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12 Basic Steps for DoD RFID Compliance

Monarch®
Products and Services

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12 Basic Steps for DoD RFID Compliance

Introduction:

So you are a supplier to the DoD and think you may need to comply with the DoD passive RFID mandate. How do you sort through the myriad options to meet compliance? How can you comply with minimal cost and effort? How do you make sure that your RFID solution is going to work? How do you manage the new data that RFID compliance will generate? This document will simplify the process required to comply with the DoD mandate and provide a common-sense approach to RFID compliance. It provides 12 basic steps to help you develop a robust and cost–effective solution with minimal headache and stress.

1) Determine if and when you need to comply with the DoD RFID mandate for carton and pallet labeling:

The DoD requires compliance to the mandate at the time when a contract is renewed or recompeted. If you have an existing contract with the DoD that you expect to be up for renewal in the near future, you should expect to have an RFID requirement added to that contract.

The only way to know for sure if you must comply is to read your contract RFQ and to discuss with your DoD Contract Manager.

2) Determine what items will need to be RFID tagged:

As of January 2007, there are about 35 DoD ship-to destinations that are covered by the RFID mandate. Only products being shipped to the locations at the following link are subject to the RFID mandate:

http://www.dodrfid.org/supplierimplementationplan.htm

As of January 2006, the DoD requires that the following Classes of Supply will require RFID tags to be placed on all individual cases, all cases packaged within palletized unit loads, and all palletized unit loads (pending appropriate safety certification):

Class I – Subclass – Packaged Operational Rations

Class II – Clothing, Individual Equipment, and Tools

Class III(P) – Packaged Petroleum, Lubricants, Oils, Preservatives, Chemicals & Additives

Class IV – Construction & Barrier Equipment

Class VI – Personal Demand Items

Class VIII – Medical Materials (except Pharmaceuticals)

Class IX – Weapon Systems Repair Parts & Components

Exceptions to this rule include certain bulk commodities such as sand, bulk liquids, coal and animal feed. In addition, certain munitions and explosives may be exempt until after testing has been conducted to determine the impact of radio frequency energy on these products.

DoD has released a web-based tool called the 'Class of Supply Look Up Tool'. For further assistance in determining whether your product needs to be tagged, please refer to:

http://www.acq.osd.mil/log/rfid/Class_of_supply_lookup_tool.htm

The current mandate is for product at the carton and pallet level only. In some instances, the case is indeed the item. Therefore, the item will need an RFID tag and it may also be subject to UID requirements.

Beginning in 2007, items that require a UID (Unique Identification) will need to be RFID tagged in the item packaging.

3) Determine the best inlay for your application and where best to apply the RFID label:

As of September 30, 2006, the DoD will only accept 96-bit EPC Class 1 Gen 2 UHF passive tags. Any supplier starting new at this point should start their program using a Class 1 Gen 2 tag.

RFID inlays come in a variety of antenna configurations and price ranges. In general, UHF inlays work well on RF-friendly products – which would be products such as paper and cloth that do not have high amounts of liquid or metal. In this case, tag selection and inlay position are not critical.

Liquid products tend to absorb UHF RFID energy, making it more difficult to achieve adequate read ranges. If your cases have liquid contents, you will need to take extra care in choosing the correct inlay design and inlay placement. Often, slight shifts in the location of the inlay on the carton will be enough to move away from the liquid and resolve the read range issues. In some cases, it may be necessary to pick a more robust inlay design to help compensate for the loss of read range due to the liquids.

Metals also pose a challenge to UHF RFID labels. Since metals reflect RF energy, they often cause 'echoes' that confuse RFID readers. Again, choosing the correct inlay design and placement on your package can typically yield good results.

The DoD has specific rules concerning where these labels cannot be placed:

- Don't put the smart label where it can be cut when opening the package.

- Don't cover the smart labels with tape, bands, or other packing material.

- Keep two RFID labels at least 10 cm apart.

- Attach the label so that it is uniquely associated with the item and case it is identifying.

- The RFID tag should be placed on the identification-marking side and right of center on a vertical face, allowing a minimum of 5 cm from all edges.

You can save a lot of time and expense by choosing an RFID partner with a qualified lab that can help you choose the best inlay and placement for your application. Some labs offer inlay-positioning analysis as a free service.

4) Determine whether to add RFID to one of your existing labels or to use a new, separate RFID label:

There are a few factors to consider when deciding whether to add RFID inlays to one of your existing labels or whether to use a new, separate RFID label. Labels with RFID tags (called 'inlays') manufactured into the labels can be printed with data required by MIL-STD-129P at the same time that the RFID tag is encoded with the required data.

The two most common labels currently used in combination with RFID information are the Military Shipping Label (MSL) and the Exterior Container Label. When RFID is required for the UID Unit Container Labels, these labels will also be commonly used for the RFID data.

