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Introduction

Gerresheimer Tubing Glass

Gerresheimer Tubing with its plants Gerresheimer Glass Inc. (USA) and Gerresheimer Pisa S.p.A. (Italy), formerly Kimble Glass Inc. and Kimble Italiana S.p.A. respectively, is dedicated to the manufacture and sale of quality borosilicate tubing, rod and other glass products. Gerresheimer glass is synonymous with high quality and our name is recognized worldwide as a premier supplier of tubing and rod. Gerresheimer supplies clear and amber glass tubing as a key material in the production of health care containers, laboratory apparatuses, scientific applications, medical devices, and many other items. Tubing is manufactured to exacting standards, utilizing state-of-the-art technology that consistently meets the most rigorous standards required by today’s high-speed glass converting operations.

High-Quality Melting Technology

We control the entire glass making process from receipt of certified raw materials, through batch mixing, to melting, to tube drawing and packaging. Gerresheimer is focused on Process Discipline as a method to ensure that the highest standards are not only met today, but well into the future. The visual and dimensional quality specifications of tubing are designed to meet the exacting standards required for the production of pharmaceutical containers.

In-Process Controls

The Gerresheimer Tubing international engineering and technical staff utilizes state-of-the-art melting technology and materials to design furnaces that deliver the highest standards of visual quality throughout the life of the furnace. The commitment to continuous improvement is evident in the investments being made to further glass melting and forming technology.

General Notations

Note 1: OD, WT, ID, OOR, WS, measurements are taken on the usable length of the tube. Any local deviation of same in correspondence with knots or stones or other dimensionally relevant defects, shall not be considered defect with respect to the dimensional specification.

Note 2: API or All Points In dimensions are available upon request.
Outer Diameter

The average of the OD\textsubscript{min} and OD\textsubscript{max}:

\[
OD_{\text{ave}} = \frac{OD_{\text{min}} + OD_{\text{max}}}{2}
\]

In any tube cross section, the OD\textsubscript{min} is the minimum distance between two points on the annular cross section. This coincides with the minimum distance of two parallel lines touching the outer boundary of the annular cross section. Practically, a measurement can be obtained for any relative orientation of the cross section with respect to the parallel lines. The OD\textsubscript{min} is the minimum value obtainable by orienting the tube in every direction.

In any tube cross section, the OD\textsubscript{max} is the maximum distance between two points on the annular cross section. This coincides with the maximum distance of two parallel lines touching the outer boundary of the annular cross section. Practically, a measurement can be obtained for any relative orientation of the cross section with respect to the parallel lines. The OD\textsubscript{max} is the maximum value obtainable by orienting the tube in every direction.
**Ovality (OR)**

An equivalent measurement takes the full swing of the OD, which defines the Ovality. As it is twice the circularity, the corresponding limit is also twice:

\[
\text{Ovality (OR)} = \text{OD}_{\text{max}} - \text{OD}_{\text{min}}
\]

**Circularity (NCR)**

The Circularity error is defined in any cross section as half the swing of the oriented OD:

\[
\text{Circularity (NCR)} = \frac{\text{OD}_{\text{max}} - \text{OD}_{\text{min}}}{2}
\]
**Inner Diameter**

The average of the ID_{min} and ID_{max}:

\[ ID_{ave} = \frac{ID_{max} + ID_{min}}{2} \]

**Id min**

The minimum distance of two parallel lines touching the inner boundary of the annular cross section.

**Maximum Inner Diameter (ID max)**

In any tube cross section, the ID_{max} is the maximum distance between two points on the inner surface. This coincides with the maximum distance of two parallel lines tangent to the inner boundary of the annular cross section. Practically, a measurement can be obtained for any relative orientation of the cross section with respect to the parallel lines. The ID_{max} is the maximum value obtainable by orienting the tube in every direction.

**Notes**

The ID_{max} and ID_{min} are obtainable by measuring with double-point snap gauge or micrometer suitable for internal measurements and rotating the tube, and then taking the max and min.

