

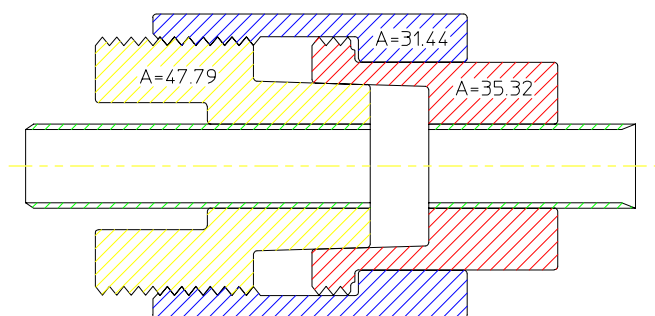
Fitting Comparisons							Mass Calculation						
Fitting Type	Metal X-Area	Other X-Area	Max Dia.	L at Max Dia.	Max. Length		Centroid R.	Rev. Vol. (Metal)	Rev. Vol. (Other)	Metal (kg)/Fitting	Other (kg)/Fitting	# Fittings	Total Mass (kg)
Luer Lock (All Metal) - Baseline	114.55	0	16.79	17.36	25.53		5.5	3958.563823	0	0.010965222	0	200	2.193044358
Luer Lock (All Metal) - MMC*	81.29	0	15.79	14.54	17.61		5.5	2809.180735	0	0.007781431	0	200	1.556286127
Luer Lock (Al/PEEK) - Baseline	79.23	35.32	16.79	17.36	25.53		5.5	2737.992245	1220.571578	0.007584239	0.001684389	200	1.853725459
Luer Lock (Al/PEEK) - MMC*	53.62	27.67	15.79	14.54	17.61		5.5	1852.974179	956.206556	0.005132738	0.001319565	200	1.290460705
Variseal (w/ centering ring)	40.16	2.2	16.97	7	17		6.25	1577.079512	62.20353454	0.00436851	8.58409E-05	200	0.890870225
Variseal (w/o centering ring)	35.99	2.2	16.97	7	17		6.25	1413.323995	62.20353454	0.003914907	8.58409E-05	200	0.800149669
Diet Luer Lock	42.38	0	12.46	11.15	11.15		4.1	1091.753713	0	0.003024158	0	200	0.604831557
Indium Fitting (scaled for sector)	20.31	0.87	10.73	6.63	11.45		3.75	478.543101	20.49889206	0.001325564	2.82885E-05	200	0.270770572
Indium Seal (Stave design)	-	-	-	-	-		-	295	13	0.00081715	0.00001794	200	0.167018

Smear Mass into volume with radius of 210 mm (approximate fitting radius) and Length of 5 cm?

$$\text{Volume} = \pi \cdot 2^2 \cdot R \cdot L \cdot t = 0.065973446 \cdot t$$

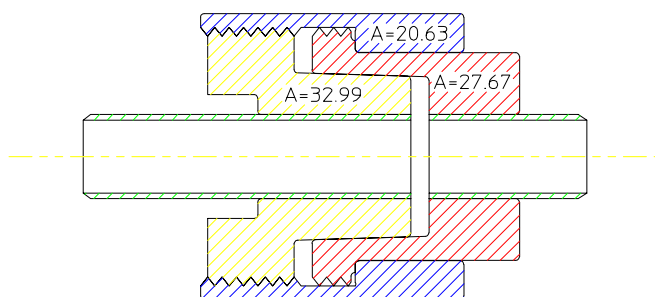
Fitting	T Al/fitting	T Plastic/fitting	T Indium/Fitting	% X0/fitting	# fittings	%X0
Luer Lock (All Metal) - Baseline	6.00E-05	0.00E+00	0	0.08%	75	5.63%
Luer Lock (All Metal) - MMC*	4.26E-05	0.00E+00	0	0.05%	75	3.99%
Luer Lock (Al/PEEK) - Baseline	4.15E-05	1.85E-05	0	0.06%	75	4.39%
Luer Lock (Al/PEEK) - MMC*	2.81E-05	1.45E-05	0	0.04%	75	3.02%
Variseal (w/ centering ring)	2.39E-05	9.43E-07	0	0.03%	75	2.27%
Variseal (w/o centering ring)	2.14E-05	9.43E-07	0	0.03%	75	2.03%
Diet Luer Lock	1.65E-05	0.00E+00	0	0.02%	75	1.55%
Indium Fitting (scaled for sector)	7.25E-06	0.00E+00	3.11E-07	0.01%	75	0.91%
Indium Fitting (Stave design)	4.47E-06	0.00E+00	1.97E-07	0.01%	75	0.57%

