

Semiconductor devices — Integrated circuits —

**Part 23-3: Hybrid integrated circuits
and film structures — Manufacturing
line certification — Manufacturers'
self-audit checklist and report**

ICS 31.200

National foreword

This British Standard reproduces verbatim IEC 60748-23-3:2002 and implements it as the UK national standard.

The UK participation in its preparation was entrusted by Technical Committee EPL/47, Semiconductors, to Subcommittee EPL/47/1, Film and hybrid integrated circuits, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

From 1 January 1997, all IEC publications have the number 60000 added to the old number. For instance, IEC 27 has been renumbered as IEC 60027-1. For a period of time during the change over from one numbering system to the other, publications may contain identifiers from both systems.

Cross-references

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INTERNATIONAL STANDARD

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Semiconductor devices – Integrated circuits –

Part 23-3: Hybrid integrated circuits and film structures – Manufacturing line certification – Manufacturers' self-audit checklist and report

*Dispositifs à semiconducteurs –
Circuits intégrés –*

*Partie 23-3:
Circuits intégrés hybrides et structures par films –
Certification de la ligne de fabrication –
Liste de contrôle et rapport d'évaluation interne
pour fabricants*



Reference number
IEC 60748-23-3:2002(E)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES – INTEGRATED CIRCUITS –

**Part 23-3: Hybrid integrated circuits and film structures –
Manufacturing line certification –
Manufacturers' self-audit checklist and report**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60748-23-3 has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

The text of this standard is based on the European standard EN 165000-3 and the following documents:

FDIS	Report on voting
47A/640/FDIS	47A/651/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

IEC 60748-23-3 should be read in conjunction with Parts 23-1, 23-2 and 23-4.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

This set of specifications prescribes a set of procedures to be used by users and manufacturers for the production and delivery of high-quality, special requirement hybrid integrated circuits and film structures with a specified level of quality and reliability.

This set of specifications prescribes reference criteria for the establishment, control, maintenance and development of a certified manufacturing line and represents a manufacturing line certification methodology.

The targeted level of quality and reliability is to be achieved by using best design and manufacturing practices. Examples of quality and reliability best practices for elimination of potential failure mechanisms and achievement of a targeted quality and reliability level include: material characterization for derivation of process design rules, in-process control, continuous improvement, etc.

Assessment (estimation) of the targeted quality and reliability level may be accomplished by:

- a) using data obtained from the material characterization, design and process control and improvement activities; or
- b) through the use of product assessment level schedule (PALS) tests.

Part 23-1 of this set of specifications provides general information.

Part 23-2 of this set of specifications provides guidance to 'users' of hybrids in terms of the 'visual inspection standards' to be expected.

Part 23-4 of this set of specifications provides a blank detail specification, which provides guidance to 'users' of hybrids for procurement purposes.

Part 23-5 of this set of specifications provides a means of quality assessment on the basis of qualification approval.

SEMICONDUCTOR DEVICES – INTEGRATED CIRCUITS –

Part 23-3: Hybrid integrated circuits and film structures – Manufacturing line certification – Manufacturers' self-audit checklist and report

1 Scope

This part of IEC 60748 applies to a high quality approval system for hybrid integrated circuits and film structures.

This checklist is intended for the use of a hybrid microcircuit manufacturer's internal assessment team.

It will provide the hybrid manufacturer and the National Supervising Inspectorate (NSI) with ongoing information on process control demonstrating compliance with IEC 60748-23-1. It is not intended to include quality system requirements.

2 Document information

2.1 General

The checklist and subsequent report is for submission to the NSI in support of an application for approval to IEC 60748-23-1, or as a demonstration of continuing compliance at intervals not exceeding 1 year. Each item in clauses 3 to 7 shall be completed or marked “not applicable”; items which invoke mandatory process or inspection requirements are shown in ***bold italics***.

