Energy Audit

Funded by

The Grange

21 Western Avenue

Henniker, NH

October 22, 2023

BUILDING STRATEGIES FOR AN AFFORDABLE FUTURE

S.E.E.D.S.

SUSTAINABLE ENERGY EDUCATION DEMONSTRATION SERVICES

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Introduction

This Energy Audit has been funded by Eversource. Funds may, or may not, also be available to help reduce cost for eligible Energy Saving Measures (ESM) including weatherization efforts and equipment upgrades.

The purpose of an energy audit is to identify energy saving measures (ESM) in a building. Computer simulated energy models are developed to estimate energy consumption based on the local climate conditions, physical dimensions and characteristics of a building, mechanical systems, presumed lighting, equipment, and occupancy patterns, in addition to a number of other variables.

With the building modeled in existing conditions, energy savings can be estimated for improvements to the thermal envelope and/or more efficient mechanical systems. The cost of those measures can then be analyzed in terms of predicted energy saved and savings potential from converting to different sources of energy. The primary objective is to evaluate the level of investment warranted by energy and dollars saved from those specific measures.

This audit has been prepared with the best of intentions to assist the Town of Henniker make informed decisions regarding energy saving improvements in keeping with long term goals for the property. We do not make any warranty, expressed or implied, or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product or process disclosed.

Executive Summary

The Grange is an historic wood framed structure with a meeting room, office, and small restrooms on the first floor. The basement is unfinished, but fully used as a food pantry with refrigeration and dry goods storage.

As shown in the historic energy usage on page 7, the cost to heat the building in 2022 was $1765 for propane and an estimated $212 for electric resistance heating in the office. A portable air conditioner in the small office is the only cooling available at this time. While there are definitely opportunities to improve the thermal envelope to conserve heat, the costs for substantial improvements cannot be easily justified when the annual heating costs are relatively low, ie under $2000 at current energy prices.

Therefore, recommended ESM have been organized into three tiers, representing different levels of investments and benefits. Tier one includes four ESM with an estimated total cost of $1,820 and estimated annual savings of $166 for a simple payback of 11 years. Tiers two and three reflect a more comprehensive upgrade to the thermal envelope, at an total estimated cost of $22,232 (for all three tiers) and annual savings of $1040 from existing equipment and current energy prices. A cost/savings analysis of all three is on the next page.

The predicted savings from this more comprehensive approach does not appear to be financially appealing at today's energy prices, but it reduces the heating loads enough to make converting to electric heat pumps more affordable with increased annual savings and offering summer cooling. It also has a more dramatic reduction of carbon emissions, improves comfort, and the ability for the building to 'coast' through power outages while conserving heat.

Other recommendations from this study include:

- Install new, Energy Star, bath fans on timers and vent to the outside to eliminate the risk of condensation in attic
- Convert all lighting (14 fixtures with 32 tubes) to LED,
- Replace a gasket on one of the freezers, defrost all of them, and plan on replacing oldest refrigeration units in the near term.

Summary of Energy Saving Envelope Measures

The recommended ESM are described in more detail later in this report.

The chart below summarizes the cost of each ESM in the fairly cost effective Tier One, estimated annual dollar savings, a simple payback in years, and return on investment (ROI) of each measure based on the service life of the improvement.

An investment of an estimated $1,820 is predicted to save at least $166 in energy costs at the three year average propane cost per gallon, and $0.16 per kWh. This would result in a simple payback within 11 years. Since ESM continue to save energy for the life of each measure, this also results in a minimum annual return on investment (ROI) of 2.8% over each of the next 25 years. Again, the savings are based on recent average energy prices. If (when) prices increase, so too will the ROI.

Tier One	Cost of Measure	Annual Savings	Simple Payback Years	Life of Measure	Invest-ment Gain	ROI	Annual ROI
Replace Thermostat	$70	n/a					
Weatherstrip Doors	$165	$28	5.9	10	$115	69.7%	5.4%
Air Seal Ceiling	$650	$63	10.3	25	$925	142.3%	3.6%
Rim Joists	$1,005	$75	13.4	25	$870	86.6%	2.5%
	$1,820	$166	11.0	22	$1,795	100.7%	2.8%

This next chart presents the same Tier One ESM with resulting annual energy savings from each implemented measure and the annual reduction of CO2 emissions. Potential Eversource incentives are based on energy saved for the cost of the measures. Contact your Eversource representative, Jack Paloulek, to determine if the project is eligible for incentives. jack.paloucek@eversource.com

Tier One	Cost of Measure	Lp Gallons Saved	kWh Saved	Site Energy Reduction MMBTU	Source Energy Reduction	Tons CO2 Reductions Annually
Replace Thermostat	$70					
Weatherstrip Doors	$165	16		1.5	1.7	0.1
Air Seal Ceiling	$650	37	162	3.9	5.7	0.3
Rim Joists	$1,005	44	45	4.2	5.1	0.3
	$1,820	98	207	9.6	12.6	0.7

Note: Replacing the main room thermostat with a programmable unit, with auto set back, will likely save measurable heating energy. But saving estimates are not included because they would depend on how the dial thermostats are operated now—which is not available. Programming for nighttime set back with an auto set back feature would allow people to turn the thermostats up as needed, but then automatically return to nighttime setbacks, without having to remember to do so.

"Going Deeper"

The chart below summarizes the cost of each ESM in a Tier Two and Tier Three which includes insulating the above grade walls, estimated annual dollar savings, a simple payback in years, and return on investment (ROI) of each measure based on the service life of the improvement.

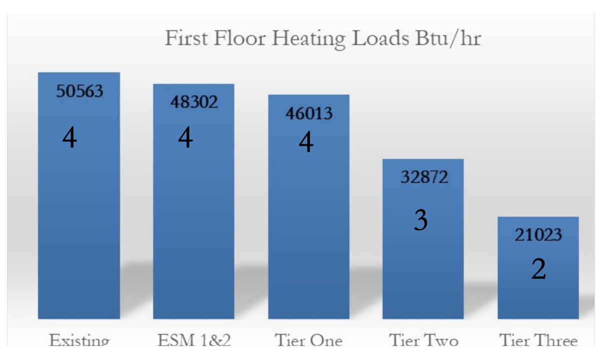
In this case, pursuing a "deeper" energy retrofit by investing a total of $22,232 (incudes Tier One costs) is predicted to save $1,040 in annual energy costs. This would result in a simple payback of over 20 years, but a positive annual ROI each of those years of just under 1%. Again, this is based on stagnant energy prices. While price increases are likely, no one has a crystal ball on future energy prices, so the financial analysis is likely conservative. Costs are estimated and would need a contractor proposal for actual costs.

Tier Two	Cost of Measure	Annual Savings	Simple Payback Years	Life of Measure	Invest-ment Gain	ROI	Annual ROI
Insulate Foundation Walls	$2,970						
Innerglass on Windows	$3,960						
Ceiling Insulation Upgrade to R50	$3,749						
Total Tier 2	$10,679	$525	20.3	25	$2,447	22.9%	0.8%
DP AG Walls	$9,734	$349	27.9	25	-$1,009	-10.4%	-0.4%
Totals For All Three Tiers	$22,232	$1,040	21.4	25	$3,768	17.0%	0.6%

This next chart presents the same ESM with resulting annual energy savings from each implemented measure and the annual reduction of CO2 emissions. Potential Eversource incentives are based on energy saved for the cost of the measures.

Tier Two	Cost of Measure	LP Gallons Saved	kWh Saved	Site Energy Reduction MMBTU	Source Energy Reduction MMBTU	Tons CO2 Reductions Annually
Total Tier One	$1820	98	207	9.6	12.6	.7
Total Tier Two	$10,679	309		28.2	32.4	1.9
Insulate AG Walls	$9,734	205	312	19.8	25.1	1.4
Total All ESM	$22,232	612	519	57.6	70.1	4.0

Based on the articulated interest in converting to air source heat pumps for more efficient heating and adding summer cooling, the chart to the right shows the reductions in heating loads for each ESM group. Numbers indicate the heat pump capacity in tons for each condition, also indicating potential first cost reductions.



Assessed Values for The Grange and Other Model Inputs

The thermal envelope is the assembly of materials which form the barrier between inside conditioned space and outdoor weather and climate. Its ability to conserve heat and manage moisture determines, primarily, the heating load or demand of a building. Continuity and thickness of insulation, in direct contact with air barrier, is key to an effective thermal barrier.

Square Feet Area (whole)	3090	
Volume (ft3) (whole)	23,636	
Design Temps	Outdoor Dry	Indoor Dry
Winter	2	70
Summer	87	75
Reference City	Concord NH	

Summary reports for load calculations of the existing and retrofitted condition has been included at the end of this study. Below is a summary of values for existing and improved envelope components.

Envelope Component	Surface Area FT2	Assessed Effective R-Value	U-Factor	Improved U-factor	Improvement
DH Stained Glass Windows	192	1.75	0.57	0.37	Weather-Strip and Interior glaz-
Exterior Entry Doors	59	1.78	0.56	n/a	Weather-Strip
Wood Framed Walls	1952	6	0.167	0.083	Exterior Insulation
Rim Joists	165	2	0.5	0.056	Three inches SPF
Foundation Walls to 2' below grade	620	2	0.5	0.083	2" FF Thermax OR
Foundation Walls to Floor	160	8	0.13		
South Foundation	61	1.7	0.61	.083	
Flat Ceiling	1470	16	0.063	0.02	Air Seal and add 12" cellulose
Slopes and Flat above Storage	310	10	0.100	0.05	Dense Pack Slopes and Blow in
Floor Over basement	1350	2.7	0.37		Bring foundation walls into ther-
Volume: 12,000 ft3 Above Grade		Exist		Improved	
CFM Air Leakage Winter/Summer		110/59		75	

Other formulas used in this analysis:

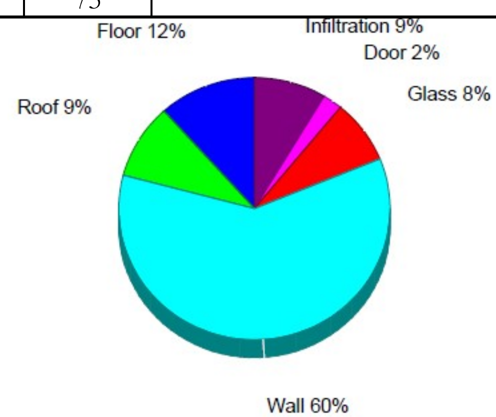
Propane: 91,300 Btu per gallon for site energy
Source energy: 104,995 Btu per gallon (1.15xSite)

Electric: 3412 Btu per kWh site energy.
Source energy: 11,361 Btu per kWh

CO2 Emissions:

Propane: 12.35 lbs per gallon

Electric: CO2 lbs = kWh X .89



Heat loss by the thermal envelope component

Historic Energy Use Analysis

The energy analysis below is based on an average of the energy data provided for 2021 and 2022.

