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 0976)\1.FLG

CAESAR II ANALYSIS REPORT: Flange Leakage/Stress Calculations

FLANGE LEAKAGE/STRESS CALCULATIONS

Flange Inside Diameter [B] (User to verify)	(mm.)	387.350
Flange Thickness [t].....	(mm.)	36.576
Flange Rating (Optional)		150.000
Bolt Circle Diameter	(mm.)	539.750
Number of Bolts		16.000
Bolt Diameter	(mm.)	25.400
Bolt Initial Tightening Stress	(kg./sq.cm.)	
Uncompressed Gasket Thickness	(mm.)	4.500
Grade of Attached B16_5 ANSI Flange.....		1.100
Leak Pressure Ratio [m]		3.000
Effective Gasket Modulus	(kg./sq.cm.)	24429.000
Externally Applied Moment	(optional)(kg.m.)	5219.000
Externally Applied Force	(optional)	(kg) 4585.000
Pressure [P].....	(kg./sq.cm.)	4.600
Disable Stress Calculations (Y/N)		N
Flange Type (1-8, see ?-Help or Alt-P to plot)		1.000
Flange Outside Diameter [A].....	(mm.)	596.900
Design Temperature	C	220.000
Small End Hub Thickness [g0].....	(mm.)	9.525
Large End Hub Thickness [g1].....	(mm.)	34.925
Hub Length [h].....	(mm.)	90.424
Flange Allowable @Design Temperature	(kg./sq.cm.)	1400.125
Flange Allowable @Ambient Temperature	(kg./sq.cm.)	1408.000
Flange Modulus of Elasticity @Design	(kg./sq.cm.)	1932100.000
Flange Modulus of Elasticity @Ambient	(kg./sq.cm.)	2076799.875
Bolt Allowable @Design Temperature	(kg./sq.cm.)	1760.000
Bolt Allowable @Ambient Temperature	(kg./sq.cm.)	1760.000
Gasket Seating Stress [y]	(kg./sq.cm.)	704.000
Flange Allowable Stress Multiplier		1.000
Bolt Allowable Stress Multiplier (VIII Div 2 4-141) ...		3.000
Disable Leakage Calculations (Y/N)		N
Disable ANSI B16.5 Checks (Y/N)		N
Flange Face OD or Lapjt Cnt OD.....	(mm.)	596.900
Flange Face ID or Lapjt Cnt ID.....	(mm.)	387.350
Gasket Outer Diameter	(mm.)	463.550
Gasket Inner Diameter	(mm.)	412.750
Nubbin Width	(mm.)	
Facing Sketch		2.000
Facing Column		2.000

Flange Type: (Integral Weld Neck)

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Effective gasket width parameters:

Effective gasket seating width, b.....(mm.) 8.9803
 Diameter of gasket load reaction, G....(mm.) 445.5894

SAFETY FACTOR SUMMARY for the different Flange Models analyzed. (SAFETY FACTOR = Allowed/Actual)

	SAFETY FACTOR
Flexibility/Gasket Compression Model (Leakage)..	6.30
ANSI B16.5/Equivalent Pressure (Stress).....	0.36
ASME Model Operating (Stress).....	1.14
ASME Model Seating (Stress).....	0.97

FLANGE FLEXIBILITY MODEL -----

BOLTED FLANGE CHARACTERISTICS:

Initial Tightening Stress in the Bolt (Not the seating stress): 3168 kg./sq.cm.

Approximate Torque required to induce the above initial stress: 43 kg.m

GASKET COMPRESSION:	COMPRESSION (mm.)
After Initial Boltup (Ci).....	0.1881766617
Loss-of due to Pressure (Cp).....	0.0035571370
Loss-of due to Applied Moment (Cm)..	0.0232455526
Loss-of due to Applied Force (Cf)...	0.0022766141
Loss-of due to all loads (CL).....	0.0290793031
Initial minus all Losses (Ci-CL)....	0.1590973586
For Leak-Proof Joint (Creq).....	0.0050841216
Excess available (Ci-Creq)	0.1830925345

LEAKAGE SAFETY FACTOR: (If less than one then joint leakage is predicted.) (Allowed/Actual)

Pressure Only (Ci-Creq)/Cp	51.47
Force Only (Ci-Creq)/Cf	80.42
Moment Only (Ci-Creq)/Cm	7.88
Pressure+Force+Moment (Ci-Creq)/CL	6.30

EQUIVALENT PRESSURE MODEL -----

Equivalent Pressure (kg./sq.cm.)	37.60
ANSI B16.5 Flange Allowable Pressure Rating .	13.49

STRESS SAFETY FACTOR: (If less than one then joint failure is predicted.) (Allowed/Actual)

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ANSI B16.5/Equivalent Pressure 0.36

ASME SECT VIII DIV 1 STRESS MODEL -----

ACCORDING TO A05 APP 2-14, THE FOLLOWING RIGIDITY FACTORS SHOULD BE LESS THAN 1.0

ASME Rigidity Factor "J", Operating Case 0.2945
 ASME Rigidity Factor "J", Seating Case 0.3233

CALCULATED STRESSES (kg./sq.cm.)

	OPERATING -----	ALLOW -----	SEATING -----	ALLOW -----	
Longitudinal Hub ..	910	2100	1074	2112	
Radial Flange	1226	1400	1447	1408	*failing
Tangential Flange .	376	1400	444	1408	
Maximum Average ...	1068	1400	1261	1408	
Bolting	1092	5280	1556	1760	

"*" Indicates Failure for an item.

STRESS SAFETY FACTOR: (If less than one then joint failure is predicted.) (Allowed/Actual)

	OPERATING -----	SEATING -----
Longitudinal Hub	2.31	1.97
Radial Flange	1.14	0.97
Tangential Flange ...	3.72	3.17
Maximum Average	1.31	1.12
Bolting	4.84	1.13