

## Inglewood Engineering Consultancy



## **DSEAR & ATEX Compliance Services**

Inglewood Engineering Consultancy Ltd.

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### Introduction to Inglewood Engineering Consultancy

### Who are IEC?

Inglewood Engineering Consultancy (IEC) was formed in 1983 and is a team of professional design and compliance engineers working predominantly in the electrical, instrument and control industry.



### What does IEC do?

IEC supports Clients through the process of achieving and demonstrating compliance with the Dangerous Substances and Explosive Atmosphere Regulations (DSEAR) and Electricity at Work Regulations.

IEC also provides instrument, electrical and control design solutions in the hazardous and non-hazardous sectors.

IEC provides safety instrumented system compliance services to standards such as IEC 61508 and IEC 61511.

IEC strives to smooth the path to full compliance without unnecessary expenditure by providing practical advice and support on how to manage non-conformances.

How do IEC demonstrate their competence to assist the Client in achieving compliance?

IEC are able to demonstrate their expertise and competence by the blend of qualification, training and development, experience and project management structure of the team:-

- Project experience covering blue chip national and international companies in sectors such as Chemical Manufacturing, Food Industries, Pharmaceutical Plants, Fuel Depots & Stores, Power Stations, Airports, Office Buildings, Research Facilities.
- Preferred supplier to two UK notified bodies.
- Operation of a company coaching and mentoring system.
- Project deliverables approved by Chartered Engineers.



### Legislation and Mandatory Requirements

The most fundamental legislation with respect to safety is the Health and Safety at Work Act (HSWA) 1974 which created two new institutions: the Health and Safety Commission (HSC) appointed by the Secretary of State for Transport, Local Government and the Regions; and the Health and Safety Executive (HSE) appointed by the Commission (with the consent of the Secretary of State).



The law, in the form of the HSWA, directs that the general duties, principles and goals of safety be progressively set out in regulations proposed by the appropriate Government Minister (helped by the Commission) and that the details be expressed in approved codes of practice. Approved codes of practice (ACOPs) are endorsed by the HSC and have a special authority in law. Failure to comply with the provisions may be taken by court in criminal proceedings as evidence of failure to comply with the requirements of the Act or of regulations to which the ACOP relates, unless it can be shown that those requirements were complied with in some equally effective way.

**The Dangerous Substances and Explosive Atmospheres Regulations** (DSEAR) 2002 came into force on 9<sup>th</sup> December 2002. DSEAR implements the requirements of two European Directives: the safety requirements of the Chemical Agents Directive (CAD); and the requirements of the Explosive Atmospheres Directive (ATEX 137).

The Explosive Atmospheres Directive (ATEX 137) requires employers to protect workers from the risk of explosive atmospheres. An explosive atmosphere is defined as a mixture of air, under atmospheric conditions, of dangerous substances in the form of gases, vapours, mist or dust in which after ignition has occurred, combustion spreads to the entire unburned mixture. DSEAR applies to all dangerous substances at nearly every business in Great Britain.

The HSE enforce the DSEAR regulations at industrial premises.



### Hazardous Area Compliance Process

The process of achieving full compliance can be broken down into a step by step process.

The IEC proposed methodology is as follows:-

**Step 1** – Complete site DSEAR Audit to establish compliance status and site specific programme of actions.

**Step 2** - Initial Risk Assessments & Area Classification.

**Step 3** – Complete Hazardous Area Equipment Inventory – Electrical & Non-Electrical.

**Step 4** – Complete Initial Detailed or Periodic Close Grade Hazardous Area Inspections For Electrical Equipment.

**Step 5** – Complete BS EN 60079 Part 17 Hazardous Area Electrical Inspection Schedules.

**Step 6** – Complete Non-Electrical Equipment Site Audit and Risk Assessments.



**Step 7** – Complete installation and documentation remedial actions for any non-conformances.

**Step 8** – Complete Site Explosion Protection Document.

**Step 9** – Implement Change Control Procedures and ongoing compliance system of work using system such as Complied Electrics.

Step 10 – Implement Periodic Inspection Plan.



### **DSEAR Initial Site Audit Service**

The first step of the process is to establish exactly what remaining actions need to be completed in order to achieve compliance.

IEC offer a DSEAR site audit service with this in mind.

