I. Purpose:

A. This standard provides the cosmetic requirements for plastics, sheetmetal and painted parts used in Concierge products. It defines the plastic and paint flaws and establishes the acceptance criteria for Concierge Computer bases, plastic molded parts and other surface finishes.

II. Scope:

A. This standard applies to all molded parts and surface finishes used by Concierge unless otherwise stated in the engineering drawings and/or shown on a Concierge Engineering approved sample. If there is a conflict between this standard and the engineering drawing and/or Concierge Engineering approved sample, the engineering drawing and/or Concierge Engineering approved sample will supersede.

III. Department(s) Responsible for Implementation:

A. Quality Engineering
B. Manufacturing Engineering
C. Manufacturing
D. Supplier Quality Audit
E. Inprocess Quality Assurance

IV. Revision History:
<table>
<thead>
<tr>
<th>Revision</th>
<th>Description of Changes and Pages Affected:</th>
<th>Effective Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/C</td>
<td>Initial release</td>
<td>July 16, 1996</td>
</tr>
</tbody>
</table>
| A        | 1. Revised the Departments Responsible for Implementation (III.D).  
2. Revised Surface Classification (V.A.1, V.A.2 and V.A.3).  
3. Revised Preferred Cosmetic Requirements (V.E.4, V.E.7 and V.E.8).  
4. Revised Tables A1 and A2 (VI.A.1 and VI.A.1).  
5. Added definitions to the Glossary.  
6. Added paragraph VI.D.12.  
7. Added Surface Classification Examples (VIII). | September 30, 1996 |
| C        | Modified V.E.1, V.E.8, VI.D.3 and VI.D.12. | September 25, 1997 |
| D        | Modified VI.D.5 and VI.D.12 | November 10, 1997 |
| E        | Modified VI.D.12 for the rust criteria. Added step criteria in section V.E and definition in Section VII. Changed the criteria for knit lines in Sections V.E and VI.A | June 19, 1998 |
| F        | Modified section II.A. to include “…CONCIERGE Engineering approved sample…” will supercede this spec. Modified section E.4 to change gap spec requirements. Modified section VI.A.no. 5 to change Class B surface distance to 750mm. | August 6, 1999 |
V. General:

A. Surface Classification: The finished product is classified into three different types of classes as below:

A.1 Class A Surface: This is the area that is directly exposed to the view of customer. Examples are: Front bezel and top cover of a computer, front of a monitor, top of the keyboard, etc. The class A surface is most critical for cosmetic requirements.

A.2 Class B Surface: This is the area that is normally facing away from the customer’s direct view. Examples are: Side of a computer, side of a monitor, etc.

A.3 Class C Surface: This is the area that is out of view in the finished product. Examples are: Bottom of a computer, bottom of a monitor, bottom of a keyboard, etc.

B. Inspection Method:

B.1 Personnel: The parts shall be inspected by trained inspectors with normal color perception. The inspector shall have a normal 20/20 vision or corrected vision to 20/20 with appropriate lenses. The inspector shall be able to differentiate between different colors according to Farnworth Panel D-15 test.

B.2 Distance and Time: The parts shall be viewed from a distance of 20 - 30 inches. The normal industry standard is an arm’s length that is equal to 30 inches. The viewing time will be 5 - 10 seconds per surface.

B.3 Lighting: The parts shall be viewed in normal glare free fluorescent shop lighting. The minimum illumination of 100 foot candles is required to detect the cosmetic defects.

B.4 Viewing Angle: The parts shall be inspected with a viewing angle between 40 degrees and 50 degrees.

C. Color Inspection:

C.1 Standard: Concierge will follow the standard defined by Commission International de l’Eclairage (CIE) L*a*b color space (CIELAB) under the standard illuminant “C”.

