

# COMMISSION OF THE EUROPEAN COMMUNITIES

COM(92) 560 final - SYN 449

Brussels, 23 December 1992

Proposal for a

COUNCIL DIRECTIVE

on the minimum health and safety requirements regarding the  
exposure of workers to the risks arising from  
physical agents

-----

(presented by the Commission)

EXPLANATORY MEMORANDUM

1. Legal basis

This proposal is based on Article 118a of the EEC Treaty and takes the form of 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 health and safety of workers at work<sup>(1)</sup>.

The Commission pointed out the need for this proposal in its communication on the programme of action to implement the Community Charter of Fundamental Social Rights of Workers<sup>(2)</sup>. In its Resolution of 13 September 1990, the European Parliament invited the Commission to prepare by 30 June 1992 a proposal for a Directive in the field of risks due to noise and vibration and any other physical agent at work<sup>(3)</sup>.

All the Member States with the exception of Luxembourg have either specific legislation or general legislation which makes reference to international standards concerning protection from the risks arising from the physical agents dealt with in this proposal.

These existing national provisions feature certain shortcomings and disparities from one Member State to another, with the result that there is a significant degree of unevenness within the Community. These disparities are brought out in the comparative table appended to this explanatory memorandum.

This situation has existed for some considerable time, and there is no sign of any change for the better, except for the noise element, which is covered by Council Directive 86/188/EEC, and for which there is a basic set of harmonized protective measures.

All workers in the Community are entitled to a certain level of health protection in particular when they move from one Member State to another to pursue their professional activities in the internal market. The employers, too, must all be on an equal footing and must put up with the constraints and bear the costs resulting from measures taken to protect the health of workers, without this involving social dumping and distortion of competition. This is certainly not the case in respect of physical agents: there are still considerable gaps in and disparities between the Member States in relation to protection against the risks from physical agents which justify recourse to Article 118a of the EEC Treaty to harmonize existing conditions in this field, while maintaining progress. This alone would amply justify legislation at Community level. The proposal for a Council Directive should additionally contribute a significant value added element. For the first time in an item of Community legislation, it integrates national and international regulations or practices on vibration and electromagnetic fields.

(1) OJ No L 183, 29.6.1989, p. 1.  
(2) COM(89) 568 (final).  
(3) OJ No C 260, 15.10.1990, p. 167.

As regards protection against the risks arising from noise, the proposal constitutes the second phase of the approach adopted by the Council with Directive 86/118/EEC, the provisions of which are brought into line with the principles established by the framework Directive 89/391/EEC. Any incompatibilities between the two texts have thus been eliminated. The proposal also extends the scope of Directive 86/188/EEC to the sectors of air and sea transport, which had not been covered hitherto. Finally, it modulates the obligations on employers and workers with regard to the different levels of risk, thus enhancing the current implementation provisions for Directive 86/188/EEC.

The proposal introduces protective measures in respect of the risks arising from physical agents other than noise, and transposes international provisions and standards to which national legislation refers into provisions which are applicable at Community level. Such provisions and standards have been established by organizations acknowledged to be the most competent in the field, such as the International Labour Organization (ILO), the International Maritime Organization (IMO), the International Non-Ionizing Radiation Committee of the International Radiation Protection Association (INIRC-IRPA), the National Radiological Protection Board (NRPB) and the Bundesamt für Strahlenschutz (BfS).

At the same time, the proposal sets out the results to be achieved and is limited to what is necessary to bring about the requisite harmonization process. Anything which is not essential to this process has been taken out of the proposal, to be dealt with at a more appropriate level.

2. Aim of the proposal and the need for action

2.1 The aim of the proposal is to bring about a gradual improvement in the level of protection afforded to workers from the risks arising from exposure to physical agents and harmonization of the minimum safety and health requirements in this field, as part of the social dimension of the internal market.

2.2 The proposal was drawn up taking into account the dangers (principally the deleterious physiological effects) associated with exposure to physical agents; it does not consider the problem of the "comfort zone" (a limited range of values which is generally deemed to be the optimum)(\*).

Scientific studies show that physical agents do have harmful effects which are confirmed by statistics on occupational accidents and disease.

---

(\*) For example the requirements on optical radiation are intended to prevent injuries to the eye but do not consider optimum lighting of the workstation which is dealt with elsewhere.

- (a) In the Community tens of millions of workers are subjected to excessive exposure to physical agents (noise, mechanical vibration, electromagnetic radiation, etc.) which can have harmful effects on health. These result in occupational accidents or illness, the immediately identifiable costs of which are very far from reflecting the cost in real terms to the economy, without mentioning the pernicious effect on the victims' quality of life.

By way of example, the trade and industry accident insurance organizations in the Federal Republic of Germany paid out some ECU 145 million in 1990 to cover the costs of rehabilitation and occupational illness pensions to 39 361 victims of occupational illness caused by exposure to physical agents. This sum still only represents the tip of the iceberg because it takes into account neither the working hours lost through illness nor the cost of preventive examinations by the medical officer nor the loss of valued workers who have to be replaced prematurely.

- (b) There are gaps in and disparities between national regulations which result in considerable inequality, depending on geographical location, in terms of the level of protection afforded to workers and the burdens borne by undertakings in respect of measures taken to control the risks due to physical agents.

This has been the situation for some considerable time and there is no evidence of any tendency to remedy it, except in the case of noise where a Council Directive has established basic protective measures.

2.3 As it stands, the proposal covers four physical agents (noise, mechanical vibrations, optical radiation and electromagnetic fields and waves) but its provisions can be extended subsequently to other physical agents: the Commission will propose amendments to the Directive at such time as it considers sufficient new findings to have emerged.

2.4 It seems appropriate at this juncture to explain where the dividing line runs between the physical agents covered by this proposal and ionizing radiation which is the subject of Euratom directives on basic standards. Whilst there is no qualitative physical difference between X-rays and optical rays (all of which are electromagnetic rays), it does not seem justified to subject an activity such as arc welding, a source of high energy ultraviolet radiation which can ionize material by breaking down fragile chemical bonds, to the same stringent provisions as for operating a nuclear reactor. The Commission opted for the classification used in photobiology and this proposal is limited to radiation with a wave length of over 100 nanometres.

3. The current situation

- 3.1 Physical agents are normally present at almost all places of work, but it is only outside a certain range of values that they can have harmful effects on health.

In the Community tens of millions of workers can be subjected to excessive exposure to various physical agents and the measures intended to control these risk vary from one Member State to another; they range from voluntary application of international recommendations to implementation of binding provisions.

Some general tendencies can be traced in the national measures and a consensus is emerging on the basic preventive measures; it is upon these that the proposal is largely based.

3.2 Noise

Directive 86/188/EEC sets out the basic requirements and the national transposal provisions ought to be in force in all the Member States; on 1 July 1992 only one Member State had not discharged its obligations in this respect.

The main problems encountered by the Member States in transposing Directive 86/188/EEC have been due to certain cases of textual imprecision, more especially as regards the measurement of noise and the conditions under which health surveillance was to be proposed.

These problems regarding the transposition of Directive 86/188/EEC in the Member States have highlighted certain points, which have now been incorporated into this proposal.

It should be noted that, as workers in sea and air transport were excluded temporarily from the benefits afforded by this Directive and ought to enjoy the same protection, the Commission undertook in 1990<sup>(4)</sup> to remedy this in the present proposal.

Directive 86/188/EC, which paved the way for this proposal, contains provisions which require the Commission to submit to the Council proposals for reviewing the Directive by 1 January 1994.

The Commission, which is the guardian of the treaties and which must be scrupulous in ensuring that each Member State respects all its obligations in respect of Directive 86/188/EC, must honour the obligations which the same Directive places upon it.

At the time of the 1982 proposal for a Directive, scientific and technical knowledge was already sufficiently advanced to make it possible to ascertain precisely the harmful effect of noise on hearing capacity. The scientific community had already established that, from 75 dB(A) on, the risks run by workers were far from negligible.

(4) SEC(90) 1230 final, 26.6.1990.

However, because of the difficulties inherent in the adoption procedure based on Article 100 of the EEC Treaty, the Council was not in a position at the time to adopt protective measures appropriate to this threshold. The Council therefore made provision for a two-stage approach with a view to achieving the appropriate level of protection. Ten years after its initial proposal, the Commission is therefore now submitting a document enabling the Council to pass on to the next stage.

One point to be borne in mind here, though, is that, in its proposal, the Commission, far from imposing a rigid protection system based on the value of 75 dB(A), is introducing a substantial degree of flexibility by way of "action levels".

Since adoption of the Directive in May 1986, the legal and political context has been changed profoundly by the entry into force of the Single Act and Article 118a, and by the adoption in 1989 of Directive 89/391/EEC, which sets out new health and safety guidelines necessitating a review of previous texts to ensure consistency.

The most recent scientific findings on noise were set out in three reports covering the effect of noise on hearing, the non-auditory physiological effects and the non-physiological effects of noise<sup>(5)</sup>; in the technical field, the international standard ISO 1990 - the revised version of which was published in 1990 - describes a method for determining exposure to noise and estimating the loss of hearing which it causes; noise measuring instruments have also benefited from considerable advances in electronic technology (in particular, digitalization and processing of signals). Finally, Directive 89/392/EEC on machinery included noise abatement in its basic safety requirements and the European standardization organizations have used these as benchmarks in their activities in this field.

As regards the non-auditory effects of noise (which range from physiological disorders to interference with the proper execution of tasks requiring attention and concentration), the Commission feels that knowledge in this field is not sufficiently advanced to justify a quantitative limitation of exposure (which would involve levels well below 75 decibels); moreover, without wishing to play down the non-auditory effects, it must be acknowledged that they are often less significant socially than the isolation resulting from loss of hearing, and that there is a point where the profitability of an occupational activity soon has to be taken into account. The Commission thus thinks it best to stick to the approach followed in the Directive of 1986, but nevertheless feels that there is a case for taking account of the non-auditory effects of noise, preferably by means of a recommendation supplementing the Directive on physical agents which it is starting work on.

- 
- (5) (a) W. PASSCHIER-VERMEER  
Occupational noise exposure and effects on Hearing.  
(b) Prof. Dr. Med. Dr. Phil. G. JANSEN  
The Physiological effects of Noise  
Dylan M. JONES  
Non-physiological effects of Noise.

3.3 Mechanical vibrations

Vibrations transmitted to the hands and arms cause vascular, neurological and articular disorders which can lead to disability; when transmitted to the entire body they can contribute to pathological dorsal and lumbar conditions, one of the main causes of absence from work for medical reasons.

All in all, figures on vibration trauma are increasing at a rate which gives cause for concern.

In the Member States prevention in this field is achieved either by general provisions requiring a place of work to be safe, or in some cases by specific provisions which are based on two international standards (ISO 5349 for the hand and arm system and ISO 2631 for the entire body).

A close look at industry shows that the use of equipment generating vibration involves a level of risk which is considerably higher than levels which are considered unacceptable for other agents; as antivibration protection is not available, exposure can only be controlled by reducing its duration, which rapidly becomes impractical.

For example, daily use for half an hour of an item of equipment generating  $16 \text{ m/s}^2$  (some percussion drills and riveters generate in excess of  $30 \text{ m/s}^2$ ) causes vascular disorders in the fingers to arise in 10% of the population\* after little more than five years.

There is no lack of scientific papers on the reaction of the organism to vibrations and there is, for example, a summary in a publication of the International Social Security Association<sup>(6)</sup> which sets out, *inter alia*, the quantitative links between the parameters to vibration exposure and the effects on health.

The table below, which is taken from the above publication, covers the vibrations transmitted to the hand-arm system.

**Effective values for weighted accelerations  
in frequency ( $\text{m/s}^2$ ) liable to cause  
vascular symptoms in 10% of the subjects exposed to vibrations**

Daily exposure	Cumulative exposure over the entire life (years)					
	1/2	1	2	4	8	16
15 min	256.0	128.0	64.0	32.0	16.0	8.0
30 min	179.2	89.6	44.8	22.4	11.2	5.6
1 h	128.0	64.0	32.0	16.0	8.0	4.0
2 h	89.6	44.8	22.4	11.2	5.6	2.8
4 h	64.0	32.0	16.0	8.0	4.0	2.0
8 h	44.8	22.04	11.2	5.6	2.8	1.4

\* The reliable detection limit in accordance with BS 6842, taking into consideration the other possible causes of vascular disorders.

