

Comforto 89
Handbook



Design starts with a **vision**.



Comforto 89 | The vision

It was the vision to develop a task chair which exceeds everything that has been designed so far in respect of ergonomics, technology and creativity; which is positioned at the top and which is, at the same time, attractive in price. Through its innovation, Comforto 89 should be characterised by unique features which provide the user with a perceptible better quality of life. Comforto 89 should be also exemplary when it comes to sustainability and environmental protection.

A **vision** raises many questions:

How can we achieve our **objective**?



Is there anything we don't
know about sitting **yet**?



Where are our **limits**?



What does **science** say about it?



Comforto 89 – Ergonomic fields of emphasis:

Field 1 | Back and lumbar support

Field 2 | Seat shape

Field 3 | Armrest support

The Human Performance Institute of Western Michigan

University (WMU) has been entrusted with the research project.

Anthropometric data have been collected and evaluated as well as chair prototypes in different development stages tested among 200 participants. The results have continuously flown into the further development and have led to measurable, positive results.

Field 1 | Back and lumbar support

The investigation was based on the following questions:

1. How do users define comfort with respect to back support?
2. Where is support required to maximise comfort?
3. How much support is needed and where exactly?
4. Is there a consistent pattern across users?

Field 1.1 | Lumbar support

The investigation

The central problem in connection with long periods of sitting is concentrated in the lower back, the lumbar region. When standing or walking, the spinal column forms the ideal double S-curve while the lumbar region is curved to the inside and, when sitting, the spinal column to the outside. Thus, the intervertebral disks are put under pressure, the static strain increases and pain as well as permanent damages are caused. Many ergonomic chairs already offer a lumbar support which is to optimise the sitting posture. But we were absolutely convinced that a further improvement is possible and necessary and that there may be even completely new approaches. To find out more about it we have developed a test chair and systematically analysed it together with Drs. Tycho Fredericks and Steve Butt from the Human Performance

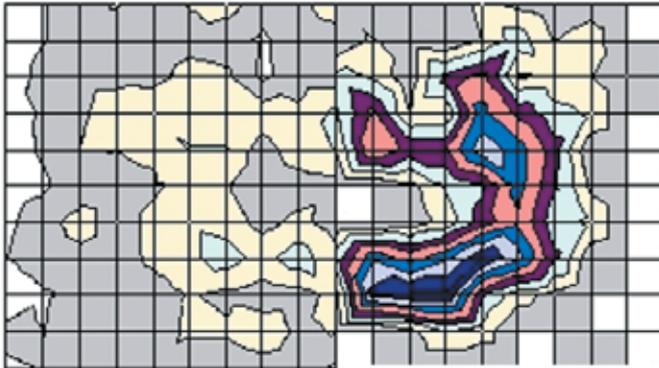


Institute Department of Industrial & Manufacturing Engineering of Western Michigan University (WMU). A test chair was created with 35 springloaded diodes to measure support in the lower back region by remote control. 200 test persons have adjusted the support in the lower back region again and again until they felt comfortable. The sensors provided the scientists with data which they evaluated using pressure mapping technology. The procedure was repeated several times and the results were clearly confirmed.

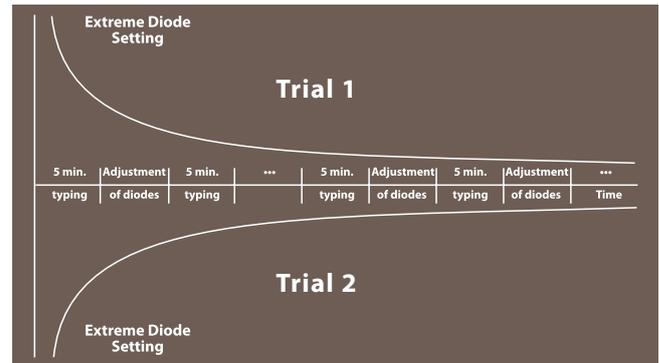
The findings

The result which was a bit unexpected by the scientists was the fact that 70% of all test persons self-selected an asymmetric lumbar adjustment. All of them decided against pressure directly onto the spinal column. No matter if it was a left-hand or right-hand person or if the right or left eye was dominant, there was no connection between them. However, we assume that anthropometric reasons have led to these results, namely that the different measurements have been caused by an irregular development of the body halves.

