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DOE HANDBOOK

Suspect/Counterfeit Items Resource Handbook

U.S. Department of Energy
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ATTACHMENT 1

Change Notice No. 1 **DOE-HDBK-1221-2016**

January 2017

Suspect/Counterfeit Items Resource Handbook

Table of Changes

Page/Section	Change
Page 7/Section 6.2	Section name was changed to "DOE and Industry Resources"
Page 22/Figure 3: Suspect/Counterfeit Part Headmark List	Added underline for Type 3 grade A325 fastener
Page 22	Deleted note: "Manufacturer symbols are not shown"
Page 24/Figure 4/Note on right side of figure	Deleted "Any bolt on this list should be treated as…" and replaced with "Any bolt with a black background should be treated as…"
Page 30/Section 10.2.2	Deleted "Integra Technologies Laboratory has commonly seen 20 percent or even higher failure rates with refurbished parts."
A-3/Appendix A	Updated link to FQA Register of Active Fastener Insignias
Throughout Document	Corrected spelling and grammatical errors

Foreword

This Department of Energy (DOE) Handbook provides information to assist DOE sites in preventing suspect/counterfeit items (S/CI) from entering the DOE complex. Specifically, it provides information on identifying, reporting and dispositioning S/CIs, and includes examples of S/CIs. Internal and external resources have been referenced for additional information.

The Handbook is available for use by all DOE elements and their contractors.

This Handbook does not establish new requirements, and any existing requirements are explicitly referenced from a DOE Order. DOE Order requirements prevail. This handbook provides guidance to implement DOE S/CI requirements and therefore uses the words “should” and “may”.

Beneficial comments (recommendations, additions, and deletions), as well as any pertinent data that may be of use in improving this document, should be emailed to nuclearsafety@hq.doe.gov or addressed to:

Office of Nuclear Safety (AU-30)
Office of Environment, Health, Safety and Security (AU)
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Acknowledgments

This Handbook was developed with significant contributions of Duli Agarwal (AU-30), Dale Govan (AU-1.1); Sharon Brown (AU-23); Robert (Bob) A. Carter (EFCOG/WCH); Robert A. Toro (EM); Roger D. Moerman (Energy Solutions); Dave Torczon (Energy Solutions); Richard D. Warriner (CHPRC Richland); Nancy Tessmar (LANL), Alexis Earley (PEC) and James (Jim) A. Powell, Consultant to DOE.

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Acronyms

AGA	American Gas Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASTM	American Society of Testing Materials
CGA	Canadian Gas Association
CFR	Code of Federal Regulations
CFSI	Counterfeit, Fraudulent, and Suspect Items
CMTR	Certified Material Test Report
COTS	Commercial Off The Shelf
DECAP	Decapsulation
DOE	Department of Energy
EPRI	Electric Power Research Institute
ARAI	Electronic Resellers Association International
FM	Factory Mutual
FQA	Fastener Quality Act
G	Guide
GIDEP	Government-Industry Data Exchange Program
GL	Generic Letters
IACC	International Anti-Counterfeiting Coalition
IAEA	International Atomic Energy Agency
IDEA	Independent Distributors of Electronics Association
IC	Integrated Circuit
IFI	Industrial Fasteners Institute
IG	Inspector General
INPO	Institute of Nuclear Power Operations
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
NCR	Nonconformance Report
NIST	National Institute of Standards and Technology
NNSA	National Nuclear Security Administration
NQA	Nuclear Quality Assurance

NRC	Nuclear Regulatory Commission
NRTL	Nationally Recognized Testing Laboratory
O	Order
OCM	Original Component Manufacturer (electronic components)
OEM	Original Equipment Manufacturer
OIG	Office of the Inspector General
OMB	Office of Management and Budget
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PQFP	Plastic Quad Flat Pack
PSO	Program Secretarial Office
QA	Quality Assurance
QAP	Quality Assurance Program
S/CI	Suspect/Counterfeit Item
SAE	Society of Automotive Engineers
SAM	Scanning Acoustic Microscopy
SEM	Scanning Electron Microscope
SME	Subject Matter Expert
UL	Underwriters Laboratory
WVDP	West Valley Demonstration Project

1.0 Purpose

This Handbook provides information to assist the Department of Energy (DOE) sites in preventing suspect/counterfeit (S/CI) items from entering the DOE complex. Specifically, it provides information on identifying, reporting, and dispositioning S/CIs.

2.0 Applicability

This Handbook is applicable to the DOE Complex, including all DOE elements and their contractors, S/CI coordinators, procurement, engineering, and quality assurance personnel. It is also applicable to the procurement process and all safety related and systems essential to mission execution applications items purchased.

3.0 Scope

To meet the requirements of DOE Order (O) 414.1D, *Quality Assurance*, it is recommended that the current version of DOE Guide (G) 414.1-2, *Quality Assurance Program Guide* and IAEA TECDOC-1169 , *Managing Suspect and Counterfeit Items in the Nuclear Industry*, be used for the establishment and implementation of an effective S/CI prevention, detection and disposition process. IAEA TECDOC-1169 uses the term Counterfeit/Fraudulent/Suspect Items (CFSI) while DOE O 414.1 uses the term S/CI, but the meaning of both CFSI and S/CI are the same. IAEA TECDOC-1169 addresses guidance for a typical or generic S/CI process, which includes the important elements, but not limited to the following:

- Ensuring detection, control, reporting, and appropriate disposition of S/CI ;
- Ensuring that items and services meet specified requirements;
- Preventing any further introduction, installation, or use of S/CIs;
- Eliminating the hazards created by S/CIs that are present in nuclear facilities;
- Providing training to inform managers, supervisors, engineers, and workers on S/CI processes and controls; and
- Considering the approach for identifying a single database and methodology for reporting S/CI.

IAEA TECDOC 1169 does not address all DOE S/CI requirements in DOE O 414.1. This Handbook provides additional guidance and information to ensure the DOE S/CI process is effective and compliant with DOE requirements. The guidance includes, but is not limited to:

- The DOE notification process, including the collection and review of information from internal and external sources;
- Reporting S/CI items in accordance with the requirements specified in DOE O 232.2 Admin Chg. 1, *Occurrence Reporting and Processing of Operations Information* and DOE O 414.1D;
- Government-Industry Data Exchange Program (GIDEP);
- Good Practices for Prevention of S/CI into DOE Facilities; and
- Information on counterfeiting issues with electronic components.

The most recent version of DOE G 414.1-2 provides information on principles, requirements, and practices used to establish and implement an effective Quality Assurance Program (QAP) for both non-nuclear and nuclear facilities consistent with the requirements of DOE O 414.1 and Title 10 CFR, Part 830, Subpart A, including approaches and methodologies to meet the requirements for S/CIs described in Attachment 3 of the Quality Assurance (QA) Order.

4.0 Definitions

Certified Material Test Report (CMTR): A written and signed document approved by a qualified party containing data and information that attests to the actual properties of an item and the actual results of all required tests. (DOE G 414.1-2B)

Critical Load Path: A structural component (e.g., fastener) in a crane, hoist, transporter, or other handling or lifting equipment that bears the load being lifted or moved, and whose failure could result in an operational safety problem or an unacceptable risk of injury to workers or to the public.

Items:

- Per American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1-2008. An all-inclusive term used in place of any of the following: appurtenance, assembly, component, equipment, material, module, part, structure, subassembly, subsystem, system, or unit.

- Per DOE O 414.1D. An all-inclusive term used in place of appurtenance, assembly, component, equipment, material, module, part, structure, product, software, subassembly, sub-system, system, unit, or support systems.

Nonconformance: A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. (ASME NQA-1-2008)

S/CI: The definition provided by DOE O 414.1D, is enriched by the following definitions:

- Genuine Item. Items that are produced and certified without the intent to deceive.

- Counterfeit Items. Items that are intentionally manufactured, refurbished or altered to imitate original products without authorization in order to be passed off as genuine.

- Fraudulent Items. Items that are intentionally misrepresented with intent to deceive, including items provided with incorrect identification or falsified and/or inaccurate certification. They may also include items sold by entities that have acquired the legal right to manufacture a specified quantity of an item but produce a larger quantity than authorized and sell the excess as legitimate inventory.

- Suspect Items. Items where there is an indication or suspicion that they may not be *g*enuine.

5.0 S/CI Discovery and Reporting

5.1 Discovery Process

Immediately initiating a Non-conformance Report (NCR) process immediately after a potential S/CI is discovered ensures the item is controlled to prevent it from being put back into circulation and used. This facilitates meeting time requirements for Occurrence Reporting Processing System (ORPS). The key is getting the NCR to a site S/CI subject matter expert (SME) or S/CI coordinator in a timely manner. The SME or S/CI coordinator should make a technical determination that the item is truly suspect of being S/CI. At a minimum, an S/CI coordinator should consider:

- What was ordered, against what was received;
- Determine the S/CI requirements flowed down to the supplier in the procurement documents; and
- That the item is nonconforming as defined in the sites S/CI prevention process.

S/CI Processes and programs that fail to prevent an S/CI from being delivered to a DOE facility are key areas for focus to prevent such occurrences.

The Discovery Process is described in Figure 1 below.

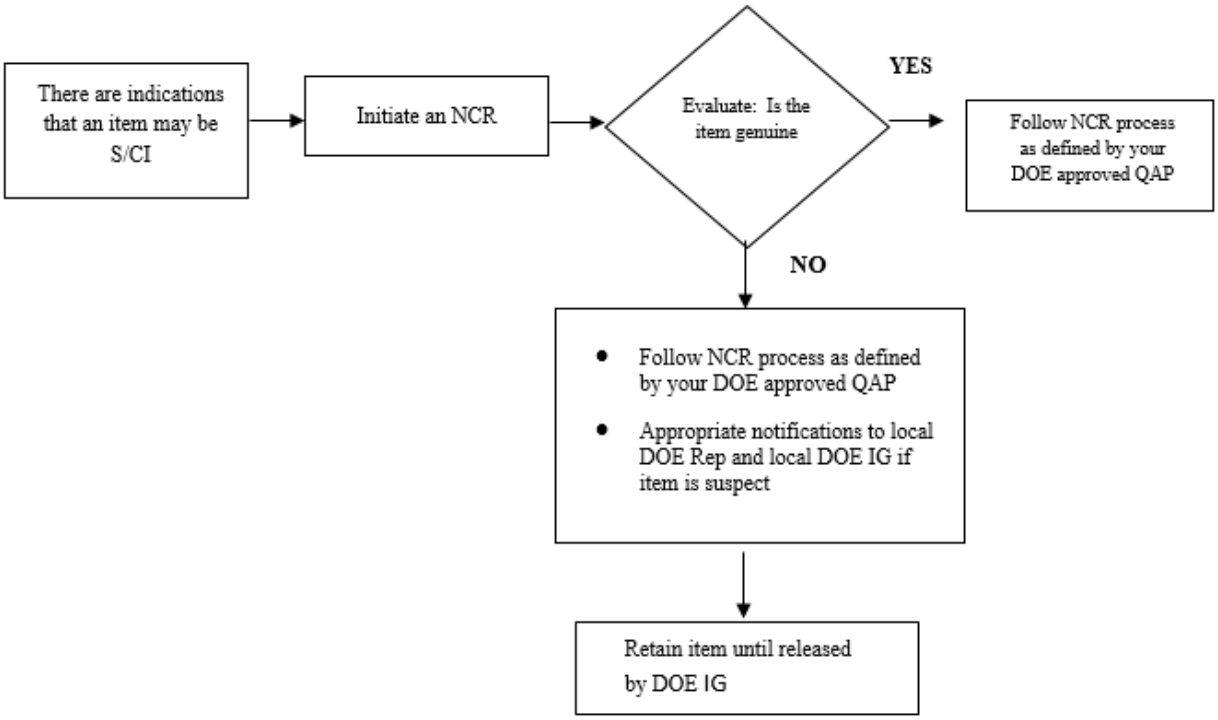
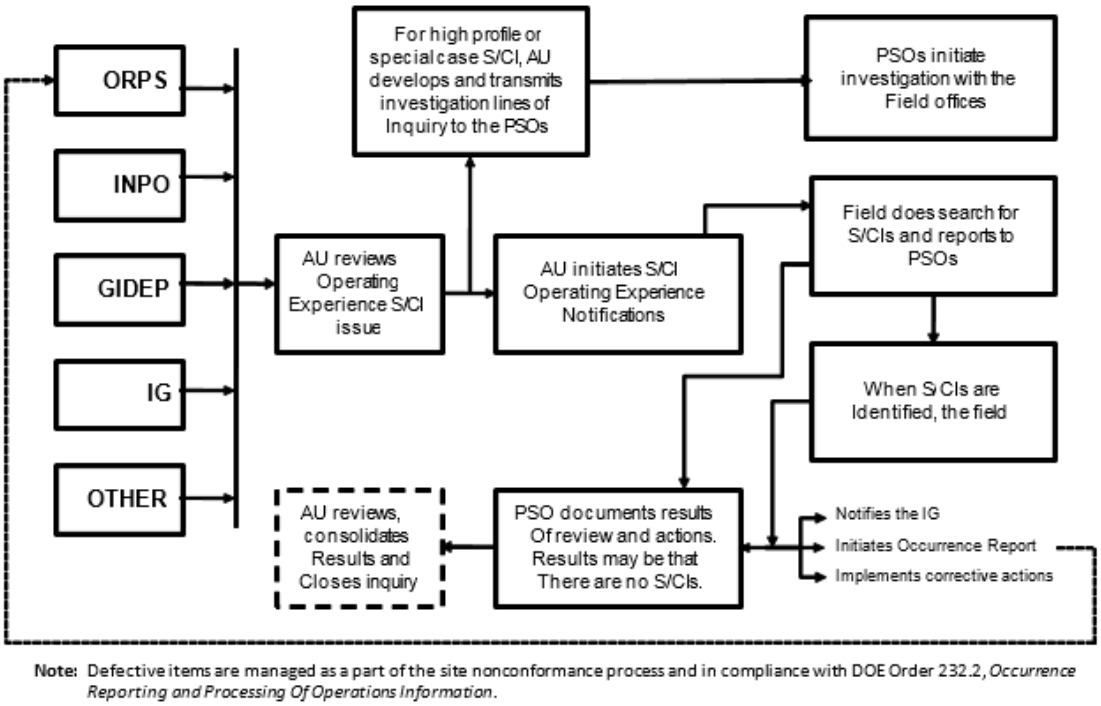


Figure 1: Describes the Discovery Process for S/CI

5.2 Source of Information

Figure 2 is a depiction of the S/CI process developed by DOE to aid in identifying S/CI items.



(Source: DOE Guide 414.1-2B, *Quality Assurance Program Guide*, Admin Chg 2)

Figure 2: Suspect/Counterfeit Item Notification Chart

5.3 Reporting S/CI

Report items determined to be S/CI in accordance with the requirements specified in DOE O 232.2 and DOE O 414.1D, which includes occurrence reporting and reporting to the Inspector General (IG). Additional guidance is found in DOE G 414.1-2B, Section 5.3, "Responsibility in Reporting," through Section 5.5, "Reporting S/CIs to DOE Office of Inspector General (OIG)."

Training should emphasize the importance of S/CI identification and non-conformance reporting preparation and the time requirements for reporting provided by DOE O 232.2.

6.0 S/CI Resources

6.1 Government-Industry Data Exchange Program (GIDEP)

GIDEP is a cooperative activity between Government and private Industry participants seeking to reduce or eliminate expenditures of time and money by making maximum use of existing knowledge. The program provides a means to exchange certain types of technical data essential in the research, design, development, production, and operational phases of the life cycle of systems and equipment. DOE participates in GIDEP and is directed by the Office of Management and Budget's (OMB) Policy Letter 91-3, *Reporting Nonconforming Products*, which requires Agencies to participate in the "Failure Experience" data interchange. The OMB Policy Letter 91-3 can be found at:
https://www.whitehouse.gov/omb/procurement_policy_letter_91-3/.

DOE and its contractors should utilize GIDEP to report S/CI to organizations outside of DOE and to identify information from outside organizations to prevent S/CIs from entering their supply chain. Proper utilization of GIDEP data can materially improve the total quality and reliability of systems and components during the acquisition and logistics phases of the life cycle and reduce costs in the development and manufacturing of complex systems and equipment. To register for access to the GIDEP database, go to: http://www.gidep.org/join/requirements.htm.

For more S/CI information and resources see Appendix B and Appendix C of this Handbook.

6.2 DOE and Industry Resources

The DOE Office of ES&H Reporting and Analysis (AU-23) maintains a Web site for relevant S/CI information and related reference documents at: https://energy.gov/ehss/policy-guidance-reports/databases/suspectcounterfeit-and-defective-items. Online registration is required

The DOE lessons learned program also maintains a web site for relevant operating experience at: http://energy.gov/ehss/policy-guidance-reports/databases/lessons-learned-database. Online registration is required

The Electronic Resellers Association International (www.erai.com) provides its global members with supply chain risk mitigation solutions, including the world's largest searchable database of counterfeit components and high-risk suppliers.

The International Anti-Counterfeiting Coalition (IACC) (www.iacc.org.) brings together thousands of people from various industries, educational institutions, and government at all levels to share with and learn from each other on key strategies and practical solutions to addressing counterfeiting and piracy. IACC members benefit from a global community.

