TABLE 5. EXPERIMENTAL DATA FOR COLD HYDROSTATIC EXTRUSION OF WROUGHT TZM MOLYBDENUM ALLOY AND BERYLLIUM ROUNDS

Die Angle - 45 degrees (included) Stem speed - 6 ipm
Fluid - Castor oil

Trial	Die	Extrusion Ratio	Billet Lubricant	Extrusion Pressure, 1000 psi				Type of Curve (see p 25)	Length of Extrusion, inches	Cracks	
				Breakthrough		Runout					
				Stem	Fluid	Stem	Fluid			Circumferential	Longitudinal[a]
				Wrought TZM - Stress Relieved							
441	Standard	2.5	L17	156	140	136	122	B4	5	Nose only	3
442	Short controlled-relief	2.5	L17	156	140	140	127	B4	4-1/2	Nose only (less than in Trial 441)	4 (split open at nose)
469	Double reduction[b]	2.5	L38	157	141	142	129	B1	4	None	3
452	Long controlled-relief	3.3	L17	240	210	184	165	C1	10	Nose only (less than in Trial 442)	3
455	Long controlled-relief	3.3	L38	224	198	184	165	C2	10-1/2	Nose only	3
443	Standard	5	L17	280	237	240	207	C3	7-1/2	Nose only (less than in Trial 441)	2 (split open at nose)
				Wrought TZM - Recrystallized							
460	Long controlled-relief	3.3	L38	172	155	137	125	C2	10	Nose only	3
				Beryllium - Powder Metallurgy							
461	Long controlled-relief	3.3	L38	213	189	168	149	B2	11-1/2	Mostly at nose; some during runout	5

(a) Longitudinal cracks were generally a fine, hairline type which extended along most or all of the extruded length.

(b) Second reduction in area was 1.5 percent.

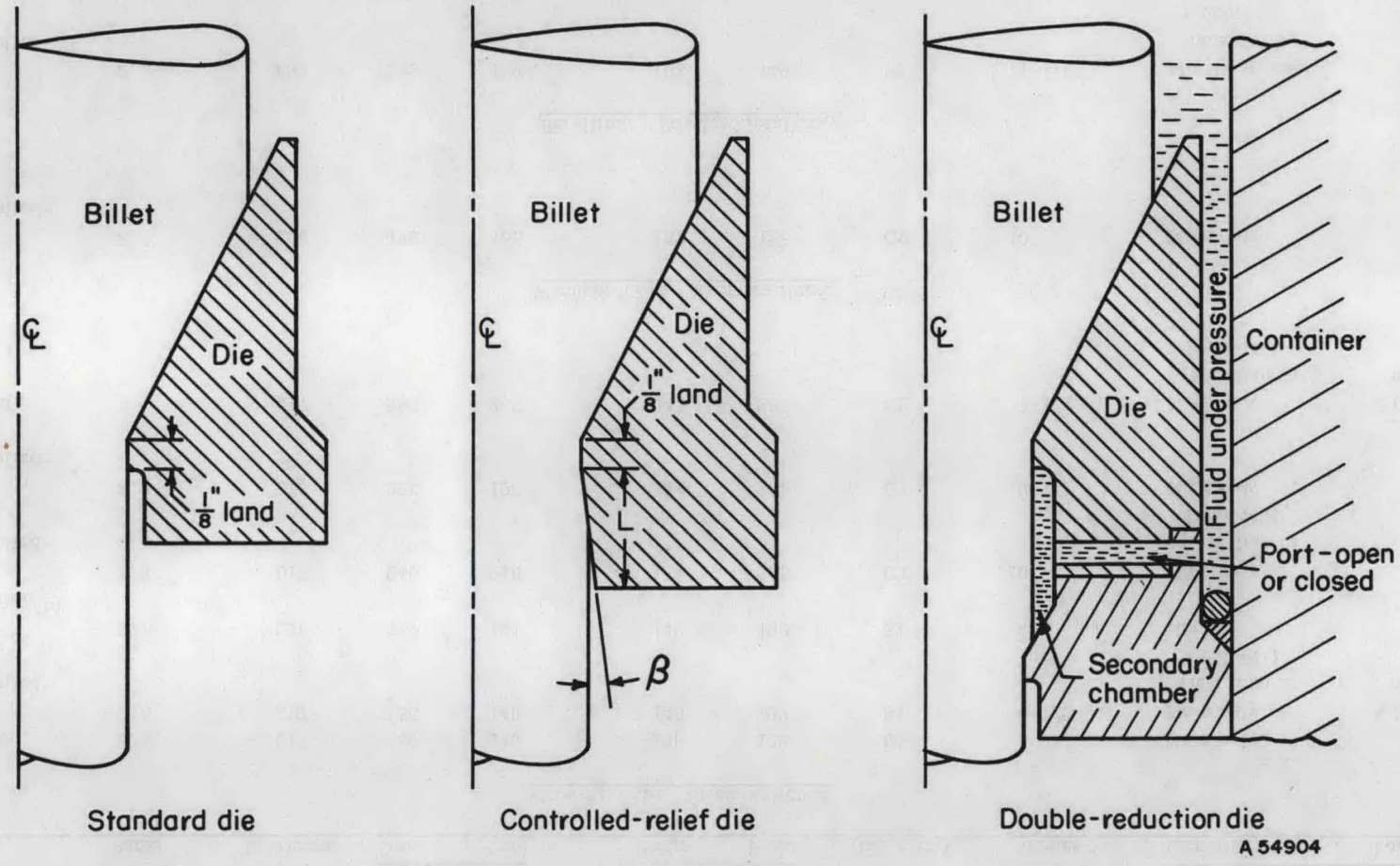

FIGURE 7. STANDARD-DIE PROFILE AND TWO DIES DESIGNED TO ELIMINATE CRACKING OF HYDROSTATIC EXTRUSIONS