



ISCEON® MO99™ Refrigerant

COMPRESSOR PERFORMANCE DATA

TECHNICAL DATA SHEET

This data is intended to provide guidance to design engineers and mechanical contractors on the relative performance of ISCEON® MO99™ refrigerant when used to replace R-22 during retrofits of DX refrigeration and AC systems. The data is applicable to the equipment types and operating conditions listed in the data sheet and is believed to be accurate to $\pm 10\%$. Actual system performance depends on a number of factors including operating and design conditions. For critical systems or detailed information on a specific system please consult your compressor OEM.

How to Use this Data Sheet

For estimating relative performance of Isceon® MO99™ when replacing R-22, simply look up the relative performance factor at the desired conditions in the table.

For absolute values of performance factors, see steps below:

1. Determine system performance with R-22 using original design, historical or computer generated data, etc.
2. Based on the desired comparison conditions, locate the appropriate relative performance factor in the table.
3. Multiply the R-22 data by the relative performance factor to obtain the expected performance for the system operating with MO99™ at identical conditions.

The relative performance factors on this data sheet were calculated using a computer model derived from laboratory compressor calorimeter testing results measured in statistically designed experiments for both R-22 and Isceon® MO99™ over the range of conditions listed. Compressor calorimeter tests were performed in accordance with AHRI Standard 540.

The relative performance factor data has been extensively validated thru a statistical process and is accurate to $\pm 10\%$. Additionally, comparison of data generated with this method to independent external data using common refrigerants and compressors, calculated under identical operating conditions was found to agree within $\pm 10\%$.

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Relative Compressor Performance Factors (R-22 = 1.00) for ISCEON® MO99™ (R438A) Refrigerant

Low Temperature Reciprocating Compressors w/ Liquid Injection (Tests performed on Copeland® Discus® 3DS3F46KE w/ Demand Cooling)

10°F Liquid Subcooling (from Avg Cond T) 65°F Return Gas Temp		Average Evaporator Temperature , °F													
		-30	-25	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	0	
Average Condenser Temperature, °F	80	Cap	0.92	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
		EER	1.02	1.02	1.01	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97	0.97
		Mass Flow	1.08	1.07	1.07	1.07	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10
	85	Cap	0.92	0.93	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
		EER	1.03	1.02	1.01	1.01	1.00	1.00	1.00	0.99	0.99	0.98	0.98	0.97	0.97
		Mass Flow	1.08	1.07	1.08	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10	1.10
	90	Cap	0.91	0.92	0.93	0.93	0.93	0.93	0.94	0.94	0.94	0.94	0.93	0.93	0.93
		EER	1.04	1.03	1.02	1.01	1.01	1.00	1.00	0.99	0.99	0.98	0.98	0.97	0.97
		Mass Flow	1.08	1.08	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10
	95	Cap	0.91	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
		EER	1.05	1.04	1.03	1.02	1.01	1.01	1.00	1.00	0.99	0.99	0.98	0.98	0.97
		Mass Flow	1.09	1.08	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10	1.10	1.11
	100	Cap	0.90	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
		EER	1.06	1.05	1.03	1.03	1.02	1.01	1.01	1.00	1.00	0.99	0.98	0.98	0.97
		Mass Flow	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10	1.11
	105	Cap	0.90	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.91
		EER	1.07	1.06	1.04	1.03	1.03	1.02	1.01	1.01	1.00	0.99	0.99	0.98	0.97
		Mass Flow	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10	1.11
	110	Cap	0.89	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
		EER	1.09	1.07	1.05	1.04	1.04	1.03	1.02	1.01	1.00	1.00	0.99	0.98	0.97
		Mass Flow	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10	1.11
115	Cap	0.89	0.90	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	
	EER	1.11	1.09	1.06	1.05	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.99	0.98	
	Mass Flow	1.09	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.09	1.10	1.10	1.10	1.11	
120	Cap	0.89	0.90	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
	EER	1.13	1.10	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	
	Mass Flow	1.09	1.08	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10	1.10	1.11	
125	Cap	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	
	EER	1.15	1.12	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.01	1.00	0.99	0.98	
	Mass Flow	1.08	1.08	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10	1.10	1.11	
130	Cap	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	
	EER	1.18	1.14	1.11	1.10	1.08	1.07	1.06	1.05	1.03	1.02	1.01	1.00	0.99	
	Mass Flow	1.08	1.07	1.07	1.08	1.08	1.08	1.08	1.09	1.09	1.09	1.10	1.10	1.11	

