

THE RELATIONSHIPS IN PRODUCT STANDARDIZATION, THIRD PARTY PRODUCT TESTING AND IECEX CERTIFICATION

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Abstract - To achieve Third Party approval and subsequently IECEX Certification for a product, a manufacturer must not only completely understand all the attributes of the product but also have a total understanding of the related product standard, Ex type of protection standard, the IECEX process, any specifics related to the National Differences related to the IEC Ex standard and the National Conditions of the IECEX Member Country concerned. This paper will outline the experience of obtaining an IECEX Certification, and point out potential conflicts and issues that might arise in the process.

Index Terms — IECEX Scheme and Certification, National Differences, National Conditions, ExMC, ExTAG, Decision Sheets, ExCB, ExTL, Ex Test Report (ExTR).

I. INTRODUCTION

The goal of the IECEX Scheme of “One Standard, One Certificate, One Mark” is not a unique concept in the IEC, but it is potentially easier to implement due to the relatively small number of product standards under TC31. As a result, the IECEX Scheme has supported a rapid evolution of the processes necessary for effective implementation of international certifications. The Scheme concepts are scarcely 10 years old, with certifications allowed only since mid-2003.

This relatively rapid development has of course led to growing pains, some of which were anticipated and others not. While the Scheme itself has required significant dedication and countless hours from its developers, it has also created an environment affecting Standards developers, testing laboratories, certification bodies, and manufacturers across the globe. It has created an environment with unprecedented levels of communication between certification bodies and with Ex equipment manufacturers and suppliers.

The work of Standards development organizations at the National level now includes the determination of National Differences with respect to the IEC TC31 requirements. For some countries this means that the national requirements are formally restated in the format and structure of the IEC standards.

This paper presents the most notable, significant effects of the Scheme on the various parties, and points out some of the conflicts and issues that have been encountered or that could potentially occur. The paper's purpose is to summarize these effects for both the National and International arenas.

A complete list of the acronyms used herein appears in Appendix A.

II. ROLE OF STANDARDS MAKING BODIES

A. Role of the IEC, in particular TC31, and IECEX

Standards utilized by the IECEX scheme are those created under TC31, the IEC Technical Committee covering Equipment for Explosive Atmospheres. In general the IEC TC31 standards are developed as a set of rules to govern the evaluation of equipment intended to be used in explosive atmospheres. With the implementation of the IECEX Scheme, the working groups and maintenance teams under TC31 are now required to be increasingly cognizant of the implementation of these standards as the single source of construction, performance, and testing requirements for product certification in this area. This requires language in standards that is as clear and meaningful as possible, to help eliminate the need for interpretations for specific certifications. Further, it is important that each generation of standards under development be reviewed in the context of interpretations that have occurred both within TC31 and the IECEX Scheme.

It is also imperative that the IECEX Scheme rules are clear on the evaluation and implementation of interpretations, so that conflicts between the Scheme and TC31 are avoided. Further, the operation and implementation of the Scheme must correspond directly with the goals and scope of TC31.

Interpretations of standards within IECEX are processed through the Ex Testing and Assessment Group (ExTAG). Requests for interpretations typically come in from various sources within the National Committees, and may or may not include a proposed solution. Each request is reviewed and edited by the IECEX Secretariat, the ExTAG Chairman, and the ExTAG Secretary, prior to being distributed for review to the ExTAG, which includes all Ex Certification Bodies (ExCB) and Ex Testing Laboratories (ExTL), and the chairpersons and secretaries of the relevant IEC TC31 committees. The time allotment for this review is eight weeks. If resolved and completed by this point, the interpretation question and response is posted in the form of a Decision Sheet (DS) or a Recommendation Sheet (RS) on the IECEX website. If consensus cannot be reached, then the DS or RS is reviewed at the next ExTAG meeting. If still unresolved, then the discussion is shifted to the ExMC, which may elect to establish a Working Group to study the problem in more detail. Once resolved, all ExCBs and ExTLs are expected to apply the DS or RS as stated to any applicable certifications. Because a number of interpretation issues have already been submitted, the ExTAG has issued more than fifteen Decision Sheets.

As the standards from TC31 evolve, then the Scheme rules and implementation thereof must also evolve. One recent example is the recognition of Equipment Repair and Overhaul shops based on IEC 60079-19. This has led to the development of the Certified Service Facilities Program (or Repair Scheme) under IECEx, which has generated much discussion over the scope and rigorosity of the requirements of the Scheme. At the same time, MT 60079-19 is working on a new revision to that standard, so IECEx developers must be cognizant of the changes in order that the Repair Scheme meets not only the current requirements but also is lined up to meet the revised requirements.

