

**Quality and surface requirements plastic parts****1 Goals**

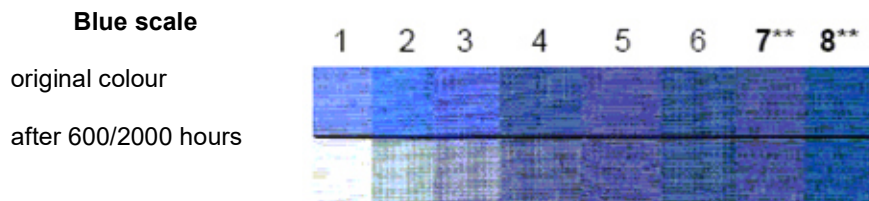
The aim of this document is to define the quality and surface requirements in relation to plastic parts. Assembly groups can consist of different components. The components can be produced with different manufacturing methods from several manufactures. The standardized characteristics and features of plastic parts are therefore mandatory for a uniform impression of the assembly group.

**2. UV stability and permissible color variation****2.1 UV Stability****Lightfastness for plastics:**

Inspection request for indoor products, 600 hours  
Inspection request for outdoor products, 2000 hours

**Test requirement:** according to Vitra test instructions (acc. to EN ISO 105- B02)

**Testing instrument:** Suntest CPS, Xenon Lamp 1500 B + UV Filter + Quartz glass



\*\* = fulfills Vitra requirement (at least grade 7)

**Embrittlement:** bending test, breaking test 45° (after UV test)

**Required test samples** > 3 pieces of 60mm x 10mm x < 5mm for determination of lightfastness

**2.2 Colour deviation**

The metric assessment of the colour is carried out by the CIE- Lab system with the following light types:

- **D 65**, daylight
- **F 11 or TL84**, artificial daylight

The optical evaluation is carried out in a light cabin (ASTM D 1729) also with the above light types

**Permissible tolerances during measurement:**

$\Delta L$  <1  
 $\Delta a$  <1  
 $\Delta b$  <1  
 $\Delta E$  <1

**Metameric Index:** < 0.5

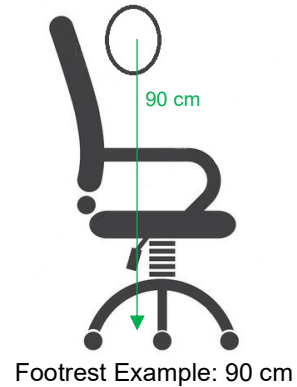
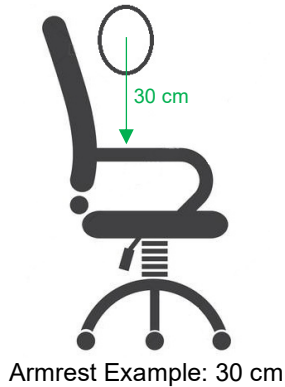
The optical assessment takes precedence over the measured value. Slight optical deviations from the original pattern are permissible, see stage 4 of EN 14323:2004 (D)

**Required test samples** > 3 pcs of min 30mm x 50mm for colour measurement and optical evaluation

**3 Surface Specification**

**3.1 Test conditions**

- **Testers**
  - Normal viewing ability
- **Illumination**
  - Daylight (D65) and artificial light (F11), low reflection of 1,000 lux
- **Viewing distance**
  - If possible, the viewing distance should reflect the real usage/installation condition
  - The surfaces should generally be assessed at a distance of 0.3-0.9 metres. The surface to be assessed must be evaluated from different viewing angles.

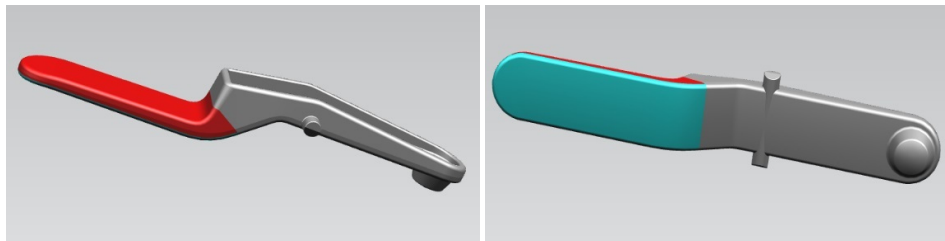


- **Test condition**
  - The surfaces must be assessed in a clean condition
- **Error Detection/Identification**
  - The defectiveness of the area to be assessed on the component must be detected within a maximum of 10 seconds
- **ABC Surfaces Definition**
  - Component specific information on A/B/C surfaces is included in the product-related Q specification

**Legend:**

- Red = A surface // directly visible surfaces
- Blue = B surface // indirectly visible surfaces
- Grey = C surface // invisible surfaces

**For example:**



**3.2 Not / poorly Countable Errors**

Errors that cannot be counted are to be evaluated as described below. Detailed error description with examples, see 3.4.

