



Precision work in the watch industry

Workstations

ergonomic increase

well-being and productivity

When at work, do your employees regularly complain of pain such as stinging eyes, neck pain, headaches or pain in the shoulders, arms or hands? Or do they evoke difficulties in concentrating? Such symptoms are frequently linked to an unfavorable workstation layout or working environment. This brochure will help you learn how to optimize them.

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Precision work in the watch industry Ergonomic workstations
increase well-being and productivity

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We would like to thank the Federal Labor Inspectorate of SECO and the
technical commission of the Intercantonal Association for the Protection of
Workers (AIPT), who kindly checked this manuscript and gave us their
friendly support.

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purposes, with acknowledgment of the source. 1st edition:
May 2010, 6000 copies

Reference

44084.f

The Suva model

- **Suva is better than insurance: it combines prevention, insurance and rehabilitation.**
- **The Suva is managed by the social partners. The balanced composition of its Board of Directors, made up of representatives of employers, workers and the Confederation, allows consensual and pragmatic solutions.**
- **Suva's surplus earnings are returned to policyholders in the form of lower premiums.**
- **Suva is financially autonomous and does not receive any state subsidy.**

1 Ergonomics increase well-being and productivity

Carry out **precision work** with a very short visual distance is a feature of many workstations. This is the case, for example, in the watchmaking industry as well as in the field of microelectronics. People who do this type of work remain virtually immobile, in a static posture, sometimes for hours on end, which can be particularly trying. An ergonomic design of the workstations, that is to say an arrangement which takes the human factor into account as much as possible, is particularly important in such cases.

An ergonomically designed workplace should be able to be adapted to the characteristics and individual needs of people. It facilitates work flow and limits loads and nuisances to an acceptable level for health.

Healthy employees in a healthy company

The health of employees and that of the company are directly interdependent in the long term. Investing in well-appointed workstations therefore makes sense (fig. 1).

If someone is forced to work in unfavorable conditions, their ability to concentrate as well as their performance and ultimately their health will be affected. Such a situation can lead to several consequences: increased error rate, reduced performance, suffering, absences, absenteeism.

A business will only suffer. The economic environment demands high productivity from all stakeholders, which only efficient and healthy employees can achieve.

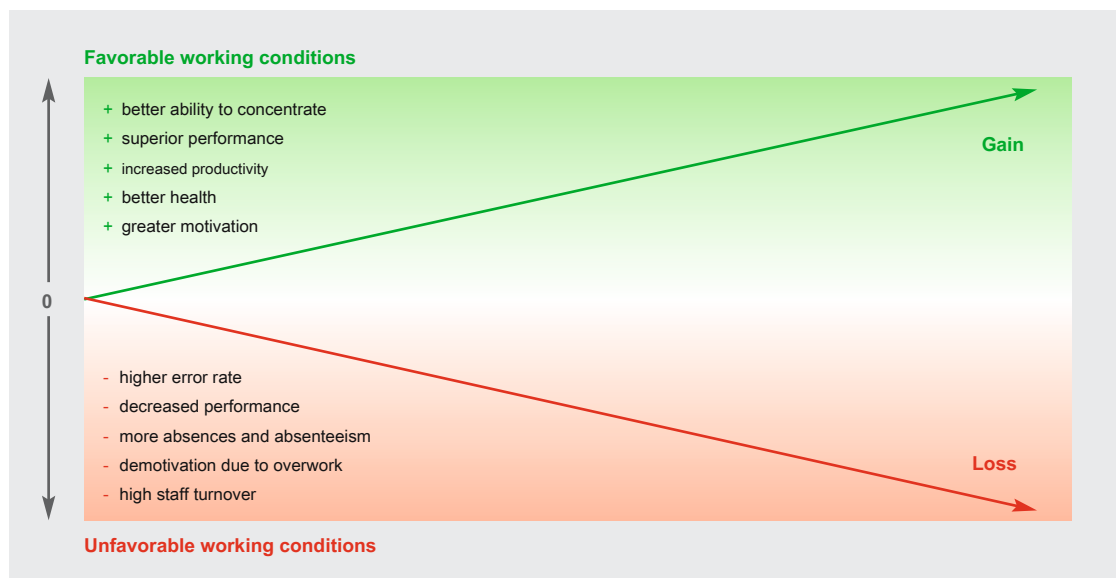


Fig. 1: investing in well-appointed workstations makes sense.

TOP Strategy

This brochure is based on the TOP strategy, a proven approach to health protection that allows problems to be addressed in a structured way.

These three letters mean **T** technical, **O** organization and **P** person (fig. 2).

Appropriate technical equipment as well as carefully thought out work organization and management are essential conditions for each employee to perform optimally at their level. It is therefore important that the people concerned can participate in the organization of their workstation. Collaboration in occupational safety and health protection is not only a legal requirement¹, but also an important factor of success.



Fig. 2: TOP strategy.

¹ Art. 82, al. 2 of the Federal Law on Accident Insurance (LAA) and art. 6 of the Labor Law (LTr)

2 Typical nuisances

2.1 Static postures and forced postures

To achieve precision work, the body must remain in the most stable position possible. People who do such work remain virtually still, sometimes for hours. Blood circulation slows down, which also reduces blood flow to the muscles. However, some muscles must maintain a static posture for long periods of time. The irritation and possible pain areas

can strain tendons and musculature as well as blood vessels, nerves or other tissues and organs, and lead to painful contractures and shortening of muscles and tendons. These contractures can become chronic.

2.2 Typical forced postures

This imbalance of the tissues, which can lead to muscle pain.

If the work bench and work chair are not suitable for the size and activity, inevitably results in **forced postures**. Poor position of the joints

Fig. 3 shows the typical forced postures in precision work performed with a very short visual distance, as well as areas prone to pain.

