



# APPLICATION REPORT

Chemical

## Mass flow measurement of a gas mixture

- Measurement of a product with low density (relatively high temperature / low pressure)
- Mixture of different gases in different concentrations
- Installation in hazardous environment (ATEX zone)



### 1. Background

French chemicals company ARKEMA runs a production facility in an industrial area of the Pierre Bénite commune near Lyon, France. The facility is operated in accordance with enhanced safety requirements due to the dense population. Fluoride derivatives are manufactured at this location. The use of reliable, accurate measuring devices manufactured using appropriately high-performance materials is a decisive factor when it comes to ensuring production quality.



Measuring gas mixture with the OPTIMASS 6400 C

### 2. Measurement requirements

One production unit in operation since 2003 must measure approximately 20 process media including gases, steam, acids, sulphates and latex. One of the gas mixtures consists of difluoroethylene (VF2) and up to 20% hexafluoropropylene (HFP). The medium has a density between 5 and 7.5 kg/m<sup>3</sup> / 0.3 and 0.47 lb/ft<sup>3</sup>.

The maximum flow rate is 700 kg/h / 25.7 lb/min at a process temperature of 80 °C / 176 °F and a pressure of 1.5 bar / 21.75 psi. An accuracy of ±0.35% of measured value was specified for this measurement. The pressure drop may not exceed 60 mbar / 0.87 psi. Since these gases are flammable, the measuring device must have Ex approval in accordance with ATEX.

**KROHNE**

### 3. KROHNE solution

The OPTIMASS 6400 C mass flowmeter was chosen. The KROHNE device features a twin V-shaped measuring tube made of stainless steel (316L). It was supplied in nominal size DN 25 / 1".

The OPTIMASS 6400 is a standard measuring device for process applications in the chemical industry. It provides maximum measuring accuracy and repeatability. Thanks to its patented flow splitter, the mass flowmeter also enables an optimised flow profile. This reduces pressure loss to a minimum.

To prevent the buildup of condensation from influencing the measurement it is generally recommended that the measuring device be installed in a horizontal pipeline with the bent dual measuring tube above the longitudinal axis of the pipe. However, since condensation was not a factor in this application, the device could be installed with the converter above (see image). The NAMUR installation length (as per NE132) also makes it easy to replace the device at this measuring point.



OPTIMASS 6400 installation

### 4. Customer benefits

Using the OPTIMASS 6400 has helped ARKEMA considerably increase the accuracy and repeatability of measurement and allowed them to better meet the production quality criteria. KROHNE fully complied with the quality requirements that ARKEMA had for the measurement. The OPTIMASS 6400 is only one of many KROHNE measuring instruments used in a wide variety of measuring points in the facility.

### 5. Product used

#### OPTIMASS 6400 C

- Mass flowmeter for maximum performance in the process industry (DN 10...300 / ½...12")
- For liquid and gas applications
- For cryogenic (-200 °C / -328 °F), high temperature (+400 °C / +752 °F) and high pressure applications (up to 200 bar / 2900 psi)
- With Entrained Gas Management (EGM™): Stability with entrained gas (gas concentrations 0...100%)
- Stainless steel (316L) measuring tube, Hastelloy or Duplex
- Approved for hazardous areas (including ATEX, cFMus, IECEx, NEPSI)
- Approved for custody transfer in accordance with OIML R117, R137, MI-005, MI-002



**ETA Process Instrumentation**  
[www.etapii.com](http://www.etapii.com)  
[sales@etapii.com](mailto:sales@etapii.com)  
tel 978.532.1330

**Martech Controls**  
[www.martechcontrols.com](http://www.martechcontrols.com)  
[sales@martechcontrols.com](mailto:sales@martechcontrols.com)  
tel: 315.876.9120