BS EN 4726:2015

BSI Standards Publication

Aerospace series — Acceptance of the cosmetic variations in appearance of aircraft cabin parts

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ACE/1, International and European Aerospace Policy and Processes.

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

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Published by BSI Standards Limited 2015

ISBN 978 0 580 83233 8

ICS 49.095

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2015.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 4726

September 2015

ICS 49.095

English Version

Aerospace series - Acceptance of the cosmetic variations in appearance of aircraft cabin parts

Série aérospatiale - Acceptation des variations esthétiques de l'aspect des éléments de cabine d'avion

Luft- und Raumfahrt - Akzeptanz von kosmetischen Qualitätsabweichungen bei Flugzeug-Kabinenbauteilen

This European Standard was approved by CEN on 10 January 2015.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 4726:2015 E

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European foreword

This document (EN 4726:2015) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2016, and conflicting national standards shall be withdrawn at the latest by March 2016.

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1 Scope

This standard defines surfaces on visible components in the aircraft cabin. Surfaces will be considered under the aspects of technical feasibility of the industrial design.

This standard is a guideline between airlines, supplier and OEMs with regard to cosmetic issues.

This document aims to:

a) Provide the supplier with quality criteria, which need to be met during the production, testing- and quality-inspection-process,

b) Guide airline-, OEM- and supplier-quality assurance with a description of cosmetic standards for following inspections:

— Supplier internal QA inspection;

— First article inspection;

— Source inspection;

— Incoming inspection;

— Final assembly line cabin inspection.

2 Normative references

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

EN 12464-1, *Light and lighting — Lighting of work places — Part 1: Indoor work places*

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°*

EN ISO 11664-1, *Colorimetry — Part 1: CIE standard colorimetric observers*

EN ISO 11664-2, *Colorimetry — Part 2: CIE standard observers*

EN ISO 11664-4, *Colorimetry — Part 4: CIE 1976 L*a*b* Colour space*

EN ISO 11664-5, *Colorimetry — Part 5: CIE 1976 L*u*v* Colour space and u', v' uniform chromaticity scale diagram*

3 Abbreviations

For the purposes of this document, the following abbreviations and definitions apply.

A/C aircraft

CDR critical design review

3D three dimensional

CAS cabin attendant seat

e.g. for example

FAI first article inspection

FAL final assembly line

HTPT hydro transfer printing technology

ICS Industrial design colour specification

NTF non-textile floor

OEM original equipment manufacturer

Pax passenger

PTS purchaser technical specification

PVF polyvinyl fluoride

QA quality assurance

QC quality control

TTL taxi, take-off and landing

SU Service unit

4 Definitions of cosmetic defects, inspection zones and criteria

4.1 Simplified definition of a cosmetic defect

Cosmetic defects are deviations from the standard or customized specifications/definitions if they are distinct without additional illumination and/or mirror and according to the defined criteria's within this standard. The defects listed encompass any process relevant material.

Pick-ups raised by OEM which are disputed between both parties (OEM and supplier) are subject to be finally decided by the customer. Any decision has to be documented and to be attached to each individual unit.

Samples have to be supplied by the supplier and/or the customer to the OEM in order to validate the inspection.

4.2 Zonal type definition for installed parts

4.2.1 Zone A

All surfaces (and edges) directly visible after installation in TTL position from a standing or seating position; specially critically parts regarded by the customer e.g. table top / backs and video arms and as well as areas around logos.

4.2.2 Zone B

All surfaces (and edges) not directly visible after installation in TTL position from a standing or seating position, which will only be visible after modification of the module, e.g. stowage and stowage doors inside.

4.2.3 Zone C

All surfaces (and edges) not visible after installation from a standing or seating position and which are entirely covered. To view these areas parts needs to be removed, or inspection equipment (e.g. mirror) is needed. Surfaces and edges are only visible while maintenance.

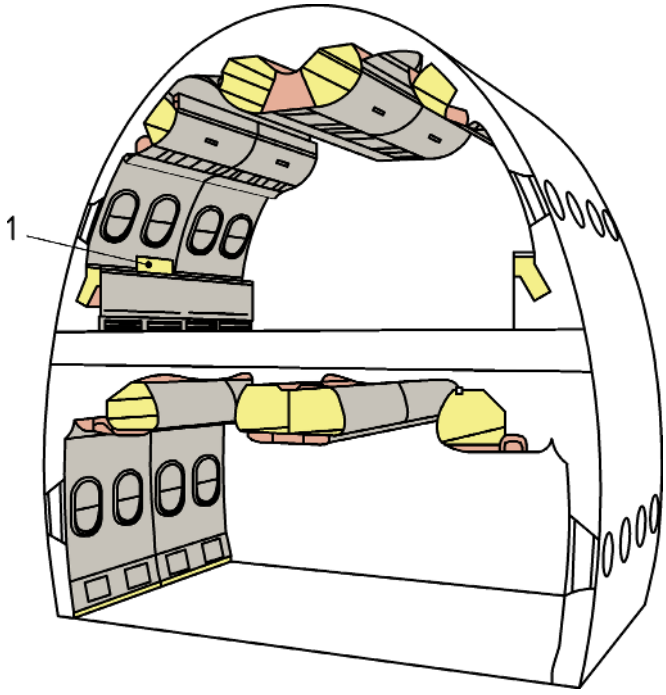
4.3 Classification of surfaces to be inspected

The surfaces to be inspected are classified into three zones (A, B, C).

Customers and suppliers shall document latest at CDR (critical design review) areas that are not visible after installation in the cabin of the aircraft and all other surfaces according to the below zones prerequisites unless otherwise agreed.

Figure 1 to Figure 6 show typical areas for the zone classification.

Areas/parts allowing functional manual or driven movement, thereby becoming fully visible to the passenger or cabin crew, are classified as “A” zones. In some cases the installation position is paramount facets covered up of wall flush items will have an upgraded classification if free standing.



Key

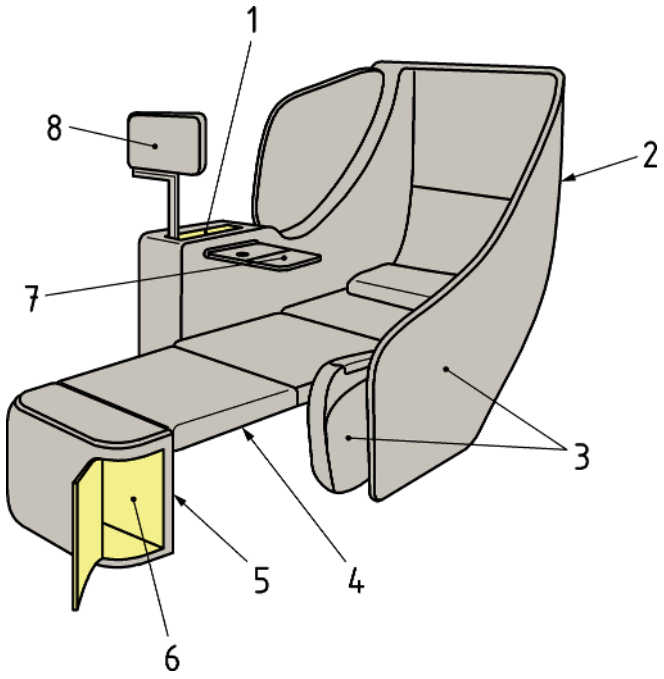
1 Side wall stowage lid shown open to view lid inside