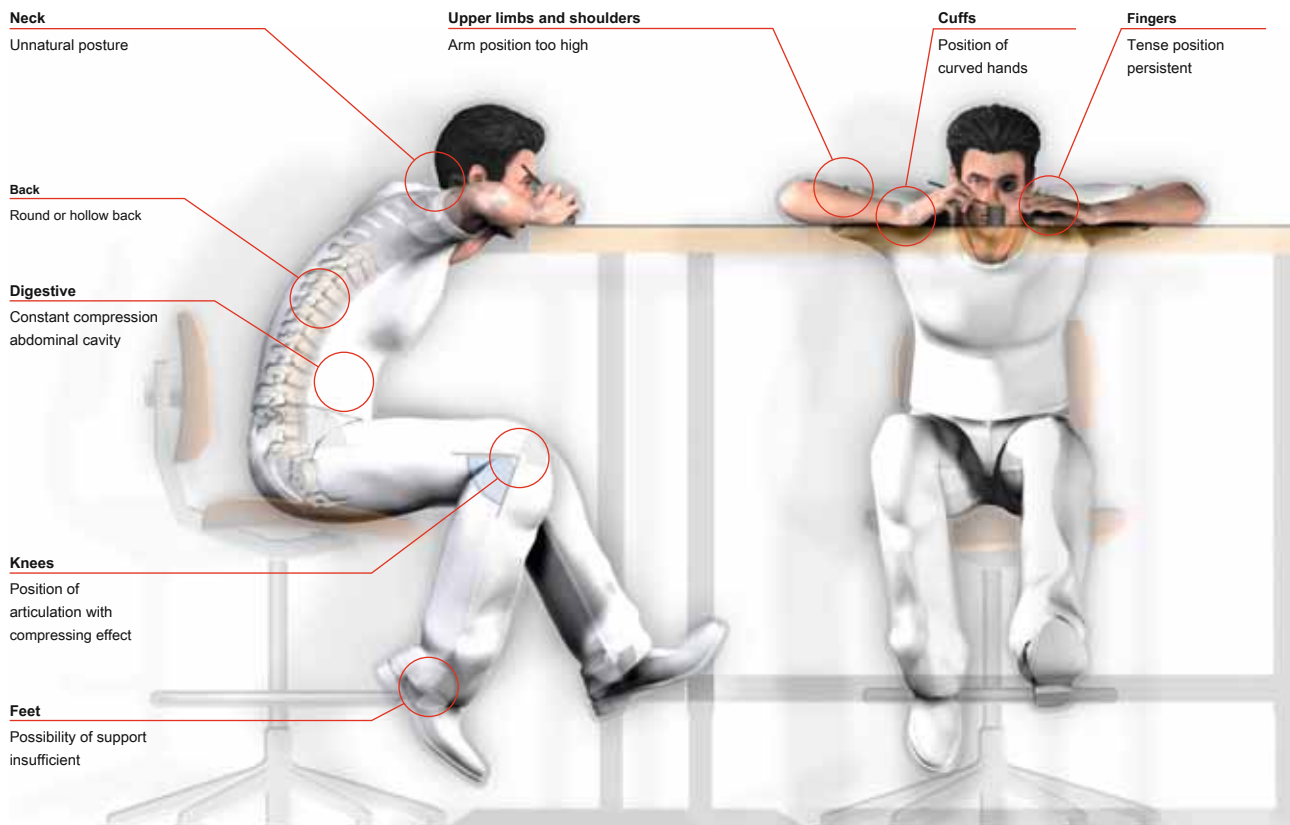


Fig. 3: Forced postures and typical painful areas at workstations that are not optimally adapted to body size.

2.3 Pressure zones and skin irritations

When the body remains in a static posture, the workbench, chair, or objects in the movement area and in the leg area exert constant pressure on the soft parts, tendons and nerves. This situation can cause pain in the areas of the body concerned, or even lead in some cases to inflammation of the tendons and nerves. Skin irritation can also occur, in particular in the areas of contact with the seat cushion and the armrests when these areas are not padded and perspiration cannot be absorbed (fig. 4).

2.4 Nuisances due to the working environment

Precision work puts a strain on visual acuity as well as the ability to concentrate. If nuisance factors related to the work environment are added to it, workers tire more quickly. By nuisance factors is meant, for example, unfavorable lighting conditions, an unsuitable ambient climate (temperature, humidity, drafts) or annoying noise. These factors can disrupt performance and well-being, and affect health.



Fig. 4: typical pressure areas in ergonomically poorly arranged workstations.

3 Ergonomic layout of workstations

3.1 Key points

Precision work is above all characterized by a vision-oriented activity. This determines the position of the eye (and therefore the head) relative to the workpiece. The position of the hands is a second determining factor. This is defined by the part to be worked and by the tools used. The position of the rest of the body adapts to the given conditions.

In order to prevent harmful postures, the workstation must be adapted at two levels:

1. **the specific requirements of the activity**, as
viewing distance, viewing angle, and hand position and posture
2. **to individual specificities** of the worker,
especially its size and visual acuity

In order to meet these basic requirements, the workstation must meet the following conditions:

- The **established** must be height adjustable, or workbenches of different heights must be available.
- Of **arm or hand supports** must be available for precision manual work. They are used to support the upper limbs and stabilize the hand. The height and angle of the stand must be adjustable.
- The **seat** and the backrest must be individually adjustable.
- The **adjustment functions** must be simple to use so that workers actually use them.
- The **freedom of movement** under the workbench and at chair level should not be obstructed.

Relaxed working atmosphere

In addition to physical nuisances, workers can also suffer from psychological disturbances, for example due to inadequate organization, too much pressure to perform or tensions between people. Negative stress can over time make you sick or make symptoms of other illnesses worse. More information is available at www.stressnostress.ch or in the Suva brochure "Stressed? This can help you!" (ref. 44065.f).

3.2 Adjust the height of the workbench according to the activity (visual task)

The height of the workbench should be chosen according to the visual task at hand.

