



MANUAL SUSTAINABLE OPERATION OF SHOPPING CENTERS

IDEAS  **INNOVATIONS**
SUSTAINABLE SOLUTIONS 

In collaboration with



ECE Manual "Sustainable Operation of Shopping Centers"

Client

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INTRODUCTION

Dear readers,

There is more to a sustainability strategy than concentrating on a few outstanding projects. For us, sustainability is working in detail and considering sustainable aspects across the entire life cycle of a property. As a property developer, we have a basic approach: How can we plan, realize, and operate properties so they have a long-term positive impact on their environment?

This manual is a supplement to the manual "Sustainable planning, building and operating of shopping centers" which was published by ECE in 2010. It is another cornerstone in ECE's efforts to set up a holistic sustainability strategy.

Sustainable operation is not new to ECE. We have been planning and operating shopping centers for almost 50 years. Energy efficiency, safety, cleanliness and customer satisfaction is a key aspect in all ECE centers and an important factor in the sustainable operation of shopping centers. In an analysis of a number of centers, we found that the center management teams are already successfully implementing aspects of a sustainable operation and that some of these have already been established as standards. This manual takes up this experience, delves into it and adds further sustainability aspects, to provide detailed, hands-on recommendations for the operation of shopping centers to the teams on location. Thus, the manual attempts the balancing act of providing very general and plain recommendations and recommendations which require more comprehensive and specific know-how. The manual is a guideline and reference book for new as well as experienced ECE employees.

INTRODUCTION

In contrast to the ECE Sustainability Manual for New Developments, it has to be considered that, when it comes to the sustainable operation of commercial properties, the conditions are different for every center. These conditions may complicate, delay, or hamper the implementation of the recommendations mentioned above. For example the illumination in a center can only slightly be influenced and the recommendations in the manual may not be implemented in their entirety. In another center, the trash bins cannot be modified for fire protection purposes. Because of the diversity and individuality of the centers, not all distinctive features can be discussed in this manual. Every center management team has to check first which parts of this manual can be realized and which cannot.

Thus, the manual cannot be regarded as a specification sheet. Moreover, the measures and information in the manual serve as stimuli for the operation. The aim is to support the sustainability of the centers beyond what has already been achieved. We hope that, with this publication, we can provide detailed and hands-on recommendations for the sustainable operation of shopping centers to all employees and those who are interested.

Yours sincerely,
Alexander Otto
Chief Executive Officer

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DEFINITION OF SUSTAINABILITY

The sustainability principle can be traced back to forestry. About 300 years ago, the forester Hans Carl von Carlowitz stated in his book "Sylvicultura oeconomica" (1713) that only as many trees should be logged as can grow back by sowing and re-planting.

The study "The Limits to Growth" (1972), issued by the Club of Rome put the sustainability principle on the map of science. The term "sustainability", as it is used today, was coined as early as the Brundtland Report (1987) of the World Commission on Environment and Development (WCED). It focused on a "lasting balance" which was to meet the "needs of today's generation without jeopardizing the opportunities of future generations".

The final report of the Enquete Commission "Protection of the environment and people" (1994) described a three-column model of the sustainability principle in which environmental, economic, and social criteria are balanced.¹

The latest regulatory developments take this approach further and add functional and technical aspects (cf. CENT TC 350 Sustainability in Construction Works, Definition of Integrated Building Performance). Certification systems like the German Sustainable Building Council (DGNB) additionally assess the process quality as a basis for sustainable operation. Therefore, this manual does not only cover environmental criteria but the entire spectrum of sustainability.

¹ See also the final report of the Enquete Commission of the German Bundestag "Schutz des Menschen und der Umwelt" (1994), which describes sustainability as a concept for the future development of the economic, environmental, and social dimension of human existence. According to the report, the three columns of sustainability are in a state of interdependency and require balanced coordination.

DEFINITION OF SUSTAINABILITY

Pioneering in sustainability in the shopping center industry, ECE contributes with this manual to the increasing integration of sustainability into the operation of shopping centers.

HOW TO USE AND IMPLEMENT THIS MANUAL

Unlike the ECE Sustainability Manual for New Developments which is mainly based on the DGNB criteria catalog, this book is structured by topic. The puzzle pieces assigned to headings provide information on the impact levels (from 0 to 2) of the topic areas on the various aspects of sustainability. Thus, in the following example, the criteria has a very high significance for the environment, the economy, and the process quality, a medium significance for the technical quality, and non or a only very little significance for the social quality.



In every chapter there is a short overview about the key fields of activity; at the same time, the most important aspects are summed up at the end of each chapter. An index on the side helps you navigate through the manual. Additional info boxes provide background information or further details on various aspects. The key element of every chapter is the checklist with recommendations. There will be further differentiation for operation as well as refurbishment and modernization measures in the chapter on HVAC facilities. With this approach the manual provides information on different detail levels to facilitate a hands-on implementation.

Structure

Puzzle pieces and their meaning

Index
Info boxes
Checklists

HOW TO USE AND IMPLEMENT THIS MANUAL

With the gradual use of the manual the contents will become a natural component of ongoing operations. While this is the case for some of the aspects today – depending on the center – the implementation of other elements will take time due to the respective conditions, such as ongoing contracts. Even if probably not all of the aspects of the manual will ever be implemented in a shopping center, following the sustainability path is the clear objective. Thus, this manual will be developed, updated and supplemented constantly.

***Aims and use of
the manual***

OPERATIONAL PROCESSES/FM

The operation of an ECE center is the partial responsibility of Facility Management.

Facility Management is very customer-oriented. Therefore, a strict orientation on processes (in contrast to a hierarchical-functional approach) has developed. For example, a general model for Facility Management is defined in the GEFMA Guideline 100-1.

Facility Management System

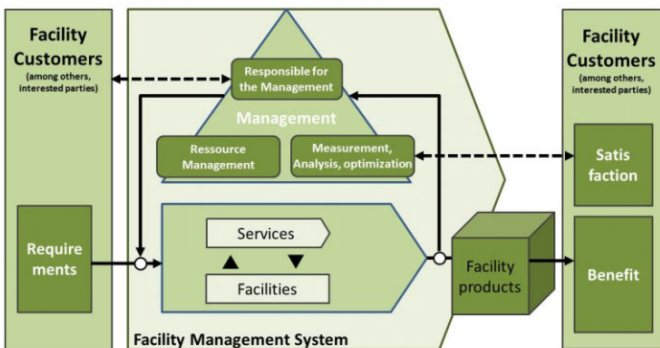


Illustration 1: Cf. GEFMA 101-1: 2004 Facility Management - Basics
[Source: GEFMA]

The Facility Management System (which comprises of the Center Management of ongoing operations and Facility Management in the headquarters as well as internal and external service companies and suppliers) has to achieve appropriate customer satisfaction by providing different facility products.

Operating characteristics

Besides individual customer demands the process depends on the facility type and therefore the overall situation of the center.

OPERATIONAL PROCESSES / FM

- **Customers**

At ECE, at least three groups of customers have requirements to the operation of a center:

Three customer groups

Investor, tenants, and customers/visitors.

Satisfying all customer groups is a particular challenge for the entire FM system.

- **Facility**

The Center is a highly frequented building with special requirements on cleanliness, safety, and usability on the one hand and impacted by tenant area construction measures and the shop operations on the other hand.

Special demands

This is a further challenge for Facility Management.

The optimization of operation will not only include the "classical" criteria such as quality, costs, and time, but also increasingly the aspects of sustainability.

The way how the aspect "sustainability" can be considered during center operation will be explained in the following chapters for individual facility products.

These recommendations can only be implemented successfully in the medium or the long run, especially in the light of challenging ECE conditions, if the production processes are monitored, analyzed and adjusted, where necessary.

FM methods

OPERATIONAL PROCESSES / FM

Different methods (constant improvement process, kaizen, work-flow analyses, benchmarking, etc.) are applied.

There is a number of examples in literature how a control model can be designed.

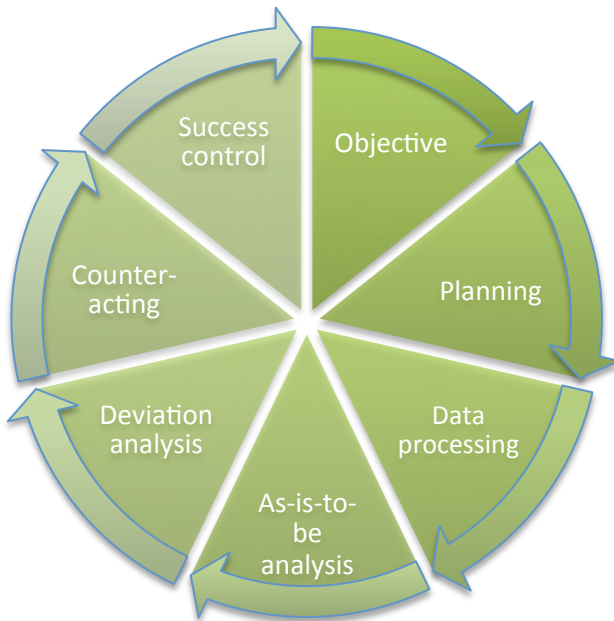


Illustration 2: A detailed example for a control cycle as a control model
[Source: ikl based on www.projektmanagementhandbuch.de (German only)]

OPERATIONAL PROCESSES / FM

All these methods have in common that, once the processes have been established (e.g. cleaning cycles and used cleaners) will be scrutinized regularly and adjusted if necessary. This is also very important for ECE.

Regular monitoring of processes

Thus, a system is to be implemented which allows for an evaluation of defined processes during ongoing operations with regard to the achievement of the target criteria. Changes in the conditions (e.g. regarding the utilization of areas) or technological developments may lead to the notion that decisions, which were made in the past and which were right at the time, cannot be considered best practice anymore. These aspects are often pursued with a low priority only or are even forgotten during ongoing operations in the stress of day-to-day operations.

Change of the conditions

As the centers (with regard to construction, facilities, age, etc.) and the existing processes are different, the manual cannot define sample processes. Only directions can be given, which then need to be implemented on location and filled with life.

No sample process



CLEANING

The cleaning of a shopping center has a considerable impact on all aspects of sustainability. It therefore has key significance regarding a sustainable operation. Besides economic aspects, especially environmental aspects such as water consumption and environmentally-friendly detergents as well as social aspects such as hygiene and health and safety aspects are important.

The cleaning procedure which does not affect hygiene, the value or the public appearance is the most sustainable. Besides general criteria to assess the cleanliness, the subjective feeling of cleanliness is important. If the cleaning intervals are reduced the reaction of customers is to be monitored very closely.

Environmental aspects are to be considered when choosing the suitable detergent; the use of detergents is to be avoided whenever possible. Avoiding "aggressive" cleaners reduces the sources of danger in the center and health risks due to dosing errors of highly concentrated detergents.

The following recommendations can be implemented if the individual situation of every center is considered.

1. **Optimizing cleaning intervals**
2. **Optimizing cleaning methods**
3. **Reducing the use of detergents**
4. **Use of environmentally friendly detergents**

Water consumption
Detergent
Hygiene
Health and Safety
Ancillary costs

Optimization
Cleaning Cycles

Environmentally-friendly Detergents

CLEANING: CHECKLIST

Avoidance of dirt

- Use of more trash bins and/or review the positions of trash bins
- When selecting the trash bins, the trash bin lids have to suit the packaging in the food court; if necessary, the trash bins or the entire waste disposal concept will require adaption. Please note: In some centers so-called "self-extinguishing trash bins" are an essential part of the fire protection concept and therefore have comparatively smaller slots. Fire protection regulations precede in this case.
- The design of footpaths (e.g. hard-surfaced footpaths to the entrance area) as well as their cleanliness (e.g. leafs, grit) are to be maintained. Here, cooperation with authorities may be helpful and should therefore be considered.
- Uncarpeted surface zones are to be adjusted.

Cleaning intervals

- The assessment of the cleaning quality and the cleaning area is based on inspections
- Review and possible adjustment of cleaning intervals, especially in sensitive areas such as children play areas
- Consideration of the possibility of adjusting the cleaning work in the cleaning service specifications

Detergent

- Reducing the use of detergents
- If possible, use purified water to clean floor surfaces and windows.

CLEANING: CHECKLIST

If the use of detergents cannot be avoided, the following environmental requirements are to be regarded as basic principles:

- Avoidance of the following detergents:
 - Sanitary detergents containing chlorine, toilet and bathroom cleaners containing inorganic acids
 - Toilet tank additives and toilet and toilet tank cleaners, e.g. toilet stones containing paradichlorobenzene
 - Air freshener / odor dispenser for restrooms and lavatories
 - Chemical pipeline detergents
 - Disinfectants or germicides (except for specific areas)
 - Special detergents such as abrasive cleaners, emulsion cleaners, dust removers
- Use of biodegradable detergents
- Use of detergents which do not contain solvents
- The products are to contain few fragrances and should not be very acidic or superalkaline
- Safety and data sheets have to be available for every detergent
- Use of detergents with the European ECO label (EU-ECOLABEL)

If the bidder can produce a certification with the EU-ECOLABEL or a similar certification, the environmental criteria of the EU-ECOLABEL mentioned above are regarded as being observed.

CLEANING: CHECKLIST

- The detergents must not exceed the exposure limits of R42 (may cause sensitization by inhalation) and/ or R43 (may cause sensitization by skin contact). Substances or secondary substances with R-limits, must not be used in a concentration of more than 0.1% in end product. This applies for secondary substance lemon oil which contains the components lime and citral which are both rated R43 and might also cause allergies.
- All detergents must be available as concentrate or high concentrate liquids, if available.
(Please note: health and safety regulations have to be observed!)

The following requirements are to be coordinated with the contractor in each individual case and are to be implemented as far as possible.

The available detergents are to match the following criteria regarding their secondary substances.


- The product must only contain biocides for preservation purposes and only in the necessary doses for the mentioned purpose
- It must neither on the label nor in other way be claimed or suggested that the product has an antimicrobial effect
- Biocides as component of the combination or as part of a combination in a formulation, which serves the preservation of the product and which underlie R-ratings R50/53 or R51/53 according to Council Directive 67/548/EEC and its amendments or Directive 1999/45/EC and its amendments. These must not be potentially bioaccumulatable, i.e. a log POW ≥ 3.0 if there is a BCF ≤ 100 which was not experimentally determined.

CLEANING: CHECKLIST






- The product may only contain colorants which are allowed subject to the Cosmetics Directive 76/768/EEC (incl. amendments) or the directive "Colors for use in Foodstuffs 94/36/EC" (incl. amendments) or environmentally-friendly colorants which make the assignment of R-ratings R50/53 or R51/53 unnecessary subject to Directive 67/548/EEC.
- Nitromusk or polycyclic musk compounds must be used, such as musk xylene (muskxylen CAS-No 81-15-2), Musk ambrette (CAS-No: 83-66-9), Muskene (CAS-No:116-66-5), Moskustibetin (CAS-No: 145-39-1), Moskusketone (CAS-No: 81-14-1), HHCB (CAS-No: 1222-05-5), AHTN (CAS-No: 1506-02-1)
- The detergents must not exceed the exposure limits of R42 (may cause sensitization by inhalation) and/or R43 (may cause sensitization by skin contact). Substances or secondary substances with R-limits, must not be used in a concentration of more than 0.1% in end product
- The following secondary substances must not be contained in the available detergents: APE (Alkylphenol Ethoxylates) and derivatives, EDTA (Ethylenediaminetetraacetic acid) and its salts, NTA (Nitrilotriacetic acid); non-biodegradable, quaternary ammonium salts, secondary components with a mass share of more than 0.01% according to Directives 67/548/EEC or 1999/45/EC which were labeled with the following r-ratings: R31, R40, R45, R46, R49, R50/53, R51/53, R59, R60, R61, R62, R63, R64, R68

Alternatively, the use of environmentally-friendly detergents can be proved initially as follows.

CLEANING: CHECKLIST

-  For every available detergent a completed "Anbieterfragebogen für Reinigungsmittel" ("Supplier Form for Detergents") of the "Industrieverband Hygiene und Oberflächenschutz" (IHO) must be provided. The respective threshold values or requirements have to be observed for every product. A similar data sheet which contains the same information like the form, is to be accepted. You can order the supplier form from ECE FM (Hamburg).

Further documents, information and links

-  Published by the Umweltbundesamt: "Modellprojekt Ökologische Gebäudereinigung" ("Model project environmentally-friendly building cleaning"), series "TEXTE" volumes 44/95 and 45/95 (available in German only)
-  <http://www.umweltbundesamt.de/search/content/reinigung> (available in German only)
-  <http://www.eco-label.com/>
-  <http://www.green-care.eu/>
-  <http://www.nachhaltigebeschaffung.at/node/110> (available in German only)

CLEANING: INFORMATION



Environment labels for detergents



The German environment label **Blauer Engel** (Blue Angel) is awarded for different categories. There has been no category for detergents to date. The certification RAL-UZ 84a/84b applies for detergents and hot rinse additives (e.g. for mobile toilets) only.