(6) ISSA  
Vibrations at work stations.

Less progress has been made in the field of vibrations affecting the entire body (there is a causal relationship between these vibrations and, for example, back pain, although the dose-effect ratio is not well established) and standards defining the measurement of vibrations and assessment of their effects are largely based on subjective responses, the biomechanical response of the human body or on a certain amount of experience in occupational exposure. Much is being done to improve these and the British Standards Institute, for example, has adopted standards which represent a departure from international ISO standards, the main body of which dates back to 1975 and has produced a complex system for linking duration and exposure limits.

### 3.4 Optical radiation

Sources of intense optical radiation can result in eye or skin damage, many examples of which are found in working life (erythema caused by ultraviolet lamps and welder's flash, not to mention the hazards from laser sources).

Legislation specifically for optical radiation is rare in the Member States; guidelines often exist for particular cases (example: filters used by welders). The radiation produced by lasers is singled out for special treatment: the international standard IEC 825 covers the safety of laser equipment and is widely applied in industry.

However, provisions governing sources of radiation (not all of which are covered) are not enough to control the hazards and need to be backed up by exposure limits.

Documents of this type have been published, for example by the International Non-Ionizing Radiation Committee of the International Radiation Protection Association (INIRC-IRPA) which cover part of the spectrum; the American Conference of Governmental Industrial Hygienists (ACGIH) has recommended exhaustive maximum exposure values.

It should be emphasized that these documents comprise both technical elements (an exact description of the physical magnitudes used as hazard warnings for example) and political ones (such as the exposure values which may not be exceeded); the former are relatively objective and would, for example, be ideally placed in standards, whilst the level of acceptable risk could only be fixed after a period of deliberation by the relevant authorities.

Another feature of optical radiation is the marked distinction generally made between laser and other sources of radiation. And although it is recognized that under identical conditions (wavelength, intensity and duration of exposure), the biological effects of optical radiation are virtually the same for coherent sources (lasers) and incoherent sources and although harmless lasers are used together with incoherent sources which do represent a hazard, the general practice is to issue specific and detailed operational provisions for laser radiation, whilst viewing protection against other sources with more detachment.



The INIRC-IRPA and ACGHI documents represent a consensus on the aims of prevention as shown by a document<sup>(7)</sup> (drawn up at the request of the Commission) which sets out the knowledge we have on which to base proposals for exposure limits. The relationship between exposure parameters and the resulting hazard is too complex to be dealt with here.

### 3.5 Fields and waves

This section covers the effects induced<sup>(\*)</sup> by electrical and magnetic radiation of lower frequency than optical radiation, the limit normally being set at 300 GHz.

These effects are due to excessive electrical currents circulating in the organism or exchanged between the body and the outside world, or absorbed energy.

The phenomena they cause are things with which we are familiar, since it is electrical currents which bring about muscular contraction (a major factor in electrocution); since although the current resulting from electrostatic discharge can only cause an unpleasant shock it can also produce extremely severe electrical burns; and since microwave ovens show how quickly the temperature of biological tissue exposed to this type of radiation can rise.

Obviously, these phenomena, for which the human body acts as a reception antenna, must remain below certain limits.

Increasing concern has been expressed throughout the world as to the other harmful effects of electrical or magnetic fields and, in particular, their suspected carcinogenicity. The Commission has fallen in with the scientific community's opinion which is that there is no conclusive evidence to support this, although it cannot be ruled out entirely; this theory will therefore be disregarded until it is backed up by scientific evidence.

There is little specific legislation on electromagnetic waves and fields and, what is more, it only deals with part of the range of frequencies; what legislation there is, is based on international recommendations.

As in the case of optical radiation, existing legislation mainly comprises detailed operational instructions for a restricted and specific field of activity.

Almost all the legislation deals with the hazards by limiting the biological effects mentioned above (local or general heating of the human body, effects of currents on the nervous system, shocks and burns etc): these are the basic limits.

---

(7) S.G. Allen. Proposals for protection against occupational exposure to electromagnetic non-ionizing radiation.

Physica Medica - Vol VII N2, pp. 77-89 1991, April-June.

(\*) The hazard caused by contact with energized conductors is not covered here.

The corresponding magnitudes are, however, difficult if not impossible to measure directly with state of the art instruments and it is the magnitudes derived from these (such as electrical and magnetic fields) that technicians require.

However, deriving the values of these fields is a technically complex process: the biological effects depend on the electrical bond between the field and the "target", which means that a given field will not induce the same effects in a child or an adult, and the effects will vary depending on whether the axis of the body is parallel with or vertical to the field.

Finally, the legislation setting out maximum values for electrical or magnetic fields generally allows them to be exceeded as long as the basic limits mentioned above are respected.

Much of the work enabling us to determine what measured values will, in a given situation, ensure that the basic limits are respected, is objective and can be entrusted to trained experts, and the resulting documents (perhaps European standards) could then be certified in accordance with a suitable procedure.

The report on non-ionizing electromagnetic radiation mentioned in reference 7 also covers the range of frequencies lower than 300 GHz; this document therefore contains current findings accepted by the scientific community.

Mobile radiotelephone equipment, which is specially designed to emit electromagnetic energy, warrants particular attention here.

The telecommunications industry is currently working hard on establishing acceptable technical rules which would bring down current emission values to levels which are compatible with the ceiling values set out in Annex 4 to this proposal.

### 3.6 Other physical agents

There are other physical agents at some places of work which represent a health risk. Without wishing to list all of these, mention could be made of temperature or, more precisely, the microclimate resulting from a combination of factors which, in certain cases, can generate thermal stress approaching the physiological limits. Similarly, there are hazards associated with breathing in environments where the air is not at the normal pressure and temperature, prime examples being divers (breathing compressed air or special respiratory mixtures) or people working in hyperbaric chambers, and also activities under reduced atmospheric pressure (flight crews, work at high altitudes).

It ought to be possible to control the hazards generated by these agents by implementing the same principles as for the agents mentioned above, as long as the same information is available: i.e. what is the danger, how can it be expressed and how can exposure be limited and at what level. The Commission is taking stock of what is known in the various fields and, where there is sufficient information to enable it to do so, will transform this into operational provisions.

#### 4. Scope and structure of the proposal

- 4.1 The proposal contains minimum health and safety requirements as provided for in Article 118a of the EEC Treaty. The proposal supplements Directive 89/391/EEC (and is one of its individual directives), explaining how some of its provisions must be applied in the specific case of exposure to physical agents, and, like the earlier Directive, covers all activities where workers can be subject to the risks due to this type of exposure, except in certain situations in the public service and civil protection.

Whilst physical agents and their effects on health can differ, the strategy deployed to cope with the hazards they represent is the same.

There are two major options for controlling the hazards due to exposure to physical agents: either by means of a single document covering all of them, or a series of directives dealing with each one separately.

Each of these options has its merits, but the first ensures that a substantial part of the provisions does not reappear in the same form in each of the directives, since they are all governed by the same principles; moreover, it would otherwise be necessary to make an arbitrary decision as to how detailed the individual directives should be.

In the final analysis, a more global type of Community legislation has been preferred to a profusion of texts, which is what the Council has requested on several occasions.

The Commission's proposal thus opts to cover the risk due to exposure to physical agents by means of a single document, the main body of which sets out the provisions applying to all the agents (provided for in general terms by Directive 89/391/EEC) and the Annexes provide specific guidance for each separate agent, stating in qualitative and quantitative terms what the hazards are and what specific provisions apply.

This proposal is not an isolated piece of legislation but takes account of and supplements other Community directives on such subjects as working equipment or personal protection equipment. It should also be clearly understood that the proposal does not repeat any provisions which have already been enacted (and specifically those of Directive 89/391/EEC): explicit reference to other documents is made only in cases where it is deemed necessary to provide more accurate or fuller details.

The proposal restricts itself to setting the protection targets in terms of the results to be achieved and to establishing a suitable procedure for drawing up the objective technical material needed to put the Directive's provisions into practice.

This approach duly respects the sharing of responsibilities, prevents the legal text from becoming too cumbersome and is flexible enough to be adapted to technical progress. It provides a response to practical needs and, in particular, makes use of technical standards where they provide appropriate back-up, such as when an employer chooses to be guided by a standard describing in full how a result prescribed by the directive can be attained; the fact that compliance with standards is voluntary means that he is still free to exercise his responsibilities in a different manner.

- 4.2 This Directive protecting workers from the risks due to exposure to physical agents thus follows the rule established by the Treaty in setting out the results to be achieved and leaving the Member States to decide how to do so.

However, if the level of protection set out in the Directive is to be attained, it is vital for its aims to be understood to mean the same in all the Member States and to be translated faithfully into practical instructions for the people to whom the provisions of the Directive are addressed.

This means that there must be hard-and-fast rules to be followed by the Member States in setting out equivalent operational objectives and that the Member States have the same understanding of the potential of technical progress when they take into account its development. This is only possible if sufficiently detailed documents are available and if the system can be managed flexibly and dynamically to respond to new situations without excessive delay.

To this end, the Commission intends to draft additional documents within the framework of the Directive on physical agents aimed at:

- explaining certain concepts used by the Directive where necessary;
- explaining the guidelines on the implementing principles (factors to be taken into consideration, rules adopted for quantification);

- ensuring that the directive does not clash with operational documents (such as the certification of technical standards or approval of terms of reference for such standards);
- managing technical progress: methodology to be used, and the potential of equipment and processes.

These additional documents will be adopted in accordance with the procedure under Article 17 of Directive 89/391/EEC.

In the framework of the Directive on physical agents additional texts might deal with the following aspects (non-exhaustive list):

- assessment of the risk arising from exposure to such agents;
- measurement of the agent;
- special risk groups, particularly dangerous activities and extension of or interference with exposure;
- provisions covering personal protective equipment and working methods and equipment;
- the level of protection which is feasible and its adaptation to technical progress.

4.3 The overall strategy followed by the proposal is founded on the obligation to reduce the hazards to the lowest attainable level; this strategy defines three hazard zones:

- a black zone where exposure results in hazards which are considered to be excessive and which the Directive bans;
- a white zone in which the Directive does not stipulate any specific measures and which are a matter for long-term prevention;
- an intermediate grey zone where measures must be implemented to control the hazards, all the more vigorously the closer the black zone.

These measures follow the principles already laid down in Directive 89/391/EEC: reduction of the risk, if possible at source, then by means of collective protection and, as a last resort, by means of personal protection; at the same time, information and training and proper participation of the workers must be guaranteed.

What is meant by the threshold and action levels must, however, be clearly understood to prevent the text from being misinterpreted: under no circumstances are these maximum permissible exposure values (i.e. exposure ceilings). A threshold level constitutes the upper boundary of the white zone, and expresses in quantitative terms to what level preventive efforts are intended to bring values down; in essence this will be fixed on the basis of the known health effects. An action level represents the conditions under which the situation may become a cause for concern, which will justify specific action, at the least closer examination of the specific situation.

In proposing values corresponding to the various levels of hazard at which action has to be taken, the Commission has based its proposals not only on scientific findings in the field on the health effects of exposure to the agent in question (which forms the essential basis for the threshold level limiting the white zone) but also on other factors such as the technical and economical aspects of the real industrial world. The necessary balance between the conflicting requirements can only be maintained by proposing conditions which control the health risks and which set out a target which can be met by a dynamic management process (taking account of new evolving opportunities).

5. Consultation

The Commission has drawn up its proposal in consultation with experts and representatives of government and workers' and employers' organizations. The Advisory Committee for Safety, Hygiene and Health Protection at Work, which was formed pursuant to Council Decision 74/325/EEC of 27 August 1984, was consulted and delivered an opinion which was taken into consideration in drawing up the proposal.