70% of the test persons have decided in favour of an asymmetric adjustment.



The asymmetric adjustment was chosen again and again.



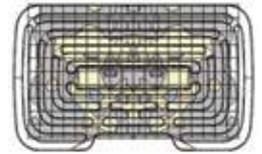
Field 1.1 | Lumbar support

The realisation

Our designers and engineers have developed a lumbar support which rests upon the results of the scientific research. The PAL-BACK-System is based on a lumbar pad that may be adjusted individually due to its flexible structure and adapts to the user's back. The differing thickness of the concentric rings cause a different counterpressure which is spread onto the lumbar region in a way that make the seated individual feel comfortable but which avoids direct pressure onto the spinal column. The complete lumbar pad may be pulled up or down to adjust the height. The PAL-BACK-System offers the possibility to adjust the pressure asymmetrically by simply turning the lever. This system is a unique feature within the Haworth group.



Lumbar adjustment. Flexible concentric rings adapt to the form of the back and support the region of the lumbar vertebrae.



Wavelike structure. Direct pressure onto the spinal column is avoided.



Asymmetric lumbar support. By turning the lever, the counterpressure on the left and right side may be adjusted differently in line with the user's desire.

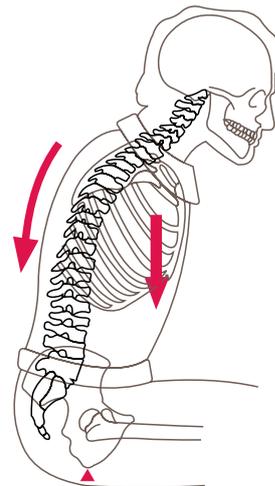
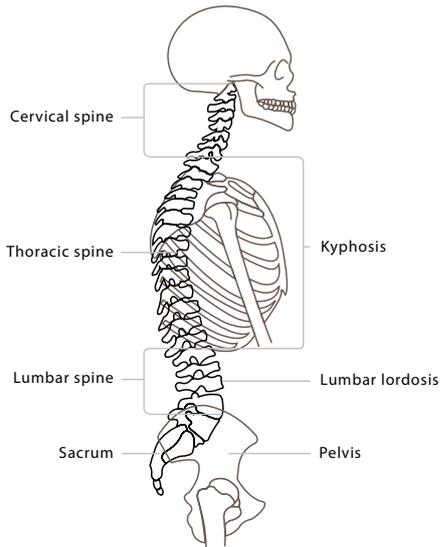


Elastic pelvis support (see next page).

Field 1.2 | Pelvis support

The investigation

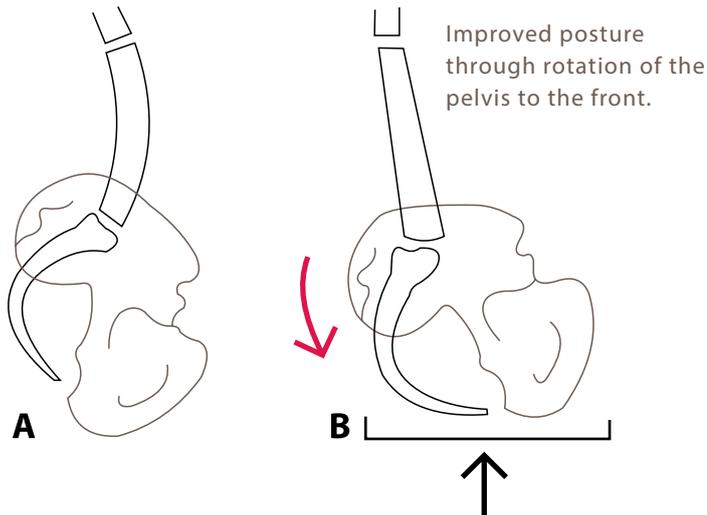
When sitting, the pelvis tends to rotate backwards. The lumbar region is curled to the outside and does no longer keep the ideal posture of a double S-curve. As described on the previous page, this position is a strain on the spinal column. In addition, the pressure in the thoracic and stomach region is increased and breathing made more difficult. Our team has addressed itself to the task of improving the total result by a pelvis support in addition to the lumbar support. On the basis of anthropometric data, several prototypes have been developed which accommodate the difference in the pelvic region between man/woman and compensate for extreme differences in body heights.