Note: When WT (wall weight/wall thickness) is specified, ID is not applicable.
The average of WTmin and WTmax of a given cross section:

\[ WT_{ave} = \frac{WT_{max} + WT_{min}}{2} \]

The maximum oriented WT obtainable in a given cross section.

In any tube cross section the OD is the shortest distance between two points on the inner and outer surfaces of the tube. Practically, a local measurement can be obtained for any angular position of the external point. The WTmin of the cross section is the minimum of such values.
Wall Siding (LOP)

The Wall Siding is the difference between the maximum and minimum Wall Thickness on a cross section of the tube:

$$\text{LOP} = \text{WT}_{\text{max}} - \text{WT}_{\text{min}}$$

**Notes**

The WTmin and WTmax are practically obtainable by magnetic gauge with bead or with dial gauge with mandrel, the sample is rotated to obtain the max and min Wall Thickness. Wall Siding maximum acceptable value is specified depending on the nominal Wall Thickness, usually as a percentage of same.

When ID is specified, WT is normally not specified. The Wall Siding (LOP) requirement instead, applies anyway.
Length

The maximum distance between two planes perpendicular to the tubing axis, touching both tube ends.

<table>
<thead>
<tr>
<th>Bow (B_{center})</th>
<th>The Straightness is defined as longitudinal curvature of the tubing, and is measured at the maximum deviation from a straight line over 1000 mm length of the tube.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes</td>
<td>The Bow is obtained by laying the tube on two supports, 1000 mm apart from each other, and measuring half the swing of the position of its mid section axis, when it is rotated at least one complete turn around its axis.</td>
</tr>
<tr>
<td>Snaky Bow (B_s)</td>
<td>After initial visual observation, measurement is defined as longitudinal curvature of the tubing, and is measured at the maximum deviation from a straight line over agreed upon length of the tube as stated in individual agreed upon specifications.</td>
</tr>
</tbody>
</table>
Square Cut

**Square Cut (SC)**

The Square Cut of a defined tube end, is the greatest absolute difference between two parallel planes, perpendicular to the tube axis, enclosing the whole end rim of the tube end. The end rim is defined by the point of contact of a linear probe, mounted perpendicularly to the tube axis and parallel to the tube radius, while the tube is rotated 360°.

Every tube provides two measurements of the Square Cut, one on each end.

**Notes**

The tube shall not translate along its axis while it rotates. This can be ensured by keeping the opposite end in contact with a suitably wide reference plane, perpendicular to the tube axis.

The Square Cut limit may be specified as a percentage of the nominal OD.

Glazing

**End Taper (ET)**

The End Tapper of a defined tube end, is the distance between tube end and tube section where the ODmax is:

\[
OD_{ET} = OD_{max} (50\text{mm}) - OD_{toll}
\]

**Notes**

Only for Customer specific agreements.
End Finishing – Glazing

The Glazed ID of a defined tube end, is the internal diameter measurement that can be taken at the glazed tube end.

### Alternate glazing measurements:

**Glazing Thickness (GT max)** The Glazing Thickness of a defined tube end, is the maximum thickness of glazing measurable at one end along a radius:

\[
GT_{\text{max}} = OD_{\text{max}} - GID_{\text{min}}
\]

---

<table>
<thead>
<tr>
<th>Light</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Light Tube" /></td>
<td><img src="image2" alt="Medium Tube" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heavy</th>
<th>Bottoming</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Heavy Tube" /></td>
<td><img src="image4" alt="Bottoming Tube" /></td>
</tr>
</tbody>
</table>
Visual Quality Specifications
Air Lines

### Definitions

**Closed Airline**

The elongated gaseous inclusion in the tubing, completely surrounded by glass.

**Open Inside Airline**

The elongated cavity in the tubing that physically breaks the inner surface.

**Airline Width (W)**

The Airline Width is the maximum width over the whole airline as apparent from outside the tube.