During the site audit, an IEC compliance engineer completes a formal step by step assessment of the existing Client installation, procedures and policies against the requirements of the Regulations.

A site report is completed following the site audit activities. The report details recommended actions and remedial work which will allow the Client to achieve full compliance.

IEC complete this audit for new, existing and modified site installations.

Step 2 – Reduction of Risks From Dan	gerou	us Su	bstance	es
Regulation 6 (1) states that every empl dangerous substance is either elimina practicable. Regulation 6 (3)(a) states that where it risk, the risk should be controlled:-	ted o	r red	uced so	far as is reasonably
Step 2	Yes	No	NA	Comments
Has the quantity of the dangerous substance held or used been reduced to a minimum? Regulation 6 – Part 4 (a)				
Have steps been taken to avoid or minimise releases (intertional or unintentional)? Regulation 6 - Part 4 (b)				
Have steps been taken to control release at source? Regulation 6 - Part 4 (c)				
Have steps been taken to prevent the formation of an explosive atmosphere e.g. ventilation? Regulation 6 – Part 4 (d)				
Have steps been taken to collect, contain, and remove any releases to a safe place? Regulation 6 - Part 4 (e)				
Have steps been taken to avoid ignition sources including electrostatic discharges? Regulation 6 – Part 4 (f)(i)				
Have steps been taken to avoid adverse conditions (e.g. exceeding temperature limits or other control settings)? Regulation 6 – Part 4 (f)(i)				
Are incompatible substances kept apart in storage, and so far as practical, in use (e.g. Oxidisers and combustibles)? Regulation 6 – Part 4 (g)				

Step 3 - Mitigation of Detrimental Effe	cts			
Regulation 6 (3)(b) states that where it risk, the employer shall mitigate the de from dangerous substances:-				
Step 3	Yes	No	N/A	Comments
Has the number of people exposed to the dangerous substances or the explosive atmosphere been reduced to a minimum? Regulation 6 – Part 5 (a)				
Is explosion suppression or explosion pressure relief provided on equipment? Regulation 6 – Parts 5 (c) & (d)				
Is plant constructed so as to withstand the pressure likely to be produced by an explosion? Regulation 6 – Part 5 (e)				
Has suitable personal protective equipment been provided, and have staff been trained how to wear it property? Regulation 5 – Plart 5 (f)				
Step 4 – Systems Of Work Regulation 5 states that the risk asses following items:- Step 4	smer <sup>Yes</sup>		all includ	e consideration of the Comments
Have appropriate safe systems of work, or other required procedural systems of organised work, been developed and communicated to all persons who might need to know, either by way of this form or another document?				
Have appropriate safe systems of work, or other required procedural systems of organised work, been developed and communicated to all persons who might need to know, either by way				

A fixed cost fee is agreed before work commences.

An audit completed by an independent and competent body ensures that the Client management and third party authorities are assured of the accuracy of the audit information and the current compliance status.



IEC

### **DSEAR Risk Assessment**

Regulation 5 of DSEAR requires that where a dangerous substance is or is liable to be present at the workplace, the employer shall make a suitable and sufficient assessment of the risks to his employees which arise from that substance.

An IEC competent risk assessor completes a site audit and conducts risk assessment meetings with those Client personnel responsible for operations and health and safety within the relevant site areas.

The hazards relevant to DSEAR are identified and the potential accident frequencies consequences are and qualitatively assessed. The means to prevent, control and mitigate the accidents are recorded, together with any further risk reduction measures, in order to demonstrate that the risk is as low as reasonably practicable.

#### RISK ASSESSMENT

C 1: DESCRIPTION OF ACCIDENT CONSEQUENCES

This section allocates a conseq accident. ed in the table below, for each ice category, de

Consequence Category Title	Description of	Consequence
I	Major accident of extended duration requiring a full-scale response from the Emergency Services. Significant damage to plant & disruption of business	Fatality or several serious injuries or serious off-site effects
П	Serious accident but mainly on- site effects but some modest off-site effects.	Several serious on-site injurie
	Some damage to plant & disruption of business	
ш	Moderate accident with only on- site effects and short duration.	One serious on-site injury or several minor on-site injuries
	Minor damage to plant and limited disruption.	
IV	Little effect.	Minor on-site injuries
V	No effect.	No injuries

Note that an accident in position Unexpected or Expected with Category I would be Intolerable' (Reference 5, R2P2).