Most importantly, you must determine if your inlay position analysis has forced you to place the inlay in a position so that it can no longer comply with the MSL and Exterior Container Label placement specification per MIL STD 129P. In this case, you will need to use a separate RFID label so that you can place the label for optimal RFID read. (A qualified, capable RFID partner can easily determine this through lab testing).

Another reason to use a separate RFID label is if you do not want to make any changes to your existing label process. If you do not want to change the data stream, printing, and applying of your current labels, you may find it easier to simply print and apply a separate RFID label.

Most suppliers using a separate RFID label choose to use a 4" x 2" RFID label as this provides adequate space for most RFID inlays and enough room for human readable backup of the RFID data.

5) Determine the best face sheet and adhesive for your application:

For applications in which the label is being placed on corrugated or stretch

wrap, a plain paper face sheet with a standard permanent adhesive is the lowest-cost alternative for the label. If the label is going to be used in very cold or very moist environments, you may need special adhesives and face sheets to protect the RFID inlay and assure that the label stays attached. Remember that moisture absorbed into the face sheet of your RFID label can have a negative impact on the RFID read performance. Choosing a smart label supplier with a full range of face sheet and adhesive offerings will help you best meet your requirements.

6) Determine what you will encode to the RFID chip:

There are 2 basic methods of developing the data for your RFID tag.

Some suppliers may choose to join EPCGlobal. In this case, EPCGlobal will assign the supplier a unique EPC company prefix – which is a unique identifier for the company. In this case the supplier can follow the EPC Tag Data Standard, which supports a number of constructs of the Electronic Product Code. This 96-bit Electronic Product Code typically consists of 4 basic segments: a Header, an EPC company prefix, a Product Code, and a Unique Serial Number. The **Header** defines the overall

length, identity type, and structure of the EPC tag encoding. The **Product Code** or **Object Class** identifies the general product being shipped (for example, a case of diet coke). The **Serial Number** is a unique number within each class. You are responsible for assigning unique, non-repeating serial numbers for every instance within each object class.

If you ship only to the DoD, it may not be necessary to join EPCGlobal. In this case, you will use the DoD Identity Type Option. In this case, you will use your previously assigned Commercial and Government Entity (CAGE) code instead of the EPC company prefix. The DoD encoding scheme consists of a header, a filter, a government managed identifier, and a unique serial number. The **Header** identifies that the tag contains either DoD 64-bit or 96-bit data. The **Filter** identifies whether the tag represents a pallet, case, or UID item. The **Government Managed Identifier** is the CAGE code. The **Serial Number** is a 36-bit unique identification for tagged items, which represents over 68 billion unique serial numbers.

It is beyond the scope of this white paper to explain the EPC Tag Data standard or the DoD Identity Type in detail. More information on developing the RFID data using the DoD construct can be found in the 'United States Department of Defense Suppliers' Passive RFID Information Guide':

http://www.acq.osd.mil/log/rfid/supplier guide.htm

More information on developing the RFID data using the EPCGlobal Tag Data Standards can be found at:

http://www.epcglobalinc.org/standards/

By far, the easiest way to comply with the DoD tag data standards is to work with one of the many software suppliers that offer relatively inexpensive applications that use your existing data to build the EPC code for you. These companies specialize in DoD solutions and will save you the time and frustration of trying to understand and implement all the details of the tag data specifications.

7) Determine what you will print on your labels:

If you are going to add RFID to your existing 4" x 6" MSL or Exterior Container Label, the human readable and barcode data on your existing MSL does not change. However, the data stream to your printer/encoder will need to be updated in order to support the RFID encoding.

If you choose to use a separate 4" x 2" label for your RFID tag, the printing requirements are minimal. It is recommended that you print a human readable and a barcode backup of the RFID data as a minimum. Some companies also choose to print whether the label is carton or pallet. You may additionally choose to print your company name or other information that makes the label more useable in your specific application.

8) Determine how you will print and apply your labels:

Printing and encoding RFID labels is not as straightforward as printing barcode labels. Unfortunately, there are still varying levels of quality in both RFID encoding devices and RFID tags and labels.

It is critical that the RFID printer and the RFID labels are designed to work as a system. If you choose to purchase your encoding equipment and your labels from different suppliers, be sure that they guarantee that the products will work as a system.

It is very rare to receive 100% yield of RFID labels through printer/encoders. However, you should expect at least 98% yield. Be sure to choose a partner who will provide a guarantee on encoded labels. Your partner should be willing to provide credit to you for any label that does not encode.

No matter which method you choose, be sure to select a supplier that will provide a DoD **Letter of Compliance** or **Certificate of Compliance** to the DoD specifications.