**Aggregate Length %**

The Aggregate Length is the fraction of tubing length which is occupied by airlines, expressed in a percentage. It is the sum of the lengths of all airlines exceeding a certain dimension (Length and Width thresholds), divided by the total length of tubing inspected.
# Knots & Stones (Inclusions or Rough)

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knot</td>
<td>The transparent inclusion</td>
</tr>
<tr>
<td>Stone</td>
<td>The opaque inclusion</td>
</tr>
<tr>
<td>Size (S)</td>
<td>The Stones are the apparent diameter of the opaque core. The Knots are the apparent diameter of the transparent core, to be measured as indicated in the figures below.</td>
</tr>
</tbody>
</table>

## Knots & Stones

![Knots](image1)

![Stones](image2)
## Cracks

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracks</td>
<td>The extensive break running deep into, or completely passing through, the glass wall. Cracks significantly weaken the mechanical robustness of a tube.</td>
</tr>
<tr>
<td>End Cracks (Fissures)</td>
<td>The Cracks originating from the tube end, or entirely laying within 20 mm from the tube end.</td>
</tr>
<tr>
<td>Surface Cracks</td>
<td>That are all other Cracks.</td>
</tr>
<tr>
<td>Length (L)</td>
<td>The Length of the Crack line measured at the tube outer surface.</td>
</tr>
</tbody>
</table>

### CRACKS

- [Image of a tube with a crack](image1)
- [Image of a tube with a crack](image2)
- [Image of a tube with a crack](image3)
- [Image of a tube with a crack](image4)
Surface Impurities / Foreign Material

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Surface Impurity/Foreign Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This is any material adherent to the glass surface, that is foreign to the glass composition, such as dust, grease, oil, and other organic or inorganic material, which can be seen without magnification under normal lighting. Surface Impurities can be divided into different categories, such as Inner or Outer, removable or non-removable Surface Impurities (this is clarified on individual specifications).</td>
</tr>
</tbody>
</table>

| Size (S)    | The diameter (or longest dimension) of the piece of the stain or spot as visually apparent from outside the tube. |

SURFACE IMPURITIES / FOREIGN MATERIAL
Scratches

Definitions

Scratches

The slight surface abrasions that do not penetrate the tubing wall. Mechanical strength is not impacted by Scratches.

Size

The size is measured with respect to the longitudinal and circular dimensions of the area occupied by the scratch.

Length (L) for longitudinal scratches
Arc (A) for circular ones (fraction of circumference)

Width

The width of the single Scratch. Can be better measured by means of a 10 x microscope.

Aggregate Length

In case of multiple Scratches, the overall length (AL) shall be obtained by summing up the axial projection lengths of all Scratches wider than the specified minimum.
Glass Particles

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Glass Particles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The fragments of glass inside the tube</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Particle Size (S)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The diameter (or longest dimension) of the fragment as visually apparent from outside the tube.</td>
</tr>
</tbody>
</table>

Glass Thread

<table>
<thead>
<tr>
<th>Definitions</th>
<th>“Thread”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The elongated mass of glass, completely or partially sticking to the inner or outer surface of the tube.</td>
</tr>
</tbody>
</table>
Pit Trail / Roller Marks

Definitions

Pit Trail / Roller Marks
Dimples in the glass that are positioned in a straight line, spaced a certain distance apart.

Paneling (Waving)

Definitions

Paneling (Waving)
The deviation of the transverse optical properties from the ideal case of “uniform glass and annular cross section”, consistent along the tubing. The typical effect is the appearance of “wavy” patterns, when looking at a banded pattern in the background, across the tube, while same is being rotated.
## Definitions

| **Strain** | An elastic deformation caused by tensile and/or compressive forces existing within the glass. |
Appendices
A. Sampling Methods and Tables

Generally the Single Sampling Plan, Normal Inspection (Level II) as described in ISO 2859 is used. For the sampling plan definition, and subsequent delivery acceptance or rejection, one lot is always defined to be one pallet, while the Test Unit is defined for each defect type according to the following guidelines.