The **EU-Ecolabel** is also awarded for various product categories. Among them, the product category multi purpose cleaners and sanitary cleaners. The list of these products has become very comprehensive, i.e. there is a number of these products on the market. Moreover, the product list can be filtered by manufacturer and country in which they are available.



The environment label **Sustainable Cleaning** of the soaps, detergents and maintenance products industry. Differentiates various product categories. Comprises aspects such as consumer safety, environmental protection, and innovation. The voluntary initiative counted more than 140 members in July 2011.

CLEANING: INFORMATION



Purified water

Some centers (and also similar properties) have already gained positive experience using purified water. For the floor surface maintenance, no additives are required for this procedure and the usual machines can be used. Purified water is a better cleaner than normal water as calcium and salts have been removed and the water tries to accumulate minerals again. The water dries without recess and leaves no stripes or calcium deposits. Specific scrubber tools (special brushes, microfiber pads, diamond pad systems) can increase the cleaning effect.

Staining is reduced considerably as the dirt particles cannot stick to the recesses of tensides, soaps, or calcium.

Besides the reduced use of detergents, this leads to more positive effects regarding sustainability.

- Cost savings
- less storage space required
- less hazardous substances and fire load in the center
- less risks for the cleaning staff
- no tenside residues

You can find more information e.g. on:

http://www.hako.ch/ch_de/AquaForce/index.php

http://en.wikipedia.org/wiki/Purified_water

CLEANING: INFORMATION



EU Ecolabel Catalogue

A list of all detergents with an EU Ecolabel can be found on:

<http://ec.europa.eu/ecat/>

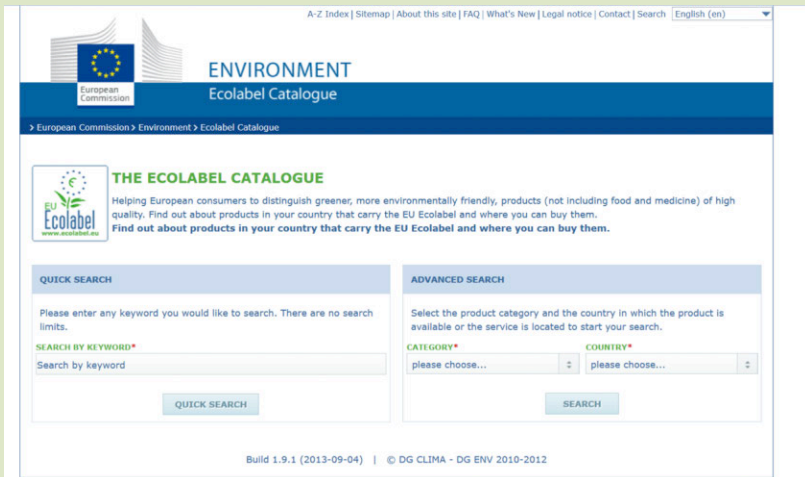


Illustration 3: Screenshot Environment Ecolabel Catalogue [ee.europa.ecat]

The online catalog has a search function to look for e.g. all-purpose cleaners, also sorted by country.

Products with a Nordic Ecolabel may be used alternatively.

More information on www.nordic-ecolabel.org

WASTE



The waste accumulation of a center has decisive environmental and economic effects. Therefore, there have been considerable efforts within ECE to increase the recycling rates in recent years.

Considerable effects

In case of the assessment of the waste criteria, different regulations are to be observed. Besides the standardized federal regulations, state-specific or municipal regulations are also to be observed. An overall rule should be to reduce the accumulation of waste and to create a situation in which the recycling rate can be increased. A distribution ratio of paper and cardboard packaging in relation to residual waste of 60:40.

Regulations

**Recycling rate
60:40**

For environmental and economic reasons an appropriate strategy is to be prepared with the local waste disposal contractor considering the building and its surroundings. Therefore it is to be established which waste will be credited and how to separate it. Usually, paper, plastic (separated by color), and metal can be credited depending on the market situation. In this case, state-specific regulations are to be considered.

Reducing residual waste

Customer waste has a share of 10% of the overall waste accumulation and is therefore a comparably irrelevant. Experience from previous tests show that the separation of customer waste in the respective trash bins is difficult as the customers do not dispose the waste correctly. This may lead to a pollution of an entire waste category.

Waste separation in the customer area

1. **Avoiding waste**
2. **Separating waste**
3. **Considering waste credits**

WASTE: CHECKLIST

Customer areas / mall

- Reviewing and optimizing the positions of trash bins
- The size of the trash can slots which should fit the packaging in the food court are to be considered when purchasing trash cans for the food court. If necessary, trash bins or the entire waste disposal concept is to be adjusted (note: when purchasing trash cans, fire protection is to be considered).

Rental areas

- State-specific opportunities are to be considered when separating the waste. Possible categories for the separation of waste are for example:
 - Paper / cardboard
 - Foil
 - Plastic
 - Polystyrene
 - Metal
 - Glass (separated by color)
 - Wood
 - Residual waste
- If possible, the following waste categories can be separated after previous coordination with the disposal contractor:
 - Foil colored
 - Foil white
 - White sheet metal
 - Wood
- Use of trash compactors to optimize the weight, the volume and the number of transports

WASTE: CHECKLIST




*The recycling of the various packagings depends on specific aspects. In general, the contamination and impurity by contaminants (e.g. paper labels on foil) is to be avoided. **In every case the conditions for the acceptance of waste are to be coordinated with the local waste disposal contractor.***

Office and Center Management

- Reducing the use paper by:
 - duplex-printing (set your printer to duplex-printing as a standard)
 - resizing the printouts (several pages on one sheet)
 - use of misprints as scrap paper
 - faxing without paper directly from the PC
 - central printing and copying units (longer distance and therefore carefully considered printing)
- Use of recyclable paper with the ecolabel Blauer Engel RAL-UZ 14 for recycling paper or with the Nordic Ecolabel for copy and printing paper or EU Ecolabel for copy and graphic paper (possibly coordination with the central supplying department, if necessary)
- Use of paper with 60/70 white for all standard printouts (80 white for letters and printouts for representative purposes). Note: The lower the degree of whiteness, the more cost-efficient the paper.
- Returning the ink cartridges of laser printers to the manufacturer. The procedure is possibly to be coordinated with the supplier. Advice: If the display shows "toner empty", the toner does not need to be replaced immediately, but the cartridge may be carefully shook to make the remaining toner spread inside.
- Waste separation in the Center Management too, of course.

WASTE: EXAMPLES

Further documents, information and links

-  ECE presentation on waste and cleaning (available from Mr. Harald Boll, ECE Regional Director CM Region Berlin)
-  Published by Berliner Stadtreinigungsbetriebe: "Abfallvermeidung im Büro" ("Avoiding waste in the office"); Berlin (no publishing date) (available in German only)
-  Arbeitsgemeinschaft Abfallberatung in Unterfranken (Hrsg.): "Leitfaden Einzelhandel" ("Retail Guideline"), Landratsamt Kitzingen 2000 (available in German only)



The Blue Angel for recyclable paper



Der Blaue Engel (RAL-UZ 14) for recyclable paper

- 100% recovered paper, among them at least 65% lower and medium quality recovered paper
- No use of any colorants
- Optical brighteners, chlorine, halogenated bleach, and complexing substances (EDTA) are not permitted
- Lebensdauerklasse (service life class) "LDK-12.80" = durable for some 100 years
- Complying with DIN regulations for continuous paper, envelopes, cartonnage for office purposes and copy paper (DIN 19309)

The use of premium recyclable paper (e.g. with the Blue Angel label) neither leads to a higher contamination of printers or copy machines nor to higher maintenance costs. There is also no higher jamming rate or increased use of toner. **Premium recyclable paper is more environmental-friendly than fresh fiber paper but shares the same technical features. Paper with Nordic Ecolabel or EU Ecolabel are recommended alternatives.**

WASTE: EXAMPLES



Standard ECO print settings

The standard settings of the printer are not always ideal, especially when a low use of resources is to be achieved. All changes of the printing options can be saved as standard settings. Thus, the printer settings do not need to be adjusted every time the printer is used. Thus the settings have to be changed directly in the printer driver.

To do this, click on the windows start button and select "Control Panel". If you go to "Printer" or "Devices and Printer" respectively. The list of printers with all installed and available printers will appear. Select the "printer settings" of the desired printer by clicking the right mouse button. Now you can change the standard settings in the configuration window. Confirm your selection with "OK". Because the changes were made directly in the printer driver, they are the standard settings for all printouts. You should use these as standard settings especially for internal documents.

You can set various options for a use of resources as sustainable as possible depending on the manufacturer and the driver of the printer. Thus a double-sided printing ("duplex printing") with a reduced use of toner should be set as a standard option in day-to-day operations. Many printers also provide further saving opportunities such as a draft print ("ECO Print"), an energy saving mode ("Sleep Mode"), several pages on one sheet, etc.

If a printout in a high quality is needed, the settings can be adjusted for each printout.

ENERGY MANAGEMENT



Energy management is a management task to optimize the supply, distribution and the use of energy. Continually reducing the energy use (and thus the CO₂ emissions and the use of resources) and the respective energy costs is the objective. To achieve this, it is reasonable to appoint an energy officer.

Appointment of an energy officer

Energy management is a recurring cycle process. Starting with setting the objectives and conducting an energy analysis (measuring, comparing, monitoring), the planning and implementation of measures as well as the verification of the achieved objective (a further energy analysis) and the correction (planning and implementation of measures).

The energy management system may also be certified with a quality seal by applying the international standard DIN EN ISO 50001.

A constant energy monitoring and energy controlling is a key condition for energy management. Only if you know your consumption figures and your biggest consumer and are monitoring them you can remain operating sustainably.

prerequisite for energy monitoring / controlling

1. **Appointing an energy officer**
2. **Separate measuring of the energy use**
3. **Preparation of key energy figures**
4. **Planning and implementation of measures**
5. **Monitoring of the objective achievement**

ENERGY MANAGEMENT: CHECKLIST

Energy analysis

- Appointing energy officer
- Analyzing and comparing the energy use of the past 3 to 5 years (overall use, period annual, weekly, daily)
- Establishing energy figures and comparing them with the figures of other centers, e.g. MWh/m² and CO-emissions/m²; considering the differences of the center with a correlation analysis (see information on page 35)
- Developing a measuring concept and determining the energy use of large consumers and the individual tenants. Using Energy Controlling Online for electrical energy users (see information on p. 38)
- Integrating measuring and counting devices or consumption data into the building management system (BMS) to monitor, analyze, and control the real-time consumption/loads with GLT and Energy Controlling Online (see information on p. 38)
- Briefing employees and contractors on the ECE energy policy and promoting a sustainable, efficient and resource-conserving operation (see Information p. 33)
- Annual energy audit regarding consumption figures and improvement measures (ECE energy officer + tenant)
- Preparation of an energy pass according to the European Energy Performance of Buildings Directive (Directive 2010/31/EU) (see information p. 37)

Planning of measures

- Preparing a catalog of optimizing measures and prioritizing measures. (Stimuli on this issue can be found in the chapter "energy efficiency" and in the chapters on the technical groups chapters "air conditioning", "cooling technology", "electrical engineering")
- Gradual implementation of energy efficiency and energy-saving measures








ENERGY MANAGEMENT: CHECKLIST

- Conducting a constant energy controlling to verify the success, i.e. the objective achievement of the efficiency measures. For electricity, the energy-controlling online is available, (see information p. 38); for heating, the meters for the real-time measurement of consumption and load have to be integrated into the building management system.

Integrating rental areas

- Leading the energy management process and motivating tenants to conduct and take part in efficiency measures
- Establishing an energy team (ECE energy officer and tenant representative) to identify the energy-saving potential
- Implementing a system to collect energy key data for the rental areas for a branch-related consumption analysis

Further documents, information and links

-  DIN EN ISO 50001: Energy management systems – requirements with user instructions (12/2011)
-  Published by the Umweltbundesamt: "DIN EN 16001 Energiemanagementsysteme in der Praxis. Ein Leitfaden für Unternehmen und Organisationen" (Energy management systems in practice. A guideline for companies and organizations"), Leitfaden (06/2010) (available in German only)
-  GEFMA 124, Teil 1 bis 4: Energiemanagement
-  EnEV-Online.de: Information on the energy pass and the energy saving ordinance "Energieausweis + EnEV 2009" (available in German only)
-  <http://www.gefma.de/english.html>
-  <http://www.umweltbundesamt.de/uba-info-medien/3959.html>
-  <http://www.is-argebau.de/> (> sample of construction regulations / sample ordinance > construction supervision / structural engineering > interpretation matters relating to the energy saving ordinance (EnEV) (available in German only)

ENERGY MANAGEMENT: INFORMATION



Energy management system

Energy management systems help to increase the energy efficiency in a company. The better and more effective the energy management system, the higher the energy efficiency.

The DIN EN ISO 50001 is a guideline for the establishment of an energy management system in a company. An energy management system which is certified according to DIN EN ISO 50001 is therefore a quality seal for the energy management of a company.

Moreover, a certified energy management system is a condition for energy-intensive companies, tax compensation regulations, and to receive subsidies today and in the future.



Energy policy

The energy policy of a company defines the **global energy objectives** of the company **regarding energy costs, energy consumption and CO₂ emissions** and constitutes the framework for corresponding activities and strategies.

It is essential for a working energy management and guiding principles of energy efficiency measures of a company. The energy policy is to be resolved, communicated and facilitated by the management of a company.

The consistent use of green electricity and the increasing of the energy efficiency in the centers are aspects of the energy policy of ECE.

ENERGY MANAGEMENT: INFORMATION

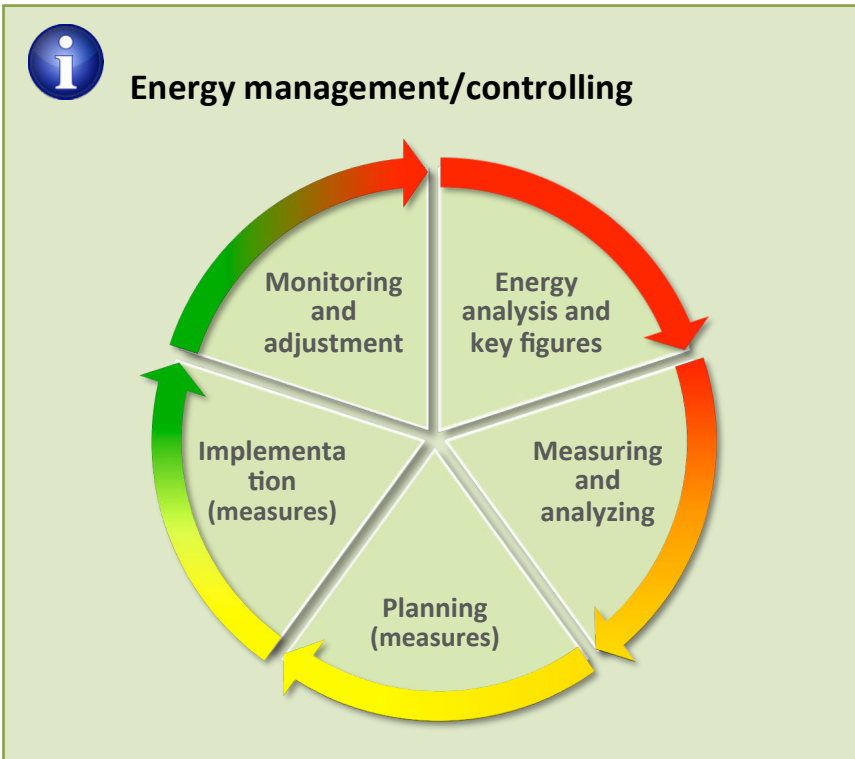


Illustration 4: Energy management Process cycle [Source: ikl]

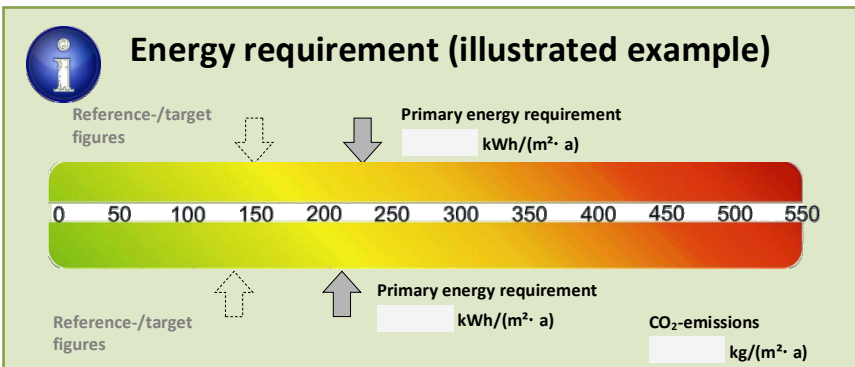


Illustration 5: Energy requirement, illustrated example [Source: ikl]

ENERGY MANAGEMENT: INFORMATION



Energy key figures and benchmarking

Shopping centers are different in general (number of sales levels, number of visitors, opening times, etc.). However, energy key figures and a benchmarking of shopping centers **are the first cost-efficient step** to identify energy efficiency potential.