6. Comments and explanatory notes on the contents of the proposal

6.1 Following the citations and recitals the enacting terms contain provisions aimed at:

- controlling the exposure of workers and reducing the attendant risk;
- ensuring that workers receive information and training and that the participation of workers is secured;
- allowing the surveillance of workers' health;
- ensuring that equipment and working methods do not entail a risk of overexposure;
- allowing the provisions of the Directive to be applied uniformly and in a way which takes account of changing situations.

The proposal extends, in this broader context, the scope of the Directive on noise at work and contains a number of final provisions.

Article 1 establishes the purpose of the Directive.

Article 2 defines the physical agents covered and the various levels and specific terms used.

Article 3 ensures that the Directive is applicable to all activities where such a risk exists and requires such risk to be identified and evaluated.

It explains the provisions of Directive 89/39/EEC concerning the protection of particularly sensitive risk groups. The proposal does not impose any specific measures, the latter being largely determined in the light of the case in question, but the non-exhaustive list of guidelines included could, however, be of assistance for the implementation of practical measures.

This Article also contains provision for certain activities to be the target of particular attention in view of the greater risk of overexposure that they involve. Such activities (also referred to in each Annex) must be declared to the authorities responsible which, thus alerted, can take appropriate measures to ensure that the situations in question are kept under control.

Article 4 establishes the procedure for measuring the physical agent in a way which will identify and quantify the exposure risk; it does not prescribe the use of specific methods or apparatus but indicates the parameters that are to be ascertained. In this way, flexibility can be safeguarded and scope ensured for adaptations in the light of technological progress, particularly in the field of instrumentation, while making sure that the quality of measurement does not suffer.

Article 5 establishes the principle of the reduction of risk to the lowest attainable level and contains specific provisions to this end.

Article 6 describes personal protective equipment and extends the provisions of Directive 89/656/EEC.

Article 7 contains provision for workers to receive information.

Article 8 contains provision for the marking of risk areas and, where appropriate, the control of access thereto.

Article 9 requires workers to receive training whenever they need to protect themselves.

Article 10 relates to the consultation and participation of workers.

Article 11 establishes the procedure for health surveillance in accordance with Directive 89/391/EEC. This Article is of particular importance whenever use has to be made of personal protective equipment or if a worker is accidentally overexposed.

Article 12 extends the general requirement to reduce risk to include working methods and equipment. It stipulates that information must be supplied on the residual risk posed by the material after the agent in question has been released. The Article also requires a choice to be made, whenever possible, in favour of working equipment which by virtue of other Community provisions may release only limited quantities of agents.

Article 13 considers the cases of workers who, for occupational reasons, remain subject to exposure beyond the duration of normal working hours (for example, when a seaman at sea finishes his watch he cannot leave the ship, so he needs an acoustic environment which is conducive to the sleep which his health requires), the cases in which a physical agent interferes with the safety of workers although the requirements of the Directive have been satisfied (for example, vibrations may make it difficult for monitoring instruments to be read while this may not necessarily mean that workers' personal exposure exceeds the limits) and the cases of workers where a physical agent can, indirectly, create harmful effects (for example, a laser can cause material to decompose into toxic products or cause them to ignite).

In all these cases, which are outside the main areas concerned by the Directive, the proposal contains a warning and calls for appropriate remedial action.

Article 14 specifies that any derogation from the exposure levels must be justified and, with a view to minimizing risk, be of a temporary nature only.

Article 15 contains provision for the drafting and adoption of additional documents.

Article 16 relates to the various Annexes dealing specifically with each physical agent.

Article 17 repeals Directive 86/188/EEC with the entry into force of the new Directive.

Articles 18 and 19 introduce the final provisions in accordance with standard procedure.

- 6.2 Annex 1 relates to noise and, without overturning any of the provisions adopted in 1986, proposes the levels which the Member States consider they are able to impose at national level by the transposal of Directive 89/188/EEC. It consolidates the text of the said Directive, brings it into line with the provisions of Directive 89/391/EEC and clarifies a number of items which Directive 86/188/EEC had not expressly stated and which were detected at the time of the transposal in the Member States. The objective pursued remains that of reducing noise exposure to at least 75 dB(A) (the exposure level above which a permanent change in the threshold of audibility can be ascertained and already implicit in Directive 86/188/EEC) and of ensuring that the black area (ceiling level) extends beyond 90 dB(A) and that, between the two levels, more stringent preventive measures are adopted than those required in 1986.

Enhanced-risk activities are considered to be those which generate either ambient noise levels exceeding 105 dB(A) or impulses with a peak pressure exceeding 600 Pa (corresponding to 150 decibels). In such situations an unprotected ear is at risk of attack during the very short periods of exposure.



6.3 Annex 2 relates to mechanical vibrations, the hazard constituted by which being expressed in terms of equivalent acceleration over the reference period of eight hours (frequency-weighted to allow for the different reactions of the organs affected), and this is irrespective of whether the vibrations are produced along a dominant axis or in a number of directions ("vector sum" of the accelerations).

The Commission has therefore opted to lower the exposure duration to a standard eight hours, in line with the corresponding UK standard, for the sake of consistency and because this period closely resembles the length of the working day in industry. It should be pointed out that the period in question is not the duration of the measurement, an operation which is conducted neither over a period of eight hours nor of four hours, but normally over a period (usually less than 15 minutes) which corresponds to a work cycle with the vibrating equipment. It is by calculation that the equivalent value for the reference period is determined.

The "vector sum" is used as a general parameter in order to avoid any ambiguity due to what might be an arbitrary choice of alignment along the three orthogonal axes used for measuring.

However, industrial practice reveals evidence of many situations where monoaxial acceleration constitutes the major part of the risk and where it is consequently superfluous to measure for other directions. The Directive must set out the conditions under which this simplified procedure is permissible and the Annex specifies the fraction of the total with effect from which any one axis is considered to be "dominant". Since preventive measures must be in force for as long as a risk to health persists, new thresholds of  $1 \text{ m/s}^2$  for the hand-arm system and  $0.25 \text{ m/s}^2$  for the whole body are given.

As regards the maximum level for vibration transmitted to the whole of the hand-arm system, the options are either to set the level at around 4 to 6  $\text{m/s}^2$ , which would mean that many tools could only be used for periods which would not be compatible with industrial practice, or to set a much higher level (15 to 25  $\text{m/s}^2$ ), a move which would involve an unacceptable health risk.

Under these circumstances the Commission proposes that the ceiling level be set at 5  $\text{m/s}^2$  (0.7  $\text{m/s}^2$  for the whole body) and that a transitional period be permissible during which exposure may be at a higher level.

During this transitional period the consequences of unavoidable risk should be reduced by taking as many precautions as possible, for example, splitting up exposure time by working alternately on vibrating tools and on tasks involving no exposure, ensuring that an adequate temperature is maintained for the worker - the combination of cold and vibration being particularly harmful.

The Commission will play the coordinating role that falls to it to ensure that technical progress quickens and that the increasing scope is exploited at more or less the same rate by all involved, using the latest information on the equipment and processes available (data banks).

Lastly, enhanced-risk situations are considered to be those which either involve the use of equipment transmitting to the hand-arm system acceleration of  $20 \text{ m/s}^2$  for short periods (in view of the risk it entails, this equipment should be appropriately marked) or any activity subjecting the whole body to more than  $1.25 \text{ m/s}^2$  over a period of eight hours or the equivalent thereof.

6.4 Annex 3 concerns optical radiation likely to injure either the eye or the skin.

For its proposals for ceiling levels the Commission has used the INIRC-IRPA recommendations where available and where not, the ACGIH levels have been used.

It is mainly with a view to keeping a warning signal that the proposal includes a threshold level, but it applies only to artificial sources whose numerical values are half the corresponding ceiling level.

In order to define the higher-risk activities likely to lead to overexposure the classification of the laser emitters (on the basis of IEC standards) would seem to be an appropriate one. The proposal imposes the same restrictions in the case of non-coherent radiation (for example, the pencil beam of a very powerful projector is equally capable of burning the retina) when such radiation involves the same risk as a class 3B or 4 laser source. The corresponding equipment (whether laser or not) must then be duly marked to indicate the enhanced risk and the level of competence of operators must be verified.

6.5 Annex 4 relates to electromagnetic fields and waves for which limit values are set for three biological effects: heating by energy absorption, circulation of induced currents and shocks and burns. To set the ceiling and threshold levels the proposal makes exclusive use of basic restrictions and reflects largely the INIRC-IRPA recommendations.

This is, however, not the case for the ceiling level for current density permissible in the  $4 \text{ Hz} - 1 \text{ Hz}$  frequency range, where the INIRC-IRPA has opted to set the electric field at a level at which field perception is limited without involving a hazard.

The proposal does, however, contain an obligation to inform the workers concerned that such a field perception might occur (possibly unpleasant but not noticeably objectionable) and to take account of this in specific situations where safety problems might arise. The aim of protecting workers is thus reconciled with the need to limit the constraints imposed on industrial activity.

As regards threshold levels, the Commission is proposing that the levels adopted should be the same as for the exposure of the general population, not that the general population is affected by the Directive but because the values in question take supplementary factors into account (no control over conditions of exposure or compliance with prevention measures, occurrence of undesirable effects, less homogeneous target group, etc.

With a view to harmonizing the practical implementation of its proposal the Commission will prepare the additional texts to supplement it, in particular by describing the methods to be used to calculate the derived parameters.

However, the action levels (which are not limit values to be respected) are expressed in terms of magnetic or electric field values. The field values triggering information measures, workertraining programmes and the provision of personal protective equipment have been determined by applying to the basic restrictions (ceiling levels) hypothetical values selected to ensure that when the action levels are not exceeded, exposure is always less than the safety level and that a risk is highly unlikely.

Multiples of these field values have been selected to prompt additional preventive measures and for reasons of operational simplicity the same multiplying factor has been applied throughout the frequency range. It has been calculated using energy absorption (SAR) as a base. The general view is that below 0.4 W/kg exposure does not present a hazard, that from 1 W/kg upwards biological effects are discernible and that they can become undesirable at levels above 4 W/kg.

The proposal thus contains provision for the implementation of a technical measuring programme or an organizational programme aimed at restricting access to the areas in question and ensuring that the operators involved are properly qualified when specific absorption exceeds 1 W/kg. When the specific absorption reaches 4 W/kg the work is considered to entail an enhanced risk and the equipment involved must be duly marked. The corresponding values of the electric and magnetic fields are calculated on the basis of the quadratic relationship that links them to absorbed power.