<table>
<thead>
<tr>
<th>LOT or Batch Size N</th>
<th>AQL 0.025</th>
<th>AQL 0.10</th>
<th>AQL 0.25</th>
<th>AQL 0.40</th>
<th>AQL 0.65</th>
<th>AQL 1.0</th>
<th>AQL 1.5</th>
<th>AQL 2.5</th>
<th>AQL 4.0</th>
<th>AQL 6.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>from – to</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
<td>n / AC</td>
</tr>
<tr>
<td>1201 – 3200</td>
<td>500/0</td>
<td>125/0</td>
<td>200/1</td>
<td>125/1</td>
<td>125/2</td>
<td>125/3</td>
<td>125/5</td>
<td>125/7</td>
<td>125/10</td>
<td>125/14</td>
</tr>
<tr>
<td>3201 – 10000</td>
<td>500/0</td>
<td>125/0</td>
<td>200/1</td>
<td>200/2</td>
<td>200/3</td>
<td>200/5</td>
<td>20/7</td>
<td>200/10</td>
<td>200/14</td>
<td>200/21</td>
</tr>
<tr>
<td>10001 – 35000</td>
<td>500/0</td>
<td>500/1</td>
<td>315/2</td>
<td>315/3</td>
<td>315/5</td>
<td>315/7</td>
<td>315/10</td>
<td>315/14</td>
<td>315/21</td>
<td>200/21</td>
</tr>
<tr>
<td>35001 – 150000</td>
<td>500/0</td>
<td>500/1</td>
<td>500/3</td>
<td>500/5</td>
<td>500/7</td>
<td>500/10</td>
<td>500/14</td>
<td>500/21</td>
<td>315/21</td>
<td>200/21</td>
</tr>
<tr>
<td>150001 – 500000</td>
<td>500/0</td>
<td>800/2</td>
<td>800/5</td>
<td>800/7</td>
<td>800/10</td>
<td>800/14</td>
<td>800/21</td>
<td>500/21</td>
<td>315/21</td>
<td>200/21</td>
</tr>
<tr>
<td>&gt; 500000</td>
<td>2000/1</td>
<td>1250/3</td>
<td>1250/7</td>
<td>1250/10</td>
<td>1250/14</td>
<td>1250/21</td>
<td>800/21</td>
<td>500/21</td>
<td>315/21</td>
<td>200/21</td>
</tr>
</tbody>
</table>

Lot = 1 pallet
n = Random sample size (number of testing units evaluated).
c = Acceptance figure (lot is accepted if number of defects in random sample is less than or equal to the acceptance figure).

**BTU**

The Basic Testing Unit (BTU or audit sample size) is a one tubing length. 5 kg random sample (500 TU of 10 grams each) should be used when Basic Testing Unit is not acknowledged under sample size.

**Test Unit**

1 tube. The sample must be extracted randomly as per same ISO 2859, Normal Inspection – Level II, sampling plan, from a minimum of three non-consecutive bundles. The lot size is the number of tubes in a pallet.

**Test Unit**

1 bundle. For evaluating packaging defects (e.g. labelling, plastic wrap), the sample will be as per same sampling plan of ISO 2859, randomly extracted from different rows of the pallet.
## B. Chemical and Physical Characteristics