It should be noted that it is not the requirement or the intention that each item has to be answered with an affirmative, excepting mandatory requirements. The objective of the report is for the manufacturer to demonstrate that all manufacturing processes are under control by whatever means this is achieved.

Where supporting evidence is included, for example engineering reports, statistical process control (SPC) data, etc., it should be appended to the report.

The manufacturer may use his own style of typeface to reproduce this document and produce his report.

The NSI may subsequently validate any part of the submission as a process assessment.

2.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary*

IEC 60068-2-20:1979, *Basic environmental testing procedures – Part 2: Tests – Test T: Soldering*

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*
Amendment 1 (1994)

IEC 60748-1, *Semiconductor devices – Integrated circuits – Part 1: General*

IEC 60748-23-1:2002, *Semiconductor devices – Integrated circuits – Part 23-1: Hybrid integrated circuits and film structures – Manufacturing line certification – Generic specification*

IEC 60748-23-2:2002, *Semiconductor devices – Integrated circuits – Part 23-2: Hybrid integrated circuits and film structures – Manufacturing line certification – Internal visual inspection and special tests*

IEC 60748-23-4:2002, *Semiconductor devices – Integrated circuits – Part 23-4: Hybrid integrated circuits and film structures – Manufacturing line certification – Blank detail specification*

IEC 61340-5-1:1998, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

IECQ 001002-3:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 3: Approval procedures*

3 Definitions

For the purpose of this part of IEC 60748, the definitions given in IEC 60050, IEC 60748-1, IEC 60748-23-1 and IEC 60748-23-2 shall apply.

4 General requirements

The following subclauses contain:

- 4.1 Self-audit checklist and report for thick and thin film hybrid integrated circuit manufacturers
- 4.2 Description of report/company structure
- 4.3 Approval information
- 4.4 Summary of testing
- 4.5 Analytical methods
- 4.6 Control of procurement sources and incoming material
- 4.7 Control of procurement sources and incoming material, continued
- 4.8 Environmental control and static handling
- 4.9 Change notification requirements
- 4.10 Hybrid design

4.1 Self-audit checklist and report for thick and thin film hybrid integrated circuit manufacturers

Report No:

Date:

Previous report No:

Date:

Approval: application/periodic review/extension/major change *

Company name:

Address:

Postcode:

Telephone:

Telex:

Facsimile:

Company declaration

The information contained herein is a true and accurate record of appraisals carried out between / / and / / .

Report compiled by:

Signed:

Date: / /

Report approved by:

Signed:

Date: / /

NSI counter-signature

The information supplied in this report fully supports the application/periodic review/extension/major change* as detailed.

The following items of this report have been subject to subsequent evaluation by the NSI:

For NSI:

Signed:

Date: / /

* Delete as appropriate.

4.2 Description of report/company structure

Provide a description for the purpose of this report.

- a. For a new approval application – State the extent of the technology sought in terms of materials, complexity, packaging, etc. together with the maximum screening/test level applied for from IEC 60748-23-1, annex A.
- b. For an extension/major change – Nature of technology extension required, or details of process/equipment change.

Senior management:

Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:

Quality department:

Name: Position: Quality Manager Reports to:

Name: Position: Deputy Quality Manager

Number of quality engineers:

Number of inspectors per shift:

Number of employees engaged in hybrid production:

Total:

Administration:

Production engineers:

Production operators:

Production inspection:

Design engineers:

Reliability engineers:

Supervisors:

Production:

Thick film substrate production:	YES/NO *	Number of shifts:
Thin film substrate production:	YES/NO *	Number of shifts:
Solder assembly:	YES/NO *	Number of shifts:
Chip and wire:	YES/NO *	Number of shifts:
Test and environmental:	YES/NO *	Number of shifts:
Quality engineering:	YES/NO *	Number of shifts:
Quality inspection:	YES/NO *	Number of shifts:
Production supervision:	YES/NO *	Number of shifts:

* Delete as appropriate.