7.0 Good Practices for Prevention of S/CI into DOE facilities

Responsibility for preventing S/CI from entering DOE facilities starts with but is not limited to procurement, engineering, quality assurance, inspection/testing, acceptance of items, and services utilized in DOE facilities. The following is a discussion of S/CI guidance for these organizations. Examples of S/CI found in DOE facilities are provided in Appendix A.

7.1 Procurement

The procurement process begins with a procurement request and acquisition planning, which establishes requirements for items, including special procurement requirements, which may be added to standard boilerplate terms and conditions. The enforcement of the terms and conditions by a cognizant organization and procurement officials is necessary so that contractual requirements are not waived by costs, schedule, and/or production pressures. The following practices should be used during the procurement process to prevent S/CI:

- Purchasers should ensure that suppliers have demonstrated their capability to deliver acceptable items in a timely manner;
- Both the extent of procurement controls and verification activities are commensurate with the importance of the item to safe and reliable operation as specified in the purchase documents;
- Persons involved in the procurement process should receive training in S/CI awareness and prevention methods;
- Provisions are included for the performance of technical and QA reviews of procurement documents; and
- Approved QA and S/CI clauses are included in procurement documents.

A key element of the procurement process is the specification requirement. The specification requirement including technical and quality assurance requirements should be developed by engineering. A graded approach is applied based on the specific application and the potential impact that failure of the item could have on the health and safety of the public, environment, and workers. The determination of specific quality controls and verification methods, such as a QA audit and/or supplier source surveillance, receipt inspection, and post-installation inspection and test should be described in the procurement package.

Items intended for use in safety systems and mission-critical facilities should be procured from suppliers whose QA programs have been evaluated by the purchaser, other DOE contractors, or third-party certification agencies. The designation of safety significant/safety class items should be consistent with the Preliminary Documented Safety Analysis and or Documented Safety Analysis requirements. The Quality Level (graded approach) requirements of the item should be

consistent with the classification and function of the item. Items procured for use in non-safety systems, which are subsequently upgraded for use in safety systems, should be subjected to the same controls and verification (including the use of qualified suppliers, inspection, and acceptance testing) applied to safety systems and mission-critical facilities. Items procured through surplus or other uncontrollable channels for use in safety systems and mission-critical facilities should be supported by documentation of their conformance validated by the purchaser. In the absence of such documentation, items should be verified for acceptability by inspection, verifications, or acceptance testing specified by engineering. Specifications for commercial grade items intended for use in safety systems and mission-critical facilities should identify the critical characteristics of the item and specify the verification attributes for acceptance to the appropriate grade level. For commercial grade dedication process, follow American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1 2008/2009a, Subpart 2.14., and applicable portions of Part 1.

Unless the supplier's quality system for generating the documentation and maintaining part number configuration control was previously verified through performance-based evaluations, DOE and its contractors should be cautious about accepting items based solely on supplier-generated documentation or part-number verification

7.2 Supplier Quality Assurance

The supplier QA evaluation program should be sufficient to provide the requisite level of assurance that the supplier or distributor has the capability to comply with purchase order requirements, which includes, but is not limited to:

- Providing data, if required, to indicate the component has been tested, inspected, or undergone other verification methods to assure component integrity;
- The supplier /distributor S/CI avoidance process is reviewed during supplier evaluations/commercial grade surveys/audits;
- The suppliers and distributors control customer returns to preclude the introduction of S/CI, including electronic components, into the original equipment manufacturer (OEM) or distributor inventory;
- The suppliers and distributors perform inventory assessments to screen for the presence of S/CI electronic components; and
- The suppliers evaluate their sub-tier suppliers and distributors for control of S/CIs.

In addition, when the supply chain involves multiple suppliers, each step in the supply chain process should be validated by audit, source inspection, or other methods as appropriate. To control entry of S/CIs through the procurement process, contractor QA programs should implement procedures for:

- Control of procurement processes;
- Development of procurement specification/requirements for items;
- Approved QA and S/CI clauses in procurement documents;
- Technical and quality review of procurement documents;
- Legal review of contracts for interpretation of relevant contract terms and conditions;
- Supplier past performance information;
- Maintaining approved supplier lists;
- Performing source or receipt inspection, surveillance, and performance-based audits;
- Technical validation of product acceptability, including performance of specific verifications, inspections, and tests; and
- Utilization of supplier quality information sharing processes.

7.2.1 Approved Suppliers

Approved suppliers should procure any item subject to S/CI concerns (such as raw material, high strength fasteners, electrical components, valves, and fittings etc.) particularly items intended for use in safety systems.

Supplier approval may be achieved by the following means:

- By conducting QA and technical evaluations (i.e., performance-based audit, assessment, or surveillance) of a supplier's QA program; the results should be factored into source or site inspection and testing to validate product acceptability.
- Through utilization of supplier quality information obtained from the DOE Contractor's Supplier Quality Information Group, or other similarly chartered and nationally recognized organizations, exchanging supplier quality information should optimize the use of audit resources and experiences and facilitate timely identification of potentially substandard items.

7.2.2 Contracts Clauses

All contracts should contain the S/CI clauses prohibiting delivery of S/CIs. It is highly recommended to make the clause a requirement. An example is provided below, and it can be changed or modified by a contracting officer):

> *Notwithstanding any other provisions of this agreement, the Subcontractor warrants that all items provided to the Contractor should be genuine, new and unused unless otherwise specified in writing by the Contractor. Subcontractor*

further warrants that all items used by the Subcontractor during the performance of work at the [name DOE site here], include all genuine, original, and new components, or are otherwise suitable for the intended purpose. Furthermore, the Subcontractor should indemnify the Contractor, its agents, and third parties for any financial loss, injury, or property damage resulting directly or indirectly from material, components, or parts that are not genuine, original, and unused, or not otherwise suitable for the intended purpose. This includes, but is not limited to, materials that are defective, suspect, or counterfeit; materials that have been provided under false pretenses; and materials or items that are materially altered, damaged, deteriorated, degraded, or result in product failure.

Types of material, parts, and components known to have been misrepresented include (but are not limited to) fasteners; hoisting, rigging, and lifting equipment; cranes; hoists; valves; pipe and fittings; electrical equipment and devices; plate, bar, shapes, channel members, and other heat treated materials and structural items; welding rod and electrodes; and computer memory modules. The Subcontractor's warranty also extends to labels and/or trademarks or logos affixed, or designed to be affixed, to items supplied or delivered to the Contractor. In addition, because falsification of information or documentation may constitute criminal conduct, the Contractor may reject and retain such information or items, at no cost, and identify, segregate, and report such information or activities to cognizant Department of Energy officials.

Failure of a supplier to meet a quality clause like the one above should be reported in accordance with the reporting provisions established within the contractors S/CI process.

Many items discovered at DOE/National Nuclear Security Administration (NNSA) sites were procured with credit cards from unapproved suppliers. Under many procurement systems, the use of credit cards offers the potential for bypassing procurement controls. The use of a credit card in no way relieves the credit card holder from prohibitions, controls, or other required authorizations that exist regarding the acquisition of certain types of goods and services. Care should be taken to assure application of procurement controls for items intended for use in safety systems, structures and components including flow-down of specification requirements, appropriate technical and quality requirements, and other procurement controls necessary to preclude entry of S/CIs.

7.3 Inspection and Acceptance

Acceptance is based on approved engineering attributes/specifications and appropriate QA acceptance criteria and may require inspection and testing of the item.

- Acceptance testing may take place at the Supplier's or Purchaser's facility or could be performed by a certified Testing Laboratory; and
- Acceptance testing should ensure "on-site stores and inventories" are evaluated to detect the presence of S/CIs, including electronic components and integrated circuits.

Item/part number verification and review of certification documentation (e.g., CMTRs, Certificate of Conformance) alone are not sufficient to verify the quality of purchased items. Engineering attributes and QA criteria should be specified and verified. Consideration should be given to the following but not limited to:

- History of S/CI concerns with the item;
- Intended safety function of the item;
- Attributes required to perform the function;
- Processes that encompass/embrace these attributes;;
- Supplier past performance information;
- Source inspection, surveillance, assessments, or QA audit results;
- Receipt inspection and acceptance testing results;
- Special test and examination methods (e.g., chemical analysis, hardness, and tensile testing); and
- Post-installation testing.

Large lots of received items may be sampled using the criteria of American National Standards Institute (ANSI)/American Society for Quality Control (ASQC) Z1.4. If S/CIs are discovered during inspection or sampling, the nonconforming lot should be controlled and dispositioned in accordance with site procedures. Items exhibiting S/CI characteristics, including those identified in this Handbook, should be documented as part of the NCR, evaluated, and then processed in accordance with the contactor's DOE approved S/CI process. S/CIs, including those items lacking appropriate documentation, should be identified, documented, controlled, dispositioned, and reported as early as possible in the inspection process.

Personnel trained to recognize S/CI should inspect items. Observations indicate that if a product appears to be an S/CI, it should be documented in accordance with applicable nonconformance procedures during the inspection process. Items confirmed as S/CI should be documented, reported and controlled in accordance with applicable procedures. S/CIs should not be returned to the supplier. If a suspect item is found to be acceptable (through engineering evaluation, verification testing, or the disposition process), the item may be installed or used.

Verification testing may be conducted on a sampling basis, either at the purchaser's facility or a qualified independent test laboratory. Purchased equipment that is found at any time to contain S/CIs should be withheld from installation or use pending engineering evaluation. If after evaluation it is determined that the S/CI has the potential to adversely affect the safe performance of the equipment, the S/CI should be replaced at the supplier's expense and the manufacturer should be notified. If it is determined (through engineering evaluation, verification, or disposition process) that the item conforms to specified requirements and will not create a potential safety hazard, the item may be installed or used.

When the design specifies the use of commercial-grade items in safety systems, ensure that the item will perform the intended function and will meet design requirements applicable to the replaced item and its application. The purchaser's acceptance process should provide sufficient confidence that the items meet specified requirements and should include inspections, tests, or analysis by the purchaser, or third-party dedicating entity, supplemented after delivery as necessary by one of the following:

- Commercial grade surveys;
- Product inspections or witnesses at hold points at the manufacturer's facility;
- Analysis of historical records for acceptable performance; or
- Documentation, as applicable to the item, was received and is acceptable.

Additional guidance for verifying the acceptability of commercial grade items in safety applications may be found in ASME NQA-1 and Electric Power Research Institute (EPRI) NP-5662.

7.4 Engineering Involvement

Over the past two decades, the Nuclear Regulatory Commission (NRC) has issued several generic communications (Generic Letters (GL)) to inform licensees of counterfeit or misrepresented vendor product. The GLs emphasized the four characteristics of effective procurement and dedication programs that NRC inspections have identified. (See NRC Information Notice 2012-22: *Counterfeit, Fraudulent, Suspect Item (CFSI) Training Offerings*, dated January 25, 2013). These characteristics are:

- Engineering staff involvement in procurement and product acceptance;
- Effective supplier evaluation, source inspection, receipt inspection, and testing programs;
- Thorough, engineering-based processes for review, testing, and dedication of commercial-grade items for suitability in safety systems and mission-critical facilities; and

- Training Engineering staff in S/CI awareness and design, prevention, and detection methods.

An important objective of engineering involvement is to prevent or mitigate potential risks to the public and worker safety attributable to S/CIs. Engineering should be involved in support of procurement, product inspection and acceptance testing, and the nonconformance dispositioning process. Engineering should also be involved when items are known to have been previously misrepresented. The extent of engineering involvement should be commensurate with the risk and intended application of the item (i.e., graded approach).

Engineering functions may include but are not limited to the following activities:

- Participation in S/CI training;
- Developing technical specifications. EPRI NP-5638, *Guidelines for Preparing Specifications for Nuclear Power Plants,* contains information for ensuring that appropriate requirements are specified in purchase orders;
- Determining critical characteristics of purchased items that should be specified in the purchase order and selecting those characteristics to be verified during receipt inspection or prior to use;
- Determining specific verification testing requirements and methods applicable to the acceptance of products. The extent of verification testing should be based on the history of misrepresentation of the item, supplier past performance, the sample size and dollar value of the shipment, and the item's function in safety systems and mission-critical facilities. In the absence of a performance-based audit, verification testing or inspection is appropriate, particularly when purchasing from suppliers who are neither the original manufacturers nor authorized distributors and for whom there is no past performance information. Verification testing may be performed during receiving inspection or post-installation inspection;
- Evaluating acceptance test results and dispositioning S/CIs;
- Reviewing technical changes to, and deviations from, procurement documents;
- Developing methods for use by maintenance or inspection personnel to indicate the acceptability of suspect items determined by engineering evaluation to be acceptable for use in their current application (e.g., painting heads of fasteners a distinctive color);
- Participating in supplier qualification processes, audits, surveillances, and source inspections to verify the technical performance capability of suppliers of items for safety systems; and

- Maintaining, modifying, or justifying the replacement of equipment involving design changes. Guidelines on engineering evaluation to justify equipment replacement are provided in EPRI NP-6406, *Guidelines for the Technical Evaluation of Replacement Items in Nuclear Power Plants*.

An engineering evaluation should be conducted to determine whether a system can be operated in its present configuration without modification or replacement of S/CIs, or whether the system should be locked out, tagged out, and removed from service immediately. Engineering evaluation results should specify any conditional use of the system and any compensatory actions that will ensure the least possible threat to public and worker safety. Results should be communicated to their field office in accordance with site procedures.

7.5 Installed Items

Contractors should ensure that S/CIs are dispositioned either to remain in place or to be removed later during planned or routine maintenance and are clearly identified by marking or other appropriate means as determined by site procedures. Installed S/CIs that can be removed from their current acceptable applications should be marked and controlled to preclude their reuse.

If an engineering evaluation determines that an S/CI does not pose a potential safety risk or hazard and if the item can remain in place, then it should be distinctly identified or controlled by suitable means in accordance with:

- Site procedures;
- Affected design media updated to reflect the field condition, in order to prevent issuance of an additional nonconformance report; and
- Performance of a duplicate engineering evaluation.

Note: In areas where operating temperatures are 500°F and above, or are subject to cyclic loading where fatigue failure is likely to occur, all Grades 8 and 8.2 suspect/counterfeit fasteners should be replaced prior to further use of the equipment. Additional information on fastener and other material properties, and inspection and testing criteria is provided in applicable American Society of Testing Materials (ASTM) International and Society of Automotive Engineers (SAE) standards.

7.5.1 Safety Systems

DOE O 414.1D requires that contractor QAP be developed and implemented for all work commensurate with facility/activity hazards and mission impact. Contractors should establish and maintain current lists of safety systems and those facilities/activities affecting the DOE or DOE/NNSA mission. Such lists should provide a basis for establishing priorities, conducting inspections, and identifying and dispositioning S/CIs discovered in safety systems and mission-

critical facilities. S/CIs should be documented under site nonconformance processes, appropriately dispositioned and reported by means of ORPS and to the local OIG.

An engineering evaluation should be conducted by qualified technical personnel using recognized methods and site procedures to determine where and how the S/CI is used in a safety system or mission-critical facility, its potentially adverse effect on safety, and its proposed disposition. Potential hazards to workers during S/CI removal should be recognized.

If S/CI are discovered in a safety system or mission-critical facility, an engineering evaluation should be conducted immediately to determine whether:

- The system should be removed from service immediately, locked out, and tagged out until the S/CI has been replaced with an acceptable item; or
- The system can be used, with limitations on operation, until the item can be replaced.

If an engineering evaluation determines that an S/CI does not pose a potential safety hazard, the item may remain in place, provided it is properly identified or controlled by other suitable means, according to site procedures. When it is removed, the item should be identified, marked, and controlled to prevent its reuse in an application where it may not be suitable. Sampling inspection and special inspection techniques, (e.g., portable testing equipment) may be used to locate and evaluate S/CIs installed in safety systems and mission-critical facilities.

7.5.2 Non-Safety Systems

S/CI discovery in a non-safety system should prompt inspection of similar items in safety systems. S/CI discovered in non-safety system applications should be technically evaluated to determine if it could create personnel safety hazards in which case it should be treated in accordance with the contractors approved S/CI process.

If an S/CI is discovered in a non-safety system, the following actions should be taken:

- Identify the nonconforming item through site nonconformance processes;
- Technically evaluate item to determine if it may remain in place;
- Investigation may proceed parallel to technical evaluation;
- Disposition to remove prior to continued use or remain in place until routine maintenance, or repair work;
- Report the S/CI to the local DOE/NNSA office;
- Issue an Occurrence Report;
- Notify the local OIG;

- Mark, or otherwise identify, the S/CI as determined by local procedures;
- Remove and replace S/CI during routine maintenance, or repair work activity;
- Maintain the S/CI for evidentiary purposes until no longer deemed necessary by the OIG; and
- Remove, replace, and dispose of the S/CI during routine maintenance or repair, or disposition it to remain in place as determined by the disposition of the nonconformance.

7.6 Critical Load Paths in Lifting Equipment

Lifting equipment, including both fixed and mobile cranes and other devices (e.g., forklifts, scissor lifts, man lifts, balers, truck and dock lifts, elevators, conveyors, and slings) have many bolted connections that rely on the integrity of the fasteners and structural components to meet specifications for safe operation. Cranes and other equipment manufacturers have identified the critical load paths for their key structural components. Examples of critical load paths for fixed cranes include the bottom and top blocks, trolley system, bolted connections on main bridge supports, bolted rod connections, and end stops.