No	Characteristic/Error
1	visible injection point on the opposite side
2	Streaks
3	Draw grooves
4	Contour error
5	Burned spots
6	Flow lines
7	Weld line
8	Air hook
9	Damage
10	Shrink mark
11	Flash, burr at mould parting and edges
12	Tool offset, visible mould separation
13	Deburring error
14	Gloss differences
15	Glass breakthrough

- On A surfaces, the defects shall not be recognizable under the test conditions specified in 3.1.
- On B surfaces the defects must not be recognisable from a distance of 100 cm
- On C-surfaces the technical requirements apply

Flash/Burr and tool offset (error no. 11/12) must not be clearly palpable on A and B surfaces.

In the case of unavoidable, visible/ palpable error, the above-mentioned errors must be defined with boundary and/or reference samples.

Proposals for these samples shall be submitted by the supplier in duplicate version in signed form with signature and date before EMPB completion to Vitra for counter-signature. If necessary, Vitra can assist in the selection of samples.

To assist/clarify the written specification and documentation of the samples, Vitra and the supplier can create a product-specific error catalogue, which is compiled and supplemented during sampling and production.

### 3.3 Countable Errors

Countable errors are defined and evaluated in number and size for each area category (A/B/C). To determine the allowable error size, an evaluation card ("Fehlergrößenbestimmungstabelle") can be used. This evaluation tool is provided by Vitra on request.



No	Characteristic /Error
16	Inclusion
17	Pore
18	Scratch

#### Allowed errors on A/B/C surfaces

The information is valid for the entire area of the respective category (A/B/C).

- **A-surfaces: directly visible surfaces**

Individual defects must have a minimum distance of 200mm from each other.

**High contrast** / e.g. black-and-white, clearly delimited

- Error frequency of group  $\leq 0.1\text{mm}^2$  is allowed on this area 4x
- Error frequency of group  $\leq 0.2\text{mm}^2$  is allowed on this area 2x

**Low contrast** / e.g. blue-green, non-clearly delimited

- Error frequency of group  $\leq 0.2\text{mm}^2$  is allowed on this area 4x
- Error frequency of group  $\leq 0.4\text{mm}^2$  is allowed on this area 2x
- Error frequency of group  $\leq 0.8\text{mm}^2$  is allowed on this area 1x

- **B-surfaces: indirectly visible surfaces**



Individual defects must have a minimum distance of 100mm from each other.

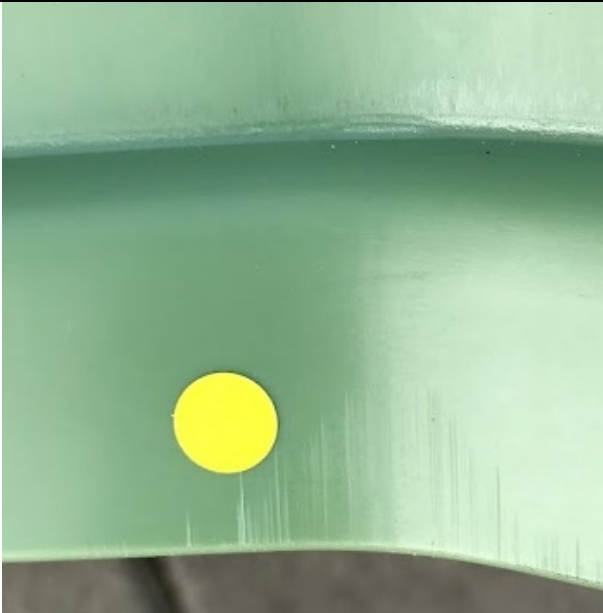

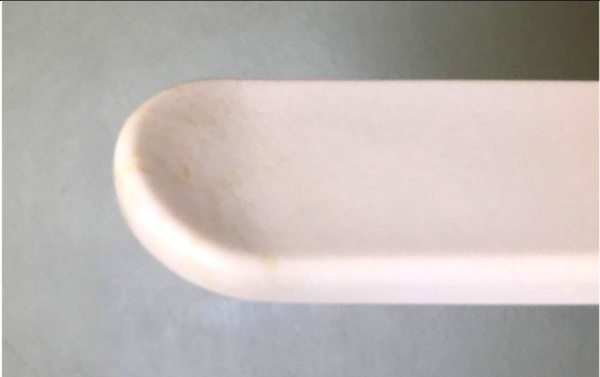
- Error frequency of group  $\leq 0.2\text{mm}^2$  is allowed on this area 4x
- Error frequency of group  $\leq 0.4\text{mm}^2$  is allowed on this area 2x
- Error frequency of group  $\leq 0.8\text{mm}^2$  is allowed on this area 1x



