

CORNING

Tubing Specification
Pharmaceutical Ampoule Tubing



Dimensional Specification

All requirements and criteria applicable to dimensional characteristics are summarized in the table below. For details see “Tubing Specifications — Definition and Supporting Information”.

Sample size according to ISO 2859 unless specified otherwise. Reference volume = 1 pallet

Requirement	Definition Item	Unit Defect Spec / Limit		AQL	Remarks	
Outer Diameter	OD _{avg}	The individual tubing sample is defective if there is a 60 mm section out of tolerance over the entire length.		Cumulative AQL of 0.25	Standard tolerances see page 5	
Circularity	NCR = $1/2 \left \frac{OD_{max} - OD_{min}}{OD_{nom}} \right $	OD range	Limit for NCR			
		OD < 25.0	0.3			
		25.0 - 35.0	0.5			
Wall Thickness	WT _{avg}	The individual tubing sample is defective if there is a 60 mm section out of tolerance over the entire length.				See page 5
Wall Siding (Lop)	WS = $\frac{WT_{max} - WT_{min}}{WT_{nom}}$	Maximum siding value is 6% of the nominal wall thickness.				
Length	L _{max}	The individual tubing sample is defective if overall length is out of tolerance.				Standard tolerances see page 5
Bow	B _{center}	Defective if greater than 0.7 mm			Limit 1000	
Square Cut	SC	OD < 25.0	Not to exceed 8% OD _{nom}	2.5		
		OD ≥ 25	Not to exceed 2.0 mm			
Glazing	GID _{max} as a percentage of OD _{nom}	Light	Sharp edges rounded with a minimum turn in	0.65	May be specified differently on the two tube ends.	
		Medium	80 - 90			
		Heavy	65 - 75			

Notes

OD, WT, NCR, WS, measurements are to be taken on the usable length of the tube. Any local deviation in each that corresponds with knots or stones or other dimensionally relevant visual characteristic shall not be evaluated with respect to the dimensional specification, but rather according to the relevant visual specification.

Visual Quality Specifications

Requirements applicable to visual characteristics are summarized in the tables below. For details see “Tubing Specifications — Definition and Supporting Information”.

Sample size according to ISO 1059 unless specified otherwise. Reference volume = 1 pallet

Requirement	Detail / Parameter	Individual Defect Definition	AQL / Criteria	Remarks		
Airlines	Single	≤ 150 (mm) or ≤ 0.08 (mm)	0.4	Defective if any airline in the tube exceeds limit length or width		
	Aggregate length of airlines	Aggregate length of airlines ≤ 30 (mm) or ≤ 0.02 (mm)	≤ 7.5%	Of tested tubing length. Apply to both open and closed airlines.		
Inclusions	Size (S) / count	Tube is defective if inclusion count per 5 kg tubing exceeds the following limits.		Inclusions up to 0.5 mm are not a defect. AQL not specified. 5 kg tubing must be controlled		
		≥ 1.0			0 allowed per 5 kg	
		≥ 1.5			Max 8 allowed per 5 kg	
Glass Particles	Size (S) / count	Tube is defective if the following maximum allowed numbers of glass particles is exceeded in any class.	0.4	Glass particles up to 0.2 mm are not considered. Cumulative size classes apply.		
		OD range [mm]			S ≥ 0.5	S ≥ 0.2
		OD < 15.0			0	5
		15.0 ≤ () < 25.0			0	1
		() ≥ 25			0	10
Cracks	Surface cracks	Any size, any length	0.025	End cracks ≤ 2 mm are not considered as defects, 20 mm from each side not considered		
	End cracks	≤ 2.0 (mm)	0.65			
Scratches Coated tubes	Longitudinal	≤ 0.1 (mm) or ≤ 30 (mm)	1.0	20 mm from each side not considered Only for bundle pack		
	Aggregate length	≤ 0.1 (mm) or ≤ 150 (mm)				
	Circular	≤ 0.1 (mm) or ≤ 1/2 (circumference)				
Scratches Uncoated tubes	Longitudinal	≤ 0.2 (mm) or ≤ 100 (mm)	1.0	20 mm from each side not considered (applies also for all tubes in sleeve pack)		
	Aggregate length	≤ 0.2 (mm) or ≤ 300 (mm)				
	Circular	≤ 0.2 (mm) or ≤ 1 (circumference)				
Surface Impurities	Outer surface	If impurities cannot be easily removed ≤ 1.0 (mm)	0.1			
	Inner surface	≤ 0.5 (mm)	0.1			

Other Requirements

Requirements for other characteristics are summarized in the tables

Requirement	Detail	Defect Specification	AQL	Remarks
Residual Stress	Longitudinal	§ 3.2.1 - Table 1 § 4.0	2.5	
	Circular	§ 3.2.1 - Table 1 § 4.5		
Make-Up	Delivered articles is not uniform in the pallet	E.g. different glass types, dimensions, coating level, different identification (label)	Not permissible	
Identification	Wrong data	Incorrect identification data on the bundle label. E.g. declared dimensions, bundle weight, pallet weight	Not permissible	Test unit = 1 bundle
	Missing bundle label	Missing bundle labels	Not permissible	
Certificates	Wrong or missing data	Missing certificate or pallet label	Not permissible	
Type I	§ 3.2.1 - Table 1 § 660 – Glass grain test	§ 0.1 and § 0.02 - Table 1 § 660	Not permissible	§ 7.01 For glass containers for Injections upon request
Paneling (Waving)	Long range optical anomaly due to deviation from circularity or glass inhomogeneity	Based on agreed upon limit samples	1.0 For printed § 3.2.1 - Table 1 § 0.25	Local deformation or inhomogeneity (e.g. knots) should not be considered a paneling defect

Standard Dimensions

Length standard tolerance is $-0.0 +4.0$ mm.

The following table defines the standard OD and WT tolerances depending on the OD and WT nominal values.

OD range (mm)	WT range (mm)	OD tol (mm)	WT tol (mm)
9.0 - 14.9	0.40 - 0.55	0.12	0.02
	0.60 - 0.75	0.13	0.03
15.0 - 17.9	0.45 - 0.60	0.14	0.03
	0.65 - 0.75	0.15	0.03
18.0 - 19.9	0.55 - 0.60	0.15	0.03
	0.65 - 0.75	0.18	0.04
20.0 - 24.9	0.65 - 0.80	0.19	0.04
25.0 - 29.9	0.75 - 0.90	0.20	0.04

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