

What Documentation Do I Need?

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Abstract

Hazardous locations certification can be a confusing and difficult process, but it does not need to be this way. Having the correct documentation for your project is an essential step towards success.

Purpose

Let's face it – not many people like doing documentation. It is usually considered a necessary evil at best – at worst, it is a non-value-added activity that actively drains effort from more practical engineering and design efforts. Despite all of that, documentation is essential.

One cannot go to manufacture without at least some semblance of documentation. However, for manufacturing purposes, “a semblance” is often all that is required. This is often the situation in smaller companies, where documentation is often poorly understood or simply ignored in the rush to deliver product.

Larger companies have more established processes, which are often intended to promote good documentation practices. Unfortunately, these processes are often too rigid or go overboard, furthering the perception that documentation is a waste of time.

However, while one might skate by with less-than-adequate documentation internally, you usually cannot say that for external vendors. Fail to give a contract manufacturing house correct documentation and they will build the wrong product. Similarly, failing to give a certifications agency the correct documentation will ensure that they are unable to certify your product.

Readers will note that we said “unable” there – not “unwilling”. Which brings us to the question:

What documentation do I need to give a certifications agency in order to certify my product?

What You Really Need

There is no doubt that certification agencies can be opaque, uncommunicative, and difficult to understand. Underneath all of this, however is a very simple answer:

The agency needs enough documentation to be able to verify the product against the standards.

This answer is – depending on your point of view – either helpful or unhelpful. But it does illustrate the one single, common requirement of all certification projects. To further illustrate, let's look at the certification process from the agency point of view.

The fundamental job of all certifications agents, inspectors and engineers is to ensure that the product they are given (i.e. yours) fully meets the requirements of the standards. To do this, they rely on your design documentation. They will take said documentation and go through the standard, point by point, until they find an issue or are finished.

From this, it becomes obvious that the most basic requirement of the design documentation is to demonstrate how the product meets the requirements of the standard.

Exactly what documentation is required will obviously depend upon what you are designing / building. However, the following documents are usually required:

- System diagram or block diagram
- Electrical and/or schematic diagrams
- PCB layouts
- Bills of material or parts lists
- Assembly and constructional diagrams
- Component or equipment data sheets
- Markings and labels
- User instructions

This list will obviously vary by application. For example, someone designing an intrinsically safe instrument may provide a block diagram, schematics, PCB layouts, bills of material, part data sheets and drawings of the enclosure(s). Correspondingly, someone designing an intrinsically safe system might provide a system diagram, electrical schematics, parts lists, equipment data sheets and assembly diagrams.

Incidentally, it is important to know that in agency-speak, all design documents are called “drawings”. This is a catch-all term for all types of design documentation, including schematics, bills of material, assembly diagrams, and other documents that designers might not think of as “drawings”, but certainly are for certification purposes.

Format

The next most common question is: **What format should I provide the documentation in?**

Fortunately, this answer is quite simple: It doesn't really matter.

Of course, that is not to say that you can do just anything you want. But the important thing is the information presented – not how it is presented. In this sense, any format that effectively communicates the required information is OK.

The Devil is in the Details

Keeping the above principles in mind, there are a number of documentation issues that can sabotage your certification efforts. This includes the following:

1. The certifications agent needs to be able to open and view the document. PDF, Word, Excel and Gerber are usually OK, but others are (usually) not.
2. Each drawing needs to have a unique, “visible” drawing number and revision. Without this, an agency cannot audit.

“Visible”, in this context, means “visible when the document is printed on paper”. That is, the drawing number and revision have to be an integral part of the document itself. This is one of the reasons why file names are not considered drawing numbers.

3. Drawings should be error-free. (Surprisingly, this is not always the case.)
4. Documentation cannot be changed after it is certified. Therefore, what you send along should be identical to what you intend to use for actual manufacture.

In this sense, there is no such thing as a “draft” set of documentation. What you give the agency will be what is certified, with no ifs, ands or buts.