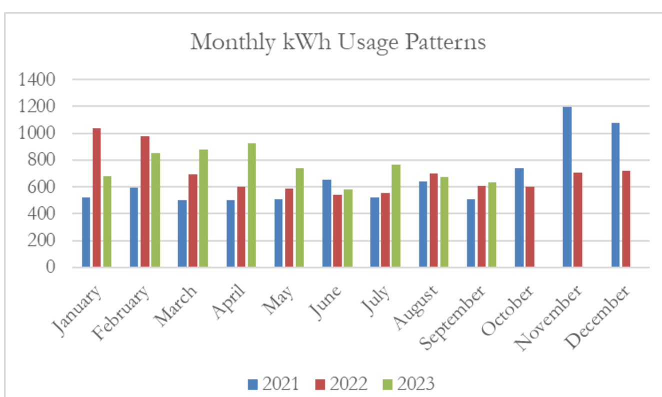
Energy	Units	Site Btus	Source Btus	$Cost
Electric kWh	8324	28,401,488	94,568,964	$1,253
Propane	1039	94,860,700	109,089,805	$1,765
Totals		123,262,188	203,658,769	$3,018
EUI KBtu/FT2	1323	93.2	153.9	$2.28
EUI with basement	2646	46.6	77.0	$1.14

The Energy Utilization Index (EUI) offers a simple snapshot analysis of a building's energy use by looking at total amount of energy input (converted to Btu's) divided by the floor area of conditioned space. "Site Energy" refers to units of energy delivered to a site. Source energy includes transmission and some allowance for off site generation and other considerations.

Based on the information provided the Site EUI for 2021 and 2022 averaged 46.6 KBtu/ft2 for the whole building. Source EUI is 77.7 KBtu/ft2, with a cost per square foot of $1.14 per ft2 based on current energy prices. Since the per unit cost for energy can vary greatly over time, converting all forms of energy to Btus is a more useful way of looking at a building's energy demands and potential reductions from energy saving measures.

An EUI of 46.6 is not considered very high, even for a building without central air conditioning, but it is notable that only the first floor is 'intentionally heated'. The basement is heated through the ceiling (conditioned floor above), from uninsulated ducts, and from heat generated from the refrigeration units.

Monthly patterns of electric consumption can sometimes tell a useful story, though assumptions are never as useful as hard facts. Still, it is likely that the peak consumption pattern in the winter is due to heating the office with electric resistance (ER) baseboard. While ER is technically more efficient than even the condensing furnace, it is also by far the most expensive way to heat a space. Electric heat pumps are two to over four times more efficient than ER, (or any other existing technology), so can compete with fossil fuels on a cost per million Btu basis. However, at the 2023/2024 contracted price of $1.439 per gallon of propane, the existing furnace isa more cost effective system. The financial advantage of converting to heat pumps is that it offers the option to offset with on-site generation of clean, renewable, and "free" solar energy.



KW Demand and the Cost of Supply

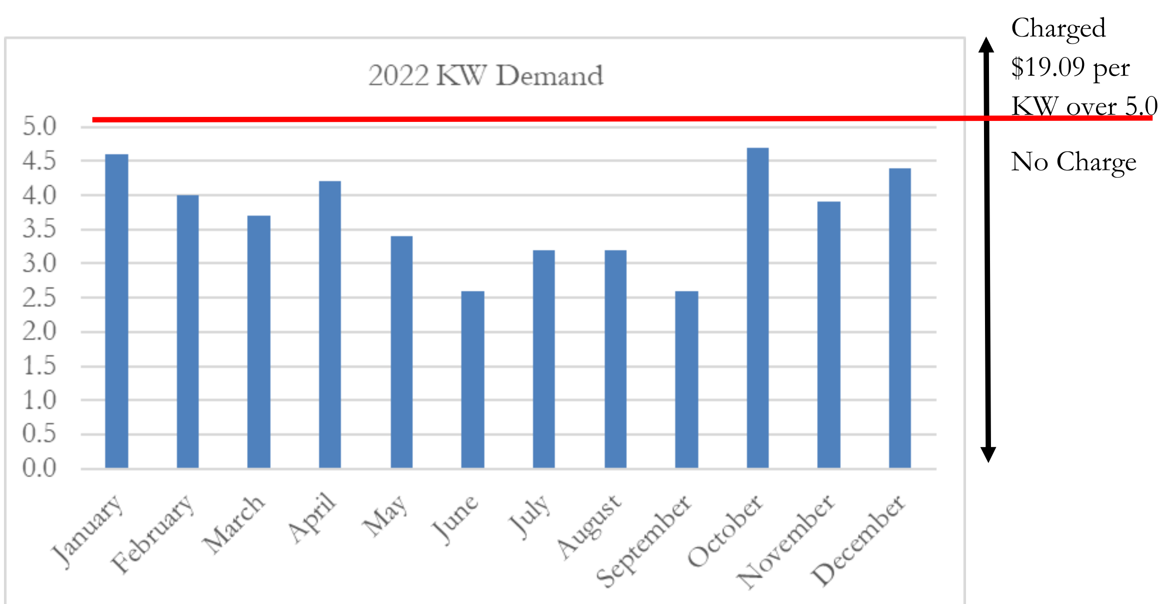
The KW Demand is determined each month by the peak call for power during any 30 minute window within a billing cycle. There were no Demand Charges in 2022 since the peak demand never exceeded 5.0 in any of the 12 months.

While its not a concern now, demand for power would increase when converting to electric heat pumps though could be mitigated by not using nighttime set backs. Heat pumps operate most efficiently when left at a stable thermostat setting.

Reducing electric usage saves energy and monthly costs in both the supply side (actual electricity used) and the delivery side (the very real transmission costs of delivering kWh to the meter, maintaining lines, etc).

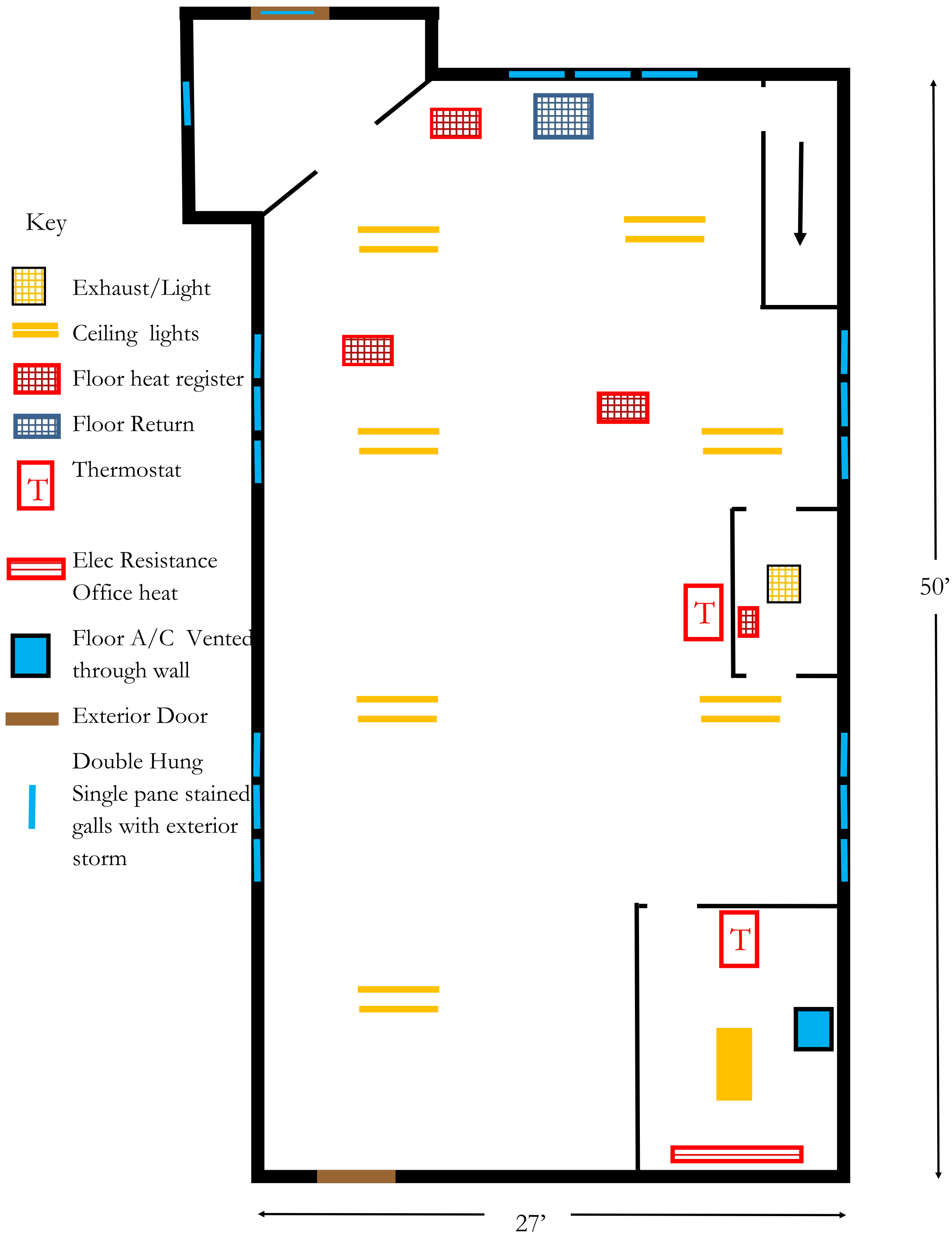
Lowering peak demand on the regional grid plays a critical part in reducing the need to build more generation plants. It may be impacted by a reduction in kWh consumption, but is mostly determined by time and the appliance used. Customers are allowed a peak use of 5.0KW each month before incurring charges.

A good explanation about Demand Charges can be found at [Making Sense of Demand Charges: What Are They and How Do They Work? - Renewable Energy World]



First Floor

Graphic roughly to scale.



Basement

Graphic only roughly to scale.

Description of Energy Saving Measures

Replacing the main room thermostat with a programmable unit, with auto set back, will likely save measurable heating energy. But saving estimates are not included because they would depend on how the dial thermostats are operated now—which is not available. Programming for nighttime set back with an auto set back feature would allow people to turn the thermostats up as needed, but then automatically return to nighttime setbacks, without having to remember to do so.

One good option: Honeywell Home RTH6580
W-Fi 7-Day Programmable Thermostat $70

Air Sealing

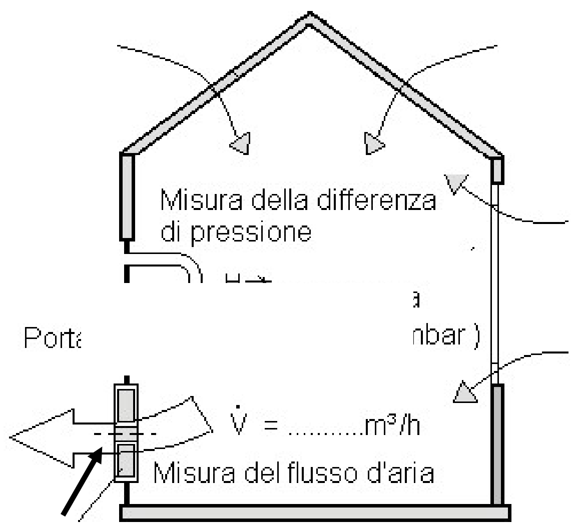
The objective of this measure is to reduce uncontrolled air leakage. Weather-stripping exterior doors, windows, and the hatch to the attic, are all recommended steps.

But the recommendation is also to hire an insulation contractor who uses a blower door assembly to slightly depressurize the building in order to locate—and seal—air leakage sites.

NOTE: The building should not be put under pressure if the ceiling tiles are deemed to be asbestos!

A blower door consists of a large fan, capable of moving 6000 cubic feet of air per minute (CFM), an adjustable door frame, and a nylon skirt to seal off the exterior door, much like how a skirt on a kayak keeps a paddler dry below the waist.

BD's are often used to measure how much is pulled through cracks and gaps at a standardized pressure differential of 50pascals. Actual air leakage under natural conditions can be (sort of) guesstimated from that measurement, but many argue, including this consultant, that the best reason to put the building under pressure is to locate leakage sites.

