Supplier anti-counterfeit requirements
April 2016

Prepared by:

Jo Vann

IEC TC107 WG3 ‘Counterfeit electronic parts; avoidance, detection, mitigation, and disposition in avionics applications’ convener, see http://www.iec.ch/dyn/www/f?p=103:14:0::::FSP_ORG_ID,FSP_LANG_ID:5736,25

Member of:
SAE: G19A, G19AD, G19C, G19CI, AMPC, IAQG
IEC TC107 WG3
IECQ WG6
UK CAWG
Counterfeit components

Counterfeit wires (CALCE 2015):

Counterfeit parts are on the rise, Paul Romano, Fusion Trade. **Figure 1: A counterfeit device that has been coated with a compound that will not be detected by normal permanency testing, but can be chipped off to reveal the remarked device.**

Vertical launches online component market to defeat counterfeit chip fraud, Dean Takahasi

From Kozio blog
Recycling is increasing

Uncontrolled processes
General Counterfeit statistics

  - 87,000 cases of detentions in 2013, resulting in nearly 36 million articles compared with 7,553 in 2002

- EU taxations and Customs union IPR statistics from 2014, >95,000 cases were registered by Customs: large numbers of small packages detained containing cigarettes, toys, medicines, car spare parts and foodstuffs.

- International Anti-counterfeiting Coalition (IACC) estimates:
What is the Avionics problem?

• In 2010/2011 the USA DoD identified upwards of a million counterfeit components in their Military supply chain.

• This resulted in the anti-counterfeit DFAR 252.247.7007 invoked in contracts of major Avionics OEMs.

• Researcher IHS analysed electronics industry data in 2013 concerning counterfeit parts that were reported from 2001 until early 2012:
  
  ➢ More than 12 million counterfeit parts have been reported over the last five years to 2013
  ➢ 57% of counterfeit part reports involved obsolete or end of life parts.
  ➢ Nearly 37% of counterfeit parts involve components still being produced by manufacturers.
  ➢ A single incident of a counterfeit part can cause up to 64 weeks of production line downtime and cost up to $2.1 million to resolve.
  ➢ Counterfeit parts are mostly sold on the open market.
ERAI reported non-conforming and suspect counterfeit parts in USA
IECQ anti-counterfeit audit roadmap

IECQ WG6 has developed Third Party audit schemes for (see http://www.iecq.org/publications/rules-procedures/)

- SAE AS5553A, OD 706-1 for any OEM in medium to high reliability industries
- SAE AS6081, OD706-2 for non-franchised distributors in medium to high reliability industries
- New IEC/TS 62668-1, OD706-3 for Avionics OEMs
- New draft ISO9001 Clause 6 risk mitigation - General Traceability audit – for any industry - work in progress

Benefit of IECQ audit schemes:

- On-line certificates viewable by any one
- Audits are available in your local language, please contact your IECQ CB, see http://www.iecq.org/members/bodies/mb-list.htm
  - e.g. LCIE, DKE, DANSK, CNCA, JISC, BSI for BEC
Avionics Supply Chains and contract flow-down which includes AS9100 flow-down:

- USA Military
  - DFARS in contracts
    - DFAR 252.246.7007 electrical and SAE AS6171
    - NEW DFAR Trusted supplier and Additional trusted supplier

- General Avionics Customer
  - Anti-C flowdown AS5553
  - NATO Directive referring to external standards
    - ARP 6328 or IEC/TS 62668-2 risk assessment and/or SAE AS6171

- UK Military
  - DEF STAN 05-135 anti-counterfeit, electronics and materials

- Avionics customer
  - SAE AS6174 Materials

- OEM AS9100
  - OEM suppliers AS9100 preferred
  - SAE AS5553 flow-down to suppliers
    - SAE AS6174 Franchised distributors
    - ARP 6328 or IEC/TS 62668-2 risk assessment and/or SAE AS6171

- SAE AS6496 materials
  - ARP 6328 or IEC/TS 62668-2 risk assessment and/or SAE AS6171

NEW DFAR Trusted supplier and Additional trusted supplier

ARP 6178 non-franchised distributor

SAE AS5553 flow-down to suppliers

SAE AS6496 Franchised distributors

ARP 6328 or IEC/TS 62668-2 risk assessment and/or SAE AS6171

SAE AS6174 Materials
Key steps for a business to avoid counterfeit and recycled components.