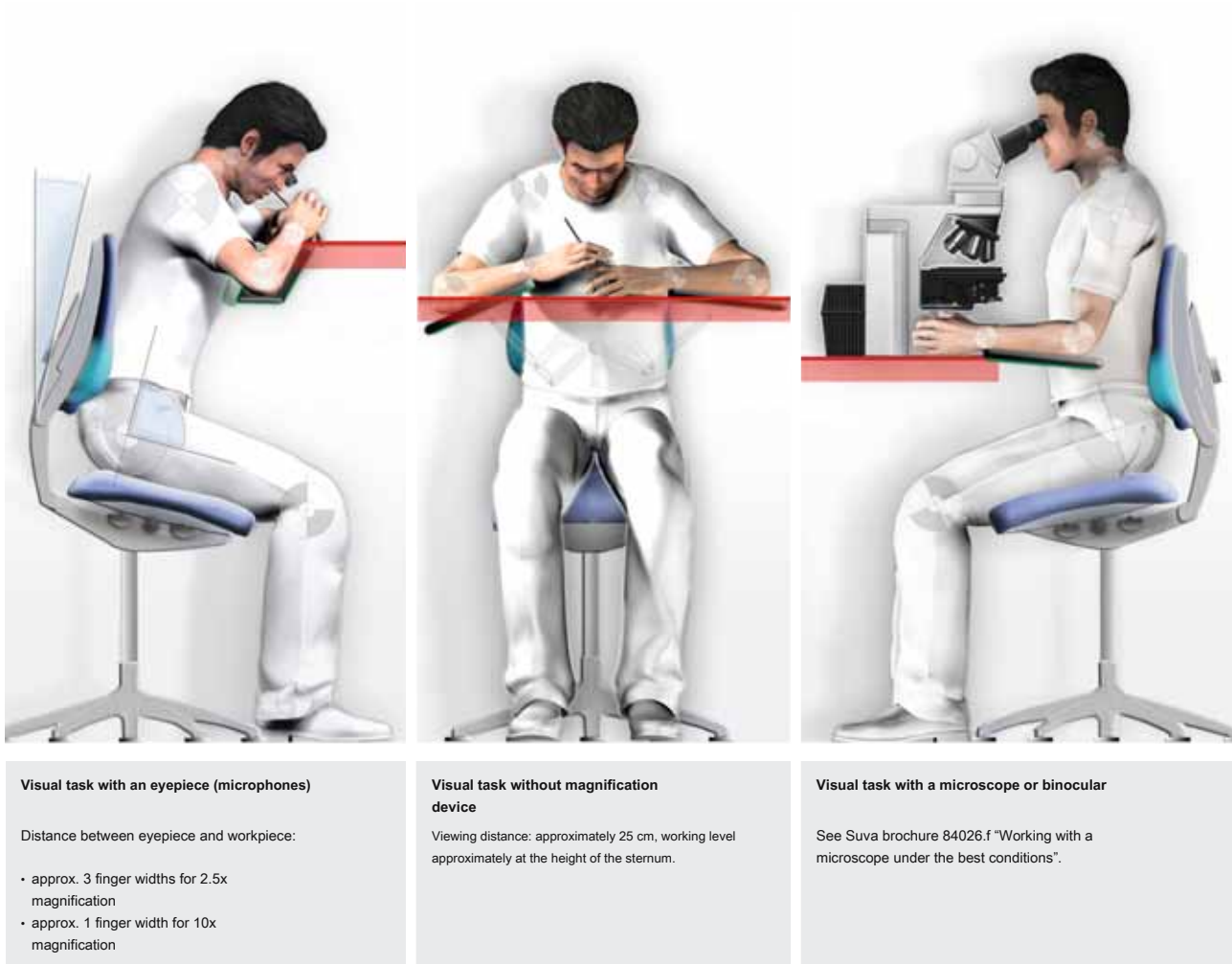
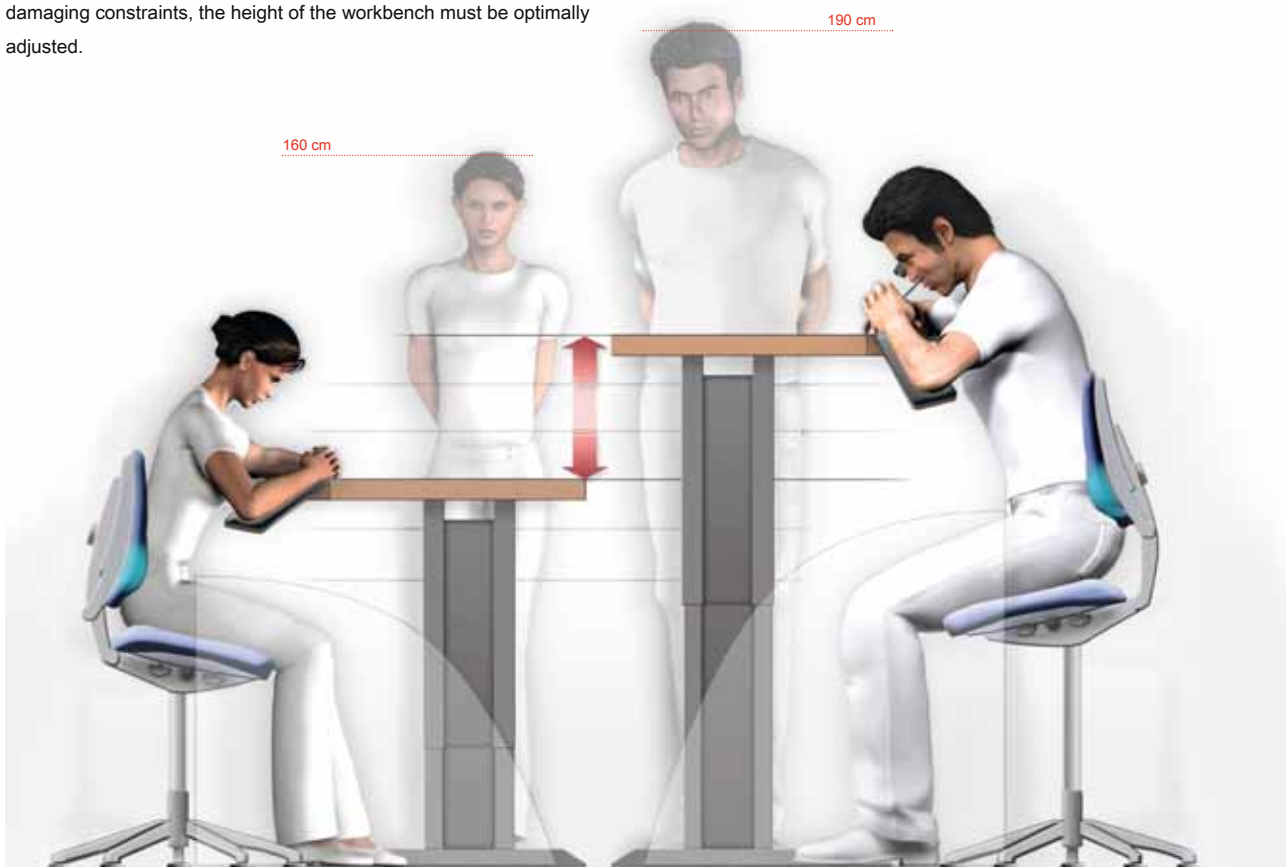


Fig. 5: adjust the height of the workbench according to the task. In the presence of workbenches adjustable in height, the adjustment possibilities must always be used.

3.3 Adapt the height of the workbench according to the body size

In order for people of different heights to work efficiently and without damaging constraints, the height of the workbench must be optimally adjusted.



