

TEST PROJECT REFRIGERATION AND AIR CONDITIONING

WSC2019_TP38_EN – V3

PART B – TEST PROJECT DRAWINGS AND INFORMATION

Competitor

- Name _____
- Country _____

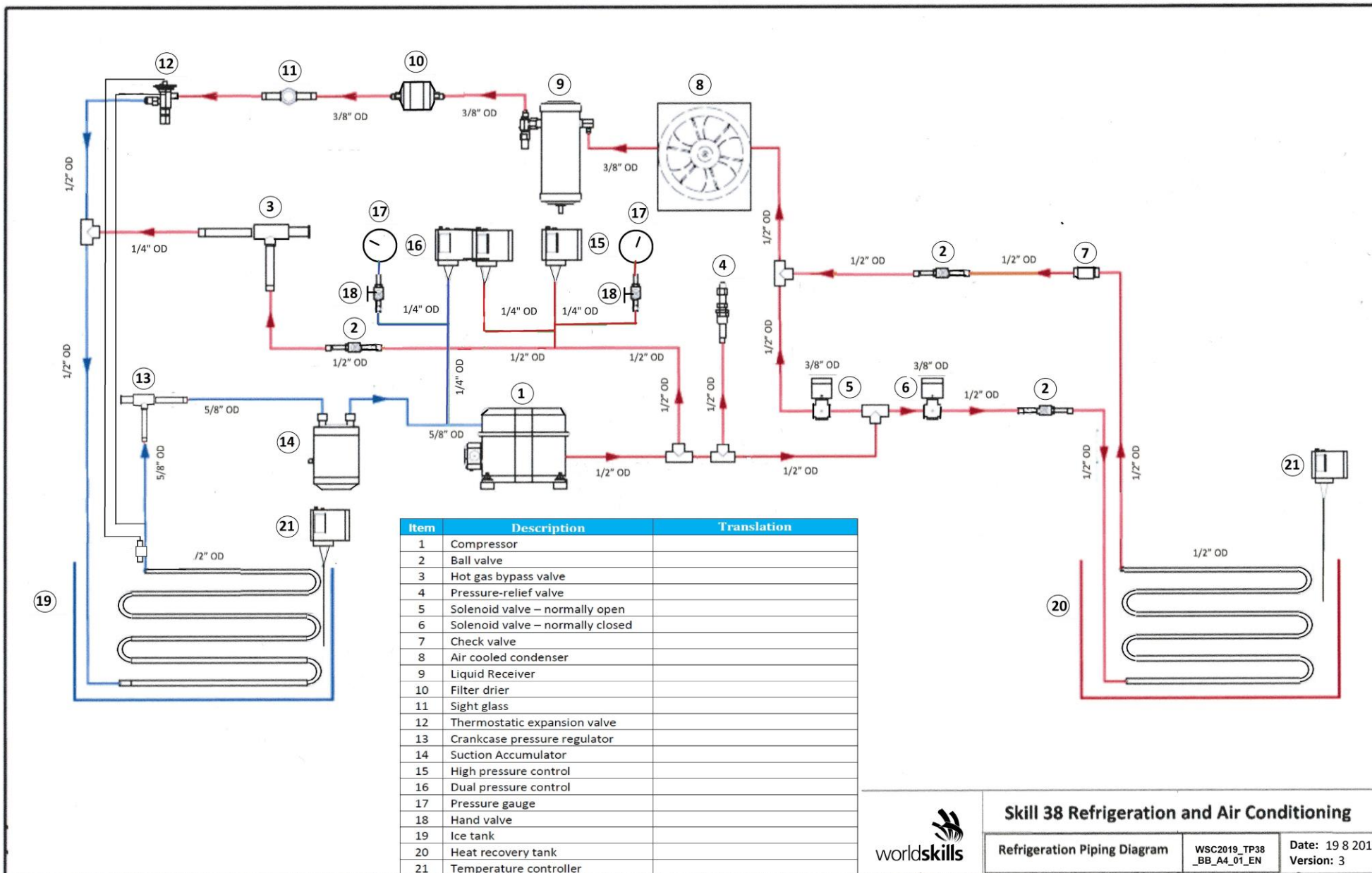


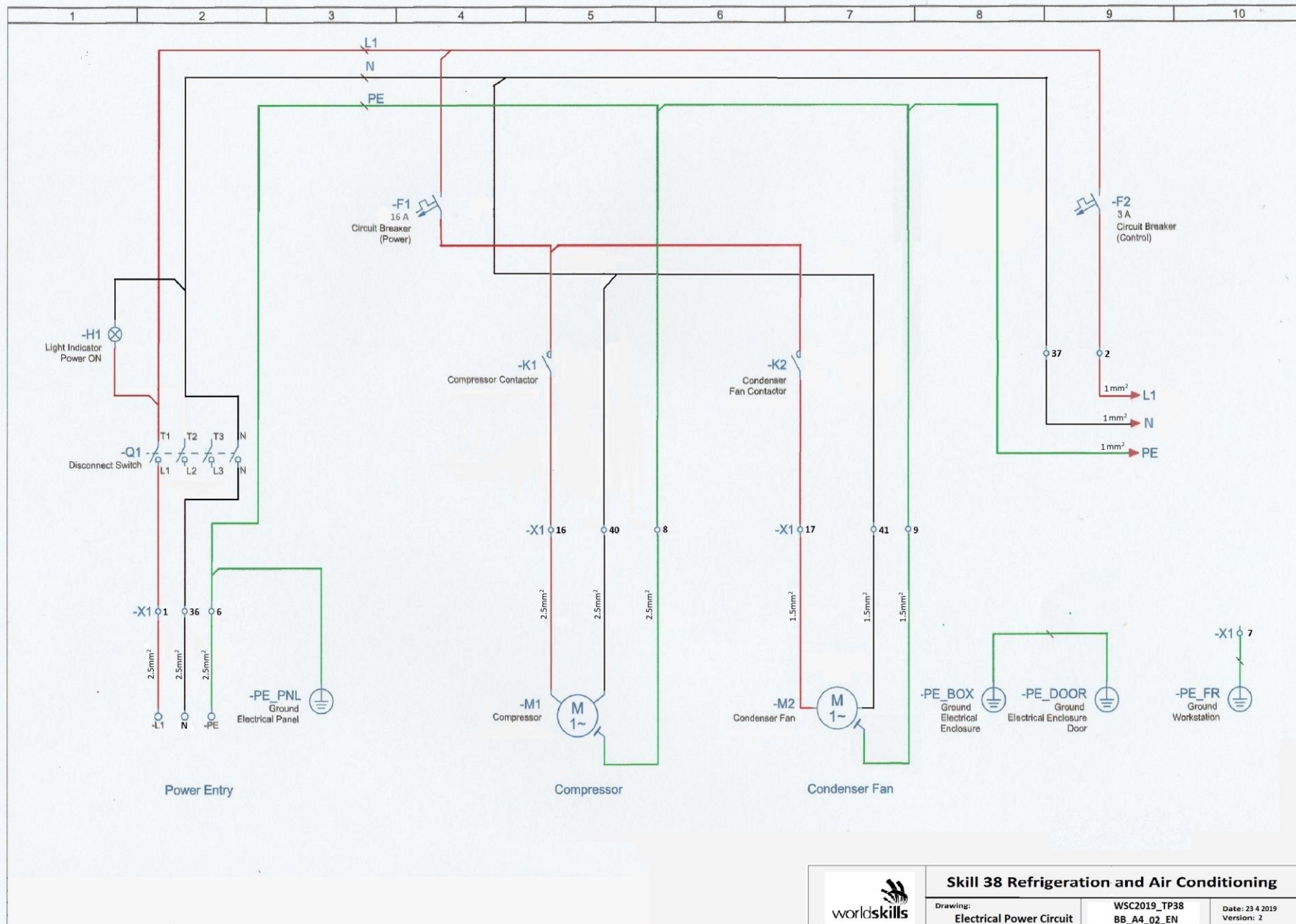
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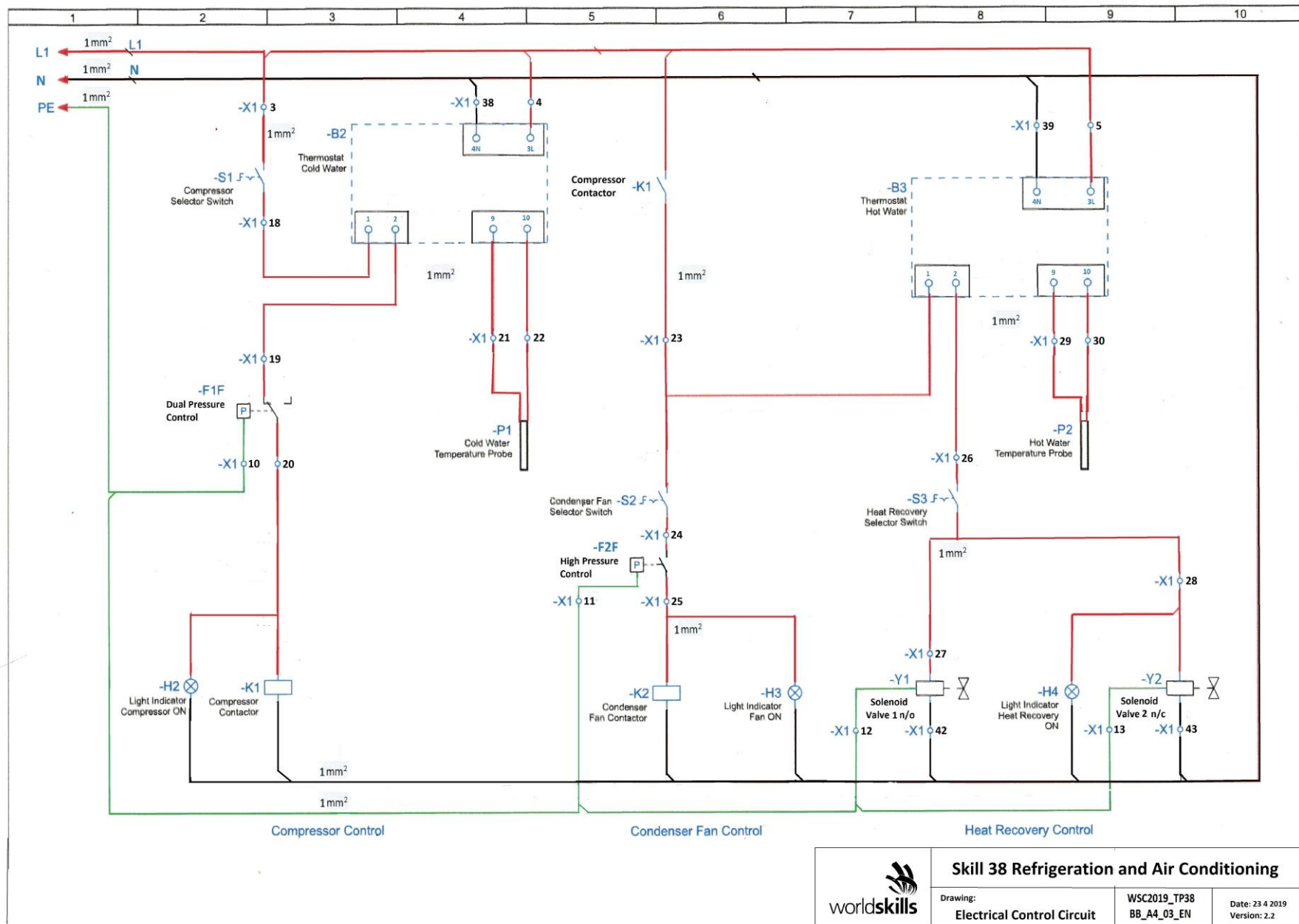
Test Project Drawings

