CALCULATION SUMMARIES FOR API 570 EXAM

Sl #	Formula Description	Formula	Description	Para/Ref. No	Reference Code
1	Soil Resistivity (ohm-cm)	***= 191.5 x d x R***	*The number 191.5 is a constant that takes into account the mathematical equation for the mass of the Soil, and a conversion factor to convert feet to centimeters.* *"d" is the distance in feet between any 0f the equally spaced pins (with all of the pins in a straight line)* *"R" is a resistance factor of the voltage drop across the two inner pins. divided by the induced current flow in the earth between the two outer pins.*	10.10.1.4.3	API 574 2009 Edition
2	Minimum Allowable Working Pressure (MAWP)	***MAWP = 2SEt/D***	*"S" is the allowable unit stress at the design temperature, In pounds per square inch (kilopascals)* *"E" is the longitudinal quality factor.* *'"t" is the corroded thickness, means actual measured thickness minus twice of calculated corrosion to next inspection period in inches (millimeters)* *"P" is the internal design gauge pressure of the pipe. in pounds per square inch (kilopascals)* *"D" is the OD of the pipe, in inches (millimeters)*	Table 4	API 570 2009 Edition
3	Temperature Conversion	**Tc = 5/9 x (Tf - 32)**	Tc = temperature in degrees Celsius, Tf = temperature in degrees Fahrenheit		
4	Temperature Conversion	**Tf = 9/5 x Tc + 32**	Tc = temperature in degrees Celsius, Tf = temperature in degrees Fahrenheit		
5	Toe to Toe Distance Patch Plate	**=√Dt**	D = Inside Diameter of Pipe, t = Thickness of Patch Plate	8.1.4	API 570 2009 Edition
6	Minimum Required Pipe Thickness	**tm = t + c** **t = PD/ 2(SEW + PY)**	The minimum thickness, T, for the pipe selected, considering manufacturer's minus tolerance, shall be not less than tm. (b) The following nomenclature is used in the equations for pressure design of straight pipe: c = sum of the mechanical allowances (thread or groove depth) plus corrosion and erosion allowances. For threaded components, the nominal thread depth (dimension h of ASME B1.20.1, or equivalent) shall apply. For machined surfaces or grooves where the tolerance is not specified, the tolerance shall be assumed to be 0.5 mm (0.02 in.) in addition to the specified depth of the cut. D = outside diameter of pipe as listed in tables of standards or specifications or as measured d = inside diameter of pipe. For pressure design calculation, the inside diameter of the pipe is the maximum value allowable under the purchase specification. E = quality factor from Table A-1A or A-1B, P = internal design gage pressure, S = stress value for material from Table A-1, T = pipe wall thickness (measured or minimum in accordance with the purchase specification), t = pressure design thickness, as calculated in accordance with para. 304.1.2 for internal pressure or as determined in accordance with para. 304.1.3 for external pressure, tm = minimum required thickness, including mechanical, corrosion, and erosion allowances, W = weld joint strength reduction factor in accordance with para. 302.3.5(e), Y = coefficient from Table 304.1.1, valid for t < D/6 and for materials shown. The value of Y may be interpolated for intermediate temperatures. For t ≥ D/6, Y = d + 2c /D + d + 2c	304.1.1 & 304.1.2	B31.3 2010 Edition
7	Pressure Design Thickness (Barlow)	***t = PD/2SE***	*"t" is the pressure design thickness for internal pressure. in inches (millimeters)* *"P" is the internal design gauge pressure of the pipe. in pounds per square inch (kilopascals)* *"D" is the OD of the pipe, in inches (millimeters)* *"S" is the allowable unit stress at the design temperature, In pounds per square inch (kilopascals)* *"E" is the longitudinal quality factor.*	11.1.2	API 574 2009 Edition
8	Pressure Design Thickness Valve and Flanged Fittings	***tm = t + c*** ***t = 1 .5[PD / 2(SE)]***	*t is the pressure design thickness for internal pressure. in inches (millimetes);* *P is the internal design gauge pressure of the pipe. in pounds per square inch (kilopascals);* *D is the OD of the pipe, in inches (millimeters);* *S is the allowable unit stress at the design temperature. in pounds per squar,e inch (kilopascals);* *E is the longitudinal quality factor.*	11.2	API 574 2009 Edition
9	Minimum Required lank Thickness	**tm = dg√3P / 16SEW + C**	c = sum of allowances defined in para. 304.1.1, dg = inside diameter of gasket for raised or flat face flanges, or the gasket pitch diameter for ring joint and fully retained gasketed flanges, E = same as defined in para. 304.1.1, P = design gage pressure, S = same as defined in para. 304.1.1, W = same as defined in para. 304.1.1	304.5.3	B31.3 2010 Edition

