

## ESA Position Statement on ATEX Directive 94/9/EC and its applicability to Mechanical Seals.

2012 May

The Directive ATEX 94/9/EC (ATEX 95) – ‘Equipment and Protective Systems intended for use in potentially explosive atmospheres’ has been mandatory since 2003 July 1. The interpretation of how this Directive applies to Mechanical seals is still largely misunderstood. On 2005 Feb 22, the EC ATEX Standing Committee provided a “*Consideration document*” § on mechanical seals defining when a mechanical seal is to be considered a machinery element or an ATEX Component.

§ <http://europa.eu.int/comm/enterprise/atex/rotating.htm>

The Members of the European Sealing Association (ESA) Mechanical Seals Division support this “*Consideration document*” and have developed the following “*Position Statement*” to summarise its content and to further clarify related issues.

### A. DEFINITION AND REQUIREMENTS FOR MECHANICAL SEALS CLASSIFIED AS MACHINERY ELEMENTS

Nearly exclusively, Mechanical Seals produced by Members of the ESA Mechanical Seals Division are “**Machinery elements**”, which do **not** fall within the Directive 94/9/EC. Machinery Elements are defined as:

- catalogue mechanical seals and their parts selected by the equipment manufacturer or equipment user alone or with assistance from the seal manufacturer
- mechanical seals stocked by the equipment manufacturer or end user for general applications
- mechanical seals used for applications where the service conditions are not closely specified
- non cartridge-seals and parts
- standard cartridge seals.

Mechanical seals will also be machinery elements if a risk assessment by the mechanical seal or equipment manufacturer shows that the seal is not expected to be an ignition source even in the event of fault conditions.

Because Machinery elements are not defined within ATEX Directive 94/9/EC they cannot be supplied with a Declaration of Conformity. However, Machinery elements are suitable for incorporation into rotating equipment that is classified as Groups 1 and 2, categories M2, 2 and 3 in potentially explosive gas or dust mixtures.

The Instruction Manual supplied by the seal manufacturer provides the necessary guidance for the safe incorporation of the mechanical seal into equipment and relevant safety aspects and limits of operation. This document assists both Rotating Equipment Manufacturer and user of the equipment when meeting the needs of the Machinery Directive 98/37/EC and the ATEX Directive 94/9/EC. Please consult your mechanical seal manufacturer for further information.

### B. DEFINITION AND REQUIREMENTS FOR MECHANICAL SEALS CLASSIFIED AS ATEX COMPONENTS

The EC ATEX Standing Committee’s “*Consideration document*” makes reference that some Engineered mechanical seals” may be classified and sold as ATEX Components. The term “Engineered mechanical seal” however has no clear definition. Applying the EC Standing Committee’s intent to restrict the definition of ATEX Components to only those rare mechanical seals in high explosive risk environments, the ESA Mechanical Seals Division offers this clarification of the terminology. ***‘Mechanical seals which use standard parts or modifications thereof are considered machinery elements. Only in exceptional circumstances should a mechanical seal be classified as an ATEX component. An engineered mechanical seal, in the context of ATEX, should be when a specifically designed mechanical seal (which meets the criteria of an ATEX component) has its design features based on the ignition potential of a particular service.’***

The “*Consideration document*” also advises that mechanical seals applied in zone 0 / 20 environments require mechanical seals to be classified as ATEX components, category 1. These circumstances are rare and for zone 0, described as ‘highly likely to be potentially explosive’, are defined as an area in which ‘the explosive atmosphere typically exists for more than 1000 hours per year’ (reference; EC *ATEX Guidelines*). Classification of a rotating equipment item requiring a Category 1 ATEX Component should be judged in this context.

Where mechanical seals are used in agitators the guidelines from the “*Consideration document*” should be equally applied and the majority of seals should be classified as machine elements. The zone in which they are operating in the case of a top-entry design can be either inside and/or outside the vessel and in rare instances operators have had to classify the inside of the vessel as a zone 0 environment.

### **B.1 Marking of ATEX Components**

Unlike ATEX equipment, marking in the context of ATEX components refers to conformity marking only. CE marking should not be affixed to ATEX components. Although not required by the legislation, from 2006 the mechanical seal industry will apply the recommendations in the “*Consideration document*” and, in the rare circumstances of a mechanical seal being an ATEX component, will conformity mark according to the recommendations of the EC ATEX Guidelines (second Edition). When necessary, appropriate conformity marking will be provided on the seal, unless size is prohibitive, in which case conformity marking will be on the packaging and documentation. The information provided will be;

- The manufacturer’s name and type or code description of the product
- The symbol for explosion protection as laid down in Directive 84/47/EEC
- The symbol of the equipment group and the category. The source of the explosive atmosphere (gas or dust).
- The symbol for the type of explosion protection employed.
- The use of the symbol ‘TX’ to indicate that the maximum surface temperature or Temperature Class is advised in supporting documentation.

