



ERGONOMICS

IO2 – EDUCATIONAL MATERIALS



Ergonomics

Ergonomics = study to make work environment as efficient, safe and comfortable as possible:

- Adjust the work environment to the worker and not vice versa!
- When a workplace is designed properly, the worker feels comfortable!



Figure 1 – Ergonomics. Source: uaw.org

Ergonomics – Risks

Poor/non-existing ergonomics → health issues/injuries

Risks for welders:

- Lifting heavy loads;
- Static body positioning;
- Using continuous force;
- Working with vibrating equipment;
- Repetitive motions;
- Awkward postures;

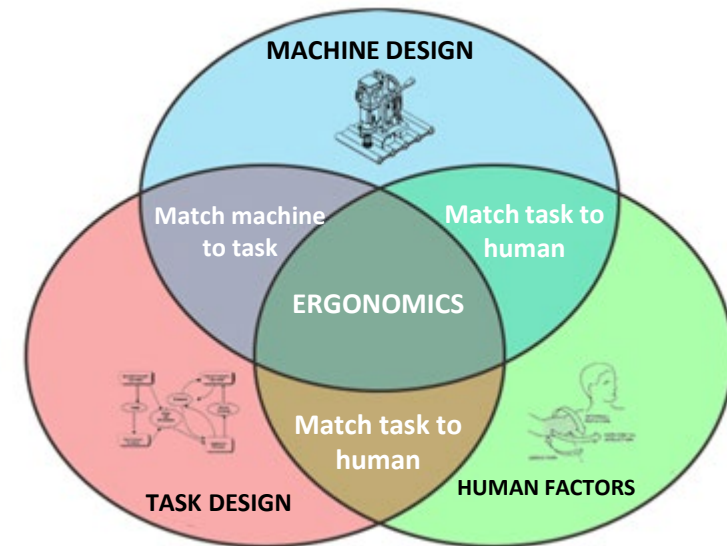


Figure 2 – Combination of factors in ergonomics. Source: Learneasy.info

Ergonomics – Consequences

Consequences of poor ergonomics

- Back pain, neck pain, muscle strain and joint pain,...;

Well known consequences = Carpal tunnel syndrome and hernia;

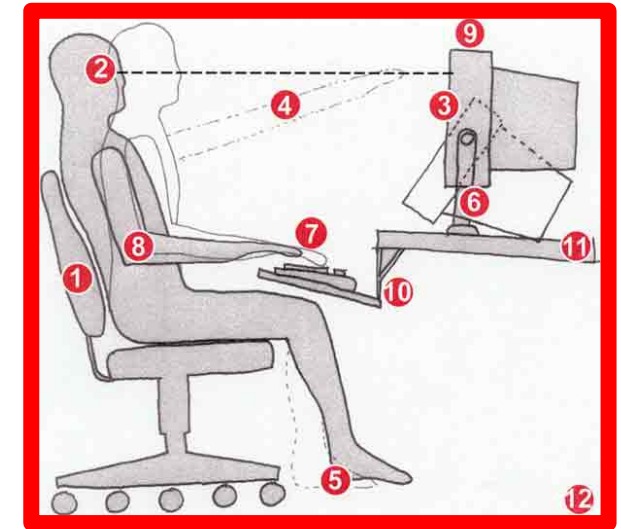


Figure 3 – Poor ergonomics. Source:
<http://vision-a4.blogspot.com>

Ergonomics – Workplace Signalization

Some warning signalization regarding ergonomics is shown below:



Figure 4, 5, 6 & 7 – Examples of signs on ergonomics. Source: <https://www.mysafetysign.com/caution-bend-your-knees-not-waist-when-lifting-sign/sku-s-5030>

Ergonomics – Minimize the risks

To minimize ergonomic risks it's the supervisors responsibility to:

- Get employee input;
- Interact with the worker. Discuss possible solutions;
- Redesign the workstation with employees' help;

Ergonomics – Minimize the risks

- Provide adequate warning signalizations when required;
- Provide adequate fixturing equipment to the workforce;
- Recognize that repetitive motion injury is mistakenly felt as a type of short-term weakness or fatigue;
- Provide regular checks and maintenance to every equipment that might contain ergonomics issues;