Capacity(CAP) Energy Efficiency Ratio (EER) Mass Flow Rate (Mass Flow)

Relative Compressor Performance Factors (R-22 = 1.00) for ISCEON® MO99™ (R438A) Refrigerant
Medium Temperature Compressors (Tests performed on Copeland® Discus® 2DA3R89KE Compressor)

10°F Liquid Subcooling (from Avg Cond T) 65°F Return Gas Temp		Average Evaporator Temperature , °F									
		5	10	15	20	25	30	35	40	45	
Average Condenser Temperature, °F	80	Cap	0.924	0.933	0.941	0.947	0.952	0.956	0.960	0.963	0.965
		EER	0.983	0.974	0.963	0.951	0.939	0.926	0.914	0.901	0.889
		Mass Flow	1.068	1.076	1.085	1.094	1.102	1.110	1.118	1.125	1.132
	85	Cap	0.920	0.928	0.935	0.941	0.946	0.950	0.953	0.956	0.958
		EER	0.996	0.988	0.977	0.964	0.951	0.937	0.924	0.911	0.898
		Mass Flow	1.066	1.074	1.082	1.091	1.099	1.107	1.115	1.122	1.129
	90	Cap	0.915	0.922	0.929	0.934	0.939	0.943	0.946	0.949	0.951
		EER	1.007	0.999	0.989	0.976	0.963	0.948	0.934	0.920	0.906
		Mass Flow	1.063	1.071	1.079	1.088	1.096	1.105	1.112	1.120	1.126
	95	Cap	0.909	0.916	0.921	0.927	0.931	0.935	0.938	0.941	0.944
		EER	1.014	1.008	0.999	0.987	0.973	0.958	0.943	0.929	0.914
		Mass Flow	1.061	1.069	1.077	1.085	1.094	1.102	1.110	1.117	1.124
	100	Cap	0.902	0.908	0.913	0.918	0.923	0.926	0.930	0.933	0.935
		EER	1.016	1.014	1.006	0.995	0.982	0.967	0.952	0.936	0.921
		Mass Flow	1.059	1.066	1.074	1.083	1.091	1.099	1.107	1.115	1.121
	105	Cap	0.895	0.900	0.905	0.909	0.913	0.917	0.921	0.924	0.927
		EER	1.013	1.014	1.009	1.000	0.988	0.974	0.958	0.943	0.927
		Mass Flow	1.058	1.064	1.072	1.080	1.089	1.097	1.105	1.112	1.119
	110	Cap	0.886	0.890	0.895	0.899	0.903	0.907	0.911	0.914	0.917
		EER	1.003	1.008	1.007	1.001	0.991	0.977	0.963	0.947	0.931
		Mass Flow	1.056	1.062	1.070	1.078	1.086	1.095	1.102	1.110	1.117
	115	Cap	0.876	0.880	0.883	0.888	0.892	0.896	0.900	0.903	0.906
		EER	0.985	0.996	0.999	0.997	0.989	0.978	0.964	0.949	0.933
		Mass Flow	1.055	1.060	1.068	1.076	1.084	1.092	1.100	1.107	1.114
120	Cap	0.865	0.868	0.871	0.875	0.879	0.883	0.887	0.891	0.895	
	EER	0.959	0.976	0.984	0.986	0.982	0.973	0.962	0.948	0.933	
	Mass Flow	1.053	1.059	1.066	1.074	1.082	1.090	1.098	1.105	1.112	
125	Cap	0.852	0.854	0.857	0.861	0.865	0.870	0.874	0.879	0.883	
	EER	0.926	0.948	0.962	0.968	0.968	0.963	0.954	0.942	0.929	
	Mass Flow	1.052	1.057	1.064	1.072	1.080	1.088	1.096	1.103	1.110	
130	Cap	0.838	0.839	0.841	0.845	0.850	0.855	0.860	0.865	0.869	
	EER	0.887	0.912	0.931	0.943	0.948	0.947	0.941	0.932	0.920	
	Mass Flow	1.051	1.056	1.062	1.070	1.078	1.086	1.093	1.101	1.108	
Capacity(CAP) Energy Efficiency Ratio (EER) Mass Flow Rate (Mass Flow)											

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