ANNEX TO THE EXPLANATORY MEMORANDUM

COMPARATIVE TABLE OF EXISTING NATIONAL REGULATIONS  
ON PHYSICAL AGENTS

1. Noise

	Specific legislation	Ref. to stand- ards in gener- al legislation	Recommendations Guidelines	Recommended exposure limits
Belgium	X	X	Medical examinations	90 dB (A)
Denmark	X	X	X	90 dB (A)
France	X		X	90 dB (A)
Germany	X		X	85 dB (A) 70 dB (A) 55 dB (A)
Greece	X	X		90 dB (A)
Ireland	X	X		90 dB (A)
Italy	X			
Luxembourg				90 dB (A)
Netherlands	X	X	X	85 dB (A)
Portugal	X	X		90 dB (A)
Spain	X	X		90 dB (A)
United Kingdom	X	X		90 dB (A)

2. Hand-arm vibration

	Specific legislation	Ref. to standards in general legislation	Recommendations Guidelines	Recommended exposure limits
Belgium		X	Medical examinations	
Denmark		X	X	3m/s <sup>2</sup> 130dB(HA)-4h
France			X	7.5m/s <sup>2</sup> -4h 15-1h
Germany	X		X	k <sub>r</sub> = 16 2.5m/s <sup>2</sup> -8h
Greece		X		
Ireland	X			
Italy				
Luxembourg				
Netherlands	(X)	X	X	3m/s <sup>2</sup> -4h
Portugal	X			
Spain		X		
United Kingdom		X		

3. Vibration: whole body

	Specific legislation	Ref. to standards in general legislation	Recommendations Guidelines	Recommended exposure limits
Belgium		X	Medical examinations	
Denmark		X	(X)	0.31m/s <sup>2</sup> 110dB-8h (ISO 2631)
France			X	0.63m/s <sup>2</sup> - 8h 1.5 m/s-0.5h (ISO 2631)
Germany	X		X	k <sub>r</sub> = 16 0.8m/s <sup>2</sup> -8h
Greece		X		
Ireland				
Italy				
Luxembourg				
Netherlands	(X)	X	X	(0.5m/s <sup>2</sup> )
Portugal	X			
Spain		X		
United Kingdom		X		

4. Non-ionizing radiation: microwaves, radiofrequency, ELF

	Specific legislation	Ref. to stand- ards in gener- al legislation	Recommendations Guidelines	Recommended exposure limits
Belgium		X	Medical examinations	
Denmark		X	(X)	ANSI, IRPA
France			X	ANSI
Germany	X		X	Spec. applic.
Greece		X		ACGIH
Ireland				
Italy				
Luxembourg				
Netherlands	(X)	X		ACGIH
Portugal		X		
Spain		X		ANSI, ACGIH, IRPA
United Kingdom		X	X	NRPB (IRPA)

5. Non-ionizing radiation: optical

	Specific legislation	Ref. to standards in general legislation	Recommendations Guidelines	Recommended exposure limits
Belgium		X	Medical examinations	
Denmark		X	(X)	IEC 825 ACGIH
France				
Germany	X		X	Spec. applic.
Greece		X		
Ireland				
Italy				
Luxembourg				
Netherlands	(X)	X		ACGIH, IRPA/INIRC)
Portugal		X		
Spain		X		IEC 825 ACGIH
United Kingdom		(X)	(X)	Spec. applic.



Proposal for a  
COUNCIL DIRECTIVE

on the minimum health and safety requirements regarding the  
exposure of workers to the risks arising from  
physical agents  
-----

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 proposal from the Commission<sup>(1)</sup>, drawn up after  
consultation with the Advisory Committee on Safety, Hygiene and Health  
Protection at Work,

In cooperation with the European Parliament<sup>(2)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(3)</sup>,

Whereas Article 118a of the Treaty provides that the Council shall adopt,  
by means of directives, minimum requirements for encouraging improvements,  
especially in the working environment, to guarantee a better level of  
protection of the health and safety of workers;

Whereas, under the terms of that Article, such directives are to avoid  
imposing administrative, financial and legal constraints in a way which  
would hold back 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<sup>(4)</sup> provides for the adoption of  
measures to promote safety at work, particularly with a view to extending  
the scope of Council Directive 86/188/EEC of 12 May 1986 on the protection  
of workers from the risks related to exposure to noise at work<sup>(5)</sup> and the  
reevaluation of the threshold values; whereas the Council, in its  
Resolution of 21 December 1987 on safety, hygiene and health at work<sup>(6)</sup>,  
took note of this;

---

(1) .....

(2) .....

(3) .....

(4) OJ No C 28, 3.2.1988, p. 3.

(5) OJ No L 137, 24.5.1986, p. 28.

(6) OJ No C 28, 3.2.1988, p. 1.

Proposal for a Council Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents

(93/C 77/02)

COM(92) 560 final — SYN 449

(Submitted by the Commission on 8 February 1993)

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 proposal from the Commission, drawn up after consultation with the Advisory Committee on Safety, Hygiene and Health Protection at Work,

In cooperation with the European Parliament,

Having regard to the opinion of the Economic and Social Committee,

Whereas Article 118A of the Treaty provides that the Council shall adopt, by means of directives, minimum requirements for encouraging improvements, especially in the working environment, to guarantee a better level of protection of the health and safety of workers;

Whereas, under the terms of that Article, such directives are to avoid imposing administrative, financial and legal constraints in a way which would hold back 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 <sup>(1)</sup> provides for the adoption of measures to promote safety at work, particularly with a view to extending the scope of Council Directive 86/188/EEC of 12 May 1986 on the protection of workers from the risks related to exposure to noise at work <sup>(2)</sup> and the re-evaluation of the threshold values; whereas the Council, in its resolution of 21 December 1987 on safety, hygiene and health at work <sup>(3)</sup>, took note of this;

Whereas the communication from the Commission <sup>(4)</sup> concerning its action programme relating to the implementation of the Community Charter of the Fundamental Social Rights of Workers <sup>(5)</sup> provides for the introduction of minimum health and safety requirements regarding the exposure of workers to the risks caused by physical agents; whereas in September 1990 the European

Parliament adopted a resolution concerning this action programme <sup>(6)</sup>, inviting the Commission in particular to draw up a specific directive on the dangers connected with noise and vibration and any other physical agent at the workplace;

Whereas compliance with the minimum requirements designed to guarantee a better standard of health and safety at work as regards the protection of workers from risks arising from exposure to physical agents is intended not only to ensure the health and safety of each worker on an individual basis, but also to create a minimum basis of protection for all Community workers in order to avoid possible distortions of competition;

Whereas a single system of protection against all physical agents must be established at Community level; whereas such a system must limit itself to a definition, free of excessive detail, of the objectives, the principles and the fundamental values to be used, in order to enable Member States to apply the minimum requirements in an equivalent manner;

Whereas Directive 86/188/EEC made provision for the Council to re-examine, on a proposal from the Commission and with a view to reducing the risks concerned, both its scope *ratione personae* and various provisions, taking into account in particular progress made in scientific knowledge and technology; whereas substantial amendments consequently need to be made to that Directive pursuant to Article 118A of the Treaty;

Whereas steps should also be taken to introduce, at Community level, minimum health and safety requirements concerning the exposure of workers to all physical agents, with the exception of those covered by the EAEC Treaty;

Whereas the minimum requirements in this field should establish the general principles of protection and the objectives to be achieved, whilst leaving open the detailed rules translating the safety levels in operational terms, to be adopted in order to comply with the provisions of this Directive;

Whereas the level of exposure to physical agents can be more effectively reduced by incorporating preventive

<sup>(1)</sup> OJ No C 28, 3. 2. 1988, p. 3.

<sup>(2)</sup> OJ No L 137, 24. 5. 1986, p. 28.

<sup>(3)</sup> OJ No C 28, 3. 2. 1988, p. 1.

<sup>(4)</sup> Commission document COM(89) 568 final.

<sup>(5)</sup> Council document FN 441/2/89, item II.

<sup>(6)</sup> OJ No C 260, 15. 10. 1990, p. 167.

measures into the design of workstations and places of work and by selecting work equipment, procedures and methods so as to give priority to reducing the risks at source; whereas provisions relating to work equipment and methods thus contribute to the protection of the workers involved;

Whereas the current situation in the Member States does not always make it possible to prescribe an exposure value for physical agents below which they no longer present a health risk;

Whereas current scientific knowledge of the effects which exposure to physical agents may have on health is not sufficient to enable precise exposure levels covering all risks to health, especially as regards the effects of noise other than those of an auditory nature, to be set;

Whereas employers are obliged to make adjustments in the light of technical progress and scientific knowledge regarding risks related to exposure to physical agents, with a view to improving the health and safety protection of workers;

Whereas, having regard to the wide variety of technical data available internationally in this field, additional documents may be drawn up with a view to consolidating and updating the minimum requirements;

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 health and safety of workers at work<sup>(1)</sup>; whereas the provisions of that Directive are therefore fully applicable to the exposure of workers to physical agents, without prejudice to more stringent and/or specific provisions contained in this Directive;

Whereas this Directive constitutes a practical step towards creating the social dimension of the internal market,

HAS ADOPTED THIS DIRECTIVE:

## SECTION I

### GENERAL PROVISIONS

#### Article 1

##### Aim

1. This Directive, which is the *n*th individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC, has as its aim the protection of workers against the risks to their health and safety, including the prevention of such risks, arising or likely to arise from exposure to physical agents.

<sup>(1)</sup> OJ No L 183, 29. 6. 1989, p. 1.

It lays down particular minimum requirements in this area.

2. This Directive shall not apply to the health protection of workers against dangers arising from radiation covered by the Treaty establishing the European Atomic Energy Community.

3. Directive 89/391/EEC shall apply fully to the whole area referred to in paragraph 1, without prejudice to more stringent and/or specific provisions contained in this Directive.

## Article 2

### Definitions

For the purposes of this Directive, the following terms shall have the meaning hereby assigned to them:

#### 1. *physical agents*:

- audible acoustic fields,
- vibrations,
- electric or magnetic fields or combinations thereof with a frequency equal to or less than  $3 \cdot 10^{15}$  Hz (wavelength of 100 nanometres or more);

#### 2. *levels*:

- *ceiling level*: the exposure value giving rise to risks for an unprotected person; exceeding this level is prohibited and must be prevented through the implementation of the provisions of this Directive,
- *threshold level*: the value towards which implementation of this Directive should be geared,
- *action level*: the value, situated between the threshold and ceiling levels, above which one or more of the specified measures must be undertaken.

These levels shall not take into account the effect of using any item of personal protective equipment within the meaning of Council Directive 89/656/EEC<sup>(2)</sup>;

- 3. *assessment*: a qualitative operation and/or a quantitative guidelines measurement, as distinct from measurement, which is quantitative and requires the use of an appropriate methodology;
- 4. *reference to the Annexes*: any reference made by this Directive to the Annexes shall be restricted to the part which is specific to the physical agent in question.

<sup>(2)</sup> OJ No L 393, 30. 12. 1989, p. 18.

*Article 3***Scope — determination and assessment of risks**

1. This Directive shall apply to activities in which workers are or are likely to be exposed to physical agents as a result of their work.
2. In the case of any activity referred to in paragraph 1, the employer shall carry out an assessment, as set out in Article 6 (3) of Directive 89/391/EEC, of the risks resulting from exposure.
3. Pursuant to the provisions of Article 9 of Directive 89/391/EEC, the employer shall give particular attention, when carrying out the assessment referred to in paragraph 2, to any effects concerning the health and safety of workers belonging to groups at particular risks, in order to ensure effective protection.
4. Under the conditions laid down in the relevant Annexes, certain activities shall be considered as presenting an increased risk. They must be declared to the authority responsible. Member States shall ensure that appropriate measures are taken in order to control the risks associated with these activities.

## SECTION II

## OBLIGATIONS OF EMPLOYERS

*Article 4***Assessment and measurement**

1. Under the conditions laid down in the relevant Annexes, each physical agent present at work shall be assessed and, when necessary, measured in order to identify the workers and workplaces referred to in this Directive and to determine the conditions under which the specific provisions of this Directive apply.
2. The assessment and measurement referred to in paragraph 1 shall be competently planned and carried out at suitable intervals, taking particular account of the provisions of Article 7 of Directive 89/391/EEC concerning the necessary competent services or persons; these intervals shall be revised where there is reason to believe that they are incorrect or that a material change has taken place in the work.

The methods used may include sampling, which must be representative of the personal exposure of a worker to the physical agent in question.

The methods and apparatus used must be adapted to the particular characteristics of the physical agent to be measured, the length of exposure, ambient factors and the characteristics of the measuring apparatus.

They shall make it possible to determine the physical parameters used as hazard predictors (defined in the relevant Annexes) and to decide whether, in a given case, the values laid down in this Directive have been exceeded. The methods and apparatus may make use of the parameters derived from those set out in the relevant Annexes, provided that the derived parameters guarantee fulfilment of the obligations set out in this subparagraph. For the purposes of applying this paragraph, the value measured shall be increased to account for inaccuracies in measurement as determined in accordance with metrological practice.

3. The data obtained pursuant to this Article shall be preserved in a suitable form so as to permit consultation at a later date.

*Article 5***Provisions aimed at avoiding or reducing exposure**

1. Taking account of technical progress and of the availability of measures to control the physical agent at source, the risks arising from exposure to the physical agent must be reduced to the lowest achievable level, with the aim of reducing exposure to below the threshold level referred to in the relevant Annex.

Reduction of these risks shall be on the basis of the general principles set out in Article 6 (2) of Directive 89/391/EEC.