Production line (space allocations):

Design:	area in m ²
Development:	area in m ²
Production:	area in m ²
Test and environmental:	area in m ²

Market:

Space: % Military: % Telecom: % Automotive: % Others: %

4.3 Approval information

Approved quality system to IEC QC 001002-3:	YES/NO *	Approval No:	Assessed:	/	/
Approved to IEC 60748-23-1:	YES/NO *	Approval No:	Assessed:	/	/

Other national/international approvals held:

Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/

Commercial approvals (e.g. Ford, IBM, etc.) held:

Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/
Approval Type:	Approval No:	Assessed:	/	/

Notes

* Delete as appropriate.

Example of abstract of capability approval

IEC 60748-23-1 approval number ABC123

Thick film technology:**General:**

In 1937 Welwyn was set up to manufacture high grade resistors primarily for use by the telecommunications industries. During 1962 the company began production of custom electronic hybrid integrated circuits for industrial, telecommunications and military customers.

Today Welwyn uses the latest technology to design and produce high reliability hybrids conforming to the most exacting requirements of customer applications, for customers requiring a wide range of electronic circuit complexity/density and for quantities of hybrids ranging from small batch production to high volume production. In addition 100 % screening tests and customer design evaluation testing programmes are also available to provide the highest level of quality assurance required by any customer.

Current levels of release available:

	Maximum	IEC 60748-23-1, annex A
	Dimensions	Reference
Surface-mount, non-hermetic technology	50,8 mm × 25,4 mm	PALS 5
Surface-mount, hermetic technology	54,5 mm × 29,2 mm	PALS 8
Chip and wire, non-hermetic technology	50,8 mm × 25,4 mm	PALS 5
Chip and wire, hermetic technology	54,5 mm × 29,2 mm	PALS 8

Sub-contracted processes: None.**Address:**

Welwyn Microcircuits
 Factory D
 BEDLINGTON
 Northumberland
 NE22 7AA
 UNITED KINGDOM
 Tel: +44 1670 822181
 Fax: +44 1670 530123
 Telex: 53514

Contacts:

Commercial Manager: Mr G Thompson, Ext. 421

Quality Manager: Mr D Oliver, Ext. 430

4.4 Summary of testing

The product testing record example shown below and overleaf is for guidance as to the required information. The manufacturer's own records may provide this information without amendment. Prior agreement should be reached with the NSI as to the form and content of supplied records.

PRODUCT TESTING RECORD				
MANUFACTURER'S NAME AND ADDRESS		Product type No: PALS release level: Package type: Technology description:		
DESIGN EVALUATION				
TEST	No. tested	No. failed	Date	Structural similarity claimed type No(s)
Endurance				
Damp heat				
Resistance to soldering heat				
Termination robustness				
Acceleration				
Vibration				
Shock				
Solderability				
Flammability				
Resistance to solvents				
Internal moisture content				
Radiographic inspection				
Salt mist				
Others				

4.5 Analytical methods

Is an SPC system involving critical or key process nodes defined?	YES/NO *	Document No.	Issue No.
Are analytical tools used to determine the appropriate characteristics to be measured for critical or key nodes e.g. failure mode and effects analysis (FMEA), etc.?	YES/NO *	Document No.	Issue No.
Do these include:			
Minimum inspections?	YES/NO *		
Result distribution?	YES/NO *		
Relation to other product?	YES/NO *		
Corrective action?	YES/NO *		
Are SPC process controls in place for:			
Film pattern registration?	YES/NO *	Document No.	Issue No.
Film thickness			
Wet?	YES/NO *	Document No.	Issue No.
Dry?	YES/NO *	Document No.	Issue No.
Fired?	YES/NO *	Document No.	Issue No.
Film track width and separation?	YES/NO *	Document No.	Issue No.
Fired resistor value (pre-trim)?	YES/NO *	Document No.	Issue No.
Printed or film adhesive thickness pre-cure (including solder paste) for add-on components?	YES/NO *	Document No.	Issue No.
Wire bond strength test for bare die interconnect?	YES/NO *	Document No.	Issue No.
Are the appropriate staff formally trained on procedures, equipment and visual standards?	YES/NO *	Document No.	Issue No.