Within TC31, several new initiatives are either under discussion or have standards in development. Two examples are the introduction of non-electrical equipment and the recent evolution of Explosive Dust requirements into the TC31 scope. The presence of these two developments has contributed to the TC31 Committee title change from "Electrical Apparatus for Explosive Gas Atmospheres" to "Equipment for Explosive Atmospheres." An additional proposal being developed and implemented in new editions of the TC31 standards is the inclusion of Equipment Protection Levels (EPL), which is based on a similar approach stemming from the CENELEC standards corresponding to the ATEX Directive. Each of these proposals is beginning its evaluation under the IECEx scheme, primarily to verify that Scheme rules and directives are stated to ensure that there will be no conflict with TC31 proposed requirements and that they do not inadvertently prevent or otherwise affect the certification of relevant equipment.

B. Role of other Standards making bodies, in particular at the National level

1) *Necessary awareness of international interaction and resolution of potential conflicts with national standards during development:* It is obvious that the promotion of global trading will succeed best if national standards harmonize closely with such international standards as the IEC standards. The success of the IECEx scheme greatly depends on the ability of national standards making bodies to adopt the IEC standards. The development of National Differences within national committees helps to bring to light areas in which significant variances and conflicts exist. This in turn helps the national committees work on resolving these differences at both the national and international levels.

2) *Interaction with IEC for acceptance of standards and provisions of standards:* The national committees of individual countries vote for acceptance of international and national standards. These committees consist of representative stakeholders, such as manufacturers, users and certification bodies. Votes must be submitted in an agreed-upon format (sometimes accompanied with comments) to the international and national standard making bodies.

3) *National Differences for the IECEx scheme:* For the most part, IECEx member countries already have standards and regulations regarding equipment for use in explosive atmospheres. The national standards making bodies of those countries therefore have the task of establishing a list of differences between the IEC standards and the national standards, to be submitted to

their IECEx National Committees for review and transmittal to the IECEx ExMC. The National Differences from the IEC standards are listed in the IECEx Bulletin [1].

Europe has set up a group approach; due to the ATEX directive, CENELEC is appointed the national standards making body for all member states and other European Economic Area (EEA) countries, such as Norway. Unique in this set-up is that each member state has its own national committee. CENELEC's intention is to adopt the IEC standards with the ultimate goal of having no National Differences. One reason that this can happen easily is the fact that the new IEC standards (IEC 60079 range) are largely derived from existing CENELEC standards. It is expected that in the future the list of National Differences will become even smaller.

Other countries that do not have existing national standards or regulations can easily adopt the IEC standards without National Differences.

The US, because of a long history of hazardous location standards development along with some philosophical differences with European practices, has a large number of existing standards with many differences from the parallel IEC standards. Consequently, the list of National Differences to the IEC standards is rather long. The US is working with each revision of the IEC standards to reduce its National Differences, and is also working within the IEC to find common ground at the international level.

One example of a US National Difference is the requirement for a Thermal Performance Benchmark test for certification of trace heating systems. The current versions of the US and Canadian national standards include an evaluation of long-term stability, to verify that there is no significant change in power level and thus T-ratings after long-term exposure to extreme temperatures. At this point, the IEC standard does not require such a test, and this is an issue with various factions of the trace heating community.

4) *National Conditions:* In order to gain access to a national market for equipment to be used in explosive atmospheres, additional requirements specified by national standards may have to be met. These requirements may include:

- Fire and shock hazards
- Electromagnetic compatibility
- Personal safety when used in machines

These requirements may not be specifically required for Ex certification. They are referred to as National Conditions and are not in the scope of the IECEx Scheme. Often the national conditions are dictated by the laws of participating countries, such as the EU EMC Directive, the EU Machine Directive, and OSHA regulations in the USA.

Therefore it is likely that an IECEx Certificate of Conformity (ExCoC) or national Ex certificate alone does not grant access to a particular national market. However, the List of Decisions [2] from the ExMC meeting in Buxton 2005 mentions the formation of an Ad Hoc working group (WG) in order to explore the National Conditions and to list them all in a report. This might help the manufacturers or service providers in building an awareness of National Conditions in each IECEx member country.

III. ROLE OF CERTIFICATION BODIES AND TESTING LABORATORIES

An IECEx Certification Body (ExCB) and IECEx Assessment and Testing Laboratories (ExTL) can exist within a single organization.