CALCULATION SUMMARIES FOR API 570 EXAM

Sl #	Formula Description	Formula	Description	Para/Ref. No	Reference Code
10	Hydro Test Pressure	**PT = 1.5 x P x Rr**	where P = internal design gage pressure PT = minimum test gage pressure Rr = ratio of ST/S for pipe or components without established ratings, but shall not exceed 6.5 = ratio of the component pressure rating at the test temperature to the component pressure rating at the component design temperature for components with established ratings, but shall not exceed 6.5 S = allowable stress value at component design temperature (see Table A-1) ST = allowable stress value at test temperature	345.4.2	B31.3 2010 Edition
11	Flange and Flanged Fittings Hydro Test Pressure	**PT = 1.5 x 100°F (38°C) rating duration NPS ≤ 2 = 60 sec. NPS ≥ 2½ ≤ 8 = 120 sec. NPS ≥ 10 = 180 sec.**	Rating from Table 1A and Table 2 (Test pressure round off to next higher 1 bar or 25 psi	2.6 8.2.2 8.2.4	B16.5 2009 Edition
12	Pneumatic Test Pressure	**PT = 1.1 x Design Pressure**		345.5.4	B31.3 2010 Edition
13	Fillet Weld Weld Size for Slip on Flange (Xmin) Branch Fillet weld Throat Size (tc)	**LEG = 1.414 x Throat** **Throat = Leg x 0.707** **Xmin = lesser of 1.4 x T or thickness of hub** **tc = lesser of 0.7 x Tb or 6 mm (1⁄4 in.)**	T = Thickness of pipe Tb = Thickness of branch tc = throat of branch fillet weld	328.5.2 328.5.4	B31.3 2010 Edition
14	Flanged Fittings subminimum area	**D = 0.35√dtm**	D = Diameter of Subminimum Thickness area d = Inside diameter of Pipe tm = Minimum Thickness of Flanged Fittings wall thickness from the tables.	6.1.2	B16.5 2009 Edition
15	Flanged Fittings subminimum thickness	**= 0,75 x tm**			
16	Flanged Fittings subminimum area edge to edge distance	**= 1.75√dtm**			
17	Corrosion Rate	**RL = tactual - trequired / Cr**	RL = Remaining life Cr = Corrosion rate, LT = Long term corrosion rate, ST = Short term corrosion rate, time = time in years between tinitial and tactual	7.1.1	API 570 2009 Edition
18	Longterm Corrosion	**LT = tinitial - tactual / time (years)**			
19	Shortterm Corrosion	**ST = tinitial - tactual / time (years)**			
20	Tension Test	**TSA = ∏R²**	TSA = Turned Specimen Area	Sec. IX	ASME SEC. IX 2010 Edition
		RSA = Width x Thickness	RSA = Reduce Specimen Area		
		TS = Load/Area	TS = Tensile Strength		
		Load = Area x Tensile Strength			
1	PWHT (Covering Thickness)	**2 x Thickness for Given Material in Table 331.1.1 or >16mm (⅝ in) for P1 materials >13mm (½ in) for P3, 4, 5, or 10A materials**	Ṫb = Thickness of branch Ṫh = Thickness of header Ṫr = Thickness of reinforcement pad	331.1.1 331.1.3	B31.3 2010 Edition
	Sketch 1	**Ṫb + tc**			
	Sketch 2	**Ṫh + tc**			
	Sketch 3	**Ṫb + tc or Ṫ + tc**			
	Sketch 4	**Ṫh + Ṫr + tc**			
	Sketch 5	**Ṫb + tc**			