

## Syringes for Automatic Liquid Handling

### PTFE-Seals, Chemically Resistant Heavy Duty Syringes – TLL

Manufactured by ILS



Volume Scale May Vary

Plunger:	Special Stainless Steel Plunger with PTFE-Seal
Glass Barrel:	Borosilicate 3.3
Precision:	< ±1% of the volume

#### Physical and Chemical Properties of Glass

Coefficient of mean linear thermal expansion $\alpha$ (20°C; 300°C) acc. to ISO 7991		$3.3 \cdot 10^{-6} \text{K}^{-1}$
Transformation temperature $T_g$		525°C
Glass temperature at viscosity $\eta$ in dPa · s:	$10^{13}$ (annealing point)	560°C
	$10^{7.6}$ (softening point)	852°C
	$10^4$ (working point)	1260°C
Maximum short-time working temperature		500°C
Density $\rho$ at 25°C		$2.23 \text{ g} \cdot \text{cm}^{-3}$
Modulus of elasticity E (Young's modulus)		$64 \cdot 10^3 \text{ N} \cdot \text{mm}^{-2}$
Poisson's ratio $\mu$		0.20
Thermal conductivity $\lambda_w$ at 90°C		$1.2 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$
Temperature for the specific electrical resistance of $10^8 \Omega \cdot \text{cm}$ (DIN 52326) $t_{k,100}$		250°C
Logarithm of the electric volume resistivity ( $\Omega \cdot \text{cm}$ )	at 250°C	8
	at 350°C	6.5
Dielectric properties (1 MHz, 25°C)		
Dielectric constant (permittivity) $\epsilon$		4.6
Dielectric loss factor (dissipation factor) $\tan \delta$		$37 \cdot 10^{-4}$
Refractive index ( $\lambda = 587.6 \text{ nm}$ ) $n_d$		1.473
Stress-optical coefficient (DIN 52314) $k$		$4.0 \cdot 10^{-6} \text{ mm}^2 \cdot \text{N}^{-1}$

Reference: Schott Duran®