These IECEx-qualified organizations are included as members of the Ex Testing and Assessment Group (ExTAG). The ExTAG addresses technical matters concerning the application of IEC standards to the assessment and testing of Ex equipment; it also deals with the assessment and surveillance of a manufacturer's or service provider's quality system.

A. Role of the ExCB (Ex Certification Bodies)

The main role of an ExCB is to provide to manufacturers or service providers:

- IECEx Test Reports (ExTR)
- IECEx Quality Assessment Reports (QAR)
- IECEx Certificates of Conformity (ExCoC)

There are approximately 30 qualified ExCBs at this time.

1) *Interaction with other ExCBs:* A quality assessment or test report issued by a particular ExCB (referred to as the issuing ExCB) can be transferred by the manufacturer or service provider to another ExCB (the receiving ExCB) in order to obtain national Ex certificates. These reports need to be very clear and detailed in order to avoid misinterpretations. The format of the ExTRs and QARs is determined by the IECEx Management Committee (ExMC). As a consequence, the test report documentation requires detailed entry and review. This process can be very time-consuming and may result in a high price tag for certification. However, the cost for the ExTR is well compensated by the fact that within IECEx member countries, complete reassessment and retesting is eliminated.

2) *National Certification:* At present only New Zealand and Australia accept ExCoCs for access to their market. All other IEC member countries require national Ex certificates. For example, European Community member states and EEA countries such as Norway require ATEX certificates. Manufacturers and service providers can apply for national Ex certificates with a receiving ExCB of their choice based on the ExTR and (if applicable) QAR of an issuing ExCB. The receiving ExCB must:

- verify compliance with national requirements for the country for which the national certificate is requested. The National Differences are laid out in the IECEx Bulletin [1].
- identify that the Ex equipment submitted for certification is the same as the subject of the ExTR.

3) *Initiation of the assessment and testing process:* Depending on the applied standards and/or types of protection, the ExCB sets up an assessment and test program for the ExTL to be carried out. The results recorded by the ExTL are reviewed and approved by the ExCB and result in an ExTR .

4) *Interpretation of standards requirements and National Differences:* During verification of compliance with standards requirements and National Differences, interpretations can lead to disputes between applicants (i.e., manufacturers or service providers) and the ExCB. In these cases ExCBs will consult IECEx for ExTAG Decision Sheets. If these fail to provide solutions, other ExCB's, IEC working groups or maintenance teams, or national standards making bodies are consulted. Should the dispute persist, an appeal can be submitted to the IECEx Board of Appeal for a decision as described in IECEx 01 Annex A [3].

5) *Interpretation of received ExTRs and QARs:* A receiving ExCB has to recognize the ExTR or QAR of the issuing ExCB unless (see IECEx 02 clause 10.4 and 10.5 [4])

- the standard(s) or amendment(s) according to which the ExTR or QAR was issued is (are) no longer valid in the country of the receiving ExCB. Such change in validity shall be listed in the IECEx Bulletin [1]
- the receiving ExCB considers the ExTR or QAR to be issued in error. The issuing ExCB shall be involved. If the ExCBs arrive at different conclusions, the case may be referred to the IECEx Board of Appeal.

Should an ExTR or QAR be refused, the applicant (i.e., manufacturer or service provider) can proceed to file an appeal with the IECEx Board of Appeal.

B. Role of the ExTL (IECEx Assessment and Testing Laboratories)

1) *Qualification and acceptance to IECEx Scheme requirements:* The conditions for acceptance of an Ex testing laboratory as an IECEx ExTL can be summarized as follows. The Ex testing laboratory:

- shall be located in a country participating in IECEx
- may be integrated with an ExCB or may have a written agreement with a single ExCB
- shall prove competence for assessment and laboratory testing according to the TC31 standards and their specified types of protection
- shall comply with ISO/IEC 17025 – *General Guide for the Competence of Calibration and Testing Laboratories*
- shall meet the requirements of the IECEx Technical Guidance Documents
- shall submit a copy of the first completed ExTR to the ExMC for review (for newly accepted ExTLs)

2) *Assessment and testing, relation between ExCB and ExTL:* The ExTL will execute the assessment and testing program established by the ExCB by filling in the templates provided by IECEx for the applied standards or types of protection. Additionally, test reports concerning National Differences may be added. The assessment and test reports shall be reviewed within the ExTL prior to submittal to the ExCB for evaluation and approval. Disputes in interpretation or test procedures shall be

clarified between the ExCB and ExTL, with the ExCB having ultimate responsibility for the interpretations.