1. Restrict PO to OCM or franchised distributor
2. Minimise buys from non-franchised distributors
3. Publish an anti-counterfeit policy or plan
4. Establish standard PO anti-counterfeit notes for suppliers
5. Request supply chain traceability back to the OCM for all POs
6. Trade-body Policy or external anti-counterfeit standards
7. Manage excess stock and scrap
8. Risk assess components from non-franchised sources
9. Implement an obsolescence management plan
10. Implement an anti-counterfeit training program
Format of an anti-counterfeit plan

Typically:

- Formatted in WORD as a traditional 6 part spec format under configuration control containing:
  - *Figures or an overall flowchart*
  - *Clause 1. Scope,*
  - *Clause 2. References*
  - *Clause 3. Definitions and acronyms and abbreviations,*
  - *Clause 4. Technical requirements directly addressing the mandatory requirements of the external standard or Trade-Body standard appropriate to your industry:*
    - **IEC/TS 62668-1** for an Avionics OEM who manufactures and services repairs etc.
    - **SAE AS5553A** section 4 for an OEM manufacturing electronic assemblies
    - **SAE AS6496** for a franchised distributor
    - **SAE AS6081** for a non-franchised distributor selling components into a high reliability customer.
    - **SAE AS6174** for an OEM manufacturing mechanical assemblies
  - *Clause 5. Plan administration*
  - *Clause 6. Bibliography and annexes where the annex contains a cross reference matrix of the auditees procedures which comply with the external standard mandatory requirements that is most appropriate.*
<table>
<thead>
<tr>
<th>SAE AS5553A mandatory requirement s i.e. ‘shall’ requirements</th>
<th>Detailed requirements - keep clause 4 sub-clauses in the same sequence as SAE AS5553A section 4.</th>
<th>OEM who owns the design IP where X means the requirement shall be achieved.</th>
<th>OEMS’s PCB subcontractor assembler</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Requirement for an anti-counterfeit plan</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.1.1 Personnel training</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4.1.2 Parts availability i.e. obsolescence management plan</td>
<td>X</td>
<td>The OEM manages this</td>
<td></td>
</tr>
<tr>
<td>4.1.3 Purchasing process addressing how suppliers are audited</td>
<td>X</td>
<td>The OEM may: (1) provide their Approved Supplier List (ASL) and manage the auditing of suppliers on behalf of the subcontractor or (2) Only supply an Approved Manufacturer list (AML) and could allow the subcontractor the freedom to buy components themselves or (3) provide an AML and only allow the subcontractor to buy from the OCM or franchised sources.</td>
<td></td>
</tr>
<tr>
<td>4.1.4 Purchasing information for supply chain traceability back to the original source of supply. Flow down to subcontractors. Have evidence that an authorised supplier is</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SAE AS5553A requirement</td>
<td>Requirements</td>
<td>OEM who owns design IP</td>
<td>OEM’s PCB subcontractor</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>4.1.5</td>
<td>Verification of purchased or returned product required depending on product risk to determine authenticity of product e.g. visual inspection to IDEA-STD-1010 etc.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.1.6</td>
<td>In process investigation of failures which could be caused by counterfeit or recycled components</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.1.7</td>
<td>Failure analysis shall include the testing needed to verify component authenticity</td>
<td>X</td>
<td>The OEM may manage this</td>
</tr>
<tr>
<td>4.1.8</td>
<td>Material control of excess and non-conforming parts to prevent them from entering the supply chain under fraudulent circumstances, e.g. suspect components cannot be returned for a refund.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.1.9</td>
<td>Reporting shall occur as appropriate to customers, local law enforcement etc.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4.1.10</td>
<td>Post delivery support shall be available for product returns and customer failures.</td>
<td>X</td>
<td>Manged by OEM</td>
</tr>
</tbody>
</table>
IECQ WG6 proposed Traceability audit i.e. a 3 way check of part numbers for ISO9001 supply chains complying to ISO9001 Clause 6

The Part A traceability audit defined in the blue circles is a 3 way check to ensure:
- the manufacturer’s part number of the component required is the same as the manufacturer’s part number ordered and is the same as the manufacturer’s part number received with supply chain traceability back to the original manufacturer.

The Part B optional capability enhancing activities are rated on a score of 2 to 12 to indicate the robustness of the organisation to mitigate against the use and supply of counterfeits.