A zone

B zone

C zone

Figure 1 — Cabin lining



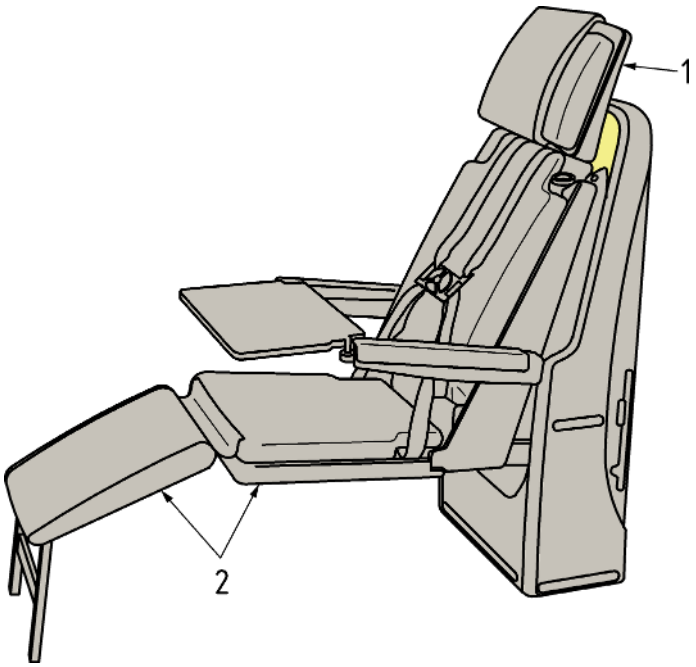
Key

1 Stowages insides: B zone
2 Rear walls, if free standing: A zone; if rear side very close to a wall (i.e. masked by wall): B zone
3 Aisle walls, if aisle side: A zone; if window side: B zone
4 Underneath, if "footrest" returns down and backwards: B zone; if "footrest" returns up and backwards: A zone; if "footrest" cannot be viewed incl. during operational movement: C zone
5 Reade side: A zone
6 Stowage insides: B zone
7 Tables top and bottom: A zone
8 LCD monitor: A zone

A zone

B zone

Figure 2 — Pax seat



Key

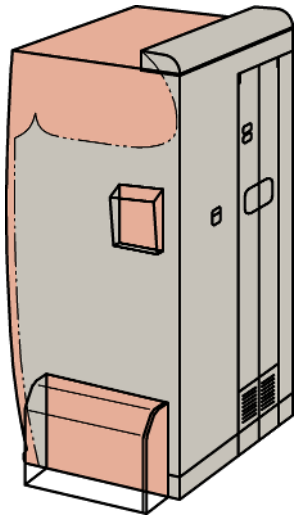
1 Only if flush to a wall: B zone behind headrest, back of seat

2 A zone, under seat pan shroud, underneath of footrest

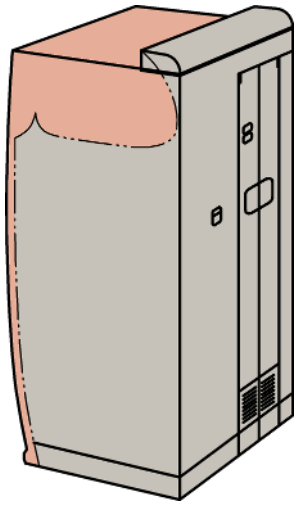
A zone

B zone

Figure 3 — CAS seat



Typical monument with magazine rack and doghouse



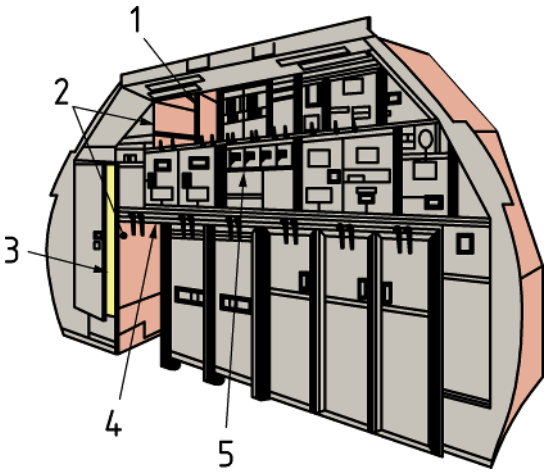
Typical monument without additional furnishings

Key

A zone

B zone

Figure 4 — Cabin monument



Key

1 Shelves and cupboards for: fixed parts e.g. ovens, boilers: C zone

2 Unless gap makes sides visible then first 10 cm A zone; removable parts e.g. SU first 10 cm is A zone thereafter C zone

3 Stowage inside: B zone incl. door inside trolley doors inside

4 Underneath is C zone

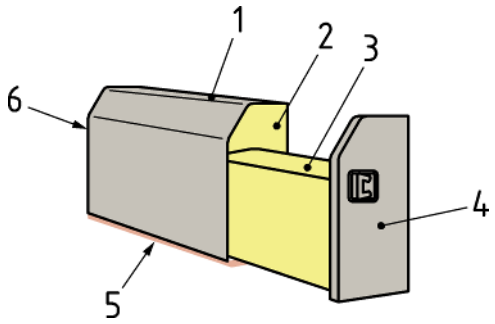
5 Underneath is B zone, because it cannot be directly viewed; if higher this will become an A zone

A zone

B zone

C zone

Figure 5 — Galley



Key

1 Corpus outside: A zone; if masked by wall, seat, etc. visible area: B zone, any areas completely not visible: C zone

2 Corpus inside: B zone; if part of inside not visible by normal operation: C zone

3 Drawer and door inside: B zone

4 Door outside: A zone

5 Bottom: C zone

6 Backside if outboard lateral side: B zone; if free standing: A zone

A zone

B zone

C zone

Figure 6 — Example for other cabin parts

4.4 Split lines, definition, cutting and placement

Decor split line positions are defined by the OEM corporate cabin design department under advisement and in conjunction with the supplier so as to include all aspects of design prerequisites and feasibility.

Split lines are inherent to a successful and controllable development and in some cases a necessity to achieve pattern harmony; therefore a split line or its position cannot be accepted as a reason for customer rejection. Due to the complex nature of the definition process split lines are shown in the corresponding colour specification to provide design direction and understanding.

