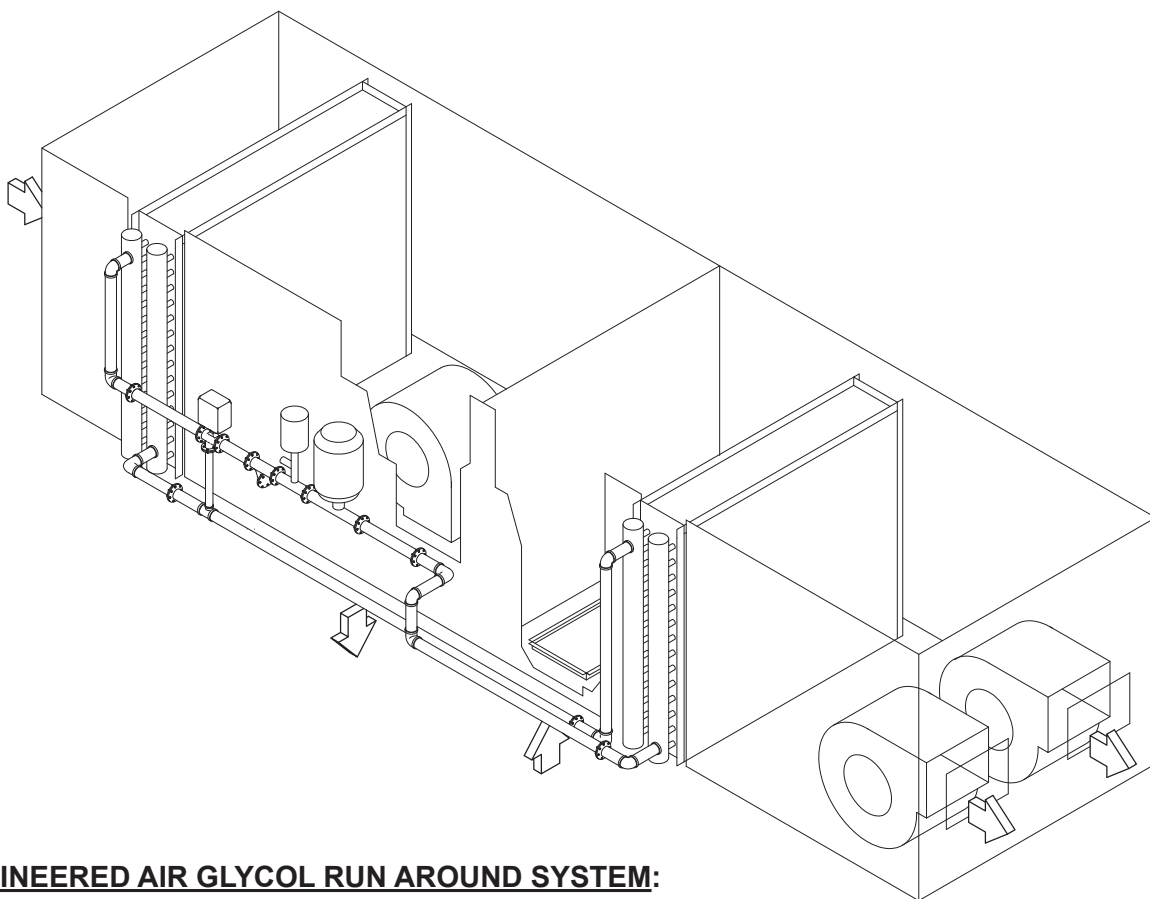



ENGINEERED AIR
**GLYCOL RUN AROUND
HEAT RECLAIM**
SERIES HRG


THE ENGINEERED AIR GLYCOL RUN AROUND SYSTEM:

- ☐ Removes the heat from the air that is normally exhausted from the building, and transfers it to the incoming fresh air, with excellent temperature control and rapid, safe, frost prevention control.
- ☐ A completely packaged system of HEAT RECLAIM including supply and exhaust blowers, heat transfer coils, filtration, supplemental heating, temperature controls and limits, and roof mounting frames.

