

The EU Directive 90/270 on VDU-Work:  
a European State-of-the-Art Overview

Report over the situation in

**Sweden**

The EU Directive 90/270/EEC on the Minimum  
Health and Safety Requirements for Work with  
Display Screen Equipment

**edited by**

**Matthias Rauterberg and Helmut Krueger**

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**Technical University Eindhoven**



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## **The EU Directive on VDU-Work: a European State-of-the-Art Overview over the situation in Sweden**

"The EU Directive on the Minimum Health and Safety Requirements for Work with Display Screen Equipment in Practice - a European Overview"

**Editors:**

Rauterberg, M. *IPO, Center for User-System Interaction, TU Eindhoven, The Netherlands*

Krueger, H. *IHA, Institute for Hygiene and Applied Physiology, ETH Zurich, Switzerland*

In Co-operation with:

International Occupational Ergonomics and Safety Assoc.

SANUS Project at University of Stuttgart (Germany)

SIG CHI of Gesellschaft für Informatik (GI)

SIG CHI of Schweizer Informatiker Gesellschaft (SI)

Swiss Federal Institute of Technology (ETH)

Eindhoven: The Netherlands

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# Foreword

The EU Directive 90/270/EEC on the minimum health and safety requirements for work with display screen equipment gives general guidelines on responsibilities and identifies areas for legislation. It does not provide measurable ergonomic standards. These values are being identified in standards such as ISO 9241 and EN 29241.

The International Standards Organisation (ISO) has announced a set of standards called ISO 9241 which provide specific values on which legislation may be based. It also provides system manufacturers, employers and employees with a scientific basis for planning ergonomic working environments. The standard currently comprises 17 parts: Part 1 General Introduction, Part 2 Task design (the way jobs are designed for people working with display equipment), Parts 3-9 Hardware and physical environment, Parts 10-17 Software and usability.

The European Committee for Standardisation (CEN) has decided to issue its own standard, EN 29241, which will be virtually identical to ISO 9241. In this context EN standards are particularly relevant because CEN member countries, which include both EEC and EFTA, have jointly decided that EN standards will replace national standards (e.g. BS 7179) as soon as they are published. ISO-standards are not always introduced as national standards.

Of course, the Directive outlines minimum standards. Many countries will have existing legislation that already meets or exceeds the proposals.

Each member country will review the Directive and having interpreted it to suit local conditions, they will create new legislation. The new ergonomic laws should be in place as soon as possible. Local legislation will refer to local standards bodies' interpretation of ISO 9241 and EN 29241.

The principles behind ergonomic legislation are simple and founded in common sense. However, far reaching implications for manufacturers and employers ensure that their implementation is complex.

The aims of this book are threefold:

- (1) to present the actual state of the national legislation from a theoretical, political and a practical point of view,
- (2) to discuss the range of possible evaluation criteria,
- (3) to give a state of the art overview of the methods and tools in practice.

The Swedish author will give an overview of the national activities and forthcomings of the legislation process.

We hope that this report will help to harmonize the implementation and practice of the EU Directive 90/270/EEC in Europe.

**Matthias Rauterberg**  
**Helmut Krueger**





# Sweden: EN-ISO 9241 and EU Directive

**Per-Gunnar Widebäck**

PG Widebäck Konsult

Sjoeboernsvaegen 33, S-117 67 Stockholm

tel. +46 8 645 95 66

e-mail: pgw@niwl.se

## Abstract

A close link between the European Directive 90/270/ EEC and EN-ISO 9241 is desired but not essential to improve the working conditions for VDU users. Some examples from the Swedish experience have been selected and evaluated.

Keywords: VDU, implementation of 118a directive in Sweden, ergonomics standard.

## 1 Introduction

When we evaluate the today system of the Directive 90/270/EEC with its complementary standards in order to reach a "better" future system we have to select some historic issues and determine its importance for the system. To manipulate the frame of the system will mean a comparison with other similar and ongoing European systems. The first selected issues should not only be easy to cope with in an evaluation process but also be a part of the development that has created the studied system. Shared experience will therefore mean a common base when discussing a future system. The only knowledge that we have for predictions is already history.