C. Assessment of ExCBs and ExTLs by IECEx ExMC Assessment Team

1) *Initial Assessment:* One of the primary strengths of the IECEx scheme is the high level of capability that must be demonstrated by each candidate to initially achieve the status of ExCB and ExTL. A three-person assessment team is appointed for each candidate to review the candidate's qualifications and subsequently to conduct an extensive on-site surveillance audit. Besides demonstrating a secure knowledge base and on-site testing/evaluation capabilities for each submitted standard, the candidates must submit their procedures for validating and assuring compliance by their clients. The assessment team relies on ODs (Operational Documents) 003 *IECEx Assessment Procedures* [5] and 006 *Site Assessment Reports* [6].

The team also assesses the candidate to IECEx 02 *Rules of Procedure* [4], ISO/IEC 17025 *General Requirements for the Competence of Calibration and Testing Laboratories* [7], and ISO/IEC Guide 65 *Compliance Audit Checklist* [8].

In addition, the candidate must demonstrate the ability to conduct quality assessments of their clients, and to issue Quality Assurance Reports (QARs) upon successful completion of the assessments. A full investigation of the candidate ExCB or ExTL to ISO/IEC 17025 is required.

Procedures are in place for dealing with non-conformance and for reassessments, as deemed necessary. At the end of the assessment procedure, the audit reports are then submitted to all of the national committees for review and vote.

2) *Annual requirements for qualification:* Each year, each accepted ExCB and ExTL must submit any relevant organizational changes, an activity report including the number of certificates and reports issued, and an annual audit report based on national accreditation. This information is reviewed and assessed by the ExMC Secretary.

3) *Re-assessment:* A complete re-assessment is required every five years. If the qualified ExCB or ExTL does not have national accreditation, the complete re-assessment occurs annually.

4) *Surveillance audits of issued ExTRs and QARs:* During each calendar year, the ExMC shall arrange for a certain number of ExTRs and QARs to be subjected to a technical review. If major issues are discovered, a task group is formed to investigate further.

Because the IECEx scheme has established such a high level of assessment for the ExCBs and ExTLs, it is universally regarded as having a sound basis for certifications.

IV. ROLE OF MANUFACTURERS

A. Applicable Standards

As a minimum, equipment developers and manufacturers of Ex equipment need to fully understand the construction, performance, and testing requirements associated with their equipment, at both the national and

international levels. Changes to standards can have a significant effect on equipment design and application design, resulting in potential loss of certification if a re-evaluation to these changes is not conducted in a timely manner. This means that it is highly advisable for manufacturers and other equipment developers to be up-to-date with respect to pending changes to the relevant standards.

B. Involvement in Standards Development

Based on the previous section, it becomes obvious that involvement in relevant standards development may be considered critical for many manufacturers, in particular in new and developing industries and for those areas in which, overall, the rules and regulations are changing at a rapid pace. Because Ex standards and philosophies have been going through rapid evolution in recent years, this means manufacturers must be involved in the development of these changes or risk being at the mercy of the other manufacturers and certification bodies that are involved.

Certification bodies and manufacturers have a vested interest in the development of the IECEx Scheme and its implementation. They have been cautiously evaluating involvement in the Scheme development, since this requires additional time and resources. However, it is becoming increasingly obvious that the implementation of a certification scheme of this magnitude, without significant input from the manufacturing community, can cause certification and regulatory requirements to expand significantly. This potentially hurts the IECEx scheme, as manufacturers would be more likely to shun the system if they see it as being overly complicated and mired in paperwork and minutia.

C. Benefits vs. Cost of IECEx Certifications

One objective of the IECEx Scheme is to make certification more cost-effective and timely for manufacturers. However, the benefits of the Scheme at the current time do not make a significant enough difference, even in International markets, to fully justify the time and cost of certifications for many manufacturers and for numerous types of products. Manufacturers that have started certifications often base the decision on a "leap-of-faith" that the ultimate benefits will outweigh the costs of initial involvement. Of course, the Scheme itself is dependent on the widespread acceptance of its goals and intentions. The exponential increase in certifications and applications for new certifications to the IECEx Scheme since 2003 (see Figure 1) certainly indicates that more and more manufacturers are taking the "leap-of-faith" for their products.