### Glass Composition (approximate oxide weight [%])

<table>
<thead>
<tr>
<th>Oxide Component</th>
<th>Symbol</th>
<th>Gx®51-V</th>
<th>Gx®51-D</th>
<th>Gx®51-L (Amber)</th>
<th>Gx®33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon Dioxide</td>
<td>SiO₂</td>
<td>72.0</td>
<td>73.0</td>
<td>69.0</td>
<td>80.0</td>
</tr>
<tr>
<td>Boron Oxide</td>
<td>B₂O₃</td>
<td>11.5</td>
<td>11.2</td>
<td>10.0</td>
<td>12.7</td>
</tr>
<tr>
<td>Aluminium Oxide</td>
<td>Al₂O₃</td>
<td>6.8</td>
<td>6.8</td>
<td>6.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Calcium &amp; Magnesium Oxide</td>
<td>CaO + MgO</td>
<td>0.7</td>
<td>1.0</td>
<td>1.0</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td>Sodium Oxide</td>
<td>Na₂O</td>
<td>6.5</td>
<td>6.8</td>
<td>6.0</td>
<td>4.3</td>
</tr>
<tr>
<td>Potassium Oxide</td>
<td>K₂O</td>
<td>2.4</td>
<td>1.2</td>
<td>2.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Cl</td>
<td>0.1</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Iron Oxide</td>
<td>Fe₂O₃</td>
<td>&lt; 600 ppm (*)</td>
<td>&lt; 400 ppm (*)</td>
<td>1.0</td>
<td>&lt; 500 ppm (*)</td>
</tr>
<tr>
<td>Barium Oxide</td>
<td>BaO</td>
<td>&lt; 400 ppm (*)</td>
<td>&lt; 400 ppm (*)</td>
<td>1.5</td>
<td>&lt; 400 ppm (*)</td>
</tr>
<tr>
<td>Titanium Dioxide</td>
<td>TiO₂</td>
<td>&lt; 400 ppm (*)</td>
<td>&lt; 300 ppm (*)</td>
<td>3.0</td>
<td>&lt; 400 ppm (*)</td>
</tr>
</tbody>
</table>

(*) Not introduced in the batch composition

### Chemical Resistance Classifications

<table>
<thead>
<tr>
<th>Resistance Class</th>
<th>Specification</th>
<th>Gx®51-V</th>
<th>Gx®51-D</th>
<th>Gx®51-L</th>
<th>Gx®33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Resistance Class</td>
<td>DIN 12116</td>
<td>Class S1</td>
<td>Class S1</td>
<td>Class S1</td>
<td>Class S1</td>
</tr>
<tr>
<td>Alkali Resistance Class</td>
<td>ISO 695</td>
<td>Class A2</td>
<td>Class A2</td>
<td>Class A2</td>
<td>Class A2</td>
</tr>
<tr>
<td>ASTM Laboratory Glass Class</td>
<td>ASTM E 438</td>
<td>Class B</td>
<td>Class B</td>
<td>–</td>
<td>Class A</td>
</tr>
</tbody>
</table>

### Physical Properties

<table>
<thead>
<tr>
<th>Name</th>
<th>Unit</th>
<th>Gx®51-V</th>
<th>Gx®51-D</th>
<th>Gx®51-L</th>
<th>Gx®33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Linear T.E.C.</td>
<td>10⁻⁷ K⁻¹</td>
<td>54</td>
<td>51</td>
<td>53</td>
<td>32.5</td>
</tr>
<tr>
<td>Density</td>
<td>g cm⁻³</td>
<td>2.33</td>
<td>2.34</td>
<td>2.37</td>
<td>2.23</td>
</tr>
<tr>
<td>Relative Refractive Index</td>
<td>(number) *</td>
<td>1.49</td>
<td>1.49</td>
<td>1.50</td>
<td>1.47</td>
</tr>
</tbody>
</table>

* λ at 587.6nm

### Viscosity Curve – Characteristic Temperatures

<table>
<thead>
<tr>
<th>Name</th>
<th>Viscosity [Poise]</th>
<th>Gx®51-V</th>
<th>Gx®51-D</th>
<th>Gx®51-L</th>
<th>Gx®33</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Point</td>
<td>10.0</td>
<td>1130 °C</td>
<td>1155 °C</td>
<td>1140 °C</td>
<td>1240 °C</td>
</tr>
<tr>
<td>Softening Point</td>
<td>10.7.6</td>
<td>785 °C</td>
<td>777 °C</td>
<td>765 °C</td>
<td>825 °C</td>
</tr>
<tr>
<td>Annealing Point</td>
<td>10 13.0</td>
<td>570 °C</td>
<td>555 °C</td>
<td>550 °C</td>
<td>565 °C</td>
</tr>
<tr>
<td>Strain Point</td>
<td>10 14.5</td>
<td>525 °C</td>
<td>515 °C</td>
<td>515 °C</td>
<td>515 °C</td>
</tr>
</tbody>
</table>