2. Under the conditions laid down in the Annexes, the employer shall establish and implement a programme to reduce the risk referred to in paragraph 1 by means of technical and/or organizational measures.

3. Where measures implemented pursuant to this Directive do not permit exposure levels to be kept below the ceiling level:

- (a) the employer shall immediately implement measures to reduce unavoidable risks to levels not exceeding those resulting from exposure of an unprotected person to this ceiling level including, in the last report, prescribing the use of personal protective equipment; if the required reduction cannot be achieved, the provisions of Article 8 (3), (4) and (5) of Directive 89/391/EEC shall apply;

- (b) the employer shall identify the reasons why the ceiling level has been exceeded and shall amend the programme of measures set out in paragraph 2 in order to avoid a repeat occurrence.

4. Pursuant to the provisions of Article 15 of Directive 89/391/EEC, the employer shall adapt the measures referred to in this Article to the requirements of particularly sensitive risk groups.

#### Article 6

##### Personal protection

1. Pursuant to the provisions of Directive 89/656/EEC and under the conditions laid down in the relevant Annexes, personal protective equipment must be made available to workers and used by them in accordance with the provisions of point (a) of Article 5 (3) of this Directive and Article 13 (2) of Directive 89/391/EEC.

2. For the purposes of this Directive, personal protective equipment shall be considered adequate if, when worn correctly, the resulting foreseeable risk is maintained at a level lower than that resulting from the exposure referred to in the relevant Annexes.

3. The employer shall be responsible for checking the effectiveness of the measures taken in compliance with this Article.

#### Article 7

##### Worker information

1. Without prejudice to Article 10 of Directive 89/391/EEC, workers must receive information concerning health and safety relating to exposure to physical agents at work; in particular, once exposure exceeds the threshold level they must be informed of the resulting potential risks.

2. In accordance with the procedures laid down in the relevant Annexes, workers shall in addition be informed about:

- measures taken pursuant to this Directive, including where and when they apply,
- the obligation to comply with protective and preventive measures, in accordance with national legislation,
- the wearing of personal protective equipment and the role of health surveillance in accordance with Article 11.

3. The workers' representatives referred to in Article 3 (c) of Directive 89/391/EEC, and the workers concerned, shall receive the results of assessments and measurements of the physical agent made pursuant to Article 4 of this Directive, together with explanations of the significance of those results. They shall also receive the programme of measures referred to in Article 5 (2) of this Directive and

shall be informed without delay of the application of the provisions of Article 5 (3) thereof.

#### Article 8

##### Access to risk areas

Under the conditions laid down in the relevant Annexes, workplaces where specific protective provisions apply shall be marked with appropriate signs. The areas in question must also be delimited and access to them must be restricted where the risk of exposure so justifies.

#### Article 9

##### Training of workers

Pursuant to the provisions of Article 12 of Directive 89/391/EEC, and under the conditions laid down in the Annexes to this Directive, workers must receive training covering in particular the matters referred to in Article 7 (2) of this Directive.

#### Article 10

##### Consultation and participation of workers

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

### SECTION III

#### MISCELLANEOUS PROVISIONS

#### Article 11

##### Health surveillance

1. The health surveillance referred to in Article 14 of Directive 89/391/EEC shall be carried out in accordance with the provisions of Article 6 (5) of the said Directive and under the conditions laid down in the Annexes to this Directive by or under the responsibility of a doctor, or by a specialist if the doctor considers this necessary.

2. The surveillance shall take account of the significance of the risk and shall have as its objective the prevention and early diagnosis of any ailment due to exposure to a physical agent. It must allow an assessment of the worker's suitability to occupy a position involving such exposure.

3. Workers whose activity involves the wearing of personal protective equipment or is referred to in Article 3 (4) shall receive systematic health surveillance. Where over-exposure is suspected, a medical examination must be offered to the worker(s) concerned within an appropriate period of time.

4. The results of health surveillance shall be preserved in an appropriate form enabling them to be consulted at a later date.

5. Member States shall take the necessary measures with a view to the doctor and/or the medical authority responsible having, as part of health surveillance, access to the data referred to in Article 4 (3) and giving appropriate indications on any protective or preventive measures to be taken.

#### Article 12

##### Provisions relating to equipment and working methods

1. The design of workplaces and work stations, the choice of work equipment and the choice of working and production methods referred to in Article 6 (2) (d) of Directive 89/391/EEC shall take into account any emission of physical agents which may result therefrom. Pursuant to the provisions of Article 3 of Directive 89/655/EEC<sup>(1)</sup>, work equipment shall be chosen by taking into account its emissions, which must be compared with those from similar equipment.

2. Member States shall take appropriate measures to ensure the health and safety of workers in order that:

(a) for the purposes of conforming with the provisions of Article 6 (1) of Directive 89/655/EEC, and if the equipment used may cause exposure exceeding the action level referred to in the relevant Annex to this Directive for a worker using it, the employer:

- carries out or causes to be carried out, for each physical agent, the assessment described in Article 4 (1), if he has appropriate information provided by the manufacturer of the work equipment on the basis of Community directives having as their objective the freedom of movement for work equipment,

- carries out or causes to be carried out the necessary measurement(s) for each physical agent;

(b) where work equipment is subject to Community provisions with the aim or effect of limiting exposure,

to a physical agent, that item of work equipment be made available to workers whenever the type of activity permits.

#### Article 13

##### Extension of exposure, interference, indirect effects

1. Under the conditions laid down in the relevant Annexes, Member States shall take appropriate measures to:

- (a) control the harmful effects resulting from the exposure of workers to the physical agent in question when such exposure extends beyond working hours for reasons related to the work;
- (b) restrict, pursuant to the provisions of Article 6 (3) of Directive 89/391/EEC, the physical agent in question to values below those laid down by this Directive whenever this is necessary for the protection of health and safety.

2. When a physical agent present during work involves a risk for workers not arising from exposure to that agent, this risk must be controlled without prejudice to the provisions of this Directive pursuant to the provisions of Article 5 (1) of Directive 89/391/EEC.

#### Article 14

##### Derogations

1. Member States may grant exemptions, but only under the conditions laid down in the relevant Annexes, from certain provisions of this Directive where, under particular circumstances, their application may increase the overall risk to the health and safety of workers and where this risk cannot be reduced by other means.

2. The exemptions referred to in paragraph 1 shall be granted following consultation with the two sides of industry and in accordance with Article 10. They must be subject to conditions guaranteeing, with due account taken for particular circumstances, the minimization of risks arising therefrom. They shall be subject to periodic review and shall be revoked as soon as possible.

#### Article 15

##### Additional documents

With a view to the practical application of this Directive, and in so far as appropriate standards for the health and safety of workers do not exist, additional documents shall be drawn up in accordance with the procedure set out in

<sup>(1)</sup> OJ No L 393, 30. 12. 1989, p. 13.

Article 17 of Directive 89/391/EEC, with particular reference to the harmonization of basic technical concepts.

#### Article 16

##### Annexes

Amendments to the provisions and technical data in the Annexes shall be laid down in accordance with the procedure set out in Article 17 of Directive 89/391/EEC with regard to:

- the adoption of directives in the field of technical harmonization and standardization with regard to the design, building, manufacture or construction of work equipment and/or workplaces,
- technical progress, changes in international rules or specifications and new findings relating to the effects of physical agents on health.

#### Article 17

##### Repeal

Directive 86/188/EEC is repealed with effect from the date set out in the first subparagraph of Article 18 (1).

References to the repealed Directive shall be understood as referring to this Directive and shall be read according to the table of equivalence set out in Annex V.

#### Article 18

##### Final provisions

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 31 December 1995. They shall immediately inform the Commission thereof.

When Member States adopt these provisions, these shall contain a reference to this Directive or shall be accompanied by such reference at the time of their official publication. The procedure for such reference shall be adopted by Member States.

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 five years on the practical implementation of the provisions of this Directive, indicating the points of view of both sides of industry.

On the basis of these reports, 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.

#### Article 19

This Directive is addressed to the Member States.

## ANNEX I

## NOISE

## 1. Risk

This Annex refers to the risk to health and safety resulting from exposure to noise, and in particular the risk to hearing and the risk of accidents. The physical parameters used to predict danger are the risk of accidents. The physical parameters used to predict danger are as follows:

- peak acoustic pressure  $P_{max}$ : maximum value, in pascals, of the 'C'-weighted instantaneous sound pressure,
- daily sound exposure  $L_{EX,8h}$ : standardized sound exposure level for a reference duration equal to a nominal eight-hour day as defined by international standard ISO 1999:1990; all noises present at work, whatever their time characteristics, are to be included when determining exposure.

## 2. Levels

The threshold level is established at  $L_{EX,8h} = 75$  dB(A); ceiling levels are established at  $L_{EX,8h} = 90$  dB(A) and at  $P_{max} = 200$  Pa (1).

Intermediate action levels are established at:

- $L_{EX,8h} = 80$  dB(A) and/or  $P_{max} = 112$  Pa for:
  - informing workers likely to be exposed to these levels (Article 7 (2)),
  - supplying personal protective equipment to workers who request it (Article 6 (1)),
- $L_{EX,8h} = 85$  dB(A) and/or  $P_{max} = 112$  Pa for:
  - training in the implementation of measures taken pursuant to this Directive (Article 9), for the benefit of workers likely to be exposed to these levels,
  - providing information on the noise produced by work equipment likely to give rise to such exposure where it relates to a reference duration of eight hours (Article 12 (2) (a)),
  - the programme of technical and/or work organization measures aimed at reducing exposure (Article 5 (2)),
- $L_{EX,8h} = 90$  dB(A) and/or  $P_{max} = 200$  Pa for the delimiting of areas where workers are likely to be exposed to these levels and for the restriction of access (Article 8),

Pursuant to the provisions of this Section, it shall be considered that the daily sound exposure of a worker is likely to reach a given value ( $L_{EX,8h} = X$  dB(A)) when the ambient noise at his workplace represented by the continuous equivalent acoustic pressure level over a period of some minutes reaches this numerical value ( $L_{Aeq,T} = X$  dB(A)).

## 3. Activities with increased risk

The provisions of Article 3 (4) shall apply to activities in which workers are subject to a personal daily exposure greater than  $L_{EX,8h} = 105$  dB(A) and/or to a peak acoustic pressure greater than  $P_{max} = 600$  Pa.

## 4. Individual protectors (Article 6)

Where daily sound exposure exceeds  $L_{EX,8h} = 90$  dB(A) and/or where peak acoustic pressure exceeds  $P_{max} = 200$  Pa, individual protectors must be used.

The protectors must maintain the foreseeable residual risk to hearing at a level lower than that resulting from exposure where  $L_{EX,8h} = 85$  dB(A) or  $P_{max} = 200$  Pa.

## 5. Health surveillance (Article 11)

The worker whose daily sound exposure exceeds  $L_{EX,8h} = 80$  dB(A) shall have the right to a surveillance of hearing function, with the objectives of providing early diagnosis of any loss of hearing due to noise and of preserving hearing function.

(1) 140 dB in relation to 20  $\mu$ Pa.



**6. Extension of exposure**

The provisions of Article 13 (1) (a) shall apply in particular where, owing to the nature of the activity, a worker benefits from the use of rest facilities supervised by the employer; noise in these facilities must be reduced to a level compatible with their purpose and conditions of use (capability of reduction to 60 dB(A) during sleep).

**7. Interference**

The provisions of Article 13 (1) (b) shall apply in particular where the type of activity requires particular vigilance.

**8. Derogations**

1. In the case of workplaces where daily noise exposure varies markedly from one working day to the next, Member States may, in applying the provisions of the Directive, use a weekly average of daily sound exposures in place of daily sound exposure (reference duration equal to a nominal week of five eight-hour days) but only on condition that adequate monitoring shows that this weekly average complies with the numerical value laid down in these provisions.
2. For workers performing special operations, Member States may grant derogations from the obligation to use personal protective equipment (Article 5 (3) (a)) where such use would increase the overall risk referred to in Article 4 (1).