Through rotation of the pelvis, the spinal column is curled to the outside. This sitting posture is a strain on the back and makes breathing more difficult.

The findings

It was basically confirmed that a rotation of the pelvis by a corresponding "guidance" and support in this region significantly improves the posture. Measurements and judgements by the test persons have revealed that despite the anthropometric difference the majority has been satisfied with a combined, uniform solution.



The realisation

The **elastic support of the iliac crest** of Comforto 89 raises the pelvis and supports the upright sitting posture of the individual user.



Elastic support of the iliac crest

Field 1.3 | Backrest torsion

The investigation

During the course of the investigations it became clear that the test persons preferred a certain freedom of movement in the shoulder region. In many attempts with prototypes, a rigid construction was compared with a number of flexible constructions. Furthermore, comparisons were made with existing chair systems.

The findings

The backrest construction should feature a controlled flexibility and offer all users a high seating comfort independent from their body size and weight.

The realization

Comforto 89 has been given a flexible frame structure which allows a controlled torsion. Tests have confirmed that 5 percentile of the female users up to 95 percentile of the male users, depending on their body height, may achieve a movement of the upper backrest edge by approximately 3 cm to the front or to the back. This flexibility has been reached with the outer backrest frame and the split T-shaped support.

+/- 3 cm



+/- 3 cm



The backrest is not rigid but has a flexible construction.



Field 1.4 | Mesh covering

The investigation

The backrest covering is in direct contact with the user's body. The mesh material should distribute the pressure over the back and the lumbar support should take effect. The characteristics the mesh material should have in combination with all other elements have been investigated and tested at the prototypes.

The findings

The tension of the back mesh should vary. There should be less tension in the upper back region and more in the lower back region in order to ensure optimum seating comfort.

The realisation

Due to special production procedures the tension varies. The clear differences in width between the upper and the more narrow lower region of the frame contribute to the maintenance of different tensions whose strength is increase the more you get down. The crossbeam in the lumbar region additionally contributes to the tension in this section. Here, the correlation of "form follows science" is confirmed again. The upper shoulder region can "plunge" deeper into the mesh so that the shoulder blades are not pressed and keep their freedom of movement. The lumbar region, however, is stabilised and brought into the ideal posture.



More elasticity

Less elasticity

Field 2 | Seat shape design

The investigation was based on the following questions:

1. Which anthropometric findings are relevant with regard to the seat shape design?
2. To what extent do the composition of the seat have and the degree of hardness influence the seating comfort?
3. Is it possible/necessary to define in advance the sitting position?
4. Which forward tilt is the "correct" one?

Field 2.1 | Seat shape design

The investigation

The seat surface absorbs the major part of the body weight and defines the posture and the feeling of comfort, especially during long periods of sitting. Different body heights make the determination of seat size, elasticity and form extremely complex. Longterm studies by the WMU and our design team have now dealt with this topic. We have started with seven seat shapes, four of which have proved to be capable of development. Through elimination processes and benchmarking the ideal Comforto 89 seat shape became evident. Studies by the University Politechnico de Milan, Italy, about pressure adjustment in the sciatic region have been taken into account as well as measurements by Prof. Danilo De Luca, Boston University.