Larger deviations in the area-related key figures due to the differences between the centers can be questioned by collecting further key figures.

To establish energy key figures the knowledge of following energy consumption figures and key specifications is essential:

Energy consumption data / energy requirement data

- Electric power for lighting
- Electric power for ventilation systems
- Electric power for cooling systems
- Power for elevators + escalators
- Power for general purposes
- Heating requirements (stat./dyn.)
- Water consumption (total)
- Water consumption (air conditioning)

Key data / reference figures

- Net floor space
- Sales area
- Opening hours
- ...
- Net space
- Mall area
- Number of visitors

ENERGY MANAGEMENT: INFORMATION



Examples for energy key figures

Possible center-specific deviations caused by:

$$\frac{\text{Energy cons. (total)}}{\text{Net floor space}} \quad \frac{[\text{kWh}]}{[\text{m}^2\text{-NFS}]}$$

- Opening times
- Size of the mall area
- ...

$$\frac{\text{Heating consumption}}{\text{Net floor space}} \quad \frac{[\text{kWh}]}{[\text{m}^2\text{-NFS}]}$$

- Number of floors
- Surface-area-to-volume ratio

$$\frac{\text{Energy cons. for vent. systems}}{\text{Rental area}} \quad \frac{[\text{kWh}]}{[\text{m}^2\text{-MA}]}$$

- Operating times
- ...

$$\frac{\text{Energy consumption for lighting}}{\text{Center opening times}} \quad \frac{[\text{kWh}]}{[\text{h}]}$$

- Size of the mall area
- ...

$$\frac{\text{Energy consumption for lighting}}{\text{Mall area}} \quad \frac{[\text{kWh}]}{[\text{m}^2\text{-Mall}]}$$

- Opening times
- Area illuminated by daylight

$$\frac{\text{Energy cons. for elev. and esc.}}{\text{Sales area}}$$

- Number of floors
- Number of visitors
- ...

$$\frac{\text{Energy consumption for cooling}}{\text{Sales area}} \quad \frac{[\text{kWh}]}{[\text{m}^2\text{-SA}]}$$

- Operating hours
- Size of the mall area
- ...

$$\frac{\text{Water consumption (total)}}{\text{Number of visitors}} \quad \frac{[\text{m}^3]}{[\text{pers.}]}$$

- Size of the surrounding areas
- ...

$$\frac{\text{Water cons. cooling}}{\text{Net floor space}} \quad \frac{[\text{m}^3]}{[\text{m}^2\text{-NFS}]}$$

- Opening times
- ...

ENERGY MANAGEMENT: INFORMATION



Energy pass for newly-leased areas

According to the nationwide implementation of the European building guideline, the energy pass has to be made available to the tenant if rental areas of a center (office, practice, shop) are re-leased when they ask for it, at the latest!


ЕНЕРГИЕН ПАСПОРТ

Положение във в.ч. 7 (Изм. - ПД № 32 от 2010 г.)

Сградата "Маслофундационен търговски център" с административна сграда, с обща площ за продажба, е разположена в:

Адрес: Ул. "В" 550 от № 164 в "Областен център" в София

Реконструкция енергетика	
Площ на разпоредима площ	128 181 м ²
Общоплощ на площ	98 215 м ²
Площ на разпоредима площ	90 379 м ²



Скала на класиране на енергопотребление

По типове помещения

По типове помещения

Клас	Средна стойност на енергопотребление (кWh/m ² ·a)
A	0 - 100
B	100 - 200
C	200 - 300
D	300 - 400
E	400 - 500
F	500 - 600
G	600 - 1000

Процент енергия от възобновяеми източници	Енергийна ефективност	Енергийна ефективност	Енергийна ефективност	Енергийна ефективност
247,19 kWh/m ²	110,1 kWh/m ²	242,89 kWh/m ²	282,7 kWh/m ²	34 758 kWh/a
Общ изходен резултат на енергия	23 987 kWh	10 726 kWh	23 546 kWh	28 282 kWh
Енергия от възобновяеми източници	0 kWh	0 kWh	0 kWh	0 kWh
				Дел на BEP - %

Създаден на: 15.09.2012

Създаден от: Административна група "ОД" в София

ENERGIEAUSWEIS für Nichtwohngebäude

gemäß dem § 161f. Energieeinsparverordnung

Gültig bis: Aushang

Gebäude

Heizungsart: / Gebäudekategorie

Sonderzone(n)

Adresse

Gebäudeart

Baujahr Gebäude

Baujahr Wärmebrücke

Baujahr Klimaanlage

Nettogrundfläche

Gebäudeinfo (freiwillig)

Heizenergieverbrauchskenwert

Dieses Gebäude: kWh/(m²·a)

0 100 200 300 400 500 600 700 800 900 >1000

↑ Vergleichswert dieser Gebäudekategorie für Heizung und Warmwasser

Warmwasser enthalten

Stromverbrauchskenwert

Dieses Gebäude: kWh/(m²·a)

0 100 200 300 400 500 600 700 800 900 >1000

↑ Vergleichswert dieser Gebäudekategorie für Strom

Der Wert enthält den Stromverbrauch für:

Zuluft-Heizung Warmwasser Lüftung Eingebaute Beleuchtung Kühlung Sonstiges

Aussteller

Beauftragter

Beauftragter des Ausstellers

Illustration 6: Sample energy pass for Bulgaria [Source: ECE] and for Germany [Source: EnEV (Energy saving ordinance)]

ENERGY MANAGEMENT: EXAMPLES



Energy Controlling Online (ECO-Online)

An efficient energy management and center operation requires a monitoring of the consumption and the load curve at any time (real-time consumption, real-time load-curve).

ECO-Online by Vattenfall

The power supply or the power consumption respectively can be monitored with an online-tool (Energy Controlling Online) like the tool provided by Vattenfall. Vattenfall installs and connects the necessary meters at key consumers, and sends the consumption data for every center to ECO-Online. The real-time consumption and load curves can be monitored and analyzed in a numerical and graphical interface via an online access.

The consumption and load curves of every large consumer can be compared by day, week or other time periods. Thus, the success of measures to increase efficiency can be verified directly.

The load management for the activation of air conditioning systems, cooling systems or for example the escalators can be optimized.

- Is the time period for the staggered activation of each air condition system optimal? Too short? Too long? Or are the ventilators with a frequency transformer activated too quickly or too slow?
- How can escalators be operated most efficiently? Continuous operation, stop-and-go or standby mode with reduced speed? Which operation type is the most efficient at what time of day and at what visitor frequency?
- How can cooling systems be activated / turned on?

ENERGY MANAGEMENT: EXAMPLES

Advice:

In a pilot project, Phoenix Center Hamburg is using ECO-Online. Among others, the engineers of the center were able to optimize the cooling system. It became apparent that it is more efficient to activate the turbo cooling center before the screw-type cooling system, as it was used to be done before many times.

Illustration 7: Login-page of Energy Controlling Online [Source: Vattenfall]

	Measuring station	Measuring station history	Consumption development
Name of the measured station	03_Cooling_big		↑ 5,4%
Time period history	deactivate		
Time period	5.8.2011 - 5.8.2011	4.8.2011 - 4.8.2011	
Consumption	6.198,6 kWh	5.881,0 kWh	312,6 kWh
CO2	3.719,2 kg	3.528,6 kg	190,6 kg
Maximum	540,6 kW on 05.08.2011 09:30	565,8 kW on 04.08.2011 12:30	
Exceedance limits	None		None
Meter reading/performance	☐ / ☒		☐ / ☒
Consumption price	0,10 EUR/kWh		0,10 EUR/kWh
Costs	619,86 EUR	588,10 EUR	31,76 EUR

Illustration 8: Comparison of a daily load curve of a cooling system (numerical) [Source: Vattenfall]

ENERGY MANAGEMENT: EXAMPLES



Illustration 9: Comparison of a daily load curve of a cooling system (graphical)
[Source: Vattenfall]

You can get further information on the introduction of ECO-Online in the shopping centers from the section FM BS of ECE in Hamburg.

ENERGY EFFICIENCY



The Energy efficiency of buildings and its technical systems is influenced by many factors: On the one hand, due to the constructional and technical situation cannot be changed offhand. On the other due to the consumer behavior and the processes in the building which has to be adjusted systematically.

Operating building facilities sustainably saves energy and resources, reduces CO₂-emissions, and has a considerable impact on operating costs and the economic success of a center. Moreover, maintenance and repair requirements will be reduced.

Building facilities such as electric, heating, cooling, air conditioning and conveyor facilities are to be adjusted to an optimum operation and the settings are to be monitored regularly (target-performance comparison).

Regular maintenance and repairs of the systems do not only reduce the energy consumption when generating and distributing energy (efficiency) but increases security of supply, reliability and life cycle of the systems at the same time.

Optimizing the consumer behavior and the processes

Saving Energy and costs / Reducing CO₂ emissions.

Adjusting the building's systems

Maintenance and repairs

1. **Optimizing the consumer behavior/use**
2. **Optimizing the operation scenarios**
3. **Adjustment and control of the reference and actual values**
4. **Regular maintenance and repair intervals**
5. **Use of efficient system technologies**

ENERGY EFFICIENCY: CHECKLIST

Note: In the following we have listed general technology-specific approaches to an efficient operation of systems. Further information can be found in the following info boxes on energy efficiency or in the chapters of each technical group (electrical engineering, inside air systems, cooling systems, etc.).

General energy efficiency measures

- Conducting a lighting assessment in centers which were build before 2007 (see information p. 51)
- Supporting tenants optimizing the illumination of rental areas ("Cool-down Initiative") (see information p. 52)
- Energy-efficient and resource-conserving acting of ECE employees in the centers (see information p. 53)
- Minimizing the heat irradiation (shading technology depending on the light and the sun position, necessary shading technology is to be installed if necessary, etc.)
- Energy inspection of air conditioning systems (see information on p. 46)
- Adjusting technical building equipment, or reviewing or re-adjusting existing reference values (see information on p. 56)
- Adjusting or optimizing operation hours, temperatures, (e.g. forerun, return run), pressure and performance of the technical building equipment
- Maintenance and repairs to maintain the operability of systems (e.g. dirt deposits increase the energy consumption)

ENERGY EFFICIENCY: CHECKLIST

Measures without or with few technical constructional changes

- Optimizing the load curves of the electric energy and heating requirement (for electric energy: see information on p. 38)
- Sustainable operation of the daylight control of the mall (see information on p. 64)
- Optimizing the outside air / ventilation air rate of the air conditioning system (see information on p. 73)
- Limiting the thermostatic valve to the reference room temperature (see information on p. 85)
- Optimizing the operation of existing heat recovery systems (see information on p. 75)
- Filters (drinking water, circulating water, ventilation systems) regular cleaning or replacement; basing replacement intervals on the increased energy use in case of dirty / obstructed filters and the replacement or cleaning costs
- Fountains are to be operated during shop opening times, if possible; the formation of algae is to be kept in mind!
- Using the potential of existing building management systems: further differentiation of day, night, weekend and seasonal operation and adjustment to the actual requirements (see information on p. 38 and p. 75)




Measures with technical and constructional changes

- Implementing measures arising from the lighting assessments (see information on p. 51)
- Use of highly efficient motors/engines for pumps, ventilators, cooling systems, elevators and escalators / moving walkways. In case of systems with a variable flow rate or a variable load requirement: Using engines with a frequency converter (see information on p. 48)

ENERGY EFFICIENCY: CHECKLIST

- In older centers: Extending the building management system! A well operating building management system (BMS) is essential for an efficient operation of complex technical building equipment
- Installing a heat recovery system if the cost-benefit analysis is positive
- Verification and optimization of the insulation on fittings, pipes, containers and building structure; identifying insulation problems with infrared thermal imaging
- Minimizing leakage in the air passage network

Further documents, information and links

-  The European Energy Performance of Buildings Directive (Directive 2010/31/EU) DIN EN 15239 "Leitlinien für die Inspektion von Lüftungsanlagen" ("Guidelines for the inspection of ventilator systems")
-  DIN EN 15240 "Leitlinien für die Inspektion von Klimaanlageanlagen" ("Guidelines for the inspection of air conditioning systems")
-  <http://www.nachhaltigebeschaffung.at/node/110> (available in German only)

ENERGY EFFICIENCY: INFORMATION



Energy efficiency

Energy efficiency is the perfect relation of the used energy for the required use. To achieve high energy efficiency all aspects from energy requirement to the energy distribution, the energy transformation and the energy generation are to be optimized. The less energy is used for the required purpose (net energy) the higher the energy efficiency and resource conservation. Thus, it can be said:

The most efficient energy is the energy which is not "consumed" at all! Therefore there should be a constant assessment and optimization of the requirements prior to every energy efficiency measure.



Illustration 10: Energy efficiency [Source: ife Institut für Energieeffizienz]

Note:

The terms "consumption" and "consumer" in an energy context are very common and are therefore also used here. Even if the term is not correct — from a physical point of view — as energy is transformed and not consumed.

ENERGY EFFICIENCY: INFORMATION



Energetic inspection of the air conditioning system

In Germany, operators of air conditioning systems in buildings have to conduct an energetic inspection **10 years after the initial commissioning** of the system. This applies for all air conditioning systems/ partial air conditioning systems / ventilation systems with a **reference cooling requirement of more than 12 kW**. **An energetic inspection should be conducted after 10 years in any case. The respective country-specific laws and regulations have to be observed.**

- Air conditioning system in the building
- Reference cooling performance > 12 kW
- Initial commissioning 10 years ago

**Energetic
Inspection**

Who is allowed to conduct the inspection?

The energetic inspection has to be conducted by an expert. Experts are...

- Persons with a University degree in building services engineering or technical building equipment and at least 1 year of professional experience in planning, constructing, operating or inspecting ventilation systems
- Persons with a University degree in a different subject (Mechanical Engineering, Electrical Engineering, etc.) but at least 3 years of professional experience in planning, constructing, operating or inspecting ventilation systems

Country-specific characteristics for the documentation of the energetic inspection are to be considered

ENERGY EFFICIENCY: INFORMATION

Which systems are "air conditioning systems"?

The term "air conditioning system" is defined in the EU building directive. It states: "'air-conditioning system' means a combination of the components required to provide a form of indoor air treatment, by which temperature is controlled or can be lowered;"

Thus, all ventilation systems with a cooling mode – whether ventilation, mixed air or pure outside air whether is a central or decentral unit – are subject to "air conditioning systems" according to the EPBD (European Building Directive).

What does an energetic inspection comprise?

- Assessing and determining the efficiency / the efficiency of the key components (ventilation systems incl. cooling systems)
- Assessing and evaluating the dimensions of the system
- Assessing and evaluating the operation parameters
- Calculating the reference values of the systems subject to the requirements of the energy pass
- Short specialist advice on cost-effective improvement measures

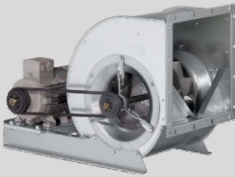
How can the inspection be conducted and how should a certification look like?

The certification should contain the system data and the results in a text and a graphical account. In addition, the certificate has to be signed by the inspecting person, stating their name, company, profession/qualification.

ENERGY EFFICIENCY: EXAMPLES



Highly efficient motors



air conditioning/
ventilation



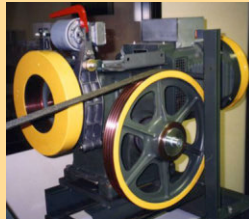
cooling



cooling



Pump



Elevator



Escalator

New requirements for electric motors and the use of frequency converters were determined based on the ecodesign guideline 2009/125/EC. Furthermore, new efficiency classes were defined.

- Since **June 6, 2011**, only motors of **efficiency class IE2** must be used
- In a nominal performance range from **7.5 to 375 kW** only motors with the **efficiency class IE3** or motors with the **efficiency class IE2 with frequency converter** must be used as of **January 1, 2015**.
- Also, in a nominal performance range from **0.5 to 7.5 kW** only motors with the **efficiency class IE3** or motors with the **efficiency class IE2 with frequency converter** must be used as of **January 1, 2017**.

ENERGY EFFICIENCY: EXAMPLES



Efficiency test



Besides the lighting, electric motors are the largest consumers of energy in a shopping center. If and when existing motors are replaced by highly efficient motors depends on a number of aspects, especially the operating hours, and needs to be assessed for each case.