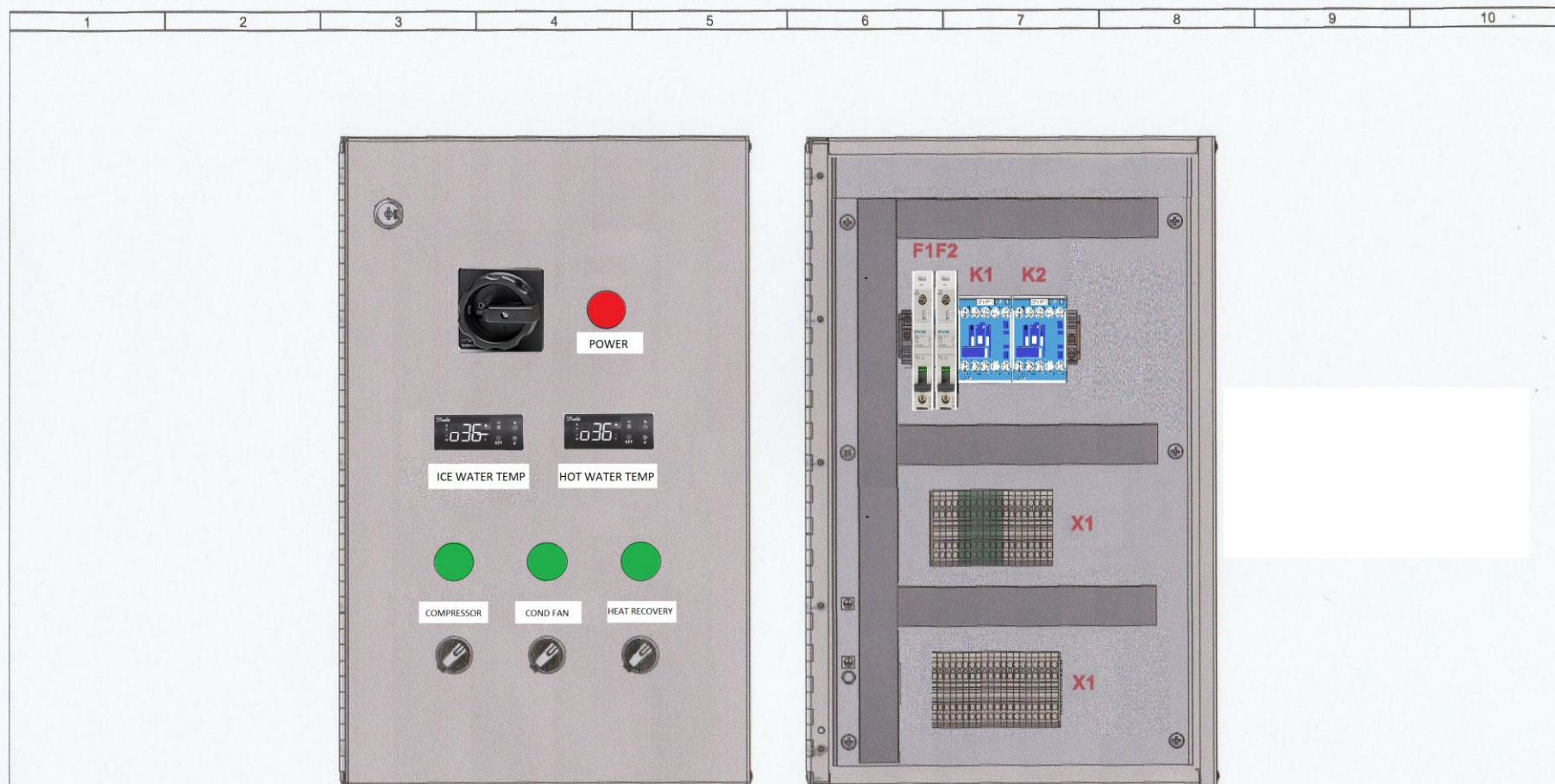
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Refrigerant Pressure/Temperature Chart