Around 1980 international standards in the field of ergonomics seemed to be a powerful way to make the design of VDUs better in terms of users' complaints etc. Image quality was identified as a priority area for Sweden. For the keyboard - another troublesome area for the user - we just follow the German standardisation i.e. the public procurement process (Swedish Agency For Administrative Development, Swedish Telecom and others).

A lack of confidence in the knowledge and in the processing of international standards was the first reason to organise the Work With Display Units (WVDU) Conferences: Stockholm 86, Montréal 89, Berlin 92, Milan 94, and Tokyo 97. The Conferences go back to a working group on image quality. (Knave and Widebäck, 1995) gives an overview of important topic areas.

## 2 Evaluation Modell

As discussed in sessions at CHI' conferences Stuart Card has sometimes reviewed the presented studies using a simple model of criteria for evaluate the results: A) Replication across labs B) Predict something C) Connected to something D) Unintended consequences to be explain. This row of basic criteria will cover the purpose of this book.

### 2.1 Reference white

For usual office applications a reference white with a colour temperature of 6500 K is suitable. You may argue that you for example prefer 5500 K. If the programmer and the user of the application have monitors with the same reference white the user will get the colours along with what the programmer has expected and the user will not be astonished. Using one reference white for the whole group of applications will mean that the software will give a predictable result that could be repeated with other screens, B) and A). You can also add your experience to an existing system, C). Part 8 of ISO 9241 recommends 6500 k for the majority of applications. For applications that need a more blue reference white 9300 K is advised in the standard. D) is then satisfied too and "reference white" in Part 8 will therefore pass our evaluation. A designer seeking more knowledge will of course make a literature search using key words as "reference white" and "colour usage". A very good advice is also to look up "Derefeldt, Gunilla"!

### 2.2 Europe - our home market

To get rid of the technical trade barriers and create "one single market" stands in the lines of the traditional Swedish trade policy. It is good for the consumers as well as for the producers. A Directive 100a like 89/392/EEC on Safety of Machinery creates a systematic reference system. It makes "reference to standards", standards which often are just produced to fit the system. The work is performed by experts feeling that their task is in a priority area. For the National Board of Occupational Safety and Health (NBOSH) it is obvious that it has to share power also with other interest parties within the standardisation bodies.

The Directive 118a 90/270/EEC is nationally implemented. It is possible to make reference to EN-ISO 9241 (and a few other standards). Deviations in national standards are in practice negligible but you could nationally increase the requirements compared with those in the Directive. A deviation may affect the goal "one single market" which is not the goal of a Directive 118a. The "Directive is a practical contribution towards creating the social dimension of the internal market". (It is obvious that also 89/392/EEC has an social impact. It has its heritage from the days of "free circulation of goods" but now we live under the four freedoms.)

In the Swedish implementation EN-ISO 9241 has the role of interesting reading like some other important documents. It is a conservative approach because you do not the final requirements of the standard. Furthermore the development of this international standard has been classified of no priority for the regulation experts within NBOSH. The Swedish ordinance, AFS 1992:14, and the ongoing European acceptance of EN-ISO 9241 will make enough room for "one single market" with a social dimension from new Europe. So, lets regard AFS 1992:14 and EN-ISO 9241 as they are close connected and creating one system (in parallel with for example the connection in UK).

## 3 Consistency between 90/270/EEC and All the Parts of EN-ISO 9241

The development of the Standard started both earlier and for other purpose than to support the goal of the Directive but still both the Standard and the Directive are products to fit the same applications and environments. The requirements that we see in the Directive are stated by none topic specialists with only little experience in standardisation. The experts involved the development of the Standard did not get the chance to participate in the work.

