

Technical session topic : 3. New fluids and energy efficient transfer processes  
in advanced refrigeration technologies (or 4. New fluids, new systems, and system integration).

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## Experimental study and modelling of a R404A small channel condenser

**Denis LEDUCQ\*, Otman JABBOUR\*, H el ene MACCHI\*, S. ROLLAND**

*Cemagref, Refrigerating Process Unit, BP 44, 92 163 Antony CEDEX, France,*  
Tel : (00 33) 1 40 96 61 74, Fax : (00 33) 1 40 96 62 49, [denis.leducq@cemagref.fr](mailto:denis.leducq@cemagref.fr)

Extensive use of refrigerants is known as a polluting factor for environment because of its impact on the ozone layer and of its greenhouse effect. So nowadays, many researches are leaded in order to reduce the refrigerant charge in refrigerating systems. One of those research ways is the use of small channel heat exchangers that contain less refrigerant than usual ones.

Therefore, a test facility was designed and achieved. It integrates an air conditioning small channel condenser (1.34 mm hydraulic diameter) with cross-flow technology. The measurement device allows to establish accurate power balances and to visualize thermal condensation profiles thanks to an infra-red camera and a thermocouple net disposed on the condenser fins. A great heterogeneity was noticed in the refrigerant flow distribution through the small channels.

Based on a bibliographical work, two numerical models were performed to simulate the small channel condenser performances. One of them uses correlations developed for traditional condenser adapted for small channels and the other one uses correlations specially developed for small channels. The results of both models are compared with experimental data obtained for several flow regimes. The results allow to conclude to the validity of the proposed numerical structure and to an adequacy of the chosen correlations.

### Complete contact addresses :

*Cemagref, Refrigerating Process Unit, BP 44, 92 163 Antony Cedex, France,*  
Fax : 00 33 1 40 96 62 49

- Denis LEDUCQ tel. : 00 33 1 40 96 65 07 [denis.leducq@cemagref.fr](mailto:denis.leducq@cemagref.fr)
- Otman JABBOUR tel. : 00 33 1 40 96 61 21 [otman.jabbour@cemagref.fr](mailto:otman.jabbour@cemagref.fr)
- H el ene MACCHI tel. : 00 33 1 40 96 61 74 [helene.macchi@cemagref.fr](mailto:helene.macchi@cemagref.fr)

Corresponding author : Denis LEDUCQ