

PROCESS SAFETY News

Welcome, in this edition we cover our 20th Anniversary celebration, the problems with adequate test data for ATEX / DSEAR compliance, courses for IEC 61508/11 Instrumented Protection Systems, limitations of MSDSs, new particle size determination capabilities for powder testing, published data case study and a review of the new Chilworth website.

20 Years

Anniversary Edition 2006



Phil Holland
Managing Director

It gives me great pleasure to welcome all our readers to this 20th Anniversary edition of Process Safety News.

Chilworth Technology Ltd was established in 1986 to provide a centre of excellence for process safety consultancy and testing services. After 20 years of serving industry, Chilworth would like to thank their long standing customers for helping us to succeed in becoming internationally recognised as experts in the field of process safety. Chilworth now has offices in the UK, France, Italy, India and the USA and is continuing to look for opportunities to broaden its global presence.

The safety culture of industry in many countries throughout Europe and the rest of the world has improved with every passing year, driven by the desire to provide a safer working environment for staff by a greater understanding of the nature of process hazards. New Directives from Europe and updated health & safety legislation have increased the demand for safety expertise and Chilworth remains at the forefront of this work.

For Chilworth, becoming multinational has not meant compromising our quality of service. Our Specialist Consultants at each site provide a consistent level of technical expertise and professional experience. This makes

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Testing for Compliance

As the 30th June 2006 approaches, most companies will – or should – be finalising their compliance documents for ATEX 137 (DSEAR in the UK). When checking through these documents, one of the most important aspects is to confirm that good quality flammability data is available for all materials covered by the assessments. The type of data that is required to ensure compliance will depend on the selected Basis of Safety.

DSEAR and ATEX 137 dictate that the risk of an explosion is minimised as far as possible (prevention), and that any residual risk is adequately protected against. For dust explosion hazards, potential Bases of Safety include:

- Prevention
 - Avoidance of flammable atmospheres (inerting)
 - Avoidance of ignition sources
- Protection
 - Containment
 - Explosion venting
 - Explosion suppression

The data typically required to characterise the dust for these bases of safety is depicted in Figure 1, below.

Similar data requirements exist for handling flammable liquids and gases, and protecting against the risks posed by exothermic reaction hazards or thermally unstable materials.

Like any safety system, the level of safety achieved will be dictated by the “weakest link”. Using inadequate (or assumed) test data can severely impair the ultimate reliability of your Basis of Safety. Assumed or inadequate data can lead to extra expense (over-design) or an unsafe system of work. Literature data may not reflect the characteristics of your specific material – particle size, moisture content and even particle shape and morphology can have a dramatic effect on certain flammability parameters.

The provision of adequate and good quality test data is one of the easier aspects of compliance to address – make sure your compliance program is not compromised!

If you need help with any aspect of the compliance procedure – risk assessment audit, mechanical equipment ignition risk assessment, material characterisation data or basis of safety specification – or if you wish for independent external validation of your compliance procedure, please contact Chilworth Technology.

