

CORNING

Tubing Specifications
Syringe Tubing



Dimensional Specifications

All requirements and criteria applicable to dimensional characteristics are summarized in Table 1.

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

Table 1. Summary of criteria applicable to dimensional characteristics.

Requirement	Definition	Unit Defect Spec/Limit		AQL	Remarks
Outer Diameter	OD _{API}	Defective if out of the tolerance range		Cumulative AQL of 0.25	Standard tolerances, see Standard Dimensions
Circularity	NCR = $\frac{1}{2} (OD_{max} - OD_{min})$	0.3% of OD _{nom}			
Inner diameter	ID _{API}	Defective if out of the tolerance range			Standard tolerances, see Standard Dimensions
Wall Siding (LOP)	WS = WT _{max} - WT _{min}	Maximum siding value is 6% of the nominal wall thickness			
Length	L _{max}	Defective if overall length is out of tolerance			Standard tolerances, see Standard Dimensions
Bow	B _{center}	Defective if greater than 0.8 mm			Over a 1000 mm length
Square Cut	SC	Not to exceed 1.0 mm		1.0	
Glazing	GID _{max} as a percentage of OD _{nom}	Light	Sharp edges rounded with a minimum turn in	1.0	May be specified differently on the two tube ends
		Medium	90% of OD _{nom}		
		Heavy	70% of OD _{nom}		

NOTE: OD, ID, NCR, and 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 Table 2.

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

Table 2. Summary requirements applicable to visual characteristics.

Requirement	Detail/Parameter	Individual Defect Definition	AQL	Remarks	
Airlines	Single	L > 200 mm or W > 0.05 mm	0.25	Defective if any airline in the tube exceeds limit Length or Width.	
	Aggregate length of airlines	Aggregate length of airlines L > 10 mm and W > 0.02 mm	≤ 4.0 %	These criteria apply to both open and closed airlines as a percentage of tested tubing length.	
Open inside airlines	Single	L > 50 mm, W > 0.02 mm	0.25	Open inside airlines shorter than 2 mm are not considered defects.	
	Aggregate length of airlines	L > 2 mm, ≤ 50 mm and W > 0.02 mm	< 5 airlines/10 tubes		
Inclusions	Size (S)/count	Defective if inclusion count per 5 kg tubing exceeds the following limits.		Inclusions up to 0.2 mm are not considered defects.	
		Size (mm)Count			
		S > 0.80	0.1		
		0.8 > S > 0.51	1.0		
		0.5 > S > 0.35	1.5		
Glass Particles	Size (S)/count	Defective if the following maximum allowed numbers of glass particles is exceeded in any class.	0.65	Glass particles up to 0.2 mm are not considered defects. Cumulative size classes apply.	
		Size (mm)Count			
		S ≥ 0.50			0
		S ≥ 0.25			5
Cracks	Surface cracks	Any size, any length	0.025	End cracks ≤2 mm are not considered defects, 20 mm from each side not considered defects.	
	End cracks	L > 2.0 mm	0.25		
Scratches Coated Tubes	Longitudinal	W > 0.1 mm and L > 30 mm	1.0	20 mm from each side are not considered defects.	
	Aggregate length	W > 0.1 mm and AL > 100 mm			
	Circular	W > 0.1 mm and Arc > ½ circumference			
Surface Impurities	Outer surface	Defective 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 Table 3.

Table 3. Summary requirements of other characteristics.

Requirement	Detail	Defect Specification	AQL	Remarks
Residual Stress	Longitudinal	Stress > 4.0 MPa	2.5	
	Circular	Stress > 4.5 MPa		
Mix-up	Delivered articles are not uniform in the pallet	Example: different glass types, dimensions, coating level, different identification (label)	Not permissible	
Identification	Wrong Data	Incorrect identification data on bundle (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	Ph. Eur. 3.2.1, Test B, USP <660> Glass grain test	> 0.1 mL of 0.02 M HCl per 1g of glass	Not permissible	JP 7.01 Test for glass containers for injections upon request

Standard Dimensions

Length standard tolerance is -0.0/+4.0 mm.

Table 4. Defines standard OD and WT tolerances depending on the OD and WT nominal values.

OD Range (mm)	ID Range (mm)	OD Tol (mm)	ID Tol (mm)
6.85	4.65	0.10	0.10
8.15	6.35	0.10	0.10
10.85	8.65	0.10	0.10
14.45	11.85	0.10	0.10

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