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Skill 38 Refrigeration and Air Conditioning		
Scale:	Date: 19.8.2019	
Drawn / Design by: N Munkman		
Description: Electrical Control Panel Layout		No. WSC2019_TP38_BB_04_EN
Rev: V2		Page: 1

1	2	3	4	5	6	7	8	9	10									
function text	External target	Internal target															function text	
L1 from Main Power	-L1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	-Q1	Disconnect Switch
																	-F2	Circuit Breaker (Control)
																	-S1	Compressor Selector Switch
																	-B2	Thermostat Cold Water
																	-B3	Thermostat Hot Water
PE from Main Power	-PE																-PE_PNL	Ground Electrical Panel
Ground Workstation	-PE_FR																	
Compressor	-M1																	
Condenser Fan	-M2																	
Dual Pressure Control	-F1F																	
High Pressure Control	-F2F																	
Solenoid Valve 1	-Y1																	
Solenoid Valve 2	-Y2																	
Compressor	-M1																-K1	Compressor Contactor
Condenser Fan	-M2																-K2	Condenser Fan Contactor
Thermostat Cold Water	-B2																-S1	Compressor Selector Switch
Dual Pressure Control	-F1F																-B2	Thermostat Cold Water
Dual Pressure Control	-F1F																-K1	Compressor Contactor
Cold Water Temperature Probe	-P1																-H2	Compressor Light Indicator Compressor On
Cold Water Temperature Probe	-P1																-B2	Thermostat Cold Water
Condenser Fan Selector Switch	-S2																-B2	Thermostat Cold Water
Thermostat Hot Water	-B3																-K1	Compressor Contactor
High Pressure Control	-F2F																-S2	Condenser Fan Selector Switch
High Pressure Control	-F2F																-K2	Condenser Fan Contactor
																	-H3	Light Indicator Fan On

Heat Recovery Selector Switch	-S3	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Solenoid Valve 1 (N.O.)	-Y1																				
Solenoid Valve 2 (N.C)	-Y2																				
Hot Water Temperature Probe	-P2																				
Hot Water Temperature Probe	-P2																				
N from Main Power	N																				
Disconnect Switch	-Q1																				
Thermostat Cold Water	-B2																				
Thermostat Hot Water	-B3																				
Compressor	-M1																				
Condenser Fan	-M2																				
Solenoid Valve 1 (N.O.)	-Y1																				
Solenoid Valve 2 (N.C)	-Y2																				

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Skill 38 Refrigeration and Air Conditioning