If we do have the same reference system or are able transform the results from one system to the other we will pass criterion C). Let us see the high level principles stated in Part 10 as a more complete version of the statements on software in the Annex of the Directive. (Swedish experts constituted one part of the population in the Beimel, Schindler and Wandke study, Understanding and acceptance of ... Part 10 ..., reported elsewhere in the workshop.)

A next step is to request correspondent sets of such high level principles for the hardware, workplace and environment Parts of the Standard. During the development of Part 6 (environment) those principles were referred to. The opinion against became too heavy (probably mostly from some technicians in the related areas). So, "Controllability" is okay as a goal for the software but not for the environment. This is absurd! It seems reasonable to me to use the Parts as different ways (tools) to achieve a "good working life". It is also true that you have to identify additional principles to improve the Standard and the Directive at future revisions. Stimulation could be an example of such a development (Liljefors and Widebäck, 1995).

If the Parts do not work in co-operation the barriers between the Parts can sometimes cause a solution within a Part instead of using a better solution recommended in another Part. When trying to blur the reflections caused by sharp pattern in the environment the designer of a CRT believing in Part 7 will make the edge sharpness not so good. It had been better to avoid such pattern in the environment (Part 6).

There is furthermore to develop in order to get a better consistency!

### 3.1 Minimum and optimal requirements

"Of course, the Directive outlines minimum standards." When the international work with ISO 9241 started at a meeting in Manchester 1983 the Swedish delegation pleaded for optimum requirements. It stressed good working conditions, quality of equipment, workplace etc. It was important to seek knowledge and to speed up the development of good image quality. The other delegations were more or less dominated by producers or careful consultant that sometimes could defend low quality.

What do optimum and minimum requirements mean in practice?

Most of the formulations in the Annex are suitable for optimum requirements, for example "shall be easily adjustable by the operator, and also be easily adjustable to ambient conditions". Also - "The screen must swivel and tilt easily and freely to suit the needs of the operator. " - is putting the operator in focus. A good advice by the Standard is therefore to describe the "optimal" conditions to the reader (designer). It is important to state the best conditions for reading a text not only to detect the readability limits for 95 percent of the population. Optimal conditions are very much related to the task, operator and actual work situation but striving towards the objectives in the Directive.

Minimum requirements go often back to a quantitative measurement of a variable. If one variable (or a measure) is monotonous it is in principle easy to predict. If variables will disturb the outcome it will not be so easy to predict. If you only can measure the stimuli

and not the response you could be in trouble. Take for example the electromagnetic fields! Some people in Sweden and elsewhere are worried and ask if their equipment is in conformance with MPR (SWEDAC, Swedish Board for Technical Accreditation) or TCO (Swedish Confederation of Professional Employees). This is an important business for the test houses.

Standards depending on measurable variables could sometimes pass criteria A) and B) and fail according to C). Long away from the Standard issued by a standardisation body we have the "de facto standards" which are a sort of functional market standard emanating from a strong or dominating actor on the market. High resolution monitors could even have poor image quality and in fact not correspond to our Directive. Dear employer why should you care if your employees do not!

### **3.2 Long term evaluation**

Long term consequences are not stated in the Directive or in the standard. Acceptable work load in the long run could mean the complex cognitive aspect of mental underload and overload as well as physiological strain that will appear. If long term consequences of stimulating work, duration etc. will be taken care of we will have the chance to pass criterion D). Reference to other documents than the Standard is needed.

## **4 Revision of the Directive**

The ICHAC Statement on the Directive (Stewart et al., 1995) emphasizes among other things (from the press release) that "There is little practical guidance for employers on how problems and concerns should be handled." The link from the Directive and the Standard "could provide a much more straightforward route for employers and suppliers to meet their obligations and responsibilities under the Directive". The Commission has turned away this suggestion. It would like to keep the Directive as one under Article 118a.

This evaluation has shown that a group of experts could produce a revised 118a Directive that could be more useful. Such an expert group has even a better chance to make the Directive more consistent than EN-ISO 9241 because it has the possibility to work faster in a common direction and taking in account the acquired experience we have. The Swedish experience with a more loose connection between Ordinance and Standard tells us that it could work.

