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## **HFC-containing Propellants in Canned PU Foam (OCF)**

**Estimation of the reduction potential of  
emissions from OCF with regard to a clarification  
of the provisions given in §9(1) of Regulation (EC)  
842/2006**

### **Summary**

by

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**UMWELTBUNDESAMT**

## Scope of the Study

Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases (F-Gas Regulation) [1] interdicts in countries of the European Unions from 4<sup>th</sup> July 2008 onwards to place one component foams on the market if the total global warming potential of the propellant gas mixture exceeds 150. Exceptions are possible if the use of these foams is required to meet national safety standards. The German Chemicals Climate Protection Ordinance [2] does not give any further regulations.

The regulations do not treat some open questions important for both Germany and the EU as a review of the EU F-Gas Regulation will take place (Art 10).

1. Which safety standards require the use of OCF (1K, 2K) containing propellant gas mixtures of GWP > 150 (i.e. the non-flammable HFC-134a)? This question has first to be answered for the case of Germany.
2. Which high-risk applications do exist in Germany? What HFC emissions are caused by the application of OCF in these sectors in 2008-2010?
3. Which potential for emission reductions results for the period from 2010 to 2020 from a possible extension of the ban of OCF containing propellant gas mixtures of GWP < 150 from 2010 onwards?

As a basis for the discussion of these issues, the German Federal Environmental Agency asked for an overview of manufacturers in the EU and an estimation of the current production and market situation of both OCF containing HFC and HFC-free OCF in the EU and in Germany.

Based on these data, reliable statements whether or not the exception clause of the EU F-Gas Regulation is relevant for Germany have to be made.

The compilation of data is expected to serve as an appropriate basis for decisions concerning an amendment of the F-Gas Regulation by the EU Commission.

In order to meet the international reporting commitments of the UNFCCC, the study presents data on emissions of fluorinated greenhouse gases from the production and application of OCF in Germany to the German Federal Environmental Agency.

The study follows the subsequent structure:

1. Application and specifications of canned polyurethane OCF.
  2. Overview of manufacturers and market in the EU and in Germany.
  3. Importance of the propellant for canned OCF.
  4. Change of Propellant Gas in EU and in Germany since 1990
  5. Fire safety requirements for hardened foam.
  6. Explosion protection requirements, high risk provisions and applications in Germany.
  7. Recommendation for a special regulation for the mining industry
  8. Special case: Isocyanate-free foam with HFC-134a.
- Annex: Emission estimations 2007 and projections for 2010 and 2020.

## Summary

The propellant gases of OCF – first CFCs, then HCFCs, finally HFCs – have been subject to environmental legislation. In 1998, the application of OCF still constituted the major source of HFC emissions at that time by causing global warming emissions of 1.5 million t CO<sub>2</sub> equivalents in Germany.

The study shows that a lot of time was required before the European manufacturers were able to produce canned PU foam without HFC containing propellants but within the German fire protection standards for buildings. All of the eight manufacturers featuring the market in Germany can offer HFC-free OCF of commercially available type classified into Building Material Class B2. In Germany, no legal regulations require the use of materials classified less flammable than Building Material Class B2 which would apply to materials classified into Building Material Class B1 only.

As examined within this study, this is not required by any technical standards either including the following sectors:

- Road construction,
- Tunneling,
- Ship building,
- Lines for supply and discharge of water, gas and power supply lines,
- District heating pipelines,
- Automotive industry (refrigerated trucks).

While fire protection standards apply to cured foam, explosion protection requires measures against flammable gases which are released from the can during the application process. The German labour protection laws set regulations for the handling of explosible hazardous substances but do not ban them. These laws are considered to set adequate safety standards for the use of OCF containing flammable hydrocarbon gases.

The underground coal mining sector is the only exemption. Due to the high explosion risk in this sector, the use of substances featuring a flashpoint < 55°C (flammable) is interdicted by law. The authorised OCF contain exclusively incombustible propellant gas, i.e. pure HFC-134a. The number of cans used in coal mining amounts to approximately 10,000 per year.

The ban of flammable gases in the coal mining industry is the only "national safety standard" which requires the use of OCF containing propellant gases which show a GWP >150 according to annex II of the EU F-Gas Regulation.

From mid-2009, the sale of normal OCF will no longer be allowed in self-service stores because of its content of free isocyanates (MDI). MDI-free OCF is already available Europe, but only its B3 quality is produced without HFCs. HFC-free OCF of B2 standard, as required for the German market, cannot be produced without HFC-134a, so far. The manufacturers are developing isocyanate-free and HFC-free products (GWP < 150) and might be able to place them on the market in the near future.

In an additional chapter (annex), a new approach to estimate HFC emissions will be presented. Estimations for HFC emissions are given for the years 2006 to 2008 as well as emission prognoses for the years 2010 and 2020.

In Germany, climate-relevant emissions resulting from the application of OCF were cut from 1.5 million to 20,000 t CO<sub>2</sub> equivalents in the period from 1998 to 2008. They are expected to decrease to 2,000 t by 2020.