CHAPTER 5

CONCLUSIONS

From the results of experimental investigation of single mitered pipe bend, the conclusion can be summarized as follows:-

Reinforced single mitered pipe bend, its flexibility under pure in-plane bending is the same as that of smooth bend of the same dimension having an equivalent radius of six times the pipe bore mean radius.

Likewise, the flexibility of unreinforced single mitered pipe bend under pure in-plane bending is the same as that of smooth bend of the same dimension having an equivalent radius of seven times the pipe bore mean radius.

The theoretical flexibility factors with internal pressure are approximately closed to the experimental ones. In case high accuracy is not an important point, flexibility factors with internal pressure can be adopted from the theory of Rodabaugh and George with assurance.

Von Karman's third approximation formula and American Standard Code can rather be used as a standard for computing flexibility factor of single mitered pipe bend under both in-plane bending and combined loads than Kellogg's formula.

The unreinforced single mitered pipe bend is more flexible than the reinforced one of the same dimension under the application of either in-plane bending or combined loads.

In the case of small pipe with greater pipe wall thickness, internal pressure shows no significant effect on flexibility factor change. However, as the pipe size is larger in relation with thickness, the effect of internal pressure shows a slightly remarkable change in flexibility factor.

The experimental stress-intensification factors are closed to those calculated from the Rodabaugh and George theory. The circumferential stress-intensification factor is undoubtedly higher than that longitudinal one.

In fact, this theory is developed for the purpose of finding stresses at the bend of curved pipe or welding elbows. In this experiment strains are not measured at the welded joint but at a distance of 20 cm. away from it. Nevertheless, the results indicate that this theory is of adequate accuracy if applied to find the stress-intensification factor around the pipe cross-section in the vicinity of mitered joint.

For the pipe of large diameter with thin pipe wall

thickness, the ovalization of the cross-section tends to occur under the application of in-plane bending. On the contrary, internal pressure as used herein is rather low that it can produce no visible change in stress. If high pressure equipment is available, the experiment should be conducted with higher pressure to observe further information.

The longer the pipe length, the more tendency the ovalization will occur under in-plane bending no matter the pipe is of small size with evenly thin pipe wall.

It is correct to say that stresses in the pipe bend under combined loads equal to the sum of those stresses when the bend is loaded by in-plane bending and internal pressure separately. Though it is not exactly true over the entire cross-section, the deviations seem to exceed no more than ten percent.