Appendix F: Test schedule for evaluation

Technical procurement of heat recycling systems in existing apartment blocks

Parameter	Test method for verification
Electrical efficiency	Electrical efficiency for the ventilation system (SFP) to be measured at design air flow kW/(m^3/s) **After** installation
Seal in the duct system	To be tested on 10% of the duct system after rebuilding pursuant to SS-EN 12237.
Buildings' energy performance (Requirement reduced heat consumption)	Measurement to be carried out **before and after** rebuilding of the following: Heat consumption for heating. If domestic hot water is included in heat consumption measured, this must be deducted. This can be done by measuring the amount of cold water heated up, which can form the basis for calculating heat needed to produce hot water. Heat consumed before and after can then be determined. Heat recycled for domestic hot water to be measured after installation, when this is relevant. Energy measurement should preferably relate to a continual 12-month period both **before and after** installation. If pre-measurement is not available for a 12-month period, measurements can be taken during a shorter period with weekly readings for about 10 weeks during the heating season October –April. The values read off can be plotted against the average outdoor temperature for the relevant week to establish an effect signature. From this, values can be determined for a full year at normal annual temperature. The difference in heat consumed before and after will form the basis for determining whether the requirements for energy saving have been fulfilled. The follow-up period covers a year.
Efficient use of electricity	Measurement of the premises' electricity is to be carried out **before and after** installation in order to find out how big an increase in electricity consumption the heat recycling plant has given rise to. Alternatively, all new premises' electricity can be measured after installation. It is assumed that no other measures to render electricity more efficient will be carried out on demonstration projects after pre-measurements have commenced and before after-measurements have been concluded.

Indoor temperatures	Indoor temperatures are to be measured in around 20 % of the apartments (at least 4 per block) – in apartments dispersed throughout the building.
Outdoor temperature	To be measured preferably close to the building in question– alternatively values from a nearby SMHI [meteorological] station can be used.
Ventilation airflow	**Pre-measurement:** For fan-controlled exhaust air, measurement of airflow shall be carried out at every exhaust air device. It should be possible to use the total measured airflow for assessment of the relevant ventilation airflow. For natural air ventilation, tracer gas measurement should be carried out in a representative number of apartments (10% or at least three per building) on different floors. Pentiac passive samples should be used. Measurement to be carried out over a period of around one month with outdoor temperatures around zero degrees. NB. Heat consumed for ventilation before measures are taken should be converted to heat consumed for ventilation at standard airflow (0.35 l/(s m^2)) so as to be able to compare the total heat consumed before and after intervention **After-measurement:** Determining airflow at all exhaust air devices can be used for determining ventilation airflow in flats involved. NB! Ventilation plant must be pre-adjusted before measurement so that standard airflow can be deemed fulfilled.
Pressure-testing airtight seal in building	The airtight seal in buildings should be determined by a pressure test **before measures** to assess whether the heat recycling system can work without sealing measures and in order to evaluate unwanted air leakage. Around 10 % of apartments should be pressure-tested using the "Blower-door method"
Operating times	If variable airflow is found to occur, operating times when different flows occur must be registered.
Air speed in living areas	If complaints are registered about draughts in questionnaires on indoor climate, the air speed should be measured in apartments where such complaints occur on one occasion in winter and one occasion in summer (50 cm from an outer wall with windows).
Intake air temperatures	Intake air temperatures should be measured in 10% of apartments with an outdoor temperature of about + 5°C and at least -5°C.
Noise level in apts. from ventilation	To be measured pursuant to SS 025267 in 10 % apts. (at least 3 per building) after installation

Noise level in apts. from surroundings	To be measured pursuant to SS 025267 in 10 % apts. (at least 3 per building) **before and after** installation
Sound damping between apts.	If complaints are registered, noise transmission between apartments should be measured via the heat recycling system
Air quality	CO_2 content should be measured in the room is estimated to have the least ventilation in 10% of apartments
Indoor climate experienced	A questionnaire (Stockholm Questionnaire) should be carried out before and around six months after rebuilding, with all adult residents being given an opportunity to answer.