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SVENSK STANDARD **SS-ISO 6184-1**

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Brand och räddning — Explosionsskyddssystem — Del 1: Bestämning av explosionsindex för brännbart damm i luft

Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air

Denna standard utgörs av den engelska versionen av den internationella standarden ISO 6184-1:1985.

ISO 6184-1 är även fastställd som europeisk standard EN 26 184-1:1991.

This Swedish standard consists of the English version of the International Standard ISO 6184-1:1985.

ISO 6184-1 has also been accepted as a European Standard, EN 26 184-1:1991.

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Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air

0 Introduction

0.1 The assessment of measures required to provide protection against explosion hazards involving combustible dust/air mixtures requires prior determination of the potential explosion severity of such mixtures, by the measurement of explosion indices. Conversely, the measurement of the effectiveness and performance of explosion protection systems requires that they should be tested against explosions of known severity.

The severity of a dust explosion is a function of the following:

a) the physical and chemical properties of the dust;

b) the concentration of dust in the dust/air mixture;

c) the homogeneity and turbulence of the dust/air mixture;

d) the type, energy, and location of the ignition source;

e) the geometry of the container;

f) the temperature, pressure and humidity of the explosive dust/air mixture.

0.2 This part of ISO 6184 is one of a series dealing with explosion protection systems. The other parts are as follows:

Part 2: Determination of explosion indices of combustible gases in air.

Part 3: Determination of explosion indices of fuel/air mixtures other than dust/air and gas/air mixtures.

Part 4: Determination of efficacy of explosion suppression systems.

0.3 The interpretation of explosion indices determined by the method specified in this part of ISO 6184 and their relation to the development of explosions in commonly encountered explosion hazards should be recognized. In particular, the degree of turbulence can influence the hazard significantly. In practice, the link between a given degree of turbulence and a specific type of hazard is the responsibility of specialists in the fields of explosions and explosion protection.

Two extremes of turbulence commonly encountered in industrial plants are:

a) low turbulence conditions prevailing in a gravity-fed silo;

b) high turbulence conditions prevailing in a grinder or micronizer.

It should be realized that turbulence can arise in two ways:

a) turbulence intrinsic to the plant, under normal operating conditions, as a consequence of perturbations to the air-flow;

b) turbulence induced by obstructions within an installation on a gas which expands as the result of an explosion.

1 Scope

This part of ISO 6184 specifies a method for the determination of the explosion indices of combustible dusts suspended in air in an enclosed space. It gives the criteria by which results obtained using other test procedures can be correlated to yield explosion indices as determined by the method specified in this part of ISO 6184.

2 Field of application

This part of ISO 6184 is applicable only to the determination of explosion indices pertaining to the development of contained dust/air explosions after ignition of the reactants. It does not apply to indices pertaining to the conditions necessary to cause ignition of the reactants. If the specified experimental procedure for the determination of explosion indices does not result in ignition of the dust/air mixture, it should not be concluded that the dust in question cannot explode. The interpretation of such cases should be left to specialists in the field of explosions and explosion protection.

3 Definitions

For the purpose of this part of ISO 6184 the following definitions apply.

3.1 explosion: Propagation of a flame in a pre-mixture of combustible gases, suspended dust(s), combustible vapour(s), mist(s), or mixtures thereof, in a gaseous oxidant such as air, in a closed, or substantially closed, vessel.

3.2 explosion index: Numerical term, determined in accordance with the test methods specified in this part of ISO 6184, which characterizes the contained explosion of a specified concentration of reactants in a vessel having a volume of 1 m^3.

NOTE — Figure 1 shows the pressure/time curve, expressed in bars[1] and seconds respectively, of a typical explosion.

3.2.1 explosion index p_m: Maximum overpressure relative to the pressure in the vessel at the time of ignition attained during an explosion.

3.2.2 explosion index p_{max}: Maximum value of the explosion index p_m determined by tests over a wide range of reactant concentrations.

3.2.3 explosion index K: Constant defining the maximum rate of pressure rise with time $(dp/dt)_m$ of an explosion in a volume V, according to the equation

$$K = \left(\frac{dp}{dt}\right)_m \times V^{1/3}$$

NOTE — Under certain circumstances, this equation is not valid for vessels with a length to diameter ratio greater than 2 : 1 or with a volume of less than 1 m^3.

3.2.4 explosion index K_{max}: Maximum value of the explosion index K determined by tests over a wide range of reactant concentrations. The violence of an explosion is evaluated from the value of K_{max}.

3.3 turbulence index: Numerical term which characterizes the degree of turbulence in the experimental conditions under which the explosion indices are determined.

3.3.1 turbulence index t_v (ignition delay): Experimental parameter defined as the time interval between the initiation of a dust dispersion procedure in an experimental apparatus, and the activation of the ignition source. It characterizes the degree of turbulence prevailing at the moment of ignition.

3.3.2 turbulence index T_u: Ratio of the explosion index $K_{max,\ turbulent}$ determined as specified in this part of ISO 6184 to the explosion index $K_{max,\ quiescent}$ of the quiescent reactants. It is given by the equation

$$T_u = \frac{K_{max,\ turbulent}}{K_{max,\ quiescent}}$$

NOTE — For dust/air mixtures, $K_{max,\ quiescent}$ is a theoretically derived parameter.

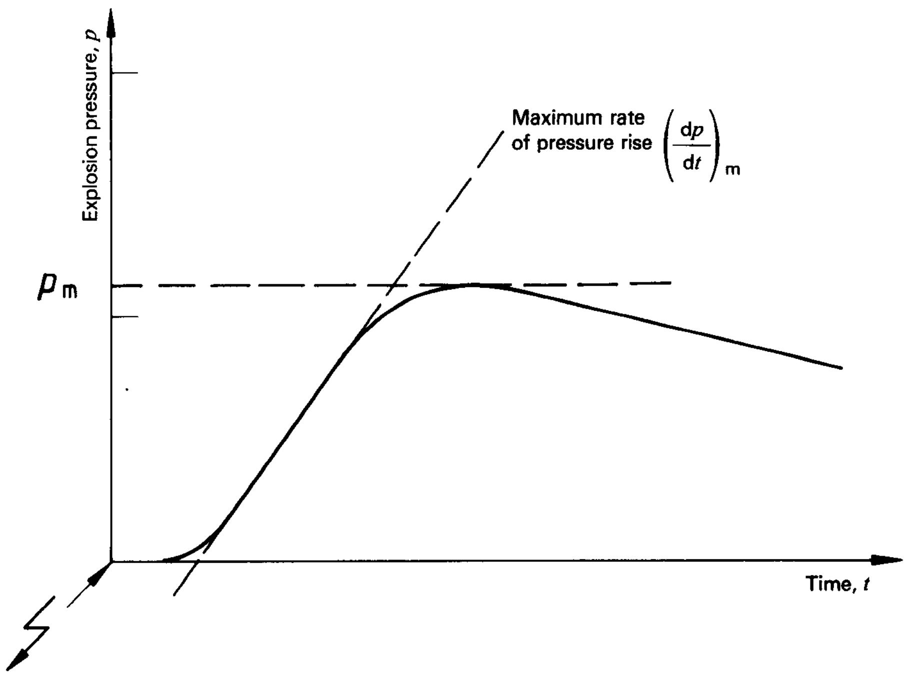

Figure 1

1) 1 bar = 10^5 Pa