For a first superficial efficiency test, Energieagentur NRW provides an appropriate tool on its home page. ("E-Motor-Check"). (In German only) <http://www.energieagentur.nrw.de/tools/e-motor/>

Illustration 11: E-Motor-Check, Entering of actual data [Source: EA NRW]

Example: Ventilation motor, 22 kW, 4-pin, efficiency class EFF3, Operating hours 3,120 h/a, electric power rate 15 ct/kWh

ENERGY EFFICIENCY: EXAMPLES

E-MOTOR.check
EnergieAgentur NRW

Navigation: Einführung | Neuanlage | Altanlage | **Ergebnis**

Ergebnis

	IE 1	IE 2	IE 3	alt
Wirkungsgrad	89,9%	91,6%	93,0%	87,8%
kWh/a	76.382	74.944	73.841	78.144
€/a	11.457	11.242	11.076	11.722
gesparte Energie [kWh]	1.762	3.200	4.303	0
gesparte Betriebskosten [€]	264	480	645	0
vermiedenes CO ₂ [kg]	1.154	2.096	2.818	0

ZURÜCK ZUM ANFANG

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Two bar charts are displayed on the right side of the interface:

- kWh/a chart:** Shows energy consumption for IE1 (green), IE2 (green), IE3 (green), and Alt (red). Values are approximately 76,382, 74,944, 73,841, and 78,144 kWh/a respectively.
- €/a chart:** Shows operating costs for IE1 (green), IE2 (green), IE3 (green), and Alt (red). Values are approximately 11,457, 11,242, 11,076, and 11,722 €/a respectively.

Illustration 12: E-Motor-Check, result [Source: EA NRW]

New/old efficiency class (e-motors)

New IE efficiency classes		Old IE efficiency classes by CEMP	
efficiency class	IE Code	efficiency class	Class
Super Premium	IE 4	-	-
Premium	IE 3	-	-
High	IE 2	High	EFF 1
Standard	IE 1	improved	EFF 2
below standard	No marking	Normal	EFF 3

Illustration 13: Comparison new/old efficiency classes [Source: Deutsche Energieagentur]

ENERGY EFFICIENCY: EXAMPLES



Lighting assessment



The company LDBS conducted a joint lighting check with Philips for many German ECE centers in 2010. This objective was to show the saving potential for energy as well as for maintenance.

This test showed that in many centers, highly efficient illuminants are already being used. There is a considerable saving potential with regards to the energy requirements as well as the costs for the replacement and purchase of lamps (see illustration). **In individual cases the lighting costs (energy, replacement, lamp costs) can be reduced by half by installing energy-efficient illuminants.**

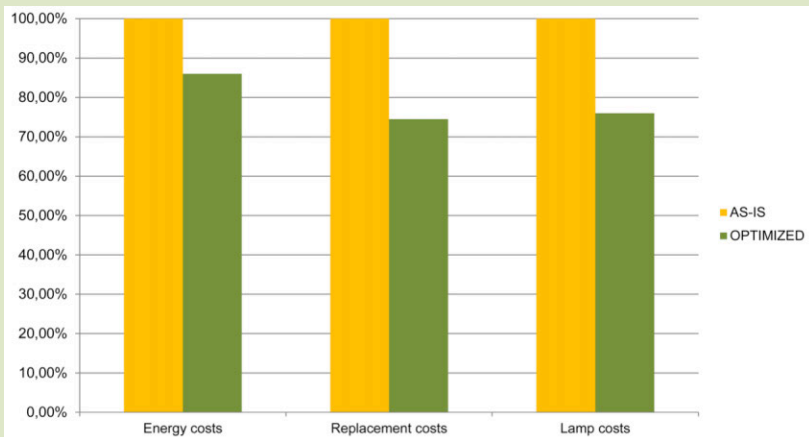


Illustration 14: Results of the lighting test [Source: iki]

Thus, it should be the objective to consider the recommendations of the lighting test during the normal lamp replacement procedure.

You can get further information from the colleagues from FM BS in Hamburg.

ENERGY EFFICIENCY: EXAMPLES



Cool Down



To increase the energy efficiency of the center as a whole, the tenants have to be involved into the lighting concept as well. The initiative "Cool down" by ECE and its partner Philips is the first measure.

"It is the aim of the project to sustainably reduce the energy requirement for the lighting in the shopping centers of ECE with the tenants. Two-thirds of the energy which is used for the lighting of the centers is consumed in the rental areas. This share can be reduced by approx. 20% by using state-of-the-art lamps and illuminants. 900,000 kilowatt hours can be saved annually. This equals about 610 tons of carbon dioxide which in turn equal the annual energy consumption of 200 four-person households. The easiest measure for portfolio centers is the replacement of lamps. Thus, for example 50-watts halogen lamps can be replaced by the latest technology with only 35 watts: The lighting levels will remain the same, in addition the heat will be reduced. All these developments are already considered in the planning stage of new projects. Additional saving potential can be realized by lowering the brightness without destroying the lighting conditions relating to each other. **The same light with the same quality is an aim that can only be achieved if ECE and its tenants work hand in hand.** There are already recommendations for the use of illuminants and light intensity in the shop windows in the tenant shop-fitting specifications. A reduction of the shop lighting, for example by 50% in the evening, as it is done with the light control in the mall, can reduce the energy consumption as well as the costs significantly." [Source: ECE – Sustainable Success (2010/11)]

ENERGY EFFICIENCY: EXAMPLES



Energy efficiency at the work station (CM)

Everybody can contribute...

- PC and screen are turned on all day! Turn off your PC if you do not use it or you are away for some time, or attending a meeting. The "power management" of the operating system can help you (in Windows: Control Panel > Power Options)
- Screensavers also consume energy. Most of the time, the off-switch is the better choice
- Keep coffee warm in a thermos flask and not on the heating plate of the coffee machine
- Turn off the light after leaving the room
- Open the window for a short time instead for a longer time! Open the window only if the heating is turned off, in summer when the air conditioning system is turned off
- Adjusting the thermostat valves on the heating properly
- Finding the appropriate temperature for all persons in the room
- Switch on the dishwasher when it is full only

After work...

- Unplugging all office devices
- Turn off plug boards
- Turn off coffee machines
- Turn down the heating
- Turn off the air condition



BUILDING TECHNOLOGY



A thorough and correct maintenance and repair of the building technology is essential for sustainable operation. This is the only way to establish whether the operability and the supply guarantee as well as the longterm value can be maintained.

Regular maintenance and repairs

It has to be kept in mind, however, that technical facilities operate more sensitive the more complex they are. Therefore, especially new systems require an appropriate adjustment, and, in case of deviations or alterations, a re-adjustment may be essential. While older systems are hardly affected by recesses (for example in heat exchangers, pumps, valves) because of the general tendency of overdimensioning, new systems deviate soon and considerably from reference and operating values. Thus, their service life is rapidly shortening. Regular maintenance intervals with a subsequent function and reference value control is inevitable. Especially prior to operating and after every refurbishment the systems have to be cleaned and flushed.

Adjusting and re-adjusting

Maintenance






Function and reference value monitoring

In the following, key aspects for the technical systems ventilation, cooling, and heating are explained. There will also be advice on measures which go beyond day-to-day operations, with regard to refurbishment, modernization, or repairs.

1. **Adjusting and re-adjusting**
2. **Regular maintenance and repair intervals**
3. **Monitoring the parameters**

BUILDING TECHNOLOGY

Further documents, information and links

-  VDI 6039: "Facility management - Managing of building commissioning - Methods and procedures for building-services installations" (11/206) (available in German and English)
-  VDI 6026, Blatt 1: "Documentation in the building services - Contents and format of planning, execution and review documents" (05/2008) (available in German and English)
-  VDI 3810, Blatt 1: "Operation and maintenance of building installations - Fundamentals" (Entwurf 05/2012) (available in German and English)
-  GEFMA 922-08: "Dokumente im Facility Management – Dokument für das Betreiben" (09/2004) (available in German only)
-  CEN EN 14336:2004 "Heating systems in buildings, installation and commissioning of water based heating systems" and other related national codes regarding commissioning and maintenance of building service installations

BUILDING TECHNOLOGY: INFORMATION



Commissioning / operating competence

In a technological context, the term "commissioning" means: Taking into operation, putting into service, acceptance test, handover.

In contrast to the initial operation and handover which has been common for a long time, commissioning has become a part of the building operations. It is the aim, **to optimize the design data and adjusted values of technical building equipment in practice, under load and the climatic conditions, based on the operating competence.**

The practice has shown that existing systems frequently remain unaffected since the first operation and that adjusted values and reference parameters are not adjusted to the actual conditions at any time.

For a sustainable and efficient operation the adjusted values and reference parameters for new systems are to be assessed and adjusted after the first 10 to 12 months as well as recurrently after 5 years or significant changes, if necessary.

The following aspects should be assessed and optimized:

- Operating times
- Day, weekend, night and season settings
- Full and partial load operation
- Volume flow of the air conditioning system
- Forerun and reflux, ventilation and supply air temperatures
- Switch, control, and regulating processes (outside temperature, sunshine, weather, wind speed)
- Inspection and maintenance intervals, etc.

BUILDING TECHNOLOGY: INFORMATION



Data sovereignty



Complying with operating obligations and legal regulations is to be certified with a number of documents (maintenance history, maintenance and repair protocols, disposal records, cooling agent monitoring, etc.).

The certificates are frequently issued by the contractor and maintenance companies or updated in the maintenance history. To certify that the operating obligations were implemented these documents should be up-to-date and readily available. **Otherwise, one might not be able to proof that the operating and due diligence obligations were indeed observed.**

Practice shows that changing the contractor or the maintenance company often leads to the loss of the respective data.

Therefore, the operator should have data sovereignty at any time!

Recommendation: Already when commissioning the service company / maintenance company it has to be mutually agreed that ...

- ... essential certifications or updated maintenance histories are to be handed over
- ... essential certifications or updated maintenance histories are to be handed over in paper form or as PDF document.

Certifications and maintenance histories can be stored on the center's servers structure and are therefore accessible to all authorized persons (without regard to absence due to illness or vacation).

BUILDING TECHNOLOGY: INFORMATION



Conformity statements



The manufacturer / installation contractor or service provider confirms in the conformity statement (formerly: specialized company statement) that their services rendered as well as the used materials / construction materials comply with legal regulations.

What has been in best practice in fire protection and serves safety and quality assurance is also recommendable for at least some services of the technical building equipment, regarding the increased requirements and the complexity of guidelines which have to be observed.

Moreover, the operator can proof that they have observed their due diligence obligations by providing conformity statements.

Recommendation: For future maintenance, repair and repair services, conformity statements should also be demanded from service providers for the technical building equipment.

- Ventilation systems (compliance with national regulations – especially regarding the requirements for hygiene and energy efficiency)
- Water supply (compliance with national regulations – especially regarding the hygiene requirements)
- Electrical installations (compliance with national regulations)
- Energy supply systems (compliance to national regulations, especially regarding the implementation of the directive on energy performance of buildings)

ELECTRICAL ENGINEERING



Electrical engineering comprises all electric facilities of a center, especially the lighting and the power supply. Electrical engineering plays a significant role economically due to the high equipment standard. Maintaining the operation and optimization of the capability and operational life and the prevention of hazards are key aspects considering the operation of electric systems.

High equipment standard

Besides the regular assessment of installations and devices, a proactive test of the control systems and distributors is to be conducted. Technologies such as infrared cameras can identify problems which cannot be spotted with the naked eye.

Optimizing the capability and operational life

To reduce energy supply costs the connection values should be optimized by reducing the performance peaks. To do this, the load curve should be leveled using the building management system, for example by time-delayed starting of electric systems. At the same time, performance peaks may be compensated by using alternative supply systems.

Avoidance of hazards

1. Proactive maintenance and tests
2. Using modern test methods
3. Reducing performance peaks

Reducing the supply data

ELECTRICAL ENGINEERING: CHECKLIST

Measures without or with few technical constructional changes

- Compensating performance peaks by the time-delayed starting of electric systems and leveling the load curve (building management system) or optimizing the actual load management with available online tools such as ECO-Online (see information on p. 38)
- Regular tests of installations and devices subject to the regulations by the professional associations
- Conducting regular load and capacity tests on accumulator systems
- Checking for non-compliant installations and additional installations (note: electric installations and facilities are among the most frequent causes of fire!)
- As part of the expert inspection electric motors, pumps, vents are to be checked for bearing damages with an infrared camera selectively (proactive maintenance; see info on p. 63)
- Comparison of maintenance services with deficiencies from expert inspections stipulated by respective national laws
 - Were any deficiencies found in expert inspections previously established during maintenance and were they documented?
 - Were any of the deficiencies found in expert inspections caused during the maintenance work?
- Inspection and inventory documents are to be updated in case of changes and updating the legally required certificates (maintenance history, disposal certificated etc.) (see information on p. 57)

ELECTRICAL ENGINEERING: CHECKLIST

Measures with technical and constructional changes

- Preparing an emergency plan for an electric systems failure; e.g. the following aspects require consideration:
 - Is the emergency power supply operational?
 - Who assesses the cause of the power failure and its duration?
 - Who notifies visitors and tenants?
 - Is the center to be evacuated or can all persons remain in the building?
 - How long can the persons remain in the building if the heating, ventilation and air conditioning systems fail?
 - How can be made sure that the persons can leave the parking garage?
 - How can persons stuck in elevators leave them? Is there an evacuation ride? Who checks whether the evacuation ride has worked or if there are passengers stuck in the elevator?
 - How can disabled persons (e.g. wheelchair users) leave the upper floors?
 - Which tasks are assigned to the security service in this case? Controlling the exits or patrolling the property?

Lighting




- Choosing an energy-efficient light scenario (e.g. cleaning light) which is adjusted to the (e.g. spacial or procedural) requirements outside the shop opening times.
- Assessing the lighting scenarios in the minor corridors. Especially the corridors, which are emergency routes for shops, are to be inspected. Besides the reduction of the lighting, the subsequent installation of motion sensors or switches is reasonable.

ELECTRICAL ENGINEERING: CHECKLIST

Please note: The minimum illumination levels must not fall below the limits which are stipulated by safety regulations. Coordinate with ECE FM (Hamburg), if necessary.

- Optimizing the use and the energy efficiency for season illuminations (illuminations, illumination level, operating times, etc.)
- Optimizing the operating times of the facade illumination
- Optimizing the illumination by opening the parking areas strategically. Please note: Road safety must be kept in mind!
- Note: In times with less visitors it often suffices to open only a few parking levels or areas. Thus, the lighting (as well as the ventilation) in unused areas can be reduced. Some centers (e.g. Ernst-August-Galerie) have additional visitor-frequency controlled escalators which are set to standby in less frequented stories. Please note: Due to insurance obligations, escalators must not be deactivated manually!
- Supporting tenants in optimizing the illumination of rental areas ("Cool-down-Initiative") ("Cool-down initiative"; see information p. 52)

Further documents, information and links

-  Country-specific notification of insurances and professional associations
-  CEN EN 12464-1 Light and lighting – Lighting of workspaces, 2011
-  CEN EN 12464-2 Lighting of work places – Part 2 Outdoor work places, 2007

ELECTRICAL ENGINEERING: EXAMPLES



Preventive maintenance with electro-thermography

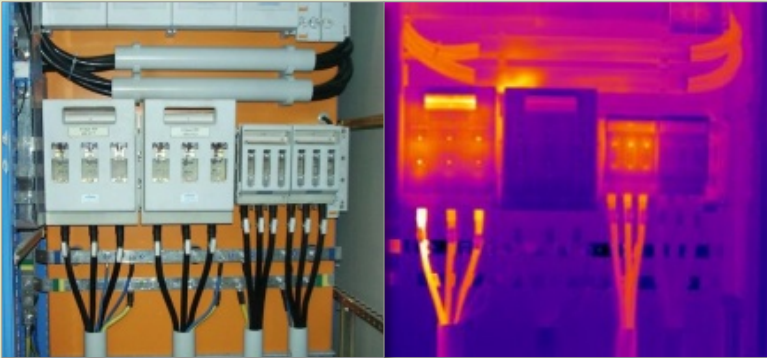


Illustration 16: Thermographical analysis [Source: ikl]

Thermography can identify corroded joints, overloaded lines, de-fected relays or damaged fuses.