General split line rules:

a) Any applied film, split line position tolerance is 2 mm, i.e. ± 1 mm on curved or wavy surfaces and will be 1 mm, i.e. – 0,5 mm on purely flat surfaces.

b) In cases of split line production templates, the templates may also be used for quality inspection checks.

c) Split line necessity overrules aesthetic reasoning.

d) Parts with integrated deep recesses or 3D shapes surpass most technical solutions for films and therefore generally split lines will be set or a different medium chosen.

e) PVF Film split lines are always overlapped by 10 mm and if wrapped around edges, e.g. doors, etc. must also have a minimum of 10 mm wrap around. Reinforced material (PVF film) is always butt jointed.

f) All split lines in all mediums are optically straight, neat (no over spray by painting) and run parallel to edges, i.e. vertical or horizontal, unless otherwise defined. If a split line is noticeable to the eye, i.e. slanted it is considered a defect. Butt joint edges cover the substrate panel completely, i.e. nothing of the panel is visible through the butt joint.

g) Split lines are as a rule visible and are therefore so acceptable, although the goal is always to make them as least obvious as possible.

h) Split lines for hydro transfer printing technology (HTPT) have a different set of rules and can be found in the HTPT PTS document.

i) Paint split lines whereby two different colours meet on a single part must have a smooth transition, i.e. no noticeable (to the touch) paint depth difference at the edge (supplier to provide samples for acceptance).

j) PVF film cut edges are never left exposed except when an overlap is defined.

4.5 Time limits and part appraisal

There is no specific time limitation for part appraisal. This is due to the diversity and complexity of parts and finishes which must also be cross-referenced with the pertinent Interior colour specification and any special inspection requirements.

The inspector must be allowed to assess the complete validated area of inspection, without time constraints. All inspections should be carried out as expediently as possible with a fair and sensible orientation.

4.6 Distance from the test specimen

4.6.1 Distance at FAI-, source- and incoming – inspection (general ruling)

The distance to the surfaces of all items to be inspected shall be not less than 0,4 m without any sight enhancing or influencing (e.g. tinted glasses) instrumentation (if any imperfections are discovered, analysis will be closer and case dependent). Multitudinal observation angles may be employed to capture any aesthetical deviation characteristics.

4.6.2 Distance at FAL, final inspection and customer presentation

The distance to the surfaces of all items to be inspected at final assembly line check, final inspection and customer presentation depends on the assembled module / furniture of the A/C cabin.

The distance from the test specimen is defined by the installation situation as it will actually be found in the aircraft, this may in some cases influence the general ruling of 4.6.1. Neighbouring parts may not be removed to gain advantage, enhance or achieve closer inspection distance.

Seats shall be inspected in accordance with their geometry, i.e. the distances and surfaces to be inspected depend on the design as well as the installation situation, which is defined by the seat layout. Findings from inspections under real installation conditions in cabin supersede the inspection criteria in 4.6.1.

4.7 Illumination

The conditions of the inspection areas, except final assembly line check and final assembly line customer presentation, should be sufficiently equipped and illuminated during the inspection. In cases

where inspection areas are not sufficiently illuminated to fulfill inspections, the supplier will arrange additional light until the requirements are met:

On the surface of the test specimen the intensity of light has to be at least 800 Lux (fluorescent tube DL65 - white) in specific inspection area e.g. FAI or max cabin illumination for cabin inspection,

a) On the surface of the test specimen the intensity of light has to be at least 800 Lux (fluorescent tube DL65 - white) in specific inspection area e.g. FAI or max cabin illumination for cabin inspection,

b) To maintain as the required light colour, the wavelength of the light has to cover the range from 360 nm to 700 nm,

c) The surface of the test specimen has to be free of any shadows from non cabin related parts,

d) On the surface of the test specimen emitted interference light is not acceptable, if there are additional reflections or other influences.

4.7.1 Additional light sources

Defects only seen with additional light sources (flash light) will not be accepted if 4.7 is fulfilled. For outside inspection in final assembly line area no additional lights are required to detect any defects. During the performance of the final assembly line check and final assembly line customer presentation only the cabin light has to be used.

4.7.2 Surfaces

The following criteria to be considered for any surface inspection.

4.7.2.1 Decorative surfaces

This describes the inspection and acceptance criteria for all cabin crew or passenger potentially frequented, perceived or visible parts throughout the aircraft, and the corresponding gloss levels within the cabins and is applicable for all programs. The trim and finish FAI for all parts for all new customers or fleets will be carried out by the OEM cabin design and QC department.

4.7.2.2 Environmental inspection area parameters

There should be no, glare interference, shadows, direct sunlight, colour corruption caused by additional light sources or influences from large multi-coloured reflective surfaces.

All parts for any assessment have to be:

a) clean;

b) completely free of packaging and protective foils;

c) complete, correct and finished;

d) correctly labeled;

e) undamaged;

f) fully assembled.

4.7.2.3 Inspection of high gloss and satin matt smooth surfaces

The starting angle should imitate the position of installation, carefully tilt the part or slowly shift the angle of viewing and observe the light reflection over the surfaces; any imperfections will become apparent, rotate, swing the part and repeat observations.

Run the gloved hand over the surfaces, radii and edges and feel for imperfections.

In cases of contention the surface roughness shall be tested with a cotton wool ball. Move the ball continually across but without pressure over the suspect area about 10 times, so long as no fibres are observed being pulled out, it is deemed acceptable. Leave no fibres on the part.

This procedure only applies to a singular painted decor, if however multiple different decors join (split line) a certain edge will be apparent. The smoothness of the transition will be captured in/by master samples.

4.7.2.4 Examination of the parts for installed items

The distance depends on the amount of room left by the assembled furniture and linings in the aircraft. Distances will vary on individual installation situations and should therefore be taken into account, e.g. seats vary in pitch and size. Nevertheless the inspector should appraise all facets in a methodical and structured way.

Also direct comparisons must be drawn between the left, centre and right hand bulkheads, analyzing any intended pattern coherency, split lines, defined idiosyncrasy, e.g. logo, colour impressions, grain directions or positioning, etc. Inserts to be opened, closed or decorated over must be documented in the supplier documentation and be readily available in cases of contention.

The OEM colour specification is not, nor cannot be used as a replacement for this documentation. Any part protection or protective item has to have been removed and the part appropriately cleaned before starting an inspection.

The function of surface protection may not be compromised by cosmetic defects as defined.

4.7.2.5 Non-Decorative surfaces

Non-decorative surfaces are all surfaces in the A/C cabin, which are invisible for passengers and/or cabin attendants in their normal posture and which are not accessible areas (zone C).

These are not decorated and are outside specific cosmetic variations.

4.7.2.6 Samples

Samples of decor materials are generally available from the OEM cabin design department or it is the responsibility of the airline or the airline representative to make the master sample available to the OEM cabin design for inspection purposes. The sample requirement is defined at CDR and is to be made available, latest 2 calendar weeks before FAI.

4.7.2.7 Paint

For standards in semi gloss and texture, samples are available.

Separate samples can be made available for high gloss and mat (non standard).

Only the latest released sample from the OEM cabin design department has validity.

For cosmetic defects see other applicable sections and evaluation tables.

4.7.2.8 PVF film

Decor material properties, i.e. pattern, logo, repeat, special decor size, special and standard application instructions, direction or application position, etc. are specified in the latest issue of the appropriate interior colour specification.

Idiosyncratic properties are defined or captured by master samples. PVF film containing suspended particles (e.g. metals) will unavoidably have aesthetical deviations.

If selected, customer acceptance of the deviations is required before proceeding.

4.7.2.9 Non-textile floor

For non-textile floor (NTF) material that has a pattern, repeat, special size, special and standard application instructions, direction, idiosyncratic properties or application position, etc. are documented in the latest issue of the appropriate interior colour specification.