S/CIs discovered on lifting equipment should be reported to the manufacturer, documented through site nonconformance processes, reported in ORPS, reported to their local field office, and reported to the local OIG office. An engineering evaluation should be conducted to determine the critical load paths in lifting equipment based on information provided by the equipment manufacturer. If the evaluation determines that an S/CI discovered in a critical load path of lifting equipment could create a safety hazard, site or facility management should be notified and the lifting equipment locked out and tagged out or otherwise removed from service according to site procedures. The S/CI should be removed and replaced by an acceptable item. Once removed, the S/CI should be placed in a nonconformance hold area until authorized for disposal by the OIG. If the evaluation determines that the S/CI in a critical load path could not create a safety hazard in its current application, the S/CI should be identified by marking or other appropriate methods and its location noted; the S/CI should either be removed and replaced during future maintenance, repaired, or allowed to remain in place in accordance with the contractor approved S/CI process.

An S/CI discovered outside the critical load path of lifting equipment should be documented through site nonconformance processes, reported in ORPS, to the local DOE/NNSA office, and to the local OIG office.

8.0 Removal and Disposal of S/CI

Known S/CIs should be removed as soon as practicable from any location within the DOE complex when an engineering evaluation has determined that the S/CI could create a safety hazard. S/CI may be destroyed, provided:

- The item cannot be traced to a supplier, manufacturer, or distributor;
- The item is not required as material evidence by the local OIG for litigation; and/or
- The local OIG has authorized destruction of the item.

If authorized by the OIG, destruction of the S/CI should be performed in a manner that permanently and irrevocably alter the S/CI so that it cannot be used. Examples of alteration include melting, shredding, or destroying the threads on fasteners; crushing circuit breaker casings; or embedding fasteners in concrete or other media, rendering them useless. A Certification of Destruction should be obtained from the disposal source. Burying S/CIs may be acceptable if they do not contain hazardous material or material prohibited by Federal, State, or local regulations (for example cadmium-plated fasteners; chromium, welding materials; etc.).

Consideration should be given to surplus safety systems, components, structures, and mission-critical facilities that have been confirmed counterfeit. All systems, structures or components with known S/CI should have an associated NCR, which should remain open until those surplus SSCs or systems essential to mission execution facilities are sold, returned to use, or scrapped.

9.0 Common Indicators for S/CI Hardware Items

9.1 Fasteners

High-strength fasteners are extensively used throughout DOE for many different applications, which are critical to achieving mission goals. Fasteners that do not meet strict standards set by National/International standards, such as ANSI, the Industrial Fasteners Institute (IFI), ASME, and ASTM or by other state and Federal regulators, may be more likely to fail. Failure can lead to serious health and safety issues and can impair achieving mission goals. Therefore, it is critical that DOE and its contractors have a rigorous S/CI process for identifying sub-standard fasteners.

9.1.1 Indicators for Counterfeit Fasteners

Components with the following may be suspect:

- No manufacturer's or grade mark (unless certified to a specification not requiring marking);
- Evidence of machining marks;
- Poor thread form, evidence of wear, or dressing;
- Headmarks shown on the Suspect Fastener Headmark List;
- Foreign manufacturer not meeting Public Law 101-592 ("Fastener Quality Act");
- No markings for nuts or washers packaged with labels indicating that they were manufactured to a code or MIL-SPEC, which requires marking;
- Headmarkings are marred, missing, or appear to have been altered;
- Headmarkings are inconsistent with a heat and/or lot number;
- Double stamping;
- Metric and SAE stamping; or
- Headmarks with raised marks and depressed marks on same fastener (not normal manufacturing process).

9.1.2 Identification

Fasteners are not the only items that are subject to counterfeiting. The list of components that have been identified to have been misrepresented, altered, counterfeited, and/or used but sold as new is growing every year. The best way to inform people of the problems is to make available a broad base of information from as many sources as possible.

This section is a compilation of information from a number of sources such as DOE, the National Board of Boiler and Pressure Vessel inspectors, and the NRC documents. The information covers material from a headmark list derived from U.S. Customs investigations, components and products that may be vulnerable to counterfeiting, to counterfeit detection traits, documentation detection traits, and contributing causes for receipt of these type materials.

9.1.3 Fastener Quality Act (FQA)

FQA was enacted in 1990(Public Law 101-592, as amended in 1999 101st Congress). The Act is intended to:

- Require that certain fasteners sold in commerce are manufactured to the required specifications;
- Provide for accreditation of laboratories engaged in fastener testing; and
- Require inspection, testing, and certification, in accordance with standardized methods, of fasteners used in critical applications to increase fastener quality and reduce the danger of fastener failure and for other purposes.

The FQA has been amended several times since 1990; the major amendments are summarized below. According to the National Institute of Standards and Technology (NIST), U.S. Department of Commerce, the FQA signed by President Clinton on June 8, 1999 is "more focused and less burdensome." The amendments include:

Eliminated Requirements: The amended law no longer requires NIST to approve organizations that accredit fastener testing laboratories.

Covered Fasteners and QA Systems: Fasteners covered under the FQA are defined as limited to bolts, nuts, screws and studs (having a nominal diameter of 6 millimeters/0.25 inch or greater), or direct tension - indicating washers that are through- hardened) or meet a consensus standard that calls for through-hardening) and manufactured to standards and specification of consensus-standards organizations or government agencies that require a grade mark.

Many fasteners are exempt from coverage of the FQA, but not exempt from the DOE S/CI requirements including those that are:

a. Part of an assembly;
b. Ordered for use as a spare, substitute, service, or replacement part, unless that part is in a package containing more than 75 of any such part at the time of sale or is contained in an assembly kit;
c. Produced and marked as ASTM-A 307 Grade A Produced and marked as ASTM-A 307 *(Specification for Carbon Steel Externally Threaded Standard Fasteners)*

d. Produced in accordance with the ASTM-F 432 standard Produced in accordance with the ASTM-F 432, Standard Specification for *Roof and Rock Bolt Accessories*

e. Specifically manufactured for an aircraft if the quality is approved by the Federal Aviation Administration or by a foreign airworthiness authority;

f. Manufactured in accordance with International Organization for Standardization (ISO); 9000, 9001, 9002, or TS16949; Quality System (QS) 9000; or other fastener quality assurance system defined by the law; or

g. Manufactured to a proprietary standard.

If an accreditation organization chooses not to follow ISO guidelines for registration and accreditation, they may submit documents to the NIST director that establish its own guidance/requirements for:

- Accredited bodies to register manufacturing systems as meeting FQA quality assurance requirements;
- Accreditation of testing laboratories; and
- Approval of accreditation bodies to accredit testing labs.

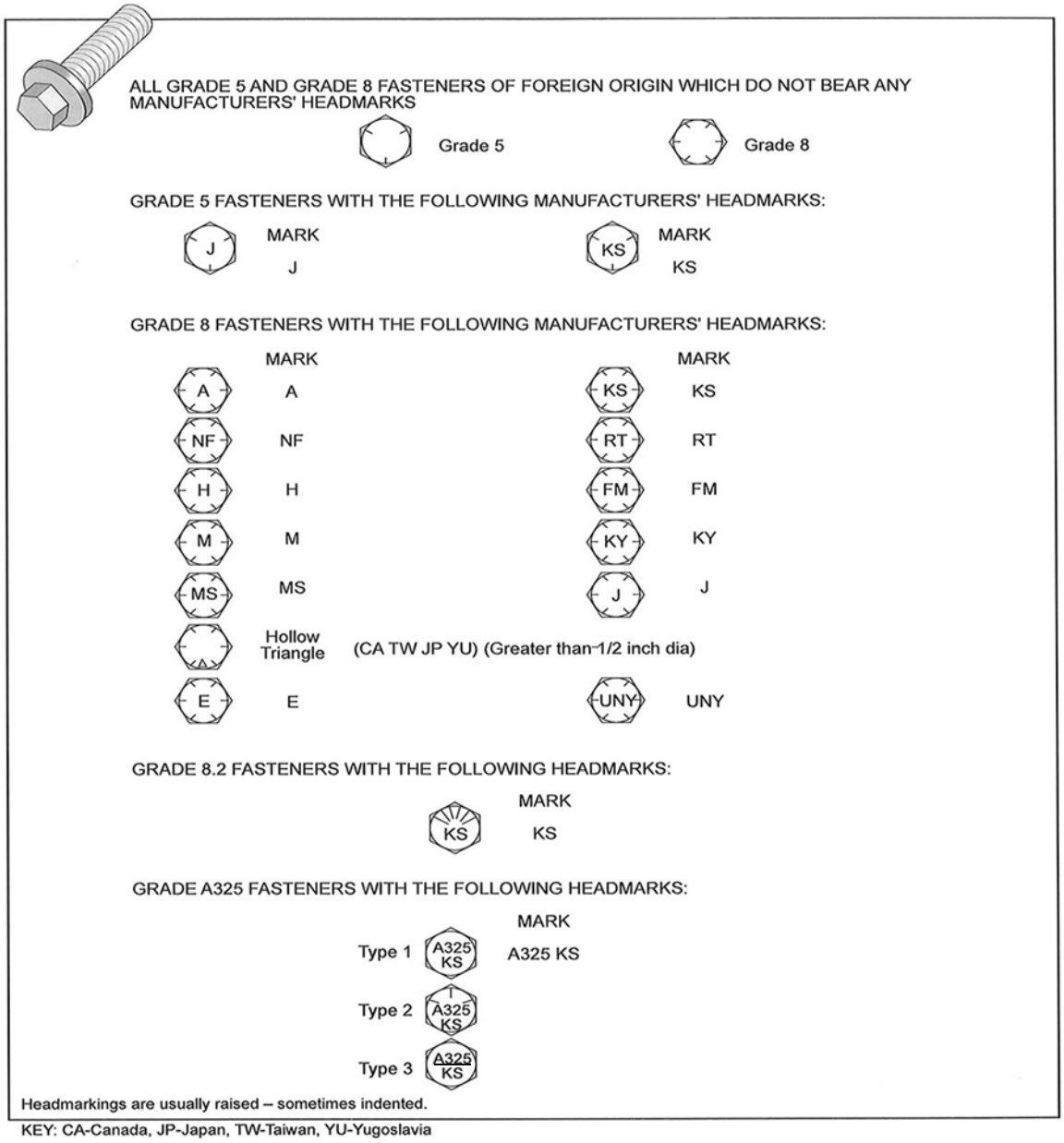


Figure 3: Suspect/Counterfeit Part Headmark List

Figure 3 shows both high strength and non-high strength fasteners.

9.1.4 Stainless Steel Fasteners

In November 1993, the IFI issued a Fastener Advisory regarding 18-8 stainless steel bolts. The advisory warned about a “bait and switch” tactic in which a distributor takes an 18-8 bolt (indicated by two radial lines 90 degrees apart), but no manufacturer’s marking, and sells them as ASTM A320 Grade B8 bolts after hand-stamping B8 on the heads.

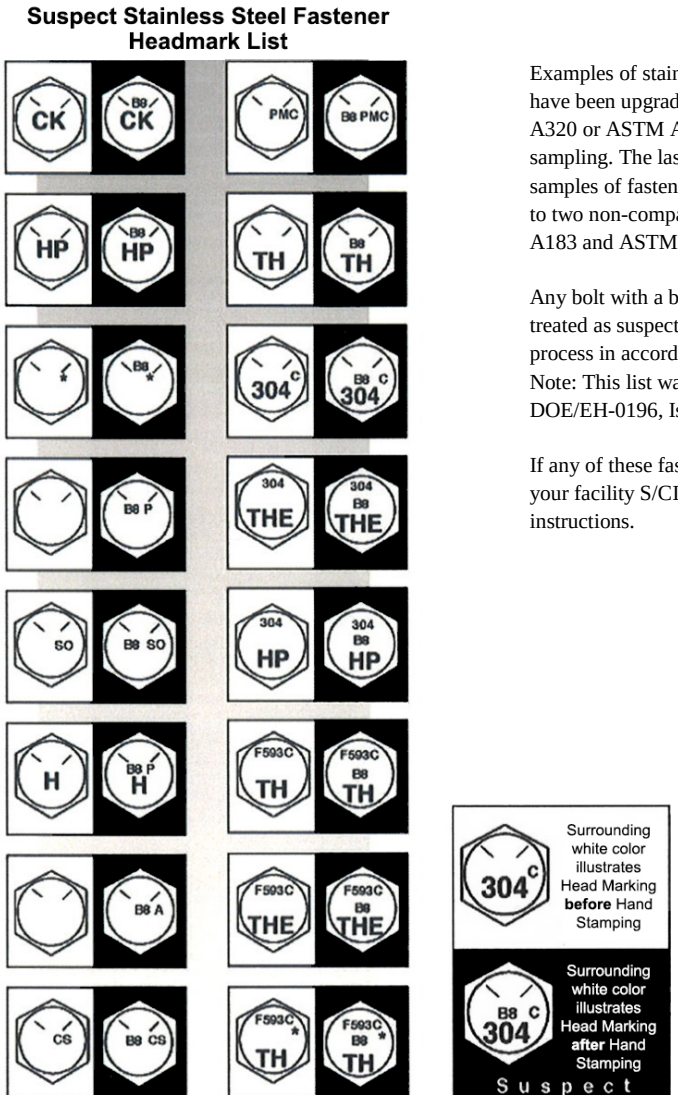
As a result of this IFI Advisory, DOE sites conducted a search of facility stores for stainless steel fasteners with hand-stamped B8 grade marks. Hundreds of stainless steel bolts with hand stamped B8 grade markings, along with a variety of other raised and depressed head and manufacturer's markings were identified in facility stores throughout the DOE complex.

Finally, a few samples did not display any manufacturer's markings. Most of the bolts discovered were purchased with the specification to meet a national consensus standard, ASTM A193, B8 Class 1 rather than the ASTM A320 standard discussed in the IFI warning.

A listing of suspect stainless steel fastener head marks is shown on the next page. For all practical applications the best rule of thumb is as follows: "when a bolt is discovered with dual headmark stamping (both raised and depressed), the bolt should be considered suspect. Following the definitions of suspect this would then require that an investigation take place to ensure the bolt meets the requirements and is not counterfeit. If the item is found to be counterfeit, the item should be processed in accordance with DOE requirements and the contractor S/CI program.

Figure 4 provides examples of stainless steel fasteners that have been upgraded from 18-8 to ASTM A320 or ASTM A193 Grade B8 after hand stamping. The last three examples show samples of fasteners to indicate conformance to two non-compatible standards, ASTM A193 and ASTM F593C.

Any bolt on this list with a black background should be treated as suspect without further testing. Note: This list was originally published by DOE/EH-0196, Issue by No. 97-6.



Examples of stainless steel fasteners that have been upgraded from 18-8 to ASTM A320 or ASTM A193 Grade B8 after hand sampling. The last three examples show samples of fasteners to indicate conformance to two non-compatible standards. ASTM A183 and ASTM F 593C.

Any bolt with a black background should be treated as suspect without further testing and process in accordance with HNF-PRO-301. Note: This list was originally published by DOE/EH-0196, Issue No. 97-5.

If any of these fasteners are located contact your facility S/CI point of contact (POC) for instructions.

Figure 4: Suspect Stainless Steel Fastener Headmark List

9.1.5 Examples of Fastener Issues Discovered in the DOE Complex

In April, 2003, Lawrence Livermore National Laboratory received a shipment of fasteners from approved Stainless Steel fastener supplier. A random check of the fasteners discovered a number of “KS” Headmark mixed in with other good fasteners, however the manufacturer of “KS” fasteners had gone out of business over 10 years earlier. In November 1993, the IFI issued a Fastener Advisory regarding 18-8 stainless steel fasteners. The advisory warned about a “bait and switch” tactic in which a distributor takes an 18-8 fastener (indicated by two radial lines 90 degrees apart), but no manufacturer’s marking, and sells them as ASTM A320 Grade B8 fastener after hand-stamping B8 on the heads. As a result of this IFI Advisory, DOE sites conducted a search of facility stores for stainless steel fasteners with hand-stamped B8 grade marks. Hundreds of stainless steel fasteners with hand stamped B8 grade markings, along with a variety

of other raised and depressed head and manufacturer's markings were identified in facility stores throughout the DOE complex.

An inspection of shop stock at a Hanford Site facility revealed fasteners with three different raised grade marking, 18-8, 304, and F593C, along with raised manufacturers' identifications of DK, H, HP, C, SO, CS, PMC, TH, THE, and a STAR. The majority of the remaining samples found at Hanford exhibited raised grade markings of 18-8 and 304, with a B8 grade marking and manufacturer's identification hand-stamped into the head of the fastener. It is not a normal manufacturing process to have raised and depressed marking on the head of a fastener; this therefore would be a flag to consider the fasteners as suspect, triggering the initiation of an NCR for technical disposition. The commercial nuclear industry and IAEA has similar processes and call it CFSI, the item is first suspect, then evaluated to determine if there is indications of fraud or counterfeit. A few samples did not display any manufacturer's markings. Most of the fasteners discovered were purchased with the specification to meet a national consensus standard, ASTM A193, B8 Class 1 rather than the ASTM A320 standard discussed in the IFI warning.

