

**Esame di Stato per l'Abilitazione all'Esercizio della Professione di  
Ingegnere Junior  
II Sessione – 27 novembre 2012**

**Settore Civile e Ambientale**

**I Prova scritta**

Il candidato svolga uno dei seguenti temi:

**TEMA 1**

Il candidato descriva le differenze, dal punto di vista della progettazione strutturale in zona sismica, tra l'uso del cemento armato e quello dell'acciaio.

**TEMA 2**

L'ingegneria italiana negli anni del miracolo economico.

Il candidato faccia riferimento ad opere realizzate.

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**Settore Industriale**

**I Prova scritta**

Il candidato svolga uno dei seguenti temi:

**TEMA 1**

Il candidato descriva i sistemi di produzione di energia elettrica su larga scala, riservando particolare attenzione alle emissioni inquinanti ed ai relativi sistemi di abbattimento.

**TEMA 2**

Il candidato elenchi, descriva e illustri le strutture di equilibrio e non del sistema ferro-carbonio, ricorrendo all'uso di diagrammi per spiegarne i meccanismi.

## **ESAME DI STATO INGEGNERIA II SESSIONE 2012**

### **II Prova Scritta Iunior - Civile**

Si riportino i capitoli fondamentali per la redazione di una relazione di calcolo per la realizzazione di un edificio per civile abitazione in cemento armato a due piani, con estensione in pianta pari a 12 m x 20 m. Si ipotizzi la sua collocazione in zona sismica di moderata intensità, pur senza far riferimento esatto alle azioni di progetto.

## **Esami di Stato Ingegneria II Sessione 2012**

### **II Prova Scritta Iunior - Edile/Edilizia**

Il candidato esponga i criteri di progettazione di un teatro di quartiere, posto alla periferia di un centro urbano. Il tema va svolto nella forma di una relazione progettuale che contenga gli aspetti urbanistici funzionali distributivi costruttivi e statici dell'opera descritti per punti e attraverso l'eventuale uso di schemi grafici.

**Esame di Stato Ingegneria Industriale  
2° Sessione 2012**

**Laurea Triennale**

**Seconda Prova Scritta - Metallurgia**

Tempra, misura della temprabilità e rinvenimento negli acciai.

**Esami di Stato Ingegneria  
II Sessione 2012**

**II Prova Scritta Iunior – Meccanica (Macchine)**

Il candidato descriva le linee progettuali di una pompa centrifuga, supponendo note la portata elaborata e la pressione di aspirazione e mandata.

**Esami di Stato Ingegneria  
II Sessione 2012**

**Prova Progettuale Iunior - Edile/Edilizia**

*In un area libera prospiciente un parco, il candidato progetti una biblioteca di quartiere la cui sala dovrà ospitare 50 lettori. Il layout funzionale dovrà comprendere un ingresso con guardaroba, sala cataloghi e banco richiesta per i prestiti, piccolo magazzino, servizi igienici, locali tecnici. Il candidato aggiunga eventualmente altri spazi complementari.*

*Il candidato deve elaborare:*

- *Planimetria generale 1:200 (accessi, viabilità, area parcheggio)*
- *Pianta con indicazione della struttura portante*
- *Un prospetto*
- *Una sezione*

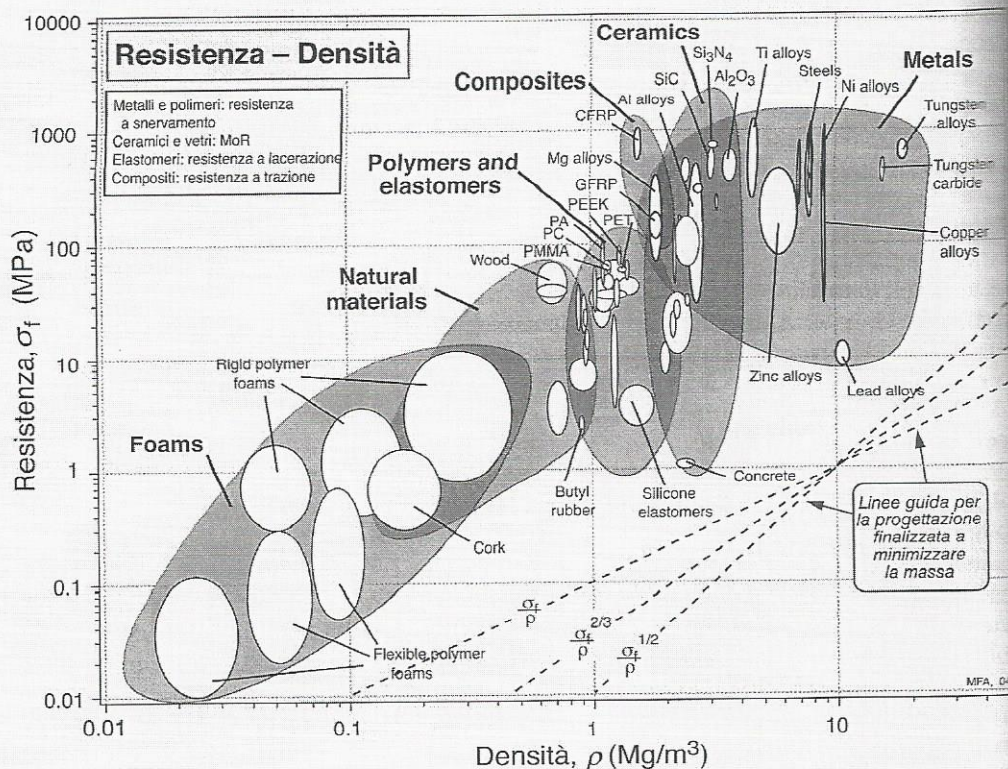
*Dettagli architettonici e strutturali della copertura della sala lettura.*



# Esame di stato 2012 per l'abilitazione all'esercizio della professione di ingegnere iunior Progetto di Metallurgia

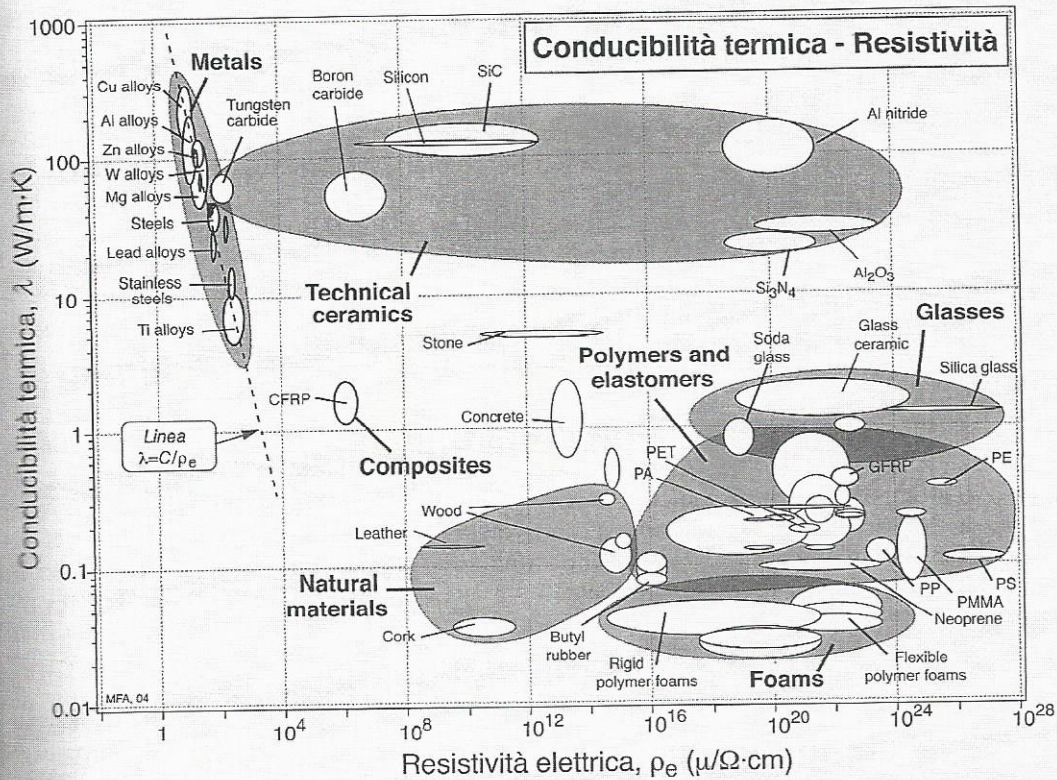
Si deve progettare una linea elettrica sotterranea.

- 1) Il candidato individui i fattori critici da tenere in considerazione per il dimensionamento dei cavi e dell'isolamento.
- 2) Si considerino i vari materiali possibili, identificando le caratteristiche fondamentali.
- 3) Si esegua un dimensionamento di massima di cavi e isolamento, assumendo opportunamente i dati necessari.
- 4) Si esplicitino le problematiche da affrontare per la corretta posa in opera.



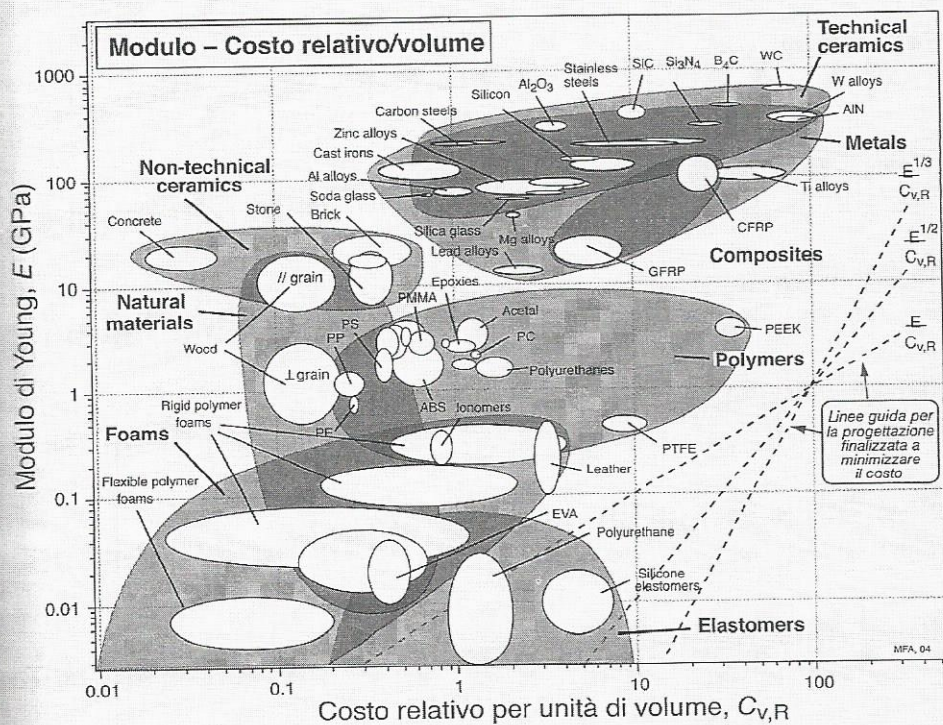
- 1.4 Diagramma resistenza,  $\sigma_f$ , contro densità,  $\rho$  (resistenza a snervamento per i metalli e i polimeri, modulo di rottura MoR per i ceramici, resistenza alla lacerazione per gli elastomeri e resistenza a trazione per i compositi). Le linee guida tracciate a valori costanti di  $\sigma_f/\rho$ ,  $\sigma_f^{2/3}/\rho$  e  $\sigma_f^{1/2}/\rho$  sono utilizzate per la progettazione finalizzata a minimizzare la massa e vincolata dal cedimento.





