

# 1 Introduction: Guidelines for occupational medical examinations

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## 1.1 Occupational medical care

Globalization and the increase in competition resulting from international trading have led to increasing expectations of workforce productivity in enterprises everywhere in Europe. In addition, demographic developments are increasing the average age of workers (the ageing workforce). The economic success of an enterprise depends on the abilities of well-trained and experienced employees. Thus, the maintenance and promotion of health of employees is becoming increasingly important from both the social and economic points of view, to do justice to the demands of society for appropriate quality of work and also to provide a basis for economic success. A healthier work environment does not only provide competitive advantages, it becomes an indicator of the social acceptability of successful commerce.

In the European Union, employers are required as part of their statutory “duty of care” to provide adequately for the health and safety of their employees. Although there are considerable differences between the relevant regulations in the various member states of the EU, there is a common basis which is described in the Council Directive 89/391/EEC and the associated individual directives. Occupational medical care, which is concerned with the interaction between work, profession and health, is covered by these directives. Its particular aims include:

- assessment of working conditions (risk assessment)
- provision of recommendations for improvement of working conditions
- informing and advising the employees about work-related risks
- early recognition and prevention of occupational diseases and work-related illnesses
- improving our knowledge of exposures and risks.

Thus occupational medical care does not only aim to keep employees healthy but also to bring about improvements in health protection at the workplace. By means of occupational medical care, the employer can demonstrate that he is meeting his “duty of care” responsibilities, provided that the medical care is provided by qualified specialists under quality-controlled conditions and the results are appropriately documented.

## 1.2 Risk assessment and health surveillance

Fundamental to health and safety protection at the workplace is the risk assessment. For this purpose the employer assesses (before a person starts work and at certain

intervals afterwards) whether and to what extent health and safety hazards for the employee are associated with the work. In this process he can use the support of health and safety experts and the works physician or an occupational health professional. In principle, the employer is required to reduce any risks to a minimum and to institute any necessary general and individual protective measures. The risk assessment must be appropriately documented.

If the results of the risk assessment suggest that in spite of all protective measures a significant risk for the health of an employee remains, occupational medical examinations carried out by a doctor or an appropriately qualified person should be considered. The conditions under which occupational medical examinations are required before an employee may begin or continue a job are stipulated by law. These examinations are therefore quite different from health check-ups or general examinations to establish whether a person is fit for work, which are not regulated by law nor associated with specific workplace exposures. Nonetheless, such medical examinations can also be a starting point for a general improvement of the health of a workforce and the maintenance of fitness for work; they are not the subject of the Guidelines but can supplement them usefully. If an employee is obliged to go to an occupational medical examination, it remains his own decision whether he allows himself to be examined and whether he answers the physician's questions adequately. If he does not, the occupational health professional must inform the employer that no statement can be made about the person's state of health or fitness to begin or continue work.

Unlike group preventive measures offered by the works physician, e.g., in the form of general occupational medical toxicological advice for employees in training sessions, occupational medical examinations are preventive measures for the individual: the observation of the state of health of an employee exposed to specific health risks during the course of his work. The object is the early diagnosis of work-related health disorders and the establishment of whether or not a particular job is associated with an increased individual health risk. At the same time, the medical examination can serve to check whether preventive measures have been effective and can document any evidence of occupational diseases. Such occupational medical examinations carried out on the basis of a risk assessment include the following procedures:

- work anamnesis and anamnesis
- physical examination
- assessment of state of health in view of the job to be carried out
- individual occupational medical advice
- documentation of the results of the examination.

### **1.2.1 Responsibilities of the occupational health professional**

The occupational medical examination is from its very nature a medical examination and so should be carried out by a doctor. That does not mean that, depending on local practice and the national health system, the examination or parts of it cannot be carried out by other qualified specialists. In such cases the national regulations are

binding. Nonetheless, medical procedures which are not carried out by a physician himself should at least be carried out under his supervision and on his responsibility and be subject to strict quality control. Fundamentally, the carrying out of occupational medical examinations is associated with a series of responsibilities.

