Humanware Cosmetic Standard

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REVISION HISTORY

<table>
<thead>
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<th>No.</th>
<th>Date</th>
<th>Changed Element</th>
</tr>
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<tbody>
<tr>
<td>00</td>
<td>2012, April 11\textsuperscript{th}</td>
<td>First Released.</td>
</tr>
<tr>
<td>01</td>
<td>2012, May 23\textsuperscript{rd}</td>
<td>• Added Acceptance criteria for defects;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Sony grade.</td>
</tr>
<tr>
<td>02</td>
<td>2012, May 23\textsuperscript{rd}</td>
<td>• Modified with commentaries of HW employees.</td>
</tr>
<tr>
<td>03</td>
<td>2012, July 20\textsuperscript{th}</td>
<td>• Added Acceptance criteria for pad and silk-screen printing.</td>
</tr>
<tr>
<td>04</td>
<td>2012, December 7\textsuperscript{th}</td>
<td>• Added Revision history</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Surface to Texture default;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Grinding mark to Scratches / Particles default;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Part line to Flash default.</td>
</tr>
<tr>
<td>05</td>
<td>2012, December 12th</td>
<td>• Added some criterias to the Sink mark default;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Weld line default;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Added Flow mark default.</td>
</tr>
</tbody>
</table>
INTRODUCTION

This document attempts to specify the inspection process and specific defect criteria to be used in the evaluation of HUMANWARE piece parts and assemblies.

It is written to consider the product in the “end user state”, and it is intended to describe the defect acceptance criteria and detailed inspection procedures used to evaluate HUMANWARE parts based on severity level & from the end users perspective.

The main goal is to form a Common Sense quality level from supplier to customer, resulting in fewer misunderstanding, higher yields and hence lower costs. The evaluation of piece parts should be considered as to how the end user perception of the product would be affected.

This Handbook must also apply to any piece parts/subassemblies that can affect the external appearance of the end user product.

The Supervisor Quality Control is the responsible for taking all of these factors into consideration and determining the cosmetic requirements of the product.

NOTE : This is a general guideline to be used as a platform for inspection of Humanware products by the manufacturers of Humanware

However if a specific Inspection Direction is issued for the component or assembled product then it supersedes this document. If no specific instruction is issued then this document applies.
LIGHTING CONDITIONS

Parts under evaluation for cosmetics should be placed directly under a light source of 1000 ± 200 Lux.

The viewing room should be away from any outside daylight source. The light should be evenly distributed and from straight above.

As a rule, the minimum lighting on the work surface should be 800 Lux.

SURROUND COLOR

The part/subassembly under evaluation should be placed in front of a light gray color background: Pantone Cool Gray 6 C.

This creates a neutral color surround and minimizes the color judgment error of the inspector.

Note: Background color can be deviated from if approved by Humanware.

Please refer to the picture below as reference.

OBSERVATION CONDITIONS / VIEWING ANGLE

Observation direction with reference to lighting condition:

- Observe the specimen at an angle of 45° when the light is from the normal direction with respect to the specimen surface & reference surface.

- Observe the specimen at the normal direction when the light is from an angle of 45° with respect to the specimen surface & reference surface.
To ensure that the part is inspected under all possible lighting conditions it is mandatory to rotate the part to ensure all defects can be seen.

PERFORMING INSPECTION

Viewing Distance / Viewing Time

The standard viewing distance measured from the eye to the object for all surfaces will be from 40 to 50cm. This is an average representation of 1 arm’s length and is a standard inspection class to represent the normal operational distance by the product user.

The standard viewing time for each component will be 5s. A maximum time of up 10s is permitted, however if a fault cannot be viewed within the 10s maximum the piece should be accepted.
DEFECT LOCATION

This specification defines the cosmetic requirements for HOUSING PARTS and ASSEMBLIES of Humanware. The cosmetic requirements shall be divided into four zones in accordance to area location.

DEFINITION OF ZONES

Zone A (critical)
Zone A is defined as areas in continuous view of the inspector.

Zone B
Zone B is defined as areas in occasionally in view of the inspector.

