Mechanical Equipment and the ATEX Directives

On 30 June 2003, the "Atmosphères Explosibles" Directives ATEX 95 and ATEX 137 became effective throughout the European Union (EU). A major consequence of these directives is that the operators of oil and gas facilities now must carry out risk assessment of equipment located within hazardous areas for potential sources of ignition and provide technical and organisational measures to eliminate or reduce the identified risks. There are implications for the Oil and Gas Industry, particularly with regard to issues associated with ignition source risk assessment of mechanical equipment located in potentially flammable atmospheres.

BY ANDY HOLLINS

What do the ATEX 95 and ATEX 137 Directives Cover?
ATEX 95 is concerned with the supply of equipment whilst ATEX 137 is concerned with the protection of workers. The directives are briefly outlined in Table 1. It should be remembered that these directives deal only with explosive atmospheres and not with other hazards.

Together they have the effect of turning what had until now been accepted best practice within the process industries into mandatory requirements. In doing so combustible dusts have been specifically included within the scope of dangerous substances. The definition of equipment within these directives is very broad and now includes mechanical equipment (both rotating and static).

"The inclusion of mechanical equipment represents one of the main compliance issues for both equipment suppliers and users."

Area classification and equipment selection
ATEX 137 requires that hazardous areas are classified into zones on the basis of frequency and duration of the hazard, as outlined in Table 2.

"Responsible operators in the Oil and Gas Sector will have done area classification exercises on their assets but they should now review them to ensure they are up to date. Operators who in the past relied on the blanket zon- ing of whole plant areas should seek to establish the necessary extent of individual zones. With blanket zoning the measures required by ATEX 137 will have to be applied to more equipment than is really necessary, thereby incurring unnecessary costs."

As from 1 July 2003, only equipment complying with ATEX 95 can be installed in a hazardous area. Equipment is divided into groups and categories with differing requirements for design, testing, certification and documentation. The use of equipment within hazardous areas is restricted as also shown in Table 2.
As far as electrical apparatus is concerned, these requirements are nothing new. Electrical engineers have been dealing with these issues for many years and there are established standards and equipment certification procedures. In contrast the equivalent standards for non-electrical equipment are still largely at the draft stage, with only EN 13463-1 being published so far.

“There are bound to be some initial problems with the certification of new mechanical equipment. Nobody wants to be first, but project timescales mean that the issues cannot be avoided for long.”

### Existing facilities and ignition source risk assessment

Operators of oil and gas facilities will need to be able to demonstrate that the equipment in use within zoned areas does not result in active ignition sources. The tolerability of active ignition sources varies depends upon the zone in which the equipment is located. The requirements are laid out in Table 3.

For certified electrical equipment this is relatively straightforward and activities will include:
- Inspecting the equipment to confirm correct for the zone
- Replacement, if necessary, with apparatus appropriate to the zone
- Undertaking any necessary remedial work.

For mechanical equipment it will first be necessary to undertake an ignition source risk assessment exercise. Once this has been completed, the required mitigating measures can then be implemented and the necessary inspections undertaken. Operators have until 30 June 2006 to complete the whole process and bring their existing facilities into compliance.

Typical ignition sources for a process gas compressor are shown in figure 1. Other mechanical plant items will have similar potential ignition sources.

“With thousands of installed plant items operating in zoned areas, this represents a significant challenge to operators in the Oil and Gas Sector.”

To meet this need ABB Eutech Process Solutions has developed an ignition source risk assessment methodology that identifies any effective ignition sources created by the operation of equipment in hazardous areas. Appropriate mitigating measures are then selected to reduce the residual risk to an acceptable level. The use of software tools enables the efficient risk assessment of large volumes of equipment and allows quick updating following plant modifications.

Mitigating measures include:
- Maintenance and operational procedures and checks
- Condition monitoring
- Trips and alarms
- Hardware devices (e.g. torque limiters, relief valves).

These are then summarised in the risk assessment report for the item of equipment and the associated inspection sheets, to enable the user to implement and manage the required mitigating measures. The methodology enables the equipment user to demonstrate compliance with the ATEX directives.

ABB Eutech Process Solutions provides a full range of ATEX compliance services and “route to compliance methodology” including process hazard reviews, area classification, training and a comprehensive set of hazardous area project documentation and management procedures.

### ABB Eutech Process Solutions

ABB Eutech Process Solutions is a part of ABB’s Automation Technologies division serving customers in the petroleum, chemicals, life sciences, manufacturing, metals, paper and utility industries.

### REFERENCES

ATEX 95
European Union directive 1994/9/EC

ATEX 137
European Union directive 1999/92/EC

En 13463-1
Non-electrical equipment for potentially explosive atmospheres
Part 1: Basic method and requirements.

### The Author:

Andy Hollins graduated from Cambridge University in 1981 with a degree in Engineering. A professional mechanical engineer, he joined ICI in 1985 where he held a series of posts in process plant operation and maintenance, engineering department and R&D. He later transferred to Eutech, which was then acquired by ABB in 2001.

Now a senior consultant with ABB Eutech Process Solutions, he has a specific interest in the safe operation of mechanical equipment. In September he delivered a paper on ATEX compliance to the Institution of Mechanical Engineers’ International Conference in London on Compressors and their Systems. e-mail: andy.hollins@gb.abb.com

### Table 1: Overview of ATEX 95 and ATEX 137

<table>
<thead>
<tr>
<th>Zone</th>
<th>Atmosphere</th>
<th>Approximate Duration (hrs per year)</th>
<th>Equipment category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>Continuously</td>
<td>&gt; 1000</td>
<td>1</td>
</tr>
<tr>
<td>Zone 1</td>
<td>Intermittently</td>
<td>Circa 100</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Zone 2</td>
<td>Abnormally</td>
<td>&lt; 18</td>
<td>1 or 2 or 3</td>
</tr>
</tbody>
</table>

### Table 2: Area Classification and Equipment Categories

<table>
<thead>
<tr>
<th>Zone</th>
<th>Type</th>
<th>Active Ignition Sources to be prevented:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0 / 20</td>
<td>Normal operation, and</td>
<td>resulting from unexpected malfunctions, and</td>
</tr>
<tr>
<td>Zone 1 / 21</td>
<td>Normal operation, and</td>
<td>resulting from rare malfunctions</td>
</tr>
<tr>
<td>Zone 2 / 22</td>
<td>Normal operation (no malfunctions)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3: Tolerability of Ignition Sources according to Zone

<table>
<thead>
<tr>
<th>Zone</th>
<th>Type</th>
<th>Tolerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>Normal operation, and</td>
<td></td>
</tr>
<tr>
<td>Zone 1</td>
<td>Normal operation, and</td>
<td></td>
</tr>
<tr>
<td>Zone 2</td>
<td>Normal operation (no malfunctions)</td>
<td></td>
</tr>
</tbody>
</table>