4.7.2.10 Plastic parts

Cuts, cracks, scratches, bad texturing, worn, bent, badly fitting, pits and burrs on plastic parts, e.g. folding table or cup-holder are not acceptable as defined.

4.7.2.11 Colour and gloss

4.7.2.11.1 Colour measuring

a) Colour measurement with spectral photometre:
The spectral functions of light source and observer are defined by EN ISO 11664-1, EN ISO 11664-2, EN ISO 11664-4 and EN ISO 11664-5. The CIE L*a*b - System is used to validate the correct colour tones. An average value is measured of the part to be inspected and the reference standard. ΔE defines the total colour difference between the sample and the standard. To determine the cause, the individual colorymetric components ΔL; Δa, Δb, need to be recorded. There are two possible measuring geometries: – 45°/0°: Illumination occurs in a circular pattern at an angle of 45°, while the observation angle is 0°, – D/8°: Light falls on the sample in a diffuse manner, while the observation angle is 8°, illuminant D65.

b) Visual comparison of the sample with the reference standard

c) Reference values.
grey/beige: $\Delta L \leq 1{,}0$; $\Delta a \leq 0{,}6$; $\Delta b \leq 0{,}6$;
coloured: $\Delta L \leq 1{,}0$; $\Delta a \leq 1{,}0$; $\Delta b \leq 1{,}0$;

$\Delta E \leq 1{,}0$;

The reference values will be defined during the colour matching process with the different material suppliers.

Colours vary in dependence of geometry and production process.

4.7.2.11.2 Gloss variance

EN ISO 2813 partial areas of a component surface show a clearly lower degree of lustre than the remaining surface or adjacent components.

Gloss measurement will be accomplished independently of colour measurement.

The gloss variance will be detached between customers and suppliers.

4.7.3 Production masters

Suppliers shall prepare / provide new production samples for acceptance by the customer. Production samples prepared / provided by suppliers must be signed off by their internal QC representative and approved by the customer to become valid.

The master samples agreed by the customer and the supplier will be stored at the supplier and OEM and can be made available if required.

5 Evaluation tables and defect size assessment

The Table 1 to Table 4 defines the acceptance criteria for cosmetic items. By multiple defects within tolerance, but, so close to one another that the main impression of that particular area is of a defect, i.e. shadow, stain, etc., will be thereby also considered as a defect.

Table 1 — Evaluation Table valid for parts up to: 0,25 m²

Size of defect - max. allowed 0,9 mm	**Number of defects allowed**			
	Grade			**Min. distance between defects**
	A	B	C	
up to 0,5 mm	any	any	any	150 mm
0,51 mm to 0,6 mm	3	5	any	200 mm
0,61 mm to 0,7 mm	1	4	6	250 mm
0,71 mm to 0,8 mm	-	2	4	300 mm
0,81 mm to 0,9 mm	-	1	2	350 mm

Table 2 — Evaluation table valid for parts up to: 0,5 m²

Size of defect - max. allowed 0,9 mm	Number of defects allowed			
	Grade			Min. distance between defects
	A	B	C	
up to 0,5 mm	4	any	any	150 mm
0,51 mm to 0,6 mm	3	any	any	200 mm
0,61 mm to 0,7 mm	2	6	6	250 mm
0,71 mm to 0,8 mm	1	4	6	300 mm
0,81 mm to 0,9 mm	-	2	4	350 mm

Table 3 — Evaluation table valid for parts larger than: 0,5 m²

Size of defect - max. allowed 0,9 mm	Number of defects allowed			
	Grade			Min. distance between defects
	A	B	C	
up to 0,5 mm	6	any	any	150 mm
0,51 mm to 0,6 mm	5	any	any	200 mm
0,61 mm to 0,7 mm	4	6	any	250 mm
0,71 mm to 0,8 mm	3	5	6	300 mm
0,81 mm to 0,9 mm	-	2	4	350 mm

Table 4 — Evaluation table valid for broad but not long defects, e. g. scratches, low marks, over spraying, hairs etc.

Width	Defect allowable		
	Grade A accepted length	Grade B accepted length	Grade C accepted length
up to 0,05 mm	-	any	any
0,05 mm to 0,10 mm	-	30 mm	50 mm
0,10 mm to 0,15 mm	-	20 mm	30 mm
0,15 mm to 0,20 mm	-	10 mm	15 mm
0,20 mm to 0,30 mm	-	5 mm	10 mm
Even larger	-	-	-

6 Inspection template to ascertain defect sizes

An example for inspection template to ascertain defect sizes is shown in Figure 7 which can be copied for individual use. Please make sure that the scale does not change during printing.