SERIES HRG GLYCOL RUN AROUND SYSTEM:

- ☐ Combined with proven Engineered Air heating systems to augment the reclaim system:
- ☐ Series HE – Direct Fired Burners
- ☐ Series HE-K – Electric Resistance Heaters
- ☐ Series DG – Industrial Gas or Oil Burners
- ☐ Series LM – Hydronic Heating

Utilize the Engineered Air computerized coil selection process to optimize the fluid handling system components for maximum efficiency and minimum cost.



Energy Aware

WHERE SHOULD GLYCOL RUN AROUND RECLAIM SYSTEMS BE USED?

1. Commercial and industrial buildings, where exhaust and makeup are required for many hours of the year, the more hours the better.
2. In installations where exhaust air temperatures are from 80°F to 200°F and where the air is not particularly corrosive. Exhaust air temperatures below 80°F tend not to be an economic source of heat, particularly where outdoor air temperatures are sub zero, and the possibility of circulating glycol at temperatures below 32°F exists, thus creating certain frosting conditions on the exhaust coil, which is a dehumidifying coil. While the control system can automatically prevent frost from forming, the efficiency of the system is low while operating in a 'frost prevention' mode, and energy savings may be less than anticipated.
3. Areas of the country where the normal energy source is relatively expensive will be attractive for heat reclaim systems: the relative cost of energy seems to be rising at an alarming rate throughout all of Canada, so few areas will not find the reclaim of heat a wise economic move.

WHY A GLYCOL RUN AROUND RECLAIM SYSTEM INSTEAD OF AN AIR TO AIR SYSTEM?

The reclaim of heat, as developed so far, while saving heating energy, does demand the expenditure of energy in another form; fan motor horsepower to overcome the reclaim device air pressure drop. A glycol run around system requires about the same amount of extra energy to run the two fans and one pump, than an air to air system does for its two fans. However, in the glycol system, the pump may be shut off at a point when it is determined that heating savings no longer outweigh the cost for pump power.

GUIDE SPECIFICATION

GENERAL - The Makeup air-Exhaust system shall be a completely packaged product, manufactured by Engineered Air, factory assembled, wired and tested, and shall include the following:

1. Supply and Exhaust blowers
2. Glycol heat Reclaim Coils
3. Glycol piping complete with pump, mixing valve, expansion tank, and system fill of 50% ethylene glycol.
4. Temperature and limit controls
5. Air Filters
6. Auxiliary Heating System

BLOWERS - Shall be DIDW, forward curved type, statically and dynamically balanced, arranged for horizontal or vertical air delivery as required. Shafts shall be selected 20% below the first critical rpm. Drives shall be variable pitch type for motors 5 H.P. and smaller, constant pitch on 7½ H.P. and larger.

GLYCOL HEAT RECLAIM COILS - Shall be constructed of " O.D. seamless copper tube arranged in staggered pattern and mechanically bonded to ENG A ULTRAFIN. Fins shall have full depth collars. All coils to be factory leak tested, dehydrated, sealed and brazed to copper pipe headers.

PUMPS - Shall be of in-line, close coupled, single stage design of bronze fitted construction. The pump internals shall be capable of being serviced without disturbing pipe connections. Sealing of the liquid cavity shall be by mechanical seal of EPT suitable for a temperature range of -20 to 250° F. The motor shall meet NEMA specifications and furnished with greasable ball bearings.

PIPING - Shall be of Schedule 40 steel with welded or flanged fittings, 150 psi rated. The piping and coil system shall be drainable through drain cocks in the coil headers. Each coil shall be equipped with manual air vents. The expansion tank shall be the air charged diaphragm type. Coils shall be removable by disconnecting flanges. A glycol solution charging port shall be provided.

GLYCOL SOLUTION - Shall be Dowtherm SR-1 or equal, 50% glycol by weight with a specific heat of 0.80, a viscosity of 7.5 centipoise, a specific weight of 1.08, all at 40°F, and a freezing point of -37°F. The solution shall contain a corrosion inhibitor, which may be analysed from time to time, and be added to without replacing the fluid.

CALCULATION OF ENERGY SAVINGS

$$\text{Annual hours of operation} = H = \frac{\text{Hours/week}}{168} \times 24 \times \frac{\text{Deg.Days (65°)}}{65° - O.A. °F}$$

H represents the number of hours of full operation at the design condition, in one year.

$$\text{Equivalent Annual hours of operation} = H_e = H \times D_f$$

Where: D_f = a correction factor to select the adjustment of fuel consumption when the hours of operation are less than 24 per day. In effect, it allows for the fact that a daylight hour is generally warmer than a nighttime hour.