Drawing:
Control Panel Terminal Diagram

WSC2019_TP38
BB_A4_05_EN

Date: 19 8 2019
Version: 2

Terminal Blocks

X1

Terminal Blocks
X1

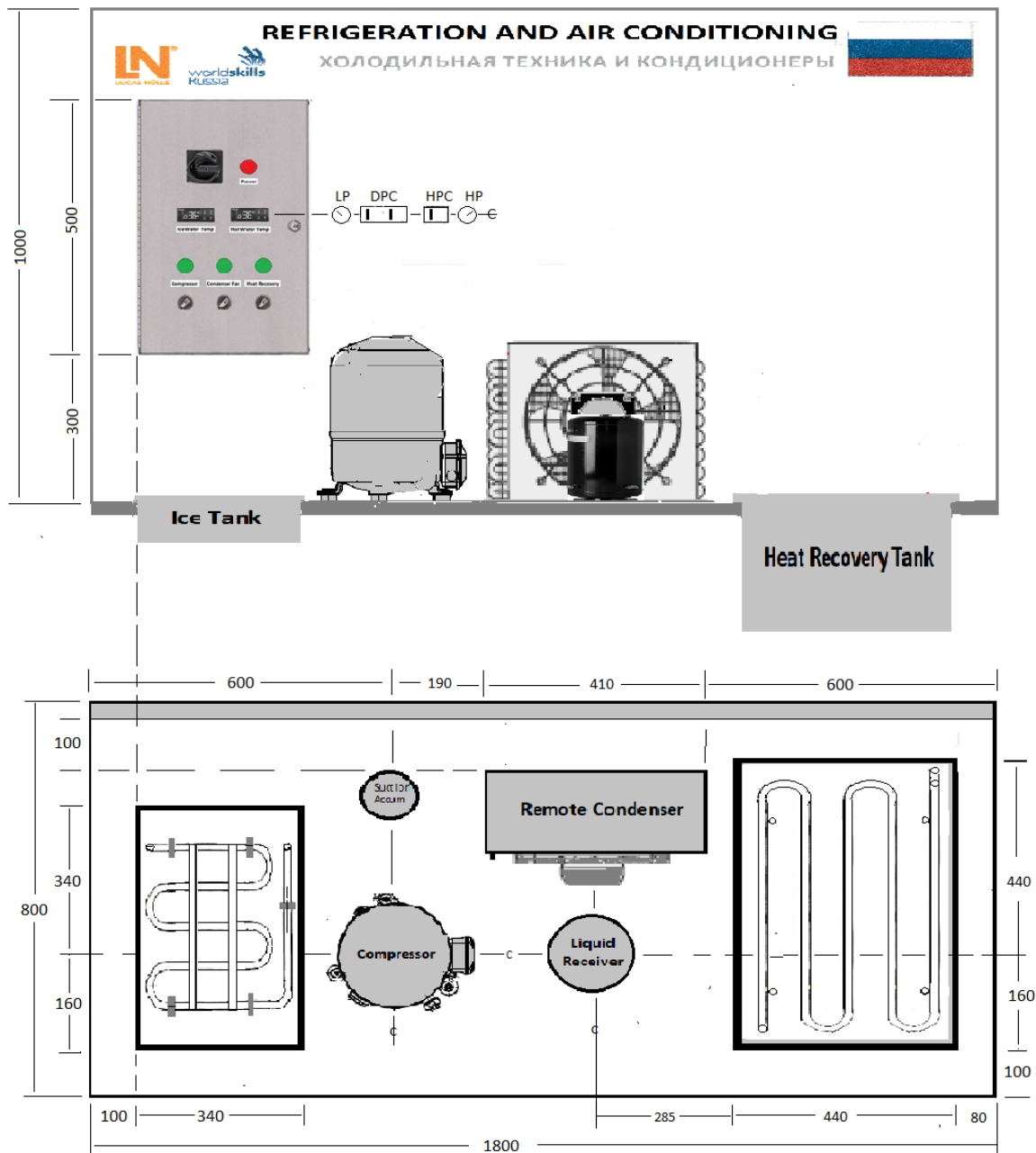


Skill 38 Refrigeration and Air Conditioning

Drawing:
Control Panel Terminal Diagram

WSC2019_TP38
BB_A4_05_EN

Date: 19 8 2019
Version: 2



Dimensions

Compressor: 225 dia x 333H

Control Panel: 330W x 520H

Liquid Receiver: 160 dia x 175H

Remote Condenser: 430W x 325H x 245D

Suction Accumulator: 100 dia x 255H

Ice Tank: External 500 x 340 x 110 Internal 470 x 315 (14L)

Heat Recovery Tank: External 640 x 450 x 340 Internal 590 x 400 x 330 (60L)

