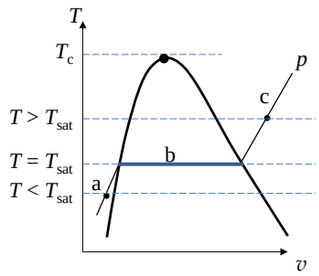
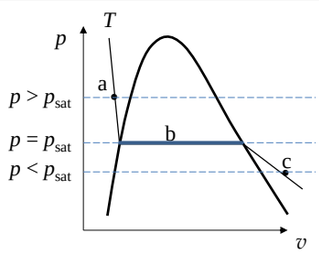
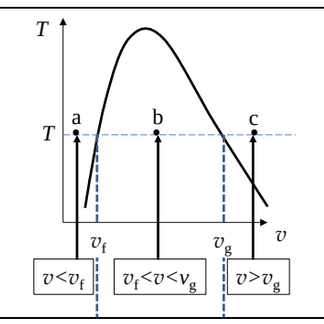
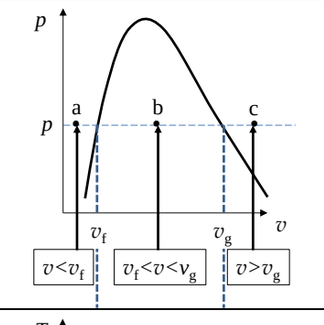
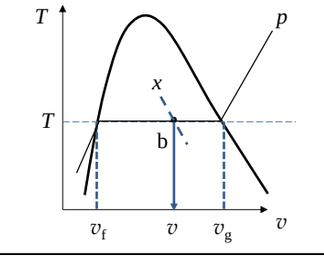
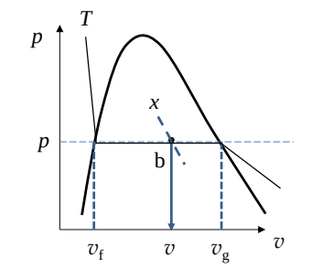
Steam Tables Process Overview

Fundamentals of Engineering Thermodynamics

8th Edition by Moran, Shapiro, Boettner, and Bailey, 2014

Given Properties	Test to Determine Region of Vapor Dome	Vapor Dome Diagram	Where/How to Obtain Properties
1. p 2. T	**Look up p in Table A-3/3E:** a. If $T < T_{sat}$, Compressed liquid b. If $T = T_{sat}$, Two-phase, liquid-vapor mixture c. If $T > T_{sat}$, Superheated vapor d. If T > T_c, Superheated vapor		a. **Table A-5/5E** or **Table A-2/2E** (approximate as saturated liquid) b. T and p are not independent; need another property c.&d. **Table A-4/4E**
1. p 2. T	**Look up T in Table A-2/2E:** a. If $p > p_{sat}$, Compressed liquid b. It $p = p_{sat}$, Two-phase, liquid-vapor mixture c. If $p < p_{sat}$, Superheated vapor		a. **Table A-5/5E** or **Table A-2/2E** (approximate as saturated liquid at T) b. T and p are not independent; need another property c. **Table A-4/4E**
1. T 2. v, u, h, or s	**Look up T in Table A-2/2E:** a. If $v < v_f$, Compressed liquid b. If $v_f < v < v_g$, Two-phase, liquid-vapor mixture c. If $v > v_g$, Superheated vapor **Apply the same procedure if u, h, or s is given.**		a. **Table A-5/5E** or **Table A-2/2E** (approximate as saturated liquid) b. **Table A-2/2E** and quality (x) calculations below c. **Table A-4/4E**
1. p 2. v, u, h, or s	**Look up p in Table A-3/3E:** a. If $v < v_f$, Compressed liquid b. If $v_f < v < v_g$, Two-phase, liquid-vapor mixture c. If $v > v_g$, Superheated vapor **Apply the same procedure if u, h, or s is given.**		a. **Table A-5/5E** or **Table A-2/2E** (approximate as saturated liquid) b. **Table A-3/3E** and quality (x) calculations below c. **Table A-4/4E**
1. T 2. x	b. Two-phase, liquid vapor mixture		b. **Table A-2/2E** and quality (x) calculations below
1. p 2. x	b. Two-phase, liquid vapor mixture		b. **Table A-3/3E** and quality (x) calculations below

Quality Calculations (Eqs. 3.2, 3.6, 3.7, and 6.4)

$x = \dfrac{v - v_f}{v_g - v_f}$	$x = \dfrac{u - u_f}{u_g - u_f}$	$x = \dfrac{h - h_f}{h_g - h_f} = \dfrac{h - h_f}{h_{fg}}$	$x = \dfrac{s - s_f}{s_g - s_f}$
$v = v_f + x(v_g - v_f)$	$u = u_f + x(u_g - u_f)$	$h = h_f + x(h_g - h_f) = h_f + xh_{fg}$	$s = s_f + x(s_g - s_f)$