C.2 Measurement Condition: Since the measurement environment has great impact on the measurement results, therefore, the measurement shall be performed under the controlled
### III. Control

#### C. Color Inspection: (continued)

**C.3 Measuring Instruments:** The color measuring instruments, spectrophotometers are available from different manufacturers. For correlation purposes, record the name of manufacturer of instrument and the model number. Before taking the measurement, the instrument shall be calibrated. Always calibrate the instrument if the power of the instrument has been turned off or turned on for more than one hour.

**C.4 Temperature:** The room temperature and the sample color chip temperature will impact the measurement. In order to get a compatible measurement, the room temperature shall be controlled. The temperature difference between the master color chip and the target color chip shall be within 5 degrees F. The room temperature difference between the master color chip and the target color chip shall be within 20 degrees F. All temperature readings taken during the measurement shall be recorded with the measurement.

**C.5 Surface:** The surface of the sample (master) color chip shall be flat.

**C.6 Measurement:** The data shall be the average of three measurements from three different locations on the sample under test.

**C.7 Color Specification:** The Product specification specifies the color specification. The reading from the sample under test shall satisfy the tolerance requirements specified on the assembly drawing.

### IV. Acceptance Criteria:

#### D. Acceptance Criteria:

**D.1** All parts, products and systems shall meet the cosmetic requirements defined in this standard.

**D.2** If the product does not meet the cosmetic workmanship requirements defined in this standard, a formal written deviation must be requested from Concierge Quality Assurance Department, before shipping the product.
D.3 During the visual inspection, a judgment must be made as to whether or not the customer (END USER) would consider the flaw(s) objectionable. During this inspection, only visual qualities are considered.

V. General: (continued)

D. Acceptance Criteria: (continued)

D.4 The acceptable limit of flaw(s) has a significant relationship to the type of area (surface) on which they are found. Flaws on a simple surface are more easily noticed and objectionable as compared to when they occur on a complicated surface. Therefore, each judgment of acceptability must be made in relation to the configuration of the surface in its final assembled form.

D.5 When a flaw is found within the specified time and distance, but an accept or reject decision is difficult to make, the product or part shall be accepted with the formal approval from Concierge Quality Assurance Department.

D.6 Repetitive cosmetic flaws that occur in the same place become more easily noticed. If a cosmetic flaw was judged acceptable at the beginning of the run or lot inspection, it shall also be acceptable at the end.

E. Preferred Cosmetic Requirements:

E.1 Cleanliness: The parts shall be free from dirt, grime, grease, oil and other contaminants. The dust caused by shipping material is acceptable if it can be blown off with air or wiped off. Suppliers may use a dry cloth or rag to wipe off residue oil. Visual oil residue will not be acceptable.

E.2 Cosmetic Texture Color: All cosmetic textured surfaces shall meet the color requirements as specified in the product specification. All cosmetic textured surfaces shall be uniform in gloss and free of streaks, runs, chips, bubbles, sink marks or any other molding defects.

E.3 Cosmetic Assembly: The assembled parts shall be free from scratches, gouges, dents, dings, cracks, stress marks, abrasions or any other defects caused by improper assembly.
Cosmetic Inspection Standard

Subject: Cosmetic Inspection Standard

Effective Date: Mar. 27, 2006

Revision: F

Reference Number: QA0601

E.4  **Gap:** It is preferred that there shall be no gap where two plastic parts joins. The maximum allowed gap is as follows: Class A \( \leq 1.0 \) mm, Class B \( \leq 1.5 \) mm and Class C \( \leq 2.0 \) mm. When measuring the gap, shoulder shall be excluded.

E.5  **Flash:** The maximum allowable height of any flash shall be 0.15 mm. Where flash has been trimmed, the cut marks shall not remove any texture. Any trimmed surface shall be smooth without jagged edges.

V.  **General:** (continued)

E.  **Preferred Cosmetic Requirements:** (continued)

E.6  **Pin Holes:** The pin holes larger than 0.20 mm in diameter are unacceptable. There shall be no more than three pin holes per viewing surface and the minimum distance between any two pin holes shall be 10 cm.