### Heavy Metals / Arsenic / Antimony

#### Heavy Metals


#### Arsenic and Antimony

Gerresheimer does not introduce any Arsenic nor Antimony in the batch composition of its glasses. Tests performed as per U.S. and European Pharmacopoeia prescriptions on containers made from Gerresheimer clear glass tubes give the following results:

As = Not detectable; Sb = Not detectable
## B. Chemical and Physical Characteristics

<table>
<thead>
<tr>
<th>Definitions</th>
<th>Viscosity Curve</th>
<th>Working Point</th>
<th>Softening Point</th>
<th>Annealing Point</th>
<th>Strain Point</th>
<th>Average Linear Expansion Coefficient (T.E.C.)</th>
<th>Density</th>
<th>Hydrolytic Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The temperature at which the glass reaches some defined levels of Viscosity. Those levels are conventionally defined, and their names refer to specific steps of the transforming process (ASTM Standard Method of Test C336-71). All values are given in °C.</td>
<td>The temperature at which the glass is sufficiently soft to be worked (formed, blowed, pressed, drawn). Log 4.</td>
<td>The temperature that the glass deforms under its own weight. Log 7.6.</td>
<td>The temperature at which internal stresses, such as those caused by a rapid cooling process can be substantially eliminated in minutes. Log 13.</td>
<td>The temperature where the internal stress of the glass is substantially relieved only after a matter of hours. Log 14.5.</td>
<td>The average length increase per unit length when the temperature varies from 0 to 300 °C. As the expansion coefficient is slightly affected by the annealing, reported values refer to annealed glass. Values are in K^-1.</td>
<td>The mass per unit volume. Values are in g cm^-3.</td>
<td>The resistance index of the glass to Hydrolytic attack measured on a powdered or glass grain sample. The testing methods and limits for Type 1 glass are established by international pharmacopoeias (USP, EP, JP, and those related to same).</td>
</tr>
</tbody>
</table>

![Graph showing Viscosity Curve for different types of glass](image)

- $10^{14.5}$ – Straining Point
- $10^{13}$ – Annealing Point
- $10^{12}$ – Softening Point
- $10^5$ – Liquidus
- $10^6$ – Working Point
C. Traceability and Labelling – Pisa

**Definitions**

**Finished Product Lot**
A sequence of pallets consecutively manufactured on the same line with unchanged production specifications.

**Traceability**
The unique six digit code Y A WW NN telling the production lot.

**Bundle Number**
The progressive BBBB bundle number within the production lot. Complete bundle identification is therefore YAWWN – BBBB.

**Traceability and Labelling – Pisa**

<table>
<thead>
<tr>
<th>Y</th>
<th>A</th>
<th>W W</th>
<th>N N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Code</td>
<td>Alley Code</td>
<td>Week Code</td>
<td>Progressive lot number</td>
</tr>
<tr>
<td>Last digit of year +5</td>
<td>Each alley has its own one digit code</td>
<td>From 01 to 53. Other numbers reserved for future use. It is the week code of the production start.</td>
<td>Progressive number, within the lots started in the same week. Incremented at job change or spec change</td>
</tr>
</tbody>
</table>

**LABEL SAMPLE (GERRESHEIMER PISA PLANT)**

![](image)
D. Traceability and Labelling – Vineland

**Definitions**

**Finished Product Lot**
A sequence of pallets consecutively manufactured on the same line with unchanged production specifications.