The Savannah River Site also conducted a site-wide search of facility stores with similar results. A total of 159 stainless steel fasteners with hand-stamped B8 grade marks and raised or hand-stamped manufacturer's symbols were found. Fifteen stainless steel fasteners that had no manufacturer's symbol were also found.

The requirements of the ASTM A193 standard regarding fastener marking and certification are very similar to those required by the ASTM A320 standard discussed in the IFI Advisory. The ASTM A193 standard requires that grade and manufacturer's identification symbols be applied to the heads of fasteners that are larger than 1/4" in diameter. The standard, however, does not specifically differentiate between raised and depressed head markings, but states only that "for the purposes of identification marking, the manufacturer is considered the organization that certifies that the fastener was manufactured, sampled, tested, inspected in accordance with this specification." In other words, the standard allows for some of the required marking to be formed into the head of the fastener (either raised or lowered) during manufacturing, and the rest to be applied later via hand-stamping.

Since ASTM A193 does not differentiate between raised and depressed marking, these fasteners can be counterfeited in the same way as the ASTM A320 fasteners discussed in the November 1993 IFI advisory. For example, distributors can procure 18-8 stainless steel bolts that were manufactured by an anonymous party, and without conducting the necessary upgrading process or certification testing, a second party could hand-stamp B8 and a manufacturer's marking into the heads to indicate that the fasteners exhibit the mechanical and chemical properties required of ASTM A193 Grade B8 Class 1.

When a fastener is discovered with dual Headmark stamping (both raised and depressed), the

bolt should be considered suspect. If the item is found to be counterfeit, process the item in accordance with the DOE O 414.1 requirements and the contractor DOE approved S/CI process.

9.1.6 Metric Fasteners

Many metric fasteners have been reported as suspect due to no manufacturer's symbol being present. The fastener FQA and S/CI Head Mark list is specific to high strength fasteners. A decision should be made to determine if a metric fastener is high strength (grade 5 or above) and possibly reportable. Until 2012, the consensus standard of choice to determine the formulas needed for this calculation from domestic type fasteners to metric was ASTM F 568 *Metric Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.* This standard has since been superseded by ISO 898-1 *Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel Part 1*. Section 10 "Marking" of this ISO standard also identifies when and how manufactures' symbols should be applied to metric fasteners.

It is important to remember that if a consensus standard is not flowed down in the procurement document that is ordering high strength fasteners then the expectation for the delivered item to meet the specification will not happen automatically. The procurer may be purchasing substandard fasteners that have the risk of premature failure. There is no requirement for the fastener manufactures or any supplier to meet these requirements unless they are provided to them. Prevention starts with the procurement document. When something procured is sent that was not ordered, then it should be returned as with any procured item unless it is determined to be counterfeit.

10.0 Common Indicators for S/CI Electronic Items

Over the past several years, the prevalence of counterfeit electronic components has increased markedly as counterfeiters continue to improve techniques. Counterfeiters have attacked every commodity of electronics from simple components such as capacitors, to complex integrated circuits, such as microprocessors, and complete assembled units such as computer network routers. Inexpensive commercial devices, as well as high cost military components, have been counterfeited.

The following terms and definitions are those predominately used throughout the electronic industry. (Source: SAE AS6174 – *Counterfeit Material; Assuring Acquisition of Authentic and Conforming Material*, Dated 2012-05)

Aftermarket Manufacturer (electronics): **(**Source: SAE AS5553 – Fraudulent/Counterfeit Electronic Parts; *Avoidance, Detection, Mitigation and Disposition*, Rev A, Dated 2013-01) is a manufacturer that meets one or more of the following criteria:

1. The manufacturer is authorized by the original component manufacturer (OCM) to produce and sell replacement parts, usually due to an OCM decision to discontinue production of a part. Parts supplied are produced from materials that have been:

    a. Transferred from the OCM to the Aftermarket Manufacturer, or

    b. Produced by the Aftermarket Manufacturer using OCM tooling and intellectual property.

2. The manufacturer produces parts using semiconductor dice or wafers, manufactured by and traceable to an OCM, that have been properly stored until use. They are subsequently assembled, tested, and qualified using processes that meet technical specifications without violating the OCM's intellectual property rights (IPR), patents, or copyrights.

3. The manufacturer produces parts through emulation, reverse-engineering, or redesign, that match the OCM's specifications and satisfy customer needs without violating the OCM's IPR, patents, or copyrights.

The Aftermarket Manufacturer should label or otherwise identify its parts to ensure that the "as shipped" aftermarket manufactured part is not mistaken for the part made by the OCM.

Authorized Distribution (electronics): (Source: SAE *AS5553 – Fraudulent/Counterfeit Electronic Parts; Avoidance, Detection, Mitigation and Disposition, Rev A*, Dated 2013-01) Transactions conducted by an OCM-Authorized Distributor distributing product within the terms of an OCM contractual agreement. Contractual Agreement terms include, but are not limited to, distribution region, distribution products or lines, and warranty flow down from the OCM. Under this distribution, the distributor would be known as an Authorized Distributor.

Blacktopping: The resurfacing or recoating of an electronic device after other processes of removing existing markings, repainting (blacktopping), and remarking with new brand information.

Certificate of Conformance: A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements. (ASME NQA-1- 2008-2009 Addenda A)

Decapsulation: The process of removing a cap, lid, or encapsulating material from a packaged integrated circuit by mechanical, thermal, or chemical means exposing the integrated circuit for further analysis, inspection, or electrical examination of the die and the internal features

Die: A small block of semiconducting material on which a given functional circuit is fabricated.

Electronic Packaging: A major discipline within the field of electronic engineering and includes a wide variety of technologies. It refers to enclosures and protective features built into the product itself and not to shipping containers. It applies to both end products and to components.

Independent Distributor (electronics): A distributor that purchases parts with the intention to sell and redistribute them back into the market. Purchased parts may be obtained from OEMs or Contract Manufacturers (typically from excess inventories), or from other Distributors (Franchised, Authorized, or Independent). Resale of the purchased parts (redistribution) may be to OEMs, Contract Manufacturers, or other Distributors. Independent Distributors do not normally have contractual agreements or obligations with OCMs. See definition of "Authorized Distribution."

Open Market (electronics): The trading market that buys or consigns OEM, Contract Manufacturer, and Aftermarket Manufacturer's excess inventories of new electronic parts and subsequently utilizes these inventories to fulfill supply needs of other OEMs and Contract Manufacturers, sometimes due to urgent or obsolete part demands. Open Market may include the purchase and sale of parts with unknown origin or where the complete chain of custody of such parts is unknown.

Semiconductor Curve Tracer: A specialized piece of electronic test equipment used to analyze the characteristics of discrete semiconductor devices such as diodes, transistors, and thermistors. Based on an oscilloscope, the device also contains voltage and current sources that can be used to stimulate the device under test

Texturing: Plastic Electronic Components are typically made with a mix of fine glass and plastic. The surface of the molded package is textured when it is removed from the mold.

10.1 Types of Integrated Circuits

There are different types of integrated circuits. Operating temperature is a key attribute to determine the possible applications of an integrated circuit. (See Table 1 below)

Table 1: Applications Determined by Temperature Range

IC TYPE	TEMPERATURE RANGE
Commercial/COTs	0 to +70 degrees C
Industrial	-40 to +85 degrees C
Automotive	-45 to +110 degrees C
Military/Aerospace	-55 to +125 degrees C
Space	-65 to +150 degrees C

A commercial off-the-shelf (COTs) chip that costs 25 cents may perform the same function as a device intended for military service that cost $25. With the exception of labeling, these devices may look identical.

10.2 Major Categories of Counterfeit Parts

Counterfeit electronic parts may be divided into four major categories: Recovered, Refurbished, Die Salvage/Substitution, and Manufacturing Rejects.

10.2.1 Recovered Parts

Recovered parts, in recent years, are the most common type of suspect/counterfeit electronic items. The first major wave of counterfeit parts were recovered parts from salvaged electronics waste. This type of counterfeit device has the appearance of the correct device, often with the wrong die internally and a remarked package. The counterfeiter's process includes:

- Component removal;
- Sanding and/or blacktopping (recoating);
- Remarking;
- Detailed cleanup of solder; and
- Packaged to make it look new.

These parts can be caught early by a careful visual inspection using industry methods described in the Independent Distributors of Electronics Association (IDEA) Standard 1010-B, *Acceptability of Electronic Components Distributed in the Open Market*. The Standard can be

found at: http://www.idofea.org/products/52-idea-std-1010-a. (IDEA Standard 1010 provides information on the inspection process). On the occasions that they are not visually detected, package decapsulation or very basic tests such as a curve trace will identify the counterfeit units. If these devices reach the application board, they may fail in the system outright and cause serious delays to manufacturing schedules. If the device makes it to the field, it can pose a great risk due to unreliability and premature failure.

10.2.2 Refurbished Parts

Refurbished components are often the correct device and may still have the original marking on the package. These refurbished units are a great risk since they are often subjected to excessive heat during removal and may have been introduced to harsh chemicals during the refurbishment process. Excessive heat can weaken the die. Counterfeiters have become masters of reworking a package and the solder on the leads. They can make a circuit board look new and unused. Even the best visual inspection techniques can have a difficult time identifying these refurbished parts with certainty. Typical signs that a part may be S/CI include: solder that looks too new, the absence of test contacts on leads, questionable scratches and solder inconsistency. Decapsulation provides no assistance in the detection of units that have the correct die internally. After careful visual inspection, an additional test that provides value with plastic parts is Scanning Acoustic Microscopy (SAM). SAM can look inside the package to see if there is severe internal package damage. Electrical testing is also effective since device failure rates provide an indication of handling issues. It is important to realize that entire lots should be rejected if the high failure rates indicate systemic issues, which may indicate long term reliability concerns with all the units. Refurbished parts would have similar packaging indications as recovered parts.

Indents are never partially made during the manufacturing process. They are uniform in depth throughout the circle. The indent on the right side (Figure 6 Indent that has been filled in with the "blacktopping" material) is filled to the edge (a symptom that it is counterfeit) versus the one on the left where the indent and alpha characters are well defined. - See more examples at: http://www.aeri.com/counterfeit-electronic-component-detection/#sthash.pypEzs0d.dpuf

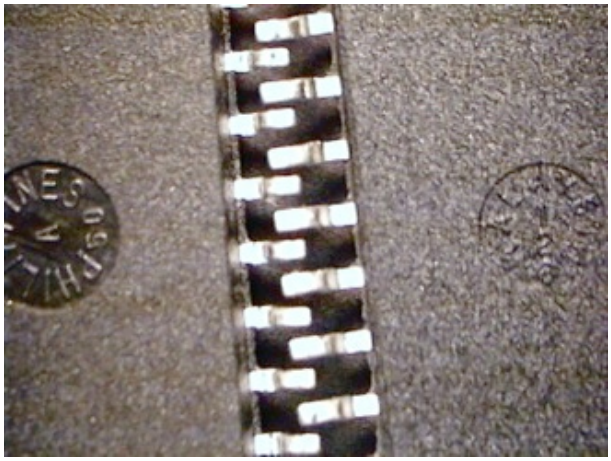


Figure 6: Indent that has been filled in with the "blacktopping" material.

Figure 7 (Idents that have been filled with "blacktopping" material) are two close-ups of indents that have been filled in with the 'blacktopping' material. Blacktopping a process in which a thin black epoxy coating is applied to the top of a component so that a new part number and date code can be printed on it. The blacktopped part has the same dimensions as the one it is intended to copy so, it usually passes visual inspection. Buyers should examine the indents – cavities that are purposefully created during the mold process. Original, clean-edged, indents are difficult to protect during the counterfeiting process, and often become unaligned or ragged. Indents are also affected by the sanding of original markings and by blacktopping, which fills the shallow cavities.

Image: American Electric Resource

Figure 7: Indents that have been filled in with "blacktopping" material

Figure 8 (Shows change in texture from the "blacktopping") shows blacktopping on the edge of the parts. See how the top of the part is shiny and the bottom has a duller finish. These parts are made in a mold. These molds are not designed to put a beautiful shiny finish on the top so they can sell their good looks. The texture should not change halfway on a section of the part. This picture is a great example of an original vs. a fake finish.

Figure 8: Shows Change in Texture from the Blacktopping

Figure 9 (Parts with Directional Sanding Markings) shows two examples of directional sanding marks. Parts coming straight out of a mold will not have any marks that have a directional pattern. These types of marks are made when the counterfeiters are sanding off the top or bottom markings to prepare the part for blacktopping. This type of inconsistency cannot be seen without a microscope. It is not visible to the human eye.

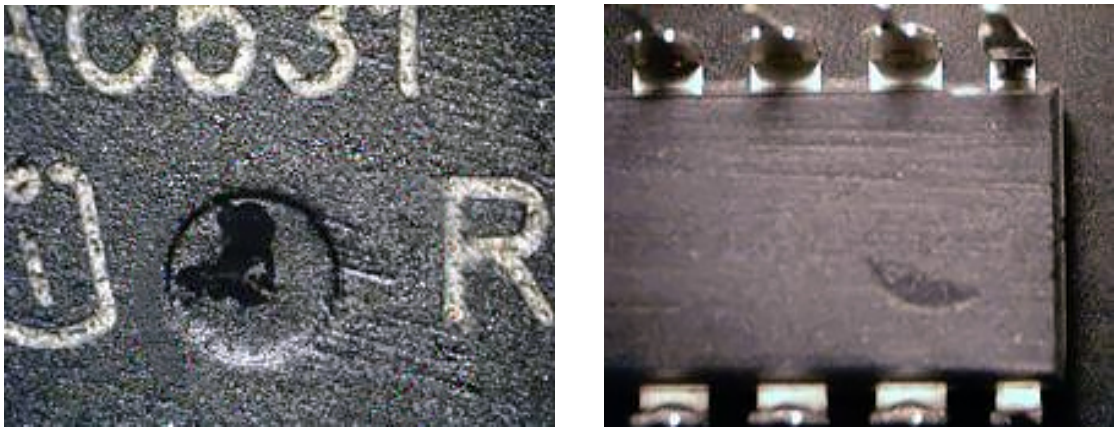


Figure 9: Parts with Directional Sanding Markings

Figure 10 (Refurbished Devices (perfect markings)) shows new remarking techniques that are often found in refurbished parts. The old method of blacktopping has been replaced by newer improved remarking techniques. One of these newer methods developed by counterfeiters is to completely remove ink marking. Typically no remnant or shadow of the original marking remains, so the new markings look completely normal. Also counterfeiters use surface sandblasting and laser ablation of surface markings. Removal of even laser marking can be accomplished without leaving sanding marks. Chemically impervious blacktopping materials that have similar material composition to the original plastic package are in use. These blacktop materials are not dissolved by military specifications marking permanency tests or even acetone tests. Blacktop removal now requires more aggressive chemical removal methods such as Dynasolve. Figure 10 below is a refurbished device with the correct die and nearly perfect marking. Only a Dynasolve was able to reveal that the units were blacktopped and remarked as indicated by the left example in Figure 10. This shows a component with a small area of blacktopping removed (lower center part of component) and a Q-tip (with blacktopping smudges) that was used to test units to determine if they were blacktopped or remarked.

Figure 10: Refurbished Devices (Perfect Markings)

Not all blacktopping is a sign of counterfeit components. Some companies blacktop or coat their chips on a board after fabrication. This effort precludes individual component replacement or repair. Thus, the device should be returned to the vendor for repair services.

10.2.3 Die Salvage/Substitution

Die salvaging is a method available to counterfeiters. This process removes a compatible die from a used package for subsequent use in a newly manufactured package. The package was chemically decapsulated, the die was removed, and then the die was built into new package. The result is a newly packaged device with the correct die internally. All the packaging and marking

are new, so it does not appear to be suspicious. However, there is great concern in using the parts since the chemical decapsulation process damages the die, and the die's reliability is greatly diminished. An internal visual inspection of the die will not typically identify the recovered die. An extensive Scanning Electron Microscope (SEM) Destructive Physical Analysis could possibly detect the recovered die, but SEM analysis is not typically part of counterfeit device inspection. The best method of detection is a robust electrical test at design temperature and vibration conditions. Parts are not normally screened under actual design conditions. Chips assembled in this way result in high failure rates due to poor quality and reliability of the recovered die.

Also closely related to recovered die are units that are newly manufactured from acquired die. The new die can be purchased from reputable sources or illegally obtained from integrated circuit (IC) manufacturer's rejects. Leftover failed die can be effectively used by the counterfeiters since the finished unit will look correct in every way. Once again, the only effective method to identify these units is a robust electrical test since visual identification techniques are ineffective on newly packaged units.

Counterfeiters are becoming masters of device substitution. In this way, they are working as component engineers trying to determine the device that will work as the best substitute for the requested device. Using device substitution techniques, they are able to replace one transistor with a similar function. It is a relatively easy task to identify a similar device and remake the component, since die markings on such components are not common. The substitution may have significant issues since the replacement part may have insufficient parameters for handlings (voltages, ampler etc.) and may not be able to withstand the designed requirements. The counterfeiter's methods also extend to simple components such as capacitors, resistors and diodes. These simple device types often have minimal or no marking present on the packages.

