KLINGER

RICHARD KLINGER INC. 2350 CAMPBELL RD. SIDNEY, OHIO 45365 PHONE (513) 498-1161 TELEX 288317

January 30, 1984 Letter No. P-1809

Utex Industries Inc.
P.O. Box 79227
Houston, TX 77079

Att: Mr. W.A. Weison

Dear Mr. Weison:

Mr. Byron Gardner of Sun Exploration and Production called us on Thursday, January 26, 1984 questioning the maximum pressure we have listed in our brochure. He is using our K62 - your Style 1101 sheet packing in 100°F salt water at 500-700 psi pressure. We list a maximum pressure of 400 psi. At this point the yeild (Y) and maintenance factor were explained to him. This letter and the enclosed copy of "Klinger Takes the Guesswork Out of Gaskets" is meant to explain fully how we arrive at the minimum assembly stress (M_{as}) for a gasket to seal.

Because the assembler knows the application in which the gasket is being used, we prefer to provide him with the numbers so he can calculate the minimum sealing stress. The assembler calculates the minimum assembly stress (M_{as}) for a gasket to seal by:

$$M_{as} = Y + MP_i + 2\frac{A_p}{A_g} P_i ,$$

where Y is the yeild factor or minimum pressure for a gasket to seal at any pressure; M is the maintenance factor or the factor to keep a seal at higher pressures. P_i is the pressure of the gas or liquid inside of the pipe or vessel. A_g is the area of the gasket that actually is being compressed. A_p is the cross sectional area of the flange joint or vessel.

On the right hand side of the equation, the first two terms are self explanatory, but the last term should be explained. $2 A_p P_i$ is the force that the medium is applying to force the flange apart due to hydrostatic end thrust. If you then divide by the area of gasket, then you are compensating for the unloading effect due to pressure of the medium.

The assembler can then calculate the bolt load to seal the joint:

Force/Bolt = $(M_{as}A_g)$/(Number of bolts in the joint)

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Now the assembler can look up the size and torque required for the joint to seal. To satisfy your requirement, the yeild, maintenance and maximum assembly stress values for K62 are:

	Liquid	Test Medium	Gases	Test Medium
Y	50 kp/cm^2 710 (psi)	Water	250 Kp/cm^2 3550 (psi)	Nitrogen
M	2.5	Water	4.0	Nitrogen

MAXIMUM ASSEMBLY STRESS

Temperature	Maximum Stress (psi)		
^oF	1/32	1/16	1/8
RT	17000	11600	8700
150	16000	11400	8500
250	11000	9300	7800
300	9900	9000	7500
400	9800	7800	7000
550	8100	6700	5900

If you have any additional questions, please don't hesitate to call me.

Kind regards,

Tom Grossman
Lab. Manager

RICHARD KLINGER INC.

TG/ded
cc: Byron Gardner
Russ Johnson
William Britton
Derek Coomber
File
Enclosure