First, the person carrying out the examination must have access to the necessary apparatus and other requirements and have the appropriate qualifications. This includes knowledge of the individual workplace, in the ideal case knowledge obtained by personal inspection of the place of work. Before the examination the employee must be informed of the planned procedures. The examination itself must meet quality control criteria and be in line with the latest developments in occupational medicine.

Of particular importance is the advice given to the employee. This should take into account the individual disposition of the person and should concentrate on any concrete health risks but should also involve general advice as to occupational hygiene and healthy behaviour. Convalescents may also be advised as to their possibilities for returning to work. Thus, the Guidelines include suggestions for the content of such advisory sessions as well as sources of information.

Regulations for occupational medical examinations must include clear instructions for the method of communication of the results to the employee being examined and his or her employer. The results of the examination and the assessment are to be recorded in writing; the employee is to be informed. As with any medical examination, the results are subject to the rules of medical discretion. Therefore the communication of the results to the employer must be limited to the date of the examination, a simple statement as to whether there is cause for concern about the person's health, and details of any conditions to be observed in the job in question.

If the results of the occupational medical examination yield evidence of critical conditions in the enterprise, the occupational health professional, while observing medical confidentiality, is to inform and advise the employer.

### **1.3 Guidelines for occupational medical examinations**

In view of the multiplicity of national health systems and the differences in legal duties stipulated in the different European countries, at first glance it seems pointless to try to present a system shown to be worthwhile in a single national system at an international level. Nonetheless we have made the attempt, in the firm conviction that once the legal regulations and the different occupational health system of the single country have been removed from the Guidelines, what is left is the essence of occupational medical procedure, in line with the latest developments in occupational medicine and thus, incorporating generally accepted rules of the profession, oriented on international standards. This means that a certain minimum of diagnostic methods and knowledge is necessary if a sound assessment of the state of health is to be made and a firm basis for deciding on further measures obtained. The description of just this minimum standard is the essential core of the Guidelines. On the basis of the Guidelines, the occupational physician carries out the occupational medical examination to obtain the data necessary to assess the risk and to advise the employee.

That the Guidelines are used so widely ensures that the occupational medical examinations – independent of regional features or conditions in a single branch of industry – are carried out uniformly and the results assessed and evaluated according to the one set of criteria. Only then is it possible to use the information yielded by the examinations for universal improvement of health and safety at work.

The Guidelines are procedures for occupational medical examinations which fulfil the legal requirements for “health surveillance”. They are to be understood as a recommendation in the sense of “best practice”. Unlike the guidelines of the medical societies, they do not reflect the opinions of a single professional group. Rather they are the combined results of a dialogue between members of the occupational medical profession, social workers, experts in occupational health and safety, and government representatives. In this process the medically desirable is brought into line with the medically possible, taking into account legal stipulations and the situation at the workplaces, and the result is guidelines which are oriented on day-to-day procedures for ensuring health and safety at work.