Conducibilità termica,  $\lambda$ , contro resistività elettrica,  $\rho_e$ . Per i metalli le due grandezze sono correlate.

Fig



Modulo di Young,  $E$ , contro costo relativo per unità di volume,  $C_{v,R}$ . Le linee guida per la progettazione permettono di selezionare materiali che massimizzano la rigidità per unità di costo.

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Table 1 Typical properties of electrical resistance alloys

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Basic composition, %	Resistivity(a), nΩ · m(b)	TCR, ppm/°C(c)	Thermoelectric potential versus Cu, μV/°C	Coefficient of thermal expansion(d), μm/m · °C	Tensile strength(a)		Density(a)		
					MPa	ksi	g/cm <sup>3</sup>	lb/in. <sup>3</sup>	
<b>Radio alloys</b>									
98Cu-2Ni .....	50	1400 (25–105 °C)	–13 (25–105 °C)	16.5	205–410	30–60	8.9	0.32	
94Cu-6Ni .....	100	700 (25–105 °C)	–13 (25–105 °C)	16.3	240–585	35–85	8.9	0.32	
89Cu-11Ni .....	150	450 (25–105 °C)	–25 (25–105 °C)	16.1	240–515	35–75	8.9	0.32	
78Cu-22Ni .....	300	180 (25–105 °C)	–36 (0–75 °C)	15.9	345–690	50–100	8.9	0.32	
<b>Manganins</b>									
87Cu-13Mn .....	480	±15 (15–35 °C)	1 (0–50 °C)	18.7	275–620	40–90	8.2	0.30	
83Cu-13Mn-4Ni .....	480	±15 (15–35 °C)	–1 (0–50 °C)	18.7	275–620	40–90	8.4	0.31	
85Cu-10Mn-4Ni(e) .....	380	±10 (40–60 °C)	–1.5 (0–50 °C)	18.7	345–690	50–100	8.4	0.31	
<b>Constantans</b>									
57Cu-43Ni .....	500	±20 (25–105 °C)	–43 (25–105 °C)	14.9	410–930	60–135	8.9	0.32	
55Cu-45Ni .....	500	±40 (–55–105 °C)	–42 (0–75 °C)	14.9	455–860	66–125	8.9	0.32	
53Cu-44Ni-3Mn .....	525	±70 (–55–105 °C)	–38 (0–100 °C)	14.9	410–930	60–135	8.9	0.32	
<b>Nickel-chromium-aluminum alloys</b>									
75Ni-20Cr-3Al-2(Cu, Fe, or Mn) .....	1333	±20 (–55–105 °C)	1.0 (25–105 °C)	12.6	825–1380	120–200	8.1	0.29	
72Ni-20Cr-3Al-5Mn .....	1375	±20 (–55–105 °C)	1.0 (25–105 °C)	13	690–1380	100–200	7.1	0.26	
<b>Nickel-base alloys</b>									
78.5Ni-20Cr-1.5Si .....	1080	80 (25–105 °C)	3.9 (25–105 °C)	13.5	790–1380	115–200	8.3	0.30	
76Ni-17Cr-4Si-3Mn .....	1330	±20 (–55–105 °C)	–1 (20–100 °C)	15	900–1380	130–200	7.8	0.28	
71Ni-29Fe .....	208	4300 (25–105 °C)	–40 (25–105 °C)	15	480–1035	70–150	8.4	0.31	
68.5Ni-30Cr-1.5Si .....	1187	90 (25–105 °C)	–1.2 (25–105 °C)	12.2	825–1380	120–200	8.1	0.29	
60Ni-16Cr-22.5Fe-1.5Si .....	1125	150 (25–105 °C)	0.9 (25–105 °C)	13.5	725–1345	105–195	8.4	0.30	
37Ni-21Cr-40Fe-2Si .....	1080	300 (20–100 °C)	–1.1 (25–105 °C)	16.0	585–1135	85–165	7.96	0.288	
35Ni-20Cr-43.5Fe-1.5Si .....	1000	400 (25–105 °C)	–1.1 (25–105 °C)	15.6	585–1135	85–165	8.1	0.29	
<b>Iron-chromium-aluminum alloys</b>									
73.5Fe-22Cr-4.5Al .....	1350	60 (25–105 °C)	–3.0 (0–100 °C)	11	690–965	100–140	7.25	0.262	
73Fe-22Cr-5Al .....	1390	40 (25–105 °C)	–2.8 (0–100 °C)	11	690–965	100–140	7.15	0.258	
72.5Fe-22Cr-5.5Al .....	1450	20 (25–105 °C)	–2.6 (0–100 °C)	11	690–965	100–140	7.1	0.256	
81Fe-15Cr-4Al .....	1250	±50 (25–105 °C)	–1.2 (0–100 °C)	11	620–900	90–130	7.43	0.268	
<b>Pure metals</b>									
Aluminum (99.99+) .....	26.55	4290(a)	–3.4 (0–50 °C)	23.9(a)	50–110	7–16	2.70	0.098	
Copper (99.99) .....	16.73	4270 (0–50 °C)	0	16.5(a)	115–130	17–19	8.96	0.324	
Gold (99.999+) .....	23.50	4000 (0–100 °C)	0.2 (0–100 °C)	14.2(a)	130	19	19.32	0.698	
Iron (99.94) .....	970	5000(a)	12.2 (0–100 °C)	11.7(a)	180–220	26–32	7.87	0.284	
Molybdenum (99.9) .....	52	3300(a)	6.9 (0–100 °C)	4.9	690–2140	100–310	10.22	0.369	
Nickel (99.8) .....	80	6000 (20–35 °C)	–22 (0–75 °C)	15	345–760	50–110	8.90	0.322	
Platinum (99.99+) .....	105	3920 (0–100 °C)	7.6 (0–100 °C)	8.9(a)	125	18	21.45	0.775	
Silver (99.99) .....	16	4100(a)	–0.2 (0–100 °C)	19.7	125	18	10.49	0.379	
Tantalum (99.96) .....	125	3820 (0–100 °C)	–4.3 (0–100 °C)	6.5(a)	690–1240	100–180	16.6	0.600	
Tungsten (99.9) .....	55	4500(a)	3.6 (0–100 °C)	4.3(a)	1825–4050	265–590	19.25	0.695	

Notes: (a) Properties are given for the alloy as received. (b) Resistivity is given at 20 °C. (c) TCR is given at 20 °C. (d) Coefficient of thermal expansion is given at 20 °C. (e) Data for 85Cu-10Mn-4Ni(e) are for the alloy as received. (f) Data for 73Fe-22Cr-5Al are for the alloy as received. (g) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (h) Data for 81Fe-15Cr-4Al are for the alloy as received. (i) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (j) Data for 73Fe-22Cr-5Al are for the alloy as received. (k) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (l) Data for 81Fe-15Cr-4Al are for the alloy as received. (m) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (n) Data for 73Fe-22Cr-5Al are for the alloy as received. (o) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (p) Data for 81Fe-15Cr-4Al are for the alloy as received. (q) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. 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(gl) Data for 73Fe-22Cr-5Al are for the alloy as received. (gm) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (gn) Data for 81Fe-15Cr-4Al are for the alloy as received. (go) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (gp) Data for 73Fe-22Cr-5Al are for the alloy as received. (gq) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (gr) Data for 81Fe-15Cr-4Al are for the alloy as received. (gs) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (gt) Data for 73Fe-22Cr-5Al are for the alloy as received. (gu) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (gv) Data for 81Fe-15Cr-4Al are for the alloy as received. (gw) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (gx) Data for 73Fe-22Cr-5Al are for the alloy as received. (gy) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (gz) Data for 81Fe-15Cr-4Al are for the alloy as received. (ha) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (hb) Data for 73Fe-22Cr-5Al are for the alloy as received. (hc) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (hd) Data for 81Fe-15Cr-4Al are for the alloy as received. (he) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (hf) Data for 73Fe-22Cr-5Al are for the alloy as received. (hg) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (hh) Data for 81Fe-15Cr-4Al are for the alloy as received. (hi) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (hj) Data for 73Fe-22Cr-5Al are for the alloy as received. (hk) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (hl) Data for 81Fe-15Cr-4Al are for the alloy as received. (hm) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (hn) Data for 73Fe-22Cr-5Al are for the alloy as received. (ho) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (hp) Data for 81Fe-15Cr-4Al are for the alloy as received. (hq) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. 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(ih) Data for 73Fe-22Cr-5Al are for the alloy as received. (ii) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (ij) Data for 81Fe-15Cr-4Al are for the alloy as received. (ik) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (il) Data for 73Fe-22Cr-5Al are for the alloy as received. (im) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (in) Data for 81Fe-15Cr-4Al are for the alloy as received. (io) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (ip) Data for 73Fe-22Cr-5Al are for the alloy as received. (iq) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (ir) Data for 81Fe-15Cr-4Al are for the alloy as received. (is) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. (it) Data for 73Fe-22Cr-5Al are for the alloy as received. (iu) Data for 72.5Fe-22Cr-5.5Al are for the alloy as received. (iv) Data for 81Fe-15Cr-4Al are for the alloy as received. (iu) Data for 73.5Fe-22Cr-4.5Al are for the alloy as received. 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(a) At 20 °C (68 °F). (b) To convert to  $\Omega$  · circ mil/ft, multiply by 0.6015. (c) Temperature coefficient of resistance is  $(R - R_0)/(R_0(t - t_0))$ , where  $R$  is resistance at  $t$  °C and  $R_0$  is resistance at the reference temperature  $t_0$  °C. (d) At 25 to 105 °C. (e) Shunt manganin



## **PROVA PROGETTUALE JUNIOR - MACCHINE**

Un impianto a vapore da 140 MW è caratterizzato da un doppio surriscaldamento del vapore, tre spillamenti rigenerativi. Il fluido di raffreddamento del condensatore è utilizzato per soddisfare un carico termico alla temperatura di 90°C.

