

New OAM-Purger can Save North Americans 4.3 Billion Dollars per Year.



A

new technology known as an Oil Acid & Moisture-Purger for existing chiller applications can save 4.3 Billion Dollars per year in North America. There are an estimated 180,000 Low Pressure Centrifugal, High Pressure Centrifugal and High Pressure Screw Chillers located throughout North America. The patent pending OAM-Purger can save approximately \$24,000 per year per Chiller. Multiplying the conservative estimate of \$24,000 per year times the estimated 180,000 applicable chillers and the result is obvious. If every existing Chiller in North America had an OAM-Purger installed, the energy savings to North America as a whole would be a phenomenal 4.3 billion dollars per year. And chiller owners will be pleased to find that the cost of the OAM-Purger can be recovered in just 3 to 4 months. With energy consumption and conservation being key issues, the New OAM-Purger is an important innovation in today's HVACR industry.

It is also important to note that in the long run, the OAM-Purger will assist in decreasing fossil fuel emissions by decreasing chiller system electrical consumption. A large number of buildings including Government Facilities, Manufacturing Facilities, University/College & School Buildings, Hospitals, Department Stores, Office Complexes, and many others typically utilize multiple chillers for air-conditioning and refrigeration. Now the technology exists to improve their electrical consumption efficiency, increase system capacity, protect the environment and save billions of dollars per year.

Oil entrained in a chiller's refrigerant charge unnecessarily costs owners thousands of dollars each year in wasted energy along with causing significant decreases in chiller system capacity. With the recent advancements in technology, every chiller owner should address this issue in order to improve their chiller's efficiency and obtain substantial energy savings.

Oil enters the chiller's refrigerant charge as the refrigerant is circulated through the chiller's compressor. On low-pressure chillers (R-11, 113 & 123) the oil is used as a lubricant for the centrifugal pump and it seeps through the compressor's seals and becomes entrained in the refrigerant charge. This same process occurs with high-pressure centrifugal chillers (R-12, 22 & 134a most common). High pressure refrigerant (R12, 22 & 134a) screw chillers utilize oil for lubrication, as a coolant and as a sealing mechanism on screw rotary tips, and this oil inevitably finds its way into the refrigerant charge. In fact, the oil problem extends into other systems including high pressure reciprocating chillers, certain ton-rack systems and ammonia refrigeration systems, to name a few.

Concerning low and high pressure centrifugal and some high pressure screw chillers, basically oil finds its way into the evaporator where it mixes with refrigerant and thus degrades system efficiency and capacity. This occurs when the evaporator tubes become coated with oil, creating a thermal barrier, and the heat transfer efficiency is retarded and drastically reduces the cooling effect. Although it is common knowledge that oil build-up occurs, the significant impact on the system's capacity and extreme energy costs are only now being realized. The following studies note the importance for chiller owners and service contractors to recognize and address this problem.

ASHRAE performed a study titled, Effects of Oil on Boiling of Replacement Refrigerants Flowing Normal to a Tube Bundle, Part I: R-123 & Part II: R-134a. As discussed in Part 1 of this study, "Conclusion: Flow boiling results have been obtained for the low-pressure refrigerant, enhanced boiling tube in the presence of R-123. The effects of oil on local and average boiling heat transfer coefficients have been given. This enhanced tube shows a marked decrease in heat transfer with the addition of even a small amount of oil throughout various heat loadings. Even at 1% to 2% oil, the heat transfer coefficient is reduced by one-third from its no-oil baseline. At substantial oil content (5% to 15%), a 40% to 50% reduction is noted.... This study was supported by ASHRAE Research Contract RP-751"

Part 2 of this study obtained a similar conclusion, "Flow boiling results have been obtained for a newer enhanced boiling tube with R-134A. The effects of oil on local and average boiling coefficients have been given. This enhanced tube shows a decrease in heat transfer with the addition of even a small amount of oil throughout various heat loadings. Even at 1% (by weight) oil, the heat transfer coefficient is reduced by 25% from its no-oil

baseline. At higher oil content, a 30% reduction has been typically measured. This study was supported by ASHRAE Research Contract RP-751."

The attached Figures graphically illustrates the findings in an additional ASHRAE Study titled, ASHRAE Research Project 601-TRP. In this study, refrigerant samples were taken from 10 operating chillers and analyzed for oil content. All of the chillers were found to contain excess oil in varying amounts from 3% (enough to significantly degrade performance) to as high as 23%.

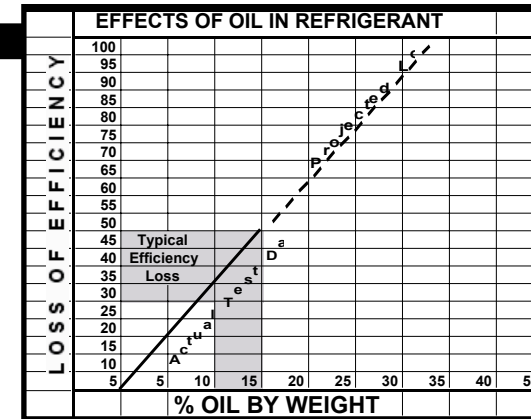
While the studies do show some slight variance, they all strongly support each other in the fact that oil does find its way into a chiller's refrigerant charge and significantly increases the amount of energy required to run the chiller.

