



# Tecumseh

## CaseStudy

### Wine Cellar Air Conditioners



Tecumseh proposed to a leader in wine cellar air conditioners in Europe, to test a best-in-class variable speed solution with R-290 for its application. The built-in units are easily installed through the wall, providing in this way a conditioned cellar of up to 50 m<sup>3</sup>.

### ► CHALLENGE

The application that was delivered to be tested in Tecumseh laboratory in La Verpillière, worked with a fixed speed compressor THB4428Z with R-449A. The main objective was to convert the application to eco-friendly refrigerant R-290, and Variable Speed, in order to have better cooling performance, to reduce energy consumption, to meet environment regulation; while maintaining the same condensation, evaporation and overheating temperatures.

### ► SOLUTION

To do so, Tecumseh proposed to the customer various components from its Tecumseh IntelliCOOL™ Technology Platform. In order to select the right fit variable speed solution, and to get the optimal performances for the customer application, the test plan was the following:

- 1- Benchmark and performance measurement of the unit delivered
- 2- Refrigerant R-449A load optimization
- 3- Unit conversion to eco-friendly refrigerant R-290
- 4- Unit optimization with variable speed compressor VTCX410U and its inverter.

### ► RESULTS

Testing and switching to a variable speed solution from the Tecumseh's IntelliCOOL™ Technology Platform, had many benefits for the customer application.

	SYSTEM	ENERGY CONS. (kWh/24h)	COOLING CAP. (W)	DEVIATION TO TARGET TEMP. (°C)	TEST PARAMETERS
1	THB4428 + R-449A (310g)	5.57	205	-0.7   +3.6	Target Temp. 10°C w/o doors opening
2	VTCX410U (FS) + R-290 (90g)	4.02 (-28% vs. 1)	220		
3	VTCX410U (FS) + R-290 (90g)	5.72	220 @3.600 RPM	-0.7   +3.6	Target Temp. 10°C w/ doors opening
4	VTCX410U (VS) + R-290 (90g)	5.44 (-4.9% vs. 3)			

► **28% energy reduction** by switching to a VTCX compressor with permanent magnet sync motor technology, and switching to R-290 refrigerant (kWh/24h measurement)

► **5% energy reduction** by switching to variable speed vs. fixed speed

► **Better cooling performance (+7% vs. R-449A)**, and **better temperature stability (variation of 1.8°C vs. 4.3°C with fixed speed)**.