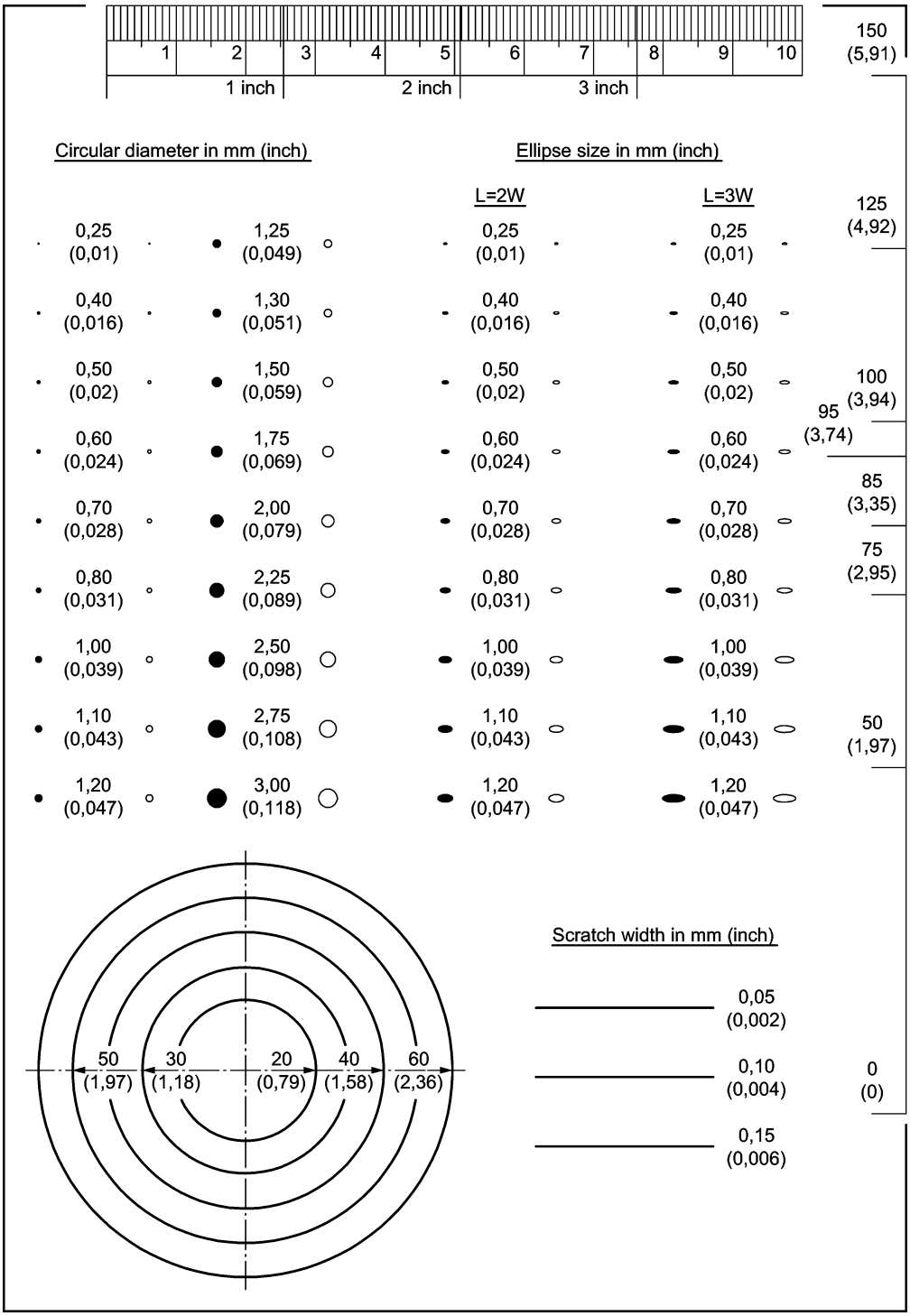


Figure 7— Example for inspection template to ascertain defect sizes

Annex A
(normative)

Unacceptable characteristics of findings

A.1 General

Unacceptable characteristics of cosmetic defects are described and partly illustrated pictorially in Annex A. Items concerned are deemed as a defect if they are contrary to the colour specification directives.

The limit values of "acceptable" are stated in Clause 6.

Tables and defect size assessment, evaluation Table 1 to Table 4.

A.2 Perforation, puncture or penetration

Figure A.1 gives an example for unacceptable surface decor perforation/puncture. Also dents or marks even if no penetration is present or any other noticeable damage are not accepted.

Figure A.1 — Example of a perforation finding

A.3 Cuts, cracks, scratches, pits tears and rips (any medium)

Figure A.2 to Figure A.6 gives exams for unacceptable cuts, cracks, scratches, pits, splits, tears and rips or any other obvious damage.

Figure A.2 — Example of a crack finding

Figure A.3 — Example of a cut finding

Figure A.4 — Example of a paint defect finding

Scratches and wear marks are cosmetic defects.

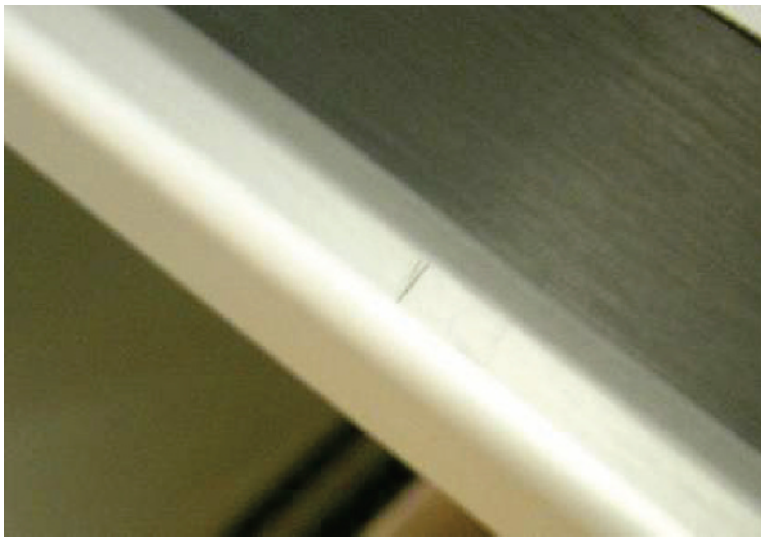


Figure A.5 — Example of a scratch finding

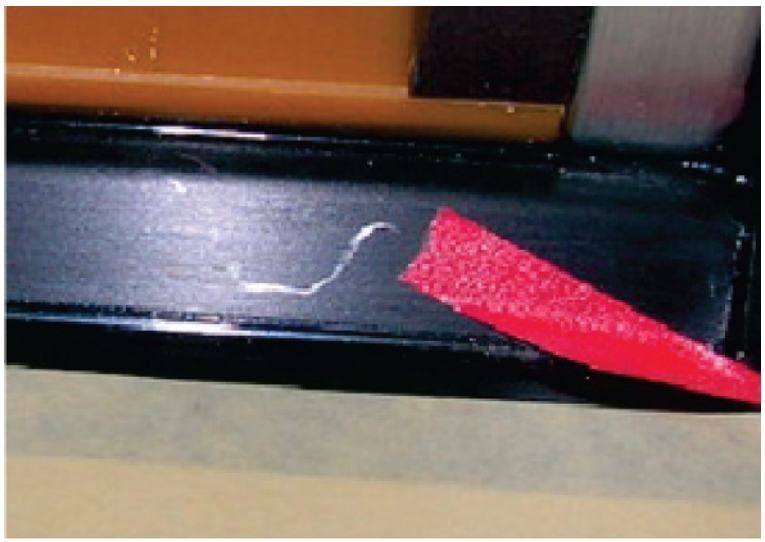


Figure A.6 — Example of a scratch finding

A.4 Adherence, de-lamination, loose / flimsy items

Figure A.2 to Figure A.6 gives exams for unacceptable cuts, cracks, scratches, pits, splits, tears and rips or any other obvious damage.

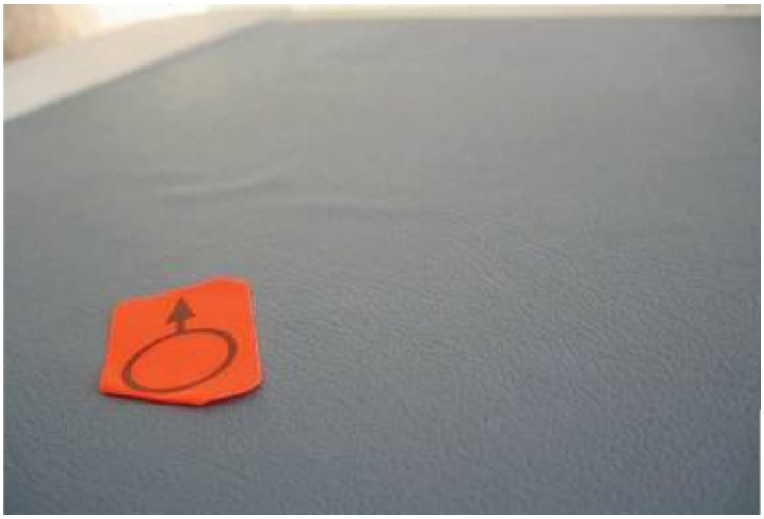


Figure A.7 — Example of a poor adhesion finding

A.5 Stains

Figure A.8 is an example for a stain finding. Staining, impurities, foreign imperfections, whether on, in (or underneath if visible) is not acceptable. Residues in any medium, e.g. polishing, cleaning, grease, oil, etc. discolouration or fading is not acceptable.