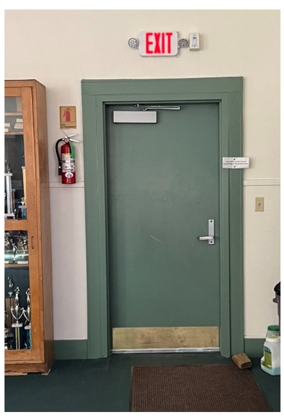


fan

Air Sealing: Weather-stripping Doors

Thermographic (aka Infra Red or IR) images depict differences in surface temperatures. Darker colors indicate cooler surfaces than brighter colors. Dark “blobs” or streaks can indicate cold air leaking into the building on a cold day, or washing through low density insulation such as fiberglass.

Air leakage around the three exterior doors offer a cost effective opportunity to reduce air filtration though installing professional quality weather stripping.



Interior Glazing Units

Exterior storm windows do reduce the amount of heat loss through windows to a certain extent, by adding an air space between the single pane of glass and storm. Importantly, they also serve to protect historic window frames and glass. But they do not stop air infiltration because they need 'weep holes' to allow drainage of condensation that forms.

As restoring historic wood windows becomes increasingly popular, many companies now offer a variety of interior options which are less expensive than full replacements and often as, or more, effective at reducing heat loss.

Interior glazing panels are a very effective option. They can be custom made with wood for $800-$1200, OR a non wood unit can be custom ordered on line and easily installed for less than $300. In this case, a compression fitting unit is estimated to cost $264 per window.

They can be single units and easily removed, or double hung, and left in place.

The statements below were copied in part from stormwindows.com and reference Innerglass Windows specifically, though many of the statements describe any quality interior glazing panel. Advantages include:

- Uses a concealed stainless steel springing system that requires no all-around track. It conforms to the window opening, automatically compensating for most out of square conditions.
- Custom made to your window dimensions, we can fit any window, no matter how crooked!
- Significantly more effective at insulating your home and lowering your heating and cooling bills than traditional exterior storm windows.
- Much tighter than exterior storms, because outside storm windows must be ventilated (you know, the weep holes) to get rid of the condensation that has already happened.
- So tight it provides a vapor barrier on the warm side that stops condensation in the first place.

Innerglass Window Systems pioneered the use of high performance Low-E glass in our interior storm windows. Low-E glass doubles the R value of regular glass making you warmer in the winter and cooler in the summer. It also cuts out 2/3 of the ultra-violet rays that damage your rugs and furniture.

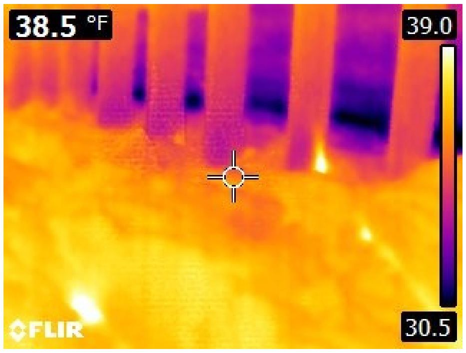
https://stormwindows.com/index.php/storm-windows-how-to-order/

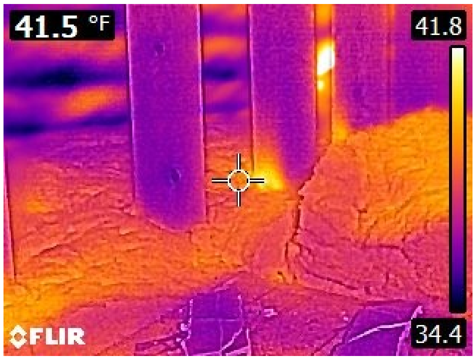
Innerglass	U.I / FT2	Per	Per Unit	# Units	Cost
Compression Unit	96	$2.75	$264.00	15	$3,960

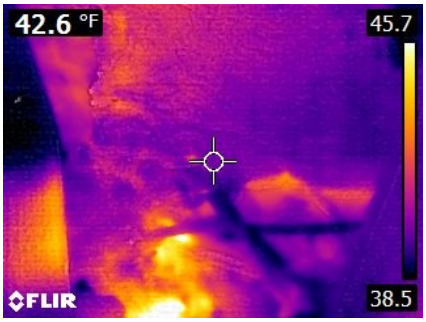
Ceiling Plane

Stairs lead up to a finished storage area with an access hatch to above the ceiling in the wall. It is apparent that the room below was (presumably a Church) and open to a vaulted roof as remnants of plaster ceiling remain at the roof plane. The new ceiling structure has an old layer of fiberglass with facing disintegrated and a newer layer of 10” fiberglass batt laid on top. In all, there is a lot of insulation material, but much of it in poor condition and not in contact with an air barrier, thus diminishing its thermal performance.

ESM two calls for ‘surgical air sealing’ of gaps and penetrations as located from using a blower door. Ideally, ESM #7 would be approved at the same time so that during the air sealing, degraded insulation could be removed, good material positioned, and an additional 12” cellulose blown on top. Note: integrity of ceiling tiles should be assessed to carry the extra weight.



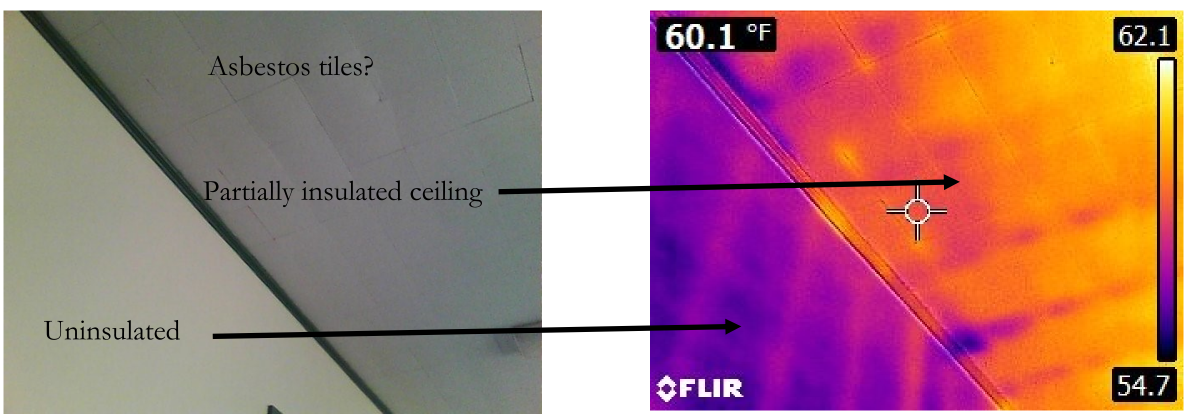


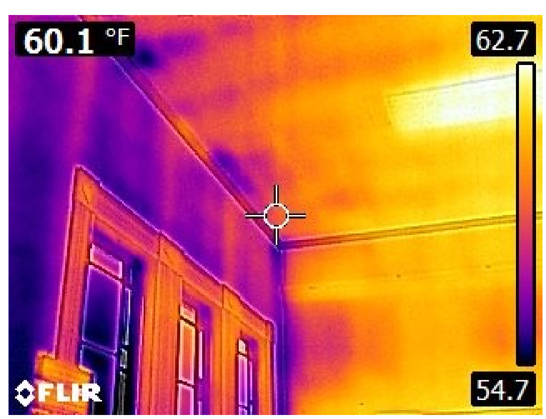


Ceiling Plane

Approximately 3’ wall inside the storage attic. Note the appearance of insulation above the lower ceiling, that does not extend up the wall.

The middle image was taken from inside the storage attic, below the hatch, with the image on the right taken from inside the room below.



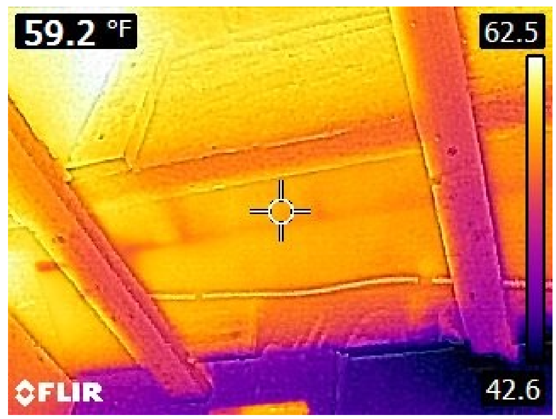


Basement and Foundation Walls

Though the basement doesn't (appear to) have a thermostat to be actively heated, it is heated by three sources:

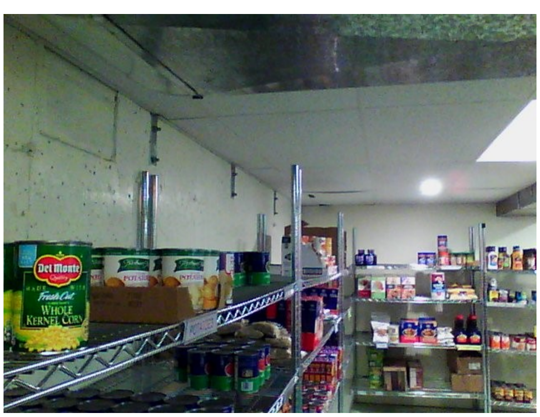
1. Heat conducting from the conditioned floor above
2. "Distribution losses" through the uninsulated metal ductwork
3. Heat expelled from the seven refrigeration units

To conserve that heat inside the building, ESM #4 focuses on insulating the rim and band joists and making a continuous air seal to the top of the foundation. ESM#II-5 suggests investing in insulating the block walls, at least the top 3-4', with either 2" foil faced foam board (Thermax has a 15 minute flame rating) or spraying closed cell foam followed by an intumescent paint to meet the fire code.



Insulating the whole foundation wall—from the rim joists down to the floor—is ideal, but in terms of "bang for the buck", the greatest heat loss occurs down to about two feet below grade, at which point the earth offers insulating value while also staying above ambient air temperatures during the coldest hours of winter.

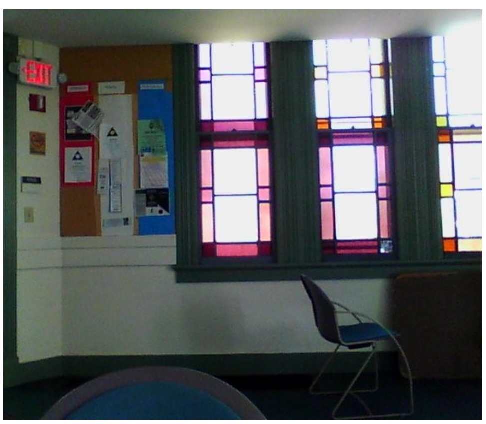
But the other advantage to insulating the walls with a vapor impermeable material is to reduce moisture migration and therefore reduce hours needing dehumidification.

