

GREENHOUSE TIPS

Alberta News

Combat the high cost of heating.

Infiltration



ENERGY CONSERVATION SERIES

Understanding roof vents and the evil and costly effects of infiltration

This year we spent considerable time on several projects in Alberta servicing roof and gutter vent systems.

To be frank it never ceases to amaze us how we are told by growers that the high cost of heating is getting them down. Well by the actual state of maintenance, repair, and operation of the vent systems that we looked at; this "THING" about high costs of energy seems mute. It is time (again) to get serious about curbing your energy consumption.

As great as roof/gutter and sidewall vents are, a poorly designed, installed, maintained and operated vent system can be a money pit.

Bulb seals at vent footer or slam rail. ? You bet. They are essential. If your greenhouse supplier doesn't offer them or specifically state that they are supplied, don't use them. Use somebody else that does. Why !!! Glad you asked that. A 1/16" gap, will allow 15 CFM of air per foot of crack. So what !!!!! Say on a 144 foot long gutter vent, this gap occurs the length of the vent and it is -10 deg. F outside, and you are trying to maintain an inside temperature of 70 deg. F. and at a paltry 0.1" pressure differential. Well folks that vent system crack is costing you 190,000 BTU's of heat per hour. And that's not the worst. Just remember what goes out has to come in. And where is all that -10 deg. F air coming in ??? At low level of course and where are your plants and their root systems ? So now you have created a hostile

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Energy Conservation

A lot ... we mean a lot of wasted energy is spent on not controlling leakage through cracks and gaps.

growing environment plus you are throwing cash out the roof.

Not so you say.... It doesn't happen... Right .. Without throwing darts, we know of at least 6,360 lineal feet of vent system in this province that does not have a bulb seal and has at least a 1/16" crack along the length of the vent. In over 75% of that footage, we were told by the operator/owner, that it made the vent system to costly. Oh boy. It reinforces the fact that growers love cutting cheques to the utility companies. (Maybe it is the old Alberta attitude ... hey, we have cheap energy).

Vent service ... you need to get up at least once a year and check the vent system. By this adjust any of the racks and pinions so that the vent system does indeed close completely along the length of the vent system and that it does indeed compress the bulb seal just a tad. Folks foundations systems shift, the structure goes under millions of expansion and contraction cycles every year. DON'T take this for granted. We cannot tell you how many 1/4", to 1/2" to 3/4" gaps that we saw and adjusted this year. Actually, it was an obscene amount. While you

are up there at least grease the hangers, pinions and racks as well. It is far easier to maintain than to replace.

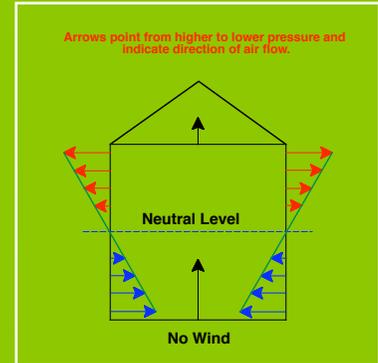
Controls. It never fails to amaze us when we are asked to install vent control systems and the client wants just T'stat control. Yep that's right. Open and close. In short this is the most useless and wasteful means of energy from a control point of view. Yes staged controllers cost money, but again this reinforces our belief growers do not mind cutting cheques to the utility companies. Multistage controllers not only provide a pay back in energy savings, but also provide for a better growing environment.

To recap.

Purchase your vent systems fully informed. Install them and the structure with care. Maintain them frequently. Use modern multistage intelligent controls. In the long run your money will stay in your pocket.



INFILTRATION



Is the uncontrolled flow of air through openings in the building envelope driven by pressure differences across the shell. Infiltration is balanced by an equal amount of exfiltration. Uncontrolled/excessive infiltration will contribute greatly to your heating costs.

More Information on Infiltration and tips to control.

- Article One : general understanding of infiltration.
- Article Two : Tips on how to cut down infiltration.
- Article Three : Control Strategies for Roof Vents

Lubrication

An excellent lubricant to use on hangers and pinions where they are supplied with nylon bearings or bronze bearings is spray white grease.

New installations ... heck spray your hangers and pinion bearing surfaces before you put them up.

Still Not Convinced

Let's only look at the infiltration loss component of your structures heat loss.

Let's look at the infiltration heat loss component for a small freestanding greenhouse, let's say a very popular sized 30 foot wide X 96 foot long. It is clad in double poly with the gable ends clad in twin wall 8 mm polycarbonate. The structure is provided with a double poly roof vent system that seats very well along the length of the structure and is provided with a decent bulb seal and is carefully built with care to details during construction.