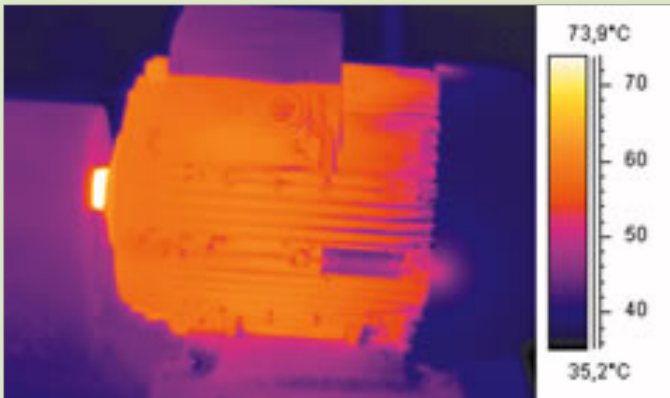


Illustration 15: Thermographical analysis [Source: ikl]

A damage to the bearing is beginning to show

ELECTRICAL ENGINEERING: EXAMPLES



Sustainable daylight control in the mall

Resource-saving and energy-efficient acting is essential for a sustainable operation. The lighting (illumination level, illuminants, lighting control, operating hours) in the shops and in the mall.

Shopping centers with natural daylight can dim or even switch off the artificial light with an intelligent light management if the daylight suffices. The objective is to achieve a consistent, permanent, and economic illumination level in the center.

Centers which control the lighting with the building management system, the lighting management for every floor / gallery can be controlled individually. Thus, the daylight input will be stronger on the highest level compared to the basement.

To avoid the chiaroscuro effect of bright daylight outside and the light in the building, and to support the eye's ability to adjust to the light, a brighter light level can be selected which decreases inside the building.

In general:

Use of daylight to illuminate the mall. No compensation of the bright daylight with artificial light but:

"Sun ON = Artificial light OFF!"

ELECTRICAL ENGINEERING: EXAMPLES

Example: Ernst-August-Galerie

The artificial light is reduced when there is a strong daylight input. The cove lighting remains activated to accentuate. Downlights are reduced.



Illustration 17: Ernst-August-Galerie Hannover [Source: ikl]



Illustration 18: Ernst-August-Galerie Hannover [Source: ikl]

ELECTRICAL ENGINEERING: INFORMATION



Energy-saving potential of modern lighting

Besides the saving potential with an intelligent control the use of modern technical lighting systems can save energy as well. In the following you can find an overview of the energy-saving potential – depending on the illuminant and controls.

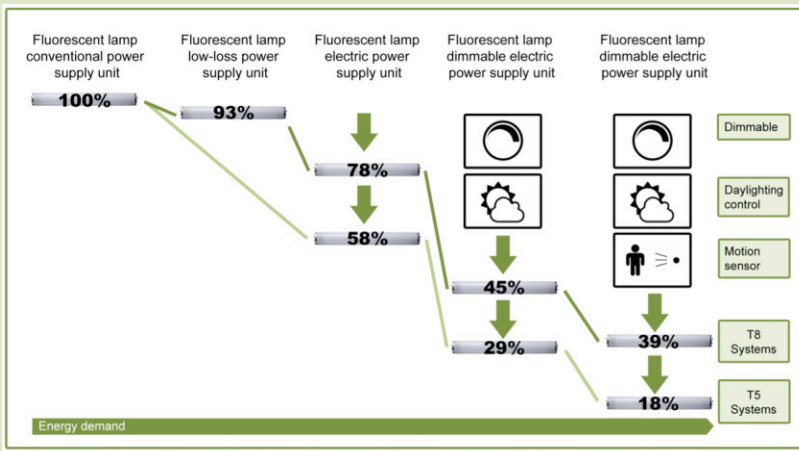


Illustration 19: Energy-saving potential [Source: ikl according to OSRAM]

The saving potential of a use of modern illuminants from a financial point of view is shown in the lighting check (see p. 51).

ELECTRICAL ENGINEERING: INFORMATION



Breaking mercurial illuminants

Code of conduct in case of broken mercurial illuminants:

- Separate the illuminant from the power grid
- Mercury spreads on ground-level, therefore one should ventilate first and then pick up the pieces
- Ventilate the room for at least 15 minutes; create a draft, if possible
- Put on gloves
- The illuminant parts can be picked up after the ventilation and seal them in an airtight container.
- Take the pieces to the nearest collecting point for used illuminants

If the lamp **broke on a smooth surface** (parquete, tiles, PVC, linoleum):

- Collect the broken pieces with a disposable item (no broom!), e.g. a stiff piece of cardboard. Thorough cleaning of the floor twice with a wet disposable cloth

If the illuminant **broke on a carpet or on a carpeted floor**:

- Vacuum the site where it broke for five minutes at an open window. Then ventilate the room for 15 minutes. Repeat the procedure twice.
- Clean the nozzle of the vacuum cleaner thoroughly and remove the vacuum cleaner bag or clean the dust container of the bagless vacuum cleaner. Turn on the vacuum cleaner outside for 15 minutes
- Dispose the vacuum cleaner bag or its contents as well as the floor cloths at the nearest collection point

[Source: OSRAM]

ELECTRICAL ENGINEERING: INFORMATION



Illuminants compared

In the following, you will find an overview of the recommended illuminants which are already used at ECE due to the framework agreement.

Illuminants	efficiency ca. lumen/watt	life cycle ca. hours
<i>Reference: light bulb</i>	<i>12</i>	<i>1,000</i>
halogen lamp	40	5,000
compact fluorescent light/ energy-saving lamp	50-60	10,000
fluorescent lamp T8, 26 mm	88	8,000
fluorescent lamp T8, Eco, 26mm	100	12.-16,000
fluorescent lamp T5, 16 mm	92	10.-12,000
vapor discharge lamp	89-92	12.-16,000
HQI/MHN quartz burner, "mercury vapor lamp"	85	10,000
halide discharge lamp, new generation	97-100	12-16,000
Power-LED	40-50	50,000

[Source: Philips]

VENTILATION SYSTEMS: CHECKLIST

Measures without or with few technical constructional changes

- Adjusting the function and configuration of the systems and all systems as a whole to the actual load conditions and requirements (in connection with a "commissioning"; see information on p. 56)
- Adjusting the operating times of the air conditioning system to the actual operating times of the rooms
 - Can the lead and stopping time of the system be reduced further?
 - Are the programs for the controls for all systems sufficiently controllable separately (e.g. settings for weeks, Christmas opening times, public holidays) or are the systems controlled manually?
 - Can systems with frequency converter and volume current regulators zones/shops with regular opening times zones/areas with special opening or use period turned off with the volume current regulator?
- Assessing whether the existing suction point for outside air comply with hygienic requirements
 - Are the suction points, e.g. in the main wind direction from meanwhile built exhaust air outlets, recooling systems or other emitters in the neighborhood?
 - If the quality of the outside air changes a measurement of the outside air quality should be performed as part of a maintenance measure and filter levels and outside air volume flows adjusted accordingly, if necessary
- Complying with hygiene requirements for inside air systems according to VDI 6022 Ventilation and indoor-air quality - Hygiene requirements for ventilation and air-conditioning systems and units (VDI Ventilation Code of Practice) (available in German and English) or national Best-Practice (whichever is more stringent) (see also VDI 6022, Checkliste-Tabelle 6). Conducting and documenting regular hygiene inspections and hygiene tests including a microbiological assessment (maintenance history for ventilation systems)

VENTILATION SYSTEMS: CHECKLIST

- In case of repair or refurbishment measures on the ventilation systems the replacement of the canvas connectors for elastic connectors made of close porous material should be evaluated and considered, if necessary (
- In case of changes to the interior the supply air and exhaust air outlets should be covered dustproof to avoid the contamination of the duct system. This problem should be kept in mind for older systems without volume current regulator and valve flaps to each shop. Valve flaps have to be installed subsequently, if necessary
- Adjusted / reference values of derating and regulating devices are to be inspected regularly (see information on p. 56)
- Conducting energetic inspections complying with national regulations or "national best practice" (see information on p. 46)
- Assessing whether the original performance parameters (e.g. of the special outside air volume flow per person or m^2 still correspond to comfort and hygiene requirements of today (see information on p. 56)
- Optimizing the outside air rate and storing separate programs in the system control unit which depending on visitor frequency, time of day, weekday, season (see information on p. 73)
- Optimizing the operation of existing heat recovery systems (see information on p. 75)
- Replace air filter (up to F7) of inside air systems at 200 pascal (see information on p. 76)
- If dampness occurs due to the bad position of the exterior air intake, the use of filters with with biocidal impregnation should be evaluated.

VENTILATION SYSTEMS: CHECKLIST







- For central ventilation systems: check whether multileaf dampers were installed on the exterior air intake and the ventilation exhaust to avoid cold air circulation during shutdown times. Install, if necessary
- Keep in mind that the accessibility of fire protection flaps, block and derating flaps is provided in case of refittings or changes to other installations of facilities.
- Evaluating the maintenance service of contractors by demanding measurement results and measuring protocols (air volume, filter pressure loss, etc.) before and after the maintenance work as well as disposal certificates
- Comparison of maintenance services with deficiencies from expert inspections stipulated by respective laws
 - Were any deficiencies found in expert inspections previously established during maintenance and were they documented?
 - Were any of the deficiencies found in expert inspections caused during the maintenance work?
- Inspection and inventory documents are to be updated in case of changes and updating the legally required certificates (maintenance history, disposal certificates, etc.) (see information on p. 57)

Measures with technical and constructional changes

- Using highly efficient smooth running ventilators with frequency converters (stepless speed regulation (see also chapter "Energy efficiency – highly efficient motors", p. 48)
- Assess, whether the air intake temperature can be optimized (e.g. with a solar panel, extensive roof vegetation, a light-colored roofing foil, etc.) if the existing air conditioning system is installed in an unfavorable place

VENTILATION SYSTEMS: CHECKLIST

Further documents, information and links

-  VDI 2082: "Air-conditioning - Sales outlets (VDI ventilation code of practice)" (07/2010) (available in German and English) or national best practice guidelines
-  VDI 6039: "Facility management - Managing of building commissioning - Methods and procedures for building-services installations" (available in German and English)
-  VDI 6026, Blatt 1: "Documentation in the building services - Contents and format of planning, execution and review documents" (05/2008) (available in German and English) or national best practice guidelines
-  DIN EN 13779: "Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems" (09/2009) (available in German and English) or national best practice guidelines based upon CEN/TC 156 "Ventilation for buildings"
-  DIN EN 15251: "Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics" (08/2007) (available in German and English) or national best practice guidelines based upon CEN/TC 156 "Ventilation for buildings"
-  <http://www.camfil.us/>

VENTILATION SYSTEMS: EXAMPLES



Optimizing outside air / air changing rate

To operate air conditioning systems more efficiently, for the central systems which supply *shops* which sell *non-odorous* products, the outside air/ air changing rate is to be **adjusted to the visitor frequency**.

Although the supply and the waste air rate need to be constantly the same, there is saving potential up to 50% for heating and cooling energy for the conditioning of the outside air by changing the outside air or ventilated air ratio.

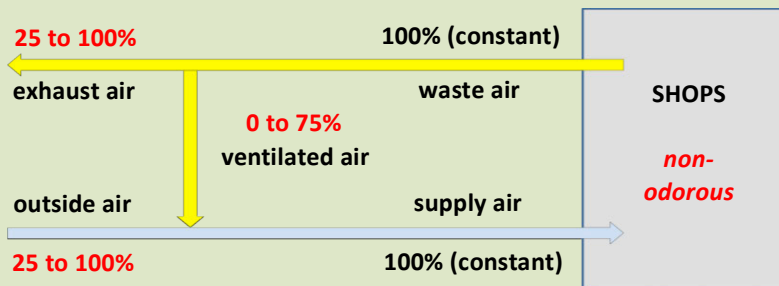


Illustration 20: Air changing rate [Source: ikl]

Please note: Check, whether there are conditions for air conditioning systems in the building permit and in the fire protection concept. Assessment and coordination with ECE-FM, Hamburg, if necessary.

VENTILATION SYSTEMS: EXAMPLES

Procedure to optimize the outside air rate:

- ❑ Check whether the visitor counting system can show the visitor frequency history of the day; the visitor counting system needs to be modified accordingly, if necessary
- ❑ Identifying the optimum outside air rate during the day depending on the visitor frequency and adjusting the system controls accordingly; linking the air conditioning system to the results of the visitor counting system
- ❑ Optimizing the identified specific outside air rate per visitor during operation; reserving resources for staff in the building and the discharge of odor emissions as well as the disproportionate distribution of person in the building, if necessary. Maintaining the results with a contaminant measurement of the inside air (VOC, CO₂), if required
- ❑ Controlling the outside air rate with extreme waste air (ABL) temperatures and adjusting it with the outside air temperature

Please note:

If the waste air temperature is higher than the outside temperature, the systems are to be operated with 100% outside air. Otherwise the conditioning of the ventilated air will require more cooling energy than for the cooler outside air.

The sixfold air change or the specific outside air (AUL) rate of 18 m³/(h x m²) in ECE shopping centers represent a high ventilation comfort; they comply with reference values from DIN or VDI regulations for the highest comfort requirements.

This comfort can be achieved with a lower outside air rate in case of a lower visitor frequency.

⇒ Efficiency increase

VENTILATION SYSTEMS: EXAMPLES



Optimizing the heat recovery

In a constant supply air temperature (e.g. +16 °C) and high cooling load in the interior (e.g. due to the lighting), the waste air temperature (AB) may be higher than the outside temperature (a) ($t_{AB} > t_a$). This means that despite cooling it is warmer in the shops than outside the building.

In this case the heat recovery would heat up the outside air/ fresh air which would then be cooled again.

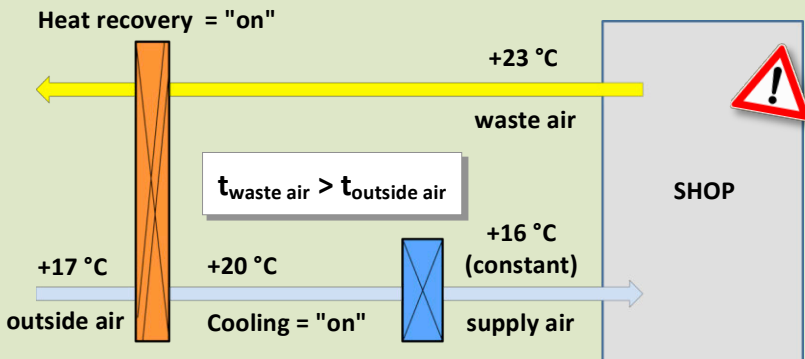


Illustration 21: Control of the heat recovery [Source: iki]

The heat recovery control is to be adjusted accordingly; i.e. the plate heat exchanger = "Bypass operation", circulating heat exchanger = „off“, circulating system = "pump off".

***Waste air temperature > outside temperature
in case of cooling ⇒ heat recovery "off"***

VENTILATION SYSTEMS: EXAMPLES



Optimizing the air filter change

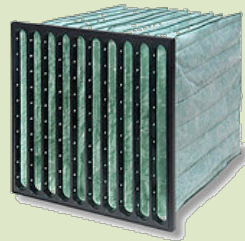
Air filter (up to filter class F7) in central ventilation systems should be replaced in case of a **pressure difference of 200 Pa** (final pressure drop) (see also DIN EN 13779, table A8 and various manufacturer recommendations).

Higher final pressure causes a higher power input and energy costs of the vent motor and has a negative impact on the cost effectiveness of the ventilation system. In general, the optimum time for the air filter change can be identified by comparing the energy cost savings and the costs for the filter change (material and staff costs).

Advice: The filter service life is influenced by the dirt / dust pollution of the outside air. Usually, the air filters have to be replaced twice a year in case of a final pressure drop of 200Pa. Best practice in a few centers shows that the maintenance of cooling and air conditioning systems

*in two steps (**spring maintenance, fall maintenance**) to make sure that the air filter can be replaced and disposed professionally. In spring, the cooling system is maintained and the air filters in the air conditioning system are replaced. The air conditioning system is maintained and the air filters are changed again.*

Note: Only filters which are specifically labeled as "reversible" are allowed to be cleaned and re-used to extend their life cycle. One should refrain from vacuuming "disposable filters" to extend their life cycles.



COOLING SYSTEMS: CHECKLIST

Measures without or with few technical constructional changes

- Using environmentally-friendly cooling agents (ODP/GWP); replacing the cooling agents in coordination with the cooling system manufacturer for existing systems.
- Conducting a legally required system monitoring regarding leak tightness for systems with more than 3 kg cooling agents (EU Regulation EG 842/2006) on certain fluorinated greenhouse gases)
- Updating a legally required maintenance history in which all inspections and maintenance activities, tightness, type, volume, point in time of the used cooling agent, service company and person are recorded (file storage obligation: 5 years or subject to national laws)
- Turn off the oil pan heating in case of longer downtimes (e.g. in winter)
- Assessing the bacteria contamination of open re-cooling plants, adjusting the cleaning and disinfecting intervals. Conducting control measurements in water and waste air. Optimizing maintenance intervals/plans (contaminated tube bundle heat exchangers reduce the efficiency and increase the energy requirements, oil changing intervals have a considerable impact on the service life of the machines, aspirated the gases from absorption cooling systems, etc.)