#### C.2: FREQUENCY OF ACCIDENTS

General frequency data is contained in the 'Purple Book' (Reference 6):

Catastrophic tank failure 5 x 10<sup>-6</sup> per annum, Leak from a tank (10mm hole) 4 x 10<sup>-4</sup> per annum Pipeline (< 75mm) failure: full bore 1 x 10<sup>-6</sup> per m per annum, leak 5 x 10<sup>-6</sup> per m per annum

Warehouse fires are 1.8 - 8.8 x 10" per annum

Table 5: Frequenc	y Categories
Erequency Category Title	Range of Accid

Frequency Category Title	per annum
Expected	10 <sup>-2</sup> to 1
Unexpected	From 10 <sup>-2</sup> to 10 <sup>-4</sup>
Unlikely	From 10 <sup>-4</sup> to 10 <sup>-6</sup>
Very Unlikely	< 10 <sup>-6</sup>

#### Table 6: Accident Frequency Categories

ACCIDENT	FREQUENCY CATEGORY
<ol> <li>Loss of containment from delivery road vehicle delivering/exporting IBC or drums</li> </ol>	Unlikely
<ol> <li>Dropped IBC or drum during road vehicle unloading creating a spill &amp; a fire</li> </ol>	Unlikely
<ol><li>Dropped IBC or drum during movement into the warehouse or out of the warehouse</li></ol>	Unlikely
<ol><li>Loss of containment in the storage warehouse</li></ol>	Unexpected
<ol><li>Loss of containment of IBC or drum in storage</li></ol>	Unexpected
<ol><li>Loss of containment of IBC or drum during charging into mixing vessel</li></ol>	Unlikely
<ol><li>Dust explosion handling dyes</li></ol>	Unlikely
<ol><li>Loss of containment from mixing vessel</li></ol>	Unlikely
<ol><li>Loss of containment from IBC, drum or vessel in 'The Compound'</li></ol>	Unlikely
<ol> <li>Loss of containment from road tankers delivering/exporting 'gas oils'</li> </ol>	Very Unlikely
<ol> <li>A gas leak within the process area causing a deflagration</li> </ol>	Very Unlikely



### **DSEAR Area Classification**

**Regulation 7(1)** of DSEAR requires that the employer classifies places at the workplace where an explosive atmosphere may occur into hazardous or non-hazardous places i.e. a hazardous area study must be completed.

During the site audit, an IEC assessor identifies the source of release of all dangerous substances. The type and extent of the hazardous area zones are determined with supporting calculations as required.

An area classification report is completed in line with BS EN 60079-10-1:2015 for vapour hazardous areas and BS EN 60079-10-2:2015 for dust hazardous areas.

Site hazardous area classification record drawings indicating the zoned areas against the physical boundaries of the plant are then completed.

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#### FLAMMABLE SUBSTANCES

2.

There are substances in use at the site that are 'flammable' as classified under CHIP [Classification (Hazard Information for Supply) Regulations] but are stored or handled well below their flashpoint.

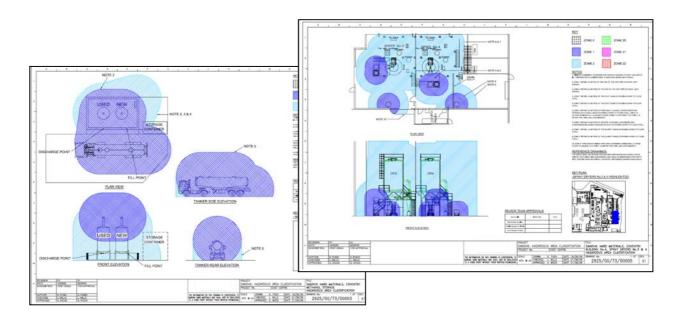
The Material Safety Data Sheets (MSDS) for the substances in use at the site were examined to determine those that may be a 'dangerous substance' (Reference 2) and the following data was obtained:

- There were no 'extremely flammable' or 'highly flammable' materials stored at the site, except for the natural gas supply to the boiler.
- There were 'flammable' liquids present that are handled at ambient temperature and below their flashpoint, quoted as greater than 28°C. These are listed below:

