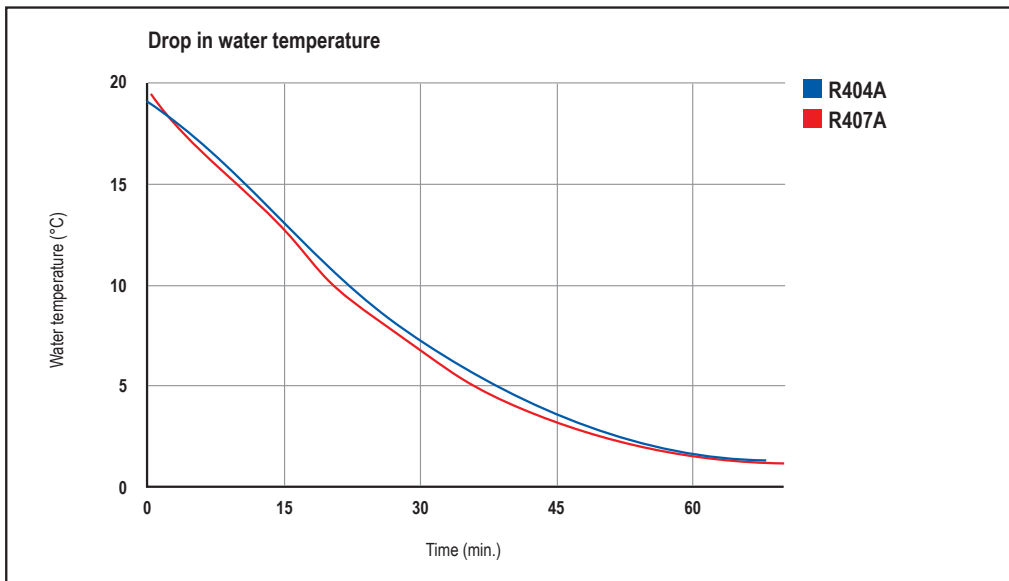


## Test Conditions

The installation is strictly identical for both fluids. Only the pressure relief valve has been adjusted (flow of liquid less in the R407A).



## Readings taken during both tests



## Analysis of the test results

The speed of the temperature drop in the water is faster with the R-407A.

The notable difference is the evaporation rate. The evaporation temperature of the R-407A is on average two to three degrees over that of the R-404A for a same rate of glycol water.

The higher speed of the temperature drop in the water with the R-407A is explained by a better specific refrigerating power due to a higher evaporation rate.

As the installation was identical, and with the same operating conditions, it can be deduced that the exchange coefficient is better with the R-407A.

The reading of the currents absorbed by the compressor shows appreciably lower values with the R407A, for an identical water temperature.

The cooler's electricity consumption is therefore lower with the use of the R-407A.

The discharge temperatures read on the R-407A are 15 to 20°C higher than those on the R-404A, but still acceptable as they are less than 85 - 90°C.

## Conclusions

The use of the R-407A in Tec Froid coolers proves to be a good alternative to that of the R-404A because it appreciably improves the COP of these coolers. Furthermore, the coolers manufactured by Tec Froid already comply with the future F-GAS regulations, which prohibits new installations from using fluids with a GWP higher than 2500 from 2017 (R-407A's GWP: 2107, R-404A's GWP: 3922).

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