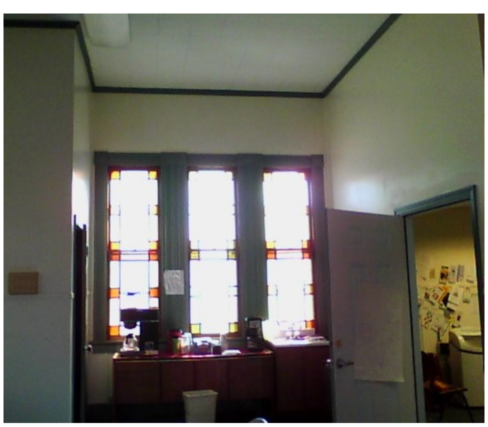


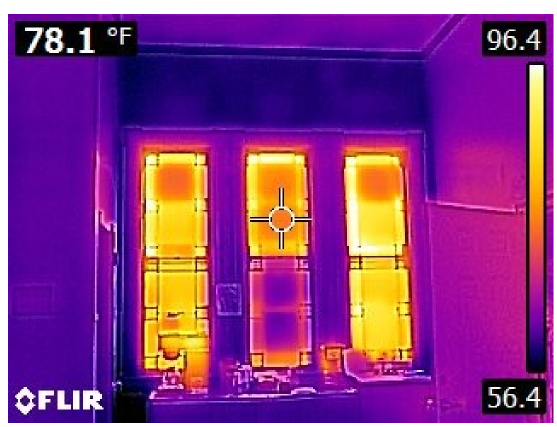
Above Grade Framed Walls

The brighter/lighter vertical lines shows that the surfaces to the inside of the wood stud framing is warmer than the cavity (stud bay) on either side, indicating that the wall cavities do not have insulation in them because the heat is moving to the outside more rapidly in between the studs. The Grange's walls account for an estimated 60% of all heat loss to the outside, mostly through the above grade framed walls, and the colder surfaces can be a source of discomfort as body heat radiates to both cold glass and walls.

The recommendation is to insulate the cavities by removing a clapboard on the outside, drilling a 2" hole in the wood sheathing, and blowing cellulose into each four inch cavity bay before sealing the hole and re-installing the clapboard.







Equipment Inventory

Appliance	Brand	Model	Serial	Manufact. Date		Efficiency	Refrigerant
First Floor							
Portable Air Conditioner	Maytag	M6P09S2A*B	MR 773013 357W		9000 Btu	9.5 EER	R-22
Paper Shredder	Staples						
Copier	HP						
Small Fridge							
Coffee Makers (2)	Bunn						
Restroom Exhaust Fans							
Basement							
SS Refrigerator	Intertek	R23-S	R23S 19060031		7.5 Amps		R-290
Refrigerator	Electrolux	FKCH17F7HWD	WB34280576	Oct 2013	5.0 Amps		134-A
	Sears	253.1654211	WB94237194	Oct 2009	5.0 Amps		134-A
GlassTop Freezer	Avantco						
B Series Glass Door Fridge	Miagali Ind.	C-10RM-HC	HC00318101600920004	Oct 2018	2.1 A 250W		R-290
Commerical Freezer	Sears	253.145921	WB53224952	Aug 2005	5.0 A		134-A
	Kelvinator	KCCf170WH	738231 0292		1.9 A		R-290
Dehumidifier	Aire	PAD 70		May 2013	6.9 A 720 W	70pints/day	R410
Electric Water Heater	State Ind.	PV 20 10MSB KZ	J95924589		19.9 gallons 1650		
Copier							
Furnace- Single Stage	Lennox	G26Q3/4	5802L 45012	Nov 2002	Output 125,000	91% AFUE	

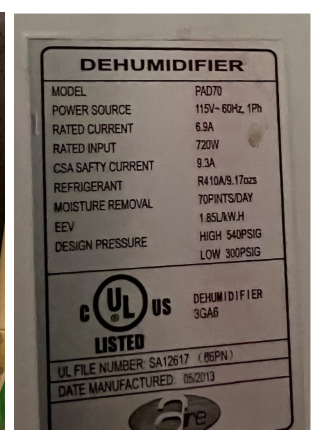




AVANTCO
Veggies
Juice

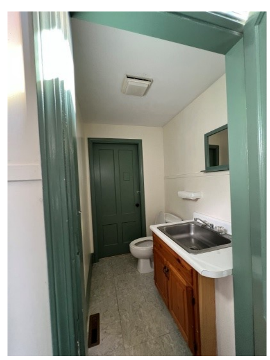
Butter - 2 for 1
1 Cheese Only




DANGER
state

DEHUMIDIFIER
MODEL PAD70
POWER SOURCE 115V~ 60Hz, 1Ph
RATED CURRENT 6.9A
RATED INPUT 720W
CSA SAFTY CURRENT 9.3A
REFRIGERANT R410A/9.17ozs
MOISTURE REMOVAL 70PINTS/DAY
EEV 1.85L/KW.H
DESIGN PRESSURE HIGH 540PSIG
LOW 300PSIG
c UL us
LISTED
DEHUMIDIFIER
3GA6
UL FILE NUMBER SA12617 (86PN)
DATE MANUFACTURED 05/2013

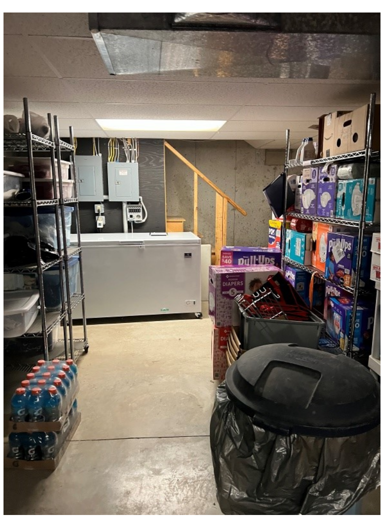
Interior Photos

To basement attic



Restroom

Office

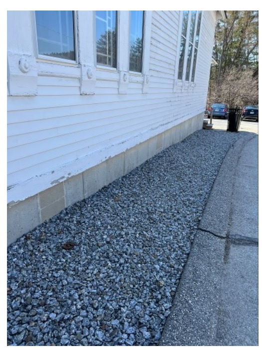


Exterior Photos

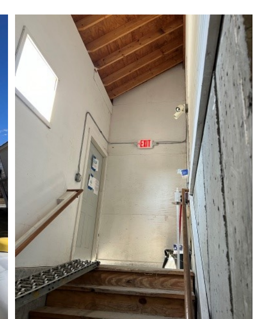
East facing

North facing

West facing



A shed roof south facing addition provides covered but unconditioned (exterior to the thermal envelope) stair access to the basement and main floor.



The Basics of Heat Transfer in a Building

Heat moves in three basic ways in a building: Conduction, convection, and radiation.

Heat **conducts** to coolth or cold in any direction and through physical contact of materials. Insulation can slow the rate of heat loss to the outside. The rate at which it moves is determined by the type and thickness of material and the temperature difference between inside and outside. Compare holding a ceramic mug of hot water vs a glass of hot water, vs a glass of cold water. The skin of your hand will be heated—or cooled—based on the conductivity of the mug, glass, and the temperature difference of the water and your hand.

In a building in our climate, heat moves, or 'is lost' to the outside as it moves from inside heated space to the colder outside through an assembly of materials. For the walls, the assembly may consist of plaster or sheet-rock, brick, or wood framing with insulation in cavities (or not), exterior board sheathing, wood clapboards, or perhaps a thin layer of insulation and vinyl siding. The rate of heat loss varies with the difference between the inside temperature and outside temperature. That is why setting the thermostat back to 55 degrees when the building is unoccupied saves energy; because the rate of heat loss is slowed.

Heat can also be transferred through air or water by **convection.** While heat moves to cold via conduction, warmer air rises because it is lighter, or less dense, than cooler air. This means that insulation can only work well if it doesn't allow air to pass through it. The other way to say it is: Insulation needs to be in contact with an air barrier on all sides to perform as expected. Weatherstripping around doors and windows, for example, can stop cold air infiltration which, when warmed, rises to the ceiling and exfiltrates through any cracks or gaps in the ceiling material.

Insulation is usually described by its R-value, or resistance to allow heat transfer. But R-value doesn't tell the whole story because it only refers to conductive heat loss and doesn't consider convection. Manufactures of insulation test their products in a laboratory by placing it, fully lofted, in a perfectly sealed box, and measure the rate that heat moves from one side to the other to determine what "R-Value" to stamp on the product to be sold. If its not installed in exactly the same way, that R-value has very little meaning.

The third way heat moves is by **radiation**. This happens through space and from a warmer source to cooler surface in visual contact. Think of feeling the warmth of the sun and the immediate difference when a cloud blocks it. The sun still warms the earth surfaces and surrounding air, but direct radiation can be blocked—or shaded. Same thing with a wood stove. A hot stove warms air, but its greatest impact is by radiation which is only felt when one is in visible contact. And the further away, the less heat is felt. Its often tempting to replace windows because we feel so cold when next to them! That's because our body heat radiates to the cold surface. Insulated shades or quilts stops that radiative loss (but also eliminates view and daylight). Interior glazing panels can make a big difference for single pane windows because the air space raises the surface temperature of the inside glass.

In reality, all three mechanisms happen at the same time, though one usually dominates the others in terms of how much heat is moved.

The role of heating equipment is to replace the heat that is lost through the envelope. This is described or measured as replacing BTU per hour (BTU/hr). If the heating system (electric baseboard, oil or propane furnace or boiler, etc…) creates or moves more heat (BTU) in an hour than in lost to the outside, the system is considered "over-sized" which can waste energy unnecessarily. On the other hand, if the system cannot generate or move enough heat to replace what is lost in any given hour, the system is "undersized" and will not be able to maintain warm enough inside temperatures for human comfort. So correct sizing is important!

Innerglass Window Systems LLC www.stormwindows.com
15 Herman Drive Simsbury, Ct, 06070 David@Stormwindows.com
800-743-6207 860-651-3951 Fax 860-651-4789

Price and Order Form

We price the Innerglass Window by the United Inch. The formula is **Width + Height = U.I.**

1. Please round to the nearest whole inch, then **add** the window width and height and write it on the sheet
2. Please write the color, window type code, and glazing code in the box on the measurement worksheet.
3. Square feet for glazing are Width x Height (in inches) divide by 144 to get Ft^2 and round up.

Storm

Window Type	Code	# Of Windows	United Inches	X Price Per U.I.	=	Price
Compression	(CP)			X $3.25	=	$
Double Hung	(DH)			X $3.55	=	$
Double Slider	(SL)			X $3.55	=	$
Triple Slider	(TL)			X $4.15	=	$
Surface Mount	(SM)			X $3.25	=	$
				X	=	$
				X	=	$

Glazing	Code		Square Feet	X Price Per Ft^2	=	Price
1/8 " Clear Glass	(DS)	Standard		X $3.00	=	$
1/8" Low E Glass	(LE)	High Performance		X $6.00	=	$
1/8' Acrylic	(AC)			X $7.00	=	$
Other				X	=	$
Call for price			Connecticut Residents add 6.35% Tax		=	$

Compression Window in Low E glass is Energy Star and qualifies for Tax Credits!

Please call for a truck freight estimate.

Shipping Total $

Total Sale $

You can pick up at the factory and avoid shipping charges.

Terms: 50% Deposit with your order. 50% paid when your windows are ready to ship. We must have full payment in order to ship your windows. We will send an order acknowledgment and the estimated ship date when we receive your order. We accept checks, money orders, VISA, MASTERCARD, AMERICAN EXPRESS and DISCOVER CARD.

ACCEPTANCE- The above prices, specifications and conditions are satisfactory, and are hereby accepted. I agree that I am responsible for correctly measuring my window openings, and that Innerglass Window Systems will not be responsible for any errors in the dimensions I have given them.

If Innerglass Window Systems measures we are responsible. Because these are custom sized, no refunds or returns are possible. Payment will be made as outlined above. When delivery or pickup of completed order is delayed by customer, balance is due. When delay is more than 30 days, storage charges may accrue.

