Controlled Airing with heatregain in flats which really rendits.

GF·SOL·AIR

What's the meaning of controlled airing?

In contrary to „uncontrolled" airng by windows or doors, at "controlled airing" exchange of inside air is performed under tight control tuning of air volumes or automatically due to the needs or other requirements (e.g. humidity, CO2-content). This way airing volumes are reliable and qualified. At least there we talk about our most important food, the air. Only few minutes we survive without air, but anyway some days without water, and some months without food. Therefore the supply of air in our homes should be valued with high level. Devices and equipments which perform this supply, do not need necessarily to be hidden.

What is heat regain (HR)?

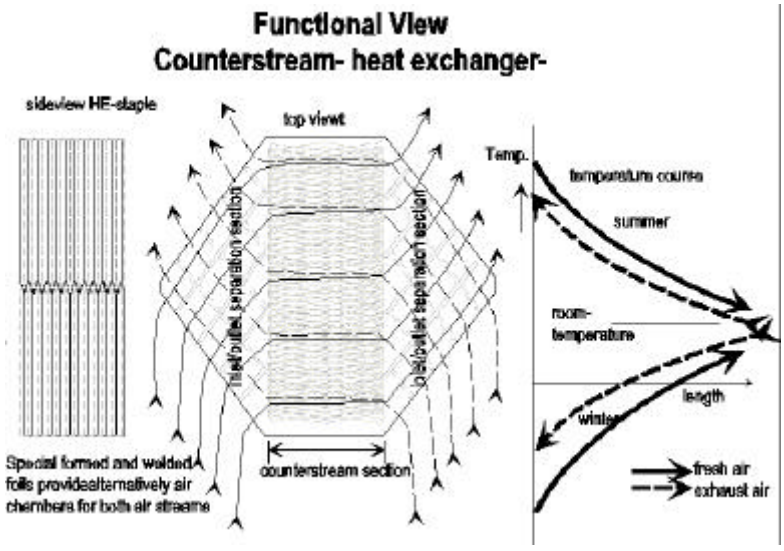
Worn out air at last is doing a very usefull action, before it leaves the house: In winter time it warms up the incoming fresh and cold air nearly to room temperature. Even though during hot seasons the advantages are comfortable, since the hot and sultry air from outside will be cooled down nearly to room temperature and no single cent/penny is required for artificial cooling!

What are heat exchangers (HE)?

Heat regain is preferrable performed in plate heat exchangers techniques (recuperative) or via of heat retainer techniques (regenerative). The retainer technique absorbs the heat of worn air in a mass of metall or ceramic with large surfaces and transfers the heat to the cold air by time lag (blowing the air stream forward and backward) or by physical displacement (rotating retainer). Due to the performance type, high heat energy regain rates can be achieved, but that does not mean, the temperature results of inlet air are in all cases optimal and continuously stable.

What are Plate-Heat-Exchangers (phe)?

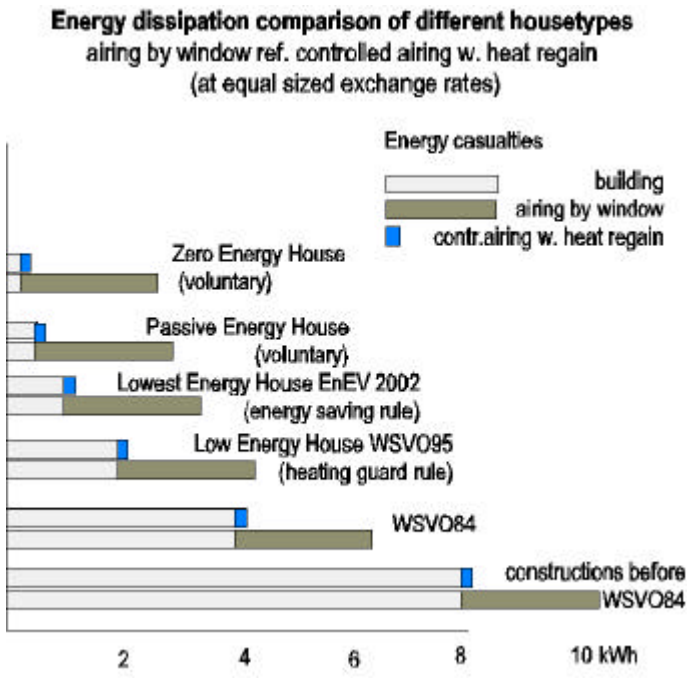
The phe are either of a counterstream or crossstream construction, where the staples of plates are either of metall or plastic type. The thin plates (foils) are arranged in a staple, separating the outlet air from inlet air in alternating manner with thin gaps for individual air streams. The foils may be profiled in a specific manner to achieve a more efficient surface and also a permanent turbulence for the individual airstreams while passing the phe, improving its efficiency powerfully, because of high frequent contacts between the air molecules and the foil surface. Both airstreams are synchronous and of equal-sized volumes, resulting in no pressure differences inside a room. The hr-efficiency becomes optimal, since the heat energy is transferred between equal-sized air volumes.