Figure A.8 — Example of a stain finding

A.6 Excess adhesive (glue) and sealant

Figure A.9 gives an example for unacceptable adhesive and sealant residues. Such kind of excessive sealant residues or inconsistency (texture size and shape), dirty, faded, discoloured against ICS definition, imprinted shapes are not acceptable.

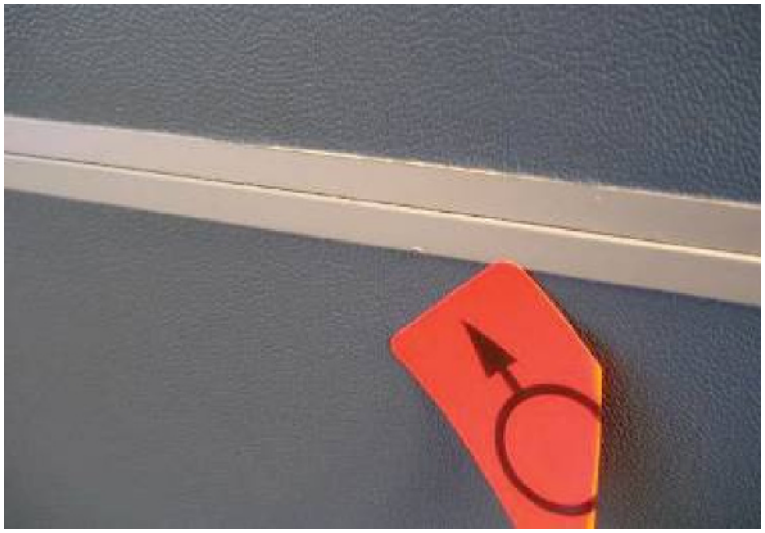


Figure A.9 — Example of non-acceptable finding

A.7 Decor overlapping / joints

Figure A.10 to Figure A.12 shows examples for unacceptable decor joints. Butt-joint line of overlapping sheets should be straight and even and not wavy. Texture of the two overlapping sheets should be continues and complementing each other. Texture failures will be the responsibility of the material supplier.

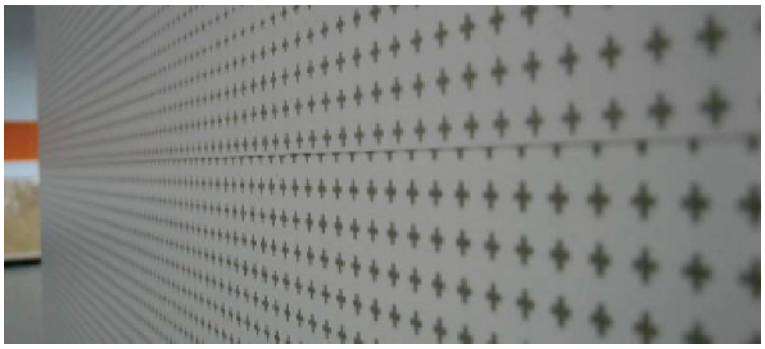


Figure A.10 — Example of decor misalignment finding

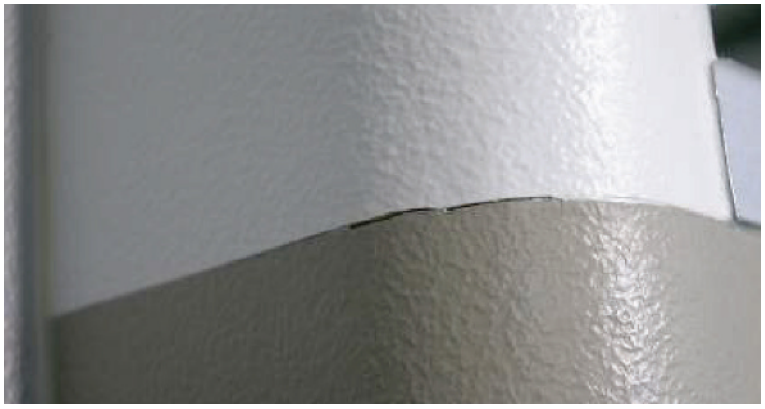


Figure A.11 — Example of uneven split line finding

Figure A.12 — Example of poor fit split line finding

A.8 Differences in decor

Production batches have a tolerance. The tolerances are tailored to be feasible for the manufacturer and realistically acceptable for all parties. Production batches or different vendor batches where operationally feasible should not be mixed to decrease the possibility of mismatches.

A.9 Pattern distortion through application

Pattern distortion caused by excessive pressure and/or heat is a cosmetic defect. Overstretched decors or folded decors causing pattern distortion are also considered as a defect. All standard films are capable of retaining pattern and texture under normal manufacturing and application processes.

A.10 Texture loss

Texture loss is a cosmetic defect, unless the airline selected a non suitable texture to be applied, e.g. a flat surface only texture on a 3D surface.

A.11 Misalignment whether pattern, material, part or point

Figure A.13 to Figure A.16 shows examples for misalignment parts. Noticeable misalignment of materials, direction, pattern, surface texture, prints or parts (with or without movement in all positions with neighbouring serial parts, e.g. armrests, etc.) are not acceptable. Inspection to be done against IC

Figure A.13 — Example of an alignment finding

Figure A.14 — Example of a misalignment finding

Figure A.15 — Example of an alignment finding

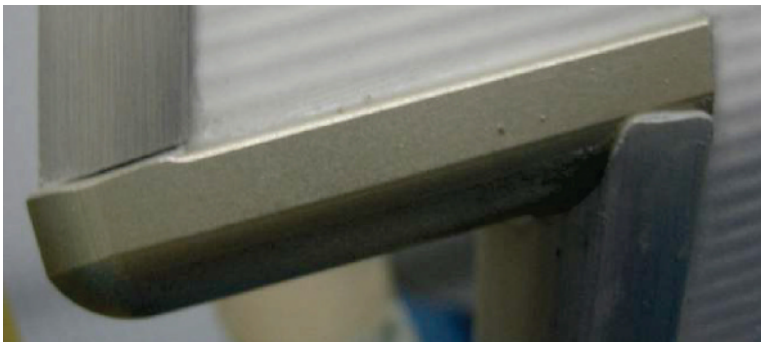


Figure A.16 — Example of an alignment finding

Decor film alignment is to within a tolerance of 2 mm over a full sheet, perfect alignment is not possible due to the inherent properties of decor films. Incorrect application or material failure represents a cosmetic defect.

Perfect alignment with texture symmetry is also not possible across two sheets. The standard texture alignment starting point (unless otherwise defined) is eye height; the "in and out of phase" after this point is no longer controllable.

Decorative material in any medium causing fitting, impaired functionality and/or freedom of operation is also a cosmetic defect.

A.12 Dents and dings

An example for an unacceptable dent on a surface is shown in Figure A.17.

Figure A.17 — Example of a dent finding

A.13 Decor trimming (cut-outs)

Edges which are uneven, creased, torn, ripped, chipped or against definition are not acceptable. For examples see Figure A.18 and Figure A.19.