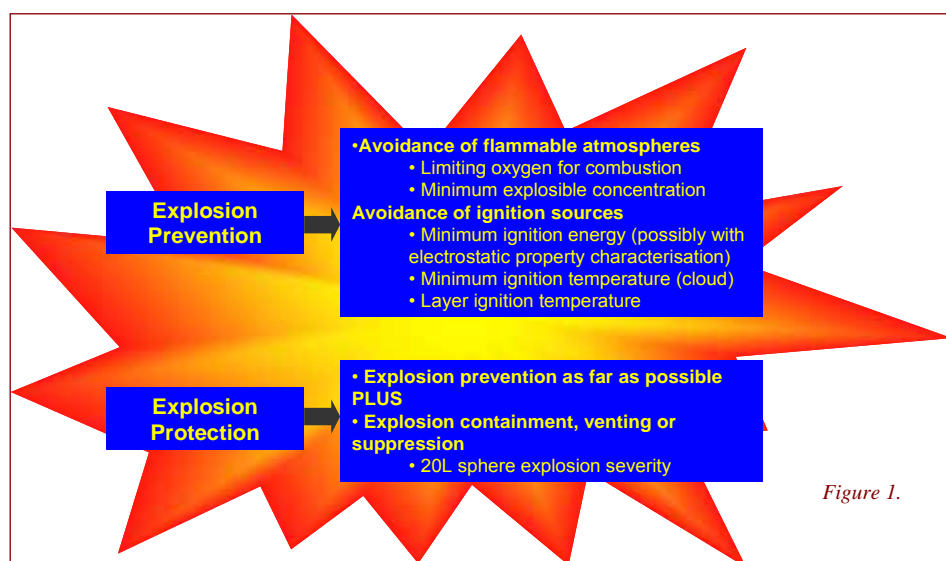


Figure 1.

Continued from page 1...

Chilworth an ideal choice for global companies looking for one provider to ensure a consistent standard of process safety at their sites.

Chilworth continues to share knowledge and understanding of process safety by providing free technical datasheets on process hazards and safety compliance to all our clients and other professional bodies.



Our testing facilities for dusts, gases and vapours have grown to cater for a wide variety of industry from Chemical and Pharmaceutical markets in the early days to Food manufacturing and High Tech industries that are developing new processes for refined and complex materials.

With GLP compliant laboratories, our clients benefit from rigorous testing procedures for every piece of work and the confidence that all data meets the relevant standards for their industry.

Our consulting team has continued to grow and has been at the forefront of developing innovative and cost effective compliance paths for ATEX / DSEAR legislation as well as best practice advice for IEC61508/11 and DIERS.

As we look forward to sharing our achievements with you from the last 20 years we also welcome the opportunity to hear from you about other process safety services you need and how we can develop our safety partnership in the years ahead. If you would like to talk to myself or any of my staff about your process safety needs please do not hesitate to call on +44 (0)23 8076 0722 or email at safety@chilworth.co.uk.

Again, thank you to all who have helped us complete 20 years of service to industry.

See www.chilworth.co.uk for further information on Chilworth and our range of process safety support services.

Instrumented Protection Systems – Achieving and Maintaining Safety Integrity

New for our 2006 training programme is [IEC 61508/11 Safety Instrumentation Integrity](#); the third in our series of IEC 61508/11 appreciation and awareness courses.

Chilworth have developed this open course on valuable feedback gained from delegates on our [IEC 61508/11 Functional Safety](#) and [SIL Determination](#) courses delivered in 2004-5. Essentially our new course builds on the requirements for the design of the safety instrumented systems, matching the target SIL performance, reliability criteria and the end user operational requirements.

The course includes an introduction to reliability analysis and examines the key requirements of IEC 61508/11 during safety instrumented system design, implementation, operations and maintenance. The course is practically biased and will feature a mix of theory, best practice and worked examples.



The key objectives of the Safety Instrumentation Integrity course are as follows:-

- To gain an appreciation of the factors which influence instrumentation integrity.
- To gain familiarity with the requirements of IEC 61508 and IEC 61511 for safety system implementation.
- To understand how to assess system integrity and the safety integrity level achieved by a given system.
- Familiarity with the requirements for operation and maintenance of safety instrumented systems and their ongoing management.

Details of dates and venues of our IEC 61508/11 courses are on the back page of this newsletter and also on the Events page of our website at www.chilworth.co.uk.

Does an MSDS meet your duty of care obligations regarding flammable dusts?

The legislation regarding material safety datasheets (MSDS's) has been improved and more rigorously enforced in recent years both in Europe and in the US. The main sections of an MSDS are well defined and it is well understood, in most areas, the type of data that should be incorporated in each section.

In our experience, one particular area where MSDSs are weak is in information given for flammable dusts. It is normal to see phrases such as "this material is capable of forming combustible dust clouds when dispersed in air" – but is this enough? Sometimes the wording is less definitive e.g. "this product is combustible".

