Current Work on Dust Test Method Standardisation – ongoing work in CEN and IEC/ISO

Presentation given at 52nd UKELG "*Dust Explosions*" held at Leeds University 23rd September 2014

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Disclaimer

- Due to the informal nature of UKELG meetings there was no accompanying paper to this presentation.

- These slides were an accompaniment to the talk. Warning, they do not contain a transcript of what was said, so much detail and context may be missing.

Who am I?

- Fire and Explosion hazards
  - Active Ingredients
  - Formulations
  - Seeds
- Convenor of CEN/TC 305 WG1
- Member of IEC MT 80079-20-2;
  - WG28; MT 80079-20-1; WG31

CEN/TC 305: Potentially Explosive Atmospheres – Explosion Prevention and Protection

- 6 Working Groups (WGs)
- WG1 – material characterisation
  - Test methods for determining the flammability characteristics of substances
- WG2- equipment
  - Equipment for use in potentially explosive atmospheres
- WG3 – Protective systems
  - Devices and Systems for explosion prevention and detection
- WG4 – Definitions
  - Terminology and Methodology
- WG5 – Mining
  - Equipment and protective systems for mining
- WG6 – Flame Arrestors

IEC/TC 31 – Equipment for Explosive Atmospheres

- 60079 series of standards
- Various Sub-committees, WGs, MTs and Ad-Hoc groups (AHGs)
- SC31G
  - Intrinsically Safe
- SC31J
  - Classification of hazardous areas and installation requirements
- SC31M
  - Non-electrical equipment and protective systems for explosive atmospheres
- WG28
  - Dusts
- WG31
  - Hybrids

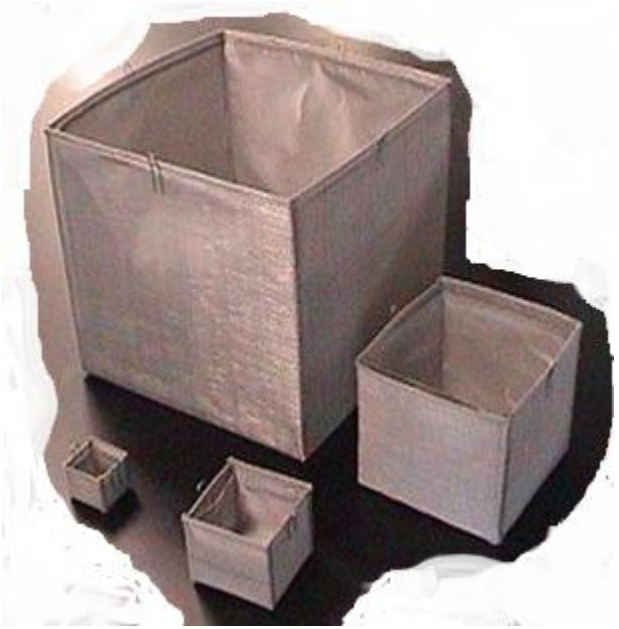
Things to note

- CEN standards
  - Demonstrate compliance with ATEX directives
- CEN/CENELEC
  - adopt IEC (&ISO) standards
  - Some additions
- SC31M
  - 80079 series of standards
  - Dual logo with ISO
  - 3 rounds of voting
    - CEN; IEC; ISO

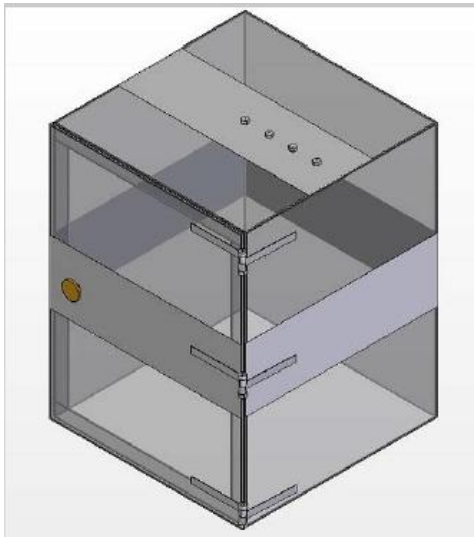
TC 305/WG1

- Dust Standards
  - EN 13831: MIE
  - EN 14034 series: 1m^3/20 litre sphere
    - P_{max}; dp/dt; LOC; MEC
  - EN 15188: Bowes-Cameron cage tests/basket line
    - Determination of the spontaneous ignition behaviour of dust accumulations
  - IEC 80079-20-2
- Pre-work items
  - Burning Class/Burning Number
- Future Work?
  - Nanopowders
  - Dustiness