Space for legs and feet

Unlimited movement area and, in the knee area, at least 60 cm deep from the edge of the workbench.

Workbench height

Ideal workbench height between 65 and 120 cm; with electric height adjustment for frequent change of task or people.

Workbench surface

Rounded edges in the grip area, uniform matt, non-reflective surface color.

Armrests

Adjustable height and angle of inclination, flat contact area, non-slip surface material, good skin affinity.

Fig 6: adapt the height of the workbench to the height of the operator.

3.4 Workbench at a fixed height: what to do?

Traditionally, the height of workbenches can only be changed to a limited extent; in some cases it is even impossible to adjust it. What can we do then?

1. Check and exploit the **adaptation possibilities**

existing: many workbenches are set to a fixed height by means of a set screw, but can be adjusted to some extent. Workbenches of different heights may also be available.

2. Have shorter people sit at a higher height. To do this, it is often necessary to use a raised seat and a height-adjustable footrest.

3. For taller people, on the contrary, it may be necessary to **raise the feet of the workbench** so that the work surface is high enough.

When the height of the workbench is suitable, the footrests should be dispensed with, as they limit the freedom of movement under the workbench.

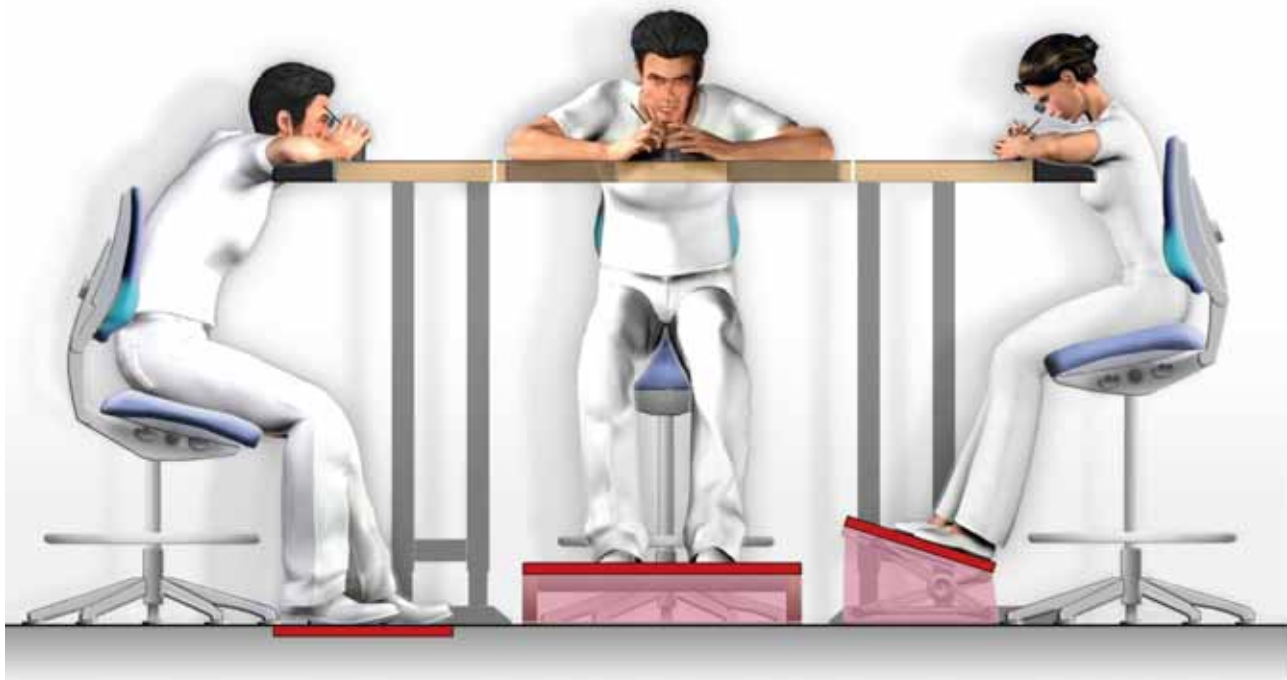


Fig. 7: possibilities of adaptation with workbenches with fixed height.

3.5 Flexible armrests allow a comfortable position natural joints

Workers need to be able to do precision work without getting tired quickly. Adopting extreme positions that strain the joints of the shoulders, arms and hands should remain an exception. The elbows should be at maximum height of the chest. As much as possible, the position of the wrists should be in the same axis as the forearm, without forming an angle.

When purchasing armrests, the following must be observed:

- The armrests must be able to be adapted to the activity. In other words, the support height and the angle of inclination must be adjustable.
- The two armrests must be able to be adjusted separately. The various tasks will thus be performed in an optimal position for each hand.
- The support zone is flat, without the presence of grooves, in order to allow the arms maximum freedom of movement.
- The surface material has good skin affinity, is antistatic and non-slip.

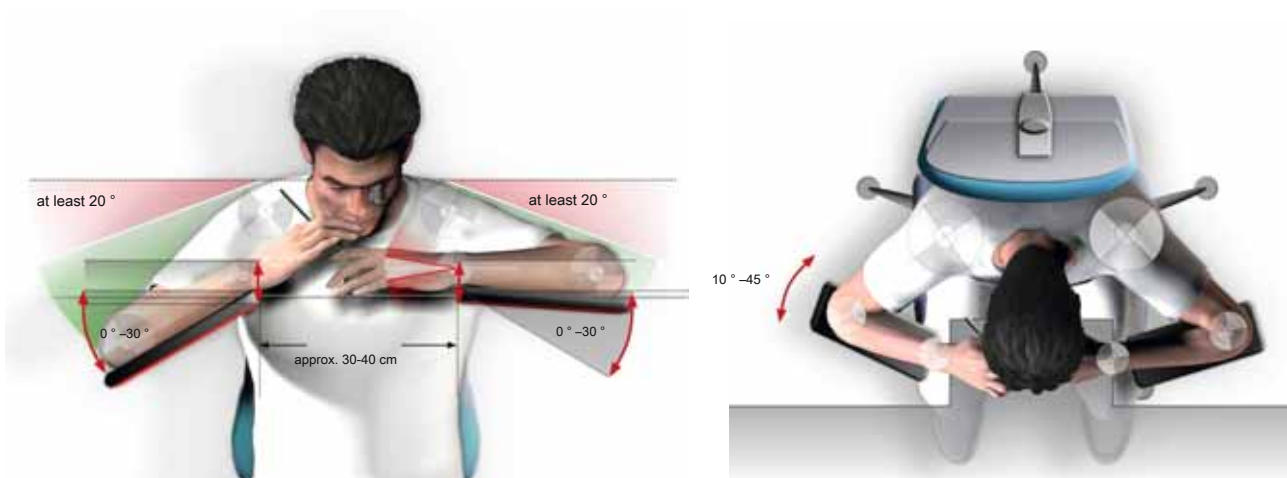


Fig. 8: natural position of the joints thanks to adjustable armrests.