There are four basic methods to choose from for printing and encoding of RFID Smart labels:

Purchase pre-printed and pre-encoded labels to meet your specifications:
If you are shipping relatively low volumes of RFID-labeled product, (hundreds or less per month as opposed to thousands), you may not want to invest in the hardware and the software required for printing and encoding your own RFID labels. There are several companies that provide pre-encoded RFID labels. You simply provide the correct data, and the labels are printed and encoded for you. You should expect that the supplier tests the labels, that they ship in a static-resistant bag, and that you receive a written Certificate of Conformance to the DoD specifications. You should expect that your label order ship within 48 hours once the initial design template has been created. You will still need some method of pulling together the RFID data and shipment data to form your Advanced Ship Notice (ASN).

Print and encode your own labels using an RFID Printer/Encoder:
If your volumes are high enough, and you want to maintain control of your printing process, you may choose to purchase an RFID printer/encoder and print and encode the labels as you need them. In this case, you can develop your own data streams or purchase a software package that has the DoD compliance formats built-in.

Print, encode, and apply your labels using an RFID Printer/Encoder/Applicator:
For very high-volume applications, you can choose to use a machine that will not only print and encode your RFID labels, but also automatically apply them to your product. For solutions involving automatic print, encode, and apply, you should be sure to use the highest quality labels available and also be sure to consider how you will handle exceptions if your label does not encode.

Open-Air Encode:
Finally, you may choose to do what is called an open-air encode. With this method, an RFID reader is used to encode the RFID labels after they are applied to your package. This method is not recommended because it will typically result in the lowest encode yield and also does not provide human readable or barcode backup of the RFID data.

9) Determine how you will test/verify your RFID tags before shipment:

The DoD mandate requires that the RFID tag be verified before shipment. This can be achieved with either fixed or handheld RFID readers. The choice of the reader will be driven by your specific application: package size, current process constraints, and shipment volume will determine which reader best meets your needs.

10) Determine how to communicate the RFID data to the DoD:

The RFID mandate requires that all vendors who are contractually obligated to affix passive RFID tags to material must also send an ASN via WAWF (Wide Area Workflow). The ASN is not a new process/transaction, but is an extension to the existing Material Inspection Receiving Report (MIRR) transaction being sent to WAWF with additional data (RFID data elements) added to the transaction. The RFID tag ID has been added to WAWF as an additional data element in the MIRR. Within the ASN, you must provide the ID of every RFID tag in a shipment in hexadecimal format (example: 2F03031484C443900000000C).

Further information on RFID and WAWF can be found at:

http://www.acq.osd.mil/log/rfid/advance_shipment_ntc.htm

It is recommended that you work with a qualified software partner with experience in dealing with RFID, UID, and WAWF applications.

11) Determine cost to quote to DoD – contract submittal

The DoD considers the cost of implementing and operating RFID as a normal cost of business.

The cost of compliance is an allowable cost under the contract. Therefore, you should determine the cost of implementing RFID before your contract submittal so that this cost may be included.

12) Choose your supplier(s) wisely:

The DoD website has over 240 pages of documentation explaining the RFID initiative. A reliable, experienced supplier can guide you through the many decisions you need to make at very lowest cost. Here are some questions you may want to consider asking a supplier:

- How much experience do you have with RFID technology? With suppliers to the DoD? Can you guide me through the DoD mandates?

- Can you install the solution and train my people on how to use it?

- Do you have service available to come to my location should I run into issues after installation?

- Can you supply me with a complete package of what I need? What is the cost of your simplest, most basic package (note: supplier should be able to provide you with the basic software you need, one printer/encoder, a reader and initial labels, and install it for well under $15,000)

- Do you offer software that can encode the DoD required Electronic

Product Code numbers? Does your software send the information to the DoD electronically in the required format?

- Do you guarantee that your labels will scan? Can I return failed labels for a credit?

- Do you offer laboratory services to guide me through the placement of the tag on my product, and guide me through selecting the proper inlay for my product? What is the cost of this service?

- Are the printer/encoder and smart labels you offer certified as "Interoperable" with other Gen2 products by the recognized standards agency, EPCglobal (Products certified as "Interoperable" meet EPCglobal's Gen2 specifications and will work in harmony with the DoD reader hardware they will use to read your labels).

You can go through all of the DoD materials and manuals. However, you don't have to. The right supplier can provide all the information and services outlined in the questions above, and more - making your compliance with the DoD standards easy for you to accomplish.

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Email address for sending RFID questions to the DoD: info@dodrfid.org

DFARS Clause 252.211-7006:
http://farsite.hill.af.mil/archive/dfars/dcn200608
14/dfars252_000.htm#P1223_61118

MIL STD 129P (over 140 pages long):
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3.htm

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http://www.acq.osd.mil/log/rfid/supplierguide.ht
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http://www.acq.osd.mil/log/rfid/advance_shipm
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