E.7  **Surface Contamination:** It is preferred that there are no molded in contamination spots. The molded-in contamination spot shall not exceed 0.20 mm in diameter. There shall be no more than two contaminated spots per viewing surface and the minimum distance between any two contaminated spots shall be 15 cm.

E.8  **Surface Blemish:** The surface blemish spots larger than 0.3 mm in diameter are unacceptable. There shall be no more than two spots per viewing surface and the minimum distance between any two spots shall be 15 cm. The supplier must submit corrective actions within 48 hours. Samples to be sent to the SQA Manager immediately. Only SQA Manager or VP to approve or reject the sample in question.

E.9  **Step:** The maximum allowable step between two plastic parts is 0.7 mm for Class A surface, 1.0 mm for a Class B surface, and 1.5 mm for a Class C surface.

E.10  **Miscellaneous:** The short shots, burn marks, warpage and crazing are not acceptable.
VI. Specific requirements:

A. Specific Criteria for Plastic Surfaces:

<table>
<thead>
<tr>
<th>No.</th>
<th>Defect or Flaw</th>
<th>Class A Surface</th>
<th>Class B Surface</th>
<th>Class C Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Gouges</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>3.</td>
<td>Crazing</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>4.</td>
<td>Sink Marks</td>
<td>None allowed</td>
<td>Per limit samples</td>
<td>Per limit samples</td>
</tr>
<tr>
<td>5.</td>
<td>Knit Lines</td>
<td>Not to be visible @ a distance of 500 mm</td>
<td>Not to be visible @ a distance of 750 mm</td>
<td>Not to be visible @ a distance of 1 meter.</td>
</tr>
<tr>
<td>6.</td>
<td>Flash</td>
<td>0.15 mm</td>
<td>0.15 mm</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>7.</td>
<td>Burn Marks</td>
<td>None allowed</td>
<td>None allowed</td>
<td>Not to exceed 1% of the total surface area.</td>
</tr>
<tr>
<td>8.</td>
<td>Underfills or voids</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>9.</td>
<td>Fracture</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>10.</td>
<td>Smudges</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>11.</td>
<td>Stress Marks</td>
<td>None allowed</td>
<td>None allowed</td>
<td>Not to exceed 1% of the total surface area.</td>
</tr>
<tr>
<td>12.</td>
<td>Cracks</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
</tbody>
</table>
VI. Specific requirements: (continued)

A.1 Size Limits for Contamination

<table>
<thead>
<tr>
<th>Surface Area</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-400 mm²</td>
<td>1 @ 0.15 mm</td>
<td>1 @ 0.20 mm</td>
<td>1 @ 0.25 mm</td>
</tr>
<tr>
<td></td>
<td>or 2 @ 0.20 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400-1600 mm²</td>
<td>1 @ 0.30 mm</td>
<td>1 @ 0.40 mm</td>
<td>1 @ 0.50 mm</td>
</tr>
<tr>
<td></td>
<td>or 2 @ 0.20 mm</td>
<td>or 2 @ 0.20 mm</td>
<td>or 2 @ 0.30 mm</td>
</tr>
<tr>
<td>&gt;1600 mm²</td>
<td>1 @ 0.50 mm</td>
<td>1 @ 0.70 mm</td>
<td>1 @ 1.00 mm</td>
</tr>
<tr>
<td></td>
<td>or 2 @ 0.40 mm</td>
<td>or 2 @ 0.50 mm</td>
<td>or 2 @ 0.50 mm</td>
</tr>
<tr>
<td></td>
<td>or 3 @ 0.20 mm</td>
<td>or 3 @ 0.25 mm</td>
<td>or 3 @ 0.30 mm</td>
</tr>
</tbody>
</table>