Figures 11 (Genuine Atmel Device) and 12 (Counterfeit-Marked Atmel) provides one indicator of potential counterfeit device, the indent is identifying the Pin 1 location. This should suggest that further evaluation of the device is necessary.

Figure 11: Genuine – Atmel Device

Figure 12: Counterfeit – Marked Atmel

10.2.4 Manufacturing Rejects

Manufacturing rejected items continues to be an issue. These rejected items occasionally show up in the secondary components supply chains. Most manufacturers have tightened their procedures to ensure that rejected items are not reused; however, it is difficult to have complete assurance that a failed device is destroyed. Some of the units can be diverted or smuggled out and eventually sold as new. These rejected units are often nearly functional, and with the true manufacturer marking they look like real, fully functional, units. The risks are also significant for eventual re-use of rejected wafers, or re-use of the remaining rejected die left over after assembly. Robust electrical testing is the only effective method to identify manufacturing rejects that could be sold as good units.

10.3 Visual Flaws

The indents are always clean and uniform from the manufacturer.

10.3.1 Indents

Figure 13 (Differences in the Indents) provides an example of the effects of blacktopping. The indent to the lower left looks similar, but the right indent is not apparent on the bottom part. This seems to occur because the counterfeiters sand down the parts to remove the old markings and then they resurface it with a process called “blacktopping,” which often fills shallow cavities (Figure 13).

Image: American Electric Resource

Figure 13: Differences in the Indents

Figure 14 two (Differences in Indents) provides an example of two parts received in the same lot with differences in indents. These parts have identical part number markings. These are the same ends next to each other and one has three indents and the other only has two. The shape and size of the indents are also different. One is a rounded cavity and the others are all flattened.

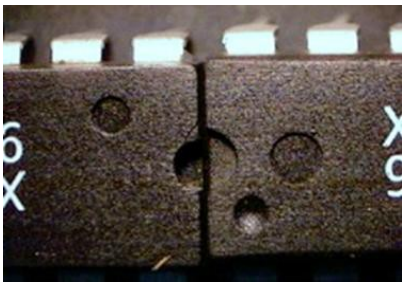


Image: American Electric Resource

Figure 14: Two Parts Received in Same Lot

10.3.2 Blacktopping

Figure 15 (Plastic Quad Flat Pack (PQFP) with Clear Indications of Blacktop) is another example of “blacktopping”.

Figure 15: PQFP with Clear Indications of a Blacktop

10.3.3 Texture

Plastic electronic components are typically made with a mix of fine glass and plastic. The surface of the molded package is textured when it is removed from the mold. Although difficult to see in pictures, a microscopic view shows that the differences between a typical fake and the surface of an authentic part can best be described as having a sharper and duller look. The glass in the mixture makes for sharp little peaks and valleys, whereas, when painted with the blacktopping material the peaks and valleys are smoothed over and filled in, as if there was a coat of paint on sand paper.

10.3.4 Surface

Examination of the surface is an important indicator in determining counterfeit items. The surface should have an as molded appearance rather than a surface that has been changed by chemical or sanding to remove initial markings. Figure 16 is an example of the as molded surface image of a good device after removal from a manufacturing mold. Figure 17 is a comparison of the exemplar (top image-genuine) top surface and a suspect top surface (bottom image).

Image: American Electric Resource

Figure 16: Surface Image of a Good Device after Removal from a Manufacturing Mold

Figure 17: Top Image: Exemplar Top Surface, Bottom Image: Suspect Top Surface

Figure 18 shows example of the side surface of an Exemplar item. The top image is a genuine Exemplar Side Surface, while the bottom image is the side surface of a suspect part.

Figure 18: Top Image: Exemplar Side Surface, Bottom Image: Suspect Side Surface

All reputable electronics manufactures have quality standards which reduce the likelihood of major imperfections. The part numbers are to be in a certain location on the part and they are not to be crooked, misspelled, or out of alignment. The logos are also monitored very closely and should not vary from part to part. In addition, the markings are to withstand tough environments and still be legible.

11.0 Vulnerable To Counterfeiting

11.1 Components and Products Vulnerable to Counterfeiting

- Moderate or low cost items with high turnover usage rate;
- May be widely used in non-critical and critical applications;
- Easily copied by secondary market suppliers;
- Often by-passing the supplier, and drop shipped to the customer; and
- Substantially lower priced than market value or competitors pricing.

The following is a reproduction of Attachment 3, IN 898-70, Supplement 1, April 26, 1990:

1. General Items
    - Spare/replacement kits from vendors other than the Original Equipment;
    - Manufacture;
    - Elastomer – “O” rings, seals;
    - Lubricants;
    - Adhesives;
    - Electrical connectors;
    - Metal Framing components (i.e. flat plate fittings, post bases, beam clamps, channel); and
    - Flanges.
2. Electrical Items
    - Motor control centers - complete units;
    - Components;
    - Starters;
    - Starting coils;
    - Contactors;
    - Contactor kits;
    - Overload relays;
    - Starter control relays;
    - Overload heaters;
    - Protective/control relays;

- DC power supplies/chargers;
- AC inverters;
- Current/potential transformers;
- Exciters/regulators;
- Bus transfers/auto bus transfers;
- Motor generators sets;
- Generators;
- Rewindable motors;
- Printed circuit boards;
- Fuses;
- Splices Vacuum breakers (BWR);
- Indicators/controllers;
- Panel lights/switches;
- Transmitters/instrument switches; and
- Isolation devices.

3. Mechanical Items
    - Welding Materials;
    - Rod;
    - Wire;
    - Flux;
    - Small piping products;
    - Small structural members (pipe supports);
    - Spent fuel pool cooling pumps and similar pumps;
    - Ultimate heat sink supply manual valves and similar valves; and
    - Valves.
4. Diesel Generator Items
    - Diesel speed governors;
    - Diesel fuel transfer pumps; and
    - Diesel injection pumps.

5. Lifting Materials
    - Slings;
    - Hooks;
    - Cables; and
    - Shackles.

11.2 Indicators of Suspect Components

The list reproduced here has been updated with information through June 2000. The authors have also added additional information through June 2013.

11.2.1 Indications of Suspect Piping and Piping Components (Including mechanical and metal products)

- Used component appearance;
- Unusual or inadequate packaging;
- Foreign newspapers used as packaging;
- Scratches on component outer surface;
- Evidence of tampering;
- Components with no markings;
- Pitting or corrosion;
- External weld or heat indications;
- Questionable or meaningless numbers;
- Typed labels;
- Evidence of hand-made parts;
- Painted stainless steel;
- Ferrous metals that are clean and bright;
- Excess wire brushing or painting;
- Ground off casting marks with stamped marks in the vicinity;
- Ground off logo mark;
- Signs of weld repairs;
- Threads showing evidence of wear or dressing;
- Inconsistency between labels;

- Old or worn nameplates;
- Nameplates that look newer than the component;
- Missing manufacturer's standard markings and logos;
- Overlapping stamps;
- Different colors of the same part;
- Traces of Prussian Blue;
- No specification number;
- No size designation;
- Missing pressure class rating;
- Other missing designations per the specification;
- Evidence of re-stamping;
- Deficient welds on chemical/nuclear shipping casks;
- Thinner than expected;
- Parts identified as "China" only, or "Korea," "Mexico," "Thailand," "India"; and
- Excess certification logos (i.e. "UL," "FM," "CGA," "AGA") all on one valve body – not normal, usually will have one or two logos plus ANSI or ASME.

11.2.2 Indications of Suspect Valves

- Wrench marks on valve packing glands, nuts, and bolts;
- Nameplates attached with screws rather than rivets;
- Poor fit between assembled valve parts;
- Dirty internals;
- Scratched or marred fasteners or packing glands;
- Gate valve: gate off-center when viewed through open end;
- Fresh sand-blasted appearance of valve bodies, eyebolts, fittings, stems;
- Loose or missing fasteners;
- Different types of hand wheels on valves of the same manufacturer;
- Some parts (e.g., hand wheels) look newer than rest of the valve;
- Improper materials (e.g., bronze nut on a stainless stem);
- Post-manufacturing alteration to identification/rating markings;

- Indication of previous joint welding;
- Excessive standards markings (e.g. Underwriter's Laboratory (UL), Factory Mutual (FM), Canadian Gas Association (CGA), American Gas Association (AGA)
- Valves will not open or close, even when wrench applied; and
- Substandard valves mixed in with standard valves (substitution).

11.2.3 Indications of Suspect Specific Valves

Valves produced by the following manufacturers generally have the following acceptable features. If these features are missing, the item should be considered a potential suspect item.

1. Crane Valves

- Body cast or forged markings;
- Crane name;
- Pressure rating;
- Pattern number;
- Nameplate Information:
    - Made from stainless steel (silver color) with black lettering;
    - Attached by drive screws OR attached on valve stem underneath handle;
    - Valve size pressure class, operating pressure at temperature; and
    - Body material.
- Seat material on valve body and valve seat;
- Stem trim material and heat treat conditions;
- Certification data – military specification, if applicable;
- Drawing number Shop Order Number;
- Body cast or forged markings including the name "Crane";
- Valve class;
- Valve size;
- Grade of steel; and
- Melt number.

2. Powell Valves (Wm. Powell Co.)

- Body cast or forged markings including the name "Powell";

- Valve class;
- Valve size;
- Grade of steel;
- Melt number;
- Nameplate Information;
- Riveted to valve body OR attached to valve stem underneath handle;
- Attached with single end welded wire (small valves);
- Serial number;
- Valve size;
- Figure number;
- Body style;
- Valve stem, disc, and seat type;
- Strength at temperature;
- Strength at 100°F;
- The Wm. Powell Co. Cin., Oh. Made in U. S. A.;
- Vogt, Henry Machine Co., Inc.; and
- Body cast or forged markings;
    - The name “Vogt”;
    - Pressure rating;
    - Pattern number;
    - Size;
    - Material specification; and
    - Two-code ID – a 3-letter code and a 4-digit code.

- Nameplate Information
    - Made from aluminum with electrochemical etched lettering;
    - Attached on valve stem underneath handle;
    - Valve size;
    - Pressure class, operating pressure at temperature;
    - Body material;
    - Internal seat material or internal H.F.;

- Stem trim material;
- Specification number Drawing Number; and
- Pressure rating.

3. Walworth Valves

- Body Cast or forged markings:
  - The name “Walworth”;
  - Pressure class;
  - Size;
  - Heat code; and
  - Serial number (stamped).
- Nameplate information:
  - Made from aluminum;
  - Attached by drive screws;
  - Attached to cover at times;
  - Valve size;
  - Pressure class and operating pressure at temperature;
  - Body material;
  - Internal seat material;
  - Stem trim material and heat treat conditions;
  - Figure number;
  - Serial number;
  - Location of Manufacture; and
  - Item code number.

4. Masoneilian - Dresser Valves

- Masoneilian or Worthington Controls stamped on nameplate; and
- MD or Masoneilian on valve body.

11.2.4 Indications of Suspect Electrical Components

a. General Indications

- Screwdriver marks on terminals;
- Different screw types or materials on terminals;

- Handwritten or typed rather than stamped tags;
- Missing tags (usually Nationally Recognized Test Laboratories (NRTL) approval tag);
- Pitted or worn contacts and lugs;
- Not in manufacturer's box or container;
- Signs of paint or smoke;
- Insufficient nameplate information;
- Missing terminals;
- Screws used in place of rivets;
- Body worn or discolored;
- Rough metal edges;
- Scratched or marred surfaces;
- Metal color inconsistencies;
- Modified or re-stamped nameplates;
- Improper fastening of nameplates;
- Plastic parts of different colors;
- Discolored or faded manufacturer's labels;
- Past due calibration stickers (internal and external);
- Broken or damaged solder terminations;
- Broken or damaged termination lugs;
- Contact surfaces that do not mate properly;
- Lubrication that appears to be old;
- Shipping in plain packaging (no manufacturer bar code); and
- Used or damaged parts in new packaging.

b. Specific Indications

1. Molded Case Circuit Breakers

- Handle modified to change ampere rating;
- Style is no longer manufactured;
- Unusual packaging: bulk packaging, generic packages, and cheap appearance;
- Refurbisher's name on breaker;

- Broken seal between halves;
- Contradicting amperage ratings; and
- Use of silicone sealant.

2. Fuses
   - Label missing or weathered; and
   - Wear marks on bases.
3. Power (Draw out) Circuit Breakers
   - Different color or shape of over current devices; and
   - Suspicious- looking auxiliary trip devices.
4. Motor Starters with poor fitting or wrong voltage rated operating coil.
5. Motor Control Centers
   - Breakers that are not easily opened or closed with compartment door closed; and
   - Exposed buss work with compartment doors open.
6. Electromechanical Relays with poor or loose-fitting relays
7. Potter-Brumfield Relay
   - Sloppy coil lead solder joints;
   - Painted relay base grommets (normally clean);
   - Terminal strips fastened with eyelets;
   - Painted rivets fastening the terminal strip to the relay housing;
   - Termination screws in brown paper bags (should be in clear, heat-sealed plastic bags);
   - Use of bubble wrap (plastic with Styrofoam should be used);
   - Repainted inner bell surface;
   - Missing or inconsistent date codes, inspection stamp, and test stamp;
   - Incorrect shaft relay cover clearance, shaft play, and lack of bearing lubricant;
   - Tops of rotor shafts painted a color other than black;
   - Non-uniform numbers stamped on the contact decks, indicating decks made up from various relays; and
   - Incorrect coil.
8. Capacitors

- Polished surfaces scratched or dented;
- Termination lugs scarred;
- Buildup of debris and dirt in termination guards; and
- Plain packaging (no manufacturer bar codes).

11.2.5 Indications of Suspect Documentation and Certification

- Use of correction fluid or correction tape;
- Type style or pitch change is evident;
- Documentation has missing (or illegible) signature, initial, or data;
- Document is excessively faded or unclear;
- Inconsistent technical data;
- Certification or test results are identical between items when normal variations should be expected;
- Document is not traceable to the items procured;
- Technical data are inconsistent with code or standard requirements;
- Documentation is not delivered as required on the purchase order, or in an unusual format;
- Lines on forms are bent, broken, or interrupted indicating that data have been deleted or exchanged by “cut and paste”;
- Handwritten entries are on the same document where typed or pre-printed data exist;
- Data on a single line are located at different heights;
- Product recall;
- Chemical alloy composition totals 100% (or >99.75%) as shown on Certified Material Test Report (CMTR); and
- Heat and lot numbers are same for different materials in same order (i.e., 6010 and 7018 weld wire cannot be manufactured from same heat and lot of material).

11.2.6 Indications of Suspect Stainless Steel Wire Rope

- Lack of or incomplete documentation; and
- Noticeable alteration of documentation (refer to Documentation and Certification section).

11.2.7 Indications of Suspect Lifting Materials

- Original markings ground off and re-stamped;
- Altered markings on identification tags;
- Used appearance of items (i.e. straps appear worn, or hook have indications of previous use);
- Parts identified as “China” only, or “Korea,” “Mexico,” “Thailand,” “India”;
- No or incomplete documentation (refer to Documentation and Certification Section); and
- Red hooks not labeled with Crosby Group markings (“Crosby” or “CG”) Crosby has the Crosby Red Carbon Steel Hook U.S.A. Trademark, Registration #2,108,103.

12.0 Counterfeiting of NRTL Certifications and Symbols

NRTLs are third-party organizations recognized by the Occupational Safety and Health Administration (OSHA) as having the capability to provide product safety testing and certification services to the manufacturers of a wide range of products for use in the American workplace. The testing and certifications are based on product safety standards developed by.US-based standards developing organizations and often issued by ANSI.

S/CI coordinators can use the following web site to locate contact information for any NRTL. The NRTL can assist in verifying if an NRTL certification or symbol is legitimate or a counterfeit. NRTL's maintain strict traceability to their issued certifications and symbols.

For a current listing of NRTLs and the testing locations that operate under the program, see http://www.osha.gov/dts/otpca/nrtl/.

NRTL regulations are contained in 29 CFR 1910.7.

NRTL approved certification means that the NRTL determined that the product met the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself or by verifying that a contract laboratory has done so; and the NRTL has certified that the product met the requirements of the product safety standard.

Many products "approval" requirements are found in OSHA's standards (29 CFR Parts 1910, 1915, 1918, and 1926). NRTL testing and certification is required for many types of products, including:

- Electrical equipment;
- Fire detecting and extinguishing equipment;
- Liquefied Petroleum Gas utilization equipment; and
- Equipment to be used in Hazardous locations.

More products requiring NRTL approval can be located at https://www.osha.gov/dts/otpca/nrtl/prodcatg.html.

13.0 References

Current and draft directives and accompanying guidance relevant to S/CI can be found at http://www.directives.doe.gov.