Order Date____________ Signature________________________ Name____

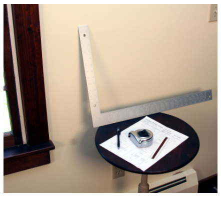
Address____ State____ Zip________

Home Phone____ Work or Cell____

Email address____

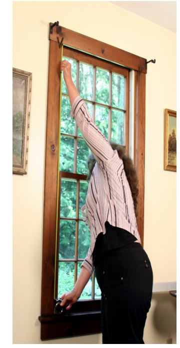
Credit Card # ____ Expiration Date___________ Billing Zip____________

Innerglass Window Systems Measuring Guidelines

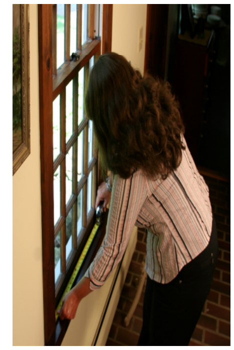


Tools needed

- 3” Case Dimension Locking tape measure
- 16”x 24” framing square (to check for out of square)
- 6” or 12” ruler
- Window Worksheet to record measurements



1. Measure all 4 sides to 1/16” and record the actual measurement. Do not average. Don't bend the tape into the corner. Instead add the tape case dimension to your measurement. Measure exactly where the window will be mounted.



2. The Innerglass Compression-Fit window needs 3/4 "depth in the window opening for mounting, 5/8” is possible but call us. The double hung and horizontal sliding interior storms need 1 1/8” depth in the window opening. Watch for obstructions such as window hardware. Screw heads and recessed pockets for the window stops are generally not a problem if they don't stick out more than 1/16".

3. To check for out of square, notice the framing squares at the left and right bottom corners and the 2 lines under each framing square where you record the gap on the worksheet. Start tight to the left side and slide the 24” side down until it touches the sill at either the corner or the end. The framing square is always held tight against the side so that any gap will show up at the bottom. If the window is square at the bottom you would record a “0” at each of the 4 lines under the framing squares. If the gap is 1/16 or less it is effectively square. For example: If a window sags down to the right the gap measurements could be 0 ¼, 0 ¼. Place the framing square against the right side of window and repeat the procedure. Think of this as a snapshot of each bottom corner. In reality they overlap but for clarity they are separated and are not to scale. Next lay the 24” side of the framing square on the sill to check if the sill is bowed up or down, if so give us a center vertical measurement and draw an arc showing the bow.

4. Innerglass Windows will accommodate 3/16” vertical and ½” horizontal play. On deep openings measure where you want the window to be and measure the opening at the wall to check that is does not get smaller than these tolerances. If the opening is smaller or the bottom of the opening is obstructed call us.

Mullions for dividing up large windows

5. If you are measuring for a double hung storm or are doing a large opening as separate upper & lower windows with a mullion, measure from the sill to the top of the meeting rail. (Where the dust collects.) This is where the top of the mullion will be. A window opening may be done as one window or two windows with a mullion. Generally double hung windows taller than 72" inches should be done as 2 windows with a horizontal mullion. Measure the length for the mullion where it is to be installed. The dimensions of the vinyl covered wood vertical mullions are 1 5/8” deep x 1 1/8" wide. The vinyl color will match the window. The horizontal mullion is ¾” thick x 1" wide. Measure the width and height of the entire opening.

Do not make allowance for the mullion size. We will do that. For pricing purposes, remember that it is one opening but TWO windows, so the width & height of each needs to be added together to come up with the united inch measurement.

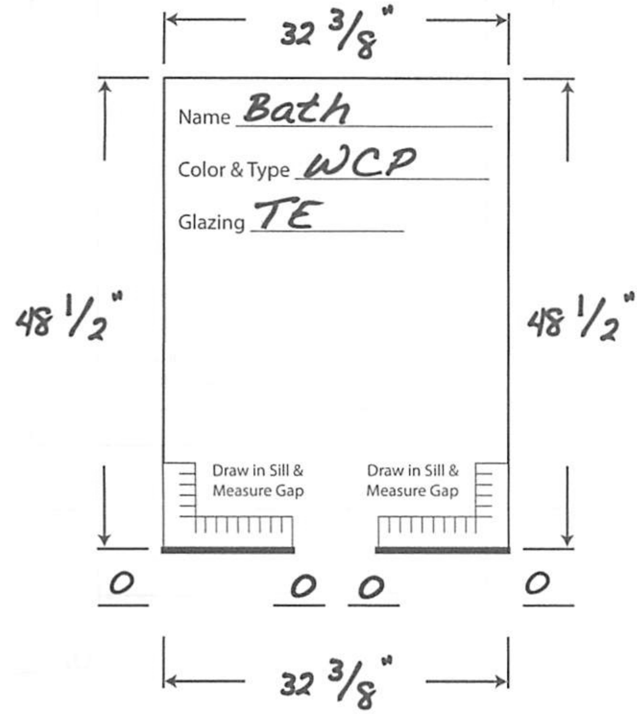
Maximum size for double strength glass is 25 sq ft or 125 united inches.
Larger than that 3/16" or 1/4" laminated or tempered glass will be used at extra cost.
Within 12" of a door or 18" of the floor, Acrylic or tempered glass must be used at extra cost.

Please call us at 860-651-3951 or 800-743-6207 with any questions.

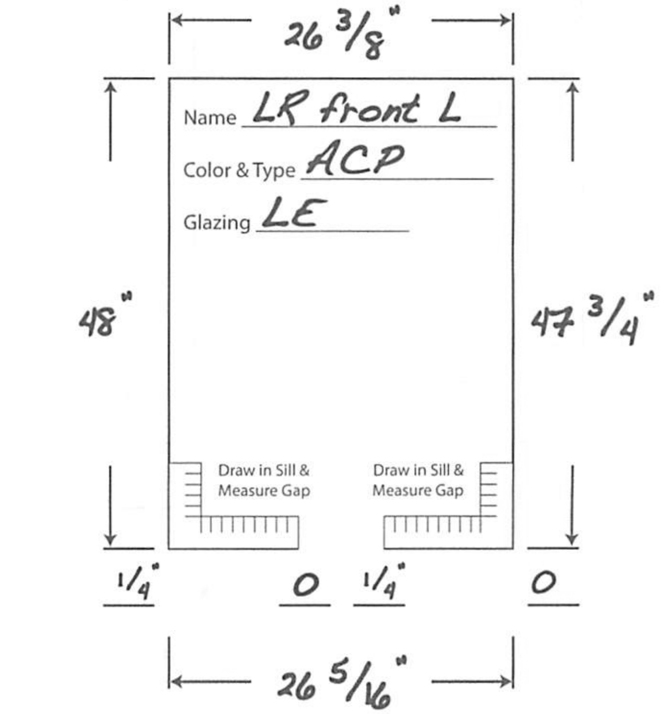
Code Key

Color	Window Type	Glazing	United Inches = Width + Height
A = Almond B = Brown W = White	CP = Compression DH = Double Hung SL = Sliding TL = Triple Slider SCR = Exterior Screen	DS = Regular LE = Low E LA = Laminated Glass AC = Acrylic TG = Tempered Glass TE = Tempered Low E	• Round to the nearest whole number before **adding** width and height • 1/2" and over, round up • Under 1/2", round down

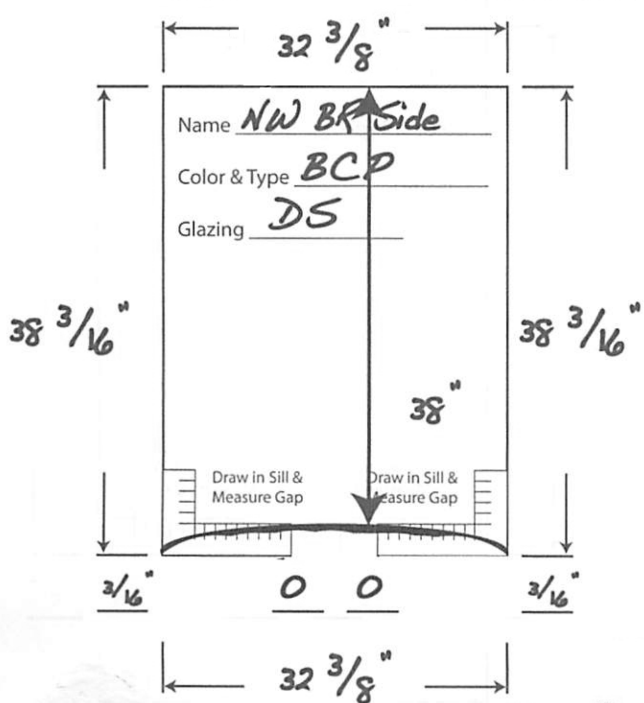
WORKSHEET EXAMPLES



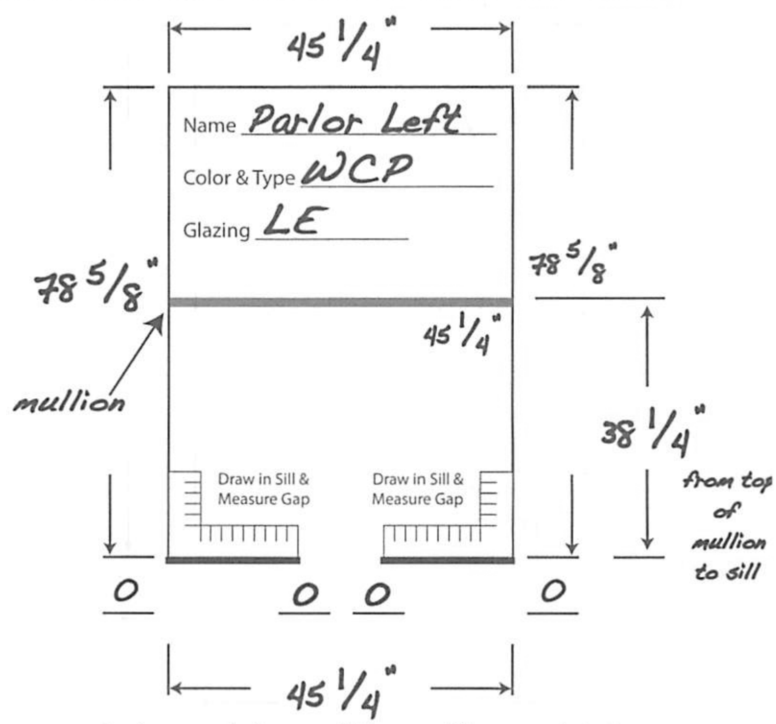
Ft² 11 Square Window UI 81
White Compression Tempered LE



Ft² 9 Almond Compression Window UI 74
Low E sill down to the left 1/4



Ft² 9 Brown Compression Window UI 70
Regular glass
Sill bowed up



Ft² 25 2 windows with a mullion UI 169

Innerglass Window Systems

15 Herman Drive, Simsbury, CT 06070

Telephone 800-743-6207 • 860-651-3951

Fax 860-651-4789

www.stormwindows.com • david@stormwindows.com

Customer Name ______________________

Window Worksheet

Page _____ **of** _____

(please make a copy for your use)

Totals This Page

Ft² _______ **UI** _______

Name ____________________

Color & Type ______________

Glazing ___________

Draw in Sill & Measure Gap

Draw in Sill & Measure Gap

Ft² ______ UI ______

Name ____________________

Color & Type ______________

Glazing ___________

Draw in Sill & Measure Gap

Draw in Sill & Measure Gap

Ft² ______ UI ______

Name ____________________

Color & Type ______________

Glazing ___________

Draw in Sill & Measure Gap

Draw in Sill & Measure Gap

Ft² ______ UI ______

Name ____________________

Color & Type ______________

Glazing ___________

Draw in Sill & Measure Gap

Draw in Sill & Measure Gap

Ft² ______ UI ______

Henniker Grange EXISTING With Floor
HVAC Load Calculations

for

Town Of Henniker

Henniker NH 03242

RHVAC Residential HVAC Loads

Prepared By:

Margaret Dillon
S.E.E.D.S.