This increased energy consumption drastically increases a chiller owner's electric utility bill (or increased costs associated with increased usage from any power source). On top of that, the system is losing a significant amount of capacity, and a harder working system increases its potential for earlier wear and tear breakdown or servicing.

The new Oil, Acid & Moisture purging system is an essential money saving piece of equipment for chiller owners throughout North America.

CHILLER REFRIGERANT CHARGE BY WEIGHT IN lbs.												
	100	200	300	400	500	600	700	800	900	1000	1100	1200
% OIL	lbs. of Oil in Refrigerant Charge based on % by weight											
1%	1	2	3	4	5	6	7	8	9	10	11	12
2%	2	4	6	8	10	12	14	16	18	20	22	24
3%	3	6	9	12	15	18	21	24	27	30	33	36
4%	4	8	12	16	20	24	28	32	36	40	44	48
5%	5	10	15	20	25	30	35	40	45	50	55	60
6%	6	12	18	24	30	36	42	48	54	60	66	72
7%	7	14	21	28	35	42	49	56	63	70	77	84
8%	8	16	24	32	40	48	56	64	72	80	88	96
9%	9	18	27	36	45	54	63	72	81	90	99	108
10%	10	20	30	40	50	60	70	80	90	100	110	120
11%	11	22	33	44	55	66	77	88	99	110	121	132
12%	12	24	36	48	60	72	84	96	108	120	132	144
13%	13	26	39	52	65	78	91	104	117	130	143	156
14%	14	28	42	56	70	84	98	112	126	140	154	168
15%	15	30	45	60	75	90	105	120	135	150	165	180
16%	16	32	48	64	80	96	112	128	144	160	176	192
17%	17	34	51	68	85	102	119	136	153	170	187	204
18%	18	36	54	72	90	108	126	144	162	180	198	216
19%	19	38	57	76	95	114	133	152	171	190	209	228
20%	20	40	60	80	100	120	140	160	180	200	220	240
21%	21	42	63	84	105	126	147	168	189	210	231	252
22%	22	44	66	88	110	132	154	176	198	220	242	264
23%	23	46	69	92	115	138	161	184	207	230	253	276
24%	24	48	72	96	120	144	168	192	216	240	264	288
25%	25	50	75	100	125	150	175	200	225	250	275	300
OIL WEIGHS APPROXIMATELY 7 LBS. PER GALLON												
160 LBS = APPROXIMATELY 3.5 GALLONS												

According to ASHRAE study 601-TRP the Average Chiller has 12 % oil by weight in its Refrigerant Charge. A 500 lbs. Refrigerant Charge at 12% by weight contains 60 lbs., or 8.5 gallons of oil.



Advantages to the chiller owner...

- 1) The OAM-Purger quickly cleans the chiller's refrigerant charge to only a trace level of oil.
- 2) Quickly restores chiller to peak operating efficiency.
- 3) Substantially reduces energy consumption saving the owner thousands of dollars in operating cost.
- 4) The OAM-Purger pays for itself in 3 to 4 months. So, in effect, retrofitting an OAM-Purger doesn't really cost the owner anything. In fact, retrofitting an OAM-Purger is a financial investment that keeps on paying dividends (in some cases thousands of dollars per month).
- 5) Reduces maintenance and helps prevent premature failure.

Studies supported by ASHRAE (which also site other studies) and statements of a major chiller OEM indicate that oil in refrigerant reduces heat transfer and therefore efficiency. Oil content of 1% (by weight) produces a reduction of 3% efficiency and up to 15% produces a reduction of 40 to 50% in efficiency. The reduction in efficiency tends to be consistent for different refrigerants.

Mark Key, Vice President of Marketing, Redi Controls, Inc. I would like to take a moment and thank ASHRAE for its contribution in the development of this article. Note that material provided by ASHRAE is Copyrighted 2000, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., www.ashrae.org. Reprinted with permission from ASHRAE Transactions understanding that the material will neither imply nor state that ASHRAE endorses a commercial product or service, and ASHRAE retains the exclusive copyright for the material. Other material provided is copyrighted with permission to be reprinted in this article, and these organizations must be contacted directly for additional reprint permission as they maintain exclusive copyright privileges.

INDUSTRIAL OAM PURGER

Regain Lost Chiller Capacity
Save tens of thousands of dollars in Energy Costs
Typical Savings will pay for System in just 3 to 4 months!



Automatically **REMOVES OIL** from Centrifugal Chiller's refrigerant charge and **AUTOMATICALLY RETURNS OIL TO THE CHILLER'S OIL SUMP**. Maintains Refrigerant Charge Free of Oil. Purges Oil Acid & Moisture from Chiller's Refrigerant Charge.

- Typically removes oil from refrigerant charge in approximately one month (10,000 lbs. Chiller refrigerant charge containing 12% oil by weight)
- Easy to install and Purging is totally automatic
- Keeps saving energy even after it pays for itself
- Restores Chiller to peak operating capacity
- Once cleaned, maintains system oil free
- Refrigerant charge does not have to be "pulled" to install
- Reduces maintenance and helps prevent premature failure

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