Ergonomics – Maintenance and Use of Equipment

- Make sure the equipment is easily reachable ➔ no obstructions, proper manoeuvring equipment,...;
- Train your employees to use proper postures and use ergonomic tools and equipment;
- Keep ergonomic factor in mind while buying new equipment;

Ergonomics – Basic principles

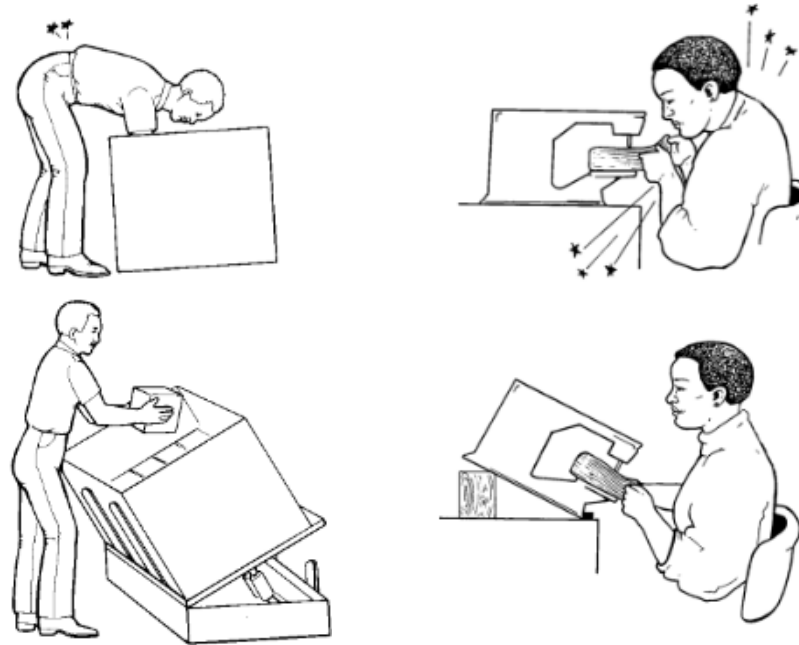


Figure 8 – Neutral postures. Source: danmacleod.com

Ergonomics – Basic principles

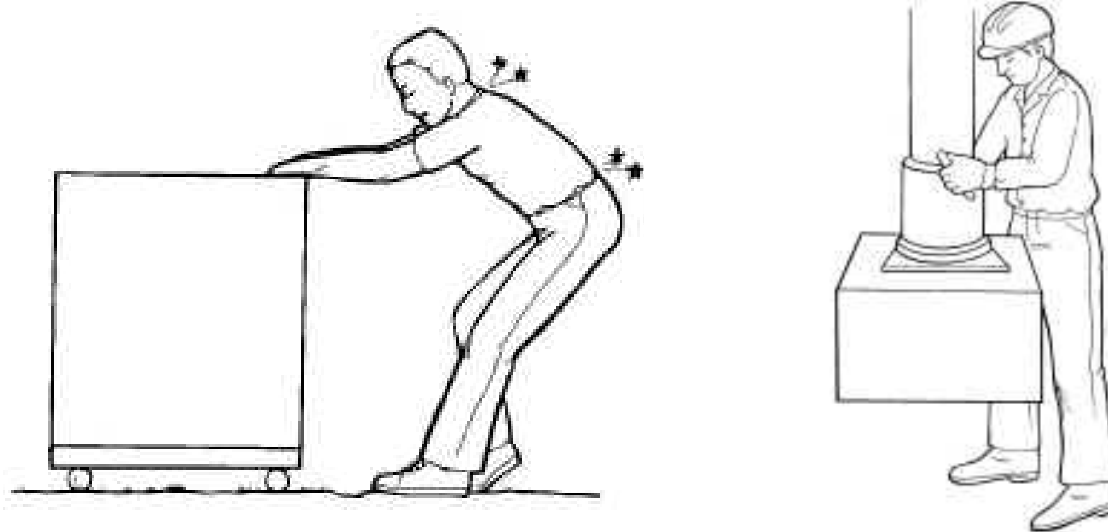


Figure 9 - Reduce excessive force. Source: danmacleod.com

Ergonomics – Basic principles

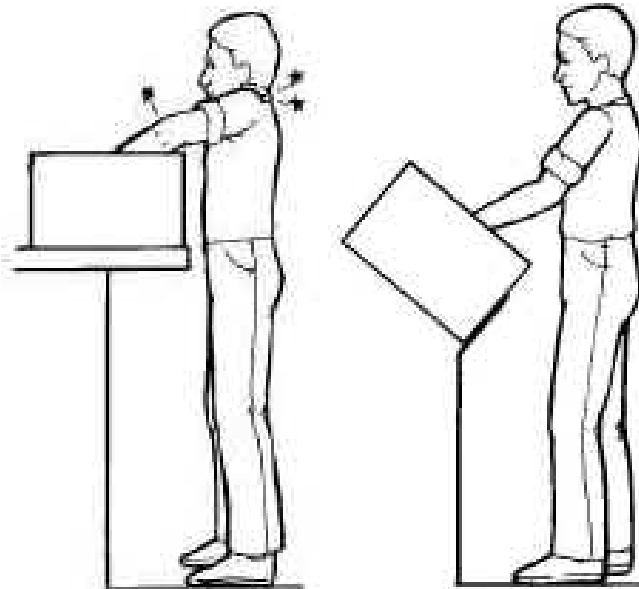


Figure 10 - Keep everything in easy reach. Source: danmacleod.com

Ergonomics – Basic principles

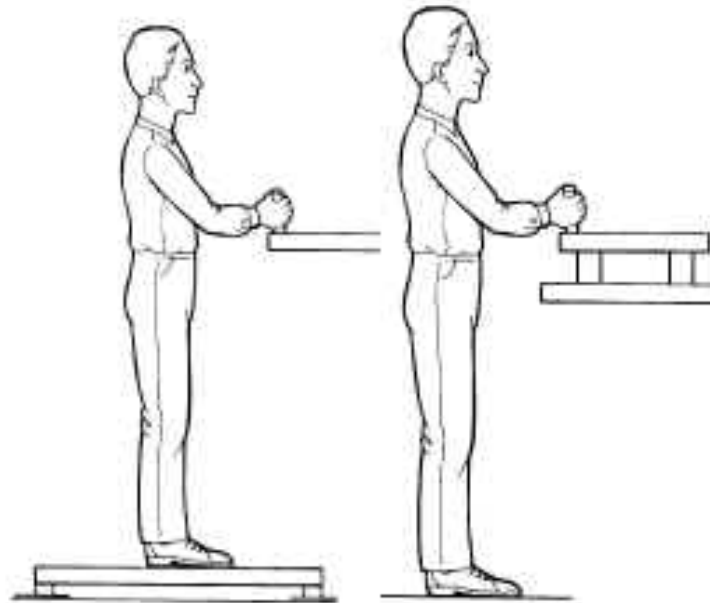