### **B.2 Maximum Surface Temperature**

The primary ignition risk from a mechanical seal during normal operation results from the maximum surface temperature. Prediction of this temperature is based on a number of different criteria; for example the typical temperature rise expected at the seal faces is very much dependent on medium to be sealed, seal design and operating conditions. Please consult your mechanical seal manufacturer for estimations of maximum surface temperature for specific seal types.

## **C. AUXILIARY SUPPORT SYSTEMS**

The ATEX Standing Committee guidance note does not consider fluid support systems which help to lubricate the seal contact surfaces and assist in improving process fluid containment. However, their applicability is now clear when put in the context of the improved definition of an ATEX ‘component’. This definition now describes ATEX components as having two defining elements;

- Are essential to the safe functioning of equipment and protective systems ***with respect to explosion protection***;
- With no autonomous function.

Auxiliary seal support systems do not fit the above definition and, in addition, generally do not have their own source of ignition. Thus they are assemblies which ***are not considered ATEX components*** but, when fitted with specific electrical switches/alarms and other parts which individually are required to be ATEX accredited, should have these items comply with the specified ATEX zone. Therefore, it is important that the purchaser **warns the system supplier of the local ATEX requirements** in purchase order documentation.

## **D. REPAIRS, OVERHAUL AND MAINTENANCE OF EQUIPMENT**

The absence of established practices for repair, overhaul, and maintenance of non-electrical (mechanical) equipment covered by EU or international standards may result in misinterpretation or confusion of key terms on the subject of repair and maintenance of rotating mechanical equipment. To avoid uncertainty, the Members of the European Sealing Association (ESA) Mechanical Seals Division have expanded on the position statement originally developed in order to clarify further issues related to mechanical seals.

The EC – Directive 94/9 is applicable to products placed on the market after 1st of July 2003. Products sold prior to this date are not subject to the scope of 94/9/EC. Therefore, in case of a product upgrade or replacement for repair, overhaul, and maintenance purposes there is no legal requirement to bring the equipment in conformity with the ATEX Directive. Nevertheless, often requests are made to manufacturers to declare the conformity of repaired, maintained and/or upgraded products according to 94/9/EC.

## D.1 DEFINITIONS & REQUIREMENTS OF EC – Directive 94/9

Mechanical seals fitted to equipment may be replaced with another type or manufacture to improve reliability, increase safety, and reduce emissions. Upgrading mechanical seals is primarily subject to seal application suitability checks, and subsequently to the specified ATEX requirements and classification.

The scope of EC – Directive 94/9 with reference to mechanical seals, relevant terms and definitions, and required methods have been defined by the **EC ATEX Standing Committee** (reference; 2005 Feb 22, Consideration Document), and encompassed in the instructions stipulated in the current document, ref; **2012 May ESA Position Statement**, sections A and B.

Further terms & definitions are given in Appendix – A for further clarity.

## D.2 UPGRADING OF INSTALLED EQUIPMENT

### Prior to 1<sup>st</sup> of July 2003

Upgrading or replacing mechanical seals fitted into rotating equipment which has been put into service prior to 1st of July 2003 should be treated as repair, overhaul or maintenance to the equipment. Equipment put into service prior to 1<sup>st</sup> of July 2003 do not fall under the scope of EC – Directive 94/9. Therefore there is no legal requirement for mechanical seal manufacturers to conform to the ATEX Directive 94/9/EC.

It is the end-users responsibility to carry out an evaluation, and ensure the equipment conforms to relevant Health and Safety requirements, and it is recommended for the user to update and store the documentation of the products.

Any information required by the end user for the mechanical seal's application suitability to be supplied by the seal manufacturer in the form of an Addendum.

### After 1<sup>st</sup> of July 2003

Replacing mechanical seals fitted to existing or new equipment, which has been ATEX Certified by the equipment manufacturer as part of a machine or assembly, may be required and/or occur for reasons of improved reliability, performance and safety.