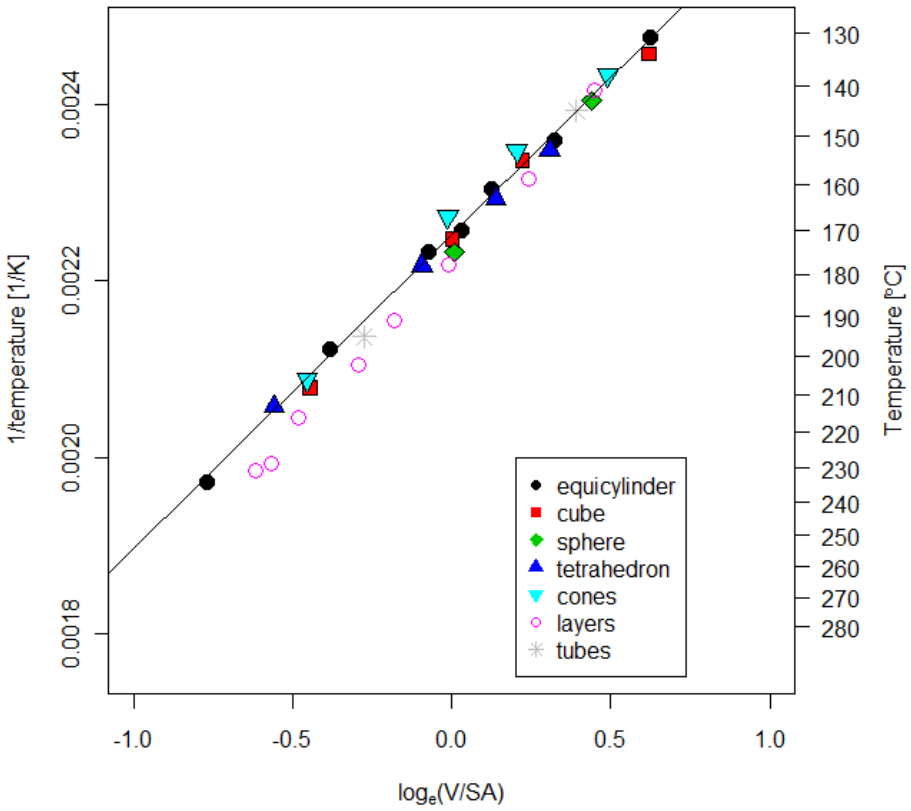
Dust Accumulation Stability – EN 15188

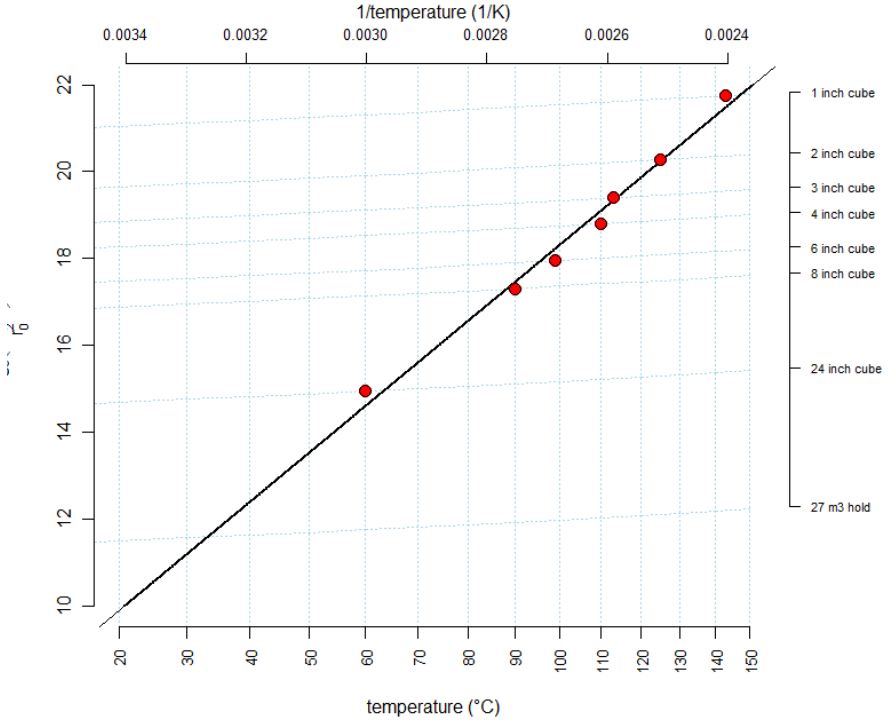


- Isoperibolic Oven testing
- Frank-Kamenetskii/Leuschke scaling
- Wire mesh cages – Bowes Cameron
- Approaching second round of “round robin”
  - More materials following carbon
- Re-design of oven cage



EN 15188 continued – scaling





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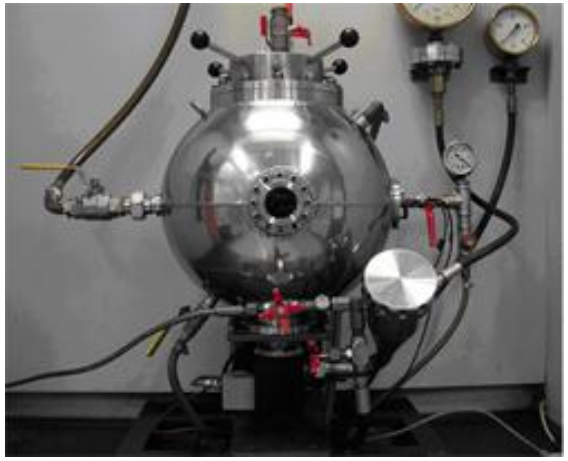
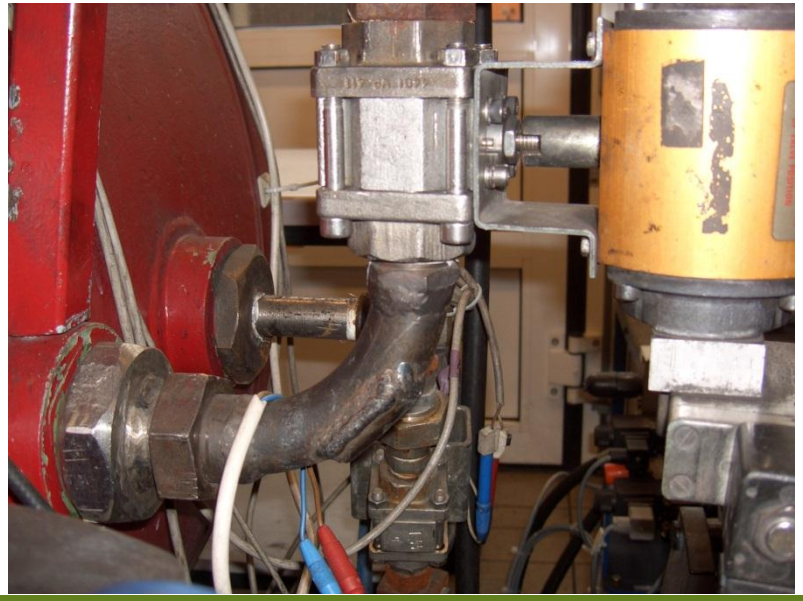
Legend of the Golden Sphere



- EN 14043 – explosion pressure characteristics
  - Current Standard based on $1m^3$
  - 20 litre is an annex
- **As standardised no longer exists**
- Variations in feed pipes and valves, hence delay time



Compromise?

- 200 plus 20 litre spheres
  - Identical designs
- Fewer than 10 1m^3 vessels identified
  - Most in Germany
    - (may have changed)
- Magic words
  - "*for which conformity has be proven*"

- 20 litre equal weighting
- 2nd hand verification to original
- Regular comparison and verification to known dust