## ANNEX II

## MECHANICAL VIBRATION

## A. HAND-TRANSMITTED VIBRATION

## 1. Risk

This Annex refers to the risk to health and safety resulting from exposure to vibration transmitted to hand-arm: vascular, bone and joint, neurological or muscle disorders.

The quantity used as a predictor of the hazard is the daily hand-transmitted vibration exposure  $A(8)$  as defined by BS 6842:1987 using for  $a_{h,w(t)}$  (in its Section 4.1) the vector sum (root sum square) of the weighted root mean square accelerations determined in orthogonal coordinates with the frequency weighting defined by that standard. However, if an axis produces a weighted value which is less than 50% of the maximum value determined at the same point but in another axis, it can be neglected.

## 2. Values

The threshold level is established at  $A(8) = 1 \text{ m s}^{-2}$ .

Subject to the provisions of Article 13, the ceiling level is established at

$A(8) = 5 \text{ m s}^{-2}$ .

The action level is established at  $A(8) = 2,5 \text{ m s}^{-2}$  for:

- providing the information mentioned in Article 7 (2), to the workers likely to be exposed to this level,
- training in the implementation of measures taken pursuant to this Directive (Article 9), for the benefit of workers likely to be exposed to this level,
- providing information on the vibration produced by work equipment likely to give rise to such exposure during a reference duration of eight hours (Article 12 (2) (a)),
- the programme of technical and/or work organization measures aimed at reducing exposure (Article 5 (2)).

For applying the provisions of this Section, it is considered that  $A(8)$  is likely to reach  $2,5 \text{ m s}^{-2}$  when the work equipment used transmits to the hand-arm system a short term (a few minutes) equivalent acceleration equal to that numerical value.

## 3. Hazardous activities (Article 3)

The provisions of Article 3 (4) apply to activities requiring the use of work equipment which transmits to the hand-arm system a short-term (a few minutes) equivalent acceleration equal to or greater than  $20 \text{ m s}^{-2}$ .

## 4. Measurement and evaluation (Article 4)

In the case of devices which need to be held by both hands, measurement shall be made on each hand. The hazard is expressed by the highest energy equivalent acceleration, and information for the other hand will be given.

Where the level of vibration cannot be reliably quantified, the likelihood of exposure above the action level must be evaluated (observation of working practices and information on the equipment used) in order to judge the risks involved. If an exposure above the action level cannot be ruled out, the corresponding preventive measures must be implemented.

## 5. Reduction of the risk (Article 5)

- (a) As long as adequate and practical personal protective equipment is not available, the provisions aimed at reducing the exposure shall be complemented by measures reducing the hazard arising from such exposure.
- (b) Where the activity involves the use of work equipment which transmits to the hand-arm system a short-term (a few minutes) equivalent acceleration exceeding  $10 \text{ m s}^{-2}$ , increased efforts shall be

made to reduce the hazard, with priority to the use of low-vibration equipment and processes, including the revision of product design and work practice.

Pending their effective implementation the duration of continuous exposure shall be reduced.

- (c) The Commission and the Member States will ensure a dynamic and coordinated application of the provisions of this Section.

#### 6. Individual protectors

No adequate personal protective equipment against vibration is presently available; when it becomes available, it shall be used.

#### 7. Information and training (Articles 7 and 9)

Information and training of workers shall include at least:

- why and how to detect and report signs of injury,
- safe working practices to minimise exposure to vibration,
- measures reducing the resulting risk.

#### 8. Health surveillance (Article 11)

Workers exposed to hand-arm vibration exceeding  $A(8) = 2,5 \text{ m s}^{-2}$  are entitled to a health surveillance which aims at early detection of a vibration syndrome, and requires routine examinations.

Workers using work equipment referred to in Section 6b must be offered such a health surveillance.

#### 9. Work equipment (Article 12)

The information referred to in Article 12 (2) (a) must include marking of the equipment which transmits to the hand-arm system a short-term (a few minutes) equivalent acceleration equal to or greater than  $20 \text{ m s}^{-2}$ .

#### 10. Interference (Article 13)

The provisions of Article 13 (1) (b) shall apply in particular where the vibration interferes with the proper handling of controls or reading of indicators.

#### 11. Indirect risks (Article 13)

The provisions of Article 13 (2) shall apply in particular when the vibration interferes with the stability of structures or the good holding of joints.

#### 12. Derogations (Article 14)

- (a) During a period of five years with effect from the date set out in Article 18, Member States may grant derogations from Article 5 (3) (workers leaving workplaces where exposure remains excessive) where the state of the art does not allow the respect of the ceiling level.
- (b) The Commission and the Member States will ensure a dynamic and coordinated application of the provisions of this Section.

## B. WHOLE-BODY VIBRATION

### 1. Risk

This part of Annex II refers to the risk to health and safety resulting from exposure to vibration transmitted to the whole body: low-back morbidity and trauma of the spine, as well as severe discomfort.

The quantity used as a predictor of the hazard is the daily whole-body vibration exposure  $A(8)$  determined as in part A, using for  $a_{h,wb}$  the vector sum (root sum square) of the values of  $1,4 a_{wx}$ ,  $1,4 a_{wy}$ ,  $a_{wz}$  where  $a_{wx}$ ,  $a_{wy}$ ,  $a_{wz}$  are the weighted root-mean square accelerations in the orthogonal axes X, Y, Z respectively as defined in ISO 2631. However, any term of the vector sum which is less than 66% of the highest one can be neglected.

## 2. Values

The threshold level is established at  $A(8) = 0,25 \text{ m} \cdot \text{s}^{-2}$ .

Subject to the provisions of Article 13, the ceiling level is established at  $A(8) = 0,7 \text{ m} \cdot \text{s}^{-2}$ .

The action level is established at  $A(8) = 0,5 \text{ m} \cdot \text{s}^{-2}$  for:

- providing the information mentioned in Article 7 (2) to the workers likely to be exposed to this level,
- training in the implementation of measures taken pursuant to this Directive (Article 9), for the benefit of workers likely to be exposed to this level,
- providing information on the vibration produced by work equipment likely to give rise to such exposure during a reference duration of eight hours (Article 12 (2) (a)),
- the programme of technical and/or work organization measures aimed at reducing exposure (Article 5 (2)).

Where whole-body exposure involves shocks or other vibration at high magnitudes during low durations, the corresponding action level is established as the hazard due to exposure during a period of one hour to a constant amplitude of  $1,25 \text{ m} \cdot \text{s}^{-2}$ .

For applying the provisions of this section, it is considered that  $A(8)$  is likely to reach  $0,5 \text{ m} \cdot \text{s}^{-2}$  when the work equipment used transmits to the whole body a short term (a few minutes) equivalent acceleration equal to that numerical value.

## 3. Hazardous activities (Article 3)

The provisions of Article 3 (4) apply to activities which result in a whole-body exposure equal to or greater than  $A(8) = 1,25 \text{ m} \cdot \text{s}^{-2}$ .

## 4. Measurement and evaluation (Article 4)

Where the level of vibration cannot be reliably quantified, the likelihood of exposure above the action levels must be evaluated (observation of working practices and information on the equipment used) in order to judge the risks involved. If an exposure above the action levels cannot be ruled out, the corresponding preventive measures must be implemented.

## 5. Reduction of the risk (Article 5)

- (a) As long as adequate and practical personal protective equipment is not available, the provisions aimed at reducing the exposure shall be complemented by measures reducing the hazard arising from such exposure.
- (b) The Commission and the Member States will ensure a dynamic and coordinated application of the provisions of this Section.

## 6. Individual protectors

No adequate personal protective equipment against vibration is presently available.

## 7. Information and training (Articles 7 and 9)

Information and training of workers shall include at least:

- why and how to detect and report signs of injury,
- safe working practices to minimize exposure to vibration,
- measures reducing the resulting risk.

## 8. Health surveillance (Article 11)

Workers exposed to whole-body vibration exceeding  $A(8) = 0,5 \text{ m} \cdot \text{s}^{-2}$  are entitled to a health surveillance which aims at early detection of health impairment due to whole-body vibration and requires routine examinations.

## 9. Extension of exposure (Article 13)

The provisions of Article 13 (1) (a) shall apply in particular where, owing to the nature of the activity, a worker benefits from the use of rest facilities supervised by the employer; whole-body vibration in these facilities must be reduced to a level compatible with their purpose and conditions of use, except in cases of *force majeure*.

**10. Interference (Article 13)**

The provisions of Article 13 (1) (b) shall apply in particular where the vibration interferes with the proper handling of controls or reading of indicators.

**11. Indirect risks (Article 13)**

The provisions of Article 13 (2) shall apply in particular when the vibration interferes with the stability of structures or the good holding of joints.

**12. Derogations (Article 14)**

(a) During a period of five years with effect from the date set out in Article 18, Member States may grant derogations from Article 5 (3) (workers leaving workplaces where exposure remain excessive) where the state of the art does not allow the respect of the ceiling levels.

(b) The Commission and the Member States will ensure a dynamic and coordinated application of the provisions of this Section.

## ANNEX III

## OPTICAL RADIATION

## 1. Risk

This Annex refers to the risk to the eye and to the skin, resulting from exposure to optical radiation (wavelength from 100 nm to 1 mm).

The exposure of the target (eye or skin) to such radiation during a working day is used as a predictor of the hazard; it is expressed, according to the case, in one of the following units:

- watt per square meter,
- joule per square meter,
- watt per square meter and per steradian,
- joule per square meter and per steradian.

2. Values <sup>(1)</sup>

The ceiling levels are established at the threshold level values mentioned in ACGIH 1992—1993, pp. 100 to 112 and 124 to 127.

The threshold levels are established for man-made sources at half the ceiling levels.

Action levels are established at:

- half the ceiling levels for:
  - providing the information mentioned in Article 7 (2) to the workers likely to be exposed to these levels,
  - training in the implementation of measures taken pursuant to this Directive (Article 9),
  - making personal protective equipment available (Article 6 (1)),
  - providing information on the optical radiation produced by work equipment likely to give rise to such exposure during a reference duration of eight hours (Article 12 (2) (a));
- the ceiling levels for:
  - the delimiting of areas and the restriction of access (Article 8) in the case of man-made sources,
  - the programme of technical and/or work organization measures aimed at reducing exposure (Article 5 (2)).

## 3. Hazardous activities

The provisions of Article 3 (4) apply to activities in which the exposure leads to a hazard equivalent to that due to a laser of class 3 B (according to IEC Publication 825, 1990).

The operators of such sources must be trained (Article 9) and their competence must be checked.

## 4. Personal protection (Article 6)

Personal protective equipment must be used by workers who are likely to be exposed to optical radiation exceeding the ceiling levels.

As far as exposure of the skin is concerned clothing may be considered as personal protective equipment in so far as it meets the protection objectives.

## 5. Health surveillance (Article 11)

Workers exposed to optical radiation exceeding  $\frac{1}{2}$  the ceiling levels are entitled to a health surveillance which includes an eye check and aims at diagnosing any impairment by optical radiation and at preserving the vision.

<sup>(1)</sup> The wording of the 'values' Section will be amended as soon as sufficient progress has been made with technical standardization.

**6. Equipment (Article 12)**

Any laser used at work must be labelled with its classification according to IEC Publication 825, 1990.

Any man-made source likely to cause damage similar to that of a laser of class 3 B or 4 must also be labelled accordingly.

**7. Interference (Article 13)**

The provisions of Article 13 (1) (b) shall apply where dazzling by light sources may interfere with complete safety of the activity.

**8. Indirect effects (Article 13)**

The provisions of Article 13 (2) shall apply where the optical radiation is likely to cause fire or to produce hazardous substances by decomposing or interfering with materials present.

**9. Derogations (Article 14)**

Member States may grant derogations from Article 5 (3) for workers performing outdoors operations in the absence of man-made sources of optical radiations; they will therefore consider the local climatic conditions as well as the sensitivity of the interested population to such exposure (e.g. solar).

## ANNEX IV

## FIELDS AND WAVES

## 1. Risk

This Annex refers to the risk to the health and safety due to the effects of electric fields and currents in the human body, as well as of absorption of energy, resulting from exposure to static and time-varying electric and magnetic fields with frequencies up to 300 GHz <sup>(1)</sup>.