* Delete as appropriate.

Provide achieved process capability indices:

4.6 Control of procurement sources and incoming material

4.6.1 Added components procured to an IEC specification

Where added components are procured to an IEC specification are they procured to normal release procedures?

YES/NO * Document No. Issue No.

4.6.2 Added components not procured to an IEC specification

Does a procurement specification controlled by the hybrid manufacturer exist for each added component?

YES/NO * Document No. Issue No.

Does an approved test and evaluation programme controlled by the hybrid manufacturer exist for each added component?

YES/NO * Document No. Issue No.

Is the approval test programme carried out on each added component from each manufacturing source?

YES/NO * Document No. Issue No.

Do the above procedures ensure that all added components are subject to testing and screening equivalent to components released to IECQ?

YES/NO * Document No. Issue No.

4.6.3 Part finished added components or subcontracted processes

Are part finished components or processes subject to the procurement controls detailed in 3.6.1 or 3.6.2 above?

YES/NO * Document No. Issue No.

Are parts stored and handled such that they are not subject to deterioration or damage?

YES/NO * Document No. Issue No.

Do all dies conform to the relevant IEC visual criteria?

YES/NO * Document No. Issue No.

* Delete as appropriate.

4.7 Control of procurement sources and incoming material, continued

4.7.1 Other materials and components

Do procurement specifications exist for all other materials and components used in the hybrid manufacture?	YES/NO *	Document No	Issue No.
--	----------	-------------	-----------

Do these specifications ensure that the hybrid manufacturer is made aware of any change to these materials and which components might effect hybrid manufacturing quality, yield or reliability?	YES/NO *	Document No.	Issue No.
--	----------	--------------	-----------

4.7.2 Continuous assessment of procurement sources

For components or materials not procured to an IEC specification, is a continuous vendor rating system of suppliers maintained?	YES/NO *	Document No.	Issue No.
---	----------	--------------	-----------

Are suppliers regularly informed of their vendor rating?	YES/NO *	Document No	Issue No.
--	----------	-------------	-----------

4.7.3 Traceability

Are the circuits, their added components, piece parts and materials traceable to original manufacturers' lot numbers?	YES/NO *	Document No.	Issue No.
---	----------	--------------	-----------

Notes

* Delete as appropriate.

4.8 Environmental control and static handling

Are there procedure(s) for controlling the environment?

YES/NO *

Document No.

Issue No.

Document No.

Issue No.

Document No.

Issue No.

Do these procedures include:

Compliance with IEC 61340-5-1:

YES/NO *

Facility cleaning:

1. Control

YES/NO *

2. Review

YES/NO *

Prevention of human contamination:

1. Use of finger cots or gloves

YES/NO *

2. Suitable clothing

YES/NO *

3. Spittle control

YES/NO *

4. Gowning procedure

YES/NO *

5. Personnel property

YES/NO *

6. Cosmetics

YES/NO *

Defined limits and monitoring of:

1. Temperature

YES/NO *

2. Humidity

YES/NO *

3. Particle count

YES/NO *

4. Positive pressure

YES/NO *

5. Field intensity

YES/NO *

Facility shut down procedure:

YES/NO *

Material storage and access:

YES/NO *

4.9 Change notification requirements

Is there a procedure for controlling change notification?

YES/NO *

Document No.

Issue No.

Does this change procedure identify when a report is required by the NSI in accordance with 6.5.2 of IEC 60748-23-1?

YES/NO *

Have any notifications of change been made during the period of this report?

YES/NO *

Please provide report identities and dates:

* Delete as appropriate.

4.10 Hybrid design

Are there separate design rules for each technology?