Because of the CENELEC countries coming into the Scheme as a group instead of individually, along with their significant influence on the IEC TC31 standards, there has been a move to parallel vote many of the IEC TC31 standards one-to-one for European certifications. For manufacturers, this means that Certification Bodies in Europe are starting to accept IECEx test reports in lieu of ATEX test reports, for applications for ATEX certifications. This move by CENELEC indicates broad-based support of the IECEx scheme, and provides manufacturers with additional support for and confidence in initiating IECEx Certifications.

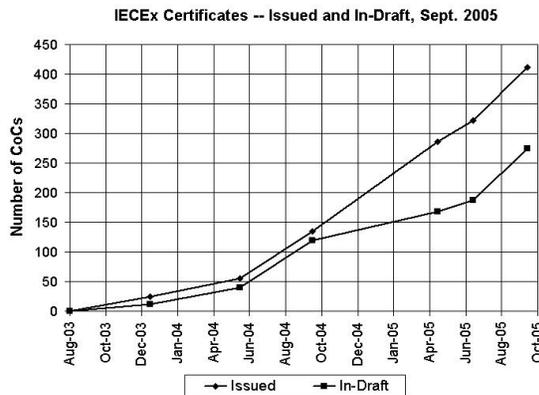


Fig. 1 [9]

D. Experiences Related to IECEX Certifications

At the onset of attempting certifications to the IECEX Scheme, manufacturers may be surprised at the level of detail required in the test reports. Instead of a listing of applicable criteria and a Pass/Fail conclusion, the IECEX reports include all relevant data from the testing of the specified materials. Manufacturers may even find that test report forms have not yet been created for their product or standard of interest. At the present time, not all standards being included under the Scheme have had test forms developed, although the majority of the major standards do have their forms in place and in use.

Many standards and/or specific editions of standards have not yet been selected for adoption by several of the countries participating in the Scheme. The National Committee of a country (or Group Committee for Europe) must publish National Differences (or state "none," if applicable) before a standard can be submitted for inclusion for their country's list of applicable standards. Further, Certification Bodies must have applied for and be qualified through IECEX audit and/or evaluation before they are allowed to issue certificates for each particular standard. In this situation, manufacturers have two choices: (1) Promote and assist their National Committee to review and publish National Differences, then apply to have the standard added for their country, and then request that the particular Certification Body be qualified to certify to that standard, or (2) Locate a Certification Body in a different country that already has the standard and qualification in place.

In general Certification Bodies are likely to be more stringent than usual for IECEX certification, since there is a greater potential for peer review by other Certification Bodies and by the IECEX Scheme itself based on oversight requirements. Data from years past may not be useable if the level of documentation is not up to the IECEX level. Manufacturers are advised to take a very conservative approach in their evaluation of relevant data for potential acceptance under IECEX. The benefit of this increased level of scrutiny by manufacturers is that the test reports and documentation package provide a more complete basis for future certification revisions and additions.

The potential exists for one Certification Body to evaluate a product somewhat differently from another Certification Body, which can lead to differences in the definition of performance levels or even T-codes. In those situations, the ExCBs may consider direct communication

about the nature of the differing evaluations. However, in many cases an application to the Scheme may be necessary for final determination through the use of Decision Sheets. The manufacturer may be able to contribute to the application process by helping to define the problem and proposing a solution.

In one experience related to trace heating certification, it was realized that the wording in one section of IEC 62086-1 was not clear regarding the applicability of other standards, including IEC 60079-7. Because the 62086-1 standard is currently under revision, the question was presented to the Maintenance Team (MT 62086), which has reviewed and is revising the subject section.

As with ATEX certifications, the IECEX requirements include an evaluation of the manufacturer's quality system and manufacturing processes for the specific certified products. The good news here is that the IECEX QAR can be based primarily on the ATEX QAN if already established for the manufacturer.

A potential pitfall for manufacturers is the use of components from other manufacturers in their product intended for certification. If the component is not already certified for IECEX, the manufacturer has to evaluate several choices: (1) Wait until the component manufacturer's certification is completed, if in process, (2) Find a similar component that is already certified, (3) Redesign the product so the component is treated as an add-on part or separate device. Nonetheless, the complete documentation package for the certification allows for quick review and revision when the subject component is certified.

To locate IECEX certifications of products and components, check the web site www.iecex.com, which includes all issued certificates in a single database. The site has several search options, including searching by keywords, manufacturer, issuing ExCB, and date of issue.

While initial involvement for manufacturers requires significant effort, this should diminish with time and experience. A growing number of manufacturers are deciding that the potential gain from securing IECEX Certifications outweigh the time and expense involved.