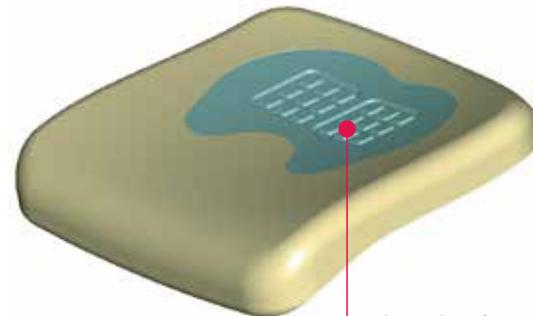
The findings

The ideal seat surface may not have preshaped seat hollows since these cannot be compatible with different body heights and shapes. A large-surface relief can best support the body weight. The front edge should be soft and rounded off in order not to cause any blood congestion in the lower extremities. The width should allow enough freedom of movement. A seat depth adjustment compensates body heights and a slight forward tilt optimises the pelvic position and the posture.



The realisation

An ideal shape of the seat has been confirmed after long-term tests. Two alternative upholstery versions are offered. A polyurethane foam as standard and a newly developed Technogel Soft Lite Gel version. The last one offers a large-surface relief and effectively absorbs the pressure in the region of the buttocks. At the same time, the user gets steady support and blood congestion in the lower extremities is avoided. Through seat depth adjustment and flexible forward tilt the adaptation is additionally supported.



Technogel® Soft Lite Gel insert

Field 3 | Armrest support

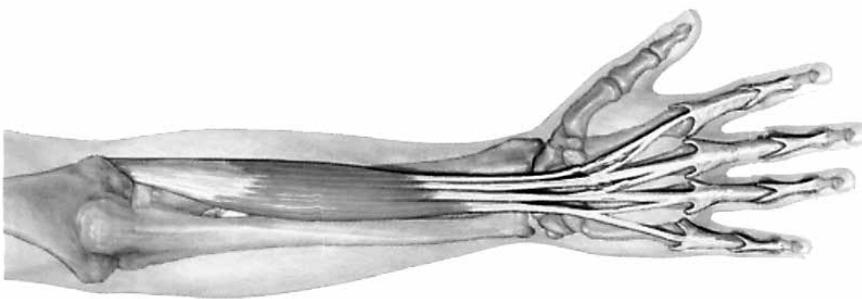
The investigation was based on the following questions:

1. The burden of repetitive activities on arm, hand and shoulder.
2. What features should an armrest have to make users of different body heights feel comfortable?
3. Are armrests adjusted correctly spontaneously?

Field 3 | Armrest support

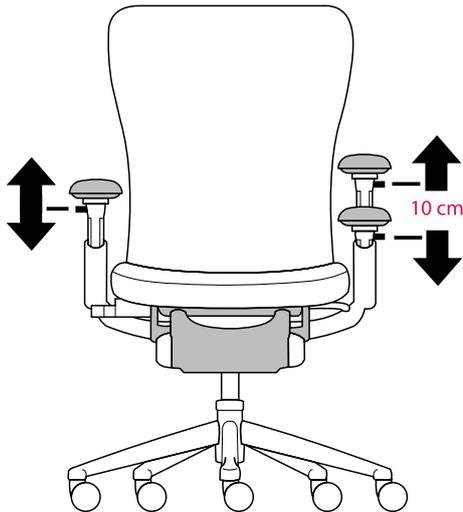
The investigation

The increasing computerisation of the workplaces led to a spread of occupational diseases. The minute motor handling of keyboard and mouse is characterised by a permanent repetition of uniform motions, which lead to discomfort in arm, shoulder and neck region as well as to the RSI and Carpal tunnel syndrome. During the past few years the problems have been identified. A remedy was found in the use of adjustable/variable armrests. Our team has analysed the adjustment range as well as several prototypes in order to optimise the intuitive handling by the user. It has been definite that Comforto 89 will be equipped with the further developed 4D armrests.