Please note: Once the incrustation has formed, the heat exchanger has to be replaced. Gases in the condenser of absorption cooling systems are to be aspirated in a 10-day interval.

- Operate the systems with gliding temperatures depending on requirement in the cooling water network (with an increasing cold water temperature, the energy requirement of the cooling production will decrease)
- Inspection and inventory documents are to be updated in case of changes and updating the legally required certificates (maintenance history, disposal certificates, etc.) (see information on p. 57)

COOLING SYSTEMS: CHECKLIST

Measures with technical and constructional changes

- Assess, whether the air intake temperature can be optimized (e.g. with a solar panel, extensive roof vegetation, a light-colored roofing foil, etc.) if the existing air conditioning system is installed in an unfavorable place (see information on p. 79)
- As a rule: the lower the intake temperature (and thus the necessary condensation temperature) the higher the cooling performance and the lesser the motor performance

Please note: The intake temperature will increase with the sun radiations or the cardinal point (best: north side, parking garage or basement garage; worse: roofs, west side, building niche)
- Evaluate the efficiency increase by replacing existing thermal expansion valves by electric expansion valves; usually the condensation can be controlled more accurately and economically by using electric expansion valves
- Basing the cooling system type in case of a replacement or a new installation on a maintenance intervals and the energy requirement (screw suppressor / turbo compressor are less maintenance-intensive than reciprocating compressor)
- Using reversible cooling systems for compression cooling systems (function for cooling load: Cooling production; function for heating load: heat pump)

Further documents, information and links



EU Regulation EG 842/2006 on certain fluorinated greenhouse gases



http://www.bitzer.de/eng/products/docu/doc_det/1

KÄLTETECHNIK: EXAMPLES



Assessing the intake temperature

The surface temperature of building parts (roof, facade) will rise considerably due to the sun radiation depending on the cardinal point and time of day. The following diagram shows the potential surface temperature on hot days and the corresponding sun radiation. Thus, there can be a temperature of up to +67°C (outside air temperature +32°C) on dark flat roof at 12am.

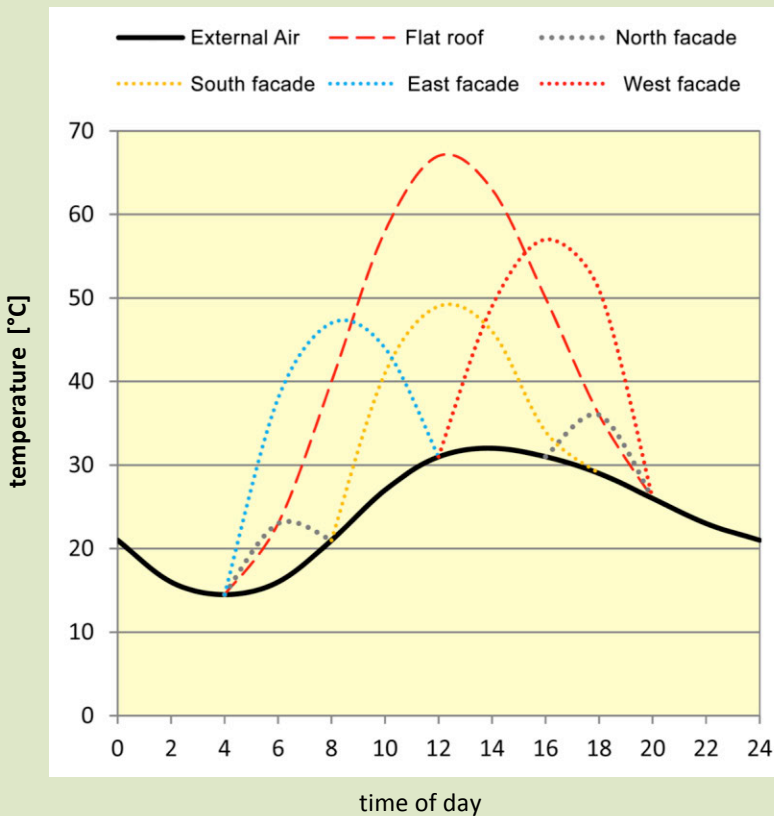


Illustration 22: Surface temperature [Source: ikl]

COOLING SYSTEMS: EXAMPLES

Air conditioning systems and air-cooled condensers which takes in the outside are over respective building parts, the energy requirement may rise. Additional cooling is required to cool down the outside air for air conditioning system. Cooling systems the drive power of the compactor by the rising condensing temperature.

Procedure

- For air conditioning systems: Comparing outside temperature (with outside sensors) and outside air intake temperature (with temperature sensor in air conditioning systems)
- For cooling: Comparing the outside temperature (with outside sensors) and the condenser temperature (with temperature sensor on the condenser)
- Evaluating potential compensation measures in case of intake temperature:
 - Staggering outside air intake with the air duct (distance to the building part surface)
 - Replacing the dark roof surface with a bright roof surface (e.g. white foil)
 - Roof greening (keep in mind the structural analysis!)
 - Artificial shading solar panels/solar lamellas (keep in mind the structural analysis!)



Illustration 23: Flat roof
[Source: DERBIGUM, Föhren]



Illustration 24: Flat roof
[Source: Marolf Erlach]



Illustration 25: Solar panel
[Source: Gerlib-Tech, Dortmund]

HEATING ENGINEERING: CHECKLIST

Measures without or with few technical constructional changes

- Inspecting and maintaining the system before the heating season
- Adjusting the system hydraulically; inspecting the system every 5 years or after refurbishment measures
- Assessing the adjusted / referenced values every 5 years or in case of technical or constructional changes
- Limiting and locking the thermostat valves and ambient temperature controls to the reference ambient temperature (see information p. 85)
- Inspection of the heating devices in the rental areas: Assessing the adjustment of the thermostat valves and instructing or briefing the tenants, if necessary
- Shutting down the supplementary heater during cooling with the building services management controls; cooling = "on" ⇒ control valves after heater = "off"
- Controlling the use of re-heaters in the rental areas in the summer time and the transition period with the building management system
- Integrating a regular function check of controls and sensors to the maintenance plan; considering the deviation of reference values with alarm notices for the building management system
- Optimizing operating systems with the building management system (operating hours, load-dependending forerun and backflow temperatures, night setback, weekend settings)
- Enabling a real-time control of the heating consumption with the building management systems; an efficient operation requires knowledge of the heating consumption and the load curve
- District heat: Adjusting the delivery rate to the actual maximum heating load . Due to the saved inside heat the heating load is usually considerable lower than the referenced values. Integrating consumption and load curve in the building management system

HEATING ENGINEERING: CHECKLIST

- Assessing the membrane of the expansion tank; generally replaced after 8 to 10 years
- Customer entrances without revolving drum doors or vestibule (double-door system) the air curtain has to be dimensioned professionally in coordination with ECE FM (Hamburg). Please note: Only a correctly dimensioned air curtain is energetically efficient!
- District heat: using the available heat to the maximum; optimizing temperature spread and return temperature
- Optimizing the insulation of pipes, moldings, armatures and air ducts (minimum standard: EnEV); identifying weaknesses with an infrared camera (thermography)
- Inspection and inventory documents are to be updated in case of changes and updating the legally required certificates (maintenance history, disposal certificates, etc.)

Measures with technical and constructional changes

- No plastic cladding for insulations; use aluminum coarse grain (plastic = fire load)
- Adjusting heatings / heating surfaces to the actual heating load
- Installing highly efficient pumps according to the Eco-design directive

Further documents, information and links

-  National laws on energy-efficiency of buildings

HEATING ENGINEERING: EXAMPLES



Using highly efficient circulating pumps

Complying with the Eco-design directive and replacing existing pumps with circulating pumps (energy class A). **Saving potential compared to electrically controlled pumps: approx. 60%.**



Assessing the quality of the insulation

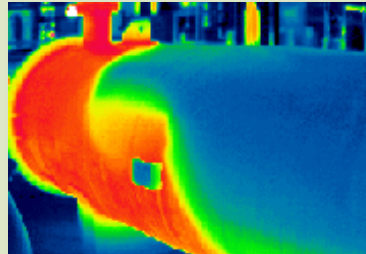
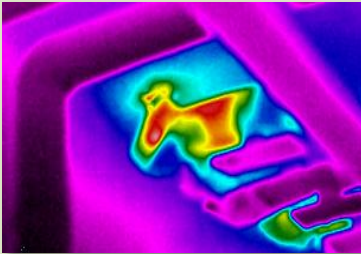


Illustration 26: Thermal image of the insulation [Source: www.sachverstaendiger-ender.de]

... in ceiling ducts (also relevant for fire protection)

... on containers and armatures

***Required minimum insulation thickness
complying with national regulations***

HEATING ENGINEERING: EXAMPLES



Hydraulic balance

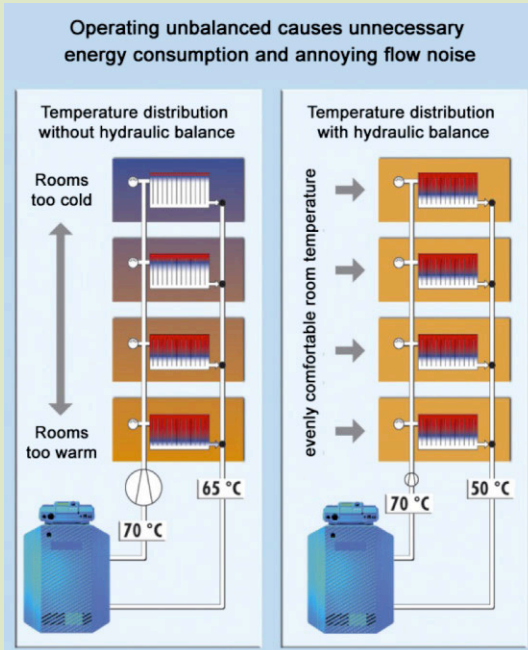


Illustration 27: Hydraulic balance [Source: ASUE, Berlin]

Missing hydraulic balance will cause ...

- imbalanced heat output (too cold or too warm)
- **higher energy consumption (5 to 10%)**
- higher pump performance and higher delivery pressure
- flow noise
- inaccurate results of the consumption metering

HEATING ENGINEERING: EXAMPLES



Thermostatventile limiting / locking

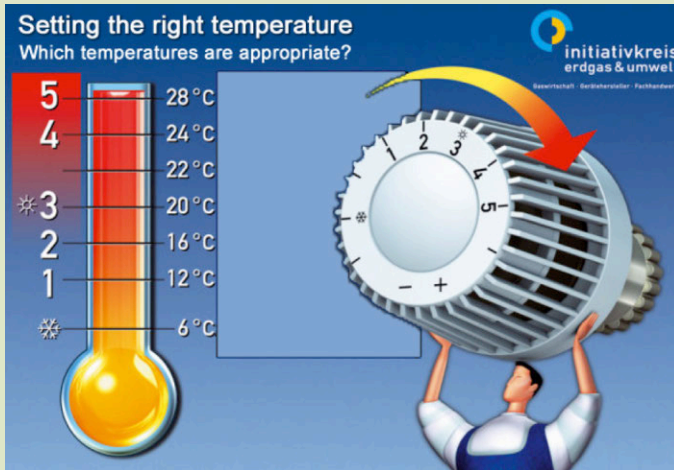


Illustration 28: Thermal image insulation [Source: Initiativkreis Erdgas und Umwelt]

room type/ utilization	room temperature	step
<i>Swimming pools (comparative value)</i>	28 °C	5
Shower and changing rooms	24 °C	4
Offices, meeting rooms, etc.	20 °C	3
Sales areas, shops in general	20 °C	3
Restrooms	20 °C	3
Heating stairwells, corridors	15 °C	1-2
Storage areas	12 °C	1
Basement areas, frost-free rooms	6 °C	☀

WATER REQUIREMENT



In case of water efficiency the focus is first on the sanitary facilities of a center. These are the places with the biggest water consumption in public buildings and therefore provide the biggest potential for saving costs and an environmentally-friendly handling of the resource "water". However, detergents and cleaning methods as well as trick fountains and fountains have an impact on the water requirement of a center. It is therewith not an objective to reduce the number of systems. The aim is to operate these with a particularly efficient technology.

Sanitary facilities

Detergents and cleaning methods

Depending on the construction type, water-cooled cooling systems may also have a considerable impact on the water requirement. Regular maintenance is to be kept in mind.

Saving water

In general, there is a high saving potential by implementing small technical improvements, adjustment the stopping times and regular maintenance.

In case of the operation of fountains or trick fountains it is to be kept in mind that a water change requires great amounts of water depending on the system. Therefore it is important to keep the pollution degree low. Detergents and cleaning chemicals are to be used in small and hazard-free doses to avoid health risks people because kids love to play at fountains.

Fountains and trick fountains

1. Refitting water-saving installations
2. Adjusting the flow rates and intervals
3. Regular maintenance and assessments of the controls and installations

WATER REQUIREMENT: CHECKLIST

Controls and installations

- Wash basins and showers
 - Installation of water volume controls (note: they are not appropriate for flow heaters and under sink water boilers)
 - Installation of water-saving aerators (Perlator)
(Models without a sieve are to be preferred; in addition models with an anti-theft protection should be used)
 - Reducing the water pressure by partially closing the angle stop valve
 - Assessing and adjusting the throughput times of electric armatures, if necessary. A throughput time of 5 up to 30 seconds per interval can be set
 - Annual assessments of set throughput quantity and intervals
- Toilets and urinals
 - Adjusting the flow rate
 - Annual assessment of the adjusted flow rates

Fountains and trick fountains

- Avoiding a frequent water change
 - Changing the pump controls with the building management system (if possible) so that fountains can be operated at night to avoid the forming of algae.
 - Using fine pored filters
 - Reducing the use of sanitizing chemicals

Open re-cooling plant (cooling towers)

- Optimizing cleaning intervals, to avoid deposits, encrustation and accumulations of algae; adding chemicals, if necessary
- Optimizing capability measurements and the desalination system

WATER REQUIREMENT: INFORMATION



Determining the water flow

If the flow rate is unknown it is recommended to measure the flow rate. To do this, just take a normal 0.5-liter bottle and take the time until it is full. (The reference value is: everything below 5 seconds means the flow rate is too high!) Divide the measured seconds by 60 (e.g. 5 seconds: $60/5 = 12$) and multiply them with 0.5. Thus, you get the flow rate in l/min, in the example 6 l/min.

Reference value for flow rate and flow volume

Washbasin	approx. 6-7 l/min
Running time washbasin	approx. 7 sec. Per turn
WC	6 l/turn
WC saving button	3 l/turn
Urinal	2-3 l/turn
Shower	approx. 12 l/min
Washbasin in break room	approx. 6-7 l/min



Managed restrooms

Most of the restrooms in centers are operated by external service providers. Thus, the influence on the equipment and appearance. It should be tried, however, to motivate the tenants to implement water saving measures.

WATER REQUIREMENT: INFORMATION



Water-saving attachment

The most well-known are the "Perlators" manufactured by Neoperl. "Aerator" is the umbrella term. The water jet is mixed with air which generates a consistent, soft water jet without splashes. At the same time, an aerated water jet saves water and energy costs. The reduction of the water requirement differs considerably depending on the product. There are also product with metal sieves or plastic attachments. The latter calcify less quickly and do not clog. As they only mix air with the water, they do not have an pressure-controlling features. This means, with a bigger water pressure, a bigger amount of water from the faucet.

There are aerators with an anti-theft nozzle which can only be disassembled with a special wrench!

In contrast to this, flow regulators work with a pressure-compensating principle. Thus, the faucet provides a constant flow of water irrespective of the water pressure. Because of its pressure-compensating effect, are not suitable for pressureless devices (for example flow heaters, boilers).

The objective should be to reduce the water flow to approx. 6 to 7 l/min with low investment-related measures.



Illustration 29: Water-saving attachments [Source: Neoperl; Ökoflow; Neoperl]

SANITARY SYSTEMS



When operating sanitary facilities, particularly environmental and social aspects are to be considered. Thus, besides hygiene especially regulations for the environmentally-friendly procurement of the consumable goods are key.

Hygiene and health

Besides the cleaning (see also the chapter "cleaning"), in particular the use of consumable material such as soap, toilet paper, towels and hand dryers.

Detergents

Cleanliness and hygiene must not be a reason for complaints, no matter whether the sanitary facilities are operated by oneself or whether the facilities are rented. This applies especially for baby changing rooms. The cleaning should be adjusted to the utilization frequency. It should be possible to perform smaller repairs immediately.

Consumable materials

All operators should implement the respective sustainability regulations in the medium term. The following guidelines are to be considered for sanitary facilities which are operated by ECE.