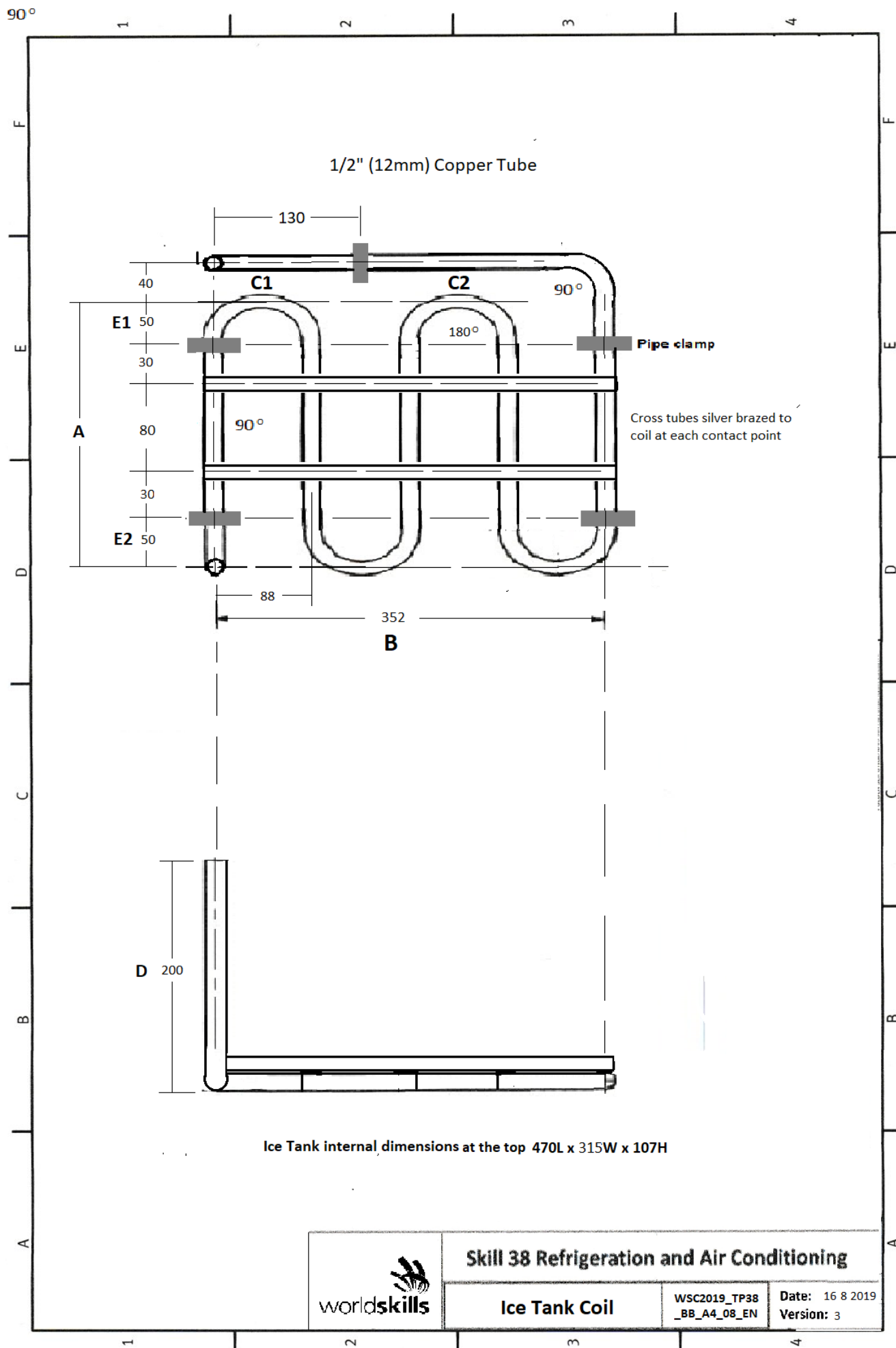


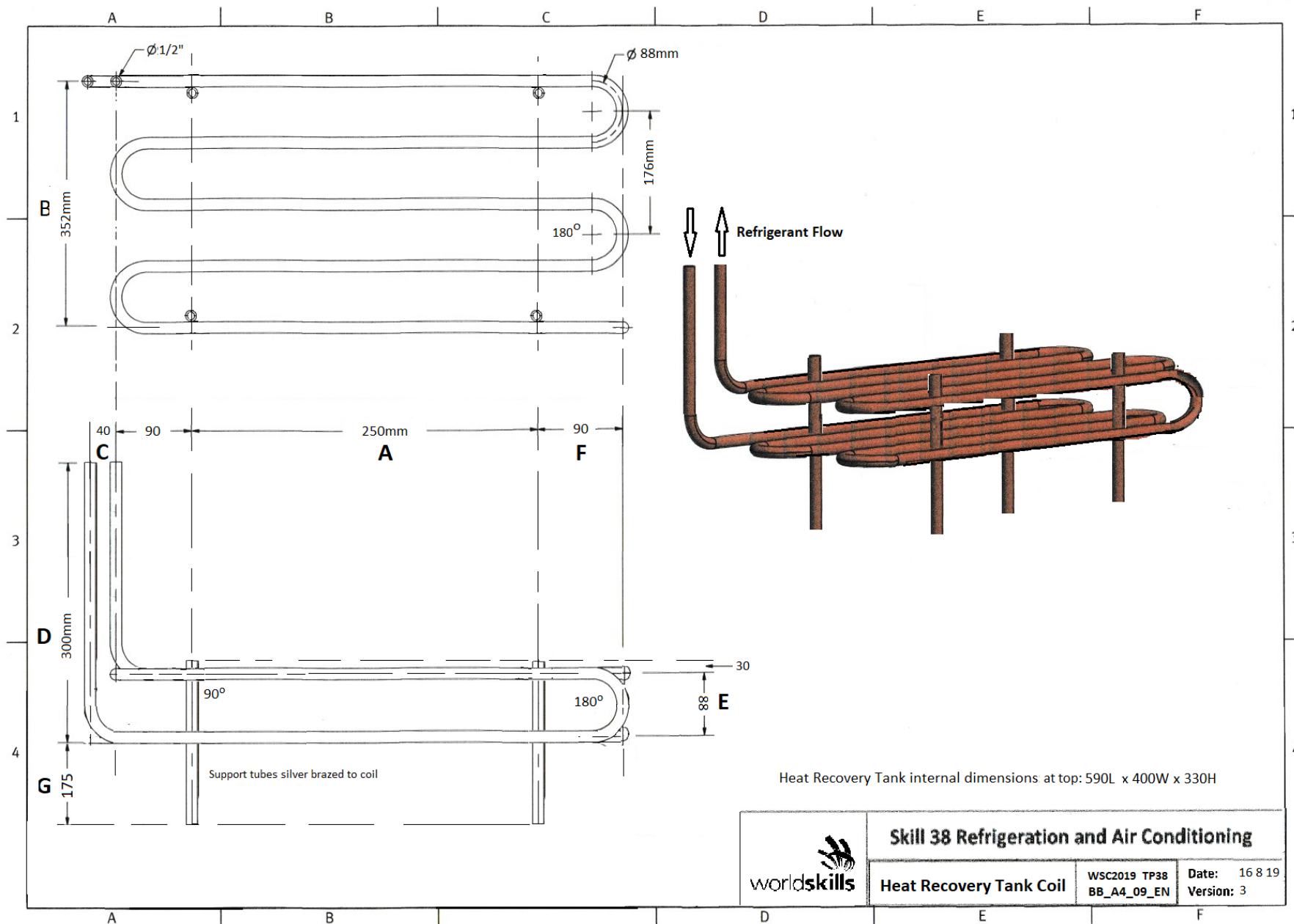
Skill 38 Refrigeration and Air Conditioning

