



Anchor Flange Calculation

PREPARED: **P.G.A.Engineering**
 CHECKED:
 APPROVED:
 DATE: 30/06/2009

This calculation is according to ASME VIII Div.1 App.2

Outside Diameter of Pipe	30		
Schedula Number	30		
Pipe Material	API 5L X65		
Design Pression	P	69,8	bar
Test Pression	P _{TEST}	105	bar
Installation Temperature	T _{INST}	30	°C
Maximum Temperature	T _{MAX}	155	°F
Minimum Temperature	T _{MIN}	70	°F
Test Temperature	T _{TEST}	20	°C
Corrosion Allowance	C	0,0	mm
Axial Load	F _X	1500,0	kgf
Bendig Moment	M _X	0,0	N m
Types of Flange	Integral Type Flange		
Exthernal Load Evaluation Method	Equivalent Pressure (Kellog assumption)		
Size of Flange	Heavy Size Flange		
Flange Material	A694 F65		
Type of Conglomerate	Normale 325		

CALCULATION

DESCRIPTION	DEF.	Imperial		Metric	
		Values	Unit or Measure	Values	Unit or Measure

INPUT

Outside Diameter of Pipe	DN	30,000	in	762,00	mm
Pipe Wall Thickness	t	0,625	in	15,88	mm
Pipe Inside Diameter	d	28,750	in	730,24	mm
Corrosion Allowance	c	0,000	in	0	mm
Design Pressure	P	1017	psi	7,02	MPa
Design Pressure at Test Temperature	P _{TEST}	1519	psi	10,47	MPa
Equivalent Pressure	P _{eq}	5	psi	0,04	MPa
Installation Temperature	T _{INST}	86	°F	30	°C
Maximum Temperature	T _{MAX}	155	°F	68	°C
Minimum Temperature	T _{MIN}	70	°F	21	°C
Test Temperature	T _{TEST}	68	°F	20	°C
Axial Load	F _X	3306,9336	lb	14710	N
Bending Moment	M _X	0	in lb	0	N m
Allowable Pipe Stress at Operating Condition	S _{P,OP}	25700	psi	177	MPa
Allowable Pipe Stress at Test Temperature	S _{P,TEST}	65000	psi	448	MPa
Allowable Flange Stress at Operating Condition	S _{AF,OP}	25700	psi	177	MPa
Allowable Flange Stress at Test Temperature	S _{AF,TEST}	65000	psi	448	MPa
Allowable Bearing Stress	S _B	4714	psi	32,5	MPa
Modulus od Elasticity at Operaing Condition	E	2,90E+07	psi	200240	MPa
Modulus od Elasticity at Test Temperature	E _{TEST}	3,02E+07	psi	208270	MPa
Mean Coefficient of Thermal Expansion at Operaing Condition	CT	6,61E-06	in/in/°F	1,19E-05	mm/mm/°C
Mean Coefficient of Thermal Expansion at Test Temperature	CT _{TEST}	6,40E-06	in/in/°F	1,15E-05	mm/mm/°C



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FLANGE DIMENSION					
Outside Diameter of Flange	A	38,380	in	974,852	mm
Diameter of Hub	DF	32,120	in	815,848	mm
Hub Diameter Beginning of Chamfer Welding Neck	C	30,000	in	762	mm
Inside Diameter	B	28,750	in	730,24	mm
Thickness of Hub at Back of Flange	g1	1,685	in	42,804	mm
Thickness of Hub at Small End	g0	0,625	in	15,88	mm
Flange Thickness	t	3,440	in	87,376	mm
Hub Length	h	3,880	in	98,552	mm

OUTPUT

Pipe Area	AP	57,70	in ²	37223	mm ²
Minimum Design Load Ratings	W _{MIN}	3500	lb	15569	N
Design Load Ratings at Maximum Temperature	W _I	1.424.724	lb	6337490	N
Design Load Ratings at Minimum Temperature	W _D	177.212	lb	788280	N
Design Load Ratings at Test Temperature	W _{TEST}	785.011	lb	3491905	N
Design Load Ratings	W	1.424.724	lb	6337490	N
Diameter of Load Circle	N	34,36116213	in	872,77	mm
Radial Distance from Load and Reaction	H _g	2,180581067	in	55,39	mm
Moment Acting Upon the Flange	M	3.106.727	lb in	544.071	N m
Moment Acting Upon the Flange	M _{TEST}	1.711.781	lb in	299.779	N m