D_f	Hours of Operation per Day
1.0	24
0.93	16
0.88	8

$$\text{HEAT SAVED} = 1.08 \times \text{SCFM (MUA)} \times \text{Reclaim Temp. Rise} \times H_e \text{ (btu's)}$$

$$\text{COST OF HEAT SAVED} = \frac{\text{HEAT SAVED}}{\text{Seasonal Fuel Eff.}} \times \text{Cost per but}$$

$$\text{Extra Elect. Power Req'd} = P = (\text{Extra Fan BHP} \times 52 \times \text{Hours/Week}) + (\text{Pump BHP} \times H_e) \times \frac{746}{\text{Power Factor}} \text{ (KW)}$$

$$\text{COST OF EXTRA ELECTRIC POWER} = P \times \text{Cost per KW}$$

$$\text{TOTAL ANNUAL ENERGY SAVING} = \text{Cost of Heat Saved} - \text{Cost of Extra Electric Power.}$$

TEMPERATURE AND LIMIT CONTROLS - Air supply temperature shall be controlled from a sensor located in the makeup air coil discharge (ahead of auxiliary heating), which will modulate a three way valve to maintain set point. A low limit sensor in the exhaust coil glycol supply piping shall ensure that exhaust coil frosting does not occur, by recirculating glycol through the coil in the warm air stream.

AIR FILTERS - Both makeup air and exhaust coils shall be protected by 1" high velocity permanent, washable filters, removable by sliding out the side of the unit opposite to the glycol piping system.

AUXILIARY HEATING - (Auxiliary heating systems may be chosen and specified from Engineered Air's broad range of heating products. See the following:

- Model HE - Direct fired Heaters
- Model HE-K - Electric Resistance Heaters
- Model DG - Industrial Gas or Oil Burners
- Model LM - Hydronic Heating

Select from the catalogue or consult an Engineered Air salesman.

OPTIONAL FEATURES - The following are a few of the additional features which may be specified:

- Airfoil blowers
- Roof Mounting frames
- Piping Enclosures, insulated and weather proofed for outdoor installations.
- Pipe insulation
- Exhaust coil washdown manifold and drain pan
- Steel tube, aluminum fin coils
- Extended fan bearing lubrication fittings
- Special dimensions and configurations

COIL SELECTION PROCEDURE

Because of the tremendous number of variables involved in matching the makeup air and exhaust coils, Engineered Air has developed a computerized selection procedure to optimize the heating surfaces.

The following information is all that is necessary to allow the Engineered Air salesman to provide the best coil selection for your specific needs:

INPUT DATA COMPUTERIZED SELECTION

NO.	FUNCTION	COIL DATA		
		EXHAUST	SUPPLY	
1	SCFM			
2	COIL HEIGHT			
3	COIL LENGTH			
4	ENT. AIR DB			
5	ENT. AIR WB			
6	ENT. AIR DP			
7	EFFICIENCY			
<u>OUTPUT DATA</u>				
8	ROWS			
9	AIR PR. DROP			
10	GLYCOL GPM			
11	GLYCOL P.D.			
12	LVG. AIR DB			

} Select from unit
dimensional data

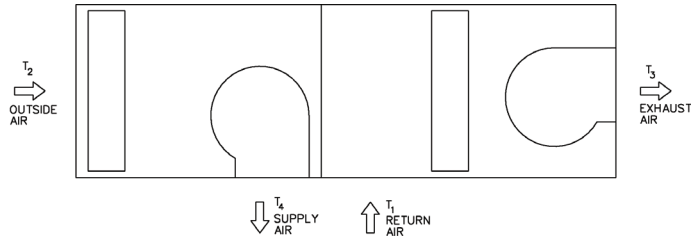
Desired Efficiency,
see Page 4 for range
of operation

This data sheet may also be used of course, to select coils for field installation, in existing or new ventilation systems. The glycol run around system is especially adaptive to systems in which the exhaust and makeup air units must be located far apart.