Table A.1

Note 1  This table defines the size limit for contamination that cannot be removed.
Note 2  The defect limits are non cumulative. Only one limit may be used to determine acceptability of product.
Note 3  Surface area calculations are based on the following dimensions:
        20 mm X 20 mm = 400 mm²
        40 mm X 40 mm = 1600 mm²
<table>
<thead>
<tr>
<th>Subject:</th>
<th>Effective Date:</th>
<th>Revision</th>
<th>Reference Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cosmetic Inspection Standard</td>
<td>Mar. 27, 2006</td>
<td>F</td>
<td>QA0601</td>
</tr>
</tbody>
</table>

75 mm X 75 mm = 5625 mm²  
150 mm X 150 mm = 22500 mm²  

Note 4  The distance between two contamination dots may not be less than 15 cm.
### VI. Specific requirements: (continued)

#### A.2 Size Limits for Scratches

<table>
<thead>
<tr>
<th>Surface Area</th>
<th>Class A</th>
<th>Class B</th>
<th>Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-400 mm²</td>
<td>1 @ 0.50 mm long X 0.10 mm wide</td>
<td>1 @ 0.50 mm long X 0.15 mm wide</td>
<td>1 @ 1 mm long X 0.20 mm wide</td>
</tr>
<tr>
<td>400-1600 mm²</td>
<td>1 @ 1 mm long X 0.10 mm wide</td>
<td>1 @ 1 mm long X 0.15 mm wide</td>
<td>1 @ 2 mm long X 0.20 mm wide</td>
</tr>
<tr>
<td>1600-5625 mm²</td>
<td>1 @ 2 mm long X 0.20 mm wide or 1 @ 3 mm long X 0.10 mm wide</td>
<td>1 @ 3 mm long X 0.20 mm wide or 1 @ 5 mm long X 0.10 mm wide</td>
<td>1 @ 3 mm long X 0.20 mm wide or 1 @ 1 mm long X 0.20 mm wide</td>
</tr>
<tr>
<td>5626-22500 mm²</td>
<td>1 @ 3 mm long X 0.20 mm wide or 1 @ 10 mm long X 0.10 mm wide</td>
<td>2 @ 3 mm long X 0.20 mm wide or 1 @ 10 mm long X 0.10 mm wide</td>
<td>2 @ 5 mm long X 0.20 mm wide or 1 @ 10 mm long X 0.20 mm wide or 1 @ 20 mm X 0.10 mm wide</td>
</tr>
<tr>
<td>&gt; 22500 mm²</td>
<td>1 @ 3 mm long X 0.20 mm wide or 1 @ 15 mm long X 0.10 mm wide</td>
<td>2 @ 3 mm long X 0.20 mm wide or 1 @ 10 mm long X 0.20 mm wide or 1 @ 20 mm X 0.10 mm wide</td>
<td>2 @ 5 mm long X 0.20 mm wide or 1 @ 15 mm long X 0.20 mm wide or 1 @ 30 mm X 0.10 mm wide</td>
</tr>
</tbody>
</table>

Table A.2
B. **Plated Finishes Acceptance Criteria:** The plating shall be bonded firmly to the base material and shall be smooth, continuous, uniform in color and free from defects. Plated surfaces shall show no evidence of bleeding or corrosion due to entrapment of plating or cleaning solutions.

VI. **Specific requirements: (continued)**

C. **Rejection Criteria for Plated Finishes:**

C.1 Poor adhesion, peeling, blisters or pits.

C.2 Plating is coarse or grainy and has abraded, scratched, burned or powdery area.

C.3 Foreign contaminants in the plated surface.

C.4 Excessive build-up (Ends, edges, corners or threads).

C.5 Improper or inadequate plating protection.

C.6 Stains around joints, surface welds or holes.

D. **Sheet-Metal Formed:** This applies to computer sheet-metal chassis or any other sheet-metal formed part. Following is the acceptance criteria for sheet-metal parts or assemblies:

D.1 The sheet-metal parts shall be formed per Engineering Drawings and shall meet all dimensional requirements.

D.2 There shall be no burrs and sharp edges.