ANSI/ASQC Z1.4-2008, *Sampling Procedures and Tables for Inspection by Attributes*

ASME NQA-1-2008, *Quality Assurance Requirements for Nuclear Facilities Applications*, 2008

American Society of Testing Materials, ASTM A193, A*lloy-Steel Bolting Materials for High-Temperature Service*, 1984

American Society of Testing Materials, ASTM A193/A193M, *Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications*, May 1, 2012

Code of Federal Regulations, 29 CFR 1910.7, *Occupational Safety and Health, Definition and Requirements for a Nationally Recognized Testing Laboratory*, June 27, 1974

DOE Acquisition Regulation Acquisition Letter 95-08

DOE Guide 414.1-2B, *Quality Assurance Guide*, August 16, 2011

DOE Guide 414.1-3, *Suspect/Counterfeit Items Guide for Use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1B, Quality Assurance;* November 3, 2004 (Replaced by DOE G 414.1-2B)

DOE Order 232.2, *Occurrence Reporting and Processing of Operations Information*, August 30, 2011

DOE Order 252.1A, *DOE Technical Standards Program*, February 23, 2011

DOE Order 414.1D, *Quality Assurance*, April 25, 2011

EPRI/*NP-5638 Guidelines for Preparing Specifications for Nuclear Power Plants*, (NCIG-04)

Federal Acquisition Streamlining Act of 1994

International Atomic Energy Agency, IAEA-TECDOC-1169, *Managing Suspect and Counterfeit Items in the Nuclear Industry*, August 2000

Independent Distributors of Electronics Association (IDEA) Standard 1010-B, *Acceptability of Electronic Components Distributed in the Open Market*, April 2011

Office of Management and Budget (OMB) Policy Letter 91-3, *Reporting Nonconforming Products*, April 9, 1991

Society of Automotive Engineers, SAE AS5553–*Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition*, April 2, 2009

Society of Automotive Engineers, SAE AS6081, *Counterfeit Electronic Parts Avoidance-Distributers*, November 9, 2009

Society of Automotive Engineers, SAE AS9120, *Quality Management System*, November 4, 2002

Appendix A - Suspect/Counterfeit Items Found at DOE Facilities

Figure A-1: Flanges Received at Savannah River Site

These photographs show that these flanges are not new. Indications of such include, clamp marks, different rivet sizes on tag, scratches, groove in bolt hole, and lack of cleanliness.

Suspect/Counterfeit Labeling

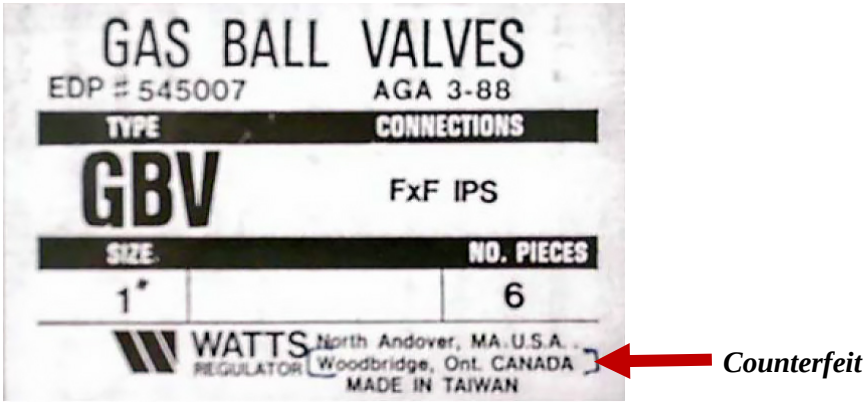


Figure A-2: Suspect WATTS Gas Ball Valve Label

The WATTS Gas Ball Valve label is S/CI because WATTS does not have a Woodbridge, Ontario, Canada facility.

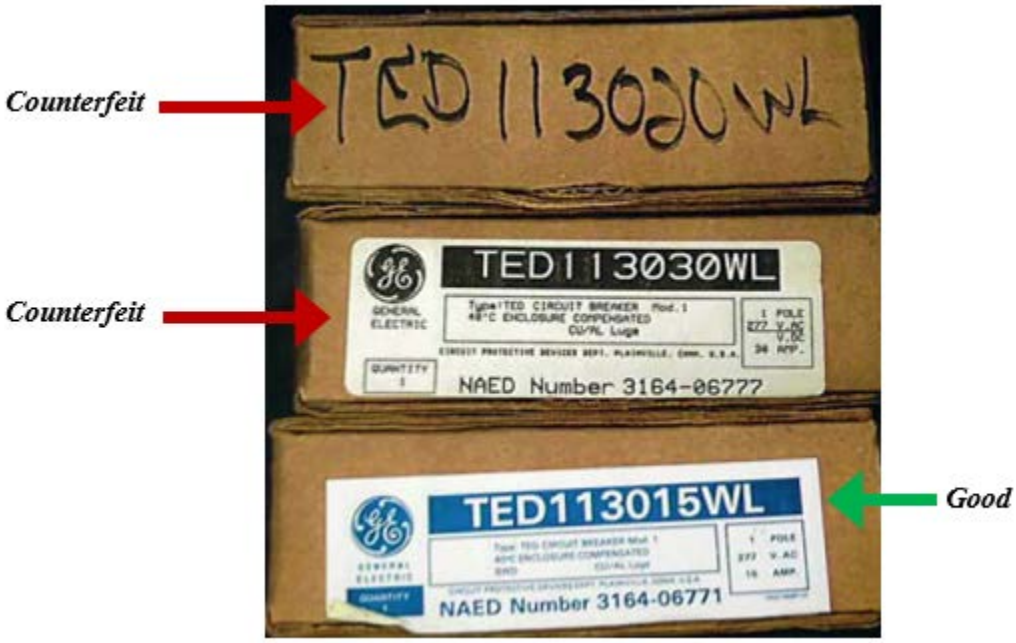


Figure A-3: Authentic GE Label

The blue and white colored GE label is authentic.

GE does not affix black and white labels on boxes for this item nor should the product number be handwritten without any proper GE labeling.

Figure A-4: Jinn Her "JH" Grade 5 Hex Bolt from the West Valley Demonstration Project

This Jinn Her "JH" Grade 5 Hex Bolt from the West Valley Demonstration Project (WVDP) was received in December 2005. Jinn Her "J" headmarks on grade 5 and grade 8 high-carbon steel fasteners are deemed counterfeit. However, Jinn Her has the "JH" insignia currently registered in the U.S. Patent and Trademark Office. The fasteners were ordered as domestic, yet the supplier provided the foreign-made Jinn Her fasteners from Taiwan. The fasteners were tested and found to meet WVDP specifications. WVDP has chosen to use these fasteners. This insignia (headmark) appears on page 18 of the FQA Register of Active Fastener Insignias at https://www.uspto.gov/sites/default/files/FQA_Registry.pdf.

Figure A-5: Suspect/Counterfeit Bulletproof Vests Manufactured by Second Chance Body Armor, Inc.

Bulletproof vests manufactured by Second Chance Body Armor, Inc. ("Second Chance"), which contains Zylon®, a fiber manufactured and sold to Toyobo Co., Ltd. and Toyobo America, Inc. Sold by Second Chance and its distributors under the trade names ULTIMA, ULTIMAX, and TRIFLEX, these vests fail to meet the performance characteristics for which they were warranted, degrading at a quicker than expected rate from light, humidity, and temperature. Allegedly, the defective condition of the vests was withheld from the marketplace. Upwards of 20 percent of the ammunition fired at these vests penetrated the fabric.

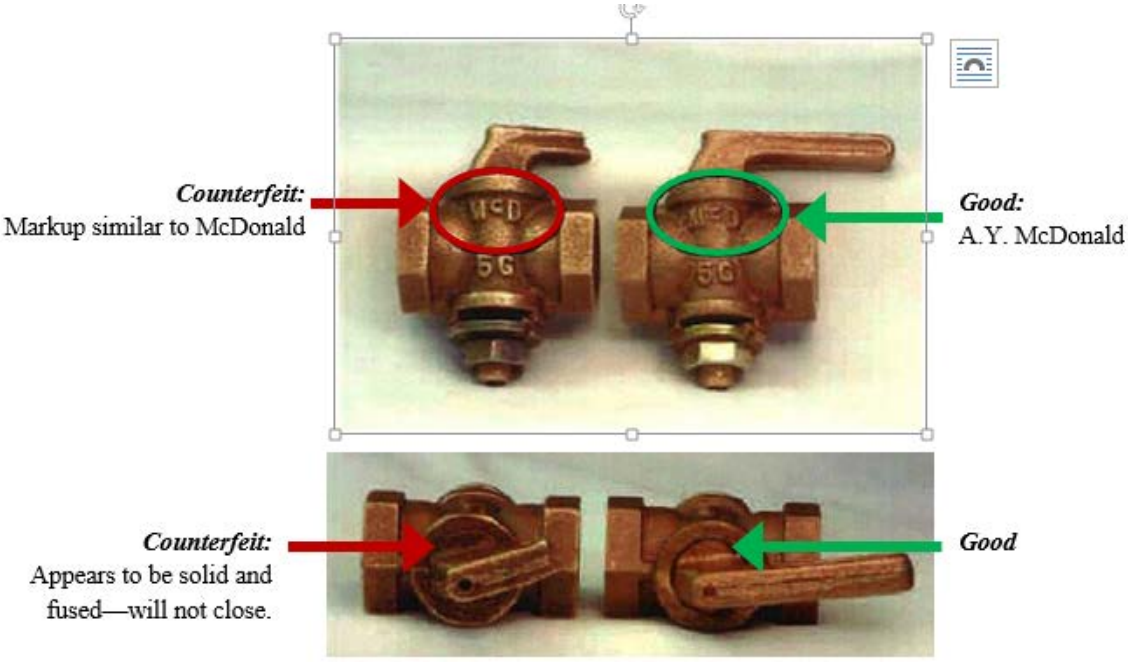


Figure A-6: Comparison of 1/2" Lever Handle with Check Low Pressure Gas Valve – Plug Style

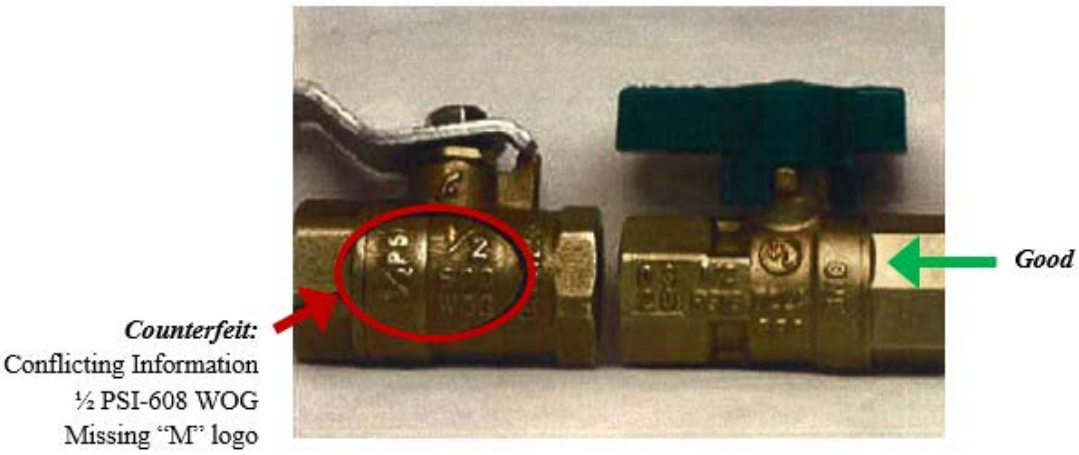


Figure A-7: Comparison between Two 1/2" Forged CSA Ball Gas Valves

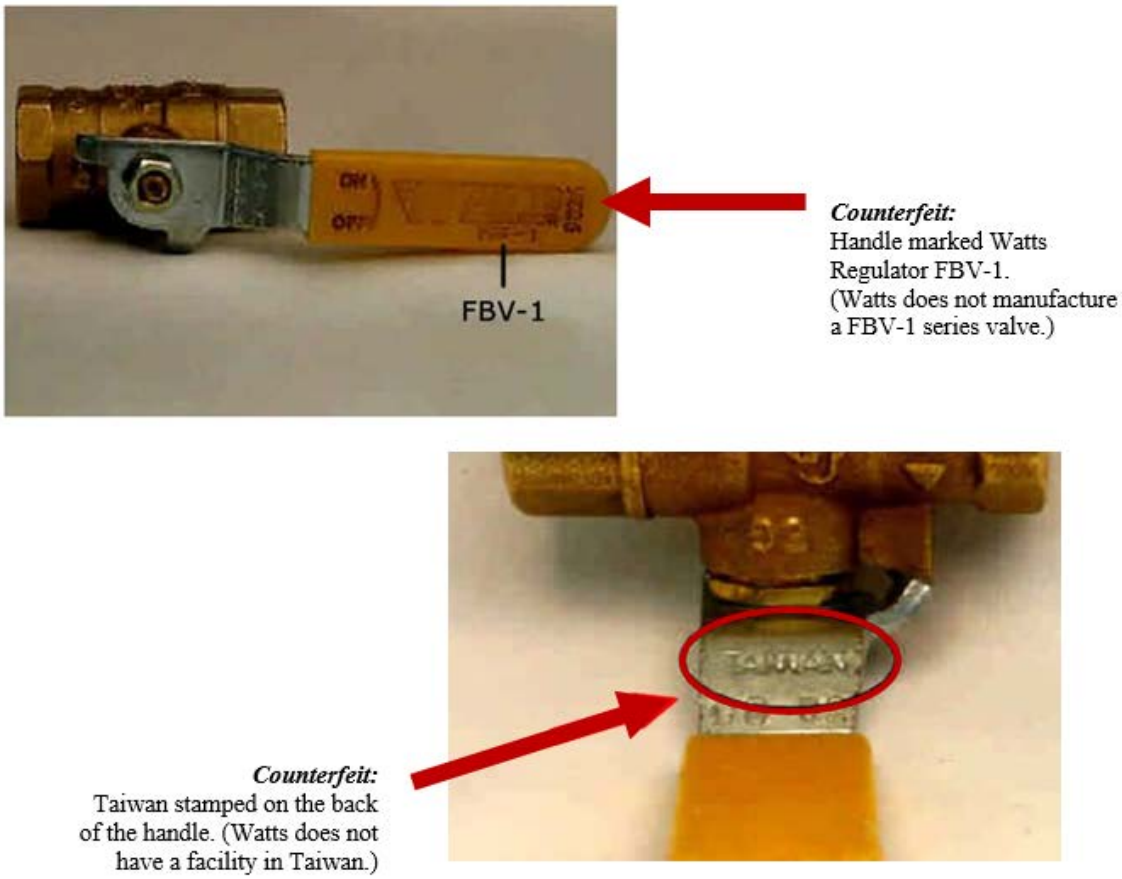
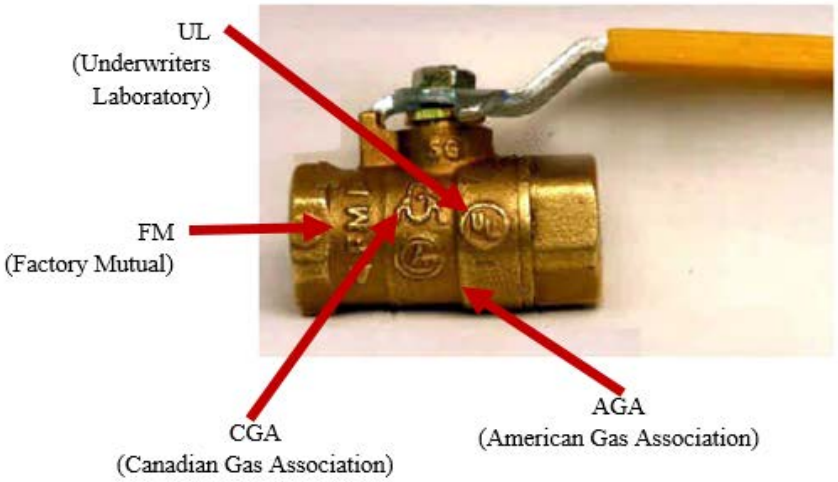