QUICK SELECT GUIDE

1. Define the System Efficiency:

$$EFF = \frac{T_4 - T_2}{T_1 - T_2} \times 100$$



2. Determine number of rows: given the M.U.A. SCFM and the coil face area from the unit data sheets. (Confirm this procedure with computerized selection).

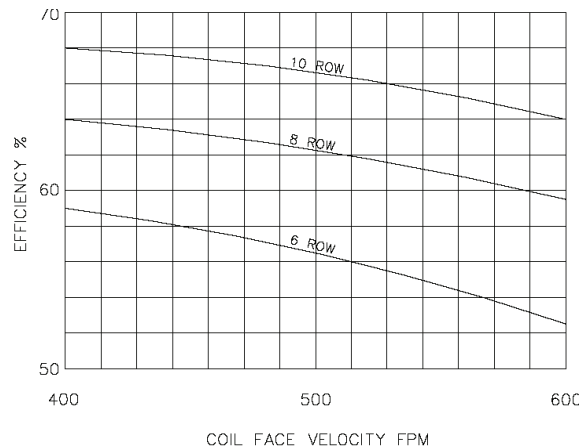


Chart No. 1 Coil Efficiency

(This chart is based on an entering exhaust temperature of 80/65, and a flow rate of 3.0 usgpm per circuit. Other conditions will vary the efficiency somewhat obtain a computerized selection for accurate results).

(Chart based on equal air flow rates for makeup and exhaust).

3. Correct the efficiency of a given coil system by applying the Efficiency Correction Factor (ECF) where unequal air flow rates exist.

Table 1 Efficiency Correction Factor

SCFM MUA	0.5	0.75	1.0	1.25	1.50
SCFM EXH.					
E.C.F.	1.15	1.075	1.0	0.94	0.88

4. Determine the static pressure of the makeup air and exhaust coils from Chart No.2.

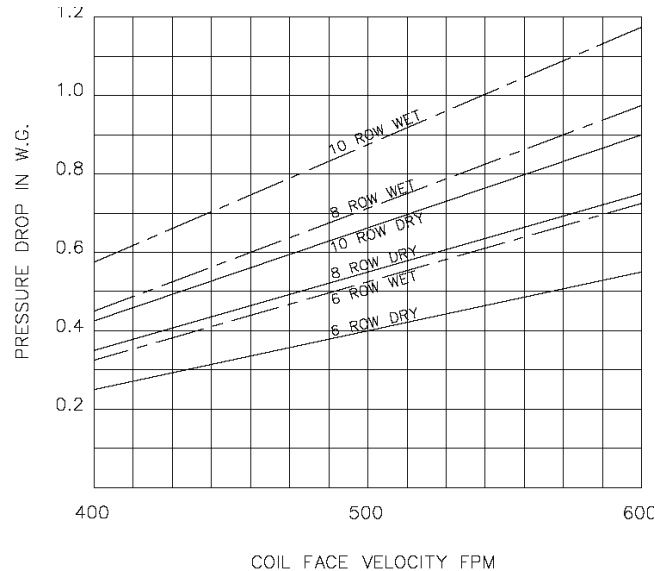


Chart No.2

Air Pressure Drop
Through Heat
Reclaim Coils.

MUA Coils – Dry
EXH Coils – Usually Wet at Design Conditions

5. Determine extra fan BHP due to coil static pressure:

$$\text{BHP} = \frac{\text{SCFM (MUA)} \times \text{S.P.} + \text{SCFM (EXH.)} \times \text{S.P.}}{6356 \times \text{Fan Static Eff.}}$$

6. Determine the pumping head in the glycol system. Normally, a pumping rate of 3.0 usgpm per circuit is required. However, if at winter design outdoor temperature, the minimum glycol temperature (leaving the makeup air coil) drops below 32°F, a higher flow rate will raise this temperature up.

As a rule of thumb, if the temperature of air leaving the makeup air coil, at design conditions, is below 32°F, increase the gpm per circuit to 4.5 if it is as low as 28°F, and to 6.0 gpm per circuit if it is 25°F or lower. Some frosting will likely occur at those low temperature conditions, however, the system will automatically enter a defrost cycle to maintain system air flows.

From Chart No. 3, obtain the pressure drop per foot of coil length, and multiply this by the length of coil in feet, plus the factor shown.

