VECAP

CONTROLLING EMISSIONS
PROTECTING THE ENVIRONMENT
CONTINUOUS IMPROVEMENT

ANNUAL PROGRESS REPORT 2006

The Voluntary Emissions Control Action Programme for the brominated flame retardant Deca-BDE

EBFRIP
A SECTOR GROUP OF CEFIC

BSEF
Bromine Science and Environmental Forum

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This report aims to introduce VECAP to a wide range of audiences, including regulatory authorities, user industries and the general public as a whole. It is designed to provide transparent and concise information on the progress of the VECAP programme in Europe on an annual basis. Any feedback or comment on the following report is welcome and would be considered for future editions.

What is VECAP?

VECAP is a **V**oluntary **E**missions **C**ontrol **A**ction **P**rogramme established by the brominated flame retardant industry. It was set up to manage, monitor and minimise industrial emissions of brominated flame retardants into the environment through partnership with Small and Medium-sized Enterprises (SMEs). As such, it represents advance practice of what the new EU chemicals policy of REACH will require in future.

Through VECAP, the manufacturers and users of Deca-BDE are working together to establish and share best practices on the handling of Deca-BDE to minimise emissions to the environment. The VECAP Code of Good Practice can become a benchmark for a wide variety of industry sectors.

VECAP is a product stewardship industry initiative that reinforces the reduction throughout the manufacturing process by fostering a culture of continuous improvement.

Its early success has motivated the brominated flame retardant industry to roll out VECAP globally, and to implement it for other flame retardants.

"I welcome this voluntary industry programme to reduce emissions of the flame retardant Deca-BDE to the environment. DG Enterprise supports voluntary industry action where this can result in environmental improvement hand in hand with economic development. I look forward to the further expansion of VECAP with a view to this providing an example of best practice for other industrial sectors"

Michel Catinat
Head of the Competitiveness Aspects of Sustainable Development Unit, DG Enterprise, European Commission

THE BROMINATED FLAME RETARDANT INDUSTRY'S COMMITMENT UNDERPINNING VECAP

The brominated flame retardant industry has voluntarily committed itself to VECAP, serving as a commitment shared by its members, who support all activities which promote:

- ➜ public health and safety
- ➜ transparency with public authorities
- ➜ scientific research
- ➜ responsible care for the environment
- ➜ a commitment to promoting fire safety through the most environmentally sustainable manner

THE VECAP PROGRAMME IS BASED ON THE FOLLOWING PRINCIPLES:

VOLUNTARY INITIATIVE: it demonstrates the commitment of the industries involved, to voluntary act in a manner which supports the interests of society and the environment.

CONTINUAL IMPROVEMENT: recognition that we can always improve processes further and should do so if economically justified.

PROMOTING SUSTAINABILITY: reducing impact on the environment while enhancing the competitiveness of local industries.

TRANSPARENCY: publishing of reports and information for the involved parties collected via an independent Product Steward.

DIALOGUE: VECAP is promoting open dialogue with all interested bodies at national and EU level. This dialogue will progress with time and feedback.

BEST PRACTICE SHARING: VECAP offers all companies - small, medium or large - equal access to the industry's expertise in environmental and process performance best practice. Such access allows benchmarking and drives continuous improvement.

SAFE USE: VECAP is providing detailed information ensuring safe and eco-efficient use of brominated flame retardants.

VECAP CERTIFICATION: an independent third party VECAP audit procedure, using ISO 9001/14001 principles is under development.

ABBREVIATIONS

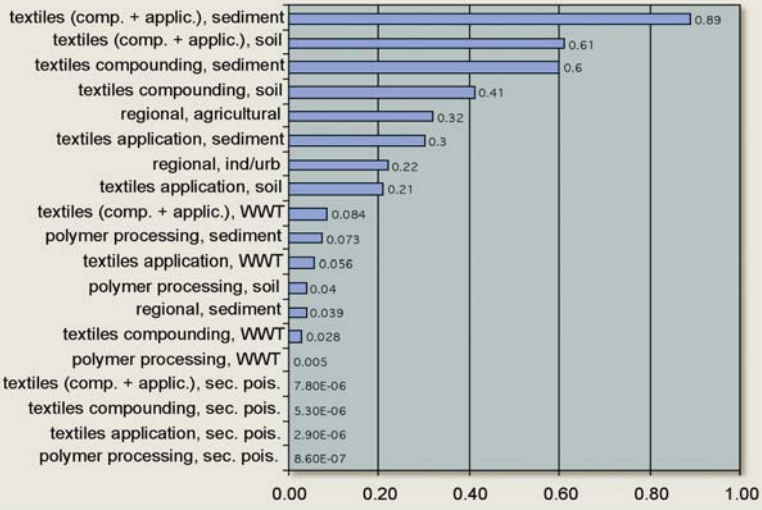
BFRs	Brominated flame retardants
BSEF	Bromine Science and Environmental Forum
Deca-BDE	Decabromodiphenyl ether
EBFRIP	European Brominated Flame Retardant Industry Panel
VECAP	Voluntary Emissions Control Action Programme
PEC	Predicted Environmental Concentrations
PNEC	Predicted No-Effect Concentrations