V. CONCLUSIONS

The IECEX Scheme has created an environment involving the roles of national and international standards making bodies, testing laboratories and certification bodies, and manufacturers of Ex equipment. While the amount of effort expended at these different levels to date has been enormous, the potential goals of the Scheme are just now starting to be realized.

Communication has been the key common component in the success of the Scheme so far. This includes: (1) Communication between IECEX and TC31, in particular on Ex Scheme rules and on the interpretation of relevant standards; (2) Interaction between national and international standards making bodies, between ExCBs and ExTLs, and between ExCBs/ExTLs and the Scheme; (3) Communication by manufacturers with the ExCBs and ExTLs; and (4) Involvement by manufacturers with the standards making bodies at the national and international levels and with their national committees to the IECEX Scheme.

Manufacturers are now aware that there is a great level of detail involved in IECEX certifications, and that they need to know about upcoming changes to the Scheme

that will affect them. The Scheme creates another level of testing, documentation, and bureaucratic involvement for ExCBs and ExTLs. The decision to become involved in the Scheme must be weighed carefully. The track record so far indicates that more and more certification bodies, testing laboratories, and in particular manufacturers are starting to embrace the Scheme with the decision to move forward.

Principal goals for the IECEx Scheme for the next phase of its existence include:

- the need for national committees to reduce the list of National Differences and National Conditions
- controlling costs for ExCBs and ExTLs to issue reports complying with the extensive ExTRs
- acceptance by regulatory bodies of the IECEx Scheme and of ExCoCs in as many countries as possible
- greater awareness and involvement by manufacturers of Ex equipment

VI. REFERENCES

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VII. VITA

Rudolf Pommé, Project Manager with KEMA Quality B.V., ExCB and ExTL in The Netherlands, has ten years of experience in application engineering, production,

product development and certification of equipment for use in explosive atmospheres in the Petrochemical Industry. He graduated from the Institute of Technology with a Bachelor of Engineering in Applied Science and Industrial Engineering and Management Science, and is a member of NEC31 and IEC MT 62086.

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Rob Mulder, Managing Director Thermon Benelux, studied business administration and has experience in a number of positions in companies involved in the petrochemical industry. He started to work for Thermon in 1979, and was involved in establishing the German affiliate company, Thermon Deutschland G.m.b.H, in the late '80s. In 1995 he was appointed the position of General Manager of Thermon Benelux, a division of Thermon Europe. Other roles within the organization include Services Manager and Interim Manager of Thermon France for a period of 2 years. In 1998 he concentrated on Thermon Benelux where he is again General Manager.

Paul House, Product Development Program Manager with Thermon Industries, graduated with a degree in Mechanical Engineering from the University of Houston. He has 25 years of experience in the development and certification of Ex equipment, and has worked extensively throughout his career on standards development at IEEE, ISA, UL, CSA, and the IEC. He is currently a member of the USNC to IECEx, and a member of working groups within IEC TC27 and TC31 for the development of trace heating standards.

Ben Johnson, Senior Vice President of Global Standards for Thermon Industries, has 36 years of experience with Thermon and eight years in the petrochemical industry with the Ethyl Corporation and the Diamond Shamrock Corporation. Mr. Johnson was Thermon's Vice President of North American Sales for five years and Thermon's Vice President of Engineering for twelve years, responsible for product application design, field and construction services. He was previously Thermon's Vice President of Research and Development. He is the holder of eight patents in the field of surface heating, and is responsible for numerous new product innovations. He has authored or co-authored 13 papers for various societies. As United States delegate to the International Electrotechnical Commission (IEC), he is the Convener for TC31 Maintenance Team 18, Electrical Equipment in Flammable Atmospheres, Electrical Resistance Trace Heating and US Technical Advisor for IEC TC27, Safety in Electroheat Installations. Mr. Johnson was elected IEEE Fellow in 1997 for development of standards and application of technology for electric surface heating.

Appendix A

Acronyms Described in the Paper

ExCoC – IECEx Certificate of Conformity

ExCB – IECEx Certification Body

ExMC – IECEx Management Committee

ExTAG – IECEx Testing and Assessment Group

ExTL – IECEx Testing Laboratory

ExTR – IECEx Test Report

IEC TC31 – Technical Committee 31 of the
International Electrotechnical Commission

DS – Decision Sheet

RS – Recommendation Sheet

OD – Operational Document

EEA – European Economic Area

EPL – Equipment Protection Level

QAR – IECEx Quality Assessment Report