Like-for-Like upgrading of mechanical seals fitted to ATEX Certified equipment is defined as modifications, replacements or retrofits for repair, overhaul and maintenance purposes that:

- Do not affect the intended use of the product in a manner which could not reasonably have been foreseen by the manufacturer
- Do not affect the explosion safety features
- Do not change the nature of the hazard(s) associated with the equipment
- Does not increase the risk from existing hazard(s)

Replacing a mechanical seal, which was originally fitted to a machine by the equipment's manufacturer, with another type or manufacture, is subject to evaluating the suitability of the seal for the application, and it is considered a Like-for-Like upgrading, modification and/or replacement on the condition that the seal suitability assessment satisfies the requirements stipulated above.

The seal assessment should include:-

- Seal Application Limits (suitability of seal's pressure & speed ratings)
- Suitability of seal's materials of construction
- Dimensional suitability including the seal's radial & axial movement capability
- Any modifications, if required, to fit the seal into the equipment
- Testing, if required, prior to putting the seal into service
- Additional instrumentation, if required
- Barrier or buffer fluid hazards, if any (Dual seals only)
- Changes to operating conditions, if any
- Maximum seal surface temperature in operation
- Dust / Debris accumulation
- Electrical Conductivity (Electrostatic Discharge)

Should the conditions of upgrading ATEX certified equipment using Like-for-Like replacements are satisfied and the seal evaluation demonstrates that the replacement seal is suitable for the application, a new declaration of conformity for the equipment is not required, i.e. the equipment remains in conformity with Directive 94/9/EC. The results of the assessment must be recorded and stored in the form of an addendum to the existing or original documentation of the rotating equipment. No reference to the manufacturer of the original equipment is necessary.

## REFERENCES

1. Considerations by the ATEX Standing Committee, 2005, "When a Mechanical Seal is a Machinery Element and when an ATEX Component", (<http://europa.eu.int/comm/enterprise/atex/rotating.htm>).
2. ATEX Guidelines (3<sup>rd</sup> Edition), June 2009, Update May 2011, Directorate General – Enterprise and Industry of the European Commission.
3. Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
4. VDMA-Leitfaden, 2005, "Mechanical Seal, 2nd Edition".
5. BS EN 60079-19:2007
6. BS EN 13463-1:2009
7. ATEX: A Pragmatic Approach To The Maintenance of Machinery Installed Within Hazardous Areas, Author: Andrew M. Hollins, AMIMechE, ABB Engineering Services, Date: 1 February 2008
8. EUROPUMP ATEX Guideline, Part II, Application of the EC-Guidelines 94/9/EC to the Pump Industry, November 2012

## APPENDIX – A TERMS & DEFINITIONS

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- **Repair**  
Action to restore faulty equipment to its fully serviceable condition and in compliance with any requirements stipulated in relevant EU and/or international Standards.
- **Replacement**  
Action to restore a defective or worn-out part of a product and/or equipment previously placed and put into service on the market with a spare part, component part or reclaimed component.
- **Overhaul**  
Action to restore equipment, which is not faulty and it has been in use or in storage for a period of time, to a fully serviceable condition.
- **Reclamation**  
Repair involving, for example, the removal or addition of material to reclaim component parts which have been sustained damage, in order to restore such parts to a serviceable condition in accordance with relevant EU and/or international Standards.
- **Spare Part**  
Items intended to replace a defective or worn out part of a product or equipment. The manufacturer of the spare part is normally not required to comply with the ATEX Directive 94/9/EC unless the spare part falls within the scope of the Directive.
- **Component Part**  
An indivisible item; the assembly of such items may form an assembly.
- **Modification**  
Change to the design of the equipment which affects material, fit, form or function; this is to be considered a substantial modification.
- **Maintenance**  
Routine actions taken to preserve the fully serviceable condition of installed equipment.
- **Serviceable Condition**  
Condition which permits a component part, replacement or reclaimed component part to be used without prejudice to the performance or explosion protection aspects of the equipment with due regard to the certification requirements, in which such a component part is used.
- **Retrofit**  
To install, fit into or onto previously manufactured equipment new or modified parts.
- **Upgrade**  
To replace older parts of existing and/or new equipment that has been in service or storage with new or modernised parts to improve reliability, performance and safety.
- **Like-for-Like modifications**  
Action to replace or restore component parts or elements of the equipment is defined as replacements, retrofits or upgrades for repair, overhaul and maintenance purposes that:
  - i. Do not affect the intended use of the product in a manner which could not reasonably have been foreseen by the manufacturer
  - ii. Do not affect the explosion safety features
  - iii. Do not change the nature of the hazard(s) associated with the equipment
  - iv. Does not increase the risk from existing hazard(s)