Refrigeration Component Layout

WSC2019_TP38
_BB_A4_07_EN

Date: 8.8.2019
Version: 3





PRESSURE TEMPERATURE CHART

Saturated Vapour Pressures (Figures in brackets vacuum inches & -kpa)																													
Temp		R404A		R507		R407F		R438A		R407C		R22		R123		R134a		SP34E		R409A		R410a		R32		R744		R717	
°C	°F	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa	psig	kpa
-40	-40.0	4.9	34	5.4	37	0	0	(5.2)	(-18)	(5.2)	(-18)	0.6	4	(28.9)	(-98)	(14.8)	(-50)	(14.8)	(-50)	(13.1)	(-44)	10.8	74	11.2	77	131	903	(8.6)	(-28)
-38	-36.4	7.0	48	7.5	52	1.5	10	(2.6)	(-9)	(2.6)	(-9)	2.2	15	(28.7)	(-97)	(12.9)	(-44)	(13.3)	(-45)	(11.4)	(-39)	13.4	92	13.6	94	142	979	(6.5)	(-22)
-36	-32.8	9.2	63	9.8	68	2.9	20	(0.2)	0.6	(0.7)	(-2)	4.0	28	(28.5)	(-97)	(10.9)	(-37)	(11.2)	(-38)	(9.6)	(-32)	16.3	112	16.2	112	154	1059	(3.7)	(-13)
-34	-29.2	10.3	71	11.0	76	4.4	30	1.6	11	1.7	12	4.9	34	(28.4)	(-96)	(9.8)	(-35)	(9.2)	(-31)	(7.7)	(-26)	17.8	123	19.0	131	166	1144	(0.9)	(-3)
-32	-25.6	12.8	88	13.5	93	5.8	40	3.2	22	3.3	23	6.9	48	(28.2)	(-95)	(7.5)	(-25)	(7.4)	(-25)	(5.4)	(-18)	21.0	145	22.0	152	179	1233	1.9	13
-30	-22.0	15.4	106	16.2	112	8.7	60	4.9	34	5.1	35	9.1	63	(27.9)	(-94)	(5.0)	(-17)	(5.0)	(-17)	(3.2)	(-11)	24.5	169	25.1	173	192	1327	2.6	18
-28	-18.4	18.3	126	19.1	132	10.2	70	6.8	47	7.0	48	11.4	79	(27.6)	(-93)	(2.3)	(-8)	(2.7)	(-9)	(2.0)	(-7)	28.2	194	28.5	197	207	1425	4.4	30
-26	-14.8	21.3	147	22.2	153	13.1	90	8.8	60	8.9	61	13.9	96	(27.3)	(-92)	0.3	2	0.1	0.5	0	6	32.2	222	32.1	222	222	1528	6.2	43
-24	-11.2	22.9	158	23.8	164	16.0	110	10.9	75	11.1	77	15.2	105	(27.2)	(-92)	1.1	8	1.5	10	2.3	16	34.3	236	36.0	248	237	1636	8.3	57
-22	-7.6	26.3	181	27.3	188	18.9	130	13.2	91	13.5	93	17.9	123	(26.8)	(-91)	2.8	19	2.9	20	3.8	26	38.7	267	40.0	276	254	1750	10.4	72
-20	-4.0	29.8	205	30.9	213	20.3	140	15.6	107	16.0	110	20.9	144	(26.4)	(-89)	4.6	32	4.6	32	5.4	37	43.4	299	44.4	306	271	1868	12.9	86
-18	-4.4	33.7	232	34.8	240	24.7	170	18.2	125	18.6	128	24.0	165	(25.9)	(-88)	6.5	45	6.4	44	7.0	49	48.4	334	48.9	337	289	1993	15.4	106
-16	-3.2	37.7	260	39.0	269	27.6	190	20.9	144	21.5	148	27.4	189	(25.4)	(-86)	8.5	59	8.1	56	8.8	61	53.8	371	53.8	371	308	2122	18.1	125
-14	-6.8	39.8	274	41.1	283	30.5	210	23.8	164	24.5	169	29.1	201	(25.2)	(-85)	9.6	66	10.2	70	10.7	74	56.6	380	58.9	406	328	2258	21.0	145
-12	-10.4	44.3	305	45.7	315	34.8	240	27.0	186	27.6	191	32.8	226	(24.6)	(-83)	11.9	82	12.2	84	12.7	88	62.4	430	64.3	443	348	2400	24.2	167
-10	-14.0	49.0	338	50.5	348	37.7	260	30.3	209	31.0	214	36.8	254	(23.9)	(-81)	14.4	99	14.5	100	14.8	102	68.6	473	70.0	483	369	2547	27.6	190
-8	-17.6	54.0	372	55.6	383	42.1	290	33.8	233	34.7	239	40.9	282	(23.2)	(-79)	17.0	117	16.8	116	17.1	118	75.2	518	76.0	524	392	2701	31.0	214
-6	-21.2	59.3	409	61.0	421	46.4	320	37.5	258	38.6	266	45.3	312	(22.5)	(-76)	19.9	137	19.4	134	19.6	135	82.2	567	82.4	568	415	2862	34.8	240
-4	-24.8	62.0	427	63.8	440	50.8	350	41.4	286	42.5	292	47.6	328	(22.1)	(-75)	21.3	147	22.0	152	22.1	152	85.8	592	89.0	614	439	3029	36.9	268
-2	-28.4	67.7	467	69.7	481	56.6	390	45.5	314	46.8	323	52.4	361	(21.2)	(-72)	24.5	169	24.9	172	24.8	171	93.4	644	96.1	662	465	3203	43.2	298
0	-32.0	73.8	509	75.9	523	60.9	420	49.9	344	51.3	353	57.5	396	(20.3)	(-69)	27.8	192	27.8	192	27.6	190	101	699	103.4	713	491	3384	47.7	329
2	-35.6	80.2	553	82.4	568	66.7	460	54.5	376	56.0	386	62.9	434	(19.3)	(-65)	31.3	216	31.2	215	30.6	211	110	758	111.2	767	518	3572	52.5	362
