

CAESAR II ANALYSIS REPORT: Flange Leakage/Stress Calculations

Flange Inside Diameter [B] (User to verify) .....	(mm.)	513.500
Flange Thickness [t].....	(mm.)	55.000
Flange Rating (Optional) .....		0.000
Bolt Circle Diameter .....	(mm.)	660.000
Number of Bolts .....		20.000
Bolt Diameter .....	(mm.)	33.000
Bolt Initial Tightening Stress .....	(MPa )	
Uncompressed Gasket Thickness .....	(mm.)	5.000
Grade of Attached B16_5 ANSI Flange.....		25.000
Leak Pressure Ratio [m] .....		1.500
Effective Gasket Modulus .....	(N./sq.mm. )	2000.000
Externally Applied Moment .....	(optional) ....( N.m. )	45000.000
Externally Applied Force .....	(optional) .....	( N.) 10000.000
Pressure [P].....	(bars )	8.000
Disable Stress Calculations (Y/N) .....		N
Flange Type (1-8, see ?-Help or Alt-P to plot) .....		5.000
Flange Outside Diameter [A].....	(mm.)	730.000
Design Temperature .....	C	20.000
Small End Hub Thickness [g0].....	(mm.)	8.000
Large End Hub Thickness [g1].....	(mm.)	14.000
Hub Length [h].....	(mm.)	6.000
Flange Allowable @Design Temperature .....	(MPa )	117.898
Flange Allowable @Ambient Temperature .....	(MPa )	117.898
Flange Modulus of Elasticity @Design .....	(N./sq.mm. )	211000.000
Flange Modulus of Elasticity @Ambient .....	(N./sq.mm. )	211000.000
Bolt Allowable @Design Temperature .....	(MPa )	129.618
Bolt Allowable @Ambient Temperature .....	(MPa )	129.618
Gasket Seating Stress [y] .....	(MPa )	5.000
Flange Allowable Stress Multiplier .....		1.000
Bolt Allowable Stress Multiplier (VIII Div 2 4-141) ...		1.000
Disable Leakage Calculations (Y/N) .....		N
Disable ANSI B16.5 Checks (Y/N) .....		N
Flange Face OD or Lapjt Cnt OD.....	(mm.)	730.000
Flange Face ID or Lapjt Cnt ID.....	(mm.)	513.500
Gasket Outer Diameter .....	(mm.)	730.000
Gasket Inner Diameter .....	(mm.)	508.000
Nubbin Width .....	(mm.)	
Facing Sketch .....		1.000
Facing Column .....		2.000

Flange Type: (Loose Ring )

Effective gasket width parameters:

Effective gasket seating width, b.....(mm.) 18.5390

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Diameter of gasket load reaction, G....(mm.) 692.9221

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

	SAFETY FACTOR
Flexibility/Gasket Compression Model (Leakage)..	45.75
ASME Model Operating (Stress).....	1.47
ASME Model Seating (Stress).....	1.77

FLANGE FLEXIBILITY MODEL -----

BOLTED FLANGE CHARACTERISTICS:

Initial Tightening Stress in the Bolt (Not the seating stress): 272 MPa

Approximate Torque required to induce the above initial stress: 1152 N.m.

GASKET COMPRESSION:	COMPRESSION (mm.)
After Initial Boltup (Ci).....	0.1442178339
Loss-of due to Pressure (Cp).....	0.0015949011
Loss-of due to Applied Moment (Cm)..	0.0013733521
Loss-of due to Applied Force (Cf)...	0.0000528685
Loss-of due to all loads (CL).....	0.0030211217
Initial minus all Losses (Ci-CL)....	0.1411967129
For Leak-Proof Joint (Creq).....	0.0060000001
Excess available (Ci-Creq) .....	0.1382178366

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

Pressure Only (Ci-Creq)/Cp .....	86.66
Force Only (Ci-Creq)/Cf .....	2614.37
Moment Only (Ci-Creq)/Cm .....	100.64
Pressure+Force+Moment (Ci-Creq)/CL .....	45.75

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 .....	0.9772
ASME Rigidity Factor "J", Seating Case .....	-0.8100

CALCULATED STRESSES (MPa )

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	OPERATING -----	ALLOW -----	SEATING -----	ALLOW -----
Longitudinal Hub ..	0	177	0	177
Radial Flange .....	0	118	0	118
Tangential Flange .	80	118	67	118
Maximum Average ...	40	118	33	118
Bolting .....	56	130	17	130

"\*" Indicates Failure for an item.

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

	OPERATING -----	SEATING -----
Longitudinal Hub ....	710.15	856.72
Radial Flange .....	728.28	878.59
Tangential Flange ...	1.47	1.77
Maximum Average .....	2.93	3.53
Bolting .....	2.32	7.70