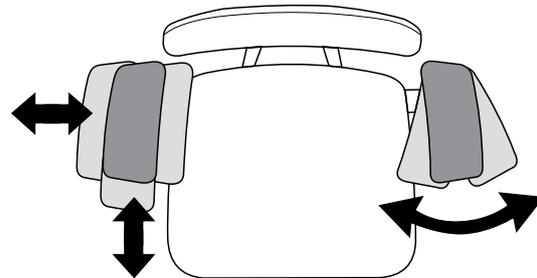
The findings

A targeted relief of neck, shoulder and arm region can be achieved by the armrests. Current anthropometric data have been taken into account as the basis for the right dimension and adjustment range as well as own research results.



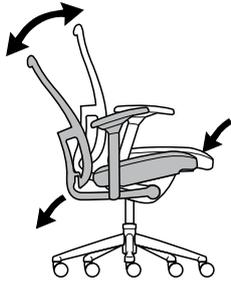
The realisation

The further developed 4D armrests may be adjusted in four directions. Height adjustment with a range of 10 cm. Thus, tension in the neck and shoulders is avoided. The upholstered arm caps may be adjusted laterally to the user's body width or in depth to move the chair as closely as necessary to the table top and pivot in angle. When changing the activity or posture or when the user of the chair changes, the adjustment is always done intuitively and without problems.



The ergonomic benefits at a glance

3-point synchronised mechanism



Features:

- 3-point synchronised mechanism
- Backrest reclines 24° from the upright position/front seat edge moves downward 1°

Benefits:

- Comfortable relaxed posture
- Better provision of the intervertebral disks with nutrients through movement
- Feet rest on the floor
- No pressure onto the lower legs
- Continuous lumbar support

Tension control



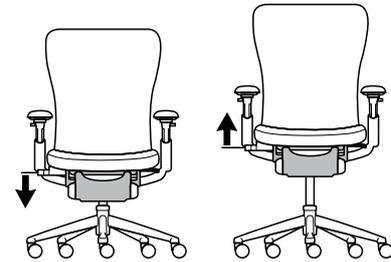
Features:

- Easy-to-reach and easy-to-activate regulation of individual tension control by a turning crank handle

Benefits:

- Individual adjustment for each body height and weight
- Stimulation of movement and permanent lumbar support

Height adjustment



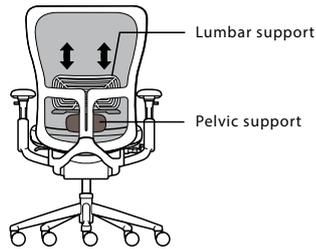
Features:

- By simply pressing a button, the chair is adjusted in height due to its gas lift

Benefits:

- Precise adjustment to the individual body height of the user optimises the seating posture

PAL™ Back Lumbar support



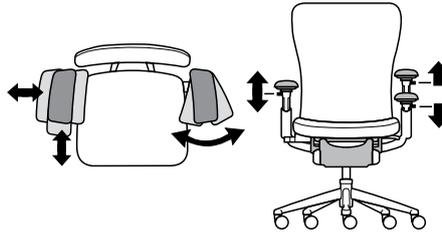
Features:

- Patented asymmetric lumbar support
- Height-adjustable (104 mm) and independently adjustable on left or right side
- Passive pelvic support

Benefits:

- The lumbar support corrects the posture of the spinal column into the double S-curve
- The pelvic is raised and also improves the user's body posture
- Individual adaptation through asymmetric adjustment

4D armrests



Features:

- Armrests adjustable in height (10 cm) and the arm caps in width and depth as well as laterally pivoting

Benefits:

- Optimum adjustment to each user's body height and activity
- Relief for neck, shoulders and hands
- Especially effective for work at the computer

