



DEAD SPACE

SOL-M™ Syringes Luer Slip Tip

SOL-M™ Syringes Luer Lock

SOL-CARE™ Safety Syringes Luer Lock

Test method for determination of dead space using distilled water

Principle

The syringe is weighed dry and after having been filled with, and emptied of, water. The dead space is inferred from the mass of the residual water.

Reference

Test method accordance with ISO 7886-1:2017 Annex C.

Apparatus

- Analytical balance.
- Distilled water at a temperature of 18°C to 28°C.

Sampling

Test 10 pieces for each REF.

Products tested

The syringes tested are listed below:

180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)
P180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)
LD180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)
JC180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)
KK180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)
P180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP) (low dead space)
180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)
JC180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)
KK180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)
P180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)
180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)



180001	SOL-M 1ml Luer Lock Syringe w/o Needle (PC)
P180003	SOL-M 3ml Luer Lock Syringe w/o Needle
K180003	SOL-M 3ml Luer Lock Syringe w/o Needle
180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle
P180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle
K180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle
P180005	SOL-M 5ml Luer Lock Syringe w/o Needle
P180005ST	SOL-M 5ml Slip Tip Syringe w/o Needle
180005ST	SOL-M 5ml Slip Tip Syringe w/o Needle
313001	SOL-M 2ml Syringe w/o Needle, 2-piece
307005	SOL-M 5ml Syringe w/o Needle, 2-piece
120006IM	SOL-CARE 3ml Luer Lock Safety Syringe w/o Needle
120007IM	SOL-CARE 5ml Luer Lock Safety Syringe w/o Needle

Procedure

Weigh the empty syringe.



Fill to the nominal capacity graduation line with distilled water, taking care to expel all air.



Expel the water by fully depressing the plunger, and wipe dry the outer surfaces of the syringe.



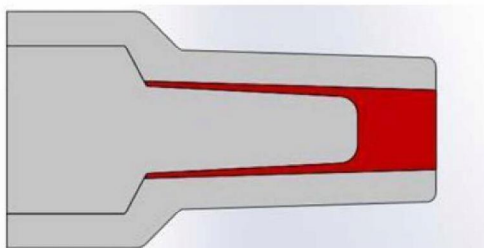
Reweight the syringe.



Determine the mass, in grams, of water remaining in the syringe by subtracting the mass of the empty syringe from the mass of the syringe after expulsion of the water.

Record this value as the dead space in milliliters, taking the density of water as 1.000 kg/m³.

Below a CAD drawing simulation which is showing the dead space measured (in red).



Results

In the following tables the results found:

REF	Description	DEAD SPACE				
		Average		Min	Max	Dev. St.
		(μ l)	(ml)	(ml)	(ml)	(ml)
180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)	17	0.0173	0.0142	0.0198	0.00160
P180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)	17	0.0170	0.0149	0.0185	0.00120
LD180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)	11	0.0107	0.0092	0.0131	0.00122
JC180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)	15	0.0152	0.0131	0.0168	0.00112
KK180011LDS	SOL-M 1ml Slip Tip Syringe w/o Needle (low dead space)	17	0.0171	0.0134	0.0188	0.00156
P180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP) (low dead space)	21	0.0209	0.0186	0.0224	0.00120
180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)	15	0.0149	0.0126	0.0175	0.00178
JC180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)	20	0.0200	0.0183	0.0227	0.0014
KK180001PPLDS	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)(low dead space)	19	0.0190	0.0160	0.0217	0.00159
P180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)	48	0.0479	0.0443	0.0500	0.00188
180001PP	SOL-M 1ml Luer Lock Syringe w/o Needle (PP)	41	0.0414	0.0401	0.0441	0.00119
180001	SOL-M 1ml Luer Lock Syringe w/o Needle (PC)	45	0.0449	0.0439	0.0465	0.00079
P180003	SOL-M 3ml Luer Lock Syringe w/o Needle	48	0.0482	0.0446	0.0609	0.00476



K180003	SOL-M 3ml Luer Lock Syringe w/o Needle	44*	Estimated data			
180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle	38	0.0377	0.0369	0.0385	0.00053
P180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle	48*	Estimated data			
K180003ST	SOL-M 3ml Slip Tip Syringe w/o Needle	44*	Estimated data			
P180005	SOL-M 5ml Luer Lock Syringe w/o Needle	44	0.0435	0.0405	0.0459	0.00163
P180005ST	SOL-M 5ml Slip Tip Syringe w/o Needle	44*	Estimated data			
180005ST	SOL-M 5ml Slip Tip Syringe w/o Needle	39	0.0388	0.0370	0.0414	0.00148
313001	SOL-M 2ml Syringe w/o Needle, 2-piece	45	0.0448	0.0433	0.0461	0.00100
307005	SOL-M 5ml Syringe w/o Needle, 2-piece	42	0.0415	0.0404	0.0425	0.00063
120006IM	SOL-CARE 3ml Luer Lock Safety Syringe w/o Needle	36	0.0365	0.0277	0.0530	0.00751
120007IM	SOL-CARE 5ml Luer Lock Safety Syringe w/o Needle	59	0.0588	0,0427	0,0783	0,01117

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Author:

Reviewer/Approver:

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