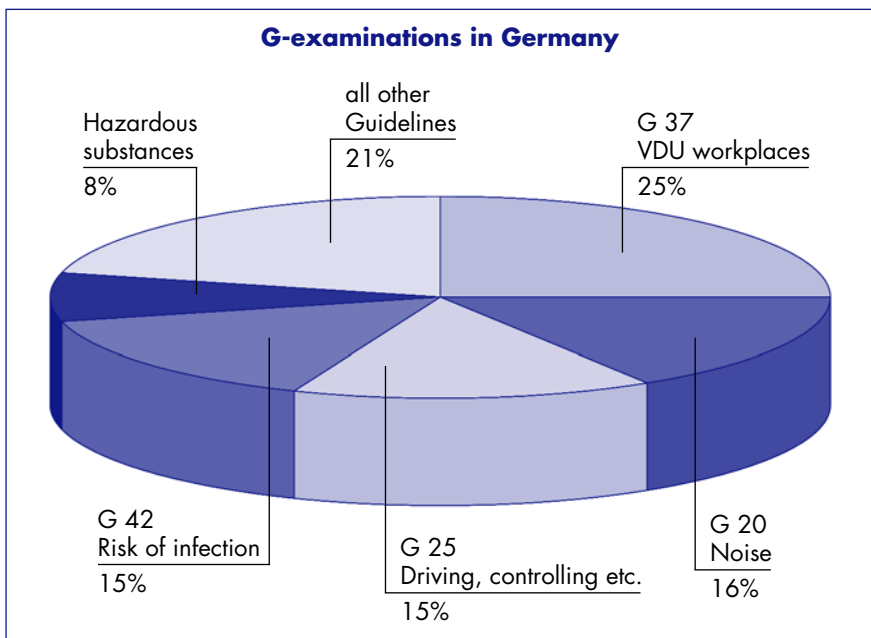


Figure 1: Frequency distribution of the occupational medical examinations carried out according to the Guidelines in the year 2002, in all 5,085,572 examinations. G 37 “VDU workplaces”; G 20 “Noise”; G 25 “Driving, controlling and monitoring work”; G 42 “Activities with a risk of infection”; total of all Guidelines dealing with hazardous substances; total of all other Guidelines.

Note: G 46 “Strain on the musculoskeletal system (including vibration)” exists only since 2005 and so was not included in the above statistics.

Another characteristic feature of the concept is its systematics. The clear and consistent structure of the Guidelines ensure that every occupational medical examination, no matter which exposure is the reason for carrying it out, follows the same principles. The Guidelines provide the medical examiner with an instrument for carrying out quality-controlled health surveillance without limiting freedom of medical procedure in the individual case. The viability of the concept has been demonstrated in Germany where the Guidelines have been a success for decades.

Apparently it does not play an important role whether the occupational medical examination is to be carried out because of statutory requirements, because an employee wishes it or because of the voluntary commitment of an employer. It is certainly not the legal requirements which decide how often an occupational medical examination is carried out in practice. As shown in Figure 1 for the examples G 37 and G 25, these two occupational medical examinations are among those carried out most frequently, although their implementation is not at present required by law.

### 1.3.1 Which Guidelines exist?

The Guidelines cover a wide spectrum of workplace health risks. They deal with work with hazardous substances (dusts, fumes, chemicals), biological working materials and physical agents (heat, cold, noise, vibration, hyperbaric pressure). Other topics are strain on the musculoskeletal system, skin disorders, skin cancer, obstructive airway disorders, VDU work, respiratory protective equipment and working abroad. Two other Guidelines ("Driving, controlling and monitoring work" and "Work involving a danger of falling") describe examinations to determine whether a person is fit for or capable of doing that kind of work. The numbering of the Guidelines serves only for identification purposes; there is no special system involved.

At present there are 44 Guidelines and four appendices on special topics. Of these, those contained in the present book are listed below.

#### List of Guidelines

- 1.1 Mineral Dust, Part 1: Respirable crystalline silica dust
- 1.2 Mineral Dust, Part 2: Dust containing asbestos fibres
- 1.3 Mineral Dust, Part 3: Man-made mineral fibres (aluminium silicate wool)
- 1.4 Exposure to dust
- 2 Lead and lead compounds (with the exception of alkyllead compounds)
- 3 Alkyllead compounds
- 4 Substances which cause skin cancer or skin alterations which tend to become cancerous
- 5 Ethylene glycol dinitrate and glycerol trinitrate (glycol dinitrate and nitroglycerin)
- 6 Carbon disulfide
- 7 Carbon monoxide
- 8 Benzene
- 9 Mercury and mercury compounds
- 10 Methanol

