

Focus on IFA's work

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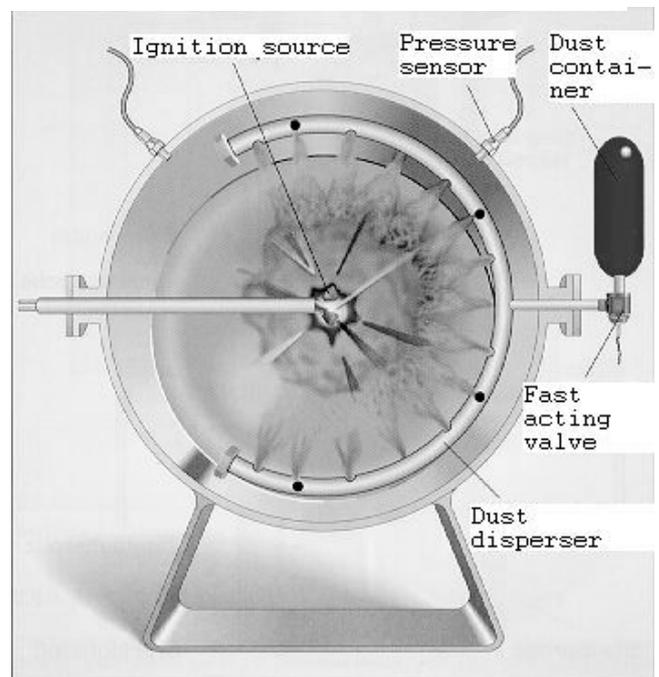
Combustion and explosion characteristics

Problem

The safe handling of fine solid substances (such as flour, powder or dust) requires that the characteristics with a bearing upon safety be known. Besides health aspects, these include flammability and explosibility. The more comprehensive the knowledge of the combustion and explosion behaviour, the more efficiently the required preventive and protective measures can be taken.

Activities

At the end of the Seventies, a research project to measure the combustion and explosion characteristics of typical dusts was launched in cooperation with what was then the Mining Test Facility (today's DEKRA EXAM GmbH) and with financial support from the then Hauptverband der gewerblichen Berufsgenossenschaften (HVBG, the Federation of the Statutory Accident Insurance Institutions of the Industrial Sector). In later years, the scale of the data records was extended considerably with funding from the European Community. Along with IFA, the then DMT-Gesellschaft für Forschung und Prüfung mbH, the Accident Insurance Institution for the foodstuffs and catering industry, Henkel KGaA, the Federal Institute for Materials Research and Testing and the Physikalisch-Technische Bundesanstalt (national metrology institute) also participated. The data records were first published in the BIA-Report-12/97 and subsequently contributed to the GESTIS-DUST-EX database, which is also available on the Internet. IFA regularly updates and extends the data.



Test apparatus for the determination of explosion characteristics of dust clouds in a 1 m³ vessel (Source: IVSS/ISSA 1995)

Results and Application

The data contain combustion and explosion characteristics of almost 5,200 dusts. The data are primarily of benefit to experts for the assessment of dust explosion hazards and for estimation of risks entailed by the handling of flammable dusts. Besides the names of the dusts, typical descriptive information is listed which is required for assessment of the combustion and explosion characteristics of the substances.

This information includes the particle size distribution and median value, and the moisture content. The data contain information on the lower explosion limit, the maximum explosion overpressure and the K_{St} value/dust explosion class, and also on the limiting oxygen concentration, the minimum ignition energy and minimum ignition temperature of a dust cloud (ignition temperature) and minimum ignition temperature of a 5 mm dust layer (glowing temperature), and on the combustion behaviour.

Area of Application

In particular: dust explosion protection experts supporting small and medium-sized enterprises in all sectors of trade and industry in which flammable dust materials occur.

Additional Information

- Directive 1999/92/EC of the European Parliament and of the Council on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres. OJEC (2000) L 23, pp. 57-64
- Directive 94/9/EC of the European Parliament and of the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres. OJEC (1994) L 100, pp. 1-29
- Regeln für das Vermeiden der Gefahren durch explosionsfähige Atmosphäre mit Beispielsammlung – Explosionsschutz-Regeln (EX-RL) (BGR 104, 06.09, updated 05.12). Carl Heymanns, Cologne 2012
- VDI 2263: Staubbrände und Staubexplosionen; Gefahren – Beurteilung – Schutzmaßnahmen (05.92). Beuth, Berlin 1992
- VDI 2263 Bl. 1: Untersuchungsmethoden zur Ermittlung von sicherheitstechnischen Kenngrößen von Stäuben (05.90). Beuth, Berlin 1990
- EN 1127-1 2011: Explosionsfähige Atmosphären – Explosionsschutz – Teil 1: Grundlagen und Methodik (10.11). Beuth, Berlin 2011
- Determination of burning and explosion characteristics of dusts. ISSA Prevention Series No. 2018 (G). IVSS, "Safety of Machinery" section, Mannheim 1995

Expert Assistance

IFA, Division 3: Hazardous substances: handling – protective measures

Literature Requests

IFA, Zentralbereich