

If you have an emergency with your refrigeration system, **please call Innovative at (540) 941-1999 x 301**. During business hours, one of our trained staff members will handle your problem immediately. If you experience problems *after* hours, our voicemail system will explain what constitutes an emergency and what steps you should take. Please leave an accessible phone number so that Innovative can return your call as quickly as possible. This system works promptly when complete information is given.

### R513a Refrigeration Temperature Pressure Chart

Temp °F	PSIG	Temp °F	PSIG	Temp °F	PSIG
-20	0.4	26	27.2	75	85.5
-15	2.4	28	28.9	80	93.8
-10	4.5	30	30.6	85	102.6
-5	6.9	32	32.4	90	111.9
0	9.5	34	34.3	95	121.7
2	10.6	36	36.1	100	132.1
4	11.8	38	38.1	105	143.1
6	13.0	40	40.1	110	154.7
8	14.2	42	42.2	115	166.9
10	15.4	44	44.3	120	179.7
12	16.8	46	46.5	125	193.3
14	18.1	48	48.7	130	207.5
16	19.5	50	51.0	135	222.4
18	21.0	55	57.1	140	238.1
20	22.4	60	63.5	145	254.6
22	24.0	65	70.4	150	271.8
24	25.6	70	77.7	155	289.9

### Carbon Dioxide Refrigeration Temperature Pressure Chart

Temp °F	PSIG	Temp °F	PSIG	Temp °F	PSIG
-69.8	60.4	-22	192.4	26	447.6
-68	63.8	-20	200.2	28	461.7
-66	67.6	-18	208.3	30	476.1
-64	71.5	-16	216.5	32	490.8
-62	75.6	-14	225.0	34	505.8
-60	79.9	-12	233.8	36	521.2
-58	84.3	-10	242.7	38	536.9
-56	88.8	-8	251.9	40	552.9
-54	93.5	-6	261.3	42	569.3
-52	98.4	-4	271.0	44	586.0
-50	103.4	-2	280.9	46	603.1
-48	108.6	0	291.0	48	620.5
-46	113.9	2	301.5	50	638.3
-44	119.4	4	312.1	52	656.5
-42	125.1	6	323.1	54	675.0
-40	131.0	8	334.2	56	694.0
-38	137.0	10	345.7	58	713.3
-36	143.3	12	357.4	60	733.1
-34	149.7	14	369.5	62	753.2
-32	156.3	16	381.8	64	773.8
-30	163.1	18	394.3	66	794.8
-28	170.1	20	407.2	68	816.2
-26	177.3	22	420.4	70	838.1
-24	184.8	24	433.8		

### R513a Refrigeration Piping Identification Guide



1. Use arrows to indicate the direction of flow in the pipe.
2. Properly identify system components with accepted abbreviations, which can be found in the chart below.

CD	Condenser Drain	HTS	High Temp Suction	MTS	Medium Temp Suction
DR	Defrost Relief	IPL	Intermediate Pressure Liquid	MTRL	Medium Temp Recirc. Suction
ES	Economizer Suction	LIC	Liquid Injection Cooling	MTL	Medium Temp Liquid
FG	Foul Gas	LPL	Low Pressure Liquid	ORL	Oil Return Line
HGD	Hot Gas Defrost	LSS	Low Stage Suction	PO	Pump Out
HPL	High Pressure Liquid	LSD	Low Stage Discharge	RV	Relief Vent
HSD	High Stage Discharge	LTRL	Low Temp Recirc. Liquid	TSR	Thermosyphon Return
HSS	High Stage Suction	LTRS	Low Temp Recirc. Suction	TSS	Thermosyphon Supply
HTRS	High Temp Recirc. Suction	LTS	Low Temp Suction	TSV	Thermosyphon Vent
		MTRS	Medium Temp. Recirc Suction	V	Vent

3. Indicate whether the refrigerant is a liquid, vapor, or both. A yellow color band indicates a liquid state; a blue color band indicates a vapor state. Use both color bands if both liquid and vapor may be present.
4. Print "R-513a" in black letters on orange background.
5. Indicate whether the internal pipe pressure is high or low. A red color band indicates high pressure; a green color band indicates low pressure.