Headrest-Adjustment



Features:

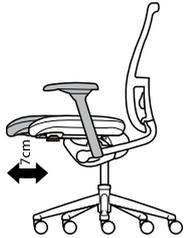
- Headrest adjustable in height
- The depth is adjusted in line with the curved neck support

Benefits:

- Relief for shoulders and neck
- Encourages the user to lean back and relax
- Optimum adjustment to each user's body height and activity

The ergonomic benefits at a glance

Seat depth adjustment



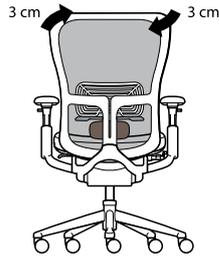
Features:

- Adjustment of the seat surface up to 7 cm to the front and back

Benefits:

- Adaptation to users of different body heights
- Relief of thighs and optimum back contact

Backrest torsion



Features:

- Flexible backrest frame construction in the shoulder region

Benefits:

- Better adaptation to the back form and stimulation of the user's movement makes it easier to reach sideways for objects.

Back Stop



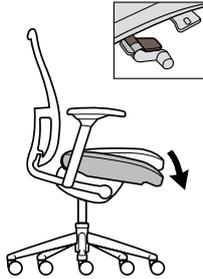
Features:

- Limitation of the backrest's opening angle to six steps

Benefits:

- Adaptation to the individual activity and user's requests

Forward tilt



Features:

- When shifting the weight to the front, the seat surface follows with a slight inclination downwards

Benefits:

- Improved posture, spinal column is raised
- Pressure onto thighs is reduced
- Better blood circulation

Through consistent implementation of all scientific findings into coordinated detailed technical solutions Comforto 89 offers an entirely harmonious concept and makes its contribution to health care at the workplace.

Form follows function. – No doubt that the classic design philosophy of the architect Louis Henry Sullivan deserves honour but Comforto 89 pursues a different philosophy, which is **Form follows science.** Design which is based on scientific findings from the beginning and is geared stylistically towards the most brilliant development – the human body. Comforto 89 – as the result of interdisciplinary performance – represents a new era of ergonomic chair design.



Comforto 89 | awarded several times



Silver Best of NeoCon Award, Seating: Ergonomics Desk/Task Chicago IL, USA June 2005.

The Best of NeoCon awards is sponsored by Contract magazine, McMorrow Report.com, Merchandise Mart Properties Inc. IFMA, and IIDA. It is the most prestigious product competition in the commercial interior furniture and furnishings market in the USA.



Gold IIDEX/NeoCon Canada Product Award, Seating: Desk/Workstation Chairs, Canada September 2005.

This award is the highest award for office furniture in Canada. The products are evaluated by a panel of judges, selected from a judging committee of 25 members from prestigious design firms and corporations.



Cradle to Cradle™ Gold Certified Product by MBDC (McDonough Braungart Design Chemistry) October 2005.

Comforto 89 has been certified as a Cradle to Cradle™ Gold Product by MBDC (McDonough Braungart Design Chemistry). Comforto 89 has been evaluated for its human health, lifecycle attributes, renewable energy, water stewardship, and social responsibility characteristics against stringent certification criteria and is considered an ecologically intelligent product.



2005 GOOD DESIGN™ Award, presented by the Chicago Athenaeum Museum of Architecture and Design December 2005.

Comforto 89 has won a 2005 GOOD DESIGN™ award, presented by the Chicago Athenaeum Museum of Architecture and Design. Founded in 1950, the GOOD DESIGN™ award recognizes new and innovative product concepts and is one of the oldest and most important design competitions worldwide.



American Physical Therapy Association Endorsement (APTA) December 2005.

Comforto 89 is the first and only chair endorsed by the American Physical Therapy Association (APTA). The endorsement comes after an APTA review based on criteria such as ergonomic features, proven benefit to the user, product efficacy, and cost-effectiveness.