603-532-8979
Saturday, October 21, 2023

Rhvac is an ACCA approved Manual J, D and S computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

Project Report

General Project Information

Project Title:	Henniker Grange EXISTING With Floor
Project Date:	Tuesday, October 17, 2023
Client Name:	Town Of Henniker
Client City:	Henniker NH 03242
Company Name:	S.E.E.D.S.
Company Representative:	Margaret Dillon
Company Phone:	603-532-8979
Company E-Mail Address:	mdillon@myfairpoint.net

Design Data

Reference City:		Concord AP, New Hampshire
Building Orientation:		Front door faces North
Daily Temperature Range:		High
Latitude:	43	Degrees
Elevation:	342	ft.
Altitude Factor:	0.988	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	-2	-2.6	n/a	n/a	70	n/a
Summer:	87	70	43%	50%	75	19

Check Figures

Total Building Supply CFM:	2,000	CFM Per Square ft.:	0.647
Square ft. of Room Area:	3,090	Square ft. Per Ton:	694
Volume (ft³):	12,000***		

***Indicated volume is based on custom building volume.

Building Loads

Total Heating Required Including Ventilation Air:	100,130	Btuh	100.130	MBH
Total Sensible Gain:	43,448	Btuh	81	%
Total Latent Gain:	9,977	Btuh	19	%
Total Cooling Required Including Ventilation Air:	53,425	Btuh	4.45	Tons (Based On Sensible + Latent)

Notes

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All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Miscellaneous Report

System 1 Existing Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	-2	-2.6	80%	n/a	70	n/a
Summer:	87	70	43%	50%	75	18.65

Duct Sizing Inputs

	Main Trunk		Runouts	
Calculate:	Yes		Yes	
Use Schedule:	Yes		Yes	
Roughness Factor:	0.00300		0.01000	
Pressure Drop:	0.1000	in.wg./100 ft.	0.1000	in.wg./100 ft.
Minimum Velocity:	0	ft./min	0	ft./min
Maximum Velocity:	900	ft./min	750	ft./min
Minimum Height:	0	in.	0	in.
Maximum Height:	0	in.	0	in.

Outside Air Data

	Winter		Summer	
Infiltration Specified:	0.550	AC/hr	0.550	AC/hr
	110	CFM	110	CFM
Infiltration Actual:	0.550	AC/hr	0.550	AC/hr
Building Volume:	X 12,000*	Cu.ft.	X 12,000*	Cu.ft.
	6,600	Cu.ft./hr	6,600	Cu.ft./hr
	X 0.0167		X 0.0167	
Total Building Infiltration:	110	CFM	110	CFM
Total Building Ventilation:	0	CFM	0	CFM

*Indicated volume is based on custom building volume.

---System 1---

Infiltration & Ventilation Sensible Gain Multiplier: 13.04 = (1.10 X 0.988 X 12.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 12.52 = (0.68 X 0.988 X 18.65 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 78.23 = (1.10 X 0.988 X 72.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.550 AC/hr (110 CFM)
Summer Infiltration Specified: 0.550 AC/hr (110 CFM)

Load Preview Report

Scope	Net Ton	ft.² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	4.45	694	3,090	43,448	9,977	53,425	100,130	1,317	2,000	2,000	
System 1	4.45	694	3,090	43,448	9,977	53,425	100,130	1,317	2,000	2,000	18x18
Zone 1			3,090	43,448	9,977	53,425	100,130	1,317	2,000	2,000	18x18
1-First Floor			1,350	26,843	4,849	31,692	50,563	665	1,235	1,235	12--7
2-Office First Floor			120	1,951	307	2,258	3,859	51	90	90	1--6
3-Storage Room			270	7,347	4,108	11,455	6,054	80	338	338	4--6
4-Basement			1,350	7,308	713	8,021	39,654	521	336	336	4--6

Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Stained Glass: Glazing-Historic stained glass with exterior storms, U-value 0.57, SHGC 0.6	192	7,872	0	10,318	10,318
11L: Door-Metal - Paper Honeycomb Core, U-value 0.56	58.5	2,358	0	590	590
Uninsulated: Wall-Frame, Custom, Unisulated 2x4 historic, U-value 0.167	1951.6	23,466	0	3,748	3,748
12A-0bw: Wall-Frame, no insulation in stud cavity, no board insulation, brick finish, wood studs, U-value 0.5	165	5,940	0	775	775
13AA-0oc: Wall-Block, no blanket or board insulation, open core, U-value 0.584	620	26,070	0	3,404	3,404
15A-2s3oc-4: Wall-Basement, concrete block wall, R-2 foam board to 3', no framing, no interior finish, open core, 4' floor depth, U-value 0.128	160	2,287	0	202	202
13AA-0oc: Wall-Block, no blanket or board insulation, open core, U-value 0.6	61	2,633	0	344	344
Layered FG Batts: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, Two haphazzard layes of fg batts with voids, U-value 0.063	1470	6,668	0	5,742	5,742
slopes. Eaves-ad: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Custom, FG in eaves Slopes, dark asphalt, U-value 0.125	200	1,800	0	925	925
Flat Blown In.Poor: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, fiberglass.Poor, U-value 0.1	110	792	0	682	682
19A-0tp: Floor-Over enclosed crawl space, No insulation on exposed walls, sealed or vented space, passive, no floor insulation, tile or vinyl, U-value 0.368	1350	11,639	0	1,940	1,940
Subtotals for structure:		91,525	0	28,670	28,670
People:	43		8,600	9,890	18,490
Equipment:			0	1,100	1,100
Lighting:	650			2,217	2,217
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 110, Summer CFM: 110		8,605	1,377	1,435	2,812
Ventilation: Winter CFM: 0, Summer CFM: 0		0	0	0	0
AED Excursion:		0	0	137	137
Total Building Load Totals:		100,130	9,977	43,448	53,425

Check Figures

Total Building Supply CFM:	2,000	CFM Per Square ft.:	0.647
Square ft. of Room Area:	3,090	Square ft. Per Ton:	694
Volume (ft³):	12,000***		

***Indicated volume is based on custom building volume.

Building Loads

Total Heating Required Including Ventilation Air:	100,130	Btuh	100.130	MBH
Total Sensible Gain:	43,448	Btuh	81	%
Total Latent Gain:	9,977	Btuh	19	%
Total Cooling Required Including Ventilation Air:	53,425	Btuh	4.45	Tons (Based On Sensible + Latent)

Notes

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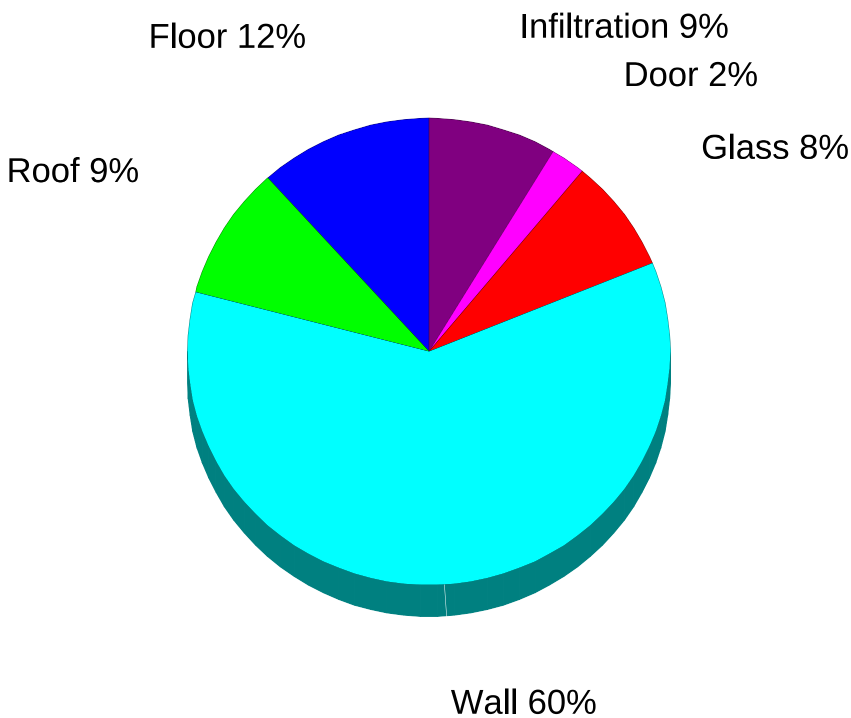
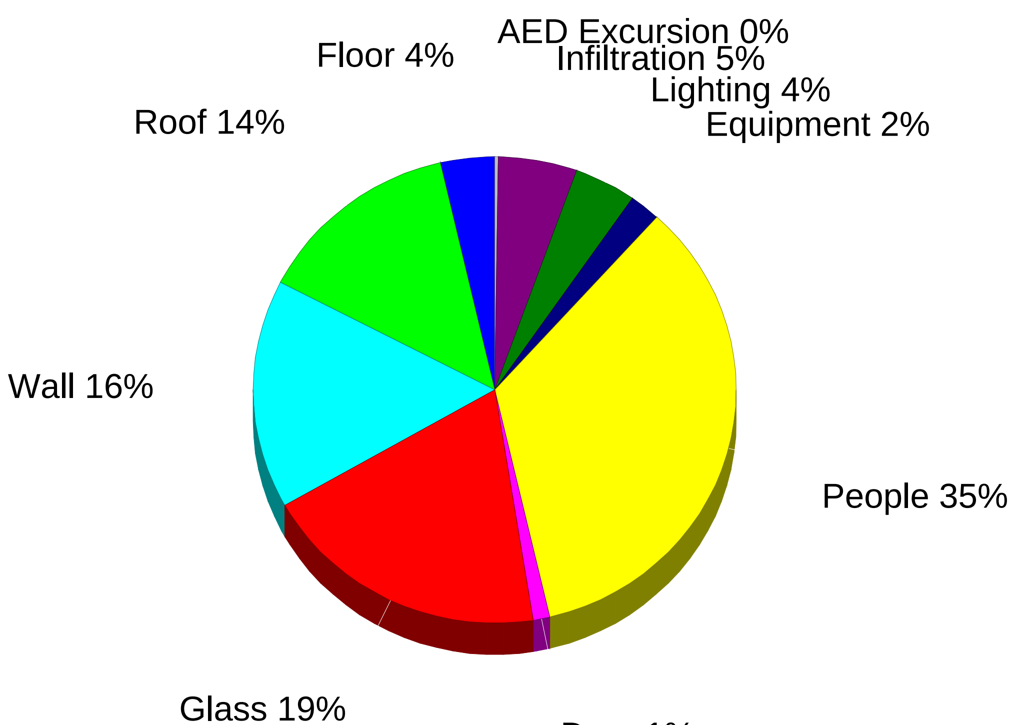
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Building Pie Chart





Henniker Grange Tier Three
HVAC Load Calculations

for

Town Of Henniker

Henniker NH 03242

Prepared By:

Margaret Dillon
S.E.E.D.S.