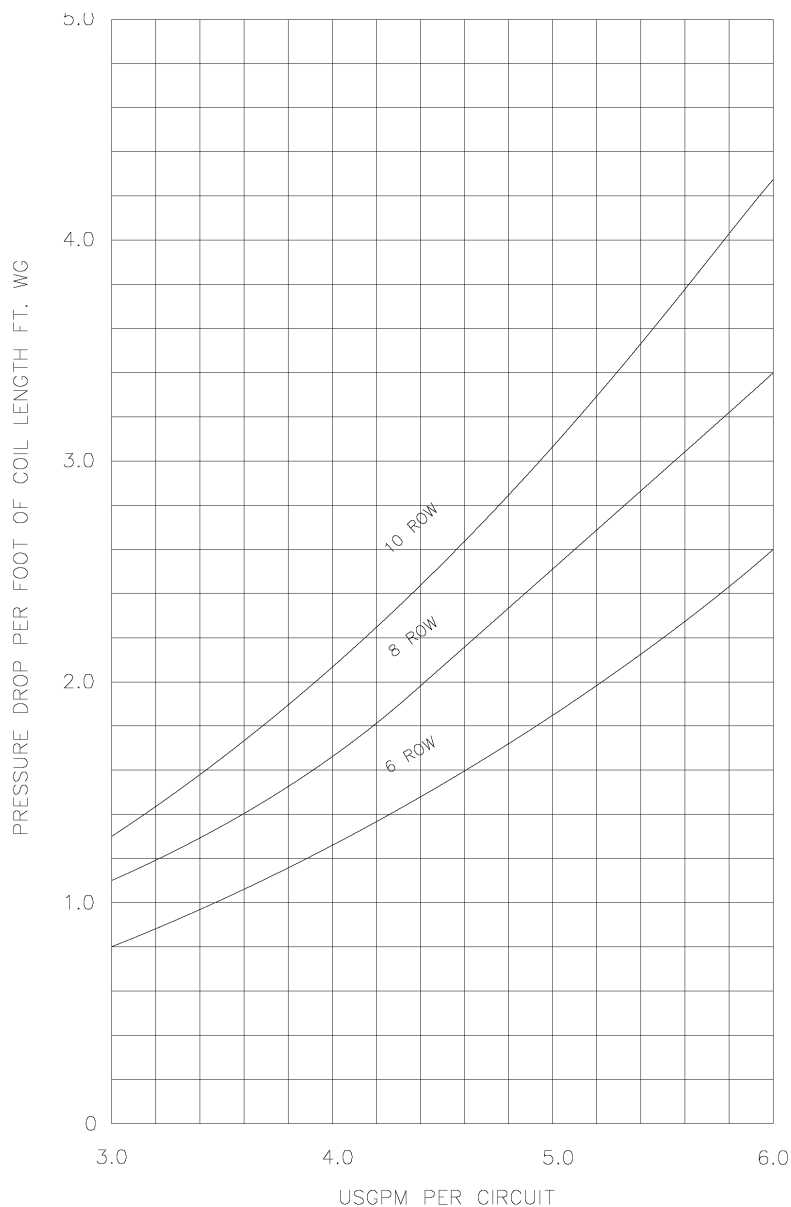


Chart No.3 Coil Glycol Pressure Drop

Multiply Pressure Drop Factor by coil Length in feet plus 2.5 feet.

Example: An LM-180 has 50" x 90" Coil, 8 row, operating at 3.0 usgpm per circuit.

$$\text{Coil P.D.} = 1.05 \times \left(\frac{90}{12} + 2.5 \right) = 10.5 \text{ ft.}$$

$$\text{NUMBER OF CIRCUITS} = \text{Coil HT} \div 1.5$$

$$\text{TOTAL GPM} = \text{No. Circuits} \times \frac{\text{USGPM}}{\text{CIRC.}}$$

TOTAL PUMP HEAD

$$= \text{P.D. (Coil A)} + \text{P.D. (Coil B)} + 10 \text{ ft. (Pipe Loss)}$$

7. Determine BHP due to glycol pump:

$$\text{BHP} = \frac{\text{USGPM} \times \text{TOTAL HEAT (ft)}}{39600 \times \text{Pump Eff.}}$$

Pump Efficiency will vary between 45% and 70%.