Dyeguard Orange J	Dyeguard Red D 66
Dyeguard Orange MT	Dyeguard Red D 75 Direct
Dyeguard Orange SAE2	Dyeguard Red DX
Dyeguard Orange TK	Dyeguard Red F
Dyeguard Purple RS	Dyeguard Red F70
Dyeguard Red D	Dyeguard Red G
Dyeguard Red D-E/50	Dyeguard Sanisol Black
Dveguard Red D 50	Dveguard Yellow R
	Dyeguard Orange MT Dyeguard Orange SAE2 Dyeguard Orange TK Dyeguard Purple RS Dyeguard Red D Dyeguard Red D-E/50

The other flammable liquid raw materials are shown in the table below

LIQUID	FLASHPOINT
	°C
Xylene (mixed isomers in 200 litre drums)	23
C18 (5-10% xylene in IBC)	43
Conductivity Improver (diol/alcohol/ketone mixture)	34





### BS EN 60079 Part 17 Hazardous Area Electrical Inspections

The IEC Standards 60079 are transposed into CENELEC & BS standards as the BS EN 60079 range. In the UK these standards replaced BS 5345.

**BS EN 60079 Part 17** requires the employer to ensure that a competent body independent of the maintenance regime completes periodic inspections.

Failure to operate a competent hazardous area inspection regime contravenes **DSEAR** and **Electricity at Work Regulations** 

IEC Inspectors are expert in completing the 4 recognised inspection types and 3 principal grades of inspection.

Following completion of the site inspection phase, the core equipment data is entered into an inspections database system to generate the Part 17 inspection schedules.

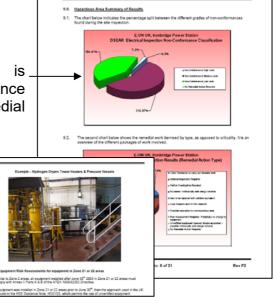
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The non-conformances are analysed before allocating the most efficient remedial action which will ensure compliance but limit overall expenditure. A dedicated corrective action schedule is produced. Equipment hazardous area certificates which are missing from site are extracted from the IEC electronic certificate library and issued to the Client.

A comprehensive summary inspection report is completed, detailing the results of the non-conformance analysis and providing further advice on the remedial action groups.

A hardcopy and electronic copy of the full inspection compliance folder is issued to the Client.





### **Non-Electrical Equipment Risk Assessments**

The ATEX manufacturing directive 94/9/EC gives constructional requirements for non-electrical equipment and the ATEX Worker Protection Directive requires non-electrical equipment already installed to be assessed for its ignition capability.

Typical examples of existing non-electrical equipment which will require risk assessment are solenoid valves, pumps, conveyor belts, hoists, gearboxes, brakes etc.

IEC completes the site audit, inspection work and risk assessment reports to ensure the Client Dutyholder meets their compliance duties in respect of non-electrical equipment.

The risk assessment process takes into account the nature of the zones that the equipment is positioned in, the properties of the dangerous substance, risk of ignition due to the type of non-electrical equipment and the guidance given in standards such as BS EN ISO 80079-36.



**BS EN ISO 80079-36:2016** is the standard for non-electrical equipment for potentially explosive atmospheres incorporating basic method and requirements details.

The equipment manufacturers' technical specification, drawings, operating information and any associated maintenance records (including records of any failures relating to the equipment concerned) are reviewed as part of the risk assessment.



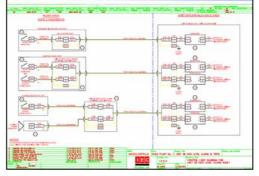
### Post Inspection Support Services

IEC strive to ensure Clients achieve full compliance and not just to provide them with a list of non-conformances. IEC specialise in providing efficient DSEAR remedial action support to Clients.

### Intrinsically Safe System Remedial Design

If uncertified field equipment falls into the 'simple apparatus' category, intrinsically safe remedial design rather than replacement with certified equivalents may be an option.

Intrinsically safe barriers can be introduced into the existing systems. The advantage of this solution is that the existing field equipment can remain in place, which eliminates the cost of replacing the equipment with certified equivalents and minimises disruption to operations. The existing field cabling can usually be reused.



### Intrinsically Safe System Retrospective Compliance Documentation

Intrinsically safe descriptive documents are required for intrinsically safe loops. This is a document that proves the barrier is compatible with the field device in terms of power, capacitance and inductance values.

IEC can complete these documents and the intrinsically safe loop diagrams retrospectively for existing installations if there are any omissions in the current documentation.