### R513a Emergency Action

<p><b>Preparing for an R-513a Emergency:</b></p> <ol style="list-style-type: none"> <li>1. Learn R-513a First Aid Procedures! <ul style="list-style-type: none"> <li>-Mouth/mask resuscitation (Rescue Ventilation)</li> <li>-Cardiopulmonary Resuscitation (CPR)</li> <li>-Treatment for shock</li> <li>-Be prepared. Delay and inexperience may result in more serious injury</li> </ul> </li> <li>2. Make sure your emergency support is knowledgeable about R-513a first aid and treatment: <ul style="list-style-type: none"> <li>-Local Fire/EMS</li> <li>-Emergency Clinics</li> <li>-Nearby hospitals</li> </ul> </li> <li>3. NEVER wear contact lenses when working with any chemicals.</li> <li>4. Read SDS for full first-aid measures, and delayed exposure effects</li> </ol>	<p><b>Exposure to R-513a: Eyes</b></p> <ol style="list-style-type: none"> <li>1. Immediately flush eyes with large amounts of water for at least 15 minutes. In case of frostbite, bathe (do not rub) with lukewarm (not hot) water.</li> <li>2. Seek medical attention if symptoms persist.</li> </ol> <p><b>Exposure to R-513a: Skin</b></p> <ol style="list-style-type: none"> <li>1. Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a soft clean cloth.</li> <li>2. Seek medical attention if symptoms persist.</li> </ol> <p><b>Exposure to R-513a: Inhalation</b></p> <ol style="list-style-type: none"> <li>1. Immediately move exposed person to fresh air.</li> <li>2. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available.</li> <li>3. Call a physician.</li> <li>4. Do not give epinephrine.</li> </ol> <p><b>Exposure to R-513a: Ingestion</b></p> <ol style="list-style-type: none"> <li>1. Ingestion is not expected to be hazardous, nor is it very likely, due to its physical properties. Do not induce vomiting unless instructed to do so by a physician.</li> </ol>
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### Carbon Dioxide Refrigeration Piping Identification Guide



1. Use arrows to indicate the direction of flow in the pipe.
2. Identify system components with accepted abbreviations, which can be found in the chart below.

CD	Condenser Drain	LTD	Low Temp Discharge
HGD	Hot Gas Defrost	LTRL	Low Temp Recirculated Liquid
HSD	High Stage Discharge	LTRS	Low Temp Recirculated Suction
HTL	High Temp Liquid	LTS	Low Temp Suction
HTRL	High Temp Recirculated Liquid	RV	Relief Vent
HTRS	High Temp Recirculated Suction	VENT	Vent
HTS	High Temp Suction		

3. Indicate whether the refrigerant is a liquid, vapor, or both. An orange color band indicates liquid state; a blue color band indicates vapor state. Use both color bands if both liquid and vapor may be present.
4. Print "CO2" in black letters on orange background.
5. Indicate whether the internal pipe pressure is high or low. A red color band indicates high pressure; a green color band indicates low pressure.

### Carbon Dioxide Emergency Action

<p><b>Preparing for a Carbon Dioxide Emergency:</b></p> <ol style="list-style-type: none"> <li>1. Learn CO2 First Aid Procedures! <ul style="list-style-type: none"> <li>-Mouth/mask resuscitation (Rescue Ventilation)</li> <li>-Cardiopulmonary Resuscitation (CPR)</li> <li>-Treatment for shock</li> <li>-Be prepared. Delay and inexperience may result in more serious injury</li> </ul> </li> <li>2. Make sure your emergency support is knowledgeable about CO2 first aid and treatment: <ul style="list-style-type: none"> <li>-Local Fire/EMS</li> <li>-Emergency Clinics</li> <li>-Nearby hospitals</li> </ul> </li> <li>3. NEVER wear contact lenses when working with any chemicals.</li> </ol>	<p><b>Exposure to CO2: Eyes</b></p> <ol style="list-style-type: none"> <li>1. Check for (and remove) any contact lenses.</li> <li>2. Immediately flush eyes with plenty of water for at least 15 minutes.</li> <li>3. Seek medical attention.</li> </ol> <p><b>Exposure to CO2: Skin</b></p> <ol style="list-style-type: none"> <li>1. Remove contaminated clothing and shoes. Immediately flush skin with plenty of water for at least 15 minutes. Wash clothing and shoes before reuse.</li> <li>2. Seek medical attention.</li> </ol> <p><b>Exposure to CO2: Frostbite</b></p> <ol style="list-style-type: none"> <li>1. Try to warm up any frozen tissue.</li> <li>2. Seek medical attention.</li> </ol> <p><b>Exposure to CO2: Inhalation</b></p> <ol style="list-style-type: none"> <li>1. Move exposed person to fresh air as quickly and safely as possible.</li> <li>2. If victim is not breathing, if breathing is irregular, or if respiratory arrest occurs, trained personnel should provide artificial respiration.</li> <li>3. Loosen tight clothing, such as a collar, tie, or waistband.</li> <li>4. Seek medical attention.</li> </ol> <p><b>Exposure to CO2: Ingestion</b></p> <ol style="list-style-type: none"> <li>1. This product is a gas. Please refer to the inhalation section.</li> </ol>
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