"Comforto 89 offers a high level of individual control and is reasonably priced", said APTA President Ben F Massey, Jr., PT, MA.

"We particularly favour the range of adjustment features it offers for user's comfort".

The **international** orientation:

Comforto 89 is an international project. This orientation has four points of emphasis:

1. An international development team should bring together a maximum of know-how and experience.

The team consisted of:

- **ITO-Design, Germany**
 - **Haworth Design Studio, Holland / Michigan**
 - **Human Performance Institute of Western Michigan University (WMU)**
2. The design should be approved and accepted by different cultures worldwide.
 3. Comforto 89 should match different groups of population with extremely different body heights and work habits.
 4. To make the favourable purchase price possible, large quantities have to be generated. This is possible due to a worldwide marketing.

Since its launch, Comforto 89 has not only received a number of awards but also proves its bestseller qualities.

Where is **Comforto 89** at home?

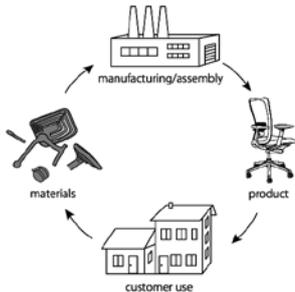
Comforto 89 is at home on management level as well as at a computer workplace, front or back office, Call Centre or in the home office.

Comforto 89 represents a **democratic design** which does not make any class differences but vouches for ergonomics as a fundamental right.

Comforto 89 shall not dominate its surrounding but complement and harmonise with it. Its design does not follow any modern, fanciful style but a timeless design philosophy of **sustainability**.

The **environment** may lean back comfortably.

Haworth pursues an integrated strategy which comprises of production, administration, logistics and its members' professional as well as private behaviour. From the point of view of 'Product Stewardship' we take on the responsibility for the complete lifecycle of Comforto 89. We have received the gold Cradle to Cradle™ award for this commitment. The lifecycle starts with the use of recycled material, like plastic and metal, for environmentally friendly production with low energy consumption. It follows on with finely honed logistics and the avoidance of emissions at the end user's workplace. Finally, at the end of its 'working life', Comforto 89 can be easily disassembled at low cost. The parts can be sorted by material without difficulty and returned into the production cycle. Comforto 89, of course, is free of PVC, PBDE and CFCs.



What does Cradle to Cradle™ mean?

Cradle to Cradle™ is based on the McDonough/Braungart Design Chemistry Protocol (MBDC). A scientifically based control process to check and optimise the use of materials in products and production processes with the objective of optimising health, safety and quality and to support the reuse of materials over several product generations. Furthermore, the use of renewable energies, the protective use of water and the social responsibility are evaluated.

Overview



8901



8923



8971



8965



8944



8950

Comforto 89 contents itself with few model versions since we prefer to offer the user rather a complete ergonomic equipment. You may, of course, do without the armrests if your activity requires it or the seat depth adjustment if the user's size is not above average. You may basically choose between a mesh back or an upholstered version.

Design diversity

Mesh covering



47/0401 (black)



47/0402 (dark grey)



47/0403 (light grey)

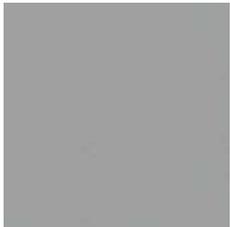


47/0404 (terracotta)

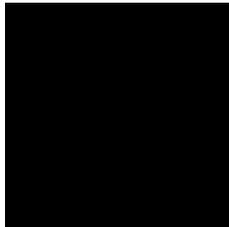
Fabric-/leather covering

Seat and back pad are available in the corresponding collections of the price list valid at that time.

Chair bases



silver metallic
(in aluminium)



black
(in aluminium)



Alu polished



Seat: Fabric
Back: Mesh



Seat: Fabric
Back: Fabric



Seat: Leather
Back: Leather

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