3.6 Adjustable seats for optimal sitting

The work chair is of utmost importance. It supports people and serves as their support throughout the day, while providing them with the required stability. It must also offer some freedom of movement so that the user can adapt their posture quickly and easily during work. A good task chair should be padded and have a series of features that can be adapted to individual needs (fig. 9).

Seats whose seat can be adjusted to a height greater than 65 cm must not be able to roll under the effect of the load and will be fitted with a step (SN EN 1335). Information on clean rooms and other special requirements can be found in the specific standards ("air purity" according to

SN EN ISO14644-1 or "protection against electrostatic discharges" according to SN EN 61340-5-1).

Folder

High (approx. 55 cm) and narrow, height adjustable and tiltable forwards by approx. 10 degrees, together with the placet. Well-formed lumbar support, adjusted to the height of the protruding part of the hip bone (approx. At waist height)

Padding

Sweat-absorbent, non-slip, anti-static, if necessary suitable for cleanroom conditions

Seat cushion

Adjustable in height (39–58 cm), adjustable in depth (distance between the anterior edge and the crease of the knee: 3–5 cm), adjustable tilt (up to 10 degrees forward)

Mechanism

Synchronous mechanism with weight regulation for active and dynamic sitting

Five-star base

On runners or with braked castors in the presence of loads, antistatic design



Fig. 9: suitable work chair.

3.7 How to correctly adjust the seat?

The easiest way is to follow the procedure described below, step by step (fig. 10).

4 Lumbar support

Lumbar support adjusted to the height of the protruding part of the hip bone (approx. At waist height)

3 Seat height

Adjust the seat height so that the angles of the knee and the trunk are open (in no case less than 90 °)

5 Synchronous mechanism

Activate the synchronous mechanism, possibly adapt the back pressure of the backrest according to the weight and height of the user

2 Seat depth

Adjust the seat depth (distance between 3 and 5 cm between the bend of the knee and the seat cushion)

1 base

The feet must be placed flat on the ground

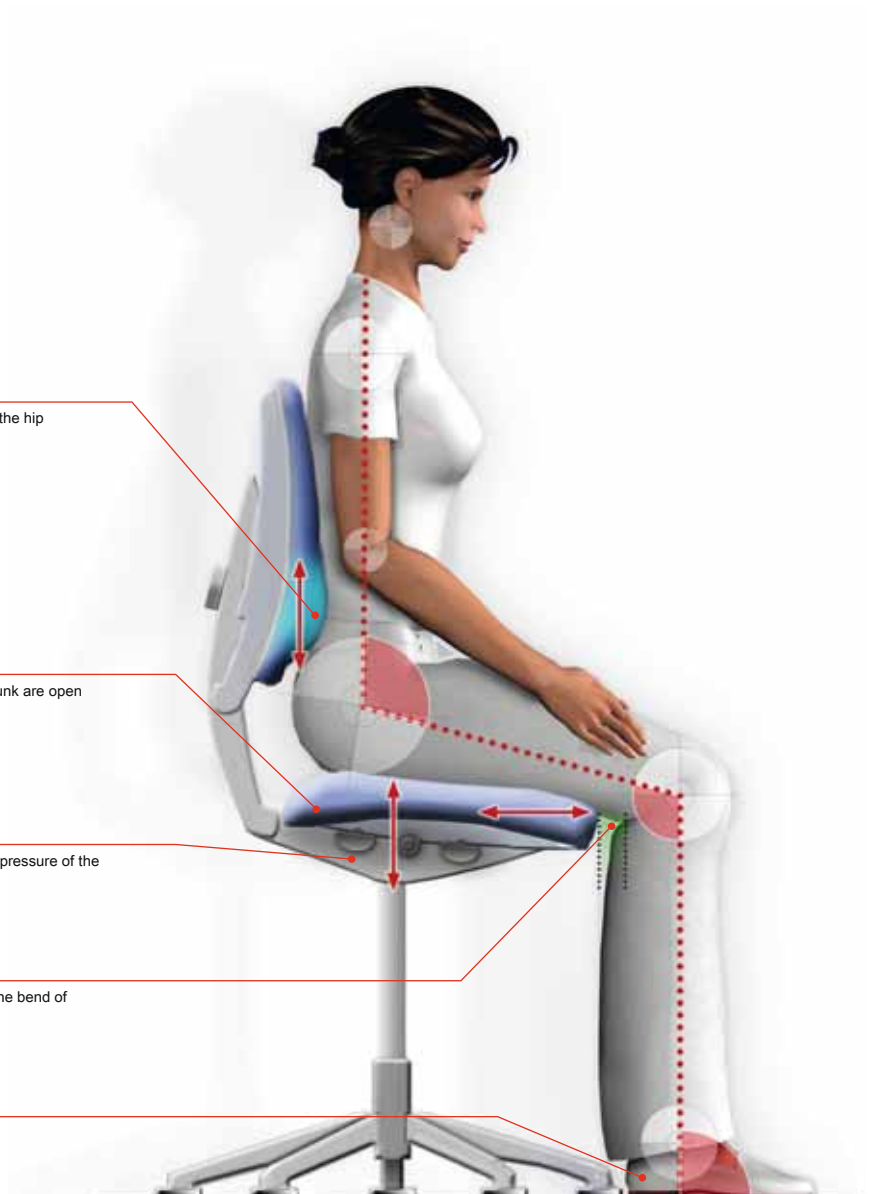


Fig. 10: steps of adjusting a seat.

4 Work environment

In the work environment, are there any factors that unnecessarily impair the well-being and the ability to concentrate of workers?

4.1 Lighting design without nuisance

Generally, these nuisances can be eliminated. The lighting conditions can, for example, be adapted to individual and activity-specific needs by means of table lamps. It is also possible to act on the ambient climate and on the acoustic conditions. However, these factors often affect the whole of a room and its occupants, which is why it is not always possible to find an ideal solution for everyone.

In order for staff to perform the demanding visual tasks assigned to them, lighting must be tailored to individual activity and needs. These needs differ from person to person, especially if they are left-handed or right-handed, or depending on visual acuity.