The quantities used as predictors of the hazard are:

- the current density, expressed in the unit ampere per square metre,
- the current passing through any one foot or hand in contact with a conducting object, expressed in the unit ampere,
- the specific absorption rate (SAR) of electromagnetic energy, expressed in the unit watt per kilogram,
- the specific absorption (SA) of electromagnetic energy, expressed in the unit joule per kilogram.

Quantities which can be obtained directly by means of a measuring instrument are used to specify action levels:

- the magnetic field strength H, expressed in the unit ampere per metre,
- the magnetic flux density B, expressed in the unit tesla,
- the electric field strength E, expressed in the unit volt per metre,
- the power (surface) density P in free-space and far-field conditions, expressed in the unit watt per square metre.

## 2. Values

The ceiling levels are established as follows (all conditions to be satisfied):

- the values of Table 1 for:
  - the induced current density in head and trunk,
  - the contact current averaged over a period of one second; the peak value may not exceed 10 times the average value,
  - the average over the whole body, as well as the local peaks in the limbs and in the head and trunk, of the SAR averaged over any six minute period,
- a SA of  $10 \text{ m J kg}^{-1}$  due to a pulse of less than 30– ms duration of microwaves at frequencies above 300 MHz.

As regards mobile radio equipment, the particularities of conditions of use and the rapidity of technological changes require that the ceiling levels be determined following further consideration.

The threshold levels are established at  $\frac{1}{5}$  the ceiling levels.

Action levels are established at:

- the values of table 2 for:
  - providing the information mentioned in Article 7 (2) to workers likely to be exposed to these levels,
  - training in the implementation of measures taken pursuant to this Directive (Article 9),
  - providing personal protective equipment (Article 6 (1)),
  - providing information on the fields and waves produced by work equipment likely to result in such values (Article 12 (2) (a)),
- 1,6 times the values of H, B or E in Table 2 for:
  - the programme of technical and/or work organization measures aimed at reducing exposure (Article 5 (2)),
  - the delimiting of areas and the restriction of access (Article 8),
  - training of the operators (Article 9) and checking of their competence.

<sup>(1)</sup> Hazards resulting from contact with live conductors are not covered by this Annex.



## 3. Hazardous activities

The provisions of Article 3 (4) apply to activities requiring the use of work equipment which exposes workers to fields exceeding three times the values of H, B or E in Table 2.

## 4. Measurement (Article 4)

Body current densities, SAR and SA are, for practical purposes, estimated from measured derived quantities (e.g. electric and magnetic field strengths) which must reflect realistic exposure situations.

The Commission and the Member States will ensure the coordinated definition of a suitable metrology.

## 5. Reduction of exposure; personal protection (Articles 5 and 6)

Personal protective equipment must be used by workers who are likely to be exposed to electric fields in which the ceiling levels would be exceeded.

There is no adequate and practical way to shield against magnetic field exposure.

## 6. Information of workers (Article 7 (2))

Workers exposed to an electric field above  $5 \text{ kV m}^{-1}$  must be informed that apparently harmless perception effects on the surface of the body may occur.

## 7. Work equipment (Article 12)

The information referred to in Article 12 (2) (a) must include marking of the equipment likely to produce fields exceeding three times the values of H, B or E in Table 2.

## 8. Indirect risks (Article 13)

The provisions of Article 13 (2) shall apply in particular where electromagnetic fields are likely to result in fire or explosion due to induced currents or voltages, e.g. when structures are electrically charged, or when using electroexplosive devices.

TABLE 1

## Ceiling levels

Frequency	Induced current density in head and trunk ( $\text{A} \cdot \text{m}^{-2}$ ) <sup>(1)</sup>	Contact current (mA) <sup>(1)</sup>	Whole body average ( $\text{W kg}^{-1}$ )	SAR Local peak in the limbs ( $\text{W (0,1 kg)}^{-1}$ )	Local peak in the head and trunk ( $\text{W (0,1 kg)}^{-1}$ )
0-1 Hz	0,04	1,5	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
1-4 Hz	$4 \times 10^{-5}/f$	1,5	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
4 Hz-1 kHz	0,010	1,5	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
1-3 kHz	$f/100$	1,5	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
3-100 kHz	$f/100$	$f/2$	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
100 kHz-10 MHz	$f/100$	50	0,4	2	1
10-100 MHz	( <sup>2</sup> )	50	0,4	2	1
100 MHz-300 GHz	( <sup>2</sup> )	( <sup>2</sup> )	0,4	2	1

(<sup>1</sup>) f in kHz.

(<sup>2</sup>) Not relevant at these frequencies.

TABLE 2  
Action levels

Frequency	H (A·m <sup>-1</sup> ) <sup>(1)</sup> <sup>(2)</sup>	B (μT) <sup>(1)</sup>	E (V·m <sup>-1</sup> ) <sup>(1)</sup>	P (W·m <sup>-2</sup> ) <sup>(1)</sup>
< 1 Hz	$1,63 \times 10^5$	$2 \times 10^5$	$6,14 \times 10^4$	<sup>(3)</sup>
1-10 Hz	$0,163/f^2$	$0,2/f^2$	$6,14 \times 10^4$	<sup>(3)</sup>
10 Hz-1 kHz	$16,3/f$	$20/f$	$614/f$	<sup>(3)</sup>
1-300 kHz	16,3	20	614	<sup>(3)</sup>
300 kHz-1 MHz	$4,9 \times 10^3/f$	$6 \times 10^3/f$	614	<sup>(3)</sup>
1-10 MHz	$4,9 \times 10^3/f$	$6 \times 10^3/f$	$6,14 \times 10^5$	<sup>(3)</sup>
10-30 MHz	$4,9 \times 10^3/f$	$6 \times 10^3/f$	61,4	10
30-400 MHz	0,163	0,2	61,4	10
400 MHz-2 GHz	$2,58 \times 10^{-4} \cdot f^{0,5}$	$3,16 \times 10^{-4} \cdot f^{0,5}$	$9,7 \times 10^{-2} \cdot f^{0,5}$	$2,5 \times 10^{-5} \cdot f$
2-150 GHz	0,364	0,45	137	50
150-300 GHz	$2,96 \times 10^{-5} \cdot f^{0,5}$	$3,7 \times 10^{-5} \cdot f^{0,5}$	$1,12 \times 10^{-2} \cdot f^{0,5}$	$3,33 \times 10^{-7} \cdot f$

<sup>(1)</sup> f in kHz.

<sup>(2)</sup> At frequencies of 10 MHz or greater, the value of H may be increased to that calculated from the formula:  $\frac{1}{6} (E_m^2/377) + \frac{1}{6} (377H)^2 \leq P$ . Where  $E_m$  is the measured electric field strength (V·m<sup>-1</sup>); H and P are the values in the table at the frequency considered.

<sup>(3)</sup> Not relevant at these frequencies.

## ANNEX V

## TABLE OF EQUIVALENCE

Directive 86/188/EEC	This Directive	Directive 86/188/EEC	This Directive
Article 1 — Paragraph 1  — Paragraph 2 — Paragraph 3	Articles 1 and 2 — Paragraph 1, Annex I, point 1 — Paragraph 3(1) — Paragraph 3	Article 7 — Paragraph 1 — Paragraph 2 — Paragraph 3 — Paragraph 4	Article 11 Annex I, point 5 Annex I, point 5 — Paragraph 4 — Paragraph 5
Article 2 — Paragraph 1 — Paragraph 2	Article 2 Annex I, point 1 Annex I, points 1 and 8	Article 8 — Paragraph 1 — (a) — (b) — Paragraph 2	Article 12  — Paragraph 1 — Paragraph 2 (a) Not applicable
Article 3 — Paragraph 1 — Paragraph 2 — Paragraph 3 — Paragraph 4 — Paragraph 5	Article 4 — Paragraph 1 — Paragraph 2 Implicit in Annex I, point 1 — Paragraphs 2 and 10 — Paragraph 3	Article 9 — Paragraph 1 — Paragraph 2 — (a) — (b) — (c) — (d)	Article 14 — Paragraph 1 and Annex I, point 8.1  Deleted — Paragraph 1 and Annex I, point 8.2 — Paragraph 2 — Paragraph 3
Article 4 — Paragraph 1 — (a) — (b) — Paragraph 2	Article 7 — Paragraph 1 — Paragraph 2 — Paragraph 3 Articles 7 (2) and 8	Article 10	Not applicable
Article 5 — Paragraph 1 — Paragraph 2 — (a) — (b)	Article 5 — Paragraph 1 Article 7 (3) — Paragraph 2	Article 11	Article 10
Article 6 — Paragraph 1 — Paragraph 2 — Paragraph 3 — Paragraph 4	Article 6 — Paragraph 1 and Annex I, point 4 — Paragraph 1 and Annex I, point 2 — Paragraphs 2, 10 and Directive 89/656/EEC Article 1 — Paragraph 3 and Directive 89/656/EEC	Article 12	Not applicable
		Article 13	Article 18

Proposal for a Council Decision concerning the conclusion of a framework Cooperation Agreement between the European Economic Community and the Republics of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama

(93/C 77/03)

COM(93) 52 final

(Submitted by the Commission on 12 February 1993)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Articles 113 and 235 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament,

Whereas the Community, for the attainment of its aims in the sphere of external economic relations, should approve the framework Cooperation Agreement with the Republics of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama,

HAS DECIDED AS FOLLOWS:

*Article 1*

The framework Cooperation Agreement between the European Economic Community and the Republics of

Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama is hereby approved on behalf of the Community.

The text of the Agreement is annexed to this Decision.

*Article 2*

The President of the Council shall give the notification provided for in Article 37 of the Agreement <sup>(1)</sup>.

*Article 3*

The Commission, assisted by representatives of the Member States, shall represent the Community in the Joint Committee set up by Article 33 of the Agreement.

*Article 4*

This Decision shall enter into force on the day following its publication in the *Official Journal of the European Communities*.

---

<sup>(1)</sup> The date of entry into force of the Agreement will be published in the *Official Journal of the European Communities* by the General-Secretariat of the Council.

## SECTION 1: FINANCIAL IMPLICATIONS

1. TITLE OF OPERATION: Proposal for a Council Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents.

2. BUDGET HEADINGS INVOLVED

B3-4310: Measures in the field of health protection, hygiene and safety at work, including specific measures with a view to completion of the internal market.

A 2510: Expenditure on meetings of committees whose consultation is compulsory in the procedure for drafting Community legislation (Adaptation to technical progress committee covered by Article 17 of Directive 89/391/EEC).

3. LEGAL BASIS

- Article 118a of the EEC Treaty;
- Directive 89/391/EEC (OJ No L 183, 29.6.1989);
- Council Resolution of 21 December 1987 on safety, hygiene and health at work, and Commission communication on its programme concerning safety, hygiene and health at work (OJ No C 28, 3.2.1988);
- Action programme relating to the implementation of the Community Charter of Fundamental Social Rights of Workers (COM(89) 568 final - Brussels, 29.11.1989).

4. DESCRIPTION OF OPERATION

4.1. Specific objectives

4.1.1. Objectives of the proposal for a Directive

The objectives of the proposal are:

- to promote improvements in measures to prevent risks due to physical agents;
- to ensure that exposure to physical agents is reduced to levels which are insignificant from the point of view of health and safety;
- to make provision for early measures to alleviate the health effects of accidental exposure;

- to set up a dynamic regulatory system of protection against exposure to risks due to physical agents, embracing general objectives, specific rules and operational measures;
- to react to risks which may arise from the free movement of workers, by guaranteeing such workers the same level of protection in any Member State, and by guaranteeing fair competition conditions for their employers.

4.1.2. Characteristics of the proposal for a Directive (particularly those with financial repercussions)

- 4.1.2.1. The proposal - more particularly the Annexes - has to be adapted and added to to take account of the adoption of technical harmonization and standardization directives, of technical progress, of evolving international regulations or specifications, and of knowledge in the field of physical agents.
- 4.1.2.2. The proposal provides for the adoption of Commission directives concerning additional documents designed to establish specific rules for the achievement of the objectives set out in the proposal.
- 4.1.2.3. The proposal provides for the Member States to forward to the Commission whatever provisions they adopt to implement the proposal, along with progress reports.
- 4.1.2.4. The proposal also makes provision for a committee to assist the Commission in the abovementioned work in association with the adaptation and adoption of directives.