Zone C
Zone C is defined as areas seldom seen by the inspector.

Zone D
Zone D is defined as areas never seen by the inspector.

ACCEPTANCE CRITERIA FOR DEFECTS

<table>
<thead>
<tr>
<th>Maximum allowable sizes of defects on commonly-used cosmetic parts</th>
<th>Appearance Zone A</th>
<th>Appearance Zone B</th>
<th>Appearance Zone C</th>
<th>Appearance Zone D</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 mm²</td>
<td>0.3 mm²</td>
<td>0.5 mm²</td>
<td>0.7 mm²</td>
<td></td>
</tr>
<tr>
<td>Maximum allowable number (N) and pitches (P) of defects in a 100mm²</td>
<td>N : 2</td>
<td>N : 2</td>
<td>N : 3</td>
<td>N : 4</td>
</tr>
<tr>
<td>P : 70 mm</td>
<td>P : 70 mm</td>
<td>P : 50 mm</td>
<td>P : 30 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Appearance Zone A</th>
<th>Appearance Zone B</th>
<th>Appearance Zone C</th>
<th>Appearance Zone D</th>
</tr>
</thead>
<tbody>
<tr>
<td>N : 2</td>
<td>N : 2</td>
<td>N : 3</td>
<td>N : 4</td>
</tr>
<tr>
<td>P : 70 mm</td>
<td>P : 70 mm</td>
<td>P : 50 mm</td>
<td>P : 30 mm</td>
</tr>
</tbody>
</table>

Subject: Humanware Cosmetic Standard
Approved by: Supervisor Quality Control
2012, December 12th
ACCEPTANCE CRITERIA FOR PAD-PRINTING OR SILK-SCREEN PRINTING

Printing defects should be evaluated based on logo below.

**Definition:**

- **w**: Width
- **a**: Protrusion
- **b**: Void
- **c**: Crack
- **d**: Blur

**On all zones, this formula is applicable**

\[ a; b; c; d : \leq \frac{w}{4} \]

**Misalignment**

< 0.2 mm

**Mispositioning**

< 0.5 mm

**ALL ZONES**

**Cosmetic Paint**

All painted surfaces shall meet the color requirements as defined by Humanware. All painted surfaces shall be uniform and free of streaks, runs, flakes, bubbles, or loss of texture caused by paint build-up. Paint shall not be rubbed off by a dry cloth or the fingers. If any paint transfers to a dry cloth or the fingers, that part is not acceptable. Any visual and/or tactile particles under the painting on the Zone A will not tolerated. On the others zone, all depends products, it will be defined by Humanware.

**Overspray**

Overspray is not acceptable.
Spot / Dust
Refer to the Sample Spot in accordance with the grade of each zone.

**Pad-printing or silk-screen printing**
The pad-printing or silk-screen printing must be perfectly readable at 40-50cm. The location of printing must be conforming to the drawing and the color reference number (Pantone or NCS) should be used to validate the color of the ink.

Use a cotton cloth dipped in alcohol and rubbed 100 times with a force of 200gf. Then, scratch with your fingernail the logo and make sure the logo will not fade, doesn’t flake and there is no ink on the cotton cloth.

**Labels**
The labels must be conforming to the requirements of Humanware and apply as per the drawings.

**Texture / Surface**
The texture or surface should be as requested in the drawings.
If the texture or surface is uneven, it’s not acceptable.

**Scratches / Particles / Grinding mark**
Any tactile default, scratches or visual particles on the Zone A will not be tolerated. On the other zones, you can refer to the HCS Zone file and the Sample Spot chart.

**Flash / Part line**
If the product is portable, all the sides in contact with the hand must not have the flash for example, the flash inside handle is not acceptable.
Other location, please refer to the HCS Zone file and the Sample Spot chart. Where flash has been trimmed, the cut marks shall not remove any texture. Any trimmed surface should be smooth without jagged edges.

**Weld line**
On zones A and B, no weld line will be tolerated. Zone C, 1 weld line by surface and the maximum length accepted is 1.5 cm. Zone D, it will be tolerated.