Why are plastic heatexchangers better than those of metall?
Astonishing for laymen: The regain rates of HE's produced by plastic foils are significantly better (25 to 30 % more) than constructions with metall foils, even though the conductivity of plastics is by factor 500 lower than e.g. aluminum. The reasons are not paradox: The conductivity of air is further by minimum factor 100 lower than plastics. For the heat transfer between air streams, it is nearly negligible, which material is in use. But the excellent conductivity of metall plate is its disadvantage, since it works also over the length of the HE in parallel to the temperature curve, with the effect of partial equalisation of energy, like a short cut. So the finally achievable inlet air temperature lacks significantly, the more, the metall plates/foils are thicker.
Actual plastic foils don't suffer under short cut, and therefore GF-SOL-AIR's (www.gf-sol-air.de) small and compact HE benefits from a excellent HR efficiency rate of 90%. Since the plastic-foil-staples can be produced at a low cost level, also the customers profit from this advantage.

Why are 100% efficiency rates impossible?
The heat transfer between the two air-streams requires a certain amount of temperature difference, depending on several parameters, such like material, construction, dimensions, speed of air flow, turbulence degree, occuring condensation, a.o. The temperature difference is a continuous value, escorting the length dimension of HE . In comparison: If two water containers have different levels and a connection is built between both, water will flow until the levels are equalized. A HE which could transfer heat without loss of temperature it would be a ‚Perpetuum Mobile' , but that never exists. If some competitors advertise with about 99% efficiency rates, we advise to examine delicately.

How big are airing casualties in flats?
In case of comparable resident's behaviour of airing, same area of living space, the loss of energy is constant. So a single airing cycle in all rooms in a 120 m² dwelling-house at 21°C inside and 0°C outside temperature, calculates to about 3 kWh energy content in the air mass left by windows. Reheating the exchanged cold airmass takes about 0.3 Liter fuel oil or 0.33 m³ natural gas. Repeated airing every 2 hours (less often the night) let's assume 10 times a day, results in 3 liters oil or 3.3 m³ n.gas during an average winter day, lost by window airing. Money thrown out! Due to outside temperature more or less.
If uncontrolled airing is replaced by controlledairing with hiegh efficient HR, the calculation looks much better the casualties are only a ten'th part of the value before. Saved money, which can be utilized for other purpose. Incase you find also the prizeworth equipment, so you can expect early ROI (return on investment).



How relates that to the heating costs for the whole dwell-house?
Depending on the construction of a building, its age, type, used construction material a.s.o., the general energy loss occurs dominant by transmission via walls, windows, doors, roofs. Governmental rules brought energy savings into construction requirements by

insulating the walls and roofs, using better window constructions with multiples of glass-layers. Heating techniques have been improved sigificantly. Such way, reduction of heating costs have been achieved by factors of 4 to 16 in reference to elder buildings, where transmission loss was 80-90% of heat consumption, remainder for airing by window.

Meanwhile we know house types called Passive-Energy-House (PEH), having only heat consumption of 1.5 kw/m² and year. Uncontrolled airing would cause the 5 or 6 fold of this value, therefore a PEH can be socalled only, if it has controlled airing with high efficient HR. Above graphic shows a reference of various house types, in each case window-airing and also controlled airing with 90% HR.

Solely the figure confirms the arguments, that a modern house construction cannot exist without controlled airing and HR. Analogous this view is applicable also for commercial and administrative buildings.

Why is controlled airing with HR not yet wide-spread?

There are a lot of reasons. The first one I call mental and is based on our education. The word airing causes in all heads the term: Going to a window and open it. We know it from our earliest youth. A change of this behaviour must start in our heads.

