

We are



Hello,

May 2020

NEW FEATURE: In this issue of *Stonehouse Safety Dispatch* we introduce a new occasional series of **Process Safety EXPLAINERS** in which we do our best to shed light on topics that we know some of our clients have struggled to get to grips with. We start the series with this piece on 'Kst' and related parameters, which are at the heart of all things dust explosion.

Process Safety Dispatch

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- Explainers: What is Kst, Pmax...?
- Free On Demand Webinars

Hand Sanitizer Explosion Kills 2, Injures 3

Eyewitnesses saw smoke coming from the chemical plant. A few moments later, 2 workers had lost their lives – and 3 others were injured in a blast that shook the neighborhood and was heard over 2 miles away (ref 1).

- All this in the midst of Coronavirus lockdown and in a factory housing around 65 employees in which there would normally be 250.
- All this in **repurposed plant**, manufacturing **hand sanitizer** where previously other chemicals were produced.

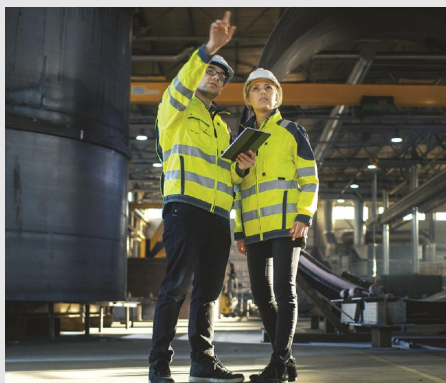


Hand sanitizer generally contains highly flammable ethyl alcohol in concentrations up to around 70%. Clearly, then, in these times of great demand for hand wash and hand sanitizer, the use of ethyl alcohol has increased globally. What's more, many companies around the world have turned to repurposing manufacturing plant to produce hand sanitizer to meet that demand. This approach **MUST INVOLVE** new or

revisited **Process Hazard Analyses (PHA)**.

The rush to keep us all infection free is laudable, but this must not come at the expense of process safety. We're pleased to note that for a few weeks now, our **process safety specialists** have been advising our clients on plant repurposing (*Process Hazard Analysis*). We advise ALL our readers, in the rush to repurpose plant for any reason, to ensure full attention is given to process safety.

Now, to the explosion incident...[Read More...](#)



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- Control of Static Electricity
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- Process Safety Management
- Fire and Explosion Hazard Assessment
- Incident Investigation
- Organizational Process



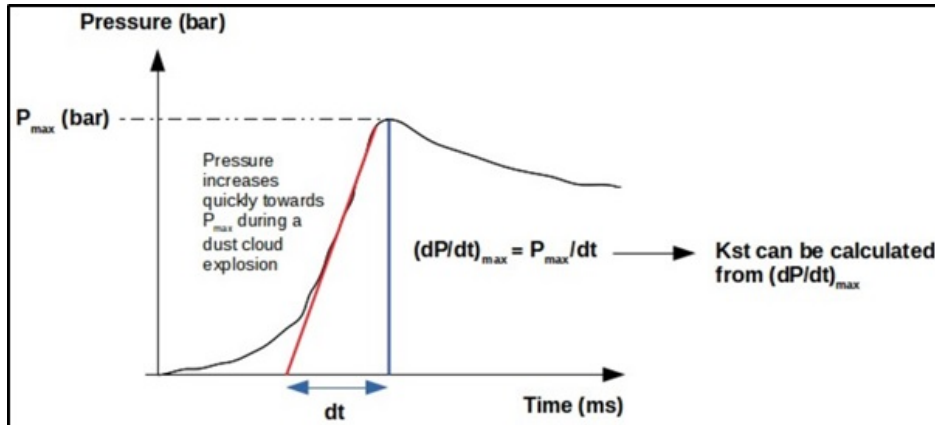
Specialist Laboratory Testing

- Combustible Dust Testing
- Electrostatic Testing
- Self-Heating / Thermal Instability Testing
- Flammability Testing of Gases & Vapors

Explainers: What is Kst, Pmax...?

If you have any interest in **dust explosions** you will have heard of the mystery term 'Kst' value. It's an often-quoted physical property of a combustible dust/powder. It has some rather strange units too – bar.m/s [yes, that's bar-meters per second]. You will also have encountered the terms 'Pmax' [bar] and 'maximum rate of pressure rise' [bar/s]. So, what do all these mean and how are they used in dust explosion safety.

Let's tempt you with some feel-right science...



Pmax

Dust explosions involve the combustion of individual powder particles in the dust cloud that transfer their heat on to adjacent particles and a chain reaction begins. Once an explosion starts, heat is produced which leads to increase in pressure (hot gases expand). If the explosion is inside a closed, strong vessel, the burning will continue until there is insufficient powder (fuel) or air left to burn anymore; it's been largely used up. So perhaps you can see that an explosion inside a strong, closed vessel will have a pressure profile beginning at atmospheric pressure then rising up to some maximum value – as shown on the diagram. If test conditions are optimized and standardized for concentration, turbulence and more, then this maximum pressure value we term 'Pmax'. So that's one of our 3 powder properties defined already!...[Read More...](#)

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[Combustible Dust Hazards: Assessment, Prevention and Protection Including the Requirements of NFPA 652 \[watch\]](#)

[Electrostatic Hazards in Processing Industry: The Nature of the Problem and](#)

[Practical Measures for its Control \[watch\]](#)

[Fire and Explosion Hazards: How to Identify and Control Them in Your Process \[watch\]](#)

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*Cybersecurity and Infrastructure Security Agency