1. **The primary commandment is hygiene and cleanliness**
2. **Daily inspections**
3. **Using environmentally-friendly sanitary products**

SANITARY SYSTEMS: CHECKLIST

Maintenance and inspections

- A maintenance and hygiene plan is to be prepared and implemented
- Cleaning intervals will be adjusted to the utilization frequently, usually 4 times a day
- Daily inspection of the facilities to identify deficiencies
- Quick response to complaints and deficiency removal
- Maintenance of the facilities at least twice a year
 - Replace Water filters all six months, if necessary
 - Remove deposits in pipes all six months
- Daily inspection of rented facilities to identify obvious deficiencies and thorough cleaning

Consumable materials

- Use of recyclable toilet paper and recyclable paper towels (folded paper), if necessary
- Use of perfume-free soap
- Use of soaps without constituents of animal origin
- Use of soaps which were produced without animal experiments, e.g. with the HCS or "Leaping Bunny" label (CCIC)
- Using environmentally-friendly and detergents that do not pose a health hazard (see detergents)

Hand drier systems

- Preferred use and convert gradually to an energy-efficient air dryers
- User of recyclable paper in paper towel dispensers

SANITARY SYSTEMS: INFORMATION

Further documents, information and links



Drinking water ordinance (Trinkwasserverordnung, TrinkwV): "Trinkwasserverordnung" (11/2011) (available in German only) or according to national best practice guidelines



VDI 6023, Blatt 1: "Hygiene in drinking-water installations - Requirements for planning, execution, operation and maintenance" (04/2013) (available in German and English) or national best practice guidelines



VDI 6023 Hygiene in drinking-water installations - Requirements for planning, execution, operation and maintenance

VDI 6023 and the Trinkwasserverordnung stipulate the hygiene for drinking water installations. They define the requirements to planning, execution, operation, and maintenance of drinking water installations.

Area of application:

VDI 6023 applies for all drinking water installations on the premises and in the building which provide water for the public as well as in commercially used real estates and large residential estates.

Pursuant to VDI 6022 "Ventilation and indoor-air quality - Hygiene requirements for ventilation and air-conditioning systems and units (VDI Ventilation Code of Practice)" a maintenance and hygiene plan is to be prepared.

Note: So far, only warm water pipes were regarded as hygienically problematic (legionella, etc.). However, inspections of cold water pipes in public buildings have shown that the ambient air temperature in the building causes a heating of the cold water pipes of more than 30°C which facilitates the reproduction of legionella (usually: +25 °C max.).

Please consider the country-specific regulations. If there are no country-specific regulations, the VDI 6023 will take effect as a guideline for the operating procedures.

SANITARY SYSTEMS: INFORMATION



Air dryers vs. paper towels

Looking at the sustainability of the sanitary facilities, the question arises which way of hand drying is the most sustainable. Criteria such as energy requirement and CO₂ emissions are key aspects as well as hygiene and costs for the purchase of consumable materials and operational costs (e.g. cleaning, filling). Various publications show that the use of air dryers is more environmentally-friendly choice if these are energy-efficient devices. This applies especially if the devices are operated with green electricity. Additionally, maintenance of the sanitary facilities can be reduced with air dryers because of less waste. Therefore, the use of energy-efficient air dryers is recommended.

The following aspects are to be considered when using air dryers:

- Use of particularly energy-efficient air dryers either with a Blue-Angel certificate or with the same or better energetic values (to be certified by the manufacturer/producer)
- Use of air dryers with NSF and/or HACCP certification

If paper towels are used, the following aspects are to be considered:

- Use of recyclable paper
- Use of towel dispensers which exclude the accidental take-out of more towels (sensor-controlled or paper rolls)

SAFETY



Safety is a key aspect for social sustainability and is of highly regarded at ECE. The location, the most economic aspect for a top-selling shopping center is also key for safety and security. Moreover, the subjective feeling of individuals is to be considered. Therefore, it is wise to adjust the to regional conditions and the feedback of visitors when choosing the number of security staff and the qualification of the experts.

Assess the safety requirement

The safety concept depends on the requirement of the center and the location. Therefore, it may comprise a sporadic use of technical systems to a continuous patrol of the property.

Consider regional conditions

In general, it should essentially be established with the police which safety measures are required for the center. Experience shows that an intensive cooperation with local police reduces the use of private security staff – even in centers which are located in a tensed social area.

Cooperate with local police

Typical tasks of the security staff are regular patrols, the enforcement of the house rules and banned persons as well as being contact persons for customers. Also, they may have emergency tasks (evacuation, rescue, etc.). The ideal case is that the security has a double function. Therefore, it is helpful to employ security staff with foreign language skills and/or first-aid skills.

Use of staff and technology

Double function

SAFETY

The security staff should also be available for people who require assistance, such as senior citizens. The respective tasks should be identified center-specifically in detail.

The security staff has to handle the affected persons calmly in difficult situations. It should be kept in mind, however, that the security does not have the same authority as the police or the regulatory authority. The latter are to be called in for more serious situations. This is to be coordinated with CM.

When using security technology such as video surveillance (usually in the parking garage only), legal data protection regulations are to be considered. At the same time, maximum security is to be achieved.

De-escalation

Authority

**Security technology /
data protection**

- 1. Establishing the amount of security and the safety concept**
- 2. Determining the tasks of the security staff**
- 3. Coordinating with the police**
- 4. Using appropriate security technology**
- 5. Considering procedures in case of fire, bomb threats, and crises communication**

SAFETY: CHECKLIST

- Preparing operation schedules considering the qualification requirements for security staff
- Determining routes and schedules which can be controlled by the center management, if required
- Coordinating responsibilities with the staff
- Regular assessment of the determined aspects and the observance of instructions
- Providing security and First-Aid trainings by the operator or a service company
- Determining authority and operating recommendations
- For liability reasons, only employ Chamber-of-Commerce certified professional staff

Note: There is a template for a security folder which is available from the Regional Directors. It can be adjusted to the center-specific situation.

Use of security technology

- Installation of motion sensors and door contacts
- Use of emergency telephones and alarm buttons
- When using video technology in particularly vulnerable areas (**NOTE: country-specific data protection regulations are to be observed unconditionally!**)
- Inspecting the alarm and emergency call systems annually

FIRE PROTECTION



Fire endangers the health and lives of people and may cause substantial damage to property. Therefore, observing fire protection regulations is not just an obligation and a reduction of the liability risk for operators. They help to prevent fires and protect life and health.

Legal fire protection regulations

For operators of shopping centers it is essential to observe all aspects of the national regulations, the building permit conditions and the utilization permit, and the approved fire protection concept.

Individual fire protection concept

The function and the availability (clearance) of all escape and emergency routes inside and outside the building as well as the accessibility for fire services must be provided at all times. The operability of security facilities/systems is to be ensured by regular inspections. In case of doubt - fire protection precedes over anti-theft protection

Evacuation and emergency routes

Regular maintenance and repairs Surveillance

It is to make sure that these services/works are documented in detail (e.g. measurement and maintenance records, maintenance histories, conformity declarations). Moreover, the evidence regarding the qualification/expertise of the persons providing the service must be presented.

- 1. Observing legal regulations and conditions**
- 2. Observing and updating the fire protection concept**
- 3. Regular maintenance of the systems which are essential for security**

FIRE PROTECTION: CHECKLIST

- Appointing a qualified fire protection officer and determining their tasks and services in the letter of appointment. Providing further training for already appointed fire protection officers (pursuant to country-specific regulations)
(Please note: inform the fire services about changed responsibilities and updating the fire service plans with new property data!)
- Preparing and updating an alarm plan/concept
- Preparing and updating an evacuation plan/concept
- Establishing the visitor frequency during the day using the visitor counting system and adjusting the evacuation plan to the maximum number of persons who are in the center at the same time
- Determining and establishing the fire protection organization and the fire protection responsibilities (fire protection officer, evacuation assistant, fire protection assistant for tenants etc.)
- Determining how many physically challenged persons can be evacuated if the escape routes are not barrier-free (elevator must not be used in case of fire) or provide barrier-free escape routes.
- Prepare, maintain, and update the fire protection regulations for the entire center. Involve the tenants, assigning tasks and responsibilities to them
- Regular inspections of escape and emergency routes regarding signage, accessibility, available width, lighting, and open doors (recommendation: daily, at least once before opening the center and once before the biggest customer frequency)
- Removing ice and snow (winter services) from outside emergency routes (escape staircases, paths, ramps, etc.) as well as the fire service areas and the hydrants (underground hydrants)


FIRE PROTECTION: CHECKLIST

- Safety trainings annually (e.g. as part of employee meetings) and documenting the attendance
- Regular trainings for service providers (customer information, sanitary facility staff, security staff, etc.)
- Regular assessment of the escape and emergency plans. According to valid guidelines, escape and emergency plans have to be up-to-date at any time! (Recommendation: a change/ replacement of existing plans, the escape and emergency plans are to be mounted in a self-luminous design)
- A regular inspection of the fire lane and fire service areas as well as the hydrants regarding signage, condition, and observance of the no-parking zones (recommendation: daily, at least once before the opening of the center and once before the largest customer frequency)
- Regular fire protection briefings of employees, tenants and security service staff as well as initial instructions of new employees and tenants by the fire protection officer
- Regular internal fire protection checks by the fire protection officer (recommendation: all three months)
- If the fire protection system (fire detection system, extinguishing systems, smoke and heat venting system or similar) have to be taken "out of commission" the local fire department and the insurance are to be informed about the planned compensation measures
- Replace fire detector system / fire alarm control panels, which are out of maintenance, in time (see information on p. 102)

FIRE PROTECTION: CHECKLIST

- Consider containment systems which comply with valid regulations when installing new pipes and cables. Open or insufficiently insulated installation ducts may lead to an uncontrolled spread of fire and smoke (=> higher risk for life and limb, more damage to property)
- Besides electric facilities / installations arson (premeditated or negligent) is the most frequent cause for fire! Therefore, waste bins / containers and other flammable materials are to be positioned or stored in a safe area. Outside containers have to be positioned in a way that avoids a fire spread (barrier, distance from the facade)
- Initiation and updating of the fire protection folder to record the obligations / duties of the operator were observed in compliance with valid regulations

Further documents, information and links

-  Country-specific regulations, standards and laws for the fire protection of shops

FIRE PROTECTION: INFORMATION



Assessing the accessibility



Illustration 30: Blocked emergency exit
[Source: ikl]



Illustration 31: Snowed in and iced over hydrant
[Source: ikl]



Illustration 32: Iced-over stairs
[Source: ikl]

(The illustrations do not show ECE centers!)

FIRE PROTECTION: INFORMATION



Replacement of fire alarm control panels / systems

The production and supply of parts for fire detector systems / panels is limited. The so-called product cycles vary from manufacturer to manufacturer and from systems to system. At the end of a product cycle, the owners/operators of the respective system are informed and productions of spare parts will be stopped with a transition period.

Despite the observed the maintenance and repair intervals, the modernization or the replacement of the respective components (fire detection panel, etc.) in time, within the transition period.

The building and operating permits of the centers require operational safety facilities. The failure of the fire detector system because of spare parts, which are no longer available, is to be avoided in time.

Please note:

If the fire alarm panel is replaced, it needs to be assessed whether the connecting condition of the local fire protection authority has changed. Routing cards are to be updated and the purchase of appropriate routing card printers has to be planned.



FIRE PROTECTION: INFORMATION



Contents of the fire protection folder



The fire protection folder is to contain all relevant information; *sometimes information, where relevant documents (e.g. maintenance records) can be found, will suffice.* It should comprise the following aspects:

- Building and operation permit
- Plans for the building permit with corrections in green ink
- Fire protection concept incl. fire protection plants
- Fire department plans
- Acceptance records and record of expert inspections (in-house inspection)
- Conformity declarations of service companies
- Appointment certificate of the fire protection officer
- Fire protection regulations
- Proof/documentation of the briefing of employees and tenants
- Reports on evacuation drills
- Reports on the internal fire prevention
- Reports on legally required fire inspections
- Maintenance contracts and maintenance records
- Reports on fire incidents
- Written communication with authorities, insurances and expert companies for fire protection

The fire protection folder should be available in paper as well as electronically (as pdf file). Both versions should be stored safely (paper: safe, fire-proof filing cabinet; electronic: data storage outside the center).

PARKING GARAGE



The design and operation of the parking garage have considerable impact on different sustainability aspects. Besides the security and the comfort for customers, especially the operating costs for cleaning and lighting as well as ventilation are to be mentioned. Moreover, the parking garage is prone to pest infestation.

The parking spaces are to be designed brightly, clearly structured, and clean and equipped with safety technology at critical points. A good lighting is decisive for the safety feeling of visitors. Therefore, the energy consumption must not be reduced to compromise the safety feeling.

To save energy, the garage should be opened area by area, if possible, i.e. individual levels will initially remain closed if they are less frequented. The lighting in these areas can be reduced to the required safety lights.

Safety facilities as well as the signage are to be inspected on their operability all three months.

Safety
Comfort
Operating costs

"Bright,
Clearly structured,
Clean"

Opened area by
area

Control

1. **Safety first!**
2. **Opening area by area**
3. **Regular function control**

PARKING GARAGE: CHECKLIST

Equipment and safety

- Sufficient lighting also for hidden corners
- Sufficient and clear signage
- Video surveillance (keep data protection regulations in mind!)
- Clearly marked alarm buttons
(install signage or whole button, if necessary)
- Special parking spaces for families and women

Opening times

- Opening parking spaces area by area
 - Switching off or controlling the lighting in closed parking levels with motion sensors.
 - Reducing cleaning and winter service on closed parking levels.

Lighting

- Lighting should not be reduced to risk safety
- Observe legal and standard lighting guidelines

Ventilation

- Conduct regular function test of the system

DELIVERY AREA



Because the delivery and supply areas are not accessible for visitors, their appearance is less important than a practical and robust design of the areas to avoid complex and expensive repairs. Saving resources should be the highest commandment here.

Practical and robust furnishings
Saving resources

Delivery zone provide saving potential regarding lighting, cleaning, and heating. Because the ancillary area is rarely used by day and if so, only for a short time. This is energy-saving potential.

Identifying saving potential

On the one hand it is important to observe the duty of care, on the other hand, there are no particular requirements for the lighting for a good spacial experience. Therefore, regular and cost-efficient illuminants can be use, ideally controlled by motion sensors, presence detectors, or regular buttons. Because of legal requirements, it is recommended to coordinate with the colleagues from the facility management planning if alterations to the lighting system are performed.

Duty of care

Coordination with planners

The cleaning concept of ancillary areas should not focus on the outer appearance but on hygiene and functionality .

Cleaning and maintenance

1. **Furnishing the delivery area with robust material and protection**
2. **Identifying and implementing saving potential**
3. **Introduce regular delivery times**

DELIVERY AREA: CHECKLIST

Lighting

- Using energy-efficient illuminants
- Observe national reference values for the lighting at the workplace and the public areas (e.g. pursuant to VDI 6011 – Part 1 "optimization of daylighting and artificial lighting – fundamentals" or DIN 5034 - Part 1 "Daylighting in Interiors – General requirements")
- Reduced lighting must not cause dangerous situations.
- Installation of motion sensors and presence detectors in less frequented areas.

Cleaning

- Dividing the ancillary areas by degree of utilization
 - Cleaning of corridors which exclusively serve as escape routes, depending on the demand
 - Developing a cleaning concept based on a reference value in the chapter "cleaning"

Delivery times

- Delivery zone can be closed at special times of day
 - Everything except of the emergency lighting can be turned off in these times
 - Controlling the appropriate use by suppliers



PEST CONTROL

Pest control is a considerable factor and, moreover, is to be considered as a health aspect of the sustainable operation of shopping centers.

Ancillary costs for hygiene and health

Vermin such as rats, mice, cockroaches, and pigeons can cause considerable damage and a high cleaning effort and can lead to health risks for visitors and real estates.

Cleaning effort

Discovering vermin in different areas of the buildings requires individual solutions for every center. Thus, the implementation of environmentally-friendly and hygienic measures and procedures is key.

Environmentally-conserving procedure

A professional partner for pest control is required which ideally takes care of the whole center to avoid a spread within the building.

Professional service contractor

A strategic and especially constant solutions with a low use of toxins is to be coordinated with the service company on location. This way, damages by vermin, pigeons, and cockroaches can be avoided and large-scale operations will become redundant.

Strategic fight

1. **Standardizing pest control in the centers**
2. **Coordinating a constant procedure with pest control technicians**
3. **Reducing toxic detergents**
4. **Considering a sufficient protection for internal measures**

PEST CONTROL: CHECKLIST

Hazard analysis

- Performing a hazard analysis with the pest control technician. In the course of this analysis, which areas in the building are at risk and how and how often can these areas be controlled during ongoing operations.
- The use of pesticides can only be applied by professional companies. Technical regulations for hazardous substances as well as the country-specific regulations and standards of pest control are to be considered
- Any pest control measure in rentals areas is to be coordinated voluntarily by the tenant with the Center Manager (CM). All rental areas with a higher risk are to be discussed in a personal conversation.
- Any rogue activities by individual are to be stopped with regard to a standard procedure.