80079-20-2 – test methods and …

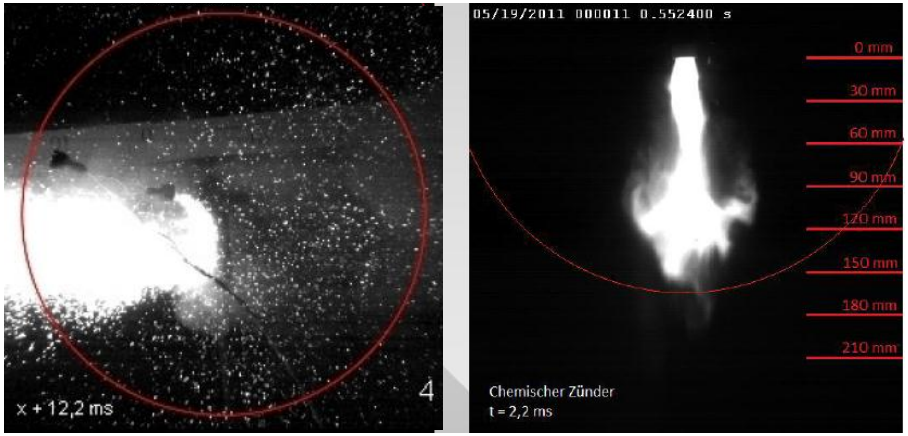
- To provide a definitive test protocol for ‘combustible dust’
- (GHS)
- Plus test methods for classification
  - Amalgamation of previous separate standards
  - Plus some convergence of CEN/ASTM
  - Database of properties!

Combustible dust

- Or *explosible* or *flammable dust cloud* or *potentially explosive dust atmosphere.*
- How hard do you hit it?
  - Saying yes is easy
  - Saying definitively no is harder

  - Visual tests clearer
    - Some tests closed

  - Overdrive or underdrive?



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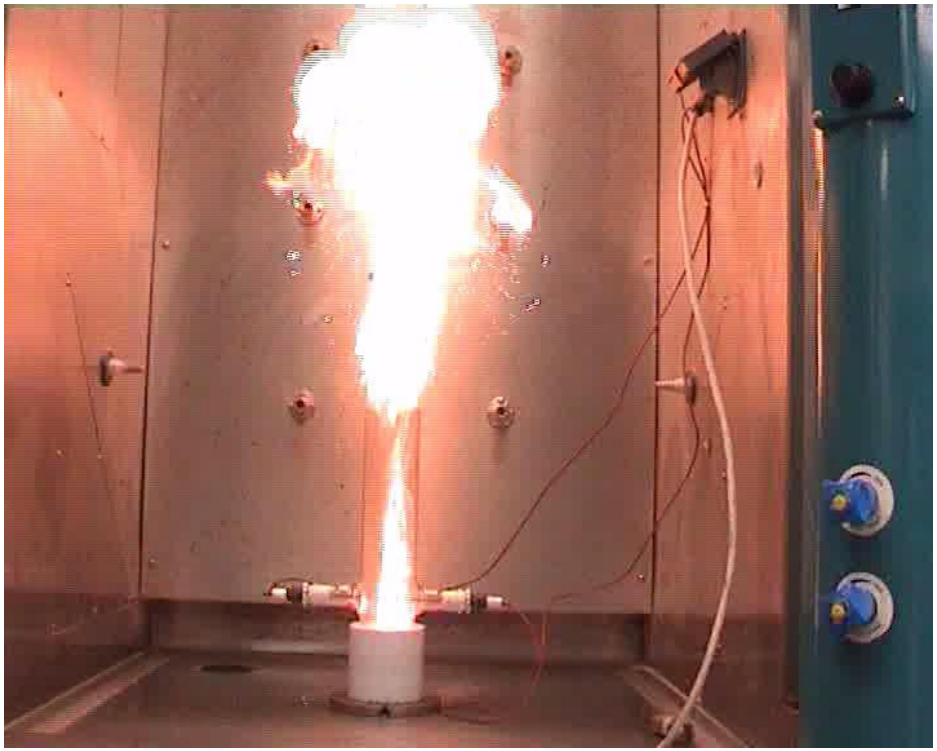
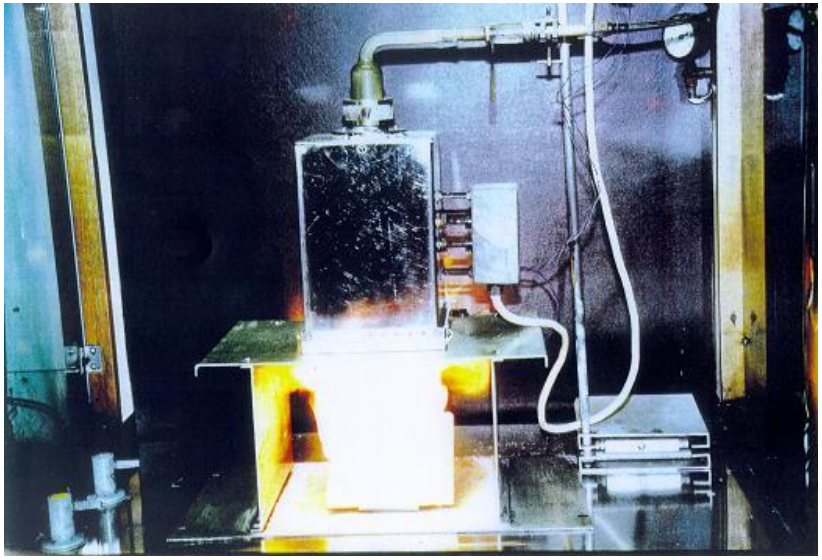
Test protocol