Why VECAP?

In 2001, BSEF commissioned the Dutch Fisheries Research Institute (RIVO) to take environmental samples in five EU Member States (the Netherlands, Belgium, Germany, Ireland and the UK). The RIVO findings, published in 2002, showed low detection levels of Deca-BDE, mainly in sediment. Importantly, this study showed that the detection levels were substantially more significant near certain industrial production sites where Deca-BDE was used.

The RIVO results prompted the brominated flame retardant industry to initiate the VECAP programme. Since Deca-BDE is not manufactured in the EU, the emissions of Deca-BDE into the environment were coming from operations associated with the formulation and use at downstream production sites. In order to monitor the success of the VECAP program, the brominated flame retardant industry embarked on what has become a ten-year programme to develop and implement a system for emission monitoring and control measures. The initial focus of the programme are the textile and plastics industries in the UK, France, Germany, Italy, Belgium and the Netherlands, covering more than 95% of the Deca-BDE EU consumption.

PEC/PNEC RATIO FOR DECA-BDE



Summarised from EU Risk Assessment Report 2002 demonstrating low environmental risk (all PEC/PNEC ratios < 1) but greater emissions from textiles application.

Measuring VECAP in envionment

As emissions from textile production sites, which use wet processes with a potential for water emissions, were higher than at plastics compounders, which only use dry processes, textile applications were deemed the first priority. EBFRIP joined with the UK Textile Finishers Association to develop a first-ever pilot emission control programme for textile applications in the UK. With the support of EU Regulatory Authorities in May 2004, VECAP was officially started.

While the EU risk assessment on Deca-BDE concluded that given the latest scientific information there was no need for further risk reduction measures, it was agreed that a specific action programme could contribute to control and reduce emissions into the environment more effectively and quickly.

Deca-BDE has proven to have excellent flame retarding properties, with its persistence being its strongest asset in providing necessary long-term fire prevention. This persistence is also the source of some environmental concern. Although Deca-BDE has not been found to be harmful to the environment, there is concern that due to its persistency levels may build up in the environment. In the interest of increased fire safety and the environment, the relevant stakeholders have come together to ensure that Deca-BDE continues to enable high level of public fire safety in the most sustainable manner.

This VECAP Europe Annual Progress Report (May 2006) marks the results of the UK pilot programme and the implementation of the VECAP programme in five other EU countries.

"Our customers expect us to control carefully the use of chemicals in the products we sell. VECAP is just the type of proactive response we are looking for our suppliers to adopt to meet these growing customer expectations."

Mike Barry ,
Head of Corporate Social Responsibility ,
Marks & Spencer

Why VECAP?

VECAP'S FORECASTED ROLL-OUT IN EUROPE

The VECAP European roll-out is projected according to the following timeframe.

"Ford Motor Company supports the objectives of this voluntary initiative to further minimise brominated flame retardant environmental emissions. Based on pan-regional rollout of VECAP, application of the program to Ford's affected supply base would be encouraged."

Andy Taylor, Director,
Corporate Citizenship/Sustainability, Ford of Europe.

Message from the VECAP Product Steward

VECAP is about people. The VECAP team would like to thank the Deca-BDE user companies who have embraced the VECAP mission, and have accepted our interventions and recommendations almost without fail. The Textile Finishers Association (TFA) played a pivotal role in carrying out the pilot project in the UK. Each of the EBFRIP member companies, Albemarle, Chemtura and ICL-IP, have dedicated customer service managers to make the continuous improvement philosophy a reality at the Deca-BDE user level.