**Flow mark**
On zones A and B, no flow mark will be tolerated. Zone C, 1 flow mark by surface and until 0.5 cm² will be accepted. Zone D, it will be tolerated.

**Sink mark**
On zones A and B no sink mark will be tolerated. On the zone C, 2 mm², not tactile is tolerated and on zone D, it will be tolerated.
Mismatch (Housing fit)
Mismatch greater than 0.40 mm per side is not acceptable.

Casing
No cracking sound is acceptable when pressing the housing with a 20 Newton force.

Tracks
Humanware will furnish you the procedure of inspection the tracks.

Piston
As described by the manufacturer.

LCD Pixels (for Class II )
The table below shows the acceptable number of malfunctioning sub-pixels, depending on the native resolution of the LCD and allowing for 5 malfunctioning sub-pixels per million pixels.

<table>
<thead>
<tr>
<th>Native Resolution</th>
<th>No. of Pixels</th>
<th>No. of Million Pixels</th>
<th>Allowable Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1024 x 768</td>
<td>786,432</td>
<td>0.79</td>
<td>4</td>
</tr>
<tr>
<td>1280 x 1024</td>
<td>1,310,720</td>
<td>1.31</td>
<td>7</td>
</tr>
<tr>
<td>1600 x 1200</td>
<td>1,920,000</td>
<td>1.92</td>
<td>10</td>
</tr>
<tr>
<td>2048 x 1536</td>
<td>3,145,728</td>
<td>3.15</td>
<td>16</td>
</tr>
</tbody>
</table>

Most, if not all, LCD monitor for commercial purpose are fit in ClassII. Class I is for military, hospital or other critical applications.

Camera Pixels
No bad pixels in the camera will be tolerated.

Button
Push buttons: The buttons must have a rebound and not jammed in the cavity. Refer to the “Assembly document” for the course of button.
Rotary buttons: The buttons should not have friction when turning or between notches for detent knob.

LCD, lens, mirror, lens cover
This part must be free of dirt, finger print, grime, grease and other contaminants.

Structural soldering
The soldering must be straight and regular.
Pin holes greater than “0.5”mm in diameter is not acceptable. There shall be no more than (1) pin hole by 25mm.
Loose part
Loose part inside the unit is not acceptable.

Cleanliness
Parts must be free of dirt, finger print, grime, grease, and other contaminants. Dust caused by shipping material is acceptable if it can be blown off with air or wiped off.

For each product, Humanware will identify a grade by zone to inspect.

SAMPLE SPOT

<table>
<thead>
<tr>
<th>DIA.</th>
<th>AREA</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>0.02mm²</td>
<td>I</td>
</tr>
<tr>
<td>0.15</td>
<td>0.03mm²</td>
<td>II</td>
</tr>
<tr>
<td>0.20</td>
<td>0.04mm²</td>
<td>III</td>
</tr>
<tr>
<td>0.25</td>
<td>0.05mm²</td>
<td>IV</td>
</tr>
<tr>
<td>0.30</td>
<td>0.10mm²</td>
<td>V</td>
</tr>
<tr>
<td>0.35</td>
<td>0.15mm²</td>
<td>VI</td>
</tr>
<tr>
<td>0.40</td>
<td>0.20mm²</td>
<td>VII</td>
</tr>
<tr>
<td>0.45</td>
<td>0.30mm²</td>
<td>VIII</td>
</tr>
<tr>
<td>0.50</td>
<td>0.50mm²</td>
<td>IX</td>
</tr>
<tr>
<td>0.55</td>
<td>0.70mm²</td>
<td>X</td>
</tr>
<tr>
<td>0.60</td>
<td>1.00mm²</td>
<td>XI</td>
</tr>
<tr>
<td>0.70</td>
<td>2.00mm²</td>
<td>XII</td>
</tr>
</tbody>
</table>

ZA | Zone A | Grade V
ZB | Zone B | Grade VIII
ZC | Zone C | Grade IX
ZD | Zone D | Grade X

March 2012