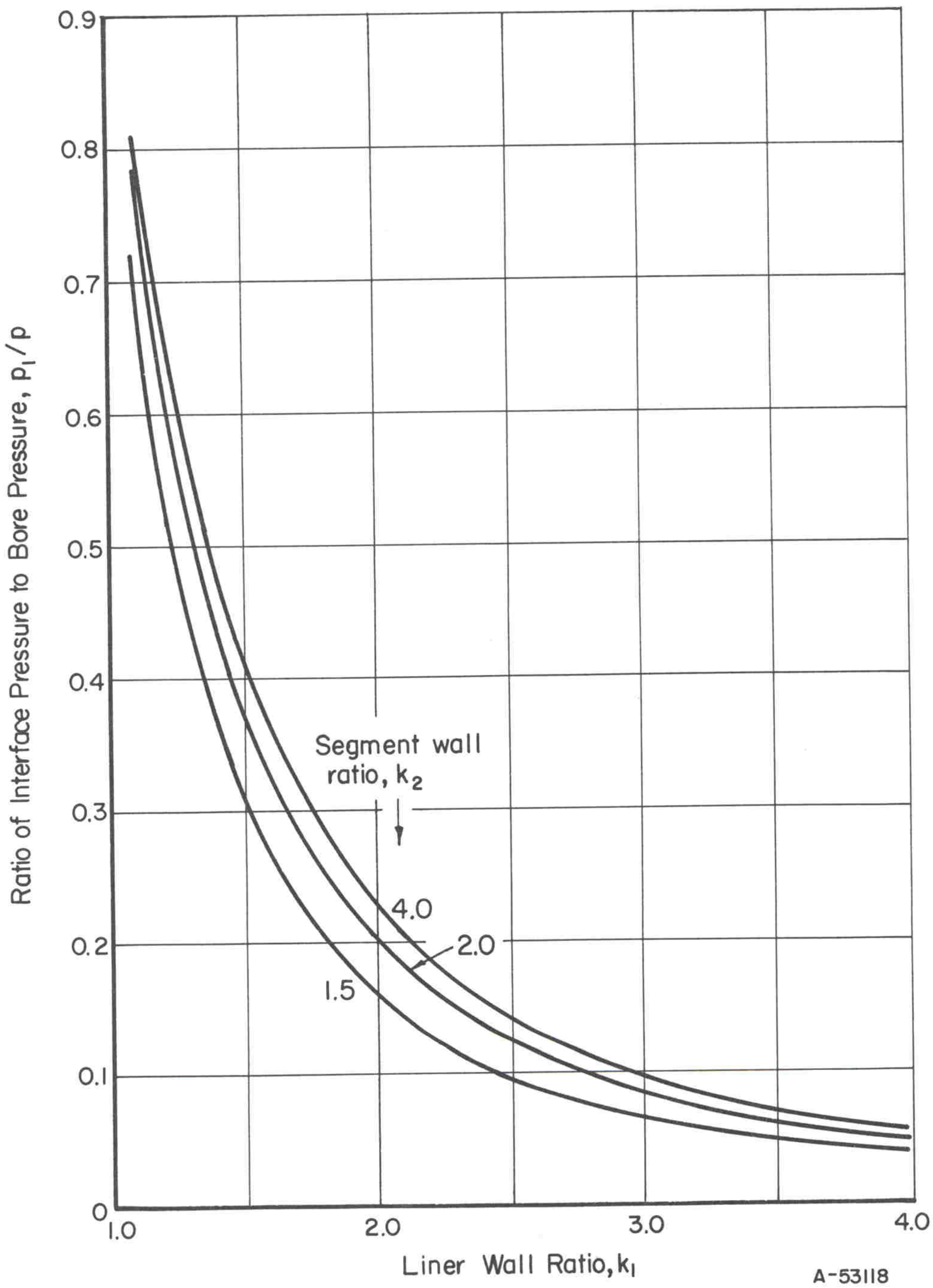

FIGURE 59. RATIO OF INTERFACE PRESSURE BETWEEN SEGMENTS AND LINER TO BORE PRESSURE FOR THE PIN-SEGMENT CONTAINER

$$\frac{d}{2r_1} = \frac{8}{3}\frac{t}{d}\frac{p_1}{\tau} \qquad (69)$$

where

d = pin diameter, t = segment thickness,

$2r_1$ = inside segment diameter, τ = maximum shear stress in pin.

Strip-Wound Container

An analysis was not conducted for the strip-wound container, because it is possible to estimate its relative strength based upon the results of the analysis of the multiring container. The strip-wound (wire-wrapped) cylinder uses basically the same principle as the multiring container. It has a cylindrical inner cylinder, the liner, under prestress, but the prestress in the liner is provided by wrapping strips or wire under tension onto the liner.

To estimate the pressure-to-strength ratio of the strip-wound vessel it is assumed that it behaves overall as a thick cylinder under internal pressure after the strip has been wound on. Referring to Equation (44), we see that the pressure-to-strength ratio p/σ_1 depends only on the overall wall ratio K and α_r the stress-range parameter for the liner material. If K for the strip-wound vessel is taken as the ratio of the outside diameter of the last strip layer to the inner bore diameter, then Equation (44) can be used to estimate its pressure capability. Therefore, it may be concluded that the strip-wound container has a maximum pressure equal that of the multiring container. However, unknown local stress concentrations and contact conditions between strips may be detrimental in the strip-wound design. Because of these possible disadvantages and no better pressure capability than the multiring container, detailed analysis of the strip-wound vessel is not warranted. However, the strip-wound design does offer advantages in producibility of large-diameter containers as pointed out later in the "Design Requirements" section of this report.

Controlled Fluid-Fill, Multiring Container

A controlled fluid-fill container, shown in Figure 60, has been proposed by Berman[42]. All the rings are assumed to be made of the same ductile material and a shear-strength criterion applies. Like the ring-segment-fluid container, this container also uses the fluid-pressure support principle. The advantage of this design is that under static applications the residual-stress limitation (the limit curve in Figure 43) can be overcome by controlling the pressures p_n; i.e., the pressures, p_n, can be reduced to zero as the bore pressure, p, is reduced to zero. There are no shrink fits, so there are no residual stresses. Berman's analysis was based upon static strength. A similar analysis is now conducted based on fatigue strength.