Le principali caratteristiche dell'impianto sono di seguito riportate:

- pressione di vaporizzazione = 180 bar
- temperatura ingresso Turbina alta pressione = 540 °C
- pressione ri-surriscaldamento = 60 bar
- temperatura uscita secondo risurriscaldatore = 500 °C
- pressione spillamento rigenerativo alta pressione = 50 bar
- pressione spillamento rigenerativo bassa pressione = 3 bar
- pressione spillamento degassatore = 5 bar
- differenza di temperatura minima al condensatore 10°C

Si assuma che gli scambiatori rigenerativi a superficie siano del tipo a fascio tubiero controcorrente e presentino un differenza di temperatura in ingresso (per ingresso si intende il lato della portata principale) pari a 20°C una differenza di temperatura di pinch point pari a 10°C.

Sapendo che il rendimento delle turbine di alta e bassa pressione vale 0.88, il rendimento delle pompe (estrazione e mandata) è 0.86, quello del generatore di vapore 0.93:

- determinare le condizioni termodinamiche nei punti significativi dell'impianto (pressione, temperatura, entalpia, entropia e titolo)
- disegnare il ciclo termodinamico nei piani T-s, H-s e p-v
- calcolare il rendimento globale dell'impianto, e la portata di combustibile supponendo che il combustibile utilizzato abbia un potere calorifico inferiore pari a 32000 kJ/kg

Calcolare inoltre la portata di acqua di raffreddamento al condensatore sapendo che la differenza di temperatura tra mandata e ritorno dell'acqua dall'utenza termica avviene a 40°C.

Infine, facendo le opportune ipotesi, **dimensionare i due scambiatori di calore rigenerativi a superficie.**



Table 2. State of Saturation (Pressure Table)  
Sättigungszustand (Drucktafel)

<i>P</i>	<i>t</i>	<i>v'</i>	<i>v''</i>	<i>q''</i>	<i>h'</i>	<i>h''</i>	<i>r</i>	<i>s'</i>	<i>s''</i>
bar	°C	m³/kg	m³/kg	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
0,010	6,9828	0,0010001	129,20	0,007739	29,34	2514,4	2485,0	0,1060	8,9767
0,015	13,036	0,0010006	87,98	0,01137	54,71	2525,5	2470,7	0,1957	8,8288
0,020	17,513	0,0010012	67,01	0,01492	73,46	2533,6	2460,2	0,2607	8,7246
0,025	21,096	0,0010020	54,26	0,01843	88,45	2540,2	2451,7	0,3119	8,6440
0,030	24,100	0,0010027	45,67	0,02190	101,00	2545,6	2444,6	0,3544	8,5785
0,035	26,694	0,0010033	39,48	0,02533	111,85	2550,4	2438,5	0,3907	8,5232
0,040	28,983	0,0010040	34,80	0,02873	121,41	2554,5	2433,1	0,4225	8,4755
0,045	31,035	0,0010046	31,14	0,03211	129,99	2558,2	2428,2	0,4507	8,4335
0,050	32,898	0,0010052	28,19	0,03547	137,77	2561,6	2423,8	0,4763	8,3960
0,055	34,605	0,0010058	25,77	0,03880	144,91	2564,7	2419,8	0,4995	8,3621
0,060	36,183	0,0010064	23,74	0,04212	151,50	2567,5	2416,0	0,5209	8,3312
0,065	37,651	0,0010069	22,02	0,04542	157,64	2570,2	2412,5	0,5407	8,3029
0,070	39,025	0,0010074	20,53	0,04871	163,38	2572,6	2409,2	0,5591	8,2767
0,075	40,316	0,0010079	19,24	0,05198	168,77	2574,9	2406,2	0,5763	8,2523
0,080	41,534	0,0010084	18,10	0,05523	173,86	2577,1	2403,2	0,5925	8,2296
0,085	42,689	0,0010089	17,10	0,05848	178,69	2579,2	2400,5	0,6079	8,2082
0,090	43,787	0,0010094	16,20	0,06171	183,28	2581,1	2397,9	0,6224	8,1881
0,095	44,833	0,0010098	15,40	0,06493	187,65	2583,0	2395,3	0,6361	8,1691
0,10	45,833	0,0010102	14,67	0,06814	191,83	2584,8	2392,9	0,6493	8,1511
0,11	47,710	0,0010111	13,42	0,07454	199,68	2588,1	2388,4	0,6738	8,1177
0,12	49,446	0,0010119	12,36	0,08089	206,94	2591,2	2384,3	0,6963	8,0872
0,13	51,062	0,0010126	11,47	0,08722	213,70	2594,0	2380,3	0,7172	8,0592
0,14	52,574	0,0010133	10,69	0,09351	220,02	2596,7	2376,7	0,7367	8,0334
0,15	53,997	0,0010140	10,02	0,09977	225,97	2599,2	2373,2	0,7549	8,0093
0,16	55,341	0,0010147	9,433	0,1060	231,59	2601,6	2370,0	0,7721	7,9869
0,17	56,615	0,0010154	8,911	0,1122	236,93	2603,8	2366,9	0,7883	7,9658
0,18	57,826	0,0010160	8,445	0,1184	241,99	2605,9	2363,9	0,8036	7,9460
0,19	58,982	0,0010166	8,027	0,1246	246,83	2607,9	2361,1	0,8182	7,9272
0,20	60,086	0,0010172	7,650	0,1307	251,45	2609,9	2358,4	0,8321	7,9094
0,21	61,145	0,0010178	7,307	0,1368	255,88	2611,7	2355,8	0,8453	7,8925
0,22	62,162	0,0010183	6,995	0,1430	260,14	2613,5	2353,3	0,8581	7,8764
0,23	63,139	0,0010189	6,709	0,1490	264,23	2615,2	2350,9	0,8702	7,8611
0,24	64,082	0,0010194	6,447	0,1551	268,18	2616,8	2348,6	0,8820	7,8464
0,25	64,992	0,0010199	6,204	0,1612	271,99	2618,3	2346,4	0,8932	7,8323
0,26	65,871	0,0010204	5,980	0,1672	275,67	2619,9	2344,2	0,9041	7,8188
0,27	66,722	0,0010209	5,772	0,1732	279,24	2621,3	2342,1	0,9146	7,8058
0,28	67,547	0,0010214	5,579	0,1793	282,69	2622,7	2340,0	0,9248	7,7933
0,29	68,347	0,0010219	5,398	0,1852	286,05	2624,1	2338,1	0,9346	7,7812
0,30	69,124	0,0010223	5,229	0,1912	289,30	2625,4	2336,1	0,9441	7,7695
0,32	70,615	0,0010232	4,922	0,2032	295,55	2628,0	2332,4	0,9623	7,7474
0,34	72,029	0,0010241	4,650	0,2150	301,48	2630,4	2328,9	0,9795	7,7266
0,36	73,374	0,0010249	4,408	0,2269	307,12	2632,6	2325,5	0,9958	7,7070
0,38	74,658	0,0010257	4,190	0,2387	312,50	2634,8	2322,3	1,0113	7,6884
0,40	75,886	0,0010265	3,993	0,2504	317,65	2636,9	2319,2	1,0261	7,6709
0,45	78,743	0,0010284	3,576	0,2796	329,64	2641,7	2312,0	1,0603	7,6307
0,50	81,345	0,0010301	3,240	0,3086	340,56	2646,0	2305,4	1,0912	7,5947
0,55	83,737	0,0010317	2,964	0,3374	350,61	2649,9	2299,3	1,1194	7,5623
0,60	85,954	0,0010333	2,732	0,3661	359,93	2653,6	2293,6	1,1454	7,5327
0,65	88,021	0,0010347	2,535	0,3945	368,62	2656,9	2288,3	1,1696	7,5055
0,70	89,959	0,0010361	2,365	0,4229	376,77	2660,1	2283,3	1,1921	7,4804
0,75	91,785	0,0010375	2,217	0,4511	384,45	2663,0	2278,6	1,2131	7,4570
0,80	93,512	0,0010387	2,087	0,4792	391,72	2665,8	2274,0	1,2330	7,4352
0,85	95,152	0,0010400	1,972	0,5071	398,63	2668,4	2269,8	1,2518	7,4147
0,90	96,713	0,0010412	1,869	0,5350	405,21	2670,9	2265,6	1,2696	7,3954
0,95	98,204	0,0010423	1,777	0,5627	411,49	2673,2	2261,7	1,2865	7,3771



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Table 2. State of Saturation (Pressure Table) (Continuation)

Sättigungszustand (Drucktafel) (Fortsetzung)