YES/NO *

Technology type

Document No.

Issue No.

Technology type

Document No.

Issue No.

Technology type

Document No.

Issue No.

Technology type

Document No.

Issue No.

Technology type

Document No.

Issue No.

Do these design rules include:

Internal materials types and usage?

YES/NO *

Package materials types and usage?

YES/NO *

Electrical design, including current
Densities, track resistance and
Capacitance, tolerance, stability, etc.?

YES/NO *

Thermal design?

YES/NO *

Environmental design i.e. package type,
stress, shock, vibration, temperature, etc.?

YES/NO *

***Are design rules formally issued
and controlled?***

YES/NO ****Document No.******Issue No.***

***Do the design rules include all
aspects of the visual criteria of
IEC 60748-23-1?***

YES/NO ****Document No.******Issue No.***

Is a periodic review carried out to ensure
that new materials, processes and
components are incorporated?

YES/NO *

Document No.

Issue No.

* Delete as appropriate.

Are design layout checks performed by:

1. Engineering?	YES/NO *	Document No.	Issue No.
2. Customer?	YES/NO *	Document No.	Issue No.
3. Others (specify)?		Document No.	Issue No.

Are formal design reviews carried out prior to production?

YES/NO * Document No. Issue No.

Does this review include:

The fact that the design is within the scope of approval?

YES/NO *

Customer requirements?

YES/NO *

Electrical functionality?

YES/NO *

Thermal considerations?

YES/NO *

Environmental conditions?

YES/NO *

Device screening requirements?

YES/NO *

Reliability e.g. material combinations?

YES/NO *

Safety e.g. materials, failure mode?

YES/NO *

Static e.g. handling, bonding order?

YES/NO *

Delivery requirements, packaging?

YES/NO *

Notes

5 Thick film processing

The following subclauses contain:

- 5.1 Artwork and screen fabrication
- 5.2 Substrates
- 5.3 Substrate saw or scribe and break and substrate hole drilling
- 5.4 Thick film pastes and printing
- 5.5 Drying and firing
- 5.6 Resistor trimming
- 5.7 Inspection and test of processing
- 5.8 Rework

5.1 Artwork and screen fabrication

Is artwork prepared in-house?	YES/NO *	Document No.	Issue No.
Is screen manufacture in-house?	YES/NO *	Document No.	Issue No.
Are quality assurance checks carried out before use?	YES/NO *	Document No	Issue No.
Is there evaluation of new screen materials?	YES/NO *	Document No.	Issue No.
Is screen tension measured before use?	YES/NO *	Document No.	Issue No.
Limits:	Min.	Max.	
<i>Do screens have unique reference and revision control?</i>	<i>YES/NO *</i>	<i>Document No.</i>	<i>Issue No.</i>
Is screen storage:			
Catalogued?	YES/NO *	Document No.	Issue No.
Access/segregation controlled?	YES/NO *	Document No.	Issue No.
In a controlled environment?	YES/NO *	Class	
Screen usage:			
Is the number of prints/or wear allowed per screen monitored and recorded?	YES/NO *	Document No.	Issue No.
Is screen tension periodically measured throughout screen life?	YES/NO *	Document No.	Issue No.
Limits:	Min.	Max.	period
<i>Are the appropriate staff formally trained on procedures, equipment and visual standards?</i>	<i>YES/NO *</i>	<i>Document No</i>	<i>Issue No</i>

* Delete as appropriate.

5.2 Substrates

Substrates used:	Manufacturer	Types		
	Manufacturer	Types		
	Manufacturer	Types		
	Manufacturer	Types		
Incoming checks: Dimensions		YES/NO *		
	Camber	YES/NO *		
	Bow	YES/NO *		
	Material	YES/NO *		
	Surface	YES/NO *	Document No.	Issue No.
Are substrates cleaned?		YES/NO *		
Chemical and method:				
	Chemical purity checked	YES/NO *		
	Routine replacement	YES/NO		
	Calibration	YES/NO *		
Is substrate storage controlled between cleaning and use?		YES/NO *	Document No.	Issue No.

