Batterie di scambio – bypass

Numero di ranghi	Velocità frontale [m/s]			
	1,5	2,0	2,5	3,0
1	0,61	0,63	0,65	0,67
2	0,38	0,40	0,42	0,43
3	0,23	0,25	0,27	0,29
4	0,14	0,16	0,18	0,20
5	0,09	0,10	0,11	0,12
6	0,05	0,06	0,07	0,08
7	0,03	0,04	0,05	0,06
8	0,02	0,02	0,03	0,04

Temperatura superficiale batteria

- $t_{rb} = t_m$ se $\Delta x = 0$
- $t_{rb} = t_m + 3$ se $\Delta \mathrm{x} > 6$
- Interpolato linearmente tra valori intermedi
- t_{rb} temperatura di rugiada della batteria

Acqua glicole etilenico

- https://www.engineeringtoolbox.com/ethylene-glycol-d_146.html

Freezing Point											
Ethylene Glycol Solution (% by volume)		**0**	**10**	**20**	**30**	**40**	**50**	**60**	**80**	**90**	**100**
Temperature	(°F)	32	25.9	17.8	7.3	-10.3	-34.2	-63	≈ -51	≈ -22	9
	(°C)	0	-3.4	-7.9	-13.7	-23.5	-36.8	-52.8	≈ -46	≈ -30	-12.8

Dynamic Viscosity - μ - (centiPoise)								
Temperature		**Ethylene Glycol Solution (% by volume)**						
(°F)	**(°C)**	**25**	**30**	**40**	**50**	**60**	**65**	**100**
0	-17.8	1)	1)	15	22	35	45	310
40	4.4	3	3.5	4.8	6.5	9	10.2	48
80	26.7	1.5	1.7	2.2	2.8	3.8	4.5	15.5
120	48.9	0.9	1	1.3	1.5	2	2.4	7
160	71.1	0.65	0.7	0.8	0.95	1.3	1.5	3.8
200	93.3	0.48	0.5	0.6	0.7	0.88	0.98	2.4
240	115.6	2)	2)	2)	2)	2)	2)	1.8
280	137.8	2)	2)	2)	2)	2)	2)	1.2

Proprietà acqua glicole etilenico

Density - ρ - (kg/m^3) (lb/ft3)												
Mass Fraction of Ethylene Glycol in Solution	Temperature - t - (^oC) (deg F)											
	-48	-35	-25	-14	-8	-4	0	20	40	60	80	100
0							1000	998	992	983	972	958
0.1						1019	1018	1014	1008	1000	992	984
0.2					1038	1037	1036	1030	1022	1014	1005	995
0.3				1058	1056	1055	1054	1046	1037	1027	1017	1007
0.4			1080	1077	1075	1073	1072	1063	1052	1041	1030	1018
0.5		1103	1100	1096	1093	1092	1090	1079	1067	1055	1042	1030
0.6	1127	1124	1120	1115	1112	1110	1107	1095	1082	1068	1055	1042

Proprietà acqua glicole etilenico

Specific Heat - c_p (Btu/lb ^{O}F) [kJ/(kg °C)]																
Ethylene Glycol Solution (% by weight)	**Temperature (°C)** (deg F)															
	-50	**-40**	**-30**	**-20**	**-10**	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0						1.0038 4.203	1.0018 4.195	1.0004 4.189	0.99943 4.185	0.99902 4.183	0.99913 4.183	0.99978 4.186	1.0009 4.191	1.0026 4.198	1.0049 4.208	1.0076 4.219
10						0.97236 4.071	0.97422 4.079	0.97619 4.087	0.97827 4.096	0.98047 4.105	0.98279 4.115	0.98521 4.125	0.98776 4.136	0.99041 4.147	0.99318 4.158	0.99607 4.171
20						0.93576 3.918	0.93976 3.935	0.94375 3.951	0.94775 3.968	0.95175 3.985	0.95574 4.002	0.95974 4.018	0.96373 4.035	0.96773 4.052	0.97173 4.069	0.97572 4.085
30					0.89373 3.742	0.89889 3.764	0.90405 3.785	0.90920 3.807	0.91436 3.828	0.91951 3.85	0.92467 3.872	0.92982 3.893	0.93498 3.915	0.94013 3.936	0.94529 3.958	0.95044 3.979
40				0.84605 3.542	0.85232 3.569	0.85858 3.595	0.86484 3.621	0.87111 3.647	0.87737 3.674	0.88364 3.7	0.88990 3.726	0.89616 3.752	0.90243 3.778	0.90869 3.805	0.91496 3.831	0.92122 3.857
50			0.79288 3.32	0.80021 3.35	0.80753 3.381	0.81485 3.412	0.82217 3.442	0.82949 3.473	0.83682 3.504	0.84414 3.534	0.85146 3.565	0.85878 3.596	0.86610 3.626	0.87343 3.657	0.88075 3.688	0.88807 3.718
60	0.72603 3.04	0.73436 3.075	0.74269 3.11	0.75102 3.145	0.75935 3.179	0.76768 3.214	0.77601 3.249	0.78434 3.284	0.79267 3.319	0.80100 3.354	0.80933 3.389	0.81766 3.424	0.82599 3.458	0.83431 3.493	0.84264 3.528	0.85097 3.563
70	0.67064 2.808	0.67992 2.847	0.68921 2.886	0.69850 2.925	0.70778 2.963	0.71707 3.002	0.72636 3.041	0.73564 3.08	0.74493 3.119	0.75422 3.158	0.76350 3.197	0.77279 3.236	0.78207 3.275	0.79136 3.313	0.80065 3.352	0.80993 3.391
80	0.61208 2.563	0.62227 2.605	0.63246 2.648	0.64265 2.691	0.65285 2.733	0.66304 2.776	0.67323 2.819	0.68343 2.862	0.69362 2.904	0.70381 2.947	0.71401 2.99	0.72420 3.032	0.73439 3.075	0.74458 3.118	0.75478 3.16	0.76497 3.203
90				0.58347 2.443	0.59452 2.489	0.60557 2.536	0.61662 2.582	0.62767 2.628	0.63872 2.674	0.64977 2.721	0.66082 2.767	0.67186 2.813	0.68291 2.859	0.69396 2.906	0.70501 2.952	0.71606 2.998
100					0.53282 2.231	0.54467 2.281	0.55652 2.33	0.56838 2.38	0.58023 2.429	0.59209 2.479	0.60394 2.529	0.61579 2.578	0.62765 2.628	0.63950 2.678	0.65136 2.727	0.66321 2.777