Vertical audit in Goods Inwards/Stockroom: Select 6 or 8 parts off a Bill of Material,
## Anti-counterfeit standards summary

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<th>Standard</th>
<th>Market sector</th>
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<tr>
<td>AS/EN/JISQ9100</td>
<td>Avionics OEMs</td>
<td>General Quality Management System</td>
<td>All Avionics OEMs are expected to operate to this standard which is currently at rev C. Revision D (due out in 2016 includes anti-counterfeit requirements for material, mechanical and electrical components. This is a ‘game changer’ for avionics industry</td>
</tr>
<tr>
<td>SAE AS5553</td>
<td>General industry but mainly used by Avionics OEMs</td>
<td>Set of 11 mandatory detailed requirements for how to buy, manage, and dispose of electronic components with reporting mechanisms when counterfeits are found</td>
<td>Currently at revision A. Can be used to satisfy AS9100 rev D electrical component anti-counterfeit requirements. Next revision, rev B is in process to align it better with DFAR 252.246.7007. Mandated by most USA Prime Contractors.</td>
</tr>
<tr>
<td>SAE AS6174</td>
<td>General industry but mainly used by Avionics OEMs</td>
<td>Similar to SAE AS5553 for the procurement, management and disposal of electronic components but modified for material and mechanical components</td>
<td>Can be used to satisfy AS9100 rev D anti-counterfeit requirements. Use rev A. Please join the committee if you have concerns contact Robert Tipton, <a href="mailto:robert.tipton@wyle.com">robert.tipton@wyle.com</a></td>
</tr>
<tr>
<td>USA DFAR 252.246.7007</td>
<td>Military US supply chain OEMs</td>
<td>Set of 12 mandatory detailed requirements for how to buy, manage, and dispose of electronic components with reporting mechanisms when counterfeits are found</td>
<td>Used in US Military contracts. Set of mandatory rules for covering how to buy and dispose of electronics components with reporting rules when counterfeits are suspected or found. Can use SAE AS5553 and or IEC/TS 62668-1 and IEC/TS 62668-2 to comply</td>
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<tr>
<td><strong>UK Defence Standard 05-135</strong></td>
<td>UK Military supply chain OEMs</td>
<td>General overall anti-counterfeit requirements</td>
<td>Used in UK Military contracts. Part of the UK Counterfeit Avoidance Maturity model which is used to assess how ‘counterfeit aware’ suppliers are. Can use SAE AS5553 and/or IEC/TS 62668-1 and IEC/ TS 62668-2 to comply</td>
</tr>
<tr>
<td><strong>IEC/TS 62668-1</strong></td>
<td>Avionics OEMs</td>
<td>Anti-counterfeit requirements for the purchase and management of electrical components, management of the products IP and control of spares and repairs</td>
<td>Allows the use of SAE AS5553 plans for components coming into a business. Considered to provide a more ‘holistic’ approach to Avionics anti-counterfeit as covers spares and repairs operations. Preferred by European Prime contractors and suppliers.</td>
</tr>
<tr>
<td><strong>IEC/TS 62668-2</strong></td>
<td>Avionics OEMs</td>
<td>Risk assessment of electrical components purchased from non-franchised sources</td>
<td>Complements SAE AS5553 and IEC/TS 62668-1 and advises on typical test methods without being overly prescriptive.</td>
</tr>
<tr>
<td><strong>ARP 6328</strong></td>
<td>General industry but mainly used by Avionics OEMs</td>
<td>Risk assessment to accompany SAE AS5553 when revision B is published.</td>
<td>Contains updated SAE 5553A annexes in preparation for SAE AS5553B which will have no annexes</td>
</tr>
<tr>
<td><strong>AIR 6273</strong></td>
<td></td>
<td>Terms, Definitions, and Acronyms- Counterfeit Materiel or Electrical, Electronic and Electromechanical Parts</td>
<td>In ballot</td>
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<td>SAE AS6496</td>
<td>Franchised distributor for high reliability, Aerospace and Defence market</td>
<td>Fraudulent/Counterfeit Electronics parts: Avoidance, Detection, Mitigation and Disposition- Authorised/ Franchised Distribution</td>
<td>Released 2014</td>
</tr>
<tr>
<td>SAE AS6171</td>
<td>Component Test Houses for any market</td>
<td>Test Methods Standards; Counterfeit Electronic Parts</td>
<td>Main spec and 16 test methods are being balloted. Contains extensive risk mitigation process. Overly prescriptive to mitigate against legal liabilities. Very complicated and will be expensive to implement. Excellent deterrent. Not known who will request this.</td>
</tr>
<tr>
<td>AS6081</td>
<td>Non-franchised distributors</td>
<td>Fraudulent/Counterfeit Electronics parts: Avoidance, Detection, Mitigation and Disposition- Distributors; Counterfeit Electronic Parts: Avoidance Protocol, Distributors</td>
<td>Parts are offered by non-franchised distributors with some basic testing which Avionics OEMs need to review in their application risk assessment process. <strong>Considered an input into SAE AS5553 or IEC/TS 62668-2 risk assessment</strong></td>
</tr>
<tr>
<td>ARP 6178</td>
<td>Non-franchised distributors</td>
<td>Fraudulent/Counterfeit Electronic Parts: Tool for Risk Assessment of Distributors</td>
<td>Very useful Excel spread-sheet with macro to remotely audit non-franchised distributors. <strong>Considered an input into SAE AS5553 or IEC/TS 62668-2 risk assessment</strong></td>
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<td>AS6462A</td>
<td>Auditing bodies and OEMS</td>
<td>AS5553A Counterfeit Electronic Parts: Avoidance, Detection, Mitigation and Disposition Verification Criteria</td>
<td>Audit checklist for SAE AS5553A for use by OEMs and Third party auditing bodies.</td>
</tr>
<tr>
<td>AS6301</td>
<td>Auditing bodies and OEMS</td>
<td>AS6081 Fraudulent/Counterfeit Electronics parts: Avoidance, Detection, Mitigation and Disposition- Distributors Verification criteria</td>
<td>Issued in 2014</td>
</tr>
</tbody>
</table>
High level language requiring a clear requirement to manage the risk in supply chains depending on the criticality of the material in relation to performance and safety where the supplier is aware of the final use of the materiel (electronic components, material and mechanical components).