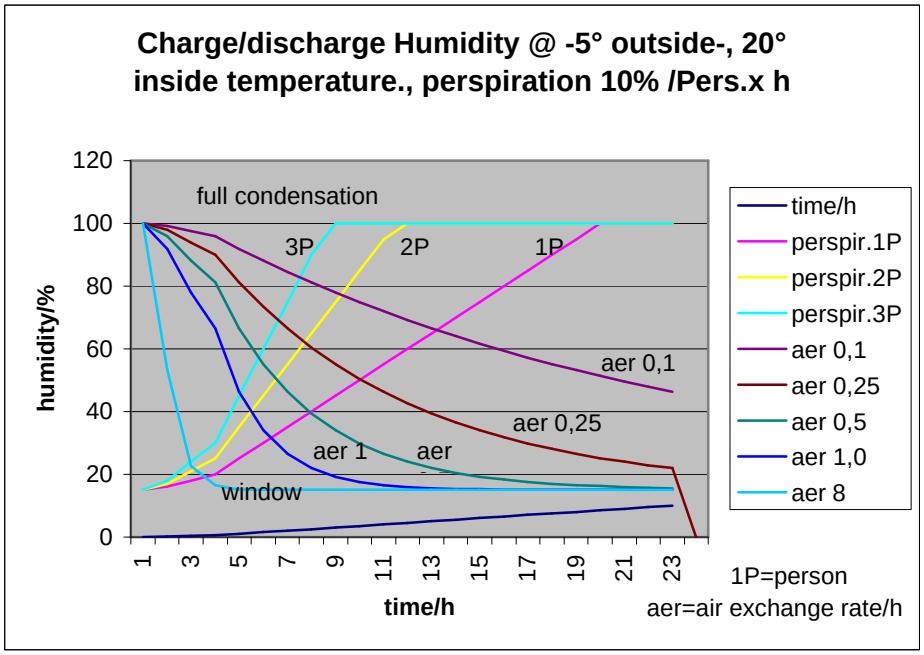
Although there were many measures initiated meanwhile to save energy costs, implementation of controlled airing with HR is braked, because of many prejudices with the people, surviving obstinate over long periods

- Airing equipments are too expensive,
- The expected HR is compensated by own power consumption,
- The HR-rates are not correct (imputes falsifying),
- The air inhouse becomes too dry, cause of SBS (sick building syndrome)
- There exist a lot of frosting and cleaning problems,

just to announce some of them.

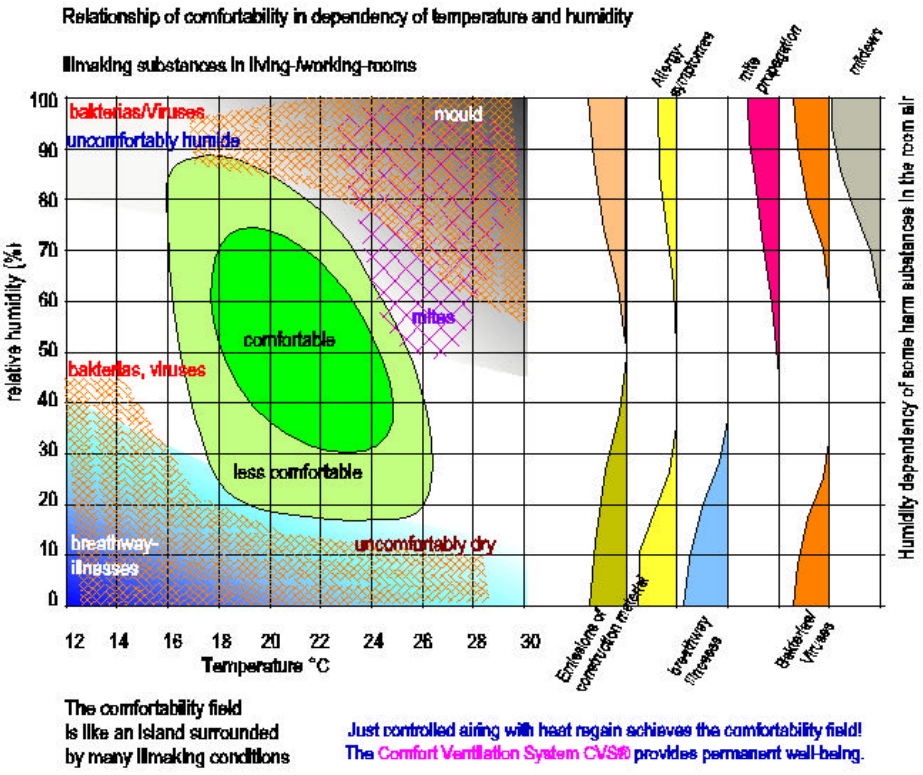
Why does the Comfort Ventilation System CVS from GF-SOL-AIR not need to frighten those prejudices?

The products of GF-SOL-AIR having the best worth of money on the market, because offering best value. A short amortisation period is preprogrammed by pure energy saving. ROI can be achieved already within 2-4 years, depending on housetype and airing behaviour of residents in before. An important reason for the best prize/feature ratio is a clearly arranged and simple construction of equipment, the decentral concept of airing (no long tubes thru all rooms), short installation time given (less 1h) and therefore low add-on costs for the users.