A recent incident investigation by the CSB in America has been published in which the question of combustible dusts – and the sharing of data – is a prominent feature. The report describes an incident (in February 2003) involving phenolic resin dust at the CTA Acoustics plant in Kentucky. The fire and explosions that occurred led to 7 fatalities and injured 37 other persons (the report can be found at http://www.csb.gov/completed_investigations/docs/CSBFinalReportCTA.pdf).

The role of supplier data and hazard communication forms a major part of the report. The OSHA Hazards Communication standard requires that chemical manufacturers describe the physical hazards of a chemical on an MSDS, including the potential for fire, explosion and reactivity – under normal use and in a foreseeable emergency. In the MSDS of the phenolic resin involved in the incident, reference was made to the fact that the resin was a combustible dust but was not considered to provide adequate warning of the explosion hazard.

In the recommendations, the operating company were advised to:

- Improve housekeeping to avoid accumulation of potentially combustible dusts
- minimise areas and surfaces where combustible dust could accumulate
- minimise the potential for dispersion of combustible dusts by appropriate cleaning methods

- address the dangers of combustible dusts and prevention of dust explosions in the hazard communication training program.

In addition the resin suppliers were given the following recommendations to comply with in the future:

- Ensure that MSDSs for the resins include, as a minimum, warnings that dust from these products can be explosive
- develop and distribute educational material, in addition to MSDSs, to inform customers of the explosion hazard of the resin dust
- communicate the findings and recommendations of the report to customers that purchase the resin.

The implications of this incident should resonate with suppliers of any powder, dust or explosive substance. Are you doing enough to comply with your duty of care?

Chilworth Technology has a vast experience of the characterisation of dust explosion hazards and offers a wide range of consultancy and advisory services to assist companies in complying with legal obligations and best practice in this field. If you have concerns regarding combustible dusts, please contact us for a no-obligation discussion of your issues. We can tailor testing programs, consultancy audits, advice and training to our customer's unique and specific needs.

Particle Sizing across 5 orders of magnitude!



Chilworth Technology recently purchased a Malvern Instruments Mastersizer 2000 unit which can measure particles in the range 0.02 μm to 2000 μm with a single lens using a patented dual wavelength detection system. The unit incorporates automatic application of full Mie theory (of light scattering by particles) and has method development capabilities that are fully compliant with ISO 13320-1 guidelines (the first formal international standard for particle sizing by laser diffraction). As well as

measuring dry powders, the unit has a liquid module for measuring the particle size of suspended or emulsified powders.

Along with particle size distribution for use with flammability test data the new equipment can also determine the Mass Median Aerodynamic Diameter (MMAD) which is a necessary requirement in inhalation studies (aerosol production). See Organisation for [Economic Co-operation and Development](#) (OECD) website for further information.

Grain Mill Case Study: Can you Trust Published Data?

A recent consultancy project for DSEAR compliance once more throws into question reliance on published data.

The need for data regarding the explosion properties of powders is an essential starting point for explosion hazard and risk assessments under ATEX 137 / DSEAR.

Without such data the risk and consequences of ignition cannot be properly quantified. Published safety data on powders is available for a wide range of materials in many industries from sources such as the German BIA-Report 13/97. There are a number of other useful reference publications, however such information is often compiled from a number of different sources, some of which is dated and may not reflect modern material preparation. As the cost of testing is perceived to be high, it is acknowledged that many companies will rely on published data. However, when the cost of dust testing is compared with the total cost of compliance, it is actually a small proportion of the overall expense.

Recently Chilworth undertook an assessment of a client's milling facility; the client being a household name in the food sector. Published data was available for the milled product which indicated that the material was similar to most milled grains i.e. a low dust explosion risk. Fortunately, the mill owners did agree to check this data with some actual testing and this showed that the published data was significantly different to the test data derived from material processed at this mill. In fact, the Minimum Ignition Energy (MIE) was significantly lower, the Minimum Ignition Temperature (MIT) was significantly lower, the explosion severity was much higher and the combustibility (BZ number for fire risk) was significantly higher. (A high BZ number indicates that if an ignition source occurs in one

part of the plant it can easily be transported by conveyors to other areas.)