Figure A.18 — Example of an uneven edge finding

Figure A.19 — Example of a poor trimming finding

A.14 Telegraphing

Objects or impurities (e.g. dirt) caught under the surface of decor films will show an exaggerated surface profile of the object in question and is therefore considered a cosmetic defect.

If the substrate material surface is recognizable through the film. This is due to inadequate part preparation i.e. not smooth enough. This is also a cosmetic defect.

A.15 Changes of colours / shades

An example for an unacceptable colour difference is shown in Figure A.20.

Figure A.20 — Example of a discolouration finding

A.16 Chafing marks

Figure A.21 to Figure A.28 shows examples for unacceptable chafing marks, wearing, indentations, cuts, chipping and holes.

Figure A.21 — Example of a chafing finding

Figure A.22 — Example of a chafing finding

Figure A.23 — Example of a chafing finding

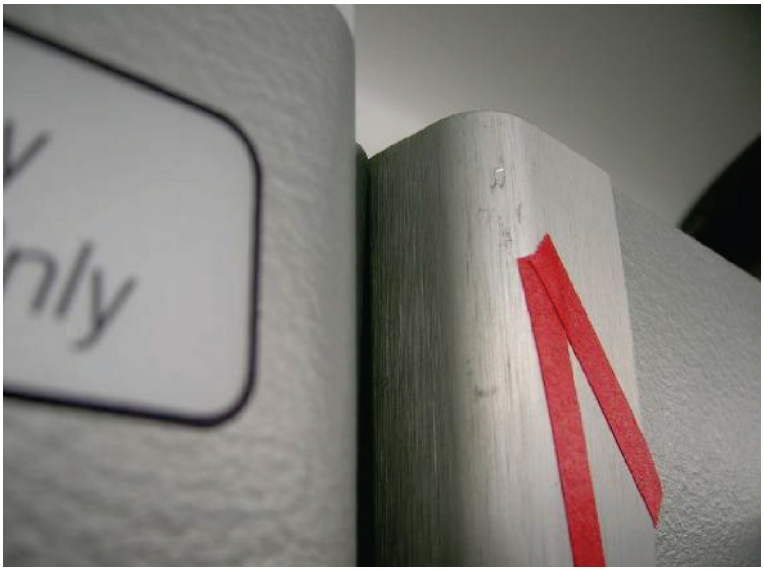


Figure A.24 — Example of an indentation finding

Figure A.25 — Example of a cut finding

Figure A.26 — Example of a hole finding

A.17 Brushing direction

Brushing direction shall always be performed in the same direction. Joining profiles have to have the same brushing direction unless otherwise defined. In case the brushing direction is interrupted, disturbed or show noticeable grain difference, it is a cosmetic defect.

A.18 Creases on bends, rippling

Visible creases in materials (usually at internal bends) are a cosmetic defect. Visible rippling of the surface material either metal or decorative is a cosmetic defect.

A.19 Sharp edges

Sharp edges whether metallic or decorative are dangerous and therefore a cosmetic defect.

A.20 Protrusions and sinking

Any component which exceeds tolerances causing direct or indirect damage is not accepted. An example for a protrusion finding is shown in Figure A.27.

Figure A.27 — Example of a protrusion finding

Any protrusive items, e.g. screw heads, pins, etc. which are not flush, thereby increasing the possibility of snagging or endangering functionality are a cosmetic defect. Parts which are installed too deep, thereby impairing functionality resulting in direct damage or when de-installing during standard maintenance routines, is a cosmetic defect.

A.21 Welds

Welding joints which are irregular in size, width, consistency, excessively large or discolour the surrounding metal will be considered as a cosmetic defect.

Generally welding joints should not be visible; they should be so prepared as to mask their identity, i.e. not noticeable where ever possible, any identified as surplus to requirements or poorly prepared are cosmetic defects.

A.22 Chrome and galvanization

Chromed or galvanized items showing inconsistent surface, pot holes, excessive material edge build-up (as long as the shape is suitable), impair fitting, block or filling of required functional items (e.g. holes),

flaking, colour deviation, dull areas (by shiny finishes), telegraphing or non-polished areas are cosmetic defects.

Any idiosyncratic properties are noted as exceptions at the prototyping phase or latest FAI and fixed through master samples.

A.23 Gaps

Gaps shall be even over a straight line.

Gaps around components shall look visually uniform with all surfaces in parallel.

Insert components shall be adjusted so as to show optical uniformity unless otherwise defined.

Gaps between neighbouring components shall be aligned to each other unless otherwise defined or OEM approved.

Irregular noises made by operating components, i.e. squeaks, rattles, etc. caused by poor fitting or inadequate adjustment are still considered as a "cosmetic defect".

A.24 Manufacturing process tooling marks

Tooling marks are not acceptable, however in rare cases if it is proven and accepted by the OEM.

Cabin design department and customer (airline) buy off is achieved the status may change to acceptable. If these kinds of defects are not registered and made known to OEM cabin design department and agreed upon prior to manufacture they are still deemed as cosmetic defects.

A.25 Seams

Seams shall be consistent, to definition, optically parallel to edges or second row (where applicable), spacing uniform, correct colour, not be loose and the correct strength.

A.26 Textiles and leather, colouring and surface texture

Textiles and leather that are, worn, cut, frayed, showing signs of failure, marked, stained, over stretched, sagging, badly cut, badly fitted, faded, are not clean or are against definition are not accepted. Wrongly fitted, wrong direction, on the wrong seat/part or is the wrong quality. An example is shown in Figure A.28.

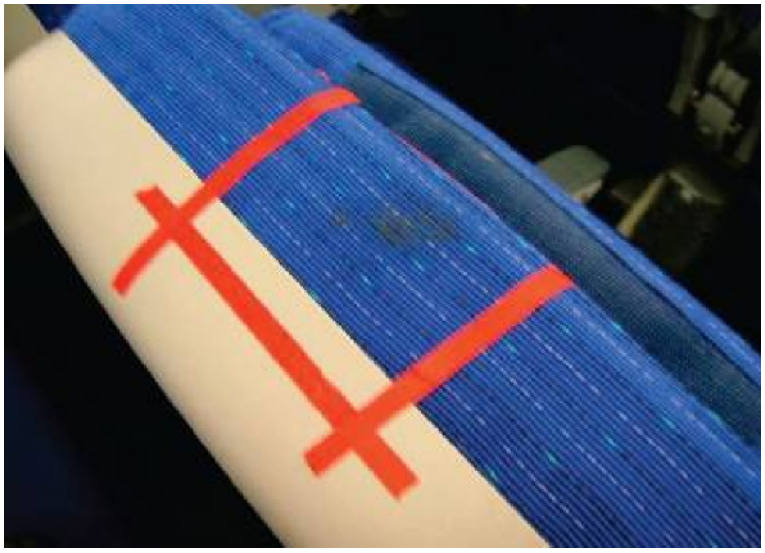


Figure A.28 — Example of a stain finding

A.27 "Soft furnishing"

Figure A.29 gives an example for unacceptable soft furnishing. "Soft furnishings" with noticeable shape disfigurement, lack of appropriate symmetry, bulging, depressions, misalignment or poor fitting are not accepted.

