



European regulation on release of ammonia from cellulose insulation products:
Relations between EN 16516 and REACH
17/10/2019 – Dr. François MAUPETIT

CSTB
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CSTB / The starting point

Commission Decision 2010/72/EU of 8 February 2010 concerning the non-inclusion of certain substances in Annex I, IA or IB to Directive 98/8/EC

→ **BORIC ACID (REPR. 1B) CANNOT BE USED ANY MORE IN SOME APPLICATIONS, INCLUDING ANTI FUNGI PRODUCTS**

French Commission in charge of delivering Technical Agreements

→ **PRODUCERS OF CELLULOSE INSULATION PRODUCTS WERE GIVEN A 2 YEARS TRANSITION PERIOD TO SUBSTITUTE BORIC ACID USED AS BIOCIDES**

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CSTB / Odours and complaints

Summer – Fall 2012: Complaints on more than 110 individual dwellings refurbished with cellulose insulation (treated with ammonium salts) were collected

→ **AMMONIA ODOUR REPORTED BY OCCUPANTS DURING/AFTER WET WEATHER EVENTS (RAIN, FOG, ETC.)**

→ **PRODUCERS HAD TO WITHDRAW THE INSULATION PRODUCT**

Reports concerning general population and occupational exposure were collected by French authorities

→ **AMMONIA INDOOR CONCENTRATION MEASUREMENTS (0-9 PPM)**

→ **LIMITED NUMBER OF CASES OF RESPIRATORY IRRITATION**

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CSTB / Can ammonia emissions from cellulose insulation products be tested using EN 16516 ?

October 2012 : CSTB was asked by the French Ministry of Housing to test ammonia emissions from all insulation products placed on the French market

→ **CEN/TS 16516 IN FINAL VERSION READY FOR FORMAL VOTE**

> Ammonia emissions not included


→ **CSTB PERFORMED PRELIMINARY TESTS DERIVED FROM EN ISO 16000**

> Simulation of emissions into indoor air using emission test chambers

> Definition of an indoor air emission scenario (dry application: blowing in attics)

> Characterization of ammonia emissions into indoor air (no available standard)

> Influence of high relative humidity (RH) on ammonia (NH₃) emissions



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CSTB / Ammonia emissions testing: Preliminary results

11 cellulose insulation products treated with ammonium salts were tested

→ **11/11 PRODUCTS COULD EMIT NH₃**

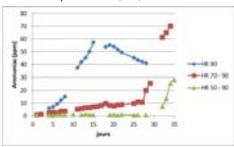
> NH₃ emissions from cellulose insulation are highly RH dependant

> Water uptake by the material (~5 % in mass) is a key factor for the release of NH₃

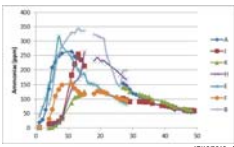
> Ammonia emissions were low to very high at 90 % RH

→ **EN ISO 16000 (AND CONSEQUENTLY EN 16516) CAN BE ADAPTED AND USED FOR THE CHARACTERIZATION OF NH₃ EMISSIONS FROM BUILDING PRODUCTS**

1 product: 50, 70, 90 % RH



7 products : 90 % RH



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CSTB / EN 16516 and REACH

- 21 June 2013, French Order
- **BAN OF CELLULOSE INSULATION PRODUCTS TREATED WITH AMMONIUM SALTS**
- 18 June 2014: REACH Annex XV restriction report
- 23 June 2016: Commission Regulation (EU) 2016/1017
- **CELLULOSE INSULATION PRODUCTS SHALL NOT BE PLACED ON THE MARKET, UNLESS:**
- > Emissions of ammonia < 3 ppm according to CEN/TS 16516
- > Test duration: 14 days
- > Relative Humidity: 90 %

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CSTB / CEN/TC 351/WG 2 contribution
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WG 2 has been asked by DG REACH unit to amend EN 16516 for the characterization of ammonia emissions from building products

WG 2 organized its work with two tasks:

- 1. EN 16516 AMENDMENT FOR THE CHARACTERIZATION OF NH₃ EMISSIONS FROM ALL BUILDING PRODUCTS AT 50 % RH**
 - > NH₃ sampling and measurements methods into indoor air
 - o Spectrophotometric analysis (and alternative methods)
 - > RRT on NH₃ emissions at 50% RH (8 participating labs)
 - o Validation of different analytical methods (uncertainty : ± 13 %)

> EN 16516/prA1 : Amendment to EN 16516 on ammonia emissions.
Approved project after CEN enquiry (summer 2019)

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CSTB / CEN/TC 351/WG 2 contribution
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WG 2 organized its work with two tasks:

- 2. TR ON THE CHARACTERIZATION OF NH₃ EMISSIONS FROM CELLULOSE INSULATION PRODUCTS AT 90 % RH**
 - > WG 2 Task Force
 - > Definition of specific emission scenarios (open blow in attics, cavity applications: walls, ceiling, floor)
 - > RH during testing: 90 % ± 5 %
 - > Testing duration: 14 days
 - > NH₃ sampling and measurements methods into indoor air (see EN 16516/prA1)
 - > RRT on NH₃ emissions at 90 % RH (8 participating labs)
 - o Difficulties in controlling RH at 90 % ± 5 %
 - o Standard dev. NH₃ measurement : ± 34 %

> CEN/TR 17304: Determination of emissions into indoor air of ammonia from cellulose insulation at 90% RH (published in July 2019)

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CSTB / Conclusions
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The concept of EN 16516 is well suited for the characterization of volatile emissions from several products:

- SIMULATION OF EMISSIONS INTO INDOOR AIR (TEST CHAMBER)
- SAMPLING AND MEASUREMENT OF SPECIFIC COMPOUNDS (VOC, FORMALDEHYDE, AMMONIA)
- EVALUATION OF EMISSIONS IN A CONVENTIONAL SCENARIO (REFERENCE ROOM)

EN 16516 is ready for use for several purposes :

- CE MARKING OF BUILDING PRODUCTS: EU VOC CLASSES
- REACH RESTRICTION ON AMMONIUM SALTS : NH₃ EMISSIONS
- REACH RESTRICTION ON FORMALDEHYDE: EMISSIONS FROM BUILDING PRODUCTS

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