

Corning® Velocity® Vials are Type I borosilicate vials with a low coefficient of friction external coating.

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

| Oxide Component           | Symbol                         | Corning® 51-V Tubing | Corning® 51-D Tubing | Corning® 33 Tubing |
|---------------------------|--------------------------------|----------------------|----------------------|--------------------|
| Silicon Dioxide           | SiO <sub>2</sub>               | 72.0                 | 73.0                 | 80.0               |
| Boron Oxide               | B <sub>2</sub> O <sub>3</sub>  | 11.5                 | 11.2                 | 12.7               |
| Aluminium Oxide           | Al <sub>2</sub> O <sub>3</sub> | 6.8                  | 6.8                  | 2.6                |
| Calcium & Magnesium Oxide | CaO + MgO                      | 0.7                  | 1.0                  | < 0.1              |
| Sodium Oxide              | Na <sub>2</sub> O              | 6.5                  | 6.8                  | 4.3                |
| Potassium Oxide           | K <sub>2</sub> O               | 2.4                  | 1.2                  | 0.1                |
| Iron Oxide (*)            | Fe <sub>2</sub> O <sub>3</sub> | < 600 ppm            | < 400 ppm            | < 500 ppm          |
| Barium Oxide (*)          | BaO                            | < 400 ppm            | < 400 ppm            | < 400 ppm          |
| Titanium Dioxide (*)      | TiO <sub>2</sub>               | < 400 ppm            | < 300 ppm            | < 400 ppm          |

(\*) Not introduced in the batch composition

#### Chemical Resistance Classifications

|                                     |                               | Corning® 51-V Tubing | Corning® 51-D Tubing | Corning® 33 Tubing |
|-------------------------------------|-------------------------------|----------------------|----------------------|--------------------|
| Hydrolytic Resistance (Glass Grain) | Ph. Eur. (3.2.1B) / USP <660> | Type 1               | Type 1               | Type 1             |
| Hydrolytic Resistance (Glass Grain) | ISO 720                       | HGA1                 | HGA1                 | HGA1               |
| Soluble Alkali Test                 | JP 7.01                       | Complies             | Complies             | Complies           |
| Acid Resistance Class               | DIN 12116                     | Class S1             | Class S1             | Class S1           |
| Alkali Resistance Class             | ISO 695                       | Class A2             | Class A2             | Class A2           |
| ASTM Laboratory Glass Class         | ASTM E 438                    | Class B              | -                    | Class A            |

#### Physical Properties

| Name                      | Unit                             | Corning® 51-V Tubing | Corning® 51-D Tubing | Corning® 33 Tubing |
|---------------------------|----------------------------------|----------------------|----------------------|--------------------|
| Average Linear T.E.C.     | 10 <sup>-7</sup> K <sup>-1</sup> | 54                   | 51                   | 32.5               |
| Density                   | g cm <sup>-3</sup>               | 2.33                 | 2.34                 | 2.23               |
| Relative Refractive Index | (number) (*)                     | 1.49                 | 1.49                 | 1.47               |

(\*) λ at 587.6nm

#### Viscosity Curve — Characteristic Temperatures

| Name            | Viscosity (Poise)  | Corning® 51-V Tubing | Corning® 51-D Tubing | Corning® 33 Tubing |
|-----------------|--------------------|----------------------|----------------------|--------------------|
| Working Point   | 10 <sup>4.0</sup>  | 1130 °C              | 1155 °C              | 1240 °C            |
| Softening Point | 10 <sup>7.6</sup>  | 785 °C               | 777 °C               | 825 °C             |
| Annealing Point | 10 <sup>13.0</sup> | 570 °C               | 555 °C               | 565 °C             |
| Strain Point    | 10 <sup>14.5</sup> | 525 °C               | 515 °C               | 515 °C             |

## Heavy Metals / Arsenic / Antimony

**Heavy Metals**

Contents of Pb, Cd, Hg, Cr<sup>VI</sup> is below the 100 ppm limit value stated by the US Toxics in Packaging Clearing House (TPCH) and European Parliament and Council Directive Article 11 of 94/62/ EC of 10. Dec. 1994 on packaging and packaging waste with updates 2001/171/EC and 2006/340/EC.

**Arsenic and Antimony**

Corning Pharmaceutical Glass 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 Corning clear glass tubes give the following results:

As = Not detectable; Sb = Not detectable

## Coating Chemical Characteristics and Physical Properties

|  |                            |  |                                |
|--|----------------------------|--|--------------------------------|
| Biological Reactivity / Toxicity (*)     | Meets Class V for Plastics | Appearance                             | Visibly Transparent, Colorless |
| Solubility - Aqueous or Organic Solvents | Below MDQ (<0.8 µg/g)      | Thickness                              | < 100 nm as single layer       |
| Volatile Organic Compounds               | Below LOQ (<0.5 µg/g)      | Coefficient of Friction under 10N load | < 0.5                          |

(\*) (USP <87> & <88>)

For more information contact [cptsvc@corning.com](mailto:cptsvc@corning.com)

Corning Incorporated, One Riverfront Plaza, Corning, NY 14831-0001 | +1 607 248 6000 | U.S.A. | [www.corning.com](http://www.corning.com)