Figure 11 - Work at proper heights. Source: danmacleod.com

Ergonomics – Basic principles

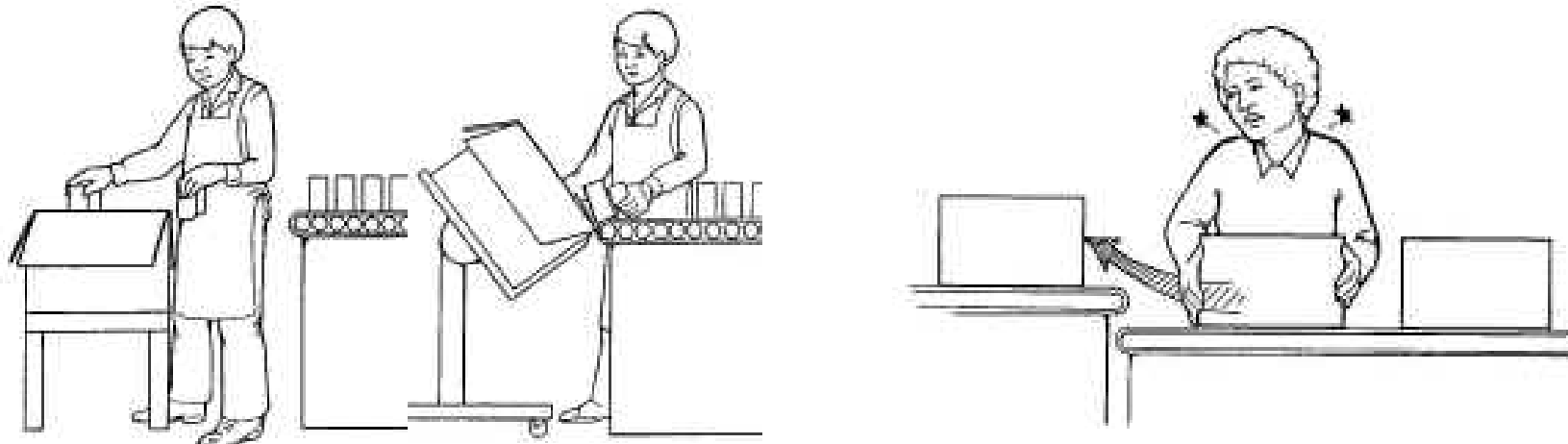


Figure 12 - Reduce excessive motions. Source: danmacleod.com

Ergonomics – Basic principles

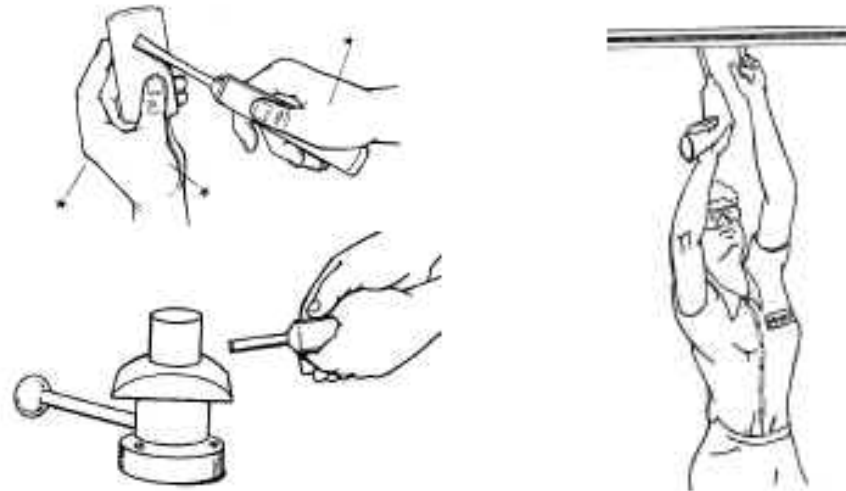


Figure 13 - Minimize fatigue and static load. Source: danmacleod.com

Ergonomics – Basic principles

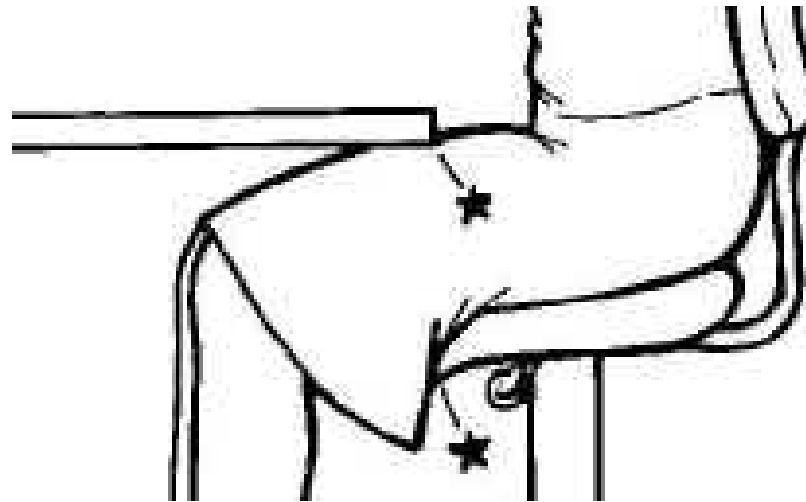


Figure 14 - Minimize pressure points. Source: danmacleod.com

Ergonomics – Basic principles

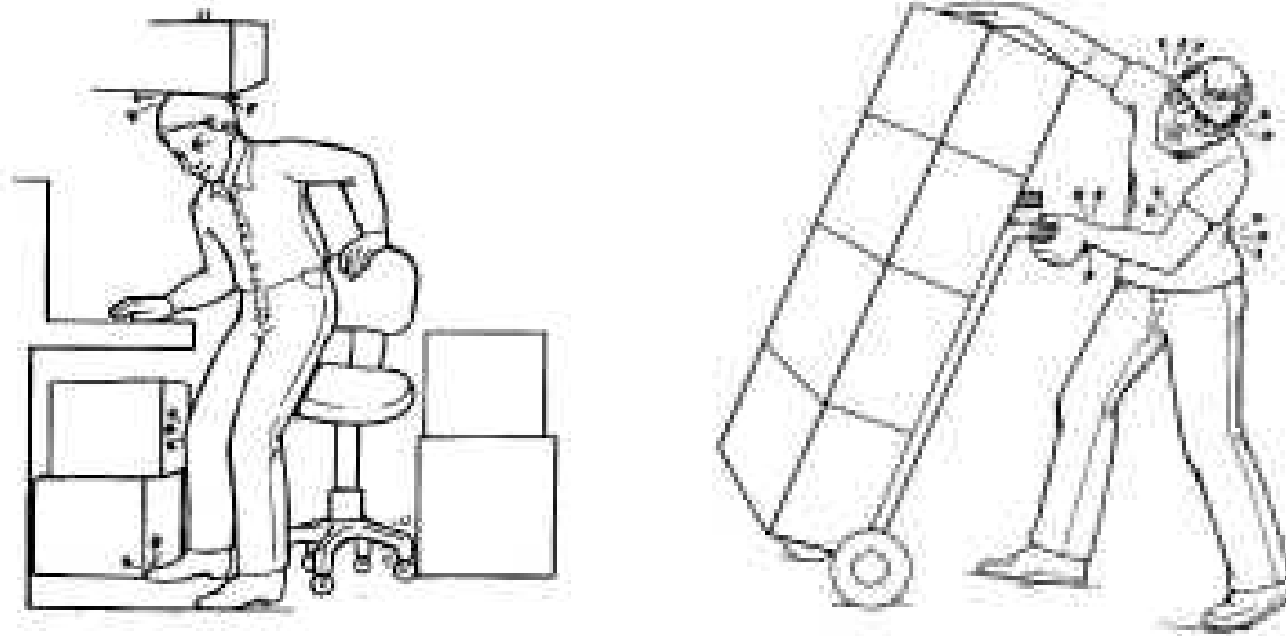


Figure 15 - Provide clearance → also visual clearance. Source: danmacleod.com

Ergonomics – Basic principles

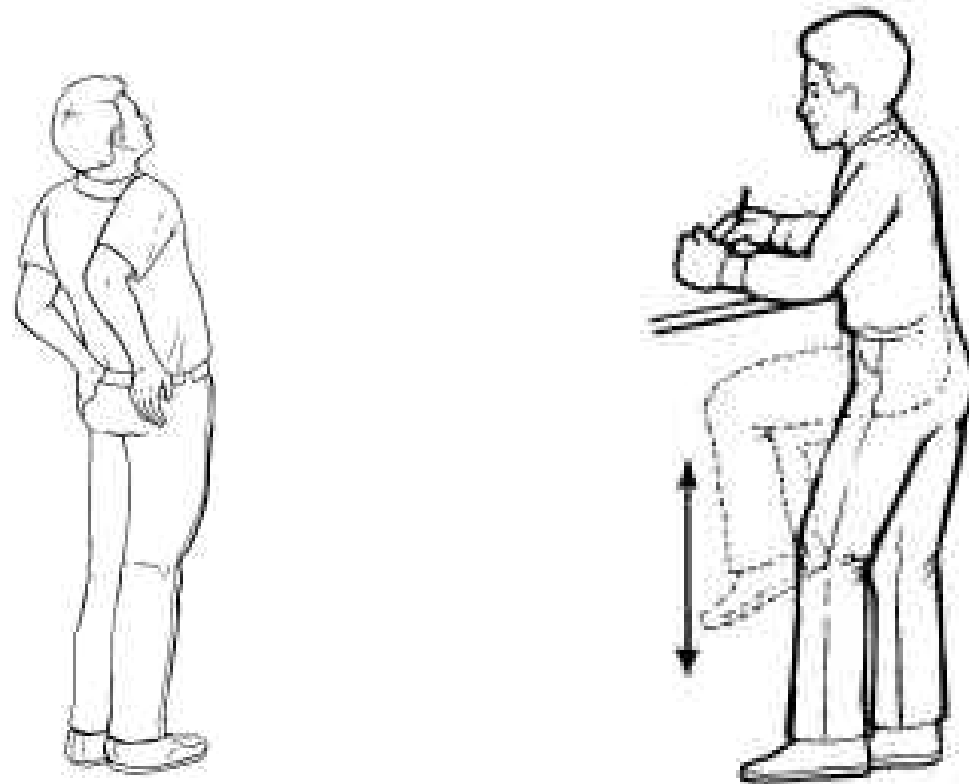


Figure 16 - Move, exercise and stretch. Source: danmacleod.com

Ergonomics – Basic principles