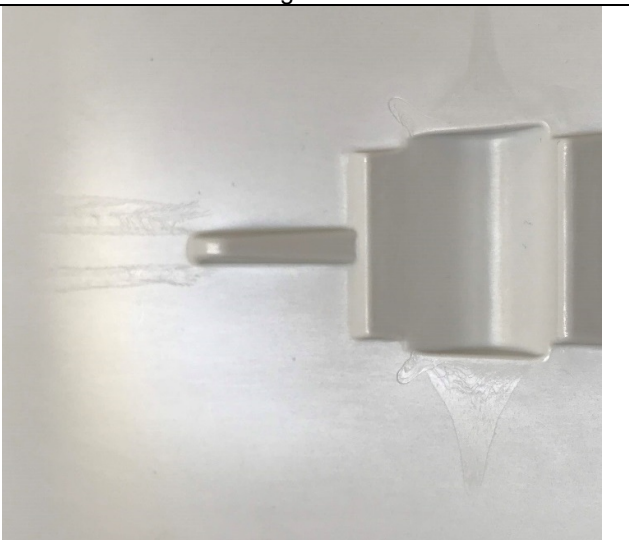
- **C surfaces: not visible surfaces**




Technical requirements

**3.4 Description of characteristics/errors**

No	Characteristic /Error	Description / image
1	visible injection point on the opposite side	 <p data-bbox="623 877 1351 940">Dull spot opposite the contact point due to e.g. material coldness, shearing, tool wear</p>
2	Streaks	 <p data-bbox="623 1310 1351 1394">Streaks in the course of the material due to e.g. poor mixing in the extruder, demixing due to high shear, or incompatibility of the carrier / colour component</p>




3	Draw grooves	 <p data-bbox="623 842 1349 894">Draw grooves due to e.g. insufficient draft angle for the respective tool surface/grain, or strong part distortion</p>
4	Contour error	 <p data-bbox="623 1266 1053 1287">Contour error due to e.g. part distortion</p>
5	Burned spots;	 <p data-bbox="623 1696 1338 1776">Material discolouration due to e.g. high material temperature due to internal friction, too high tool temperature, or insufficient ventilation</p>

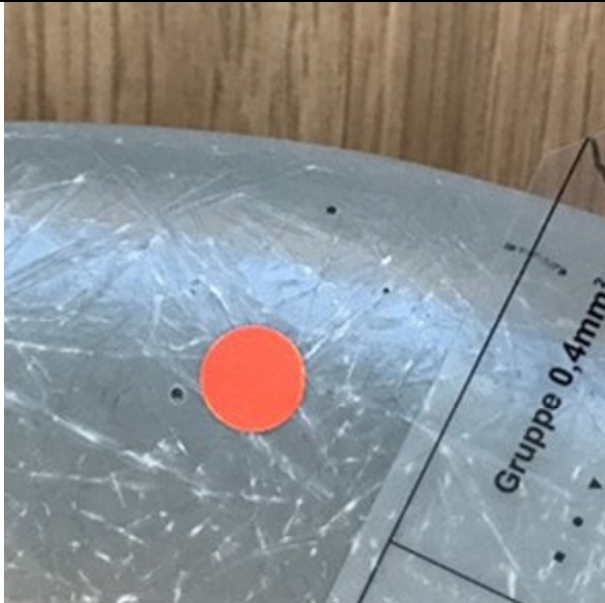

6	Flow lines	 <p data-bbox="623 600 1377 653">Material flow line visible due to e.g. insufficient tooling temperature</p>
7	Weld line	 <p data-bbox="623 1146 1377 1171">weld line visible due to e.g. confluence of two mass currents</p>
8	Air hook	 <p data-bbox="623 1707 1377 1768">Air hooks due to e.g. insufficient ventilation at wall thickness jumps</p>

9	Damage	 <p>Subsequent damage, such as gloss points (picture above), shocks, fractures due to e.g. insufficient care when handling finished parts</p>
10	Shrink mark	 <p>shrink mark in the area of bridge or point connections due to e.g. the shrinkage behaviour of the material</p>
11	Flash, burr at mould parting and edges	 <p>Flash/burr, e.g. due to insufficient clamping force, imprecise tool construction, and/or insufficient removal afterwards, sometimes goes in hand with slight overmoulding</p>



12	Tool offset, visible mould separation	 <p data-bbox="623 1087 1305 1146">Offset of two different tooling parts visible/feelable, due to e.g. imprecise tooling construction</p>
13	Deburring error	 <p data-bbox="623 1772 1305 1831">Deburring error due to e.g., too deep, manually cutting into the material</p>

14	Gloss differences	 <p>Gloss differences within one part, or between two parts of the same tool due to e.g. different tool temperature, insufficient casting of the grain due to too low pressure, or too low material temperature</p>
15	Glass breakthrough	 <p>Glass breakthrough: Gloss differences, roughness differences, stain, due to e.g. flow front turbulence at wall thickness jumps, deflections, shear, weld line</p>
16	Inclusion	 <p>Coloured inclusion in the material due to e.g. contamination of the base material or the machine</p>

<p>17</p>	<p>Pore</p>	 <p>Air inclusions in the material, especially in duromer resin systems due to e.g. non-evacuated resin, air bubble overflow on the tool surface</p>
<p>18</p>	<p>Scratch</p>	 <p>Scratches are line-shaped mechanical damage to the Surface due to e.g. inadequate attention while the handling the parts</p>