The philosophy of VECAP is to show continuous improvements, and we are only taking our first steps in that direction. This report provides first emissions considerations for the plastics and textiles sectors using Deca-BDE in 6 EU countries. The year to year market variations in the sales of Deca-BDE may result in different emissions pictures. In the coming years our progressive learning curve will provide a more global and complete view. This continuous improvement cycle will allow us to optimise the resulting data in line with new findings and a more detailed understanding of the processes involved.

Meanwhile, the future of VECAP is developing quickly. VECAP is quickly spreading throughout Germany, France, Italy, Belgium and the Netherlands. We are beginning the project in the United States and Canada and extending the VECAP codes of good practice to other brominated flame retardants. Soon we will launch VECAP for TBBPA and HBCD used in textiles and a similar programme, SECURE for HBCD's use in expanded and extruded polystyrene. We are developing an independent, third party auditing system, using ISO 9001/14001 principles. Other industry sectors are looking to our programme for guidance in setting up their own product stewardship and emission control measures.

This programme has been made possible by many individuals who believed in the programme when it was merely a concept. There were some who preferred to remain sceptical as to whether a largely SME-based industry chain would be prepared to act voluntarily to reduce emissions of a chemical for which no risk reduction measures had been deemed necessary by the EU authorities. But such voices were in a minority. I would like to thank the encouragement provided by regulatory authorities across Europe who have given us the chance to prove that voluntary emissions reduction is possible and can lead to results far more quickly than risk reduction. Above all, I salute the Deca-BDE user chain which has embraced VECAP. I am proud to be part of an industry of such committed individuals. It is with great pleasure that I share these initial results in this report.

Paul Adriaenssens
VECAP Product Steward

How Does VECAP work?

THE VECAP PROCESS

The VECAP process is structured to support the principle of continuous improvement, with the six steps moving in a cyclical manner:

1 → COMMITMENT TO THE VECAP CODE OF GOOD PRACTICE

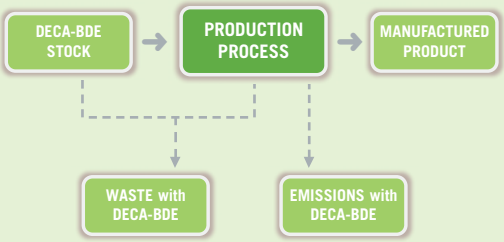
The VECAP system starts with the user's commitment to the programme, adopting the Industry's Code of Good Practice and implementing these principles into the procedures and work instructions of daily operations.

2 → SELF AUDIT

In a self-audit, the company identifies the production flow sheet of involved Deca-BDE production processes.

3 → MASS BALANCE APPROACH

The company determines the needed data to complete and close the mass balance as accurately as possible (signaling the gap in amount of Deca-BDE entering and leaving the production processes based on a worst case scenario).



VECAP is a process of continuous improvement. In repeating the process cycle, the user checks to make sure that the changes made have resulted in the expected emission reductions and looks for further changes to reduce significant emissions.

4 → BASELINE EMISSIONS SURVEY

The company uses the obtained mass balance results as a baseline to demonstrate the actual process emission performance and to determine future opportunities for emissions reduction.