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# Appendix



# English Version of the EU Directive 90/270/EEC

**COUNCIL DIRECTIVE of 29 May 1990 on the minimum safety and health requirements for work with display screen equipment (fifth individual Directive within the meaning of Article 16 (1) of Directive 87/391/EEC).**

**(90/270/EEC)**

**THE COUNCIL OF THE EUROPEAN COMMUNITIES,**

Having regard to the Treaty establishing the European Economic Community, and in particular Article 118a thereof,

Having regard to the Commission proposal (1) drawn up after consultation with the Advisory Committee on Safety, Hygiene and Health Protection at Work,

In cooperation with the European Parliament(2)

Having regard to the opinion of the Economic and Social Committee(3)

Whereas Article 118a of the Treaty provides that the Council shall adopt, by means of Directives, minimum requirements designed to encourage improvements, especially in the working environment, to ensure a better level of protection of workers' safety and health;

Whereas, under the terms of that Article, those Directives shall avoid imposing administrative, financial and legal constraints, in a way which would hinder the creation and development of small and medium-sized undertakings;

Whereas the communication from the Commission on its programme concerning safety, hygiene and health at work (4) provides for the adoption of measures in respect of new technologies; whereas the Council has taken note thereof in resolution of 21 December 1987 on safety, hygiene and health at work (5);

Whereas compliance with the minimum requirements for ensuring a better level of safety at workstations with display screens is essential for ensuring the safety and health of workers;

Whereas this Directive is an individual Directive within the meaning of Article 16 (1) of Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (6); whereas the provisions of the latter are therefore fully applicable to the use by workers of display screen equipment, without prejudice to more stringent and/or specific provisions contained in the present Directive;

Whereas employers are obliged to keep themselves informed of the latest advances in technology and scientific findings concerning workstation design so that they can make

any changes necessary so as to be able to guarantee a better level of protection of workers' safety and health;

Whereas the ergonomic aspects are of particular importance for a workstation with display screen equipment;

Whereas this Directive is a practical contribution towards creating the social dimension of the internal market;

Whereas, pursuant to Decision 74/325/EEC(7), the Advisory Committee on Safety, Hygiene and Health Protection at Work shall be consulted by the Commission on the drawing-up of proposals in this field,

**HAS ADOPTED THIS DIRECTIVE**

## **SECTION I: GENERAL PROVISIONS**

### **ARTICLE 1**

#### ***SUBJECT***

1. This Directive, which is the fifth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC, lays down minimum safety and health requirements for work with display screen equipment as defined in Article 2.
2. The provisions of Directive 89/391/EEC are fully applicable to the whole field referred to in paragraph 1, without prejudice to more stringent and/or specific provisions contained in the present Directive.

This directive shall not apply to:

- a) drivers' cabs or control cabs for vehicles or machinery;
- b) computer systems on board a means of transport;
- c) portable systems not in prolonged use at a workstation;
- e) calculators, cash registers and any equipment having a small data or measurement display required for direct use of the equipment;
- f) typewriters of traditional design, of the type known as 'typewriter with window'

### **ARTICLE 2**

#### ***Definitions***

For the purpose of this Directive, the following terms shall have the following meanings;

- a) display screen equipment; an alphanumeric or graphic display screen, regardless of the display process employed;
- b) workstation; an assembly comprising display screen equipment, which may be provided with a keyboard or input device and/or software determining the operator/machine interface, optional accessories, peripherals including the diskette drive, telephone, modem, printer, document holder, work chair and work desk or work surface, and immediate work environment;



- c) worker; any worker as defined in Article 3 (a) of Directive 89/391/EEC who habitually uses display screen equipment as a significant part of his normal work.