4	-39.2	86.9	599	89.2	615	72.5	500	59.4	410	61.1	421	68.6	473	(18.2)	(-62)	35.0	241	34.5	238	33.8	233	119	819	119.3	823	547	3768	57.6	397
6	-42.8	90.4	623	92.8	640	76.3	540	64.5	444	66.3	457	71.5	493	(17.6)	(-60)	37.0	255	36.0	262	37.2	256	123	851	127.8	881	576	3971	62.9	434
8	-46.4	97.6	673	100	691	84.1	580	69.8	482	71.8	495	77.6	535	(16.3)	(-55)	41.1	283	41.8	288	40.7	280	133	917	136.7	943	607	4182	68.7	474
10	-50.0	105	726	108	745	91.4	630	75.5	521	77.5	534	84.1	580	(15.0)	(-51)	45.4	313	45.8	316	44.3	305	143	967	146.0	1007	638	4401	74.7	515
12	-53.6	113	781	116	801	97	670	81.5	562	83.6	576	90.8	626	(13.5)	(-46)	50.0	345	49.9	344	48.2	330	154	1060	155.8	1074	671	4628	81.1	559
14	-57.2	122	839	125	860	104	720	87.7	605	89.9	620	98.0	676	(12.0)	(-41)	54.9	379	54.4	375	52.3	360	165	1137	166.0	1145	706	4865	87.7	605
16	-60.8	126	869	129	891	113	780	94.3	650	96.5	666	102	701	(11.2)	(-38)	57.4	396	58.9	406	56.5	390	171	1177	176.6	1218	741	5110	94.7	653
18	-64.4	135	931	138	954	120	830	101	696	104	715	109	754	(9.4)	(-34)	62.7	432	63.8	440	61.2	422	183	1260	187.8	1295	778	5364	102	704
20	-68.0	144	996	148	1020	129	890	108	746	111	766	117	809	(7.6)	(-30)	68.2	470	68.2	470	66.0	455	195	1347	199.4	1375	816	5628	110	758
22	-71.6	154	1064	158	1090	138	950	116	797	119	819	126	867	(5.6)	(-19)	74.1	511	74.5	514	70.9	489	208	1437	211.4	1458	856	5902	118	816
24	-75.2	165	1135	169	1162	146	1010	123	851	127	873	135	927	(3.5)	(-12)	80.2	553	80.8	557	76.1	524	222	1532	224.1	1545	897	6186	127	873
26	-78.8	170	1171	174	1200	156	1080	132	907	135	939	139	958	(2.4)	(-8)	83.4	575	85.6	590	81.3	562	229	1581	237.2	1635	940	6482	136	937
28	-82.4	181	1248	185	1278	165	1140	140	965	144	991	148	1023	(0.0)	(0)	90.0	621	90.4	623	87.0	602	244	1682	250.8	1730	985	6791	145	1000
30	-86.0	193	1327	197	1359	176	1210	149	1027	153	1055	158	1091	1.2	8	97.0	669	95.8	661	93.4	644	259	1788	285.1	1828	1032	7112	155	1070
32	-89.6	205	1410	209	1443	187	1290	158	1090	162	1120	168	1161	2.5	17	104	719	101	698	99.6	687	275	1899	279.8	1929	1165	7140	165	1140
34	-93.2	217	1496	222	1531	199	1370	168	1158	172	1189	179	1235	3.9	27	112	772	108	745	106	732	292	2014	296.2	2035	1278	7712	176	1215
36	-96.8	223	1540	229	1577	210	1450	178	1227	183	1259	185	1273	4.6	32	116	799	115	792	113	778	301	2073	311.2	2145	1481	8112	187	1290
38	-100.4	237	1633	242	1671	223	1530	189	1300	193	1332	196	1351	6.1	42	124	856	121	836	120	827	319	2196	327.7	2260	1599	8712	199	1375
40	-104.0	251	1728	257	1769	235	1620	199	1375	204	1410	208	1432	7.7	53	133	915	128	880	127	878	337	2324	344.9	2378	1782	8812	212	1460
42	-107.6	265	1828	271	1870	248	1710	211	1452	216	1492	220	1517	9.4	65	142	977	134	927	135	933	357	2458	362.8	2501	1933	8912	223	1540
44	-111.2	280	1931	287	1976	261	1800	222	1533	229	1577	233	1605	11.2	77	151	1042	142	977	144	990	377	2597	381.3	2629	2166	9012	236	1630
46	-114.8	288	1985	295	2031	276	1900	235	1618	241	1664	239	1651	12.1	83	156	1076	149	1026	152	1047	387	2688	400.5	2762	2271	9112	251	1730
48	-118.4	304	2095	311	2143	290	2000	248	1706	255	1755	253	1744	14.1	97	166	1145	156	1078	161	1108	408	2816	420.4	2899	2386	9212	265	1830
50	-122.0	320	2209	328	2260	306	2110	261	1798	268	1849	267	1842	16.1	111	177	1217	164	1130	170	1171	431	2970	441.1	3041	2501	9312	280	1930
52	-125.6	338	2328	345	2381	322	2220	275	1893	282	1947	282	1942	18.3	126	187	1292	173	1193	179	1236	454	3129	462.5	3189	2601	9412	296	2040
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