5 → EMISSIONS IMPROVEMENT PLAN

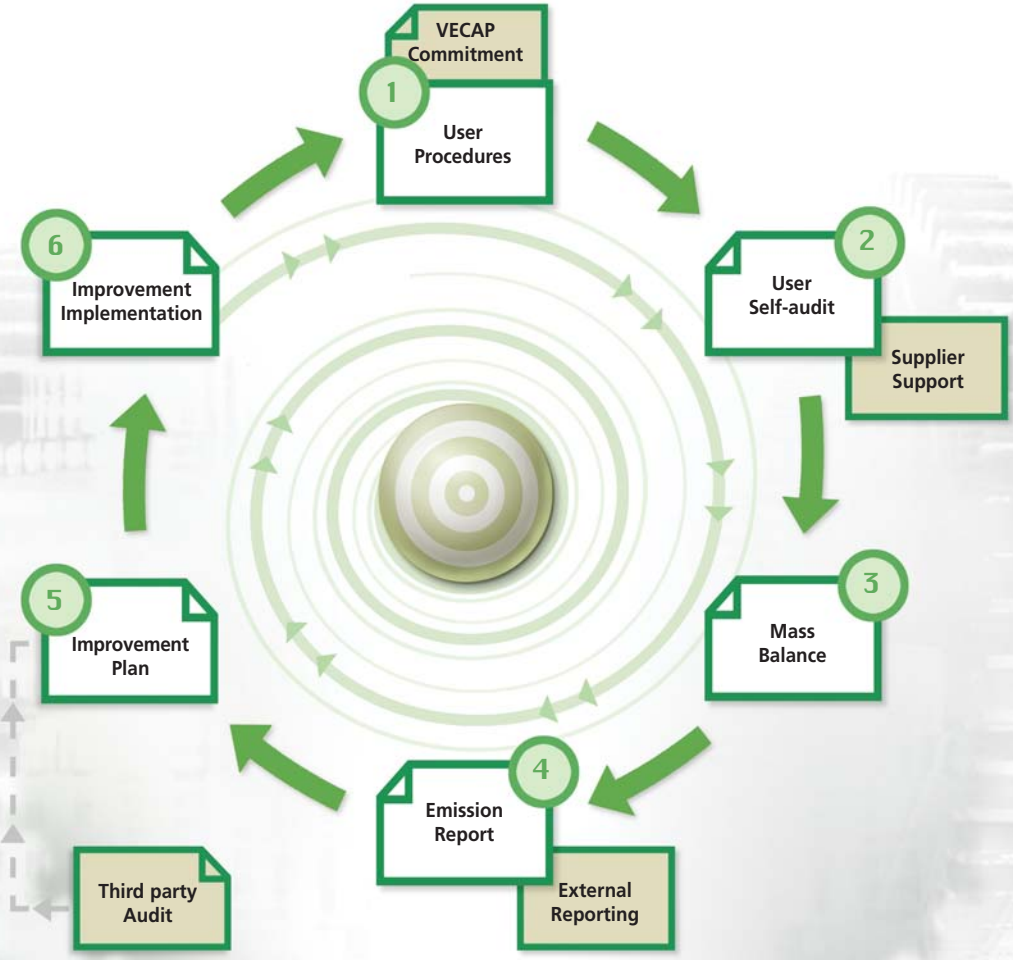
An emission improvement plan is determined in accordance with the company's own objectives and policies.

6 → IMPLEMENTATION AND CONTINUOUS IMPROVEMENT

Once the improvement plan is implemented, operational results are evaluated and potential for further emission reductions investigated, ensuring effective continuous improvement.

THE VECAP PROCESS

Continuous Improvement



2004-2006 Developments of the VECAP programme

COMMITMENTS TO APPLY VECAP PRINCIPLES

Commitment to VECAP is defined as a Deca-BDE user formally implementing the principles in the Code of Practice. The company then completes a baseline assessment of Deca-BDE emissions from the production facility. This forms the basis for future emission reduction and continuous improvement.

TEXTILES:
79 vol.% of the Deca-BDE textile users in the six priority Member States - Belgium, France, Germany, Italy, the Netherlands and the UK - have commited to VECAP and are applying the VECAP Code of Good Practice principles in daily operations.

PLASTICS:
48 vol.% of Deca-BDE usage for plastics in Belgium, France, Germany, Italy, the Netherlands and the UK is now covered by user commitments to VECAP Code of Good Practice principles. Initial baseline estimates are currently being evaluated.

"It is clear from the enthusiasm and commitment which our members have shown in implementing the VECAP process that this is a simple and practical scheme which can provide immediate and significant benefits."

John Lambert,
Secretary of the UK Textile Finishers' Association

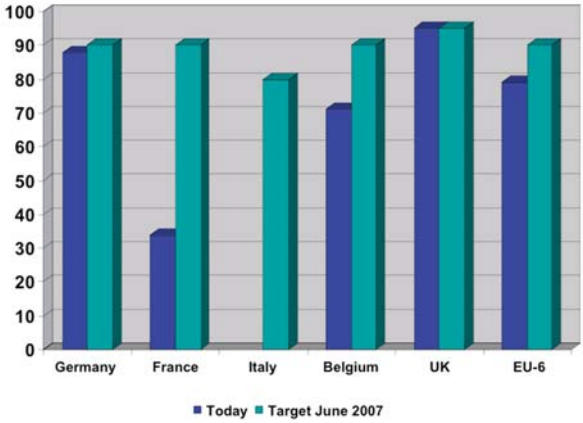
DECA-BDE USER COMMITMENTS TO VECAP

Country	Textiles		Plastics	
	Present	June 2007	Present	June 2007
United Kingdom	95%	95%	73%	80%
Belgium	71%	90%	89%	90%
Netherlands	No usage	No usage	100%	100%
Germany	88%	90%	38%	80%
France	34%	90%	29%	80%
Italy	In progress*	80%	59%	80%
Above EU-6 Member States	79%	90%	48%	85%