D.3 There shall be no dents, die marks or press marks. When a source inspector finds 3 rejects in the same area in the same lot, he/she needs to request the manager of that area to shut down the production machine of a specific part, rather than rejecting the lot.

D.4 There shall be no loose rivets or screws.

D.5 There shall be no corrosion.

D.6 The threaded holes shall have no burrs.

D.7 There shall be no stripped threads.
D.8 When a bolt or screw is screwed into a blind or tapped hole, a minimum of three threads shall be engaged.

D.9 Excessively burred or marred screws are not acceptable. Screw heads must not be so badly damaged that removal would be difficult or that sharp burrs protrude.

VI. **Specific requirements: (continued)**

D. Sheet-Metal Formed: (continued)

D.10 Rivets and eyelet’s shall be tight. The staking of rolling shall be uniform and the heads fully seated.

D.11 Cracks or splits in the rolled or plated portion of eyelet’s shall be permissible within the following limits:

D.11.1 No single part may have more than two minor cracks or splits around the outside diameter.

D.11.2 No crack or split shall extend into the shank.

D.12 No rust is allowed on any external surfaces, bent regions, or cut edges, which may or will be exposed to the End-User. This will also including any exposed surfaces or bent regions of the power supply that may not be covered by any other (either plastic or metal) component of the chassis. No rust is allowed on any internal surfaces or bent regions. But, internal rust on the cut edges, which may not be exposed to the End-User, will be permissible.

VII. **Reference Documents:**

A. Surface Classification Examples (Ref: QA0602-Surface.doc.)

VIII. **Definitions:**

A. **ABRASION:** A surface imperfection that removes or displaces material, characterized by its large width and length relative to its depth.
B. **BLEEDING**: This defect is the discoloration created by the diffusion of coloring material through an applied coating from the substrate to the surface of the coating.

C. **BLEMISH**: The change in the surface appearance due to a flaw or cosmetic defect.

D. **BLISTER**: The raised bumps in the surface, caused by air or solvent vapors forming within or under the coating.

**VII. Definitions: (continued)**

E. **BLUSH**: Discoloration or change in gloss, generally appearing at the gates, abrupt thickness changes or other structures along flow path.

F. **BUBBLE**: A gas pocket in a plastic molded part. For a coating, it is the same as blister.

G. **BURN MARK**: A condition where supper-heated trapped air in the cavity heats or burns the surface of the plastic part.

H. **Burr**: This defect appears as a rough or sharp edge on metal after it has been cast, cut, drilled, stamped, and so forth. Burrs will usually snag or tear a cleaning cloth.

I. **CHIP**: This defect is defined as the loss of adhesion and the removal usually in small fragments, of the surface coating resulting from impact by hard objects. Sometimes it is also known as Mar, Ding or Nick.

J. **CRACK**: A thin break (splitting) in the coating or plastic material or sheet-metal.

K. **CRATER**: This type of defect is characterized by a cup-shaped depression or cavity in the coated surface. Sometimes confused with pinholes, craters begin as blisters with the depression formed as the gas forming the blister escapes before surface hardening.

L. **COLOR VARIANCE**: A difference in hue or color from the specified color.

M. **CONTAMINATION**: It is a condition created by foreign material becoming mixed with virgin plastic material. The contamination spots are usually black or brown in color.

N. **CORROSION**: This defect is caused by chemical reaction with hot humid air or any other solvent.
O. **CRAZING**: This defect is noticeable in surface coatings by slight break in the coating that do not penetrate through to the substrate or a previously applied coating.

P. **DENT**: A surface depression caused by a blow or pressure from another object. Dents have no characteristic size or shape.

Q. **DING**: An impression or depression formed on the surface with impact from another hard object.

**VII. Definitions: (continued)**

R. **DIE MARK**: This type of defect is an indentation, depression, or line that occurs in the same location of every part due to a damaged die, mold, tool and so forth.