It's important to **design lighting for the entire work area**. This involves avoiding excessively high contrasts and glare (differences in light intensity in the visual field). The workbench should be placed perpendicular to the window. In the case of workstations placed directly in front of windows, the use of visors to protect the eyes can prove to be effective. Workers must also benefit from the view to the outside from their permanent workstation. This is an important factor for their well-being and their health (OLT 3, art. 24).

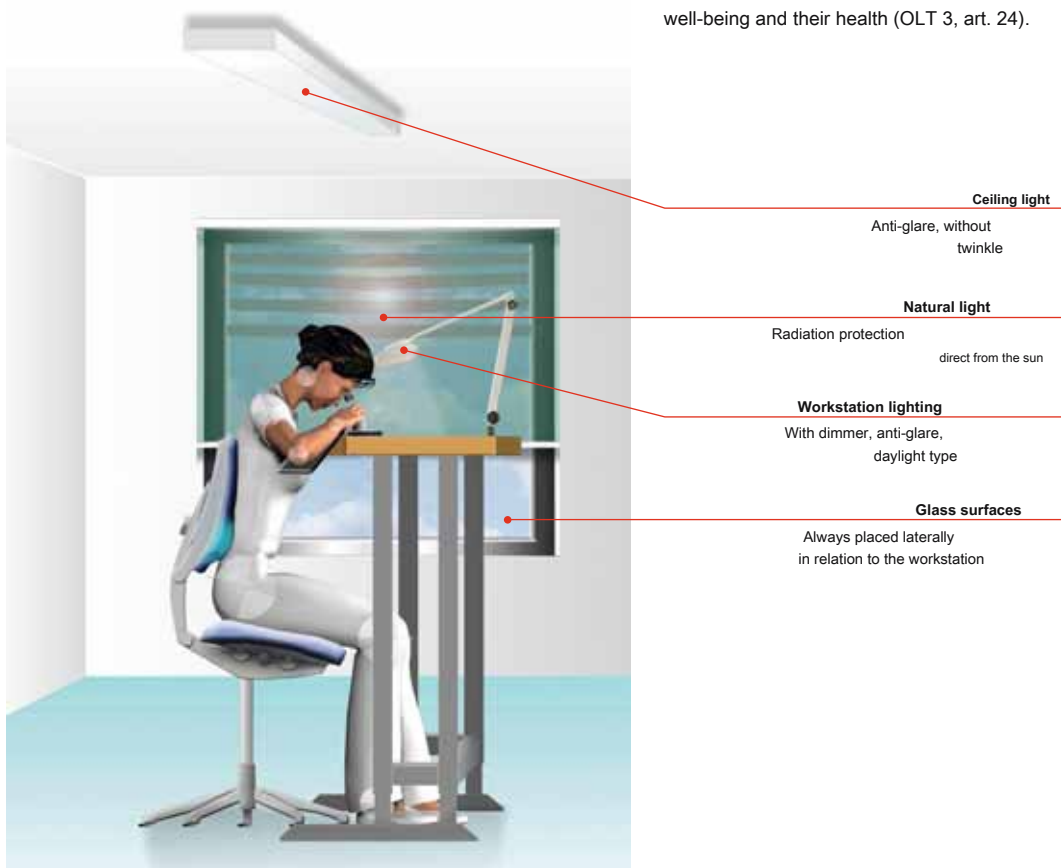


Fig. 11: workstation without too high contrasts or glare.

4.2 Adjustable artificial lighting

The basic lighting level of a room should be around 500 lux. Fluorescent tubes are ideal for this purpose. They will be equipped with an electronic power supply to prevent flickering or strobe effects.

In addition to a balanced basic lighting, each workstation must be equipped with an additional lighting adaptable according to the individual requirements so that the level of illumination of the visual work area is approximately 1000 lux. To meet individual needs

and to the specific requirements of the task, this lighting must be fitted with a dimmer in order to make it possible to adjust the brightness.

For a good contrast, it is recommended to choose a color temperature of more than 5000 K (daylight white). When color identification is important, the light source should display a color rendering index (Ra) of 90.