MMC* - "Minimum Material Condition" - I have shrunken the fitting as much as I think is possible (not very conservative)



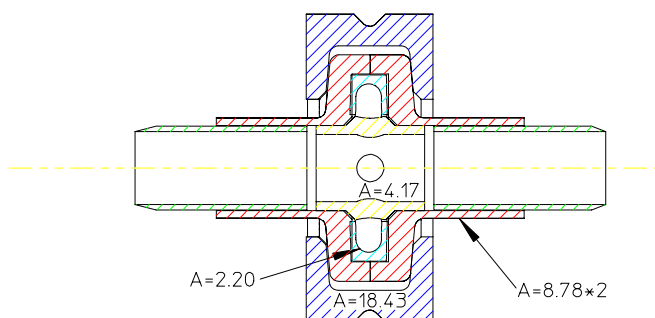
HALF AREA = 114.55 sq. mm

ORIGINAL FITTING FROM FRED GOOZEN



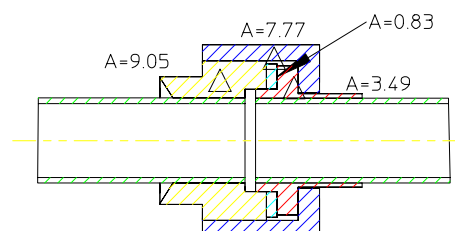
HALF AREA = 81.29 sq. mm

FITTING REDUCED IN SIZE BY NEAL HARTMAN (NO INPUT FROM FRED G.)



HALF AREA (METAL) = 40.16 sq. mm
 HALF AREA (PLASTIC) = 2.20 sq. mm
 HALF AREA (METAL, NO CENTERING RING) = 35.99 sq. mm

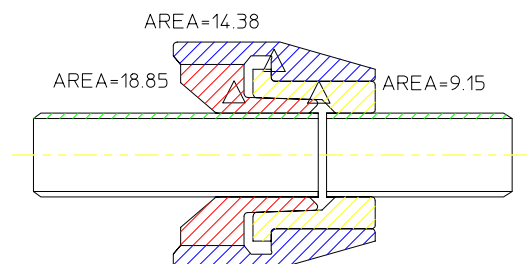
VARISEAL FITTING WITH CENTERING RING



INDIUM FITTING - SCALED UP FROM STAVE DESIGN FOR 4.7 MM BORE (SAME AS ABOVE FITTINGS). LINEARLY SCALED FROM STAVE DESIGN BY 1.175. SO VOLUME INCREASES BY 1.175^3 . STAVE FITTING VOLUMES:

ALUMINUM = 295 MM³ (STAVE) ----> 478 MM³ SECTOR COMPARISON
 INDIUM = 12.5 MM³ ----> 20.5 MM³ SECTOR COMPARISON

THIS IS BASED ON CUPRO-NICKEL DIMENSIONS, SO ALUMINUM FITTING WILL INCREASE IN SIZE AGAIN DUE TO THICKER WALLS, ETC.



"DIET" LUER LOCK FITTING. MAY STILL BE ABLE TO GET SMALLER. TOTAL CROSS SECTION OF ALUMINUM = 42.38 MM².

FITTING ENDS CHAMFERED FOR LASER WELDING.