The HR-rate is average 90% (TUV confirmed), individual power consumption ranges from 1 to 6 Wh/h depending on air

volume and performance, which is less than a energy saving lamp specifies. The ratio of energy saving and power consumption ranks over the value of 12. This ratio also depends on volume and weather. By the way, the power consumption is not to see as waste, since the energy (finally also heat energy) is feed back into the rooms, such way just replacing appropriate amounts of the general heating system.
A problem machined airing produces too much dryness does not apply to the CVS-products, since GF-SOL-AIR has the opinion, too big air exchange rates are not advantageous, but more disadvantageous. With adaption of air volumes by stepping up and down the fan speeds it is very easy to get a balance between humidity perspired by residents and humidity removed by airing. Ideal humidity values (35-65%) are achievable without big efforts. Above graphic shows linear curves each separate charging a standard room with humidity of 1, 2 and 3 prespiring persons, and also various discharge curves (depending on air exchange rates) from a 100% humide room without residents. When x residents are present and controlled airing is on, an appropriate pair of counter running curves give a intersection with longtime stability. The resulting humidity corresponds to the balance of charged humity and discharged humidity, this way creating ideal values for feelings of comfortability. Additional measures for regulation are not necessary.



Objections of some lovers for big air exchange rates, the resulting air volumes would too small, I argue that air supply is secured, while volumes are of 10 to 20-fold of necessary breath volumes are available and also the harms exhausted from furniture and construction materials will be rarefied to acceptable rates. Rarefied ratios of 5% do not differ so much from those of 2%.

Excessive airing exchange rates particular produce much too dry environments and same time more airing casualties even though the heat exchanger has good and best HR-rates.
A danger of frosting of the condenser water within the heat exchanger of the GF-SOL-AIR products ist not given before sibirian temperatures of less than – 30° C. GF-SOL-AIR has for the CVSintellec a patented method of freeblowing the HE dependant on outside temperature. A flap is changed over from inlet air to room air, such way for a while the warm room air can defrost possibly frozen condenser water and partial evaporate it, so the heat exchanger is returned to its full functionality. This action is taken the more often, the colder it's outside. This task is performed with a microprocessor controlled electronic board.
The younger CVSrobusto versions are constructed more simpler: These have a manual controlled mixing flap nearby of the HE's fresh air entry. In case weather shows frost temperatures below –5° the flap has to be opened gapwise, and more if it's colder. The resulting mixed air temperature within the entry area prevents the HE to get frozen.

How is cleaning and maintainance performed?
Especially with the products versions CVSrobusto and CVSjumbo maintainance and cleaning can be done vers easy: You open the doorflap and you see everything face to face, since installation is executed preferrably in half room height. With a vacuum cleaner you remove any dust at the airstream ways. The filter mats laying on the entry areas of the HE can be reused after cleaning them. In the case the HE is insige covers with dust, it can be deinstalled easily and washed by warm (not too hot!) water, and reinstalled together with the associated condense water van and the green fleece.

Which other benefits has controlled airing?
Beside the measurable and therefore controllable features, there are many other advantages , but these are difficult expressable in values of money.

- Controlled airing implies enforced ventilation, although there is no feeling, because of the low speed. It works without draught. Anyway heat is distributed much better than conventional by convection, so all wall partitions are equalized in temperature considering the control of the heating system. No chance for cool edges, not dew points, where mildew cultures could settle.
- Controlled airing effects in removal of excessive humidity while outside temperatures are lower and more dry than inroom. The humidity is based from the residents, their animals and plants. Without airing, it would concentrate to highly uncomfortable values and in consequence condense partial. But those conditions are best case for more growth of mites, bacterias, viruses and generally for mildew cultures, which produce now millions of spores, causing severe damages in walls, textiles, and furnitures. Controlled airing can balance the humidity either being too humide nor being too dry, because there also many other illness reasons, which like it dry.
- Controlled airing with heat regain means during hot season to prefer from a comfortable (no charge) coolness.
- Controlled airing also means optimal to avoid any burden from outside: These are dust, pollen, insects and traffic noise of any kind, streets, railways and airplanes. It’s marvelous to reside in silence.
- Controlled airing at all means always breathing fresh air, sleep better, for sick people to health earlier, to perform stressed works with more and better concentration, also means maintainance of the own home.

Which influence we get on climate change (Kyoto-Protocol?
In conjunction with the longtime required sanitation of elder buildings due to the energy saving order, and the equipment with controlled airing with heat regain, a tremendous huge amount of primary energy could be saved within a short time span. Such way the objectives of Kyoto-protocol to reduce CO2 exhaustion into atmosphere could be achieved in one decade, I guess, beaten.