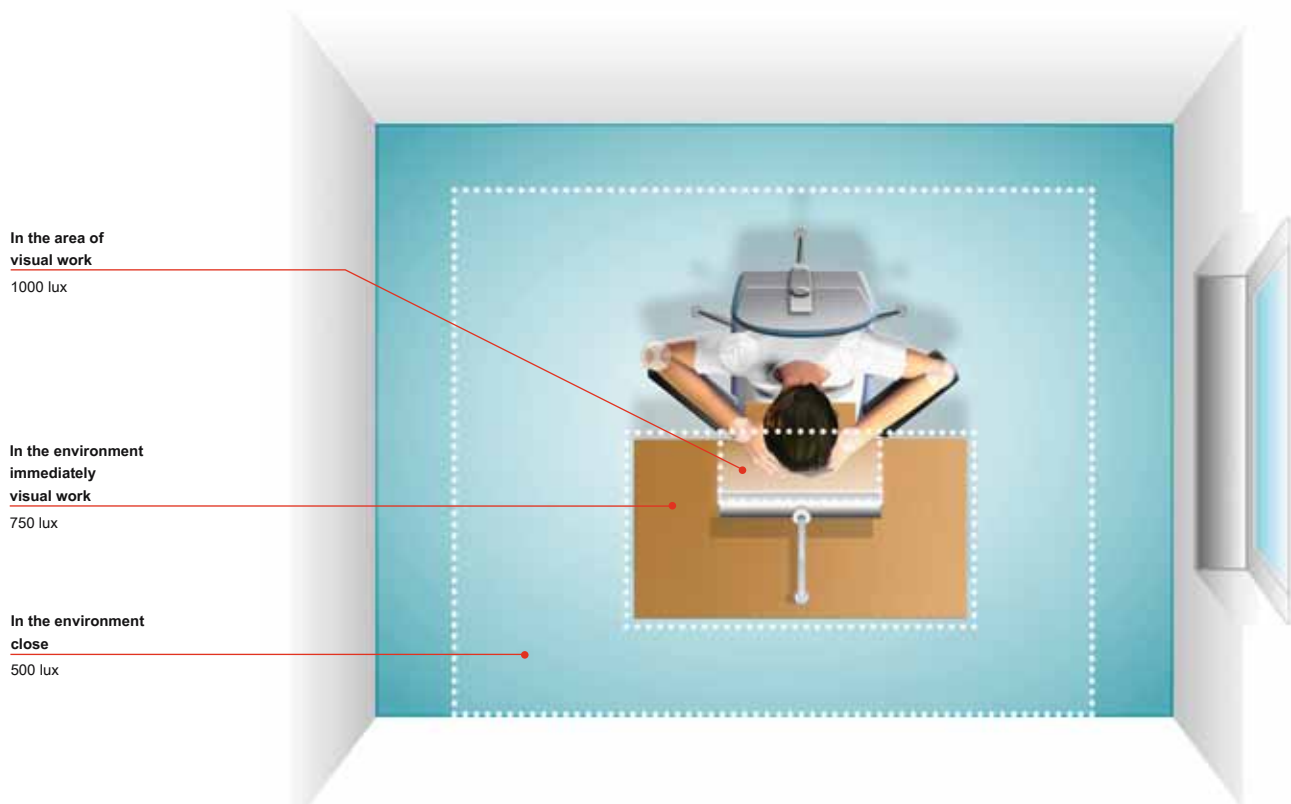


Fig. 12: brightness requirements of artificial lighting.

4.3 Pleasant room climate

Most of the time, employees who work in the same room do not all have the same requirements in terms of the room climate. This is about finding the right balance. The indicative values mentioned in fig. 13 most often make it possible to establish satisfactory conditions for the great majority of workers.

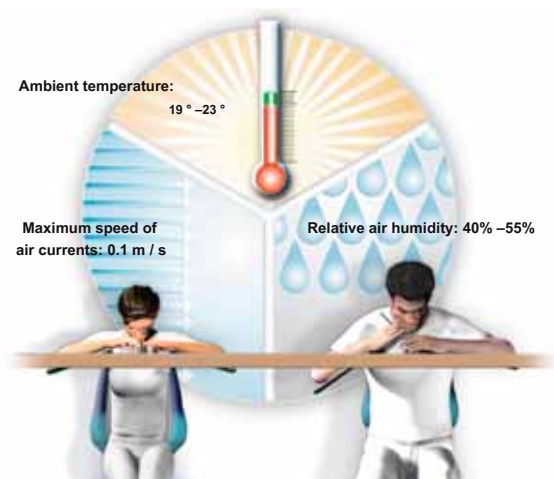


Fig. 13: indicative values for room climate.

It is also important to ensure protection against direct sunlight and insulation of the exterior walls (fig. 14).

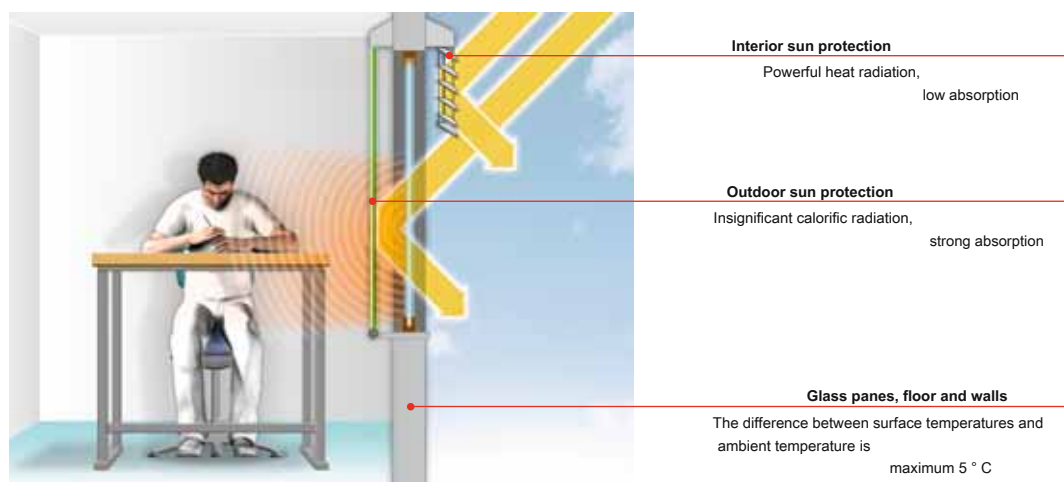


Fig. 14: sun protection and insulation.

In the case of non-air-conditioned premises, it may be advisable to designate a person who will be responsible, during periods of heat, for ventilation and protection against the sun.

Reminders for air-conditioned premises:

- guarantee the maintenance of the air conditioning system in accordance with the regulations
- keep the temperature between 19 and 23 ° C as a rule; in summer, however, the difference between the indoor and outdoor temperature should not exceed 8 ° C
- prevent local phenomena of drafts (for example by keeping doors closed)

4.4 Low sound level for optimal concentration

Noise is annoying, but the absence of noise can also be annoying. A low background sound level of nearly 45 decibels (dB_{AT}) offers the best conditions for work requiring concentration (see "Va-their limit and indicative acoustics ", ref. 86048.f).

Spatial separation

Separation of production rooms and machine rooms; also applies to machines with low noise emissions

Soundproofing

If necessary, additional measures to absorb noise

Noise level 45 dB_{AT}

Indicative value of the background noise level (approximately corresponds to the sound level of a whisper)

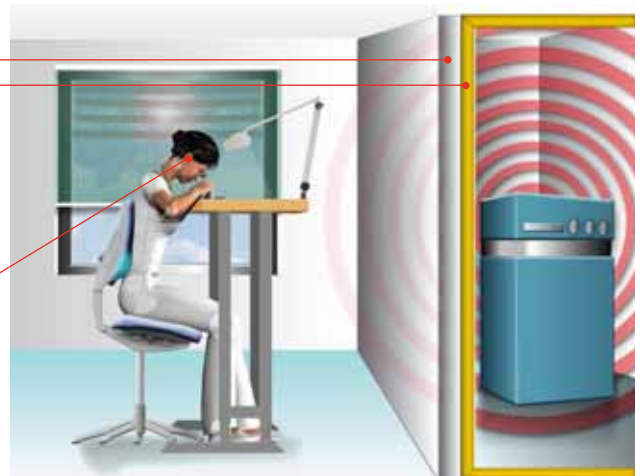


Fig. 15: protection against noise at a workstation where precision work is carried out.

Music can have a stimulating effect, but it should not disturb colleagues. The volume of the headphones should therefore be carefully adjusted (see "Music at the workstation" checklist, ref. 67121.f).



Fig. 16: the sound level of the music should be adjusted so as not to disturb colleagues.

