ACCUMULATOR SIZING TABLE

NITROGEN GAS PRECHARGE- PSI	OPERATING PRESSURE- PSI 200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
100	136.0 *169.0*	159.0 *192.0*	185.0 *216.0*	200.0 *228.0*	209.0	216.0	221.0	225.0	228.0						
300		47.8 *65.9*	101.0 *130.0*	131.0 *163.0*	150.0 *183.0*	164.0 *197.0*	175.0 *207.0*	183.0 *214.0*	190.0 *220.0*	195.0 *224.0*	199.0 *228.0*	203.0	207.0	210.0	213.0
500			31.7 *43.4*	74.0 *97.9*	101.0 *131.0*	121.0 *153.0*	136.0 *169.0*	147.0 *181.0*	156.0 *190.0*	164.0 *198.0*	172.0 *204.0*	177.0 *209.0*	182.0 *213.0*	186.0 *217.0*	190.0 *220.0*
700				23.9 *33.0*	58.5 *78.5*	83.4 *109.0*	102.0 *131.0*	117.0 *148.0*	129.0 *161.0*	138.0 *171.0*	146.0 *180.0*	154.0 *187.0*	160.0 *193.0*	165.0 *198.0*	170.0 *203.0*
900					19.1 *26.3*	48.2 *65.4*	70.5 *94.1*	88.3 *115.0*	102.0 *132.0*	114.0 *145.0*	124.0 *156.0*	132.0 *165.0*	140.0 *173.0*	146.0 *179.0*	153.0 *185.0*
1100						15.7 *23.5*	41.2 *56.4*	61.7 *82.4*	77.6 *103.0*	91.2 *119.0*	103.0 *132.0*	112.0 *143.0*	120.0 *152.0*	128.0 *161.0*	135.0 *167.0*
1300							13.6 *18.9*	35.9 *49.2*	54.3 *73.1*	69.6 *92.5*	82.1 *108.0*	93.0 *121.0*	103.0 *132.0*	111.0 *142.0*	118.0 *150.0*
1500								11.7 *16.5*	31.9 *43.9*	48.9 *66.0*	62.8 *81.4*	75.0 *98.9*	85.6 *112.0*	94.6 *123.0*	103.0 *132.0*
1700									10.4 *14.6*	28.7 *39.6*	44.2 *60.1*	57.5 *77.1*	68.6 *92.2*	79.0 *104.0*	87.7 *114.0*
1900										9.3 *13.0*	26.3 *36.2*	40.4 *55.0*	52.7 *71.3*	63.3 *84.9*	73.9 *96.8*
2100											8.5 *12.0*	23.9 *33.0*	37.2 *50.8*	48.9 *66.0*	59.1 *79.0*
2300												8.0 *11.2*	22.1 *30.6*	34.1 *47.1*	45.2 *61.7*
2500													1.2 *10.2*	20.5 *28.5*	32.5 *44.4*
2700														6.7 *9.6*	18.9 *26.3*

1 GALLON SIZE
(231 CUBIC INCH CAPACITY)
PERFORMANCE TABLE (ADIABATIC AND ISOTHERMAL)

MAX. GAS CAPACITY - 266 CU. IN.
MAX OIL CAPACITY - 231 CU IN.
ADIABATIC - TOP VALUE
ISOTHERMAL - LOWER VALUE

ISOTHERMAL vs ADIABATIC

PRESSURE CHANGE OF THE GAS IS INVERSELY PROPORTIONAL TO ITS CHANGE IN VOLUME. WHEN 100 cu. in. OF GAS ORIGINALLY AT 1000 psia, IS COMPRESSED TO 50 cu. in. VOLUME, PRESSURE WILL BE 2000 psia IF GAS TEMPERATURE IS KEPT CONSTANT. THIS IS **ISOTHERMAL** PERFORMANCE.

COMPRESSION AND EXPANSION OF THE GAS CAUSE HEATING AND COOLING WHICH INCREASE AND DECREASE PRESSURE IN ADDITION TO THE EFFECT OF VOLUME CHANGE. IF GAS WERE PERFECTLY INSULATED TO PREVENT GIVING UP ANY OF THIS EXTRA HEAT TO OR THRU THE METAL IN WHICH IT IS CONTAINED (OR PICKING UP HEAT WHEN COOLED), PERFORMANCE WOULD BE **ADIABATIC**. HERE 100 cu. in. OF GAS ORIGINALLY AT 1000 psia IS COMPRESSED TO 61.2 cu. in. TO BUILD UP TO 2000 psia. THEREFORE, LESS OIL CAN ENTER THE ACCUMU.ATOR.

ACTUAL PERFORMANCE WILL LIE BETWEEN ISOTHERMAL AND ADIABATIC. RAPID OPERATION WOULD APPROACH ADIABATIC FIGURES; SLOW OPERATION WOULD APPROACH ISOTHERMAL. THE ISOTHERMAL FIGURES ARE USUALLY EMPLOYED; ALLOWANCE AS USUALLY MADE FOR RESERVE CAPACITY WILL BE ADEQUATE TO INCLUDE EFFECT OF TEMPERATURE CHANGES RESULTING FROM COMPRESSION AND EXPANSION.

GAS LAWS FOR ACCUMULATOR SIZING

Where "P"= psia (absolute)= psig (gauge pressure) + 14.7 psi

PRESSURE OR VOLUME W/ TEMPERATURE CHANGE DUE TO HEAT OF COMPRESSION	ORIGINAL PRESSURE x ORIGINAL VOLUME^n = FINAL PRESSURE x FINAL VOLUME^n	$P_1 V_1^n = P_2 V_2^n$
	$\frac{\text{FINAL TEMP.}}{\text{ORIG. TEMP.}} = \left(\frac{\text{ORIG. VOLUME}}{\text{FINAL VOLUME}}\right)^{n-1} = \left(\frac{\text{FINAL PRESSURE}}{\text{ORIG. PRESSURE}}\right)^{n-1/n}$	$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{n-1} = \left(\frac{P_2}{P_1}\right)^{n-1/n}$

NITROGEN EXPONENTS:

"n"= 1.4 For full adiabatic conditions ex: "Full Heating" (constant full cycling)
"n"= 1.3 For rapid cycling (most heating normally experienced)
"n"= 1.1 For "Normal" cycling
"n"= 1.0 For when gas has time to cool to ambient before cycle (ISOTHERMIC)