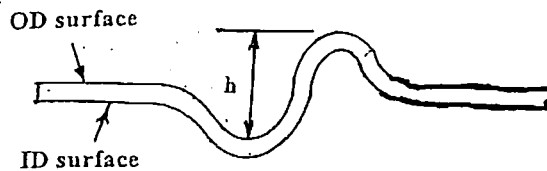


**AMERICAN SOCIETY OF MECHANICAL ENGINEERS DRAFT CRITERIA FOR EVALUATION  
OF WRINKLE BENDS IN HAZARDOUS LIQUID PIPELINES  
[DECEMBER 16, 2003]**

(8) Buckles, Ripples, Wrinkles

For small ripples (i.e., incipient buckles or wrinkles) which exhibit no cracks, no repair is required if the crest-to-trough height,  $h$ , meets one of the following criteria where the maximum operating hoop stress,  $S$ , is as shown. The absence of any cracks shall be confirmed using magnetic particle or dye penetrant inspection.

Maximum Operating Hoop Stress, $S$	$\left(\frac{h}{D}\right) \times 100$ cannot exceed
$\leq 20,000$ psi (138 MPa)	2
$> 20,000$ psi (138 MPa) but $\leq 30,000$ psi (207 MPa)	$\left(\frac{30,000 - S}{10,000} + 1\right)$
$> 30,000$ psi (207 MPa) but $\leq 47,000$ psi (324 MPa)	$0.5 \left(\frac{47,000 - S}{17,000} + 1\right)$
$> 47,000$ psi (324 MPa)	0.5



where

$S$  is the maximum operating hoop stress, psi (145 x  $S$ , MPa)

$h$  is the crest-to-trough height of the ripple, inch (mm)

$D$  is the outside diameter of the pipe, inch (mm).

When a group of buckles, ripples, or wrinkles exist in proximity to one another, the limitation on  $h$  shall be applied to the largest crest-to-trough height.