5 Provide for exercise and regeneration phases in the organization of work

A static posture leads to body pain and reduces the ability to concentrate. These symptoms are even stronger when a person is under stress. To remedy this effectively, regular breaks should be taken during work. These allow to regenerate the body, the eyes and the mind at the same time.

Planned regeneration phases are also more efficient than accidental interruptions. If a break is not made on time, the required regeneration time will be longer later. It is therefore wise to deliberately integrate exercise and regeneration phases into the organization of work. Eye relaxation exercises are also a part of it. Getting up and taking a few steps helps stimulate the large muscle groups and thereby the blood circulation.

Proposals to boost work:

- Limit the reservations on the workstation to one hour. In this way, workers will have to get up to restock.
- Place equipment intended for occasional activities so that workers have to move to reach them.
- Encourage workers to use the stairs (eg elevators "only for the transport of goods").
- Train and instruct workers in posture and relaxation exercises for the eyes and body (fi g. 17 and 18). The exercises can possibly be an integral part of the job description.
- Take joint "coffee breaks" in the morning and afternoon to replenish your energy and promote social exchange. The ideal is to have to take stairs to get to the break room.

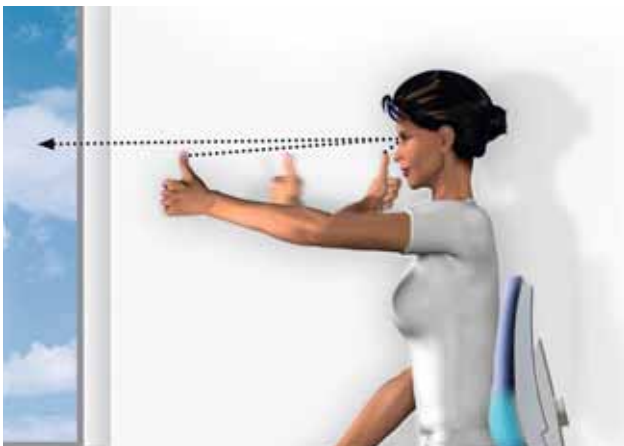


Fig. 17: example of an eye relaxation exercise: fix your thumb, then slowly move it towards your nose. Then move it back.



Fig. 18: examples of physical exercises: see Suva calendar, ref. 88210.f, "In great shape all year round!".

Lack of movement increases the risk of suffering from back pain and musculoskeletal disorders, but also of developing diabetes, cardiovascular disease and other health disorders. Constantly sitting in a sitting position can also lead to a shortening or lengthening of the muscles, especially in the stomach and buttocks, and have a negative effect on the digestive system when the abdominal cavity remains constantly compressed.

It is therefore in everyone's interest to actively protect themselves against the risks associated with a static work posture. To maintain health, everyone should also exercise regularly during leisure time. The employer has several possibilities to assist and motivate employees in this regard.

6 Ensure the working conditions of staff and train them

6.1 Employer's obligations

Under the Ordinance on the Prevention of Accidents and Occupational Diseases (OPA) and Ordinance 3 on the Labor Law (OLT 3), the employer must:

- ensure, in terms of ergonomics and hygiene, **good working conditions**, organize work appropriately and prevent excessive or repetitive efforts
- provide the **appropriate work tools** as well as the prescribed work clothes and personal protective equipment, and ensure that they are used correctly
- ensure that all workers employed in his company, including those coming from a third company, are **informed** the risks to which they are exposed in the course of their activity, and **educated**

measures to be taken to prevent them

6.2 Minimum requirements for the layout of workstations

Based on SECO comments on articles 23 and 24 of Ordinance 3 on the Labor Law (OLT 3).

Work room

- Minimum surface area of a workstation in a production site: 6 m².
- Minimum area for small offices and individual workstations: 10 m².
- Movement space: sufficient to access the workstation and to sit down.
- Free space in front of the workbench: at least 100 cm.
- Work rooms must be separated from traffic routes by dividing walls.

Work chair

- Swivel seat with five-star base.
- Adjustable seat height (if height greater than 65 cm: with footrest and on glides or with braked castors).

- Padded seat surface of a size to support the entire buttocks and at least three quarters of the thighs.

- Backrest adjustable in height and inclination.

Established

- Individual work surface of minimum 120 x 80 cm.
- No edges protruding into the support areas.
- Free space for knees and legs under the workbench (at least 58 cm wide, 60 cm deep),
no tie rods, connectors, electric cables, etc. in this free space.

Armrests

- Padded.
- Minimum area: 100 cm².

Footrest

- Independent or integrated into the workbench.
- Adjustable in height.
- Area reserved for the feet: at least 30 x 40 cm.
- The foot controls are integral with the surface and are inseparably integrated into the footrest.

For the protection and well-being of workers, here are some additional recommendations:

- The **regular eye exams** allow the timely detection of eye disorders. Visual aids, if necessary including correction, may be made available. Multifocal lenses (progressive or bifocal) are not suitable for precision work.
- The **shoes** with flat heels and soft, non-slip soles prevent the risk of slipping. The closed toe area protects against shocks and painful knocks (do not wear sandals!).
- The **work clothes** should be comfortable and not interfere with freedom of movement.
- Of the **potable water** will be available at all times near the workstations (art. 35 OLT 3). However, food and drink must not be in the direct work area. Alcoholic beverages or drugs should not be consumed before and during work.

7 Legal bases and means of information

Legal basis

LAA	Federal Law on Accident Insurance (RS 832.20)
OPA	Ordinance on the prevention of accidents and occupational diseases (RS 832.202) Federal law on work in industry, crafts and commerce (RS 822.11)
LTr	
OLT 3	Ordinance 3 (Hygiene) relating to the law on work (RS 822.113)

Advice

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Additional publications

Suva: www.suva.ch/waswo-f: platform for searching, downloading and ordering information resources.

- Ergonomics - A success factor for all businesses (brochure, ref. Suva 44061.f)
- Work with a microscope under the best conditions. Ten tips for your health and well-being (leaflet, ref. Suva 84026.f)
- Firstly. On the other hand. All you need to know about alcohol and other addictive substances at the workplace (leaflet, ref. Suva 44052.f)
- In great shape all year round! (calendar, ref. Suva 88210.f)

Swiss Association for Standardization:

www.snv.ch> Products

- SNV N.º Series 101: "Ergonomics at workstations"

SECO: www.seco.admin.ch> Protection of workers

> Legal bases

- Commentary on ordinances 3 and 4 relating to the labor law

www.stressnostress.ch: platform on the topic of stress including checklists, questionnaires, information as well as measures.

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