P	t	v'	v''	q''	h'	h''	r	s'	s''
1.0	99.632	0.0010434	1.694	0.5904	417.51	2675.4	2257.9	1.3027	7.3598
1.1	102.32	0.0010455	1.549	0.6455	428.84	2679.6	2250.8	1.3330	7.3277
1.2	104.81	0.0010476	1.428	0.7002	439.36	2683.4	2244.1	1.3609	7.2984
1.3	107.13	0.0010495	1.325	0.7547	449.19	2687.0	2237.8	1.3868	7.2715
1.4	109.32	0.0010513	1.236	0.8088	458.42	2690.3	2231.9	1.4109	7.2465
1.5	111.37	0.0010530	1.159	0.8628	467.13	2693.4	2226.2	1.4336	7.2234
1.6	113.32	0.0010547	1.091	0.9165	475.38	2696.2	2220.9	1.4550	7.2017
1.7	115.17	0.0010563	1.031	0.9700	483.22	2699.0	2215.7	1.4752	7.1813
1.8	116.93	0.0010579	0.9772	1.023	490.70	2701.5	2210.8	1.4944	7.1622
1.9	118.62	0.0010594	0.9290	1.076	497.85	2704.0	2206.1	1.5127	7.1440
2.0	120.23	0.0010608	0.8854	1.129	504.70	2706.3	2201.6	1.5301	7.1268
2.1	121.78	0.0010623	0.8459	1.182	511.29	2708.5	2197.2	1.5468	7.1105
2.2	123.27	0.0010636	0.8098	1.235	517.62	2710.6	2193.0	1.5627	7.0949
2.3	124.71	0.0010650	0.7768	1.287	523.73	2712.6	2188.9	1.5781	7.0800
2.4	126.09	0.0010663	0.7465	1.340	529.64	2714.5	2184.9	1.5929	7.0657
2.5	127.43	0.0010675	0.7184	1.392	535.34	2716.4	2181.0	1.6071	7.0520
2.6	128.73	0.0010688	0.6925	1.444	540.87	2718.2	2177.3	1.6209	7.0389
2.7	129.98	0.0010700	0.6684	1.496	546.24	2719.9	2173.6	1.6342	7.0262
2.8	131.20	0.0010712	0.6460	1.548	551.44	2721.5	2170.1	1.6471	7.0140
2.9	132.39	0.0010724	0.6251	1.600	556.51	2723.1	2166.6	1.6595	7.0023
3.0	133.54	0.0010735	0.6056	1.651	561.43	2724.7	2163.2	1.6716	6.9909
3.1	134.66	0.0010746	0.5872	1.703	566.23	2726.1	2159.9	1.6834	6.9799
3.2	135.75	0.0010757	0.5700	1.754	570.90	2727.6	2156.7	1.6948	6.9693
3.3	136.82	0.0010768	0.5538	1.806	575.46	2729.0	2153.5	1.7059	6.9589
3.4	137.86	0.0010779	0.5385	1.857	579.92	2730.3	2150.4	1.7168	6.9489
3.5	138.87	0.0010789	0.5240	1.908	584.27	2731.6	2147.4	1.7273	6.9392
3.6	139.86	0.0010799	0.5103	1.960	588.53	2732.9	2144.4	1.7376	6.9297
3.7	140.83	0.0010809	0.4974	2.011	592.69	2734.1	2141.4	1.7476	6.9205
3.8	141.78	0.0010819	0.4851	2.062	596.77	2735.3	2138.6	1.7574	6.9116
3.9	142.71	0.0010829	0.4734	2.113	600.76	2736.5	2135.7	1.7670	6.9028
4.0	143.62	0.0010839	0.4622	2.163	604.67	2737.6	2133.0	1.7764	6.8943
4.1	144.52	0.0010848	0.4516	2.214	608.51	2738.7	2130.2	1.7856	6.8860
4.2	145.39	0.0010858	0.4415	2.265	612.27	2739.8	2127.5	1.7945	6.8779
4.3	146.25	0.0010867	0.4318	2.316	615.97	2740.9	2124.9	1.8033	6.8700
4.4	147.09	0.0010876	0.4226	2.366	619.60	2741.9	2122.3	1.8120	6.8623
4.5	147.92	0.0010885	0.4138	2.417	623.16	2742.9	2119.7	1.8204	6.8547
4.6	148.73	0.0010894	0.4053	2.467	626.67	2743.9	2117.2	1.8287	6.8473
4.7	149.53	0.0010903	0.3972	2.518	630.11	2744.8	2114.7	1.8368	6.8401
4.8	150.31	0.0010911	0.3894	2.568	633.50	2745.7	2112.2	1.8448	6.8330
4.9	151.08	0.0010920	0.3819	2.619	636.83	2746.6	2109.8	1.8527	6.8260
5.0	151.84	0.0010928	0.3747	2.669	640.12	2747.5	2107.4	1.8604	6.8192
5.2	153.33	0.0010945	0.3611	2.769	646.53	2749.3	2102.7	1.8754	6.8059
5.4	154.76	0.0010961	0.3485	2.870	652.76	2750.9	2098.1	1.8899	6.7932
5.6	156.16	0.0010977	0.3367	2.970	658.81	2752.5	2093.7	1.9040	6.7809
5.8	157.52	0.0010993	0.3257	3.070	664.69	2754.0	2089.3	1.9176	6.7690
6.0	158.84	0.0011009	0.3155	3.170	670.42	2755.5	2085.0	1.9308	6.7575
6.2	160.12	0.0011024	0.3059	3.270	676.01	2756.9	2080.8	1.9437	6.7464
6.4	161.38	0.0011039	0.2968	3.369	681.46	2758.2	2076.8	1.9562	6.7357
6.6	162.60	0.0011053	0.2883	3.469	686.78	2759.5	2072.7	1.9684	6.7252
6.8	163.79	0.0011068	0.2803	3.568	691.98	2760.8	2068.8	1.9802	6.7150
7.0	164.96	0.0011082	0.2727	3.667	697.06	2762.0	2064.9	1.9918	6.7052
7.2	166.10	0.0011096	0.2655	3.766	702.03	2763.2	2061.1	2.0031	6.6956
7.4	167.21	0.0011110	0.2587	3.866	706.90	2764.3	2057.4	2.0141	6.6862
7.6	168.30	0.0011123	0.2522	3.964	711.68	2765.4	2053.7	2.0249	6.6771
7.8	169.37	0.0011137	0.2461	4.063	716.35	2766.4	2050.1	2.0354	6.6683
8.0	170.41	0.0011150	0.2403	4.162	720.94	2767.5	2046.5	2.0457	6.6596
8.2	171.44	0.0011163	0.2347	4.261	725.43	2768.5	2043.0	2.0558	6.6511
8.4	172.45	0.0011176	0.2294	4.360	729.85	2769.4	2039.6	2.0657	6.6429
8.6	173.44	0.0011188	0.2243	4.458	734.19	2770.4	2036.2	2.0753	6.6348
8.8	174.41	0.0011201	0.2195	4.557	738.45	2771.3	2032.8	2.0848	6.6269



Table 2. State of Saturation (Pressure Table) (Continuation)

Sättigungszustand (Drucktafel) (Fortsetzung)

p	z	v'	v''	q''	h'	h''	r	s'	s''
45	257.41	0,0012691	0,04404	22,71	1122,1	2797,7	1675,6	2,8612	6,0191
46	258,75	0,0012725	0,04304	23,24	1128,8	2797,7	1668,3	2,8735	6,0097
47	260,07	0,0012758	0,04208	23,76	1135,3	2796,4	1661,1	2,8855	6,0004
48	261,37	0,0012792	0,04116	24,29	1141,8	2795,7	1653,9	2,8974	5,9913
49	262,65	0,0012825	0,04028	24,83	1148,2	2794,9	1646,8	2,9091	5,9824
50	263,91	0,0012858	0,03943	25,36	1154,5	2794,2	1639,7	2,9206	5,9735
51	265,15	0,0012891	0,03861	25,90	1160,7	2793,4	1632,7	2,9320	5,9648
52	266,37	0,0012924	0,03782	26,44	1166,8	2792,6	1625,7	2,9431	5,9561
53	267,58	0,0012957	0,03707	26,98	1172,9	2791,7	1618,8	2,9541	5,9476
54	268,76	0,0012990	0,03633	27,52	1178,9	2790,8	1611,9	2,9650	5,9392
55	269,93	0,0013023	0,03563	28,07	1184,9	2789,9	1605,0	2,9757	5,9309
56	271,09	0,0013056	0,03495	28,62	1190,8	2789,0	1598,2	2,9863	5,9227
57	272,22	0,0013089	0,03429	29,16	1196,6	2788,0	1591,4	2,9967	5,9146
58	273,35	0,0013121	0,03365	29,72	1202,3	2787,0	1584,7	3,0071	5,9066
59	274,46	0,0013154	0,03303	30,27	1208,0	2786,0	1578,0	3,0172	5,8986
60	275,55	0,0013187	0,03244	30,83	1213,7	2785,0	1571,3	3,0273	5,8908
61	276,63	0,0013219	0,03186	31,39	1219,3	2784,0	1564,7	3,0372	5,8830
62	277,70	0,0013252	0,03130	31,95	1224,8	2782,9	1558,0	3,0471	5,8753
63	278,75	0,0013285	0,03076	32,51	1230,3	2781,8	1551,5	3,0568	5,8677
64	279,79	0,0013317	0,03023	33,08	1235,7	2780,6	1544,9	3,0664	5,8601
65	280,82	0,0013350	0,02972	33,65	1241,1	2779,5	1538,4	3,0759	5,8527
66	281,84	0,0013383	0,02922	34,22	1246,5	2778,3	1531,9	3,0853	5,8452
67	282,84	0,0013415	0,02874	34,79	1251,8	2777,1	1525,4	3,0946	5,8379
68	283,84	0,0013448	0,02827	35,37	1257,0	2775,9	1518,9	3,1038	5,8306
69	284,82	0,0013481	0,02782	35,95	1262,2	2774,7	1512,5	3,1129	5,8233
70	285,79	0,0013513	0,02737	36,53	1267,4	2773,5	1506,0	3,1219	5,8162
71	286,75	0,0013546	0,02694	37,12	1272,5	2772,2	1499,6	3,1308	5,8090
72	287,70	0,0013579	0,02652	37,70	1277,6	2770,9	1493,3	3,1397	5,8020
73	288,64	0,0013611	0,02611	38,29	1282,7	2769,6	1486,9	3,1484	5,7949
74	289,57	0,0013644	0,02572	38,89	1287,7	2768,3	1480,5	3,1571	5,7880
75	290,50	0,0013677	0,02533	39,48	1292,7	2766,9	1474,2	3,1657	5,7811
76	291,41	0,0013710	0,02495	40,08	1297,6	2765,5	1467,9	3,1742	5,7742
77	292,31	0,0013743	0,02458	40,68	1302,6	2764,2	1461,6	3,1827	5,7673
78	293,21	0,0013776	0,02422	41,29	1307,4	2762,8	1455,3	3,1911	5,7606
79	294,09	0,0013809	0,02387	41,90	1312,3	2761,3	1449,1	3,1994	5,7538
80	294,97	0,0013842	0,02353	42,51	1317,1	2759,9	1442,8	3,2076	5,7471
81	295,84	0,0013876	0,02319	43,12	1321,9	2758,4	1436,6	3,2158	5,7404
82	296,70	0,0013909	0,02286	43,74	1326,6	2757,0	1430,3	3,2239	5,7338
83	297,55	0,0013942	0,02254	44,36	1331,4	2755,5	1424,1	3,2320	5,7272
84	298,39	0,0013976	0,02223	44,98	1336,1	2754,0	1417,9	3,2399	5,7207
85	299,23	0,0014009	0,02193	45,61	1340,7	2752,5	1411,7	3,2479	5,7141
86	300,06	0,0014043	0,02163	46,24	1345,4	2750,9	1405,5	3,2558	5,7076
87	300,88	0,0014077	0,02133	46,87	1350,0	2749,4	1399,3	3,2636	5,7012
88	301,70	0,0014111	0,02105	47,51	1354,6	2747,8	1393,2	3,2713	5,6948
89	302,51	0,0014145	0,02077	48,15	1359,2	2746,2	1387,0	3,2790	5,6884
90	303,31	0,0014179	0,02050	48,79	1363,7	2744,6	1380,9	3,2867	5,6820
91	304,10	0,0014213	0,02023	49,44	1368,3	2743,0	1374,7	3,2943	5,6757
92	304,89	0,0014247	0,01996	50,09	1372,8	2741,4	1368,6	3,3018	5,6694
93	305,67	0,0014281	0,01971	50,74	1377,2	2739,7	1362,5	3,3093	5,6631
94	306,44	0,0014316	0,01945	51,40	1381,7	2738,0	1356,3	3,3168	5,6568
95	307,21	0,0014351	0,01921	52,06	1386,1	2736,4	1350,2	3,3242	5,6506
96	307,97	0,0014385	0,01897	52,73	1390,6	2734,7	1344,1	3,3315	5,6444
97	308,73	0,0014420	0,01873	53,40	1395,0	2733,0	1338,0	3,3388	5,6382
98	309,48	0,0014455	0,01849	54,07	1399,3	2731,2	1331,9	3,3461	5,6321
99	310,22	0,0014490	0,01827	54,75	1403,7	2729,5	1325,8	3,3534	5,6259
100	310,96	0,0014526	0,01804	55,43	1408,0	2727,7	1319,7	3,3605	5,6198
102	312,42	0,0014597	0,01760	56,80	1416,7	2724,2	1307,5	3,3748	5,6076
104	313,86	0,0014668	0,01718	58,19	1425,2	2720,6	1295,3	3,3889	5,5955
106	315,27	0,0014741	0,01678	59,60	1433,7	2716,9	1283,1	3,4029	5,5835
108	316,67	0,0014814	0,01639	61,03	1442,2	2713,1	1270,9	3,4167	5,5715