Not to frighten you (Alberta growers) with very scary numbers, the below will be based on the following conditions.

Outside temperature of -10 deg. C (14 deg . F), indoor temperature of 18.3 deg. C (65 deg. F). And just to make things easy, there is now wind. The neutral plan level of the structure is at the 2.4M (8 foot) mark, after all it is a freestanding house.

Okay here we go. Based on the above. The infiltration rate should be in the magnitude of about 385 CFM. This creates to a heat loss/load of $1.08 \times 365 \times (65 - 14) = 20,104$ BTU's per hour.

Okay not bad so far. Now say the vent was raised just a tad say 1/16" just to approximate bad vent fit. This small / insignificant (ya right) crack will increase the infiltration rate to 614 CFM. This creates a heat loss/load of $1.08 \times 614 \times (65-14) = 33,819$ BTU's. Gee's that's almost double.

Now let's get serious, let's add a small 24 kph (15 mph) wind to the equation. Now this small/insignificant crack will increase the infiltration rate to (hold on your hats) 1824 CFM. This creates a heat loss/load of $1.08 \times 1824 \times (65-14) = 100,465$ BTU's. Holy cow... Batman ... almost 5 times the heat loss.

Now for the sobering. Let's look at a realistic outdoor air temp. After all even for the bedding plant growers, we often have to deal

with lot's of -25 deg. C (-13 deg F) stuff in early spring.

You'd better pour some coffee for this. It hits home hard, Take that same small crack, keep that low wind velocity and just drop the outdoor temp. Drum roll please. The infiltration loss is now $1.08 \times 1824 \times (65-(-13)) = 153,653$ BTU's. Wow.

Now how about adding some of that wind that we get with spring blizzards. Ahlet's say increase to 48 kph (30 mph). Now that darn little crack is going to leak in 2438 CFM of outdoor air due to the increase wind pressure. This presents a heat loss of $1.08 \times 2438 \times (65-(13)) = 205,377$ BTU's/hr heat loss.

So folks there you have it. The numbers get staggering and they amount to quite a bit of your heating load.

It is interesting to note. During the above conditions and assuming your double poly roof is in reasonable shape. The conducted heat loss of the roof is only a paltry $48' \times 96' \times .55 \times (65-(-13)) = 197,683$ BTU's per hour. Folks you are losing more heat from that small crack than the whole conducted loss of the roof.

Now for you folks that are snickering that's the problem with roof vents they leak. Well folks I cannot tell you how many lineal feet of shoddy sidewall base systems I've walked past during the last 22 years in this province that would allow (leak) just as badly or worse than that small gutter vent crack.

Infiltration ! It will eat you alive if you don't take corrective steps. They all can be easily and cheaply fixed. it is time to get serious.

Infiltration --- the Necessary Evil

We run into this all the time. Growers will insist that infiltration helps them control humidity. We don't deny this. It does indeed help purge the greenhouse. The problem with this assumption is that infiltration drastically exposes the lower portions of the greenhouse to very

cold conditions. Hmmmmm ... where are the plants.

All the humidity still remains up at high level in that nice warm bubble. So what has been achieved ? Nothing ! All that you've created is a low level hostile environment for your plants. Dehumidification if required is best dealt with a controlled approach. Uncontrolled infiltration would be like driving your car with automatic transmission at full throttle and varying your speed with the clever and delicate application of the brakes.

Since I'm on such an infiltration rant. Greenhouse Doors. Folks take the time to frame them in plumb and tight as possible. I see that a lot of suppliers aren't providing door stops on their door frames (the claim is to allow the doors to be hinged either way). Foey, I say ! Nothing but leakers. Care to guess how many CFM of crack a 1/4" crack conveys. It's an obscene amount ! And consider the average greenhouse door 4'X8' has 24 feet of potential crack. And yes folks, there are many many doors out there that I've seen at least 1/2" gap.

We must be blessed with cheap energy costs !!!!

Folks take the time to frame in tightly. And if the supplier doesn't provide a perimeter door strike plate system then add one and at the same time splurge and buy a couple rolls of 3/32" thick X 1/2" or 3/8" foam tape. On the doors that you don't often use except for plant material move in or out, consider applying a row of wire lock on the perimeter of the door frame and cover over with a layer of poly.

Cheap, easy and practical.

Till next time.

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