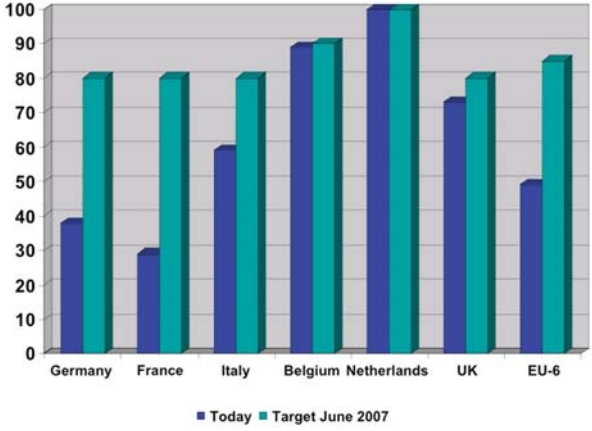
*Textiles < 5% Deca consumption

RESULTS

COMMITMENT TO VECAP - TEXTILES



COMMITMENT TO VECAP - PLASTICS



2004-2006 Developments of the VECAP programme

BASELINE EMISSIONS SURVEY RESULTS

Once a user has accepted the VECAP commitment, a baseline of its actual process emissions will be determined. The objective of the baseline is to collect data for an evaluation of the environmental performance and to obtain a reference allowing the measurement of future improvements.

"The Environment Agency (England and Wales) is pleased to see chemical producers working so effectively with their downstream users to introduce a process to monitor and control emissions. Had VECAP been a regulatory measure, with overall UK emission reductions of 75% in its first year, it would have been hailed as a major success. That it was achieved as an industry voluntary commitment means that this level of environmental protection was attained far faster and with great savings. We look forward to the next year's developments."

England and Wales Environment Agency

TEXTILES:

United Kingdom: The UK's Textile Finishers' Association, TFA, carried out a baseline emissions survey in 2004 and a second survey in 2005. In the 2004 VECAP Survey, emission reductions of 90% were recorded in some plants compared to pre-survey data. Preliminary reports from the subsequent 2005 VECAP Survey indicate an overall 75% reduction of emissions to water compared to the baseline established by the 2004 Survey, thus resulting in a significant overall reduction.

Belgium: 65% of Deca-BDE's usage in the textiles industry is now covered by VECAP in the form of signed commitments to the Code of Practice principles. In addition, a baseline emissions survey was completed in Q1 of 2006 covering 65% of Deca-BDE's usage.

France: Work with textile users of Deca-BDE is progressing with a commitment of 34% based on given information to determine the baseline values.

Germany: German textile Deca-BDE users have strongly committed to the VECAP programme, with already 88% of the total usage signed up to the VECAP principles. 21% of the volume used have completed a baseline emissions survey.

Italy: Initial contacts have been made with Deca-BDE users and we expect to be able to report significant progress in terms of commitment and baseline surveys. Note that textiles usage account for no more than 5% of total Deca-BDE consumption in Italy.

The Netherlands: No usage of Deca-BDE has been identified for textiles in the Netherlands

PLASTICS:
Work on baseline surveys is underway in each of the six selected Member States so as to provide data by the end of 2006.

United Kingdom: In 2005, 73% of Deca-BDE usage in the plastics sector was covered by a baseline emissions survey. These baseline estimates indicate that emissions per tonne of Deca-BDE used are far lower (>10x) than those for the equivalent textile sector.

Belgium: 89% of the Deca-BDE usage have signed up to the commitment to applying the VECAP principles and techniques. A baseline emissions survey has been completed for 52% of the volume of Deca-BDE used.

Italy: 59% of Italian plastics usage of Deca-BDE is signed up to the principles of the VECAP programme. Work is under way for completion of a Deca-BDE plastics baseline emissions survey. Cooperation is already in progress with the Italian plastics federation (PlasticsEurope Italia) to further increase the % of user commitment.