Table 2. State of Saturation (Pressure Table) (Continuation)

Sättigungszustand (Drucktafel) (Fortsetzung)

P	t	v'	v''	q''	h'	h''	r	s'	s''
110	318,05	0,0014887	0,01601	62,48	1450,6	2709,3	1258,7	3,4304	5,5595
112	319,40	0,0014962	0,01564	63,94	1458,9	2705,4	1246,5	3,4440	5,5476
114	320,74	0,0015037	0,01528	65,43	1467,2	2701,5	1234,3	3,4575	5,5358
116	322,06	0,0015113	0,01494	66,93	1475,4	2697,4	1222,0	3,4708	5,5239
118	323,36	0,0015190	0,01461	68,46	1483,6	2693,3	1209,7	3,4840	5,5121
120	324,65	0,0015268	0,01428	70,01	1491,8	2689,2	1197,4	3,4972	5,5002
122	325,91	0,0015346	0,01397	71,59	1499,9	2684,9	1185,0	3,5102	5,4884
124	327,17	0,0015426	0,01366	73,19	1508,0	2680,6	1172,6	3,5232	5,4765
126	328,40	0,0015507	0,01337	74,81	1516,0	2676,1	1160,1	3,5361	5,4646
128	329,62	0,0015589	0,01308	76,46	1524,0	2671,6	1147,6	3,5488	5,4527
130	330,83	0,0015672	0,01280	78,14	1532,0	2667,0	1135,0	3,5616	5,4408
132	332,02	0,0015756	0,01252	79,85	1540,0	2662,3	1122,3	3,5742	5,4288
134	333,19	0,0015842	0,01226	81,59	1547,9	2657,4	1109,5	3,5868	5,4168
136	334,36	0,0015928	0,01200	83,36	1555,8	2652,5	1096,7	3,5993	5,4047
138	335,51	0,0016017	0,01174	85,16	1563,7	2647,5	1083,8	3,6118	5,3925
140	336,64	0,0016106	0,01150	86,99	1571,6	2642,4	1070,7	3,6242	5,3803
142	337,76	0,0016197	0,01125	88,86	1579,5	2637,1	1057,6	3,6366	5,3679
144	338,87	0,0016290	0,01102	90,77	1587,4	2631,8	1044,4	3,6490	5,3555
146	339,97	0,0016385	0,01079	92,71	1595,3	2626,3	1031,0	3,6613	5,3431
148	341,06	0,0016481	0,01056	94,69	1603,1	2620,7	1017,6	3,6736	5,3305
150	342,13	0,0016579	0,01034	96,71	1611,0	2615,0	1004,0	3,6859	5,3178
152	343,19	0,0016679	0,01012	98,77	1618,9	2609,2	990,3	3,6981	5,3051
154	344,24	0,0016782	0,009914	100,9	1626,8	2603,3	976,5	3,7104	5,2922
156	345,28	0,0016886	0,009707	103,0	1634,7	2597,3	962,6	3,7226	5,2793
158	346,31	0,0016993	0,009505	105,2	1642,6	2591,1	948,5	3,7348	5,2663
160	347,33	0,0017103	0,009308	107,4	1650,5	2584,9	934,3	3,7471	5,2531
162	348,34	0,0017216	0,009114	109,7	1658,5	2578,5	920,0	3,7594	5,2399
164	349,33	0,0017331	0,008925	112,0	1666,5	2572,1	905,6	3,7717	5,2267
166	350,32	0,0017447	0,008738	114,4	1674,5	2565,5	891,0	3,7842	5,2132
168	351,30	0,0017570	0,008553	116,9	1683,0	2558,6	875,6	3,7974	5,1994
170	352,26	0,0017696	0,008371	119,5	1691,7	2551,6	859,9	3,8107	5,1855
172	353,22	0,0017826	0,008191	122,1	1700,4	2544,4	844,1	3,8240	5,1713
174	354,17	0,0017961	0,008014	124,8	1709,0	2537,1	828,1	3,8372	5,1570
176	355,11	0,0018101	0,007839	127,6	1717,6	2529,5	811,9	3,8504	5,1425
178	356,04	0,0018247	0,007667	130,4	1726,2	2521,8	795,6	3,8635	5,1278
180	356,96	0,0018399	0,007498	133,4	1734,8	2513,9	779,1	3,8765	5,1128
182	357,87	0,0018556	0,007330	136,4	1743,4	2505,8	762,3	3,8896	5,0975
184	358,77	0,0018721	0,007165	139,6	1752,1	2497,4	745,3	3,9028	5,0820
186	359,67	0,0018893	0,007001	142,8	1760,9	2488,8	727,9	3,9160	5,0661
188	360,55	0,0019072	0,006839	146,2	1769,7	2479,8	710,1	3,9294	5,0498
190	361,43	0,0019260	0,006678	149,8	1778,7	2470,6	692,0	3,9429	5,0332
192	362,30	0,0019458	0,006517	153,4	1787,8	2461,1	673,3	3,9566	5,0160
194	363,16	0,0019666	0,006358	157,3	1797,0	2451,1	654,1	3,9706	4,9983
196	364,02	0,0019886	0,006198	161,3	1806,5	2440,7	634,2	3,9849	4,9801
198	364,86	0,0020120	0,006038	165,6	1816,3	2429,8	613,5	3,9996	4,9610
200	365,70	0,0020370	0,005877	170,2	1826,5	2418,4	591,9	4,0149	4,9412
202	366,53	0,0020639	0,005714	175,0	1837,0	2406,2	569,2	4,0308	4,9204
204	367,36	0,0020931	0,005548	180,2	1848,1	2393,3	545,1	4,0474	4,8984
206	368,17	0,0021252	0,005379	185,9	1859,9	2379,3	519,5	4,0651	4,8750
208	368,98	0,0021610	0,005205	192,1	1872,5	2364,2	491,7	4,0841	4,8498
210	369,78	0,0022015	0,005023	199,1	1886,3	2347,6	461,3	4,1048	4,8223
212	370,58	0,0022488	0,004831	207,0	1901,5	2328,9	427,4	4,1279	4,7917
214	371,37	0,0023061	0,004624	216,3	1919,0	2307,4	388,4	4,1543	4,7569
216	372,15	0,0023793	0,004392	227,7	1940,0	2281,5	341,6	4,1861	4,7154
218	372,92	0,0024832	0,004115	243,0	1967,2	2248,0	280,8	4,2276	4,6622
220	373,69	0,0026714	0,003728	268,3	2011,1	2195,6	184,5	4,2947	4,5799
221,20	374,15	0,00317		315,5		2107,4	0,0		4,4429



Table 3. Water and Superheated Steam (Continuation) Wasser und überhitzter Dampf (Fortsetzung)