## **SECTION II: EMPLOYERS OBLIGATIONS**

### **ARTICLE 3**

Analysis of workstations

1. Employers shall be obliged to perform an analysis of workstations in order to evaluate the safety and health conditions to which they give rise for their workers, particularly as regards possible risks to eyesight, physical problems and problems of mental stress.
2. Employers shall take appropriate measures to remedy the risks found, on the basis of the evaluation referred to in paragraph 1, taking account of the additional and/or combined effects of the risks so found.

### **ARTICLE 4**

Workstations put into service for the first time

Employers must take the appropriate steps to ensure that workstations first put into service after 31 December 1992, meet the minimum requirements laid down in the Annex.

### **ARTICLE 5**

Workstations already put into service

Employers must take the appropriate steps to ensure that workstations already put into service on or before 31 December 1992 adapted to comply with the minimum requirements laid down in the Annex not later than four years after that date.

### **ARTICLE 6**

Information for, and training of, workers

1. Without prejudice to Article 10 of Directive 89/391/EEC, workers shall receive information on all aspects of safety and health relating to their workstations as are implemented under Articles 3, 7 and 9.

In all cases workers or their representatives shall be informed of any health and safety measure taken in compliance with this Directive.

2. Without prejudice to Article 12 of Directive 89/391/EEC, every worker shall also receive training in use of the workstation before commencing this type of work and whenever the organization of the workstation is substantially modified.

### **ARTICLE 7**

Daily work routine

The employer must plan the worker's activities in such a way that daily work on a display screen is periodically interrupted by breaks or changes of activity reducing the workload at the display screen.

## **ARTICLE 8**

Worker consultation and participation

Consultation and participation of workers and/or their representative shall take place in accordance with Article 11 of Directive 89/391/EEC on the matters covered by this Directive, including its Annex.

## **ARTICLE 9**

Protection of workers eyes and eyesight

1. Workers shall be entitled to an appropriate eye and eyesight test carried out by a person with the necessary capabilities:
  - before commencing display screen work,
  - at regular intervals thereafter, and
  - if they experience visual difficulties which may be due to display screen work.
2. Workers shall be entitled to an ophthalmological examination if the result of the test referred to in paragraph 1 show that this is necessary.
3. If the results of the test referred to in paragraph 1 or of the examination referred to in paragraph 2 show that it is necessary and if normal corrective appliances cannot be used, workers must be provided with special corrective appliances appropriate for the work concerned.
4. Measures taken pursuant to this Article may in no circumstances involve workers in additional financial cost.
5. Protection of worker's eyes and eyesight may be provided as part of a national health system.

## **SECTION III: MISCELLANEOUS PROVISIONS**

### **ARTICLE 10**

Adaptations to the Annex

The strictly technical adaptations to the Annex to take account of technical progress, developments in international regulations and specifications and knowledge in the field of display screen equipment shall be adopted in accordance with the procedure laid down in Article 17 of Directive 89/391/EEC.

### **ARTICLE 11**

Final provisions

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 31 December 1992.

They shall forthwith inform the Commission thereof,

2. Member States shall communicate to the Commission the texts of the provisions of national law which they adopt or have already adopted, in the field covered by this Directive.

3. Member States shall report to the Commission every four years on the practical implementation of the provisions of this Directive, indicating the points of view of employers and workers.

The Commission shall inform the European Parliament, the Council, the Economic and Social Committee and the Advisory Committee on Safety, Hygiene and Health Protection at Work.

4. The Commission shall submit a report on the implementation of this Directive at regular intervals to the European Parliament, the Council and the Economic and Social Committee, taking into account paragraphs 1, 2 and 3.

## ARTICLE 12

This Directive is addressed to the Member States

Done at Brussels

29 May 1990.

For the Council

The President

B. AHERN

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### Footnotes

(1) OJ No C 113, 29, 4? 1988? P.7 and OJ No C 130, 26.5. 1989, P.5

(2) OJ No C 12, 16.1. 1989, P.92 and OJ No C 113, 7.5 1990

(3) OJ No C 318, 12, 12, 1988, P.32

(4) OJ No C 28, 3.2. 1988, P.3

(5) OJ No C 28, 3.2. 1988, P.1.