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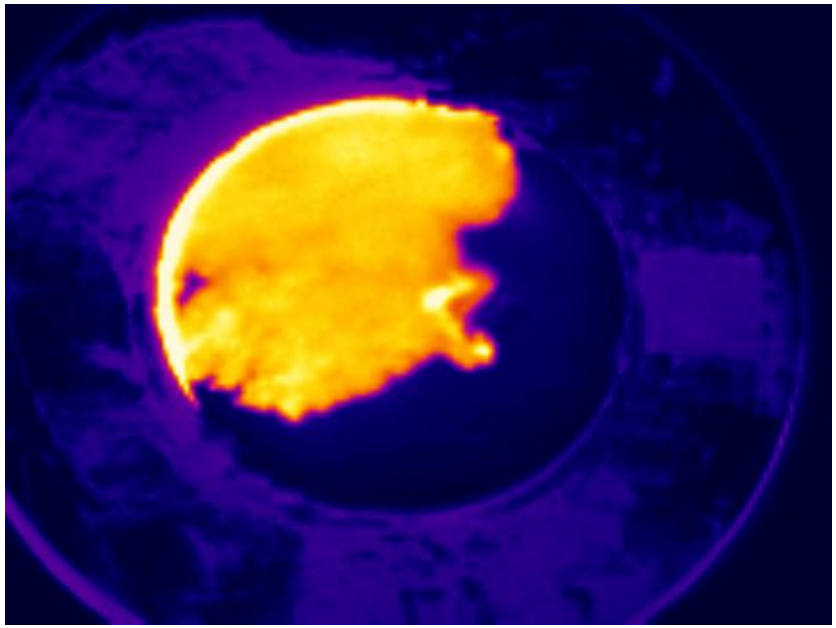
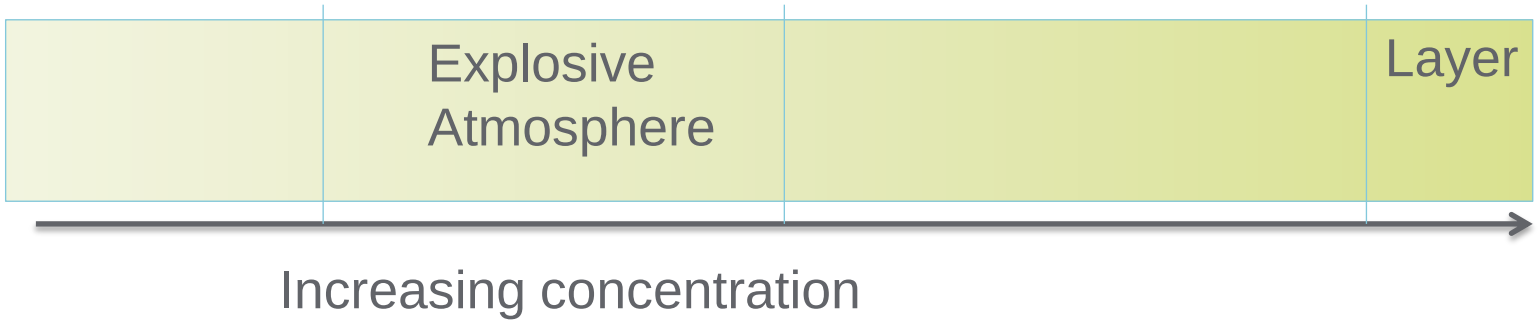
When does a non-combustible dust combust?