t °C	2,7 bar t <sub>s</sub> = 129,98 °C			2,8 bar t <sub>s</sub> = 131,20 °C			2,9 bar t <sub>s</sub> = 132,39 °C			3,0 bar t <sub>s</sub> = 133,54 °C		
	v''	h''	s''	v''	h''	s''	v''	h''	s''	v''	h''	s''
	0,6684	2719,9	7,0262	0,6460	2721,5	7,0140	0,6251	2723,1	7,0023	0,6056	2724,7	6,9909
<hr/>												
°C	v	h	s	v	h	s	v	h	s	v	h	s
0	0,0010001	0,2	0,0001	0,0010001	0,2	0,0001	0,0010001	0,3	0,0001	0,0010001	0,3	0,0001
10	0,0010001	42,3	0,1510	0,0010001	42,3	0,1510	0,0010001	42,3	0,1510	0,0010001	42,3	0,1510
20	0,0010016	84,1	0,2962	0,0010016	84,1	0,2962	0,0010016	84,1	0,2962	0,0010016	84,1	0,2962
30	0,0010042	125,9	0,4364	0,0010042	125,9	0,4364	0,0010042	125,9	0,4364	0,0010042	125,9	0,4364
40	0,0010077	167,7	0,5720	0,0010077	167,7	0,5720	0,0010077	167,7	0,5720	0,0010077	167,7	0,5720
50	0,0010120	209,5	0,7034	0,0010120	209,5	0,7034	0,0010120	209,5	0,7034	0,0010120	209,5	0,7034
60	0,0010170	251,3	0,8309	0,0010170	251,3	0,8308	0,0010170	251,3	0,8308	0,0010170	251,3	0,8308
70	0,0010227	293,2	0,9547	0,0010227	293,2	0,9547	0,0010227	293,2	0,9547	0,0010227	293,2	0,9547
80	0,0010291	335,1	1,0751	0,0010291	335,1	1,0751	0,0010291	335,1	1,0751	0,0010291	335,1	1,0751
90	0,0010360	377,1	1,1924	0,0010360	377,1	1,1924	0,0010360	377,1	1,1924	0,0010360	377,1	1,1924
100	0,0010436	419,2	1,3067	0,0010436	419,2	1,3067	0,0010436	419,2	1,3067	0,0010436	419,2	1,3067
110	0,0010518	461,4	1,4184	0,0010518	461,4	1,4184	0,0010518	461,4	1,4184	0,0010518	461,4	1,4184
120	0,0010606	503,8	1,5275	0,0010606	503,8	1,5275	0,0010606	503,8	1,5275	0,0010606	503,8	1,5275
130	0,6685	2719,9	7,0263	0,0010700	546,3	1,6344	0,0010700	546,3	1,6343	0,0010700	546,3	1,6343
140	0,6874	2741,5	7,0793	-0,6622	2740,6	7,0607	0,6387	2739,7	7,0428	0,6167	2738,8	7,0254
150	0,7062	2762,9	7,1304	0,6803	2762,1	7,1120	0,6562	2761,3	7,0943	0,6337	2760,4	7,0771
160	0,7247	2784,0	7,1797	0,6982	2783,3	7,1616	0,6736	2782,6	7,1441	0,6506	2781,8	7,1271
170	0,7430	2805,0	7,2276	0,7160	2804,3	7,2096	0,6908	2803,6	7,1922	0,6672	2803,0	7,1754
180	0,7612	2825,8	7,2740	0,7336	2825,2	7,2561	0,7078	2824,6	7,2389	0,6837	2824,0	7,2222
190	0,7793	2846,4	7,3191	0,7510	2845,9	7,3014	0,7247	2845,3	7,2842	0,7001	2844,8	7,2677
200	0,7973	2867,0	7,3630	0,7684	2866,5	7,3454	0,7415	2866,0	7,3284	0,7164	2865,5	7,3119
210	0,8151	2887,5	7,4058	0,7856	2887,0	7,3883	0,7582	2886,6	7,3714	0,7325	2886,1	7,3550
220	0,8329	2907,9	7,4476	0,8028	2907,5	7,4302	0,7748	2907,1	7,4134	0,7486	2906,6	7,3971
230	0,8506	2928,3	7,4885	0,8199	2927,9	7,4712	0,7913	2927,5	7,4544	0,7646	2927,1	7,4381
240	0,8683	2948,6	7,5285	0,8369	2948,2	7,5112	0,8078	2947,9	7,4945	0,7805	2947,5	7,4783
250	0,8859	2968,9	7,5677	0,8539	2968,6	7,5504	0,8242	2968,2	7,5338	0,7964	2967,9	7,5176
260	0,9034	2989,2	7,6061	0,8709	2988,9	7,5889	0,8406	2988,6	7,5723	0,8123	2988,2	7,5562
270	0,9209	3009,5	7,6438	0,8878	3009,2	7,6266	0,8569	3008,9	7,6100	0,8281	3008,6	7,5940
280	0,9384	3029,8	7,6808	0,9046	3029,5	7,6637	0,8732	3029,2	7,6471	0,8438	3028,9	7,6311
290	0,9558	3050,1	7,7172	0,9215	3049,8	7,7001	0,8895	3049,5	7,6836	0,8596	3049,3	7,6676
300	0,9733	3070,4	7,7530	0,9383	3070,1	7,7359	0,9057	3069,9	7,7194	0,8753	3069,7	7,7034
310	0,9907	3090,7	7,7882	0,9551	3090,5	7,7711	0,9219	3090,3	7,7546	0,8910	3090,0	7,7387
320	1,0080	3111,1	7,8228	0,9718	3110,9	7,8058	0,9381	3110,7	7,7893	0,9066	3110,5	7,7734
330	1,0254	3131,5	7,8569	0,9886	3131,3	7,8399	0,9543	3131,1	7,8235	0,9223	3130,9	7,8076
340	1,0427	3152,0	7,8906	1,0053	3151,8	7,8736	0,9704	3151,6	7,8571	0,9379	3151,4	7,8412
350	1,0600	3172,5	7,9237	1,0220	3172,3	7,9067	0,9866	3172,1	7,8903	0,9535	3171,9	7,8744
360	1,0773	3193,0	7,9564	1,0387	3192,8	7,9394	1,0027	3192,6	7,9230	0,9691	3192,4	7,9072
370	1,0946	3213,6	7,9887	1,0554	3213,4	7,9717	1,0188	3213,2	7,9553	0,9847	3213,1	7,9395
380	1,1119	3234,2	8,0205	1,0720	3234,0	8,0035	1,0349	3233,9	7,9872	1,0003	3233,7	7,9713
390	1,1292	3254,9	8,0519	1,0887	3254,7	8,0350	1,0510	3254,6	8,0186	1,0158	3254,4	8,0028
400	1,1464	3275,6	8,0830	1,1054	3275,5	8,0660	1,0671	3275,3	8,0497	1,0314	3275,2	8,0338
410	1,1637	3296,4	8,1136	1,1220	3296,3	8,0967	1,0832	3296,1	8,0803	1,0469	3296,0	8,0645
420	1,1809	3317,3	8,1439	1,1386	3317,1	8,1270	1,0992	3317,0	8,1107	1,0625	3316,8	8,0949
430	1,1982	3338,2	8,1739	1,1553	3338,0	8,1570	1,1153	3337,9	8,1406	1,0780	3337,8	8,1248
440	1,2154	3359,2	8,2035	1,1719	3359,0	8,1866	1,1314	3358,9	8,1702	1,0935	3358,8	8,1545
450	1,2326	3380,2	8,2328	1,1885	3380,1	8,2159	1,1474	3379,9	8,1995	1,1090	3379,8	8,1836
460	1,2499	3401,3	8,2618	1,2051	3401,2	8,2448	1,1634	3401,0	8,2285	1,1245	3400,9	8,2128
470	1,2671	3422,4	8,2904	1,2217	3422,3	8,2735	1,1795	3422,2	8,2572	1,1401	3422,1	8,2414
480	1,2843	3443,7	8,3188	1,2383	3443,5	8,3019	1,1955	3443,4	8,2856	1,1556	3443,3	8,2698
490	1,3015	3464,9	8,3469	1,2549	3464,8	8,3307	1,2115	3464,7	8,3137	1,1710	3464,6	8,2979
500	1,3187	3486,3	8,3746	1,2715	3486,2	8,3578	1,2276	3486,1	8,3415	1,1865	3486,0	8,3257
510	1,3359	3507,7	8,4022	1,2881	3507,6	8,3853	1,2436	3507,5	8,3690	1,2020	3507,4	8,3532
520	1,3531	3529,2	8,4294	1,3047	3529,1	8,4125	1,2596	3529,0	8,3962	1,2175	3528,9	8,3805
530	1,3703	3550,7	8,4564	1,3212	3550,6	8,4395	1,2756	3550,5	8,4232	1,2330	3550,4	8,4075
540	1,3874	3572,3	8,4831	1,3378	3572,2	8,4663	1,2916	3572,1	8,4500	1,2485	3572,0	8,4343
550	1,4046	3594,0	8,5096	1,3544	3593,9	8,4928	1,3076	3593,8	8,4765	1,2639	3593,7	8,4608



Table 3. Water and Superheated Steam (Continuation) Wasser und überhitzter Dampf (Fortsetzung)

t °C	4,8 bar $t_s = 150.31^\circ\text{C}$			5,0 bar $t_s = 151.84^\circ\text{C}$			5,5 bar $t_s = 155.47^\circ\text{C}$			6,0 bar $t_s = 158.84^\circ\text{C}$		
	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$
	0,3894	2745,7	6,8330	0,3747	2747,5	6,8192	0,3425	2751,7	6,7870	0,3155	2755,5	6,7575
	v	h	s	v	h	s	v	h	s	v	h	s
0	0,0010000	0,4	-0,0001	0,0010000	0,5	-0,0001	0,0009999	0,5	-0,0001	0,0009999	0,6	-0,0001
10	0,0010000	42,5	0,1509	0,0010000	42,5	0,1509	0,0010000	42,5	0,1509	0,0010000	42,6	0,1509
20	0,0010015	84,3	0,2962	0,0010015	84,3	0,2962	0,0010015	84,4	0,2962	0,0010015	84,4	0,2962
30	0,0010041	126,1	0,4364	0,0010041	126,1	0,4364	0,0010041	126,2	0,4363	0,0010040	126,2	0,4363
40	0,0010076	167,9	0,5719	0,0010076	167,9	0,5719	0,0010076	167,9	0,5719	0,0010075	168,0	0,5719
50	0,0010119	209,7	0,7033	0,0010119	209,7	0,7033	0,0010119	209,7	0,7033	0,0010119	209,8	0,7032
60	0,0010169	251,5	0,8307	0,0010169	251,5	0,8307	0,0010169	251,5	0,8307	0,0010169	251,6	0,8307
70	0,0010226	293,3	0,9545	0,0010226	293,4	0,9545	0,0010226	293,4	0,9545	0,0010226	293,4	0,9545
80	0,0010290	335,3	1,0750	0,0010290	335,3	1,0750	0,0010289	335,3	1,0749	0,0010289	335,4	1,0749
90	0,0010359	377,3	1,1922	0,0010359	377,3	1,1922	0,0010359	377,3	1,1922	0,0010359	377,3	1,1921
100	0,0010435	419,3	1,3066	0,0010435	419,4	1,3066	0,0010435	419,4	1,3065	0,0010434	419,4	1,3065
110	0,0010517	461,6	1,4182	0,0010517	461,6	1,4182	0,0010516	461,6	1,4181	0,0010516	461,6	1,4181
120	0,0010605	503,9	1,5273	0,0010605	503,9	1,5273	0,0010604	504,0	1,5273	0,0010604	504,0	1,5272
130	0,0010699	546,4	1,6342	0,0010699	546,5	1,6341	0,0010699	546,5	1,6341	0,0010698	546,5	1,6340
140	0,0010800	589,2	1,7389	0,0010800	589,2	1,7388	0,0010799	589,2	1,7388	0,0010799	589,3	1,7387
150	0,0010908	632,2	1,8416	0,0010908	632,2	1,8416	0,0010907	632,2	1,8415	0,0010907	632,2	1,8415
160	0,4002	2768,0	6,8849	0,3835	2766,4	6,8631	0,3470	2762,3	6,8117	0,3165	2758,2	6,7640
170	0,4112	2790,5	6,9363	0,3941	2789,1	6,9149	0,3568	2785,4	6,8644	0,3257	2781,8	6,8177
180	0,4220	2812,7	6,9858	0,4045	2811,4	6,9647	0,3664	2808,1	6,9151	0,3346	2804,8	6,8691
190	0,4326	2834,6	7,0336	0,4148	2833,4	7,0127	0,3759	2830,5	6,9638	0,3434	2827,5	6,9185
200	0,4432	2856,2	7,0798	0,4250	2855,1	7,0592	0,3852	2852,5	7,0108	0,3520	2849,7	6,9662
210	0,4536	2877,5	7,1245	0,4350	2876,6	7,1042	0,3944	2874,2	7,0563	0,3606	2871,7	7,0121
220	0,4640	2898,8	7,1680	0,4450	2898,0	7,1478	0,4036	2895,7	7,1004	0,3690	2893,5	7,0567
230	0,4742	2919,9	7,2104	0,4549	2919,1	7,1903	0,4126	2917,1	7,1432	0,3774	2915,0	7,0999
240	0,4844	2940,9	7,2516	0,4647	2940,1	7,2317	0,4216	2938,3	7,1849	0,3857	2936,4	7,1419
250	0,4946	2961,8	7,2919	0,4744	2961,1	7,2721	0,4305	2959,3	7,2256	0,3939	2957,6	7,1829
260	0,5046	2982,5	7,3313	0,4841	2981,9	7,3115	0,4394	2980,3	7,2653	0,4021	2978,7	7,2228
270	0,5147	3003,3	7,3698	0,4938	3002,7	7,3501	0,4482	3001,2	7,3041	0,4102	2999,7	7,2618
280	0,5247	3024,0	7,4075	0,5034	3023,4	7,3879	0,4570	3022,0	7,3421	0,4183	3020,6	7,3000
290	0,5347	3044,6	7,4445	0,5130	3044,1	7,4250	0,4658	3042,8	7,3793	0,4264	3041,5	7,3374
300	0,5446	3065,2	7,4809	0,5226	3064,8	7,4614	0,4745	3063,5	7,4158	0,4344	3062,3	7,3740
310	0,5545	3085,9	7,5165	0,5321	3085,4	7,4971	0,4832	3084,2	7,4517	0,4424	3083,1	7,4100
320	0,5644	3106,5	7,5516	0,5416	3106,1	7,5322	0,4919	3105,0	7,4869	0,4504	3103,9	7,4454
330	0,5743	3127,2	7,5861	0,5511	3126,7	7,5668	0,5005	3125,7	7,5215	0,4583	3124,6	7,4801
340	0,5842	3147,8	7,6201	0,5606	3147,4	7,6008	0,5091	3146,4	7,5556	0,4663	3145,4	7,5143
350	0,5940	3168,5	7,6536	0,5701	3168,1	7,6343	0,5178	3167,2	7,5892	0,4742	3166,2	7,5479
360	0,6039	3189,2	7,6865	0,5795	3188,8	7,6673	0,5264	3187,9	7,6222	0,4821	3187,0	7,5810
370	0,6137	3209,9	7,7190	0,5889	3209,6	7,6998	0,5350	3208,7	7,6548	0,4900	3207,9	7,6137
380	0,6235	3230,7	7,7511	0,5984	3230,4	7,7319	0,5435	3229,6	7,6870	0,4979	3228,7	7,6459
390	0,6333	3251,5	7,7827	0,6078	3251,2	7,7635	0,5521	3250,4	7,7187	0,5057	3249,6	7,6776
400	0,6431	3272,4	7,8140	0,6172	3272,1	7,7948	0,5607	3271,3	7,7500	0,5136	3270,6	7,7090
410	0,6528	3293,3	7,8448	0,6266	3293,0	7,8256	0,5692	3292,3	7,7809	0,5215	3291,6	7,7399
420	0,6626	3314,3	7,8753	0,6359	3314,0	7,8561	0,5778	3313,3	7,8114	0,5293	3312,6	7,7705
430	0,6724	3335,3	7,9054	0,6453	3335,0	7,8862	0,5863	3334,3	7,8415	0,5371	3333,7	7,8007
440	0,6821	3356,4	7,9351	0,6547	3356,1	7,9160	0,5948	3355,4	7,8713	0,5450	3354,8	7,8305
450	0,6919	3377,5	7,9645	0,6640	3377,2	7,9454	0,6034	3376,6	7,9008	0,5528	3376,0	7,8600
460	0,7016	3398,7	7,9936	0,6734	3398,4	7,9745	0,6119	3397,8	7,9299	0,5606	3397,2	7,8891
470	0,7113	3419,9	8,0224	0,6828	3419,7	8,0033	0,6204	3419,1	7,9587	0,5684	3418,5	7,9180
480	0,7211	3441,2	8,0509	0,6921	3441,0	8,0318	0,6289	3440,4	7,9872	0,5762	3439,8	7,9465
490	0,7308	3462,6	8,0790	0,7014	3462,3	8,0600	0,6374	3461,8	8,0154	0,5840	3461,2	7,9747
500	0,7405	3484,0	8,1069	0,7108	3483,8	8,0879	0,6459	3483,2	8,0433	0,5918	3482,7	8,0027
510	0,7502	3505,5	8,1345	0,7201	3505,3	8,1155	0,6544	3504,7	8,0710	0,5996	3504,2	8,0303
520	0,7599	3527,0	8,1618	0,7294	3526,8	8,1428	0,6629	3526,3	8,0983	0,6074	3525,8	8,0577
530	0,7697	3548,6	8,1889	0,7388	3548,4	8,1699	0,6714	3547,9	8,1254	0,6152	3547,4	8,0848
540	0,7794	3570,3	8,2157	0,7481	3570,1	8,1967	0,6799	3569,6	8,1523	0,6230	3569,1	8,1117
550	0,7891	3592,0	8,2423	0,7574	3591,8	8,2233	0,6883	3591,4	8,1789	0,6308	3590,9	8,1383