### **Electrical Equipment Risk Assessments**

If a certain piece of equipment does not meet the BS EN 60079 standard but there are mitigating circumstances why it can be left in place, IEC can conduct an equipment risk assessment to demonstrate compliance. This process has already saved other companies great expense and disruption.

### Equipment Specification & Design Assistance

	IEC	a Arrange Burn De	elific patification for allowing Baseriese area oppresent Installation ACCP	BDM HPS 05406
	BDM1	Hazardons Area Equ	ipment Risk Assess	uent
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Where site non-conformances are found that cannot be justified with an equipment risk assessment and it involves more than a simple installation remedial action, IEC assist with specifying the correct replacement equipment and/or completing a design package in order to correct the site installation.



### **DSEAR Service Level Agreement**

BS EN 60079-17:2014 requires the employer of a site handling dangerous substances to ensure that hazardous area electrical equipment periodic inspections are carried out by competent inspectors who should be sufficiently independent of the demands of maintenance activities so as not to prejudice the inspection findings.

IEC offers Clients a **DSEAR Service Level Agreement** following completion of the initial inspection phases to ensure that they comply with this periodic inspection legal requirement.

The DSEAR Service Level Agreement covers:

- All on-site periodic Close Grade and sample Detailed Grade inspections.
- Completion of relevant explosion protection method schedules, non-conformance schedules and periodic inspection reports.
- Technical support on any DSEAR or hazardous area compliance issues throughout the term of the DSEAR SLA.
- Secure Web access to site inspection regime details and status.

E C Emsix House	An Heley Road, Macdasted, Charlers, SK10 2LP 410100 Fex: 01425 410138		
	us Substances and Explosive		
Atmospheres Regulations ( DSEAR ) Service Level Agreement			
	ny:- ####################################		
	ant- All Hazardous Areas Ref- IEC / SLA / 224		
Date of iss	ue:- XXXXXXX		





### **Complied Electrics – Compliance Management Tool**

DSEAR requires Dutyholders to be able to readily demonstrate documentary compliance with the Regulations and to prove that there is a site compliance system in place to maintain that level of compliance in the future.

From a financial view, once a company has spent time and monies on initial compliance actions to bring their site into compliance, it does not make commercial sense to allow the plant to fall back into a state of non-compliance over a period of time which will then eventually lead to unnecessary future expenditure on corrective actions.

IEC have developed a Web based IT compliance management tool to protect the site compliance asset, using database programming to provide efficiencies of schedule formation, providing proof to third parties of full compliance today and proof of a site compliance system that will ensure compliance tomorrow.

It's features include:

- Web based system it can be used anywhere in the World using a standard Web browser, by any approved user, to read or update information as required. No dedicated software required.
- PDF downloads of completed 60079 Inspection Schedules.
- PDF downloads of hazardous area equipment certificates.
- Database programming system reduces time to produce inspection schedules and eliminates data translation error.
- Easy to search and retrieve compliance documentation.
- Auditable system tracks changes made to core asset data.

DOCUMENTATION	REVIEW DATE	ACTIONS	<u>STATUS</u>
Explosion Protection Document Overview	18/03/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$
Company DSEAR/ATEX Compliance Procedure	18/03/2007	Record Status View	••••
DSEAR Risk Assessment & Area Classification Report	21/03/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$
Area Classification Drawings	01/02/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$
DSEAR Electrical Inspection Summary Report	10/03/2007	Record Status View	••••
Hazardous Area Inspection Schedules		4 (Re)Inspections Required	$\bigcirc \bigcirc \bigcirc \bigcirc$
Corrective Action Feedback Schedules	18/03/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$
BS EN 13463 Non-Electrical Equipment Risk Assessments	21/03/2007	Record Status View	••••
Equipment Hazardous Area Certificates / System Certificates		6 Models/Certificates	••••
BS 7671 Electrical Test Results		SLD	$\bigcirc \bigcirc \bigcirc \bigcirc$
Static Electricity Test Procedure & Schedules	19/01/2007	Record Status View	••••
Hazardous Area Training Records	01/02/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$
Provision & Use of Work Equipment Regulations Records	02/02/2007	Record Status View	••••
Permit To Work Scheme	10/03/2007	Record Status View	$\bigcirc \bigcirc \bigcirc \bigcirc$