France: Discussions with Deca-BDE plastic users have recently started in France with 29% of Deca-BDE usage signed up to VECAP. We expect to be able to report a first baseline survey figure after the summer 2006.

Germany: Discussions with Deca-BDE plastic users have recently started in Germany. 38% of German plastics usage has signed up to the principles of the VECAP programme. Work is under way for completion of a Deca-BDE plastics baseline emissions survey.

The Netherlands: 100% of Deca-BDE's plastic usage is signed up to the VECAP principles and techniques. All of the Deca-BDE usage in plastics in The Netherlands has completed a baseline emissions survey.

DECA BDE BASELINE DETERMINATION

Country	Textiles		Plastics	
	Present	January 2007	Present	January 2007
United Kingdom	95%**	3rd mass balance**	73%	80%
Belgium	65%	80%	52%	70%
Netherlands	No usage	No usage	100%	100%
Germany	21%	60%	In progress	40%
France	34%	75%	In progress	30%
Italy	In progress	*	5%	40%
Above EU-6 Member States	66%	75%	11%	45%

*No specific target **UK Textiles, Textile Finishers Association data

Note that these values only consider the production emissions. Other potential emissions such as waste or damaged packaging are not incorporated

Providing Support to VECAP users

VECAP COMPETENCE CENTRE

Companies are improving their production processes allowing better environmental performance and helping to meet the Code of Good Practice commitments. In order to assist Deca-BDE user companies, a need for a competence centre was detected.

The VECAP competence centre aims to provide answers to questions such as:

- To check the effectivity of waste water treatment, analysing Deca-BDE concentrations might be needed, but how should this be done?
- What is the best and most representative sampling method taking into account that the solubility of Deca-BDE in water is very low?
  - What is the best analytic method?
  - What laboratories are qualified to do such an analysis?
- How should I treat wastewater in order to remove Deca-BDE?
  - What is the best technology?
  - Should filters be used?
- What is the preferable disposal option for packaging waste?
- What is an effective filter system to prevent air emissions?

This competence centre will be established in 2006-2007. It will be equipped not only with the capacity to support VECAP users in addressing their specific needs, but also to further improve the VECAP system itself as it evolves and to promote operational implementation of this pratice.

"The EOC group will certainly benefit from VECAP, which will ensure that everyone who is working with flame retardant finishing will receive the most updated information on Deca-BDE and the flame retardant compound. Moreover it will strenghten the EOC group's environmental philosophy on emission management and process improvement"

Wim Duyvejonck
Product Manager for EOC GROUP
(Belgian textiles company)

VECAP TOOLKIT

EBFRIP has developed a toolkit to assist the Deca-BDE downstream users to perform the self-audit and draw a mass balance. It also provides general principles to monitor and control emissions. The toolkit is available in English, French, Italian and German and consists of the following elements:

CODE OF GOOD PRACTICE

This document includes working procedures and good housekeeping measures aimed at controlling and reducing emissions

SELF-CONTROL GUIDANCE DOCUMENT

Supports users in defining where they stand in respect of the Code provisions

PROCESS FLOW CHART

Assists the user to identify where the potential material losses can occur within the processes

MASS BALANCE SHEET

Indicates which data should be measured, recorded and managed

Consult http://www.bsef.com/vecap
to download the above materials.

Certification

External certification by an independent third party will become operational for interested users during 2007.

The following schedule indicates the major milestones to achieve this target:

- ***Technical Reference***
  Ready end 2006
- ***Test audits***
  January – February 2007
- ***Final adjustment of Reference & Control Plan***
  April – May 2007
- ***Certification operational***
  Mid-2007

Q&A VECAP

A Questions and Answers document will be available mid June 2006 via the website http://www.bsef.com/vecap

Product Steward support

For individual assistance to introduce VECAP contact the VECAP Product Steward, Paul Adriaenssens at qualipa@skynet.be or +32 475 74 34 41

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VECAP is a voluntary initiative of the European Brominated Flame Retardant Industry Panel - EBFRIP together with the industry's global organisation, the Bromine Science and Environmental Forum - BSEF, and with the support of the European Plastics Converters - EUPC (www.eupc.org) and the European Apparel and Textiles Organisation - Euratex (www.euratex.org).

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