Table 3. Water and Superheated Steam (Continuation) Wasser und überhitzter Dampf (Fortsetzung)

Table 3. Water and Superheated Steam (continued)												
t °C	56 bar $t_s = 271.09$ °C			58 bar $t_s = 273.35$ °C			60 bar $t_s = 275.55$ °C			62 bar $t_s = 277.70$ °C		
	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$	$v''$	$h''$	$s''$
	0.03495	2789.0	5.9217	0.03365	2787.0	5.9066	0.03244	2785.0	5.8908	0.03130	2782.9	5.8753
°C	v	h	s	v	h	s	v	h	s	v	h	s
0	0.0009974	5.7	0.0003	0.0009973	5.9	0.0003	0.0009972	6.1	0.0003	0.0009971	6.3	0.0003
10	0.0009976	47.4	0.1505	0.0009975	47.6	0.1505	0.0009974	47.8	0.1505	0.0009973	48.0	0.1504
20	0.0009992	89.1	0.2951	0.0009991	89.3	0.2951	0.0009990	89.5	0.2950	0.0009989	89.7	0.2950
30	0.0010018	130.8	0.4348	0.0010017	130.9	0.4347	0.0010016	131.1	0.4347	0.0010015	131.3	0.4346
40	0.0010053	172.4	0.5699	0.0010053	172.6	0.5699	0.0010052	172.7	0.5698	0.0010051	172.9	0.5697
50	0.0010096	214.1	0.7009	0.0010095	214.2	0.7008	0.0010094	214.4	0.7007	0.0010094	214.6	0.7006
60	0.0010146	255.8	0.8280	0.0010145	255.9	0.8279	0.0010144	256.1	0.8278	0.0010143	256.3	0.8277
70	0.0010203	297.5	0.9515	0.0010202	297.7	0.9514	0.0010201	297.8	0.9512	0.0010200	298.0	0.9511
80	0.0010265	339.3	1.0716	0.0010264	339.5	1.0715	0.0010263	339.6	1.0713	0.0010262	339.8	1.0712
90	0.0010334	381.2	1.1885	0.0010333	381.4	1.1884	0.0010332	381.5	1.1883	0.0010331	381.7	1.1881
100	0.0010408	423.2	1.3026	0.0010407	423.3	1.3024	0.0010406	423.5	1.3023	0.0010405	423.6	1.3021
110	0.0010489	465.3	1.4139	0.0010488	465.4	1.4137	0.0010487	465.6	1.4136	0.0010486	465.7	1.4134
120	0.0010575	507.5	1.5227	0.0010574	507.7	1.5225	0.0010573	507.8	1.5224	0.0010572	507.9	1.5222
130	0.0010668	549.9	1.6292	0.0010667	550.1	1.6290	0.0010665	550.2	1.6288	0.0010664	550.3	1.6286
140	0.0010767	592.5	1.7336	0.0010766	592.6	1.7334	0.0010764	592.8	1.7332	0.0010763	592.9	1.7330
150	0.0010873	635.3	1.8360	0.0010871	635.5	1.8357	0.0010870	635.6	1.8355	0.0010869	635.7	1.8353
160	0.0010986	678.4	1.9366	0.0010984	678.5	1.9364	0.0010983	678.6	1.9361	0.0010981	678.8	1.9359
170	0.0011106	721.8	2.0356	0.0011105	721.9	2.0353	0.0011103	722.0	2.0351	0.0011102	722.1	2.0348
180	0.0011236	765.5	2.1331	0.0011234	765.6	2.1328	0.0011232	765.7	2.1325	0.0011231	765.8	2.1323
190	0.0011374	809.5	2.2293	0.0011373	809.6	2.2290	0.0011371	809.7	2.2287	0.0011369	809.8	2.2284
200	0.0011521	854.0	2.3243	0.0011520	854.1	2.3240	0.0011519	854.2	2.3237	0.0011517	854.3	2.3234
210	0.0011684	899.0	2.4184	0.0011683	899.1	2.4181	0.0011680	899.2	2.4178	0.0011678	899.3	2.4174
220	0.0011858	944.6	2.5118	0.0011856	944.7	2.5114	0.0011853	944.7	2.5110	0.0011851	944.8	2.5107
230	0.0012048	990.8	2.6046	0.0012045	990.9	2.6042	0.0012042	990.9	2.6038	0.0012039	990.9	2.6034
240	0.0012255	1037.8	2.6971	0.0012252	1037.9	2.6966	0.0012249	1037.9	2.6962	0.0012245	1037.9	2.6958
250	0.0012483	1085.8	2.7896	0.0012480	1085.8	2.7891	0.0012476	1085.8	2.7886	0.0012472	1085.8	2.7881
260	0.0012737	1134.8	2.8824	0.0012733	1134.8	2.8819	0.0012729	1134.7	2.8813	0.0012724	1134.7	2.8808
270	0.0013023	1185.2	2.9761	0.0013018	1185.1	2.9755	0.0013013	1185.1	2.9748	0.0013008	1185.0	2.9742
280	0.03644	2826.7	5.9914	0.03476	2816.0	5.9592	0.03317	2804.9	5.9270	0.03168	2793.5	5.8946
290	0.03799	2865.6	6.0612	0.03630	2856.3	6.0314	0.03472	2846.7	6.0017	0.03323	2836.8	5.9711
300	0.03943	2901.7	6.1248	0.03774	2893.5	6.0969	0.03614	2885.0	6.0692	0.03465	2876.3	6.0418
310	0.04080	2935.6	6.1834	0.03908	2928.2	6.1570	0.03748	2920.7	6.1310	0.03598	2913.0	6.1051
320	0.04210	2967.7	6.2380	0.04036	2961.0	6.2128	0.03874	2954.2	6.1880	0.03722	2947.3	6.1635
330	0.04334	2998.4	6.2892	0.04159	2992.3	6.2650	0.03995	2986.1	6.2412	0.03841	2979.8	6.2178
340	0.04454	3027.7	6.3375	0.04276	3022.2	6.3142	0.04111	3016.5	6.2913	0.03955	3010.8	6.2688
350	0.04570	3056.1	6.3834	0.04390	3051.0	6.3608	0.04222	3045.8	6.3386	0.04065	3040.5	6.3168
360	0.04683	3083.6	6.4272	0.04501	3078.9	6.4052	0.04330	3074.0	6.3836	0.04171	3069.2	6.3625
370	0.04793	3110.4	6.4692	0.04608	3106.0	6.4477	0.04436	3101.5	6.4267	0.04274	3097.0	6.4061
380	0.04901	3136.6	6.5096	0.04713	3132.4	6.4885	0.04539	3128.3	6.4680	0.04375	3124.0	6.4478
390	0.05006	3162.2	6.5486	0.04816	3158.4	6.5279	0.04639	3154.4	6.5077	0.04473	3150.5	6.4880
400	0.05110	3187.5	6.5863	0.04918	3183.8	6.5660	0.04738	3180.1	6.5462	0.04570	3176.4	6.5268
410	0.05212	3212.3	6.6230	0.05017	3208.9	6.6030	0.04835	3205.4	6.5834	0.04664	3201.9	6.5644
420	0.05313	3236.9	6.6586	0.05115	3233.6	6.6389	0.04931	3230.3	6.6196	0.04758	3227.0	6.6009
430	0.05413	3261.2	6.6934	0.05212	3258.0	6.6739	0.05025	3254.9	6.6549	0.04850	3251.8	6.6364
440	0.05511	3285.2	6.7274	0.05308	3282.3	6.7081	0.05118	3279.3	6.6893	0.04941	3276.3	6.6710
450	0.05609	3309.1	6.7607	0.05403	3306.3	6.7416	0.05210	3303.5	6.7230	0.05030	3300.6	6.7049
460	0.05705	3332.9	6.7933	0.05496	3330.2	6.7743	0.05302	3327.4	6.7559	0.05119	3324.7	6.7380
470	0.05801	3356.5	6.8253	0.05589	3353.9	6.8065	0.05392	3351.3	6.7882	0.05207	3348.7	6.7704
480	0.05896	3380.0	6.8567	0.05682	3377.5	6.8381	0.05482	3375.0	6.8199	0.05295	3372.5	6.8023
490	0.05990	3403.4	6.8876	0.05773	3401.0	6.8691	0.05571	3398.6	6.8511	0.05381	3396.2	6.8336
500	0.06084	3426.8	6.9181	0.05864	3424.5	6.8996	0.05659	3422.2	6.8818	0.05467	3419.9	6.8644
510	0.06178	3450.1	6.9480	0.05955	3447.9	6.9297	0.05747	3445.7	6.9119	0.05553	3443.5	6.8947
520	0.06270	3473.4	6.9776	0.06045	3471.3	6.9594	0.05834	3469.1	6.9417	0.05637	3467.0	6.9245
530	0.06363	3496.7	7.0068	0.06134	3494.6	6.9886	0.05921	3492.5	6.9710	0.05722	3490.5	6.9540
540	0.06455	3519.9	7.0355	0.06223	3517.9	7.0175	0.06008	3515.9	7.0000	0.05806	3513.9	6.9830
550	0.06546	3543.2	7.0639	0.06312	3541.2	7.0460	0.06094	3539.3	7.0285	0.05889	3537.4	7.0116



