

Table 2 Properties of steam

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
P=30.0 bar = 3.0 MPa (T _{sat} =233.90°C)				
Sat	0.0667	2604.1	2804.2	6.1869
240	0.0682	2619.7	2824.3	6.2265
280	0.0771	2709.9	2941.3	6.4462
320	0.0850	2788.4	3043.4	6.6245
360	0.0923	2861.7	3138.7	6.7801
400	0.0994	2932.8	3230.9	6.9212
440	0.1062	3002.9	3321.5	7.0520
500	0.1162	3108.0	3456.5	7.2338
540	0.1227	3178.4	3546.6	7.3474
600	0.1324	3285.0	3682.3	7.5085
640	0.1388	3357.0	3773.5	7.6106
700	0.1484	3466.5	3911.7	7.7571

5. An ideal Otto cycle has a compression ratio of 8. As shown in the following figure, at the beginning of the compression process, the air ($c_p = 1.005$ kJ/(kg·K), $c_v = 0.718$ kJ/(kg·K), $K = c_p/c_v = 1.4$) is at 100 kPa and 27°C, and 718 kJ/kg of heat is transferred to the air during the constant-volume heat addition process. Please determine

- The maximum temperature and pressure that occur during the cycle. (10%)
- The net work output. (5%)
- The thermal efficiency. (5%)
- The mean effective pressure for the cycle. (5%)