S. **DIRT**: This defect often appears in the form of irregularly distributed dust particles, usually appearing burnt and black. These particles generally have no common shape or size and may appear long in shape much like tiny hairs. Particles that are 15-20 mils in diameter can usually be felt.

T. **EJECTOR MARK**: This defect is found in compression molded parts. It is caused by distorted the mold ejector pin and leaves a scar on the part.

U. **FRACTURE**: This defect is characterized by a tear, separation, or pulling apart of metal. A fracture is generally found at corners or wherever sharp radii are located.

V. **FLASH**: This is unwanted excess plastic that occurs at the parting line or interface of molded parts.

W. **GLOSS VARIANCE**: This is a difference in the degree of light reflected from a surface. This is also sometimes call loss of sheen, shine, luster or brightness.

X. **GRAINY COATING**: This coating defect is characterized by the presence of irregularly shaped, angular or round protrusions evenly spread over the area of concern.

Y. **GOUGE**: A gouge is characterized as a scratch of wider width.
Z. **JETTING**: It is flow mark that is caused by the improper injection of plastic melt into a mold cavity. This defect sometimes also called “Snaking”.

AA. **KNIT LINES**: A noticeable line or mark in the surface of a part formed by the flow of the plastic material.

BB. **MAR**: This is coating scraped with no color change.

**VII. Definitions: (continued)**

CC. **PINHOLE**: Pinholes are sharp, round or irregularly shaped depressions randomly distributed over a surface and may range in size from those barely visible to those the size of a pin-head. These defects will sometimes have residual varnish or some other solid in their centers surrounding by a hollow, halo-like space.

DD. **PIT**: A pin hole bigger in size is called a pit.

EE. **PLATE OUT**: Separation of a portion of the material during the injection process that results in this material being deposited on the mold. Parts from a mold that is experiencing plate out will have variations in the gloss of the part, possible filling of fine textured areas and in the extreme case, the appearance of the layers of missing material.

FF. **PRESS MARK**: This is also called mold mark, tool mark or die mark. This is an indentation, depression or line that occurs due to a damaged die, mold or press tool.

GG. **RUN**: A run is generally a long, narrow, linear band of discoloration on a finished surface.

HH. **RUST**: Rust is the visible manifestation of corrosion of the iron or iron alloys. This defect is usually seen as a reddish brown coating, composed mostly of hydrated iron oxides formed on iron or its alloys, as result of exposure to humid surroundings.

II. **SCRATCH**: A scratch may be described as a roughly linear break in a surface produced by external influences. Scratches vary greatly in length and depth. A characteristic common to all scratches is that they are thin relative to their lengths.
JJ. **SMUDGE**: A dirty mark or smear appearing as a run. Smudges usually can be wiped off the surface.

KK. **SINK MARK**: Sink marks are unwanted depressions that occur when a mass of hot plastic in a thick wall section is not thoroughly cooled during the molding cycle. The outside is cool, but the inside is still hot, resulting in the wall collapsing or sinking inward.

LL. **STAIN**: This type of defect is generally brown in color and appears as runs. Stains can usually be wiped off the surface.

MM. **STEP**: The difference in surface alignment between two plastic parts.

**VII. Definitions: (continued)**

NN. **STREAKING**: This defect characterized by long narrow marks, smears, or undesirable bands of color in or on the surface. Streaking cannot usually be felt and in many cases may be wiped off the surface.

OO. **STRESS MARK**: This type of defect usually occurs at the sharp corners and characterized by stress cracking due to deformation or plastic decoration process.

PP. **TAPPED HOLE**: A threaded hole.

QQ. **TOOLING MARKS**: This type of defect is an indentation, depression, or line that occurs in the same location of every part due to damaged tool.

RR. **UNDERFILL**: A plastic part that is not complete in terms of the amount of plastic required.

SS. **WELD LINE**: A noticeable line or mark in the surface of a part formed by the flow of the plastic material.

TT. **WARPAGE**: Distortion of a part characterized by a bowing or twisted condition.