The financial repercussions will arise in connection with whatever complementary measures are planned or projected.

4.2. Duration

5 years.

4.3. Target population

Employers and workers affected by activities liable to involve exposure to risks due to physical agents.

5. CLASSIFICATION OF EXPENDITURE

- 5.1. Non-compulsory expenditure.
- 5.2. Differentiated appropriations.

6. TYPE OF EXPENDITURE

6.1. 100% funding.

7. FINANCIAL IMPACT ON OPERATING APPROPRIATIONS (PART B OF THE BUDGET)

7.1. Method of calculation

7.1.1. Nature of the complementary measures to be taken following adoption of the Directive

- (a) Monitoring and supporting measures for application of the directive at Member State level
- (b) Adoption of Commission directives comprising the additional documents
- (c) Revision of Annexes
- (d) Consultation of experts

7.1.2. Types of activities arising from point 7.1.1. with financial repercussions

These are:

- . Study and/or service contracts for
  - comparing and evaluating the information received by the Commission,
  - studying problems associated with application of the directive,
  - preparing the additional documents,
  - studying the problems associated with the Annexes and preparing adaptations of the Annexes.
- . Expenditure on experts' meetings

7.1.3. Calculation of expenditure

As information on the complementary measures covers only their nature and type but not their volume or scale, it is impossible to draw up a detailed schedule of expenditure.

The costs are calculated on a "man/month" basis, which currently comes to ECU 4 000.

7.3. Schedule of commitment appropriations (CA) and payment appropriations (PA)

Item B3-4310

Appropriations for this items will be determined annually on the strength of availability and fixed appropriations, under the budget procedure, for the measures covered by this item.

It is difficult to estimate the amounts required from 1994 on; these will be entered under the above heading as a function of the funds available.

8. ANTI-FRAUD ARRANGEMENTS

n.a.



SECTION 2: ADMINISTRATIVE EXPENDITURE (PART A OF THE BUDGET)

1. STAFF NEEDED EXCLUSIVELY FOR THE MEASURE IN QUESTION

With effect from 1994: one full-time A-grade official, one full-time B-grade official and one full-time C-grade official.

Staff requirements will be met by internal deployment.

2. STAFF AND ADMINISTRATIVE EXPENDITURE

2.1. Administrative expenditure

The administrative expenditure covers the work of the Adaptation Committee.

The cost of calling a government expert has been estimated at ECU 460 and of calling a non-government expert at ECU 630 (per day in each case). Expenditure will extend over a number of years and will be progressive. The figures set out below are global estimates.

Regarding A 2510 (Adaptation Committee), provision is made for six meetings a year of group 3 experts (i.e. government experts) between 1994 and 1996, falling to three meetings a year from 1997.

Item A 2510

	<u>CA (ECU)</u>	<u>PA (ECU)</u>
1994	66 000	66 000
1995	66 000	66 000
1996	66 000	66 000
1997	33 000	33 000
1998	33 000	33 000
	<hr/>	<hr/>
	264 000	264 000

### SECTION 3: COST-EFFECTIVENESS ANALYSIS

#### 1. OBJECTIVES AND COHERENCE WITH FINANCIAL PROGRAMMING

##### 1.1 Specific objective of the proposed operation

Implementation of the proposal for a Directive.

##### 1.2 Is the operation incorporated in the financial programming of the DG for the years concerned?

Yes.

##### 1.3 To which broader objective defined in the DG's financial programming does the objective of the proposed operation correspond?

Health and safety at work.

#### 2. GROUNDS FOR THE OPERATION

##### (a) Cost

The cost is very similar to that of comparable measures associated with other proposals with Directives.

##### (b) Spin-off effect

The proposal for a Directive should have the not inconsiderable secondary effect of protecting the general public, more particularly in places or situations where persons may be exposed, outside their professional activity, to risks due to physical agents.

##### (c) Multiplier effect

Same as for secondary effects (at Member State level).

#### 3. MONITORING AND EVALUATION OF THE OPERATION

Article 18 of the Directive says that Member States must report back to the Commission every five years on the practical implementation of the Directive, indicating the points of view of the social partners.

The Commission is required to communicate this information to the European Parliament, the Council, the Economic and Social Committee and the Advisory Committee on Safety, Hygiene and Health Protection at Work. It will make a periodic report to the European Parliament, the Council and the Economic and Social Committee on progress made in implementing the Directive.

Impact assessment formImpact of the proposal on business in small and medium-sized enterprises (SMEs)Title of proposal

Proposal for a Council Directive on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents.

Reference No: 7633/92

The proposal

1. Taking account of the principle of subsidiarity, why is Community legislation necessary in this area and what are its main aims?

- (a) Tens of millions of workers in the Community are subject to excessive exposure to physical agents (noise, mechanical vibration, electromagnetic radiation) which can have a harmful effect on their health. The visible cost of the occupational accidents or illnesses which result is by no means an accurate reflection of the real cost to the economy, not to mention the effect on the quality of life of the victims.

The main sectors of activity affected are the mining and metalworking industries, building and construction, electronics, textiles, and the woodworking and chemical industries.

As an example, the industry and craft trades accident insurance associations in the Federal Republic of Germany paid out some ECU 145 million in 1990 to cover retraining costs and occupational illness pensions for 39 361 victims of occupational illnesses caused by exposure to physical agents. And this figure is merely the tip of the iceberg, since it does not cover the working hours lost during sick leave, the cost of preventive medical examinations or the loss of valuable staff who have to be replaced prematurely.

- (b) There are discrepancies and gaps in the existing national regulations in the Member States, with particular inequalities in the level of protection offered to workers and the financial burden on firms taking measures to overcome the risks caused by physical agents.

This situation has persisted unchanged for some time, except in the case of noise, for which a Council Directive has introduced a series of basic protective measures.

- (c) The proposal forms part of a package of measures in that it spells out how the provisions of the framework Directive are to be understood to apply to physical agents, and contains the further details needed. It also takes account of the other instruments involved in combating these hazards (the Directives on workplaces, work equipment and personal protective equipment and its use).

The main impact is therefore rooted in already adopted provisions.

- (d) The proposal gives a social dimension to measures relating to the single market, for example by establishing a link with provisions on the safety of equipment (which may cause excessive exposure), including the introduction of technical European standards.
- (e) These considerations show that harmonization is essential: the results to be achieved must be laid down at Community level, leaving the practical arrangements and technical details for a more appropriate level. Using Article 118a as the legal basis means that the Member States are able to provide a higher level of protection than the minimum requirements of the Directive.

**2. Who will be affected by the proposal?**

- (a) The Directive focuses on the concept of risk and therefore affects all firms in which at least one worker is likely to face excessive exposure to physical agents. As with the framework Directive, only certain very specific groups linked to the public interest (police, armed forces, civil protection services) may be exempted.
- (b) The size of firms affected varies considerably, but the aims (to keep below a specific level of exposure to the risk in question) apply to all.

**3. What will business have to do to comply with the proposal?**

Where workers are likely to be exposed to a risk arising from a physical agent, the requirements of the framework Directive must be met by complying with the provisions of the proposal: evaluate the risk, inform and train workers, eliminate or reduce exposure, in a last resort use personal protective equipment, monitor health where necessary, make official reports, provide warning signs in risk zones, keep records of accidents at work, and run a risk evaluation and protection programme.

4. **What economic effects is the proposal likely to have?**

On employment

The proposal should not have any negative effects on employment; by improving dangerous or difficult situations, it should actually be beneficial, not to mention the work it will create in developing preventive measures.

On investment and the competitive position of businesses

Evaluating the financial and economic effects of the proposal is made even more complex by the fact that the situations vary in the Member States, with the total cost being distributed differently between the firm and the public authorities. In order to get a clearer picture, the Commission had a study carried out to estimate the total costs, using the example of the Federal Republic of Germany before reunification.

The most detailed information available is on noise, which has been covered by Directive 86/188/EEC since 1 January 1990.

Implementing the proposed provisions - measuring noise levels, the use of ear protectors and the provision of information and training for workers - would cost around ECU 40 per worker per year, two-thirds of which would be expenditure already required by the existing Directive; health monitoring accounts for ECU 65 per examination, and if every extra worker actually takes advantage of this new entitlement and has one examination every five years, the corresponding annual cost will be ECU 13. The measures therefore represent additional expenditure of ECU 26 per worker per year, which corresponds to half a man-hour.

There are almost no generally applicable figures for the cost of technical or administrative measures, which can vary considerably (in some cases such measures may even be profitable in that they reduce production costs), but there are examples of methods which have already proved highly effective in practice in industry, and for which "the rewards from the expenditure involved have been considered very worthwhile by the companies involved".

For physical agents other than noise, it is estimated that, for each agent to which workers are exposed, the cost of risk identification and evaluation, information and training for those concerned, health monitoring and the provision of personal protective equipment (though it is not known how many workers would exercise their right to have such monitoring and equipment) would be the equivalent of half a man-day per year (for technical measures, the situation is the same as for noise).

The impact of the proposal may be summarized as follows:

The socio-economic effects of this draft individual Directive, which aims to provide better safety and health protection for workers against risks associated with occupational exposure to physical agents, may be assessed as generally positive from the point of view of preventing known accident risks and occupational illnesses for which some level of compensation is already paid in the Member States. At the moment the only harmonized provisions on prevention cover exposure to noise, and the new proposal is intended to achieve the same high level of protection against other physical agents.

The cost of preventive measures must be seen as directly linked to the cost of dangerous techniques, and a large proportion of the cost will therefore have to be borne by the firms using these techniques. This view provides a more realistic assessment of the economic impact of such techniques, and establishes more accurate criteria for deciding on how appropriate they are. The proposal therefore makes the real costs involved more transparent, putting all competing firms on an equal footing.

Given that the measures proposed are solely preventive, the costs arising from the application of the Directive should be significantly lower than the sums already being paid by the national economies in compensation and interest in the broadest sense. The costs will almost always have to be paid by the firms concerned, and this will be a considerable incentive to develop less dangerous working techniques.

A comparatively low level of expenditure will also be incurred by the Member States in transposing the Directive into national legislation and monitoring its application. However, this expenditure will be only a small proportion of the sums currently paid by the national economies, or more accurately taxpayers, those paying social security contributions and the pension insurance funds, in compensation for occupational accidents and illnesses caused by exposure to physical agents.

5. The proposal does not contain any measures to take account of the specific situation of SMEs

The aim of the proposal is expressed as a minimum protection level to be achieved irrespective of the size of the firm. However, the proposal leaves the widest possible scope for choosing how to achieve this, thereby giving SMEs the flexibility they need.

## Consultation

6. List the organizations which have been consulted about the proposal and outline their main views

The following have been consulted about the initial proposal:

- specialised independent experts selected by the Commission;
- national (government) experts;
- the tripartite Advisory Committee on Safety, Hygiene and Health Protection at Work;
- the Safety and Health Commission for the Mining and other Extractive Industries;
- a group of specialists (two for each Member State) regarding the socio-economic impact of the proposal.

The consultations were very useful for identifying gaps or possible ambiguities; where compatible with the aims and basic principles of the proposal, the comments made were taken into account and the text redrafted.

However, it must be said that the parties concerned had different views about the substance of the proposal, and in particular about whether it was appropriate to re-examine the Directive on noise or to cover the known risks of electromagnetic radiation.

As a consensus could not be reached, the Commission had to decide which position to support; respecting its earlier undertakings, it decided that the proposal should follow those parties still supporting a social dimension to the single market.

ISSN 0254-1475

COM(92) 560 final

# DOCUMENTS

EN

04

---

Catalogue number : CB-CO-92-626-EN-C

ISBN 92-77-51512-0

---

Office for Official Publications of the European Communities  
L-2985 Luxembourg