Figure A-8: ½" Forged Ball Gas Valves Counterfeit



Note: Watts only Manufactures to UL and CGA

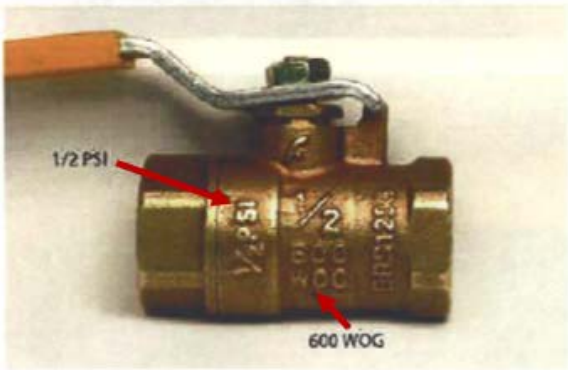


Figure A-9: ½" Forged Ball Gas Valves Counterfeit

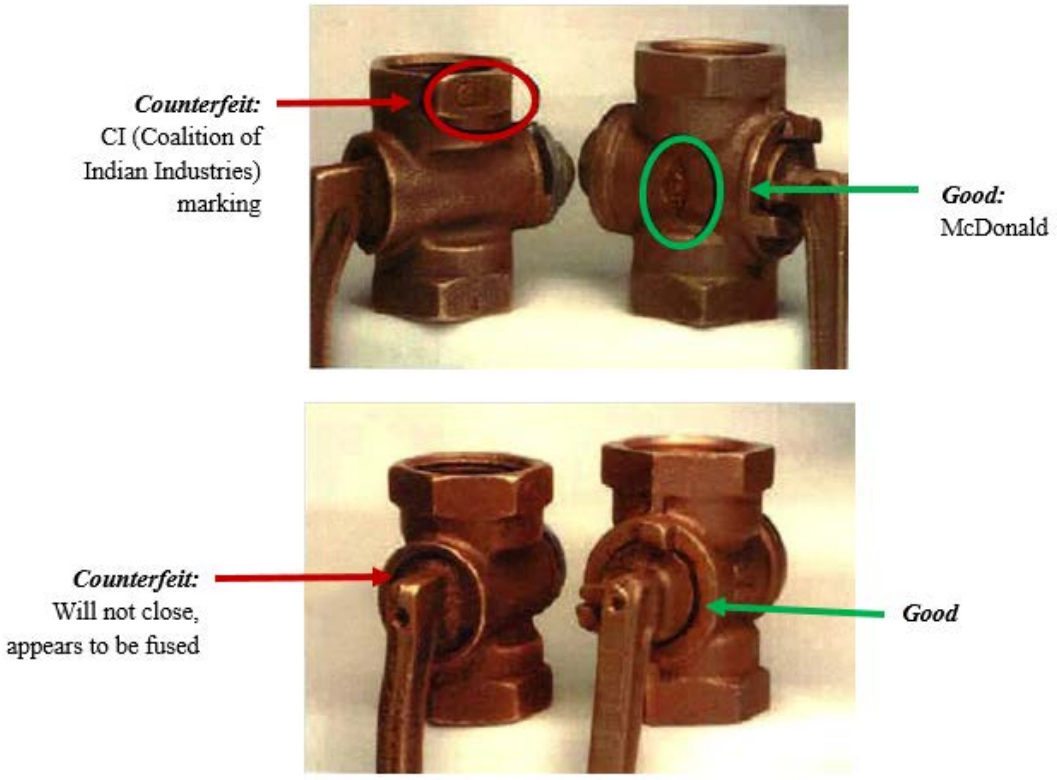


Figure A-10: Comparison of Two 1" Lever Handle with Check Low Pressure Gas Valves – Plug Style

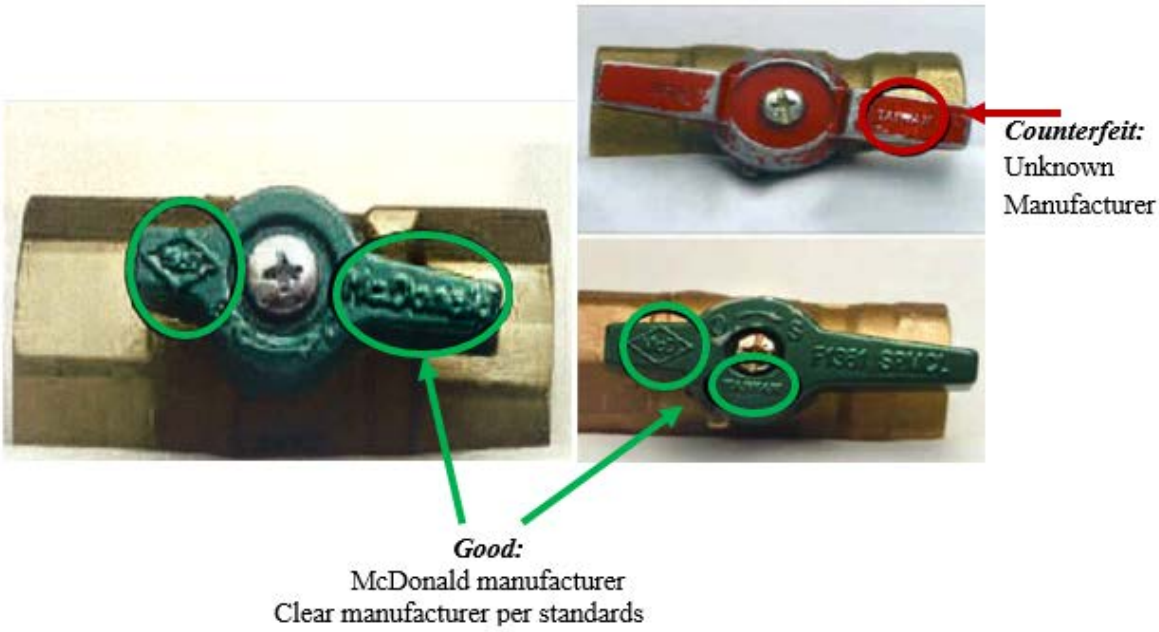


Figure A-11: Comparison of Three Valves, All Foreign by Indicators on Valves

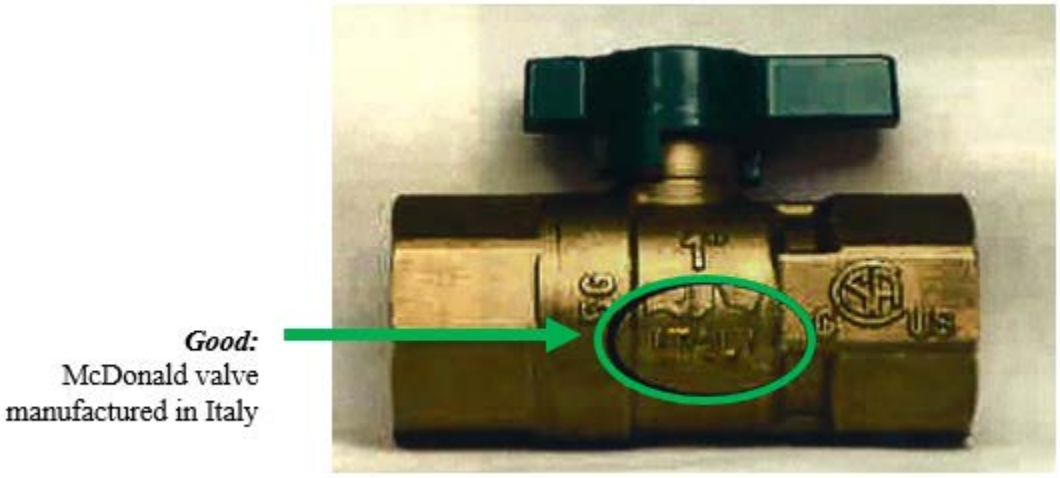
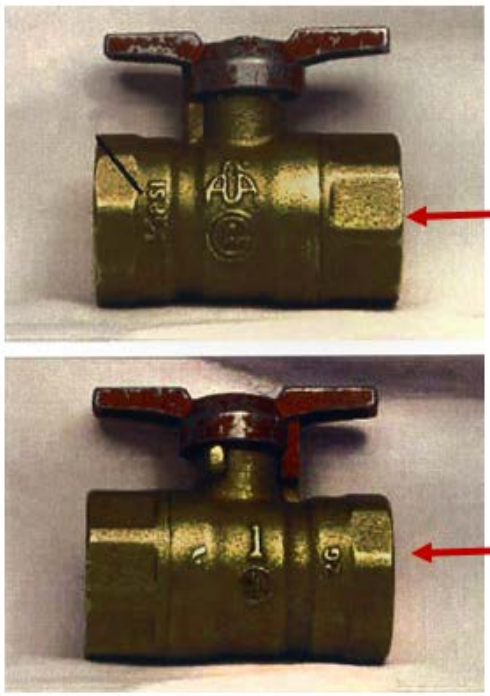


Figure A-12: 1" Forged Ball Gas Valve – Good

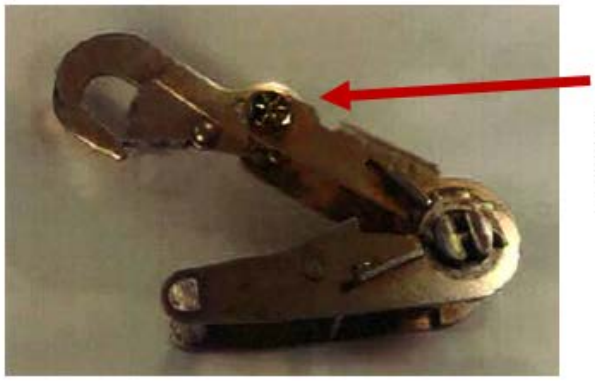


Counterfeit:
Unknown manufacturer ½ psi marking.

Represented as new No manufacturer marking.

Counterfeit:
Unknown manufacturer opposite side view.

Figure A-13: 1" Forged Ball Gas Valve – Counterfeit

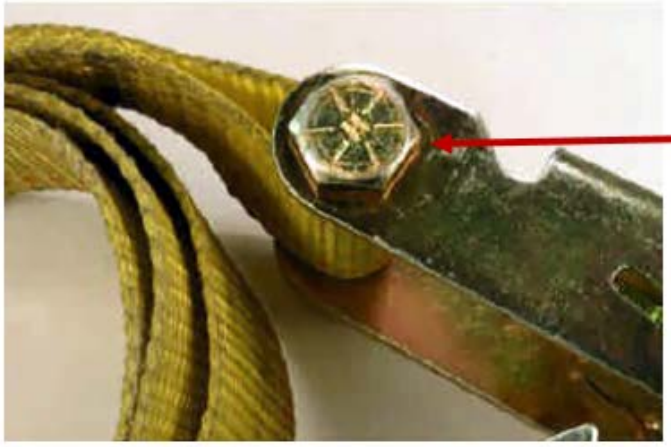


Counterfeit:
Bolt in ratchet is a Grade 8 with no manufacturer marking, which is on the DOE Suspect/ Counterfeit Headmark list.

Counterfeit:
Close-up of Grade 8 bolt.

Figure A-14: Ratchet Tie-Down without Strap – Counterfeit

Counterfeit: Bolt in ratchet is a Grade 8 with manufacturer marking of "H" which is on the DOE Suspect/ Counterfeit Headmark list



Counterfeit: Close-up of counterfeit Grade 8 bolt

Figure A-15: Ratchet Strap Tie-Down – Counterfeit

Suspect:
No manufacturer markings.

"China" is marked: however, this is unacceptable if consensus standard placed in the procurement document required the manufacturer's name or trademark.

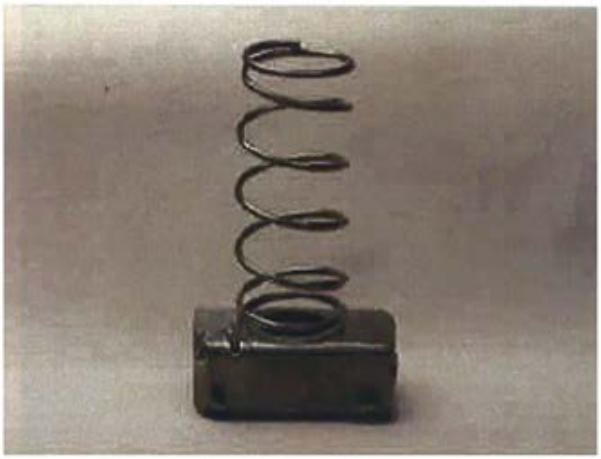
Figure A-16: Shackle – Potentially Suspect

Example of Suspect item- No traceability of the manufacturer therefore not confirmed counterfeit

Bottom view:

Suspect: No manufacturer's name or logo on part.

No part numbers or size.

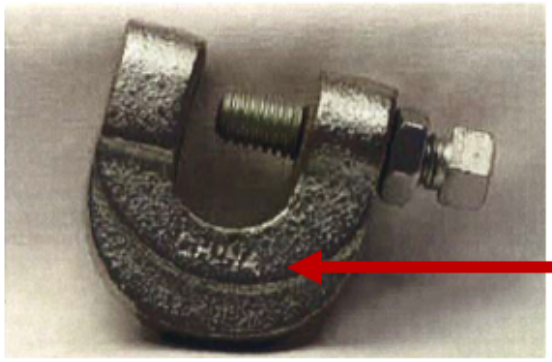


Side view:

Suspect: No manufacturer's name or logo on part.

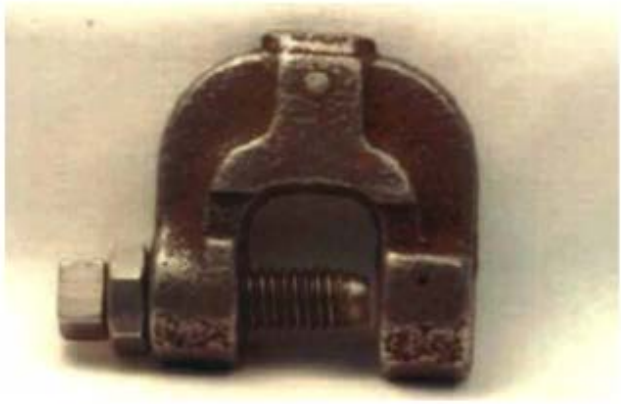
No part numbers or size.

Figure A-17: Spring Clips – Suspect



Suspect:
Product ordered domestic, label on box indicated domestic, all products inside marked with "China". No manufacturing name or logo on part. Supplied by a B-Line distributor.

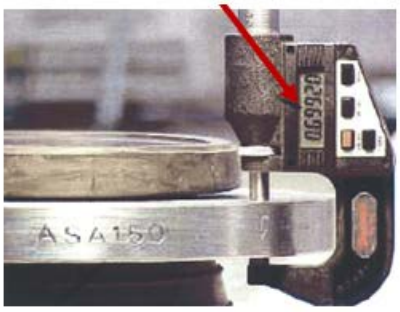
Figure A-18: 1" Zinc-Coated Beam Clamp – Suspect



Suspect: No manufacturing name or logo on part. No part number or size

Figure A-19: Beam Clamp – Suspect

Thickness rating



Suspect:
150 lb. rated flange
Should be 0.940" thick – 0.000-0.125
This one is 0.69920" thick

Suspect:
Apparently hand stamped. No manufacturer marking. "China" unacceptable as manufacturer. NO STANDARD MARKING (i.e., B16.5).

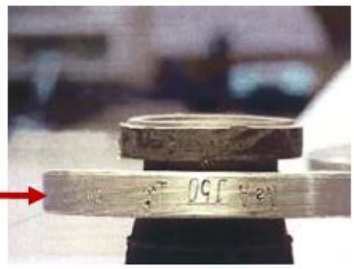


Figure A-20: Expansion Connectors – Suspect

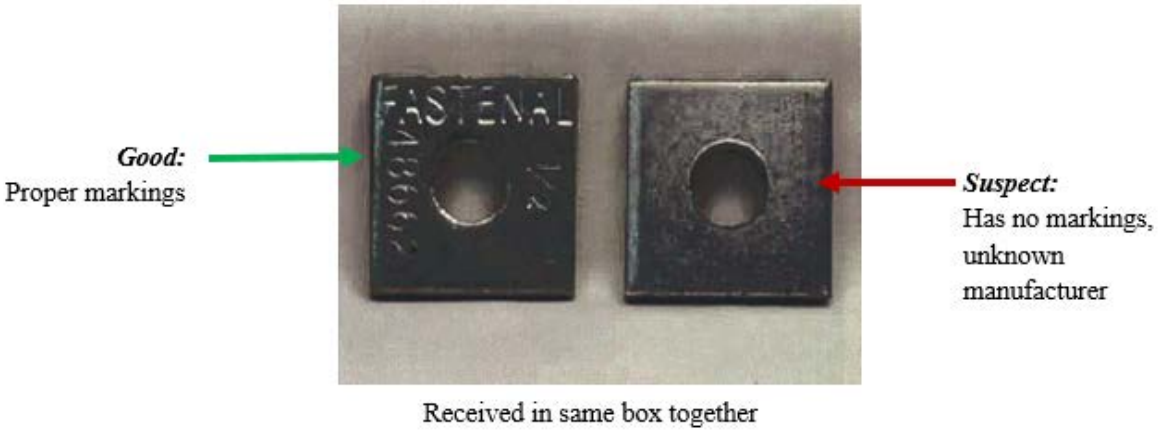


Figure A-21: Square Washers/Spacers

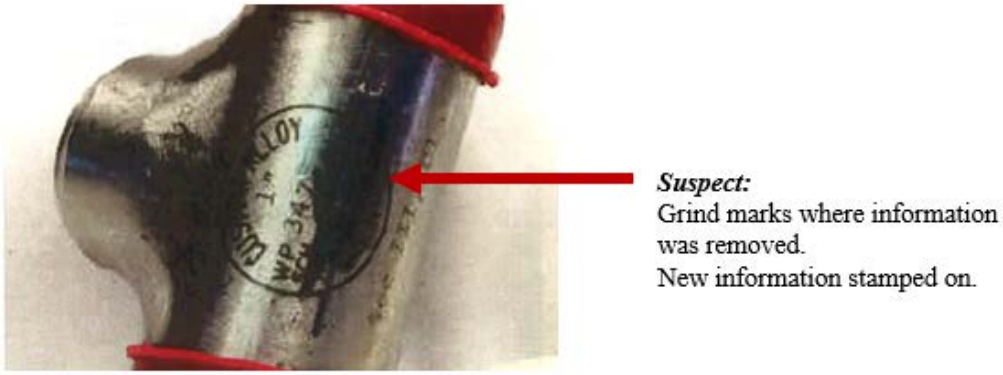
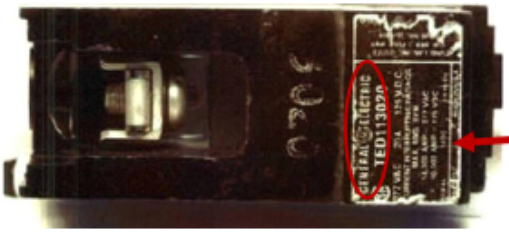


Figure A-22: Stainless Steel "T" Weldalet



Counterfeit:
Label marked General Electric and "GE"
Manufacturer stopped marking with both indicators over 20 years ago.
Label very worn.