* Delete as appropriate.

Are the appropriate staff formally trained on procedures, equipment and visual standards?

YES/NO *

Document No.

Issue No.

Notes

--

5.3 Substrate saw or scribe and break and substrate hole drilling

Enter all equipment used, or new/refurbished equipment since last report.

Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.

Are there unique references for substrate profile drawings?

YES/NO *

Document No.

Issue No.

Is the registration side of the substrate clearly identified?

YES/NO *

Is this also the registration for the pattern marking?

YES/NO *

Are there procedures covering power/speed setting?

YES/NO *

Document No.

Issue No.

Is there a formal maintenance procedure for the cutting equipment?

YES/NO *

Document No.

Issue No.

If substrates are procured prescribed or drilled, is there a detailed procurement specification?

YES/NO *

Document No.

Issue No.

* Delete as appropriate.

Are quality assurance checks made on dimensions?	YES/NO *	Document No.	Issue No.
--	----------	--------------	-----------

Are the substrates cleaned prior to returning to stores?	YES/NO *	Document No.	Issue No.
--	----------	--------------	-----------

Chemical and method:

Is chemical purity checked?	YES/NO *
-----------------------------	----------

Is there a routine replacement programme?	YES/NO *
---	----------

Is there calibration of the method?	YES/NO *
-------------------------------------	----------

<i>Are the appropriate staff formally trained on procedures, equipment and visual standards?</i>	<i>YES/NO *</i>	<i>Document No.</i>	<i>Issue No.</i>
---	------------------------	----------------------------	-------------------------

5.4 Thick film pastes and printing

Conductor inks:

Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use

NOTE Use = Minimum dimension /No. layers/termination, etc.

Resistor inks:

Manufacturer	Series No.	Compatible conductor type	Range
Manufacturer	Series No.	Compatible conductor type	Range
Manufacturer	Series No.	Compatible conductor type	Range
Manufacturer	Series No.	Compatible conductor type	Range
Manufacturer	Series No.	Compatible conductor type	Range

Dielectric and print protect inks:

Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use

Overglaze/covercoats:

Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use
Manufacturer	Type No.	Composition	Use

<i>Is lot traceability maintained for all ink usage?</i>	<i>YES/NO *</i>	<i>Document No.</i>	<i>Issue No.</i>
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<i>Is age control and storage control within paste manufacturers' limits?</i>	<i>YES/NO *</i>	<i>Document No.</i>	<i>Issue No.</i>
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Are evaluation and viscosity measurements carried out on each batch?	YES/NO *	Document No.	Issue No.
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Have adhesion tests been carried out on all substrate/ink combinations?	YES/NO *	Document No.	Issue No.
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Are paste combinations from different manufacturers used on the same substrate or are combinations other than recommended used?	YES/NO *		
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Have these combinations been fully evaluated?	YES/NO *	Document No.	Issue No.
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Is there control on the blending of resistor inks?	YES/NO *	Document No.	Issue No.
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Is each batch checked with a process test vehicle?	YES/NO *	Document No.	Issue No.
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Printing machines:

Enter all machines used, or new/refurbished equipment since last report.

* Delete as appropriate.

* Delete as appropriate.

Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.
Manufacturer	Type No.	Serial/Plant No.

Is there a formal procedure for print machine maintenance including squeegee wear, screen usage, mechanical set-up, etc?

YES/NO * Document No. Issue No.

Is printing carried out in a controlled environment?

YES/NO * Class

Are there restrictions regarding human contamination in the area?

YES/NO * Document No. Issue No.

Does the area have controlled cleaning procedures?

YES/NO * Document No. Issue No.

Are there instructions regarding each type of paste for operators/supervisors?

YES/NO * Document No. Issue No.

* Delete as appropriate.