(6) OJ No L 183, 29? 6. 1989? P.1

(7) OJ No L 185, 9.7. 1974, P.15.

## Annex

### MINIMUM REQUIREMENTS

(articles 4 and 5)

## **Preliminary remark**

The obligations laid down in this Annex shall apply in order to achieve the objectives of this Directive and to the extent that, firstly, the components concerned are present at the workstation, and secondly, the inherent requirements or characteristics of the task do not preclude it.

## **1. EQUIPMENT**

### **a) General comment**

The use as such of the equipment must not be a source of risk for workers.

### **b) Display screen**

The characters on the screen shall be well-defined and clearly formed, of adequate spacing between the characters and lines. The image on the screen should be stable, with no flickering or other forms of instability. The brightness and/or contrast between the characters and the background shall be easily adjustable by the operator, and also be easily adjustable to ambient conditions. It shall be possible to use a separate base for the screen or an adjustable table. The screen shall be free of reflective glare and reflections liable to cause discomfort to the user.

### **c) Keyboard**

The keyboard shall be tiltable and separate from the screen so as to allow the worker to find a comfortable working position avoiding fatigue in the arms or hands. The space in front of the keyboard shall be sufficient to provide support for the hands and arms of the operator. The keyboard shall have a matt surface to avoid reflective glare. The arrangement of the keyboard and the characteristics of the keys shall be such as to facilitate the use of the keyboard. The symbols on the keys shall be adequately contrasted and legible from the design working position.

### **d) Work desks or work surface**

The work desk or work surface shall have a sufficiently large, low-reflectance surface and allow a flexible arrangement of the screen, keyboard, documents and related equipment. The document holder shall be stable and adjustable and shall be positioned so as to minimize the need for uncomfortable head and eye movements. There shall be adequate space for workers to find a comfortable position.

### **e) Work chair**

The work chair shall be stable and allow the operator easy freedom of movement and a comfortable position. The seat shall be adjustable in height. The seat back shall be adjustable in both height and tilt. A footrest shall be made available to any one who wishes for one.

## **2. ENVIRONMENT**

### **a) Space requirements**

The workstation shall be dimensioned and designed so as to provide sufficient space for the user to change position and vary movements.

### **b) Lighting**

Room lighting and/or spot lighting (work lamps) shall ensure satisfactory lighting conditions and an appropriate contrast between the screen and the background environment, taking into account the type of work and the user's vision requirements. Possible disturbing glare and reflections on the screen or other equipment shall be

prevented by coordinating workplace and workstation layout with the positioning and technical characteristics of the artificial light sources.

c). Reflections and glare

Workstations shall be so designed the sources of light, such as windows and other openings, transparent or translucent walls, and brightly coloured fixtures or walls cause not direct glare and, as far as possible, no reflections on the screen. Windows shall be fitted with a suitable system of adjustable covering to attenuate the daylight that falls on the workstation.

d) Noise

Noise emitted by equipment belonging to workstation(s) shall be taken into account when a workstation is being equipped, in particular so as not to distract attention or disturb speech.

e) Heat

Equipment belonging to workstation(s) shall not produce excess heat which could cause discomfort to workers.

f) Radiation

All radiation with the exception of the visible part of the electromagnetic spectrum shall be reduced to negligible levels from the point of view of the protection of workers safety and health.

g) Humidity

An adequate level of humidity shall be established and maintained.

### **3. OPERATOR/COMPUTER**

In designing, selecting, commissioning and modifying software, and in designing tasks using display screen equipment, the employer shall take into account the following principles;

- a) software must be suitable for the task;
- b) software must be easy to use and, where appropriate, adaptable to the operators level of knowledge or experience, no quantitative or qualitative checking facility may be used without the knowledge of the workers;
- c) systems must provide feedback to workers on their performance;
- d) systems must display information in a format and at a pace which are adapted to operators;
- e) the principles of software ergonomics must be applied, in particular to human data processing.