The only typical exceptions to this “rule” are marking and instructions. These often cannot be finalized without agency blessing, meaning initial drafts are OK. You must, however, submit finalized versions before you can finish.

It is worthwhile noting, however, that the agency does not really care what kind of documentation numbers or revisions you use. You can use any kind of system you want.

Level Up

There are some documents and conventions that are not strictly necessary, but can be incredibly useful. Including these in your certification effort will make the job of certification easier – which, in turns, makes your life easier as well.

Agency inspectors are usually inundated with projects, and are sometimes given only a few hours to assess before they have to start writing their report. This is not a lot of time to assimilate and assess a brand-new, unfamiliar design.

One key, but little-used document, is sometimes called a Safety Description Document. It intended to provide the inspector with a clear, concise overview of the design. It also explains, in detail, how the product achieves its certification requirements against the standards. This greatly eases the initial discovery process.

The document is useful for many other reasons as well, including:

1. It provides a “sanity check” on the design. If it is not possible to write a coherent Theory of Protection document, there is probably a serious issue.
2. Agencies appreciate OEMs that make the effort to understand the requirements of the standards. Providing a detailed, useful guidance document therefore improves the agency relationship.
3. It captures design details critical to certification, allowing future modifications to be carried out without risk of compromising safety.
4. It can be a useful educational and guidance document, especially for newer personnel who may be unfamiliar with hazardous locations design.

Theory of Protection documents are sometimes optional, but not always. For intrinsically safe systems and purge/pressurized applications, a design description is usually a necessity.

In addition, there are a number of other useful drawings and conventions that will promote understanding of your design at the agency.

IECEx OD 017

In an effort to be helpful, the IEC has published IECEx OD-017: “Drawing and Documentation Guidance for IEC Ex Certification”. As such, agencies are often providing this guide to OEMs looking to achieve hazardous location certifications.

IECEx OD-017 is an “Operational Document”, and not a standard, so OEMs are not obligated to follow it. It does, however, give some useful and specific information helpful in achieving the broad goals set out above.

Many people find IECEx OD-017 confusing, at least at first. There is no doubt that it was written under the assumption that the reader was familiar with the IEC 60079 standards for hazardous locations. This is, of course, not always the case.

It is also true that IECEx OD-017 is written very broadly. As the document needs to cover all kinds of hazardous locations equipment, this is an unfortunate necessity.

To help in understanding, it may be useful to think of IECEx OD-017 as an extended checklist. Each clause in IECEx OD-017 is intended to address one or more clauses from the relevant IEC 60079 equipment standard. Fulfilling all of the applicable clauses will, therefore, help make sure your documentation is sufficient to verify your design against those standards.

Do note, however, that even documentation meeting IECEx OD-017 might be insufficient in certain cases. IECEx OD-017 should be considered as guidance only.

Summary

Documentation issues can hold up your hazardous locations certification project just as easily – or possibly even more easily – than actual technical problems. This can lead to unnecessary delay, confusion and frustration on all sides.

The basic purpose of the documentation is to allow verification against the standards. Documentation that does not do so, or that contains errors, will leave the agency unable to do its job.

Most documentation errors are entirely avoidable. Third-party technical review will reveal virtually all documentation errors up front, avoiding lengthy delays.

The situation can be improved further through useful conventions and supporting documentation that will assist in proving the design error-free. An experienced consultant can assist you in identifying items useful to your specific project.



About Spark Institute

Spark Institute is a full-service consultancy that specializes in intrinsically safe and hazardous locations design services. Our experience covers North American, ATEX, and IEC requirements.

Design Consulting

Know what you want, but don't know how? Put our years of experience to work for you. We can design hazardous locations products to your specifications.

Design Evaluation

Have an existing product, design, or concept? Spark Institute can help evaluate your design to the relevant standards to help ensure compliance. Take advantage of our experience to reduce your risks before making costly mistakes.

Training Services

Good designers aren't born - they're trained. Our training courses will drastically shorten the learning curve for both new and experienced designers. Courses can be tailored to your product lines on request.

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