VERIFICATION

Description	Calculated		Allowed		CHECK
	psi	MPa	psi	MPa	
S _H Longitudinal Stress in Hub at Op. Cond.	31.207	215,16	38.550	265,79	VERO
S _R Longitudinal Stress in Flange at Op. Cond.	13.271	91,50	25.700	177,20	VERO
S _T Tangential Stress in Flange at Op. Cond.	15.574	107,38	25.700	177,20	VERO
(S _H +S _R)/2 at Op. Cond.	22.239	153,33	25.700	177,20	VERO
(S _H +S _T)/2 at Op. Cond.	23.390	161,27	25.700	177,20	VERO
S _S Shear Stress at Op. Cond.	4.104	28,30	25.700	177,20	VERO
S _B Bearing Stress at Op. Cond.	3.166	21,83	4.714	32,50	VERO
S _{H,TEST} Longitudinal Stress in Hub at Test Temp.	17.195	118,55	97.500	672,24	VERO
S _{R,TEST} Longitudinal Stress in Flange at Test Temp.	7.240	49,92	65.000	448,16	VERO
S _{T,TEST} Tangential Stress in Flange at Test Temp.	8.837	60,93	65.000	448,16	VERO
(S _{H,TEST} +S _{R,TEST})/2 at Test Temp.	12.218	84,24	65.000	448,16	VERO
(S _{H,TEST} +S _{T,TEST})/2 at Test Temp.	13.016	89,74	65.000	448,16	VERO
S _S Shear Stress at Test Temp.	2.261	15,59	65.000	448,16	VERO
S _B Bearing Stress at Test Temp.	1.744	12,03	4.714	32,50	VERO



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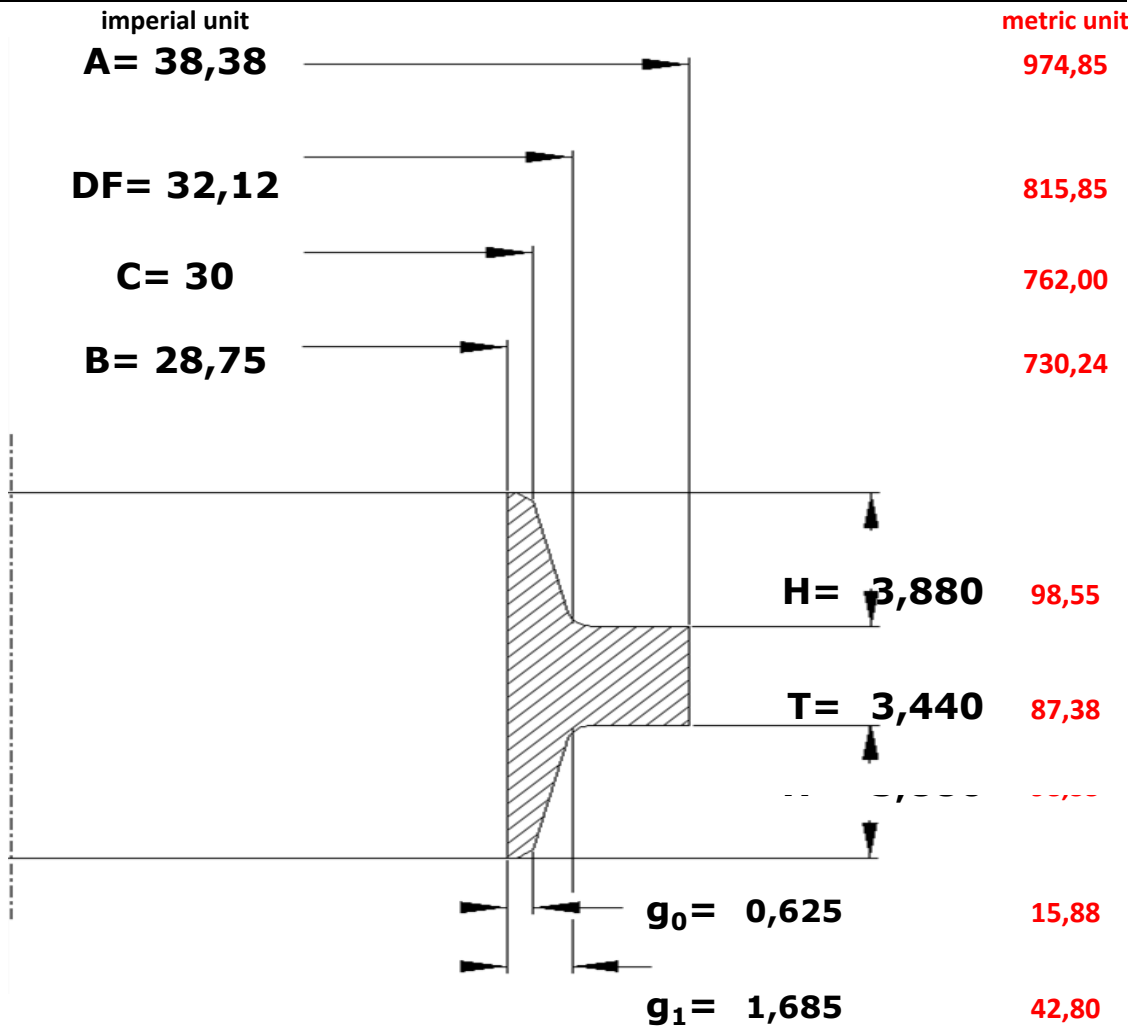
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