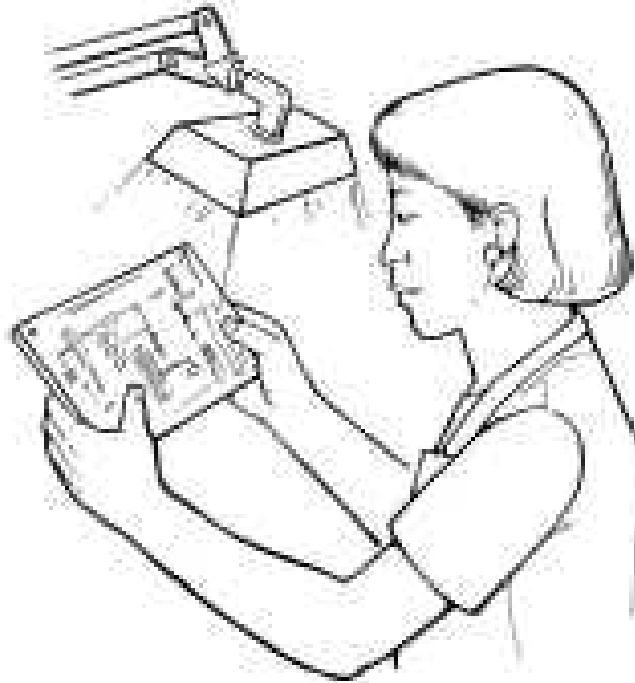


Figure 17 - Maintain a comfortable environment → enough light, minimize vibration,... Source: danmacleod.com

European, National Regulations and Recommendations

- EN 1005-1:2001+A1:2008 Safety of machinery - Human physical performance - Part 1: Terms and definitions
- EN 1005-2:2003+A1:2008 Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery
- EN 1005-3:2002+A1:2008 Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation
- EN 1005-4:2005+A1:2008 Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery
- EN 547-1:1996+A1:2008 Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery

European, National Regulations and Recommendations

- EN 547-2:1996+A1:2008 Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings
- EN 547-3:1996+A1:2008 Safety of machinery - Human body measurements - Part 3: Anthropometric data
- EN 614-1:2006+A1:2009 Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
- EN 614-2:2000+A1:2008 Safety of machinery - Ergonomic design principles - Part 2: Interactions between the design of machinery and work tasks

European, National Regulations and Recommendations

- EN 842:1996+A1:2008 Safety of machinery - Visual danger signals - General requirements, design and testing
- EN 894-1:1997+A1:2008 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 1: General principles for human interactions with displays and control actuators
- EN 894-2:1997+A1:2008 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays
- EN 894-3:2000+A1:2008 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators
- EN 981:1996+A1:2008 Safety of machinery - System of auditory and visual danger and information signals

European, National Regulations and Recommendations

- EN ISO 13732-1:2008 Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces
- EN ISO 13732-3:2008 Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 3: Cold surfaces
- EN ISO 14738:2008 Safety of machinery - Anthropometric requirements for the design of workstations at machinery
- EN ISO 15536-1:2008 Ergonomics - Computer manikins and body templates - Part 1: General requirements
- EN ISO 7250:1997 Basic human body measurements for technological design (ISO 7250:1996)
- EN ISO 7731:2008 Ergonomics - Danger signals for public and work areas – Auditory danger signals