Determining a standard procedure in the center

- Maybe small constructional changes can already help?
- Which measures can be implemented against the different kinds of vermin?
- Can toxic substances be avoided?
- Determining activity intervals with the pest control company
- Coordinating this strategy with all service companies and tenants involved
- All measures of all service companies are coordinated by CM

PEST CONTROL: CHECKLIST

The following advice and recommendations are to be observed in case of the performance of smaller measures regarding pest control

- Conducting measures with protective clothing (disposable for gloves, protective glasses, protective mask with protection level P3, disposable protective clothing)
- Immediate disposal of protective clothing after the measures
- Immediate washing and disinfecting the hands after the measure
- Additional risks such as bad lighting, insecure positions, overhead measured, risky accessibility, increase the risk and are to be avoided
- Measures on positions with fall hazards are to be conducted by professionals
- All measures of all service companies are coordinated by one body

Pigeon protection

Pigeons can transfer infectious disease to visitors. This happens either to breathing in the dispersed dust of the dry droppings or the direct skin contact with droppings containing pathogens or dead animals. Moreover, pigeon nests attract parasites such as pigeon ticks and fleas which can cause diseases with their bites.



- Proceed with caution when working on spike systems
Even smaller injuries may cause long-term infections

PEST CONTROL: CHECKLIST

Battling rodents

Rats and mice can transfer more than 70 diseases on humans directly or indirectly, among them salmonella, hepatitis, and the Weil's disease. These are transferred by the droppings or the urine of the animals or by viruses, fungi, mites, or fleas which stick to the coat of the animals.



Proceed with caution when applying rat poison. Avoid any direct skin contact with the mostly anticoagulant poisons .

- Handling the bait boxes may lead to injuries to fingers and hands. Please note, there is a high risk of an infection!

Controlling storage and hygiene pests

Cockroaches, bugs, flies, fleas and Pharaoh ants spread diseases. Controlling them must be a systematic process to avoid spreading within the building. The presence of cockroaches is not caused by a lack of hygiene and cleanliness, it is, however, considered unhygienic. Cockroaches need to be controlled professionally. They will not disappear by mere cleaning.



- The control must be coordinated to avoid a spreading of the animals. Any actions of individual tenants or control measures by using freely available insect spray should be avoided at all costs.
- Even if many agents up insecticides do not pose health risks in their usual dose, direct skin contact should be avoided.

PEST CONTROL: CHECKLIST

Further documents, information and links



EPA Citizen's Guide to Pest Control and Pesticide Safety
http://www.epa.gov/oppfead1/Publications/Cit_Guide/



http://en.wikipedia.org/wiki/GHS_hazard_pictograms

PEST CONTROL: INFORMATION



Organizations and seals



The latest, especially the environmentally-friendly and health-friendly technologies can be recognized by the RAL UZ quality seal – the Blue Angel.



Legal requirements

National laws and standards are to be observed when controlling pests. These are mostly controlled by an official veterinary and are handled with different strictness.

- Waste regulations
- Work protection regulations
- Species conservation regulations
- Biomaterial regulations
- Biocide regulations
- Soil protection regulations
- Chemical goods regulations
- Hazardous good regulations
- Health regulations
- Hunting regulations
- Food regulations
- Environmental law
- Plant protection regulations
- Animal protection regulations

There is also the possibility that the appearance of pests is to be reported to authorities. The local service provider should know these and provided consultation, if necessary.

FURNISHING



The furnishings of a center has a strong impact on the length of stay and the well-being of the customers. Thus, besides a positive psychological effect the planting may contribute to a better climate inside the property. A sufficient number of seating are key aspects, especially for senior citizens so they can take a short break. Therefore, the furnishing of the mall may contribute to the social aspect of sustainability. At the same time, the furniture may have an impact on maintenance and cleaning convenience, life cycle costs, flexibility, and fire protection.

***Quality of stay
and subjective
well-being***

Especially the requirements for higher flexibility of the mall furnishing has its difficulties. Thus, the furniture is mostly heavy and robust due to fire protection requirements and plants are quickly damaged when its position is frequently changed.

Social aspects

***Flexibility and
fire protection***

The aspects mentioned above are to be considered for a development of a furnishing concept. Over time, the requirements (e.g. of a new event or promotion concept or changed customer groups) may change. In this care the concept should be reviewed with the responsible portfolio architect.

***Furnishing
concept,
changed
requirements***

The selection of plants as well as the decision to purchase artificial or green plants depend on the design concept of the center and should be considered long-term. If natural plants are selected only plants which suit the locations are to be selected. Also, the quick change of position of natural plants (e.g. for promotions) may cause plants to be damaged quickly, and the not inappropriate temporary storage may even cause plants to die.

***Selecting the
plants***

FURNISHING

Therefore, the ECE plantation guidelines are to be used for developing of a plantation concept. These are available from the colleagues at ARCH.

***ECE plantation
guidelines***

Play areas are an element of a family-friendly center and therefore a highlight of the center. Therefore, they should be in an excellent condition. As the accident risk is particularly high, the operator is obliged to conduct regular controls and maintenance (see p. 119), to avoid possible liability. Construction regulations and standards, especially DIN EN 1176 and 1177, are to be observed at any rate to ensure the safety of play areas.

***Play areas
Control and
maintenance***

- 1. Furniture has an influence on the quality length of stay and the well-being of the customers**
- 2. Review and adjustment of the furnishing concept, if possible**
- 3. Observing fire protection requirements**
- 4. Implementing the plantation guideline**
- 5. Conduction regular maintenance and inspection, especially of play areas**

FURNISHING: CHECKLIST

Seating

- Ensuring the observance of the fire protection concept
(please always coordinate with the portfolio architect: Construction regulations may be different in the centers; what may be allowed in one center may be forbidden in another!)
- Discussing changes to the furniture concept with the portfolio architect
(e.g. flexibility, seniors, kids)
- Observe ECE guidelines when purchasing furniture

Plants

- Changes to the plant elements as and an extensive optimization of the plantation are to be coordinated with ECE FM (Hamburg), or to be initiated by an expert consultant
- Smaller measures should be performed with the ECE plantation guideline with an expert consultant or the gardener of the center
- Long-lasting and robust plants are to be preferred
- Especially when selecting the seasonal plantation, the costs and the use duration of the plants should be considered
- The use of a single plant (location, maintenance effort, life cycle, vitality) has to be discussed with an expert

FURNISHING: CHECKLIST

Maintenance effort for plants



- Maintenance intervals of three times per week up to a month are possible
- Intervals regarding the guarantee by the contractor are to be negotiated
- The maintenance effort is essential for the long-lasting life of the plantation and its vitality
- In coordination with the contractor, a support by the Technical Manager is possible
- The maintenance can be optimized for the budget, it needs to be assessed for an actual necessity (effort, costs, benefit)
- Many plants react sensibly to the change of position and should therefore not be moved
- If plants need to be temporarily stored elsewhere because of events, they have to be taken to an appropriate location (daylight, temperature, humidity)
- Extreme climate changes are to be avoided when the plants are temporarily moved (e.g. no storing in the delivery area in winter or in rooms without daylight)

FURNISHING: CHECKLIST

Play areas

- Ensuring safety
 - Use of play equipment with the GS certification or acceptance of self-planned elements by national test institutes such as TÜV/Dekra
 - Daily inspections for obvious hazard sources (such as loose screws, broken parts)
 - Assessment and operational tests every three months
 - Annual main inspection by an expert to ascertain the operational safety
- Cleaning friendliness should be kept in mind
 - Use robust and cleaning-friendly materials
 - Put up waste bins in direct vicinity
 - Consider them in the cleaning concept and define intervals according to the requirement

Further documents, information and links

-  ECE: "Begrünungsleitfaden" ("Plantation Guideline"), available from ECE ARCH
-  DIN EN 1176: "Playground equipment and surfacing - Part 1: General safety requirements and test methods" (CEN/TC 136/SC 1)

FURNISHING: INFORMATION



Inspection of play equipment

Regular inspections pursuant to DIN EN 1176-7

a) *Visual routine inspection (weekly to daily)*

- Inspections to identify obvious hazard sources which may be caused by vandalism, use or weathering
- The inspection should focus on aspects such as cleanliness (e.g. broken glass), the condition of floor surfaces, exposed foundation parts, sharp edges, broken, damaged or missing parts, extensive wear of movable parts, constructional stability of equipment

b) *Operational inspection (every one to three months)*

- Conducted according to the cycle or the specifications of the manufacturer/distributor
- Detailed inspection to test operability, wear, and the stability of equipment (focus as mention in "a")

c) *Annual main inspection (= Playground-TÜV)*

- Assessing the general operational condition of the equipment, foundations, and surfaces.
- The main inspection may require the exposure of certain parts. Thus the, effect of weathering, rotting, or corrosion as well as any change to the safety of the system as a result of performed repairs or additionally installed or replaced parts of the system will be established

Inspections a and b can be performed with trained staff of the operator . The annual main inspection has to be performed by an "expert for playground equipment".

[Source: TÜV SÜD]

FURNISHING: EXAMPLES



Artificial plants or natural plants

The decision for or against artificial plants depends mainly from their use in the center and should be well-considered.

Natural plants ...

- ✓ contribute to a good climate
- ✓ convey a good design impression and look fresh
- ✓ last longer, especially in outside areas, and contribute to a friendly appearance
- ✗ have a high maintenance requirement even when they are simple and local plants
- ✗ cannot simply be stored in case of refurbishments and promotions in the center
- ✗ depend on the spacial conditions and may die quickly in case of repositioning or false maintenance

Artificial plants ...

- ✓ can hardly be distinguished from real plants
- ✓ are green throughout the year
- ✓ have a longer life cycle than cut and potted plants
- ✓ do not require much maintenance and water
- ✓ in case of refurbishments and promotions these can be used flexibly or stored
- ✗ are a very high investment in a very good quality
- ✗ look weathered in outside areas after a short time
- ✗ do not contribute to a better air quality

[Source: ECE Greening Guideline]

CUSTOMER SATISFACTION



A very good customer satisfaction indicates the high quality of the center, confirms the good work of the center developer and center operator and is therefore an ideal criteria to evaluate the process quality.

Customer-focused marketing

Customer-focused marketing is a key instrument for entrepreneurial success because customer loyalty is the joint objective of the tenants and the Center Management.

Long-term customer loyalty

Regular surveys are the most important instrument to measure customer satisfaction. Annual customer surveys are already being conducted which include demographic aspects as well as offers, promotions as well as the general atmosphere in the center.

Conducting regular surveys

Specific questions can be included in the general, centrally prepared surveys.

Including individual questions

Another aspect not to be disregarded is the information of the interviewed visitors on the results and the measure arising from them. Customers as well as tenants are therefore involved in the improvement process which is to be initiated with surveys.

Communicating results



1. **A high customer satisfaction shows good business**
2. **Integrating specific questions to standardized surveys**
3. **Conducting additional surveys in the center regarding center-specific aspects**
4. **Communicating the results**

CUSTOMER SATISFACTION: CHECKLIST

Surveys

- Conducting regular customer surveys
 - Integrating center-specific aspects
 - Exploring new ways of surveying Integrating the Internet (e.g. Internet forums, guest books)
- Publishing results and measures in the center, e.g. on the Internet or in the center magazine
- Taking customer wishes and criticism seriously

Further documents, information and links

-  Weinreich, Uwe; von Lindern, Eike: Praxisbuch Kundenbefragungen (Hands-on manual of customer surveys: selecting spot checks – asking relevant questions – interpreting results accurately): Repräsentative Stichproben auswählen – Relevante Fragen stellen – Ergebnisse richtig interpretieren; Moderne Industrie, Landsberg 2008 (available in German only)
-  Görtker, Edmund; Rosenkranz, Doris: Mitarbeiter- und Kundenbefragung (Employee and customer surveys: methods and implementation): Methoden und praktische Umsetzung, Carl Hanser Verlag GmbH & Co. KG 2006 (available in German only)

http://en.wikipedia.org/wiki/Customer_survey

CUSTOMER SATISFACTION: INFORMATION



Customer surveys

"Customer surveys have great potential and risks, and should therefore not be taken lightly. Customer surveys can only be used as a strategic instrument to improve products or services if they are conducted on a high quality level from preparation to analysis.

Customer orientation and customer loyalty are increased by the survey. Customers feel that they are taken seriously or involved and are involved cognitively.

A professional approach may have a significantly positive effect and may add to the reputation of the company. If the survey has only few credibility, if its is badly prepared or conducted, or if the interviewed person is not involved in the results, the effect may also be sustainably negative."

[Source: Weinreich, Uwe; von Lindern, Eike: Praxisbuch Kundenbefragungen, (Hands-on guide to customer surveys) 2008]

COMPLAINTS MANAGEMENT



Satisfying the customer as well as the tenants and their employees is a key aspect for business success. In order to control and measure this criterion, regular surveys and clear structures facilitate the analysis and respective measures.

Standard complaints management

Despite all preparatory measures and quick responses mistakes and deficiencies may lead to increasing dissatisfaction of the customers and tenants. Therefore, it is of key importance to record emerging complaints systematically, process and analyze them eventually. Complaints are also a chance to improve specific problems.

Editing and analysis

Problem solving "on demand" should largely be avoided. There should be a central point for complaints instead. Thus, the management can analyze all issued complaints systematically with this method. Weak points may be identified at an early stage and remedied specifically.



Identifying weak points

1. **Establishing a standard for the complaints management**
2. **No problem solving "on demand"**
3. **Systematic analysis of weak points**

COMPLAINTS MANAGEMENT: CHECKLIST

- Establishing a standard point of complaints (e.g. as part of Center Information or Center Management)
 - Ensuring the usability by customers and tenants
 - Use of new media (e.g. Internet, e-mail, Facebook)
 - Train the employees at these points particularly on complaints management issues
- Weekly analysis of all emerged complaints in the center management and coordination of the further procedure in the team

Further documents, information and links

-  Ratajczak, Oliver (Hrsg.) et al.: "Erfolgreiches Beschwerdemanagement. Wege zu Prozessverbesserungen und Kundenzufriedenheit" (Effective complaints management; ways to better processes and customer satisfaction), Gabler Verlag 2010 (available in German only)
-  Haeske, Udo: "Beschwerden und Reklamationen managen: Kritische Kunden sind gute Kunden!" ("Managing complaints: criticizing customers are good customers"), Belz Verlag 2001 (available in German only)



Customer information

Besides the rather passive complaints management, an active customer information service should advise on changes and efforts regarding sustainable operation. Thus, the fact that waste is not collected separately can be explained positively by explaining that the disposal company will separate the waste themselves and therefore achieve a higher recycling rate. Also, sustainable measures such as the cleaning, the reduction of the water consumption, energy-efficiency, the CO₂ saving should be communicated to the center customer.

COMPLAINTS MANAGEMENT: INFORMATION



Single Point of Contact

A general contact for complaints – the Single Point of Contact – should be established. Here, problems can be separated and forwarded to the responsible body subject to the respective priority.

The advantage of this method is, that there is a comprehensive overview over the problems referred to and especially the frequency of each complaint at the Single Point of Contact. Recurring problems are a particular but avoidable nuisance for both customers and tenants. Especially when dealing with technical issues there is an unsolved question of the cost causer and the cost payer, particularly when full maintenance contracts were made systems for a vast number of systems.

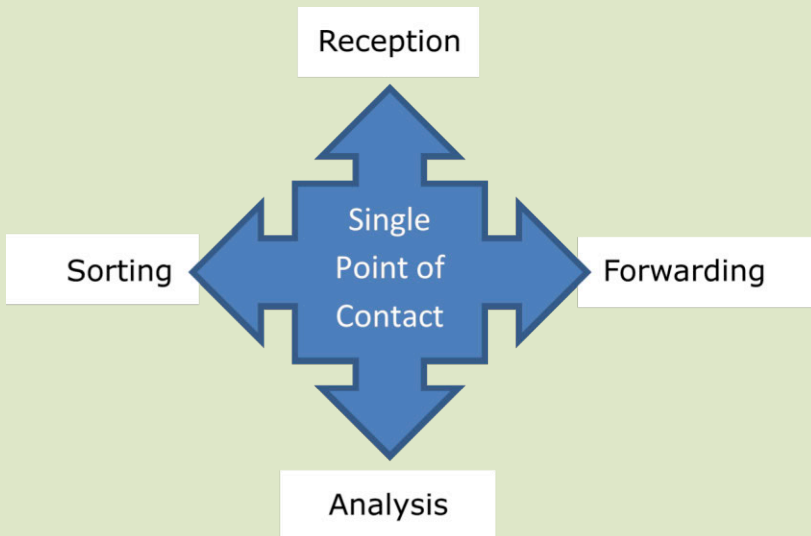


Illustration 33: Single Point of Contact [Source: ikI]

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