Counterfeit:
Represented as being new condition shown

Counterfeit:
Sold as new by supplier indications of being used or refurbished
Label worn and torn

Counterfeit:
Potting material in bottom screw hole tampered with; should be smooth and even with surface of case.
Appears dirty and worn; represented as being new in the condition above.

Figure A-23: GE Molded Case Circuit Breaker – Counterfeit

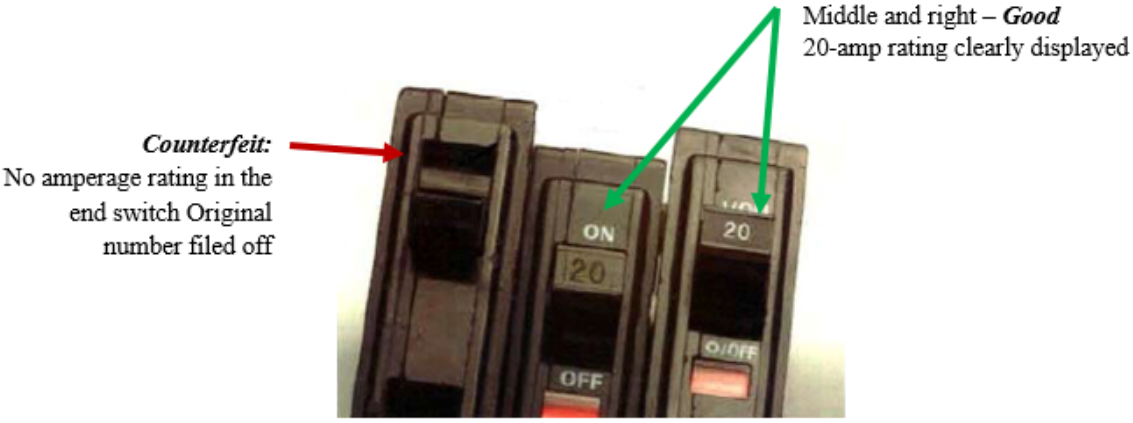
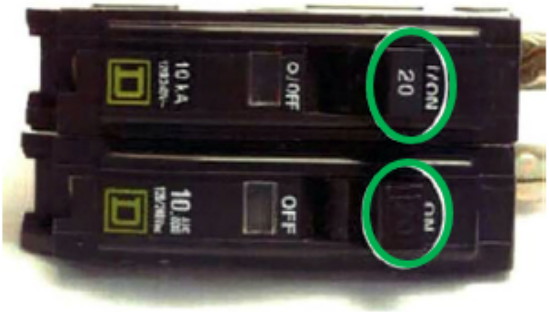


Figure A-24: Comparisons of Square D Breakers



BOTH Good:
Square D Breakers
Clearly marked amperage rating on end of switch.
Rating on top switch is silk- screened (Square D started silk-screen process in 2003.
Rating on bottom switch is molded.

Figure A-25: Square D Circuit Breakers

Example of Fraudulent Documents

Fraudulent/Counterfeit:
Certification identifies a welding electrode as a F7018 Electrode.

There is not an electrode with the identification as F7018[2]

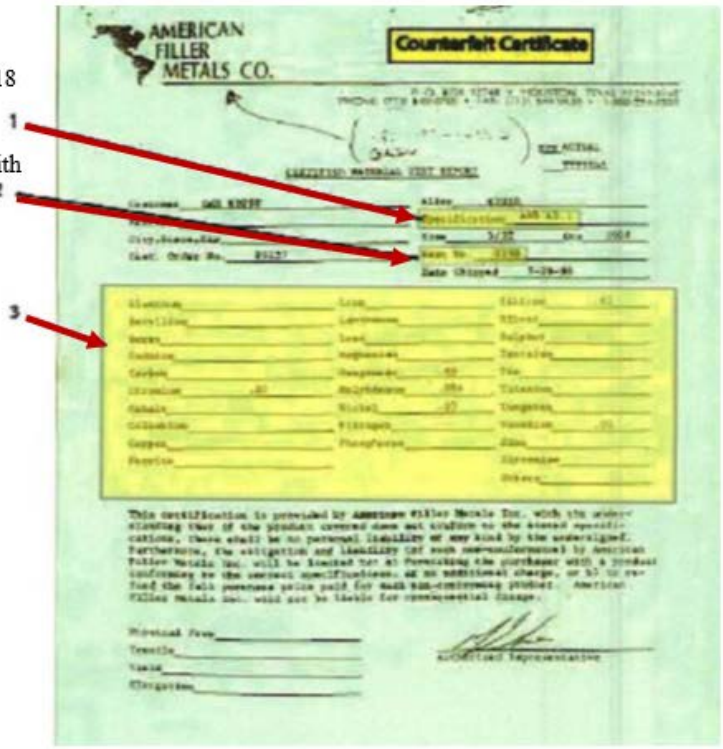
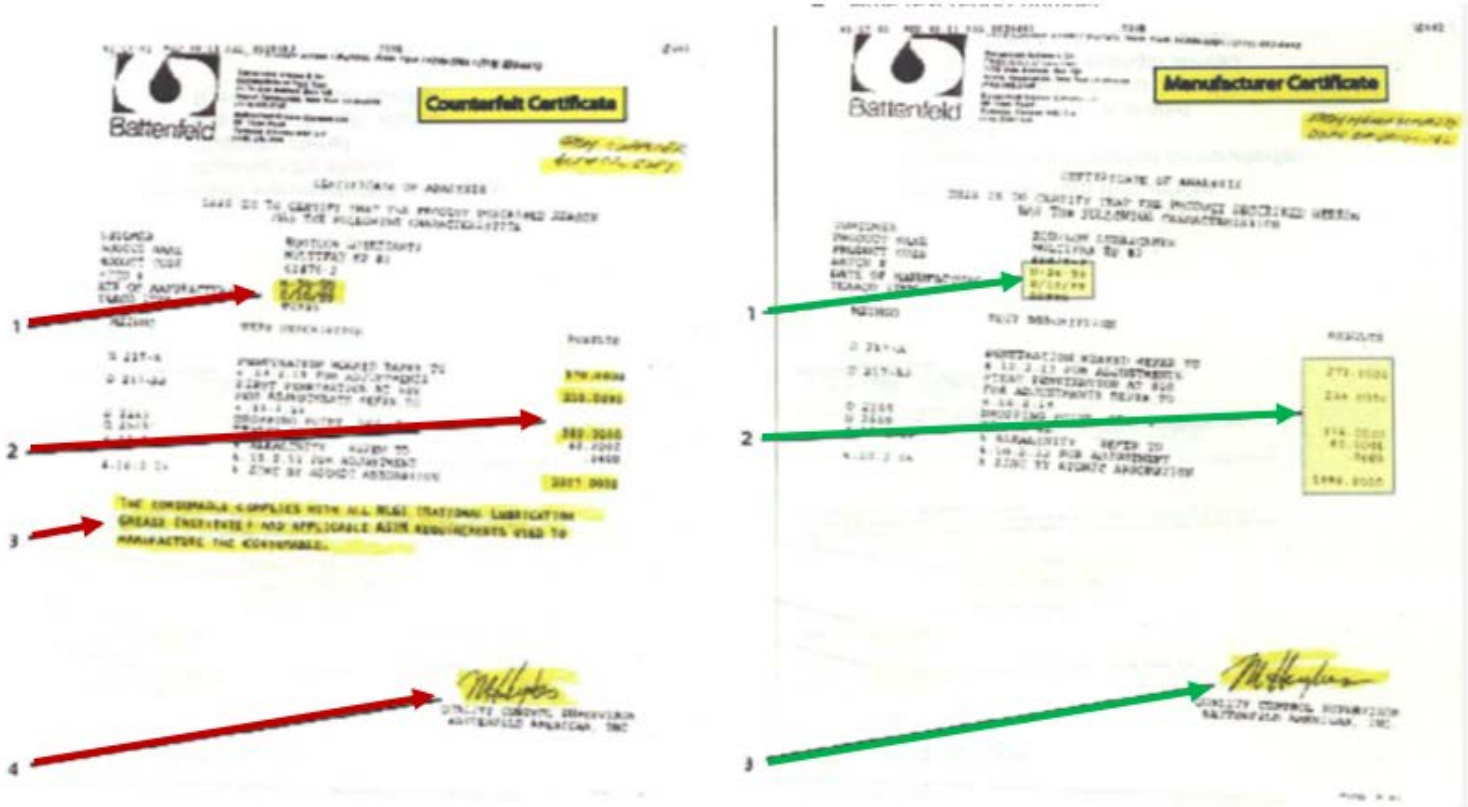


Figure A-26: Potential S/CI (Fraudulent Document)



Counterfeit:

1. Info different font
2. Results altered
3. Added information not on original
4. Signature forged

Good: Same font throughout

Figure A-27: Comparison of Counterfeit Certificate VS Authentic Certificate

the Crosby group inc.

GENERAL OFFICES
2801 DAWSON ROAD (74110-6040)
P.O. BOX 3128
TULSA, OKLAHOMA 74101-3128

JAMES A. CHRISTOPHER
DIRECTOR TECHNICAL SERVICE

November 2, 2000

Ken Brandt
Los Alamos National Laboratory
P O Box 1663
P946
Los Alamos, New Mexico 87545

RE: Red Swivel Hook with forged ELD letters

Dear Ken,

From your description the referenced hook is not a Crosby product

This hook should not be expected to perform the same as the Crosby S-322 Red Carbon Steel Swivel Hook

We have enclosed a copy of The Crosby Red Carbon Steel Hook U S A Trademark, Registration # 2,108,103

Anyone importing red carbon steel hooks into the U S A for sale, or offer to sell is violating Crosby's Intellectual Property Rights

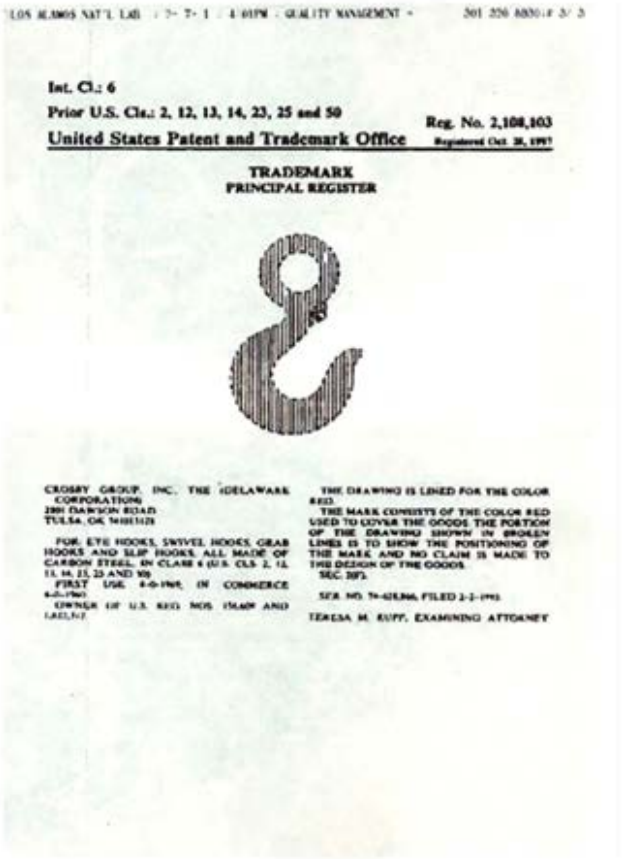
Sincerely,

THE CROSBY GROUP, INC.

James A. Christopher

Enclosures

PART OF THE TNI GROUP OF COMPANIES



Int. Cl.: 6
Prior U.S. Cls.: 2, 12, 13, 14, 23, 25 and 50
Reg. No. 2,108,103
United States Patent and Trademark Office

TRADEMARK
PRINCIPAL REGISTER

CROSBY GROUP, INC. THE (DELAWARE CORPORATION)
2801 DAWSON ROAD
TULSA, OK 74101-3128

FOR: EYE HOOKS, SWIVEL HOOKS, GRAB HOOKS AND SLIP HOOKS, ALL MADE OF CARBON STEEL, IN CLASS 6 (U.S. CLS. 2, 12, 13, 14, 23, 25 AND 50).

FIRST USE: 4-0-1985; IN COMMERCE: 4-0-1985.

OWNER OF U.S. REG. NOS. 1,546,909 AND 1,663,317.

THE DRAWING IS LINED FOR THE COLOR RED.

THE MARK CONSISTS OF THE COLOR RED USED TO COVER THE GOODS. THE PORTION OF THE DRAWING SHOWN IN BROKEN LINES IS TO SHOW THE POSITIONING OF THE MARK AND NO CLAIM IS MADE TO THE DESIGN OF THE GOODS.

SEC. 2(F).

SER. NO. 74-628,066, FILED 2-2-1993.

TERESA M. RUPP, EXAMINING ATTORNEY

Figure A-28: Documentation from Crosby Inc. concerning the lifting hooks in Figure A-29 and 30

Fraudulent/Counterfeit: Inc. trademark-patented color
Represented as being new in condition
Appearance very worn
Red color is the Crosby Group

Figure A-29: Comparison of two Latching Eye Hooks – Both Fraudulent

If carbon-steel hooks are ordered (without specifying the Crosby brand) and hooks are received that are painted red but not identified as Crosby, consider the hooks suspect. The Crosby Group, Inc. has a trademark on painting its carbon-steel hooks red and does not license others to manufacture such hooks. If suspect hooks like the ones pictured above are discovered, it is suggested to calling the Crosby Group at (800) 772-1500 as a courtesy so that they can investigate and address the issue of potential trademark infringement. Further, the hooks should be evaluated according to hoisting and rigging guidelines to ensure they have all the proper certifications, the manufacturer is traceable, and the hooks meet specifications. If hooks were ordered new but show signs of wear, or if they appear to be improperly marked, consider the hooks suspect and counterfeit. Do not return the hooks to the source from which they were purchased.

Good:
Color of hook is RED. Crosby Group, Inc. has the patent, trademark registration for the color RED in the United States.

Counterfeit:
Hook received from Crosby distributor and represented as being Crosby. Markings on hook "ELD", not "CG" or "Crosby" – Crosby markings.

Figure A-30: Swivel Hook – Red Counterfeit

Appendix A – Other Information Related to S/CI

Resource information on NRC's initiative to prevent the intrusion of counterfeit, fraudulent, and suspect items (CFSI) into NRC regulated facilities can be found at the following Web sites:

Actions to Improve the Detection of Counterfeit and Fraudulently Marked Products (Generic Letter 89-02) GL89002, http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/1989/gl89002.html

Counterfeit, Fraudulent, Suspect Items (CFSI) Project Update, http://pbadupws.nrc.gov/docs/ML1222/ML12227A917.pdf

2012 Vendor Oversight Workshop, http://www.nrc.gov/reactors/new-reactors/oversight/quality-assurance/vendor-oversight/past/2012/

Counterfeit Parts Supplied to Nuclear Power Plants (Information Notice 2008-04) IN2008-04, http://pbadupws.nrc.gov/docs/ML0807/ML080790266.pdf

Licensee Commercial-Grade Procurement and Dedication Programs (Generic Letter 91-05), GL91005g, http://pbadupws.nrc.gov/docs/ML0311/ML031140508.pdf

SECY-11-0154, *An Agency wide Approach to Counterfeit, Fraudulent, and Suspect Items*, http://pbadupws.nrc.gov/docs/ML1122/ML112200150.pdf

Staff Review of Counterfeit, Fraudulent, and Suspect Items (CFSI), ML112130293, http://pbadupws.nrc.gov/docs/ML1204/ML120440268.pdf

U.S. Patent and Trademark Office Fastener Insignia Register Active Insignias, http://www.uspto.gov/sites/default/files/FQA_Registry.pdf

Appendix B - Resources

American National Standards Institute
1899 L Street, NW, 11th Floor
Washington, DC 20036

American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428

American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016

Department of Energy
Office of Environment, Health, Safety and Security
Office of Corporate Safety Analysis, AU-23
DOE Germantown
19901 Germantown Road
Germantown, Maryland 20874

Industrial Fasteners Institute
6363 Oak Tree Blvd.
Independence, OH 44131

Government-Industry Data Exchange Program
Operations Center
P.O. Box 8000
Corona, California 91718-8000

Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, Pennsylvania 15096-0001

Underwriters' Laboratory
333 Pfingsten Road
Northbrook, IL 60062

United States Department of Commerce National Institute of Standards and Technology
Building 411
Gaithersburg, Maryland 20899

United States Nuclear Regulatory Commission
Washington, DC 20555