Using published data, 'Avoidance of Ignition Sources' seemed feasible in some areas of the mill, as the preferred Basis of Safety. However, the test data indicated that this would not be possible and explosion protection would be necessary. The risk assessment then identified the fact that some of the existing protection methods included explosion relief which vented into areas occupied by workers. In light of the new test data the correct protection measures were put in place ensuring that the explosion relief venting and suppression systems fitted would operate properly in the event of an explosion occurring and guarantee the safety of workers.

Published data can be a useful source of material properties information in some circumstances. The greater the amount of published data that is available the more confidence there can be in using it although care needs to be taken where only limited testing has been performed as this may not be representative of the materials used on the plant. It is also important to know the source of the data as much of the published information is very old and produced using out of date testing methods. Therefore, to ensure that the correct Basis of Safety can be selected it is essential that accurate material data is used during the risk assessment stage of ATEX / DSEAR compliance.

Chilworth Website more Dynamic & User Friendly

The Chilworth Technology website has just undergone a make-over to introduce new dynamic elements and improved site navigation with drop down menus to allow you to quickly get to the information you need.

We are particularly keen to develop small video footage of tests to give you a feel for the types of explosions we observe from standard process material sent to us for testing. As you will have read from the case study in this newsletter there is no reliable replacement for actual test data when defining the hazard and risk profile of your materials.



Those of you who were frequent visitors to our original site will be pleased to hear we have retained all the best features such as FREE technical datasheets and copies of our published articles. Please visit our site at www.chilworth.co.uk and while you are there help us save the environment by subscribing to our email service so we can reduce the paper demand for providing new technical information. Thank you!

Chilworth Training Courses

Details of the following courses are available from our website at :-

<http://www.chilworth.co.uk/news/events.aspx>



ATEX / DSEAR: Mechanical Equipment Ignition Risk Assessment

A half-day seminar focusing on how DSEAR (implementing ATEX 137) relates to the EPS Regulations (implementing ATEX 95/100a). In practical terms how do you ensure compliance for new and existing equipment used in areas with potentially explosive atmospheres, identified from your Hazardous Area Classification work?

- 1 March Newcastle-under-Lyme
- 5 April Darlington
- 11 April Cork
- 12 April Dublin
- 10 May Copenhagen
- 13 June Stockholm

IEC 61508/11 SIL Determination

A one day introductory course on IEC 61508/11 Safety Integrity Level (SIL) Determination for establishing the performance requirements and reliability of Safety Instrumented Systems. This course is suitable for anyone who would benefit from a basic understanding of this important safety related area.

- 25 April Manchester
- 23 May Dublin
- 31 Oct Birmingham

IEC 61508/11 Safety Instrumentation Integrity

A one day course that looks at the lifecycle implementation phase of IEC 61508/11. The need for safety instrumentation integrity will have been established from an assessment of the process risk during a Safety Integrity Level (SIL) Determination exercise. This will have generated the functional safety requirement and the Required SIL of the SIS. The focus for the team then becomes the detailed design of the instrumented system to ensure that the end-to-end configuration can satisfy this functional safety requirement (e.g. the Achieved SIL satisfies the Required SIL).

- 26 April Manchester
- 24 May Dublin
- 1 Nov Birmingham

faxback

Please faxback to Marketing on +44 (0)23 8076 7866

Name: Job Title:

Company Name:

Address:

..... Postcode: Country:

Telephone: Fax: Email:

My particular interests are:-

Mech. Equip. Ignition Risk Assessment.....

Hazardous Area Classification

I would like a FREE and confidential telephone call with a consultant about a process safety matter...

I would like a FREE visit from a consultant next time one is in my area.....

Dust/Gas/Vapour Explosion Testing

IEC 61508/11 Safety Instrumentation Integrity

DustScreen.....

DSEAR / ATEX audits

IEC 61508/11 SIL Determination

Training