603-532-8979
Sunday, October 22, 2023

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Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

Project Report

General Project Information

Project Title:	Henniker Grange Tier Three
Project Date:	Tuesday, October 17, 2023
Client Name:	Town Of Henniker
Client City:	Henniker NH 03242
Company Name:	S.E.E.D.S.
Company Representative:	Margaret Dillon
Company Phone:	603-532-8979
Company E-Mail Address:	mdillon@myfairpoint.net

Design Data

Reference City:		Concord AP, New Hampshire
Building Orientation:		Front door faces North
Daily Temperature Range:		High
Latitude:	43	Degrees
Elevation:	342	ft.
Altitude Factor:	0.988	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	-2	-2.6	n/a	n/a	70	n/a
Summer:	87	70	43%	50%	75	19

Check Figures

Total Building Supply CFM:	1,273	CFM Per Square ft.:	0.412
Square ft. of Room Area:	3,090	Square ft. Per Ton:	995
Volume (ft³):	12,000***		

***Indicated volume is based on custom building volume.

Building Loads

Total Heating Required Including Ventilation Air:	34,963	Btuh	34.963	MBH
Total Sensible Gain:	27,662	Btuh	74	%
Total Latent Gain:	9,601	Btuh	26	%
Total Cooling Required Including Ventilation Air:	37,264	Btuh	3.11	Tons (Based On Sensible + Latent)

Notes

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Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Miscellaneous Report

System 1 Existing Input Data	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	-2	-2.6	80%	n/a	70	n/a
Summer:	87	70	43%	50%	75	18.65

Duct Sizing Inputs

	Main Trunk		Runouts	
Calculate:	Yes		Yes	
Use Schedule:	Yes		Yes	
Roughness Factor:	0.00300		0.01000	
Pressure Drop:	0.1000	in.wg./100 ft.	0.1000	in.wg./100 ft.
Minimum Velocity:	0	ft./min	0	ft./min
Maximum Velocity:	900	ft./min	750	ft./min
Minimum Height:	0	in.	0	in.
Maximum Height:	0	in.	0	in.

Outside Air Data

	Winter		Summer	
Infiltration Specified:	0.400	AC/hr	0.400	AC/hr
	80	CFM	80	CFM
Infiltration Actual:	0.400	AC/hr	0.400	AC/hr
Building Volume:	X 12,000*	Cu.ft.	X 12,000*	Cu.ft.
	4,800	Cu.ft./hr	4,800	Cu.ft./hr
	X 0.0167		X 0.0167	
Total Building Infiltration:	80	CFM	80	CFM
Total Building Ventilation:	0	CFM	0	CFM

*Indicated volume is based on custom building volume.

---System 1---

Infiltration & Ventilation Sensible Gain Multiplier: 13.04 = (1.10 X 0.988 X 12.00 Summer Temp. Difference)
Infiltration & Ventilation Latent Gain Multiplier: 12.52 = (0.68 X 0.988 X 18.65 Grains Difference)
Infiltration & Ventilation Sensible Loss Multiplier: 78.23 = (1.10 X 0.988 X 72.00 Winter Temp. Difference)
Winter Infiltration Specified: 0.400 AC/hr (80 CFM)
Summer Infiltration Specified: 0.400 AC/hr (80 CFM)

Load Preview Report

Scope	Net Ton	ft.² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	3.11	995	3,090	27,662	9,601	37,264	34,963	460	1,273	1,273	
System 1	3.11	995	3,090	27,662	9,601	37,264	34,963	460	1,273	1,273	12x18
Zone 1			3,090	27,662	9,601	37,264	34,963	460	1,273	1,273	12x18
1-First Floor			1,350	16,990	4,549	21,539	21,023	276	782	782	8--7
2-Office First Floor			120	1,327	269	1,596	1,922	25	61	61	1--5
3-Storage Room			270	6,147	4,070	10,217	3,157	42	283	283	3--6
4-Basement			1,350	3,198	713	3,911	8,861	117	147	147	2--6

Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
Historic St & IP: Glazing-Historic single pane with exterior storms and interior glazing panels, U-value 0.37, SHGC 0.5	192	5,120	0	8,347	8,347
11L: Door-Metal - Paper Honeycomb Core, U-value 0.56	58.5	2,358	0	590	590
DP cellulose 4": Wall-Frame, Custom, Dense Pack Cellulose, U-value 0.083	1951.6	11,662	0	1,864	1,864
12D1-0bw: Wall-Frame, R-21 closed cell 2 lb. spray foam insulation in 2 x 4 stud cavity, no board insulation, brick finish, wood studs, U-value 0.083	165	986	0	55	55
Thermax or SPF: Wall-Block, Custom, Insulate Rim Joists, U-value 0.056	620	2,500	0	326	326
15A-2s3oc-4: Wall-Basement, concrete block wall, R-2 foam board to 3', no framing, no interior finish, open core, 4' floor depth, U-value 0.128	160	2,287	0	202	202
Thermax or SPF: Wall-Block, Custom, Insulate Rim Joists, U-value 0.083	61	364	0	48	48
16B-50: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-50 insulation, U-value 0.02	1580	2,275	0	1,327	1,327
slopes. Eaves-ad: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Custom, FG in eaves Slopes, dark asphalt, U-value 0.08	200	1,152	0	592	592
Subtotals for structure:		28,704	0	13,351	13,351
People:	43		8,600	9,890	18,490
Equipment:			0	1,100	1,100
Lighting:	650			2,217	2,217
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 80, Summer CFM: 80		6,259	1,001	1,043	2,044
Ventilation: Winter CFM: 0, Summer CFM: 0		0	0	0	0
AED Excursion:		0	0	62	62
Total Building Load Totals:		34,963	9,601	27,662	37,264

Check Figures

Total Building Supply CFM:	1,273	CFM Per Square ft.:	0.412
Square ft. of Room Area:	3,090	Square ft. Per Ton:	995
Volume (ft³):	12,000***		

***Indicated volume is based on custom building volume.

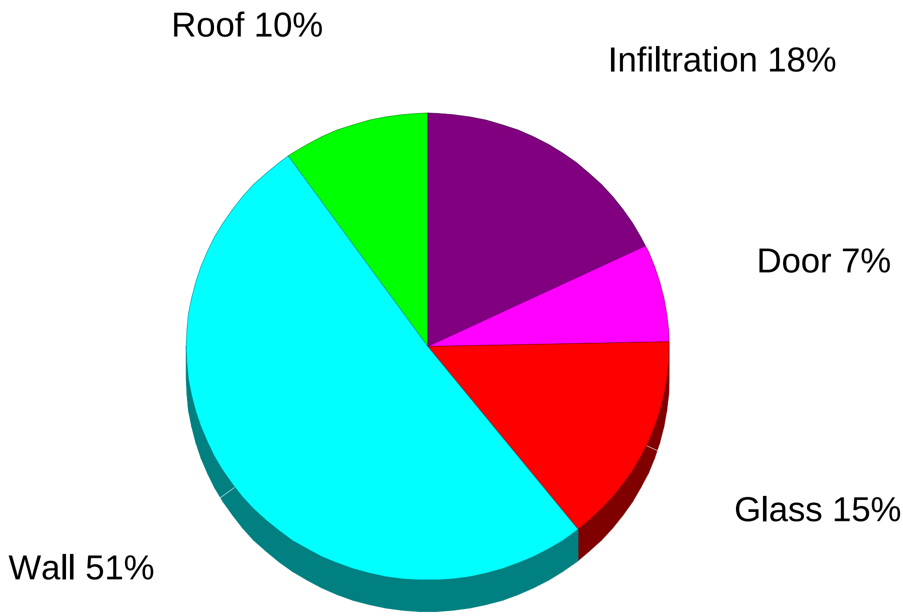
Building Loads

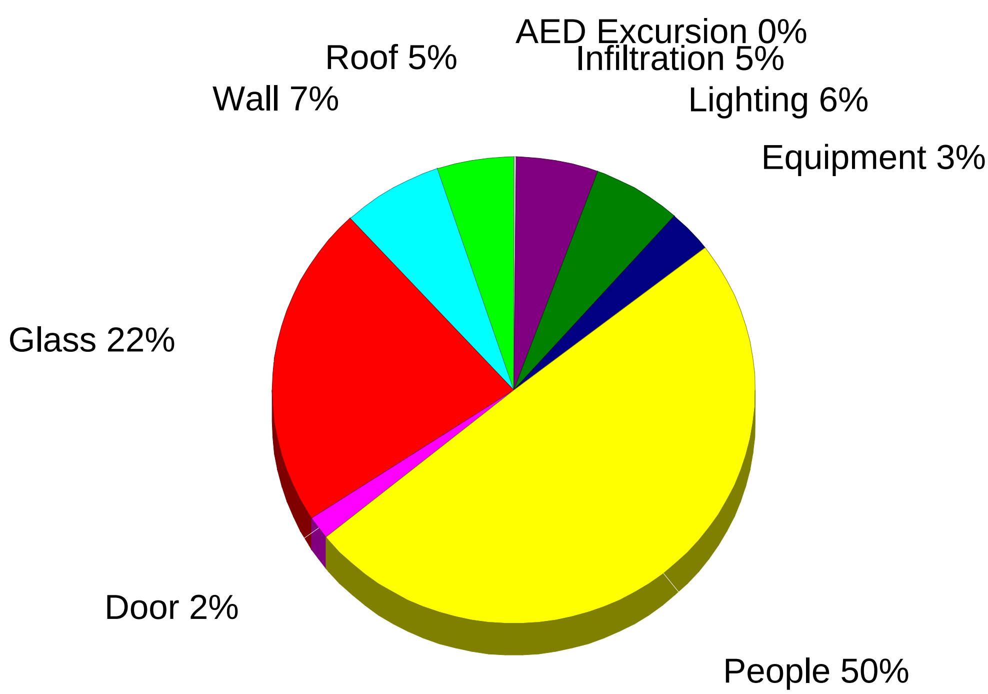
Total Heating Required Including Ventilation Air:	34,963	Btuh	34.963	MBH
Total Sensible Gain:	27,662	Btuh	74	%
Total Latent Gain:	9,601	Btuh	26	%
Total Cooling Required Including Ventilation Air:	37,264	Btuh	3.11	Tons (Based On Sensible + Latent)

Notes

Rhvac is an ACCA approved Manual J, D and S computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
All computed results are estimates as building use and weather may vary.
Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Building Pie Chart





