EUROPEAN COMMISSION
ENTERPRISE AND INDUSTRY DIRECTORATE-GENERAL

Chemicals, Metals, Forest-based & Textile Industries
Chemicals

REVIEW OF THE DEROGATION ON CHRYSOTILE ASBESTOS DIAPHRAGMS UNDER COMMISSION DIRECTIVE 1999/77/EC

The marketing and use of asbestos fibres, and of products to which they were deliberately added, was banned by Directive 1999/77/EC[1], with the option for exemption by Member States of diaphragms containing chrysotile asbestos used in existing electrolysis installations, a derogation that must be reviewed by the Commission before 1 January 2008. If no action is taken, the existing derogation will continue until those installations reach the end of their service life. The matter was discussed with Member States and industry for the first time at the Commission's Working Group meetings of 12 July 2006 and again on 3 July 2007.

Current situation

The chlor-alkali industry has been the main user of asbestos in electrolysis installations. Currently three chlor-alkali installations in the EU still use asbestos diaphragms. These plants provide direct and indirect employment for about 10 000 people. Two are in Germany and one is in Poland. The diaphragms in the cells of the three plants contain about 300 tons asbestos in total. These three installations, which are all relatively old, are of the low-voltage type for which no substitute diaphragm materials are available despite a considerable programme of research that has been carried out by the companies concerned. In contrast, high-voltage installations can be successfully operated with substitute materials, and some of such installations in the EU have been converted.

Technical characteristics of low-voltage and high-voltage installations

Industry reports that the installations that operate at low-voltage were designed to minimize power consumption (power represents 60% of production cost) and to deliver a 10% caustic soda solution directly useable for downstream chlorohydrin processes for the synthesis of propylene oxide and epichlorohydrin (for epoxy resins). In these processes the concentration up to 50% caustic soda is avoided which is a particularly important energy saving step. Low-voltage designs are characterized by a larger diaphragm area than is used in high-voltage installations. Because the diaphragm serves to keep apart the highly reactive electrolysis species, i.e. chlorine and caustic soda, a larger diaphragm area imposes greater demands on the separation capability of the diaphragm material. The substitute materials that are suitable for high-voltage installations allow mixing of the electrolysis products to a degree that causes safety problems in low-voltage installations,

[1] Commission Directive 1999/77/EC of 26 July 1999 adapting to technical progress for the sixth time Annex I to Council Directive 76/769/EEC on the approximation of laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (asbestos)

i.e. the risk of explosion due to the strongly exothermic nature of the reaction of chlorine with hydrogen.

The different physical lay-out of the installations also precludes the economic conversion of low-voltage installations to high-voltage operation. Replacement of the low-voltage installations by high-voltage installations would effectively require a total rebuild of the plant, which is not considered economically viable for the three installations in question.

Industry position

Industry reports that a research effort from 1975 to 2004 into potential substitute materials, e.g. polymeric and minerals, involving 200 man-years of effort and costing €37 million, produced 63 internal reports and 29 patents, and did result in a number of full-scale tests in the period 1990-1998. However, none of the new materials performed adequately in low-voltage installations. The Interim Chemicals Review Committee of the Rotterdam Convention on the Prior Informed Consent Procedure has listed 24 materials as possible alternatives to asbestos. Industry has assessed their technical feasibility for use as diaphragm materials and found that 22 materials were chemically unstable in the cell environment, and the remaining two materials, polytetrafluoroethylene and graphite, were not suitable because of their wetting or electrical conductivity characteristics. The research programme is now considered to have screened all potentially suitable candidate diaphragm materials and to have effectively exhausted all these possibilities.

In view of the poor prospects for further technical developments, Industry argues for the continued use of the low voltage installations, which is more energy efficient than the high-voltage installations, and for which the use of asbestos diaphragms poses no risk.

Risks from the continued use of asbestos diaphragms

The handling of the asbestos diaphragms throughout their life-cycle, including their final disposal, has to be done in a way that conforms to current legislation e.g. on exposure of workers to asbestos fibres. In fact, potential for worker exposure exists only when diaphragms need replacing (lifetime up to 10 years) because the electrolysis cells are hermetically sealed during operation to contain the chlorine gas. Industry reports that worker exposure limits for chrysotile are fully respected. For example, in Germany asbestos fibre concentrations in air did not exceed the natural background levels, and in Poland bi-annual monitoring by the authorities recorded values below the permitted limits[2] for dust and fibre concentration. The authorities in the two Member States have permitted the continued operation of the three installations, and have not expressed any concerns regarding their safety to the Commission.

Summary and conclusions

It seems that industry has made a considerable effort to develop alternative diaphragm materials. The substitute materials have proved successful in high-voltage installations, but not in low-voltage installations. Moreover, the future prospects for developing further substitute diaphragm materials appear to be rather poor.

[2] The permitted level for total dust is 0.5mg/m^3 and for respirable fibres is 0.1 fibres/cm^3.

Conversion of existing installations from low-voltage to high voltage operation would appear to be expensive, and is not economically viable given that the present installations operate as part of larger integrated plants. The Commission has not received any information to indicate that the continued use of asbestos diaphragms constitutes a risk.

Given that the technical difficulties in moving away from asbestos remain the same as when the derogation was granted, and that the operation of the installations has apparently not resulted in any risk, there do not appear to be grounds for withdrawing the derogation.

Member States and industry agreed with this assessment at the Commission's Working Group meeting of 3 July 2007. The review therefore concludes that the derogation can be maintained.