The supplier shall be able to demonstrate the materiel meets the original qualification requirements and the safety and performance of the deliverable materiel and ensure it is not degraded.

- An anti-counterfeit policy
- Flow-down to suppliers
- Appointment of a management representative
- Training
- Purchasing controls
- Test and verification
- Control of non-conforming product
- Reporting

On-line web-based training packages being developed.

Information has been provided to NATO who may issue anti-counterfeit guidance soon to all members.
IEC committee TC107  WG3 Counterfeit electronic parts


  - Published a revision in 2014, with a revision due out soon to explain the DFAR
  - Allows the use of SAE AS5553A plans for components coming into the business.
  - Enables OEMs to have one overall plan for SAE AS5553A and IEC/TS 62668-1
  - Discusses when recycled components become fraudulent components and why the Avionics industry cannot use them.
  - Also manages spares and repairs


  - Used as the IEC/TS 62668-1 non franchised distributor risk assessment process.
  - Revision in process to refer to SAE AS6171 test methods and other risk assessments
  - Can also be used as a risk assessment process for the following:
    - SAE AS5553A,
    - DFAR rule 252.246.7007
    - DEF STANDARD 05-135
SAE International Anti-counterfeit Specifications

- SAE AS5553A for Electronic components


- G-19 committee has active membership mainly from the USA and UK
  - SAE AS5553A was published in January 2013 superseding SAE AS5553 which has misleading definitions.
  - Manages components coming into a business only.
  - Targeted at general industry and AS9100 requirement is not mandatory.
  - Revision B was started to incorporate DFAR 252.246.7007 to the extent that general industry will allow. Meetings still on-going.

- The SAE has no Third Party auditing activities but is working with PRI [http://p-r-i.org/](http://p-r-i.org/) to establish an audit process which Boeing may endorse.

- The audit checklist for SAE AS5553A is published as SAE AS6462A.

- IECQ WG06 has the documents for SAE AS5553 auditing if your customer endorses an IECQ audit.

- The APMC committee will host an anti-counterfeit update April 19th, contact John Clatworthy of the SAE if you wish to attend.
How one anti-counterfeit plan can address:

**DEF STD 05-135**

**DFAR 252.246.7007**

**SAE AS5553A**

**IEC/TS 62668-1**

using the non-franchised risk assessment process from:

**IEC/TS 62668-2**
2016 Avionics anti-counterfeit supply chain

DEF STAN
05-125
UK MIL

USA DFAR
252.246.7007

Request waiver to DFAR traceability requirement

IEC/TS 62668-2 or
SAE AS6171 non-
franchised component risk assessment

Used on US MIL program?

Used on MIL program?

SAE AS6081
optional, more
testing may be
needed

Trusted supplier?

Avionics OEM

Avionics subcontractor

PCB assembly subcontractor

Franchised Distributor

Non-franchised
distributor with
supply chain
traceability

Broker with no
supply chain
traceability
The Avionics Supply Chain

1. Parts & Materials Suppliers
- Aerospace Electronics
  - Depends on materials and components developed for other industries
  - Vastly different lifecycle applications

2. Board Assemblers

3. Avionics OEMs, Logistics, Maintenance and Repair

4. Platform Integrators

5. Operators & Regulators

Using COTS components targeted for other markets (what we cannot control)

To build products that must meet mil-aero requirements (what we must control)

Global Supply Chain
SAE AS5553A counterfeit avoidance

IEC/TS 62668-1/SAE AS5553A Anti-counterfeit and IEC/TS 62239-1 ECMP

15 - 40 yr Lifecycle

Most lifecycle costs are incurred here and managed by ECMP

Requirements flow-down vs. products flow-up process is disrupted here
Overview
Anti-counterfeit summary 2016

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