**Traceability**
The big label contains unique thirteen digit code MMDDYY-HHMM-S-Alley.

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**U.S. PALLET LABEL (EXAMPLE)**

- **Type of glass**: Gx51 – V
- **Material dimensional specification**:
  - Diameter: 24.00 mm +/− 0.20 mm
  - Thickness: 1.000 mm +/− 0.040 mm

- **Date when pallet was made**: 020614
- **Time when pallet was made**: 1509
- **Alley**: 4-16
- **Batch Number – Month and Sequential**: FEB1401095
Contacting Gerresheimer Tubing

In case of need, do not hesitate to contact our local Sales and Quality departments:

<table>
<thead>
<tr>
<th>YOUR NEEDS / OUR SITE</th>
<th>GERRESHEIMER PISA</th>
<th>GERRESHEIMER VINELAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales and Delivery Information</td>
<td>Tel. +39 050 566614</td>
<td>Tel. +1 856 794 5592</td>
</tr>
<tr>
<td></td>
<td>Fax +39 050 566334</td>
<td>Fax +1 856 494 1629</td>
</tr>
<tr>
<td></td>
<td>E-mail <a href="mailto:sales.tubing@gerresheimer.com">sales.tubing@gerresheimer.com</a></td>
<td></td>
</tr>
</tbody>
</table>

| Quality and Technical Inquiries | Tel. +39 050 566631 | Tel. +1 856 692 5981 |
| | Fax +39 050 566334 | Fax +1 856 691 1307 |
| | Address Via Montelungo, 4 56122 Pisa, ITALY | Address 537 Crystal Avenue Vineland, NJ 08360, USA |
| | E-mail quality.tubing@gerresheimer.com | |

COMPLAINT PROCEDURE

In case of complaints, please follow the steps below:

Identify the material by attaching the tray label or by specifying:

- Traceability Number
- Bundle Number (if applicable)
- Nominal Dimensions

Describe the issue:

- Kind of defect
- Describe how it was found (incoming inspection, in production, on the field)
- Quantify the frequency (pieces worked, pieces inspected, pieces defective)
- Quantify the issue: values and measurements should be obtained applying, whenever possible the definitions of this specification
- Localize the issue (in the pallet and/or in the tube) at your best

Document your findings:

- If possible, attach documents or pictures about the measured samples
- If possible, ship measured samples of suitable dimension and proper identification (including, if relevant, the position of them in the original whole tubing)

Please address the whole communication to our Quality Management Department preferably by e-mail with attachments, and ship the samples with reference to same e-mail (see the address above).
## Complaint Procedure

**PRIORITY** | **TAPE** | **DATA**
--- | --- | ---
1 | Traceability |  
2 | Nominal Dimensions | +/-
1 | Kind of defect |  
3 | Describe how it was found | Incoming inspection | Yes | No
3 | In production | Yes | No
3 | On the field | Yes | No
2 | Quantify the frequency | Pieces worked | N°
2 | Pieces inspected | N°
2 | Pieces defective | N°
1 | Quantify the issue | Kg | Lbs
1 | Localize the issue | Mark with “X” the defect position (Page 30)
1 | Attach documents or pictures about the measured samples |  
1 | Ship measured samples of suitable dimension and proper identification (including, if relevant, the position of them in the original whole tubing) |  

Please address the whole communication to our Quality Management Department preferably by email with attachments, and ship the samples with reference to same e-mail.

---

**GERRESHEIMER PISA**

f.piazza@gerresheimer.com
a.villa@gerresheimer.com
v.rossi@gerresheimer.com
quality.tubing@gerresheimer.com

Gerresheimer Pisa S.p.A.
Via Montelungo, 4
56122 Pisa, ITALY

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**GERRESHEIMER VINELAND**

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l.festoff@gerresheimer.com
m.burlaga@gerresheimer.com
quality.tubing@gerresheimer.com

Gerresheimer Glass Inc.
537 Crystal Avenue
Vineland, NJ 08360 USA
Localize the Complaint Issue

Please mark with “X” the defect position.
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56122 Pisa, Italy

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Fax: +39-050/56 33 64
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