Table 3. Water and Superheated Steam (Continuation) Wasser und überhitzter Dampf (Fortsetzung)

t °C	170 bar $t_s = 352.26^\circ\text{C}$			175 bar $t_s = 354.64^\circ\text{C}$			180 bar $t_s = 356.96^\circ\text{C}$			185 bar $t_s = 359.22^\circ\text{C}$		
	$v''$ 0,008371	$h''$ 2551,6	$s''$ 5,1855	$v''$ 0,007926	$h''$ 2533,3	$s''$ 5,1498	$v''$ 0,007498	$h''$ 2513,9	$s''$ 5,1128	$v''$ 0,007083	$h''$ 2493,1	$s''$ 5,0741
	v	h	s	v	h	s	v	h	s	v	h	s
0	0,0009919	17,1	0,0008	0,0009916	17,6	0,0008	0,0009914	18,1	0,0008	0,0009911	18,6	0,0008
10	0,0009924	58,4	0,1493	0,0009922	58,9	0,1492	0,0009919	59,4	0,1491	0,0009917	59,9	0,1491
20	0,0009942	99,7	0,2926	0,0009939	100,2	0,2925	0,0009937	100,7	0,2924	0,0009935	101,1	0,2923
30	0,0009969	141,1	0,4312	0,0009967	141,5	0,4311	0,0009965	142,0	0,4309	0,0009963	142,4	0,4307
40	0,0010004	182,4	0,5655	0,0010002	182,9	0,5653	0,0010000	183,3	0,5651	0,0009998	183,7	0,5649
50	0,0010047	223,8	0,6956	0,0010045	224,3	0,6954	0,0010043	224,7	0,6952	0,0010041	225,1	0,6950
60	0,0010096	265,3	0,8220	0,0010094	265,7	0,8217	0,0010092	266,1	0,8215	0,0010090	266,6	0,8212
70	0,0010151	306,8	0,9448	0,0010149	307,2	0,9445	0,0010147	307,6	0,9442	0,0010145	308,0	0,9439
80	0,0010212	348,4	1,0642	0,0010210	348,8	1,0639	0,0010208	349,2	1,0636	0,0010206	349,6	1,0632
90	0,0010279	390,0	1,1805	0,0010277	390,4	1,1802	0,0010274	390,8	1,1798	0,0010272	391,2	1,1795
100	0,0010351	431,8	1,2939	0,0010349	432,2	1,2935	0,0010346	432,5	1,2931	0,0010344	432,9	1,2928
110	0,0010429	473,6	1,4046	0,0010427	474,0	1,4042	0,0010424	474,4	1,4038	0,0010422	474,7	1,4034
120	0,0010513	515,6	1,5127	0,0010510	516,0	1,5123	0,0010507	516,3	1,5118	0,0010505	516,7	1,5114
130	0,0010602	557,7	1,6185	0,0010599	558,1	1,6181	0,0010596	558,4	1,6176	0,0010593	558,8	1,6171
140	0,0010697	600,0	1,7222	0,0010694	600,4	1,7217	0,0010691	600,7	1,7212	0,0010688	601,0	1,7207
150	0,0010798	642,5	1,8238	0,0010795	642,9	1,8233	0,0010792	643,2	1,8227	0,0010788	643,5	1,8222
160	0,0010906	685,3	1,9236	0,0010902	685,6	1,9230	0,0010899	685,9	1,9225	0,0010896	686,2	1,9219
170	0,0011021	728,2	2,0217	0,0011017	728,5	2,0211	0,0011014	728,8	2,0205	0,0011010	729,1	2,0199
180	0,0011143	771,5	2,1182	0,0011139	771,8	2,1176	0,0011136	772,0	2,1170	0,0011132	772,3	2,1163
190	0,0011274	815,1	2,2134	0,0011270	815,3	2,2127	0,0011266	815,6	2,2120	0,0011262	815,8	2,2114
200	0,0011414	859,0	2,3073	0,0011410	859,3	2,3066	0,0011405	859,5	2,3058	0,0011400	859,7	2,3051
210	0,0011564	903,4	2,4001	0,0011559	903,6	2,3993	0,0011554	903,8	2,3985	0,0011549	904,0	2,3977
220	0,0011725	948,3	2,4919	0,0011720	948,4	2,4911	0,0011714	948,6	2,4903	0,0011709	948,8	2,4894
230	0,0011899	993,6	2,5830	0,0011893	993,8	2,5821	0,0011887	993,9	2,5812	0,0011881	994,1	2,5803
240	0,0012088	1039,6	2,6735	0,0012081	1039,7	2,6726	0,0012074	1039,8	2,6716	0,0012067	1039,9	2,6706
250	0,0012293	1086,4	2,7637	0,0012285	1086,4	2,7627	0,0012278	1086,5	2,7616	0,0012270	1086,5	2,7605
260	0,0012517	1133,9	2,8538	0,0012509	1133,9	2,8526	0,0012500	1133,9	2,8514	0,0012491	1133,9	2,8503
270	0,0012765	1182,5	2,9440	0,0012755	1182,4	2,9427	0,0012745	1182,4	2,9414	0,0012735	1182,3	2,9401
280	0,0013041	1232,3	3,0348	0,0013029	1232,1	3,0334	0,0013018	1232,0	3,0319	0,0013006	1231,8	3,0305
290	0,0013352	1283,5	3,1266	0,0013338	1283,2	3,1249	0,0013324	1283,0	3,1233	0,0013310	1282,7	3,1217
300	0,0013707	1336,9	3,2200	0,0013690	1336,1	3,2181	0,0013673	1335,7	3,2162	0,0013656	1335,4	3,2143
310	0,0014121	1392,0	3,3158	0,0014099	1391,4	3,3136	0,0014077	1390,8	3,3114	0,0014056	1390,2	3,3092
320	0,0014615	1450,5	3,4155	0,0014586	1449,7	3,4128	0,0014558	1448,8	3,4101	0,0014531	1448,0	3,4075
330	0,0015229	1513,7	3,5209	0,0015189	1512,3	3,5175	0,0015150	1511,1	3,5141	0,0015112	1509,8	3,5108
340	0,0016042	1583,8	3,6362	0,0015980	1581,7	3,6315	0,0015920	1579,7	3,6269	0,0015863	1577,8	3,6225
350	0,0017283	1667,7	3,7720	0,0017158	1663,6	3,7640	0,0017043	1659,8	3,7566	0,0016938	1656,3	3,7496
360	0,009584	2652,4	5,3458	0,008864	2614,8	5,2791	0,008104	2569,1	5,2002	0,007267	2510,8	5,1020
370	0,01069	2740,7	5,4842	0,01005	2713,5	5,4339	0,009430	2684,2	5,3808	0,008817	2652,5	5,3244
380	0,01159	2811,0	5,5928	0,01099	2789,4	5,5510	0,01040	2766,6	5,5079	0,009844	2722,4	5,4632
390	0,01235	2870,2	5,6827	0,01177	2852,2	5,6464	0,01121	2833,4	5,6095	0,01068	2783,9	5,5717
400	0,01303	2921,7	5,7599	0,01246	2906,3	5,7274	0,01191	2890,3	5,6947	0,01139	2873,8	5,6615
410	0,01365	2968,0	5,8281	0,01308	2954,4	5,7984	0,01254	2940,4	5,7686	0,01202	2926,1	5,7386
420	0,01423	3010,5	5,8899	0,01366	2998,3	5,8622	0,01311	2985,8	5,8345	0,01260	2973,0	5,8068
430	0,01476	3050,1	5,9466	0,01419	3039,0	5,9205	0,01365	3027,6	5,8945	0,01314	3016,1	5,8685
440	0,01527	3087,5	5,9993	0,01470	3077,2	5,9745	0,01416	3066,9	5,9498	0,01364	3056,3	5,9253
450	0,01576	3123,1	6,0489	0,01518	3113,6	6,0251	0,01464	3104,0	6,0015	0,01412	3094,3	5,9781
460	0,01623	3157,2	6,0958	0,01565	3148,4	6,0729	0,01510	3139,4	6,0502	0,01457	3130,4	6,0278
470	0,01668	3190,2	6,1404	0,01610	3181,9	6,1183	0,01554	3173,5	6,0964	0,01501	3165,1	6,0748
480	0,01712	3222,1	6,1831	0,01653	3214,3	6,1617	0,01597	3206,5	6,1405	0,01543	3198,6	6,1195
490	0,01755	3253,1	6,2241	0,01695	3245,8	6,2032	0,01638	3238,4	6,1826	0,01584	3231,0	6,1623
500	0,01797	3283,5	6,2636	0,01736	3276,5	6,2432	0,01678	3269,6	6,2232	0,01624	3262,5	6,2034
510	0,01837	3313,1	6,3017	0,01776	3306,6	6,2818	0,01718	3300,9	6,2622	0,01663	3293,3	6,2429
520	0,01877	3342,3	6,3387	0,01815	3336,0	6,3192	0,01756	3329,8	6,3000	0,01701	3323,4	6,2812
530	0,01916	3370,9	6,3746	0,01853	3365,0	6,3554	0,01794	3359,0	6,3366	0,01738	3353,0	6,3182
540	0,01954	3399,1	6,4095	0,01891	3393,5	6,3907	0,01831	3387,8	6,3722	0,01774	3382,0	6,3541
550	0,01992	3427,0	6,4435	0,01928	3421,6	6,4250	0,01867	3416,1	6,4069	0,01810	3410,6	6,3891