LENNOX®
Service Literature

UNIT INFORMATION

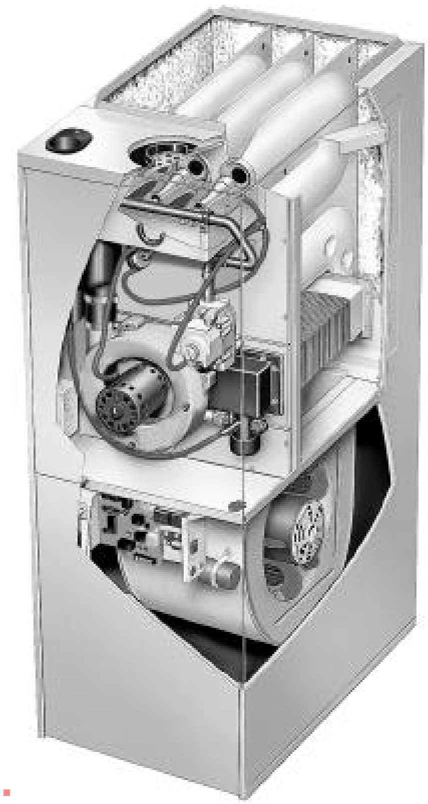
G26
Corp. 9721-L11
Revised 07-2001

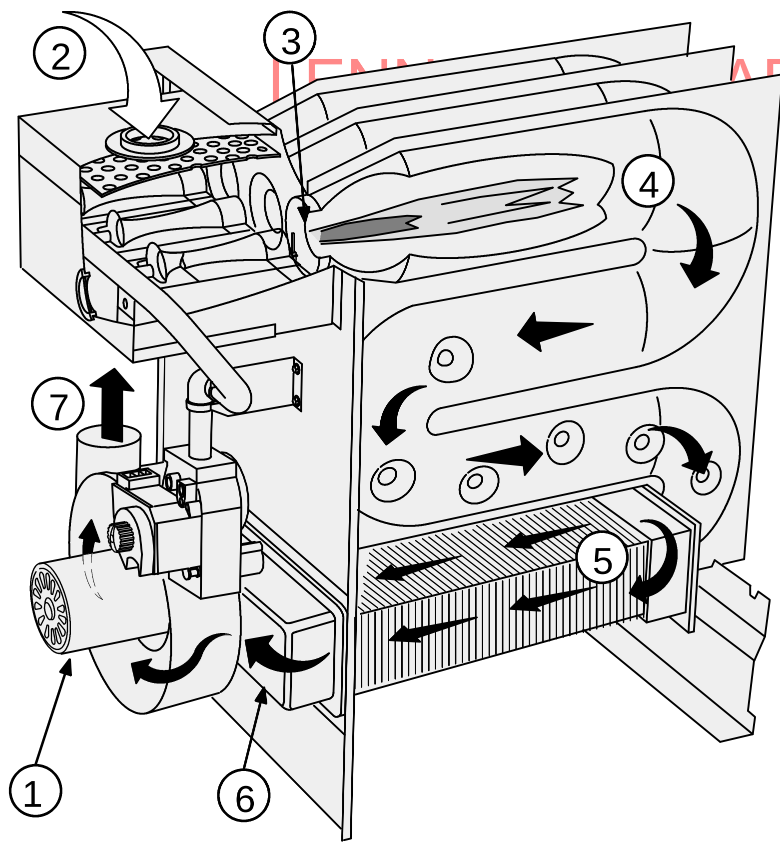
G26 SERIES UNITS

G26 series units are high-efficiency upflow gas furnaces manufactured with DuralokPlus™ aluminized steel clamshell-type heat exchangers. G26 units are available in heating capacities of 50,000 to 125,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. A kit is available for conversion to LPG operation. G26-1 and -2 model units use electronic (intermittent pilot) ignition. G26-3, -4, -5 and -6 model units feature the Lennox SureLight™ silicon nitride ignition system. Each unit meets the California Nitrogen Oxides (NO_X) Standards and California Seasonal Efficiency requirements without modification. All units use a redundant gas valve to assure safety shut-off as required by A.G.A. or C.G.A.

Information contained in this manual is intended for use by qualified service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes. In the absence of local or state codes, the guidelines and procedures outlined in this manual (except where noted) are recommended only.





G26 FURNACE▲
◀G26 HEAT EXCHANGE ASSEMBLY

Combustion Process:

1. A call for heat starts the combustion air blower.
2. Outdoor air is drawn through pipe into the burner compartment where it mixes with gas in a conventional style inshot burner.
3. The SureLight ignition system lights the burners.
4. Combustion products are drawn downward through the heat exchanger. Heat is extracted as indoor air passes across the outside surface of the metal.
5. Latent heat is removed from the combustion products as air passes through the coil. Condensate (water) is formed as the combustion products cool.
6. As the combustion products exit the coil, condensate is collected and drained away.
7. Combustion products are pulled from the heat exchanger and forced into the flue.

Technical Publications

SPECIFICATIONS

Model No.		G26Q3/4-100	G26Q4/5-100	G26Q3/4-125	G26Q4/5-125
Input Btuh (kW)		100,000 (29.3)		125,000 (36.6)	
Output Btuh (kW)		91,000 (26.7)	93,000 (27.2)	115,000 (33.7)	116,000 (34.0)
☆A.F.U.E.		92.0%	92.0%	91.0%	92.0%
California Seasonal Efficiency		86.6%	85.8%	87.5%	87.0%
1 Exhaust pipe connection (PVC) diameter— in. (mm)		2 (51)			
1 Intake pipe connection (PVC) diameter— in. (mm)		3 (76)			
Condensate drain connection (PVC)— in. (mm)		1/2 (12.7)			
Temperature rise range — °F (°C)		50-80 (28-44)	40-70 (22-39)	55-85 (31-47)	50-80 (28-44)
High static certified by (A.G.A./C.G.A.) — in. wg. (Pa)		.50 (125)			
Gas Piping Size I.P.S. Natural or LPG/propane	in.	1/2			
	mm	12.7			
Blower wheel nominal diameter x width	in.	10 x 10	11-1/2 x 9	10 x 10	11-1/2 x 9
	mm	254 x 254	292 x 229	254 x 254	292 x 229
Blower motor output — hp (W)		1/2 (373)	3/4 (560)	1/2 (373)	3/4 (560)
Nominal cooling that can be added	Tons	2 to 4	3-1/2 to 5	2 to 4	3-1/2 to 5
	kW	7.0 to 14.1	12.3 to 17.6	7.0 to 14.1	12.3 to 17.6
Shipping weight — lbs. (kg) 1 package		186 (84)	198 (90)	218 (99)	218 (99)
Electrical characteristics		120 volts — 60 hertz — 1 phase (all models) (less than 12 amps)			
Optional Accessories (Must Be Ordered Extra)					
LPG/Propane kit (optional)		**65K27** (all models)			
Filter and Filter Rack Kits ‡No. & size of filters - in. (mm)		Single **(44J21)** Ten Pack **(66K62)** (1) 20 x 25 x 1 (508 x 635 x 25)			
Concentric Vent/Intake Air/Roof Termination Kit (optional)		**33K97** — 2 inch (51 mm)			
1 Vent/Intake Air Roof Termination Kit (optional) — vent size	2 inch (51 mm)	**15F75**			
	3 inch (76 mm)	**44J41**			
1 Vent/Intake Air Wall Termination Kit (optional) — vent size	2 inch (51 mm)	**15F74** (ring kit) — **22G44** (close couple) — **30G28** (WTK close couple) **30G79** (WTKX close couple with extension riser)			
	3 inch (76 mm)	**44J40** (close couple) — **81J20** (WTK close couple)			
Twinning Kits (optional)	Non-continuous low speed	**64H88** (all models)			
	Continuous low speed	**35J93** (all models)			
Continuous Low Speed Blower Switch (optional)		**44J06** (-1 and -2 models) Not used with Twinning Kits			

☆Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.
‡Polyurethane frame type filter.
1 Determine from venting tables proper intake and exhaust pipe size and termination kit required.
NOTE - 2 inch x 3 inch (51 mm x 76 mm) adaptor is furnished with -100 and -125 furnaces for exhaust pipe connection.

BLOWER PERFORMANCE DATA

FILTER AIR RESISTANCE

cfm (L/s)	in. w.g. (Pa)
0 (0)	0.00 (0)
200 (95)	0.01 (0)
400 (190)	0.03 (5)
600 (285)	0.04 (10)
800 (380)	0.06 (15)
1000 (470)	0.09 (20)
1200 (565)	0.12 (30)
1400 (660)	0.15 (35)
1600 (755)	0.19 (45)
1800 (850)	0.23 (55)
2000 (945)	0.27 (65)
2200 (1040)	0.33 (80)
2400 (1130)	0.38 (95)
2600 (1225)	0.44 (110)

BLOWER PERFORMANCE DATA

G26Q3/4-100 BLOWER PERFORMANCE

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0	0	2065	975	920	1760	830	735	1570	740	655	1245	590	520
.10	25	2000	945	875	1730	815	705	1550	730	625	1240	585	490
.20	50	1925	910	845	1685	795	675	1515	715	590	1225	580	470
.30	75	1840	870	800	1625	765	630	1475	695	565	1210	570	455
.40	100	1740	820	760	1550	730	595	1415	670	535	1165	550	430
.50	125	1650	780	730	1460	690	560	1335	630	500	1110	525	405
.60	150	1545	730	700	1370	645	530	1260	595	475	1045	495	385
.70	175	1420	670	660	1250	590	495	1170	550	445	950	450	355
.80	200	1270	600	620	1110	525	445	1025	485	395	825	390	325
.90	225	1045	495	560	965	455	405	885	420	360	700	330	290

NOTE — All air data is measured external to unit with 1 in. (25 mm) cleanable foam filter (not furnished) in place. Also see Filter Air Resistance table.

G26Q4/5-100 BLOWER PERFORMANCE

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps														
		High			Medium-High			Medium			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0	0	2400	1135	1255	2185	1030	1070	1940	915	905	1740	820	765	1570	740	665
.10	25	2350	1110	1230	2150	1015	1055	1920	905	885	1710	805	755	1525	720	645
.20	50	2290	1080	1185	2105	995	1025	1875	885	865	1685	795	740	1505	710	640
.30	75	2225	1050	1170	2060	970	1005	1845	870	850	1655	780	730	1485	700	630
.40	100	2165	1020	1130	2010	950	985	1805	850	835	1620	765	720	1450	685	620
.50	125	2105	995	1115	1950	920	960	1755	830	810	1585	750	700	1415	670	605
.60	150	2040	965	1080	1895	895	940	1700	800	790	1540	725	690	1380	650	595
.70	175	1955	925	1045	1820	860	915	1640	775	775	1475	695	670	1340	630	590
.80	200	1850	875	1005	1730	815	885	1580	745	755	1430	675	660	1290	610	580
.90	225	1770	835	985	1650	780	855	1505	710	740	1370	645	645	1225	580	565

NOTE — All air data is measured external to unit with 1 in. (25 mm) cleanable foam filter (not furnished) in place. Also see Filter Air Resistance table.

G26Q3/4-125 BLOWER PERFORMANCE

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0	0	2070	975	920	1735	820	725	1555	735	640	1235	585	500
.10	25	2010	950	885	1710	805	700	1535	725	625	1225	580	490
.20	50	1950	920	850	1675	790	680	1500	710	600	1210	570	470
.30	75	1975	930	820	1620	765	645	1465	690	575	1185	560	455
.40	100	1785	840	775	1560	735	615	1415	670	545	1140	540	435
.50	125	1700	800	745	1475	695	575	1345	635	520	1090	515	415
.60	150	1585	750	705	1410	665	555	1275	600	490	1035	490	390
.70	175	1475	695	675	1310	620	515	1185	560	460	975	460	370
.80	200	1350	635	640	1200	565	485	1090	515	425	865	410	340
.90	225	1200	565	595	1080	510	445	965	455	385	715	335	300

NOTE — All air data is measured external to unit with 1 in. (25 mm) cleanable foam filter (not furnished) in place. Also see Filter Air Resistance table.

G26Q4/5-125 BLOWER PERFORMANCE

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps														
		High			Medium-High			Medium			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0	0	2400	1135	1210	2175	1025	1040	1965	925	895	1790	845	780	1610	760	670
.10	25	2315	1090	1175	2125	1005	1025	1930	910	875	1760	830	770	1580	745	660
.20	50	2255	1065	1150	2080	980	1000	1880	885	860	1740	820	755	1550	730	645
.30	75	2195	1035	1130	2030	960	975	1840	870	835	1710	805	750	1520	715	635
.40	100	2120	1000	1100	1970	930	960	1790	845	815	1665	785	730	1495	705	630
.50	125	2050	965	1080	1910	900	934	1745	825	800	1620	765	715	1460	690	620
.60	150	1985	935	1050	1840	870	905	1685	795	785	1565	740	705	1415	670	610
.70	175	1885	890	1020	1770	835	890	1635	765	775	1515	715	685	1370	645	595
.80	200	1815	855	1005	1690	800	860	1570	740	750	1450	685	670	1315	620	580
.90	225	1735	820	980	1615	760	835	1485	700	725	1385	655	655	1245	590	565

NOTE — All air data is measured external to unit with 1 in. (25 mm) cleanable foam filter (not furnished) in place. Also see Filter Air Resistance table.