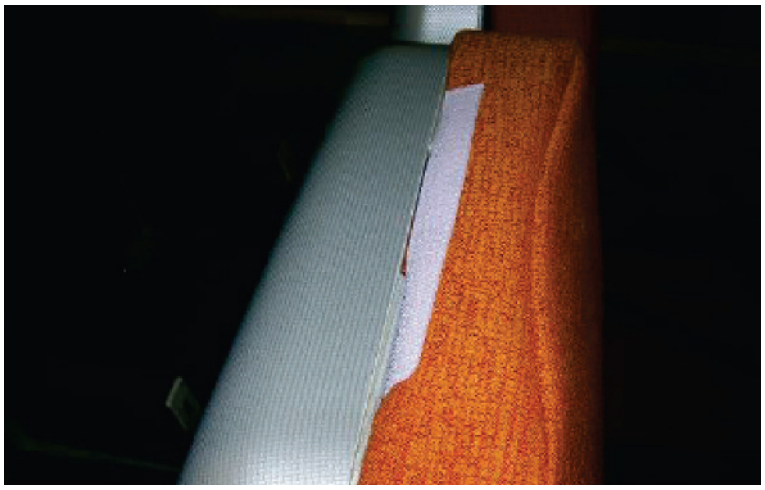


Figure A.29 — Example of a disfigurement finding

Textiles and leather covered parts are compared to master samples and may not optically differ, either in colouration, quality or texture. The airline or airline delegated body is responsible in supplying master samples, by the process - routing of documents/samples, to the OEM cabin design department.

A.28 Screws

Figure A.30 to Figure A.33 shows pick-ups for unacceptable screw installations. Ground screws needs to be painted by blue varnish for corrosion prevention.

Inappropriate countersinks, badly drilled holes, not de-burred, wrong type, position, size, depth or length are considered as unacceptable cosmetic defect.

Also screws that are missing, bent, shredded, against definition, inoperative, have the wrong colour or are the wrong type are not accepted.

Figure A.30 — Example of a ground screw finding

Figure A.31 — Example of a countersink finding

Figure A.32 — Example of a missing screw finding

Figure A.33 — Example of a bad hole finding

A.29 Inserts

The following is not accepted for insert installation:

d) Inserts that have been opened, against definition residue or foreign material n or on the threads;

e) Swelling or surface irregularities caused by an insert position;

f) Damaged threads;

g) Applied decor which prevents parts fitting together in the appropriate manner;

h) Materials which do not comply with their appropriate qualification status;

i) Dirty, blocked and not de-burred inserts;

j) Examples are shown in Figure A.34 to Figure A.36.

Figure A.34 — Example of a blocked insert finding

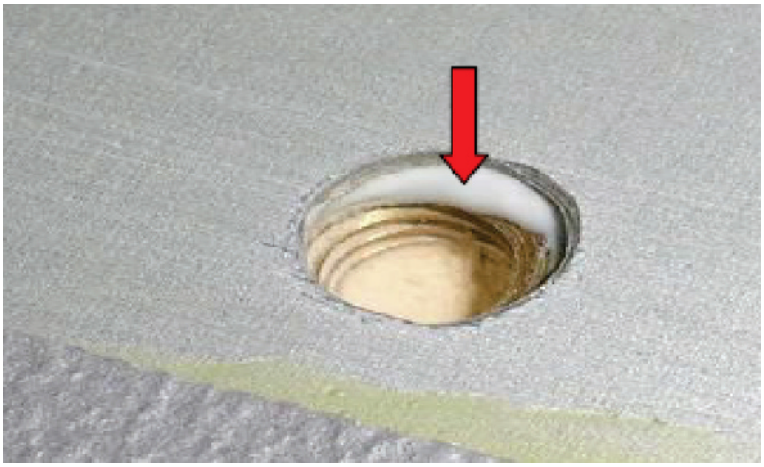


Figure A.35 — Example of an excessive glue finding

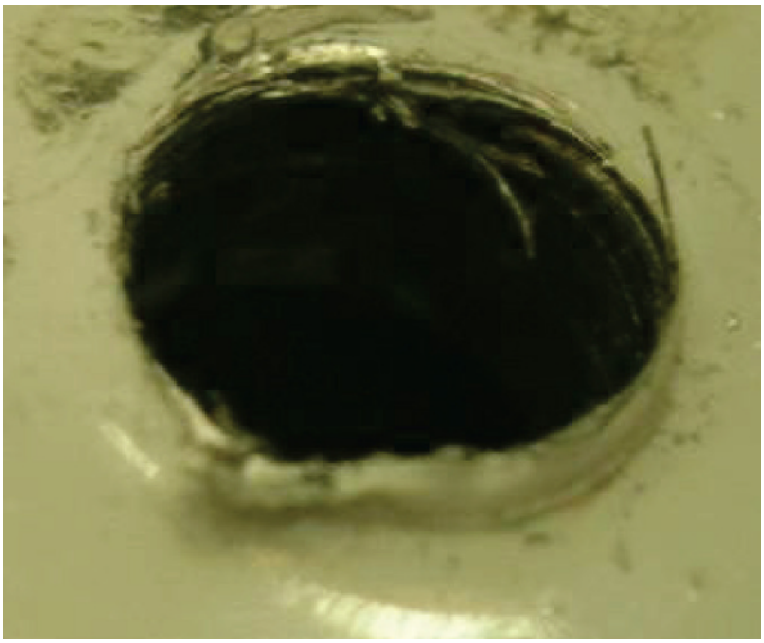


Figure A.36 — Example of a not de-burred insert finding

A.30 Foam seals and flexible seals

Foams and seals have to be in the correct position, be the correct colour, do not have excessive "elephant skin" by folding, i.e. surface bunching, be secure, be cut neatly, fit neatly and correctly, overlap correctly, have no light leakage, not be damaged, have the correct texture and be the correct length.

A.31 Varnish, clear lacquer finishes

Varnished or clear lacquered surfaces have to be consistent and have either a standard smooth texture or where otherwise defined a medium texture.

Smooth definitions need better part preparation, i.e. filled and rubbed down more until absolutely smooth. Inadequate preparations for smooth definitions will cause a cosmetic defect. High gloss will have a certain amount of "orange peel" this cannot be avoided, surfaces in question - compare to master samples.

Blistering varnish, pitted, varnish runs, excessive lacquer edge build up, mixed matt and glossy surfaces (against definition), poor part preparation, glossy values outside of tolerances, irregular finishes over the same or neighbouring parts with the same definition are cosmetic defects. Figure A.37 shows an example for a blistering finding.

Figure A.37 — Example of a blistering finding

A.32 Placards, signs, labels and engravings

Any defect which relates to an improper placard/signs/labels/engravings/positions manufacturing or installation is considered as cosmetic defect.

A.33 Light leakage

Light leakage is considered whether through or around a component a cosmetic defect, unless operationally or functionally so defined.

A.34 Transparent sections of components

Surfaces, which only have such a thin layer of paint or varnish that the primers can be seen, are cosmetic defects. For an example see Figure A.38.

Figure A.38 — Example of a thin layer finding

A.35 Retouching / reworks

If retouching or a rework is noticeable it is considered as a cosmetic defect.

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