- No dust cloud explosion hazard
  - Is there still a fire hazard?
  - YES!
  - Can still ignite layers





Other issues (80079-20-2)

- Scope limited
  - Explosive atmospheres
  - Not all test methods
- Confusion over resistivity/conductivity
  - Not electrostatic
  - Short circuits only
- Database:
  - Refers to GESTIS dust
  - Hence BAM oven

Burning Class – formerly VDI 2263 part 1

Burning class – still to be finalised

- Variation with surface
  - Melting materials
- Ignition source
  - Flame
  - Platinum wire
  - (smouldering material)
- How hard do you try
  - Attempted ignition duration
  - Air flow
- How fast ?

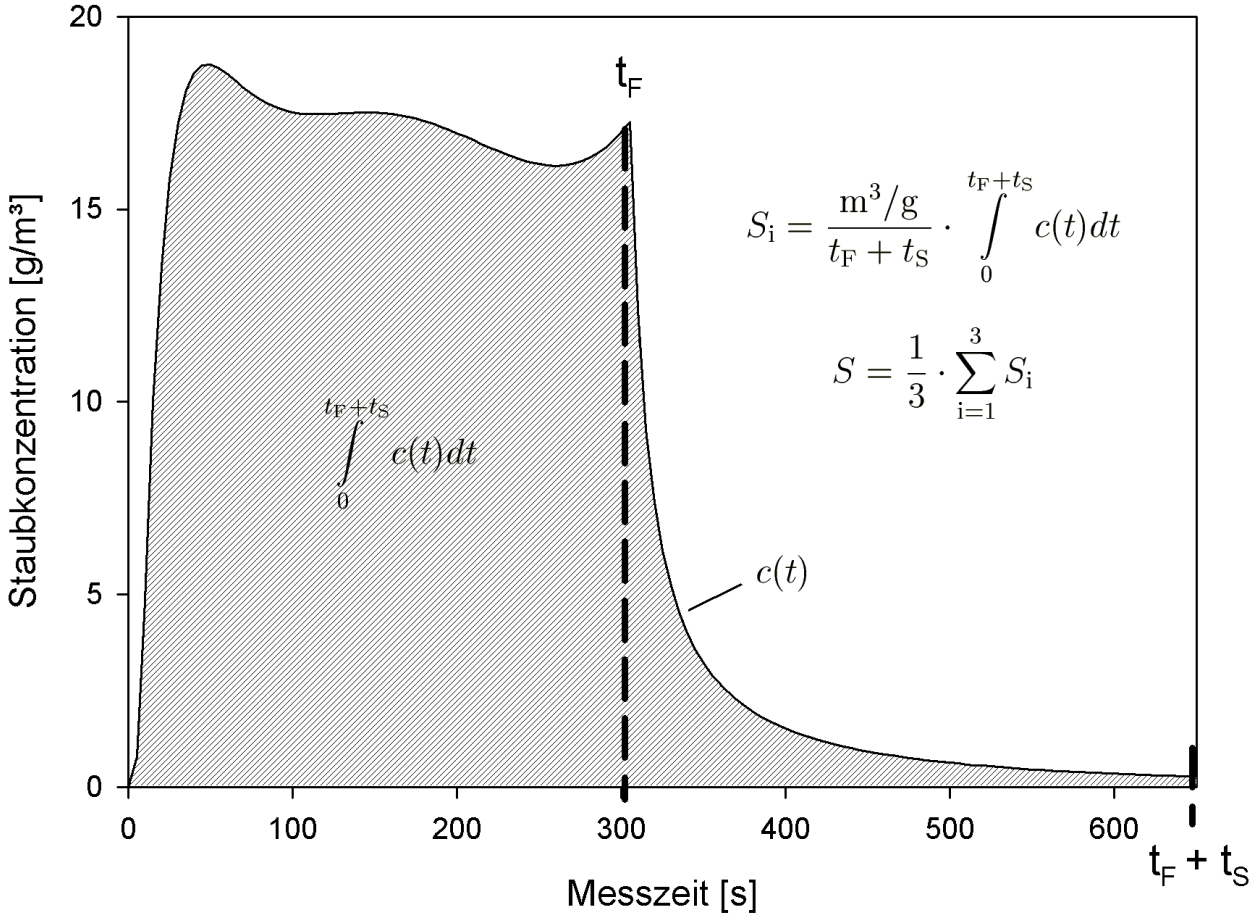
Nano powders

- Containment/hygiene
- Pyrophoricity

- No step change in MIE or explosion characteristics

Dustiness

- Dust concentration during pouring and for a period after



- 2263 part 9
- Other methods
- BAM research

- How does it relate to practical situation

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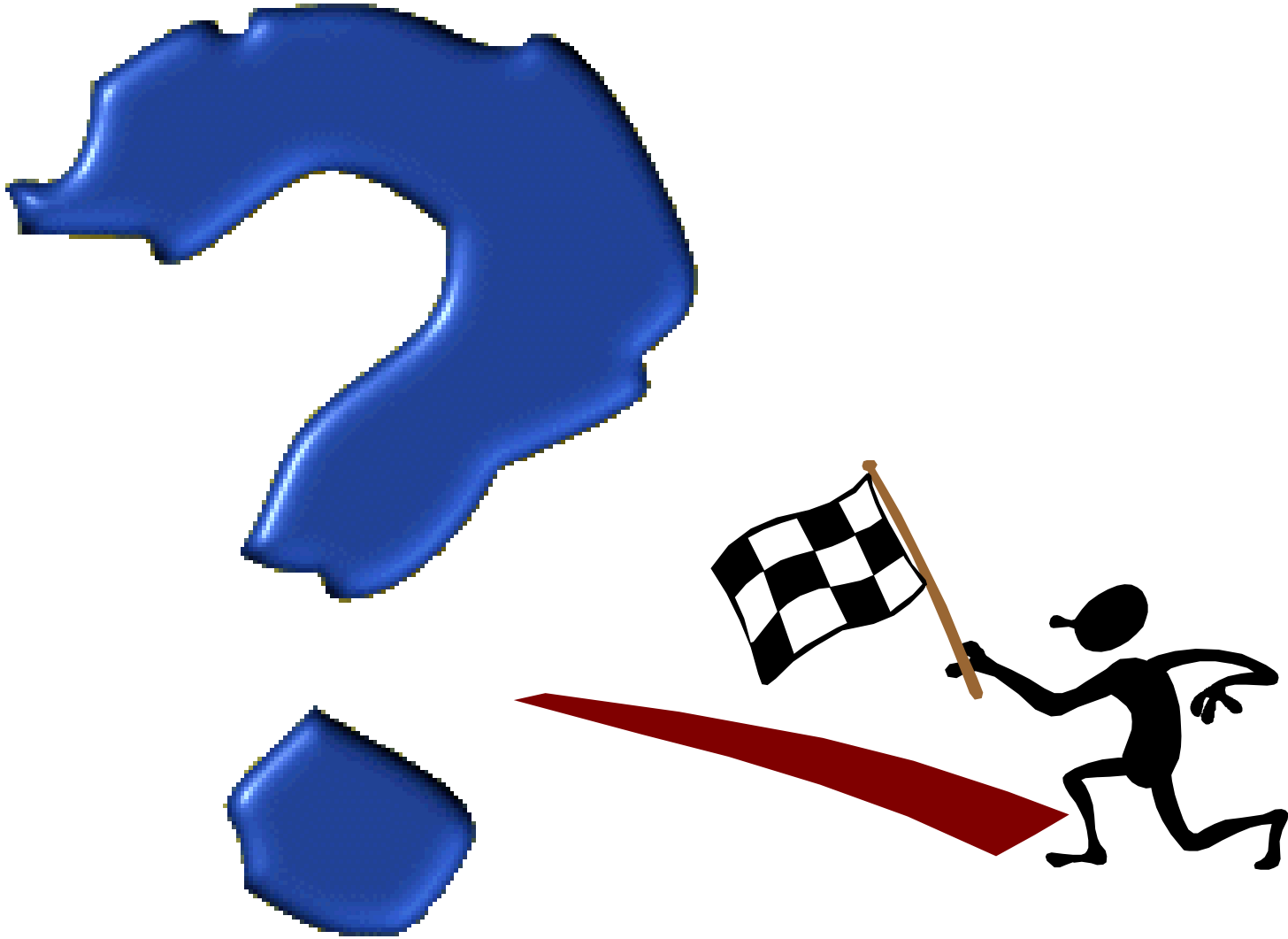
Other news

- ISO TC 31 standards
  - 6184 series (1m^3) 1985
  - Flame arrestors
- Likely to move to IEC SC31M

Any questions?



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