- 11 Hydrogen sulfide
  - 12 Phosphorus (white, yellow)
  - 14 Trichloroethene (trichloroethylene) and other chlorinated hydrocarbon solvents
  - 15 Chromium(VI) compounds
  - 16 Arsenic and arsenic compounds (with the exception of arsine)
  - 19 Dimethylformamide
  - 20 Noise
  - 21 Cold working conditions
  - 23 Obstructive airway disorders
  - 24 Skin disorders (not including skin cancer)
  - 25 Driving, controlling and monitoring work
  - 26 Respiratory protective equipment
  - 27 Isocyanates
  - 29 Benzene homologues (toluene, xylene isomers)
  - 30 Hot working conditions
  - 31 Hyperbaric pressure
  - 32 Cadmium and cadmium compounds
  - 33 Aromatic nitro and amino compounds
  - 34 Fluorine and its inorganic compounds
  - 35 Work abroad under exceptional climatic conditions and with other health risks
  - 36 Vinyl chloride
  - 37 VDU (visual display unit) workplaces
  - 38 Nickel and nickel compounds
  - 39 Welding fumes
  - 41 Work involving a danger of falling
  - 42 Activities with a risk of infection
  - 44 Hardwood dust
  - 45 Styrene
  - 46 Strain on the musculoskeletal system (including vibration)
- Appendix 1: Biomonitoring
- Appendix 2: Diagnosis of musculoskeletal disorders  
in occupational medical examinations

Appendix 1 "Biomonitoring" contains supplementary information as to the situations in which this kind of analytical procedure may be used as part of an occupational medical examination. Appendix 2 describes the methods and procedures for diagnosing musculoskeletal disorders within the time frame and cost limits of an occupational medical examination.

### 1.3.2 Browsing the Guidelines

Each Guideline is structured systematically; the universal basic structure is made visible by graphic elements. The table below shows the structure of the Guidelines using the contents of G 14 as an example.

#### G 14 Trichloroethene (trichloroethylene) and other chlorinated hydrocarbon solvents

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3.2 Functional disorders, symptoms

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3.2.2 Acute and subacute effects on health

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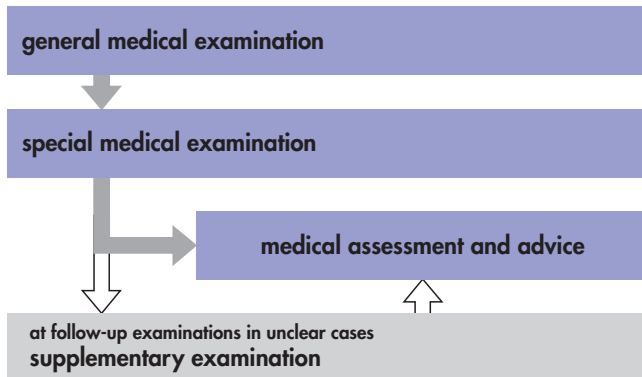
4 References

Under the title of each Guideline, the responsible working group of the Committee for occupational medicine is given (see Supplementary notes at the end of this chapter for contact address). This makes it possible for the user to contact the authors, to ask questions and to point out any problems. Such feedback makes it possible to recognize difficulties in the practical use of the Guidelines which can then be cleared up cooperatively.

Under **Preliminary remarks** the objects of the examination are described.

The **Schedule** which follows shows graphically the parts of the examination and their order. Here the essential features of the examination according to a given Guideline may be seen at a glance.

### Schedule



The Guidelines G 20 “Noise” and G 37 “VDU workplaces” include additional schedules and assessment schemes which are intended to provide a clear picture of the procedures.

Under **Medical examinations** the text describes first the group of people for whom this occupational medical examination may be used, e.g., for those exposed to a hazardous substance at concentrations in excess of the occupational exposure limit. If binding European regulations exist, they are referred to in the Guidelines. Otherwise, for hazardous substances the reader is referred to the recommendations of the German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (MAK Commission) which are recognized and available internationally. In a few cases the suggestions are based on the situation in Germany and then this is pointed out expressly. All such data serves only for orientation purposes. Decisive is only the result of the risk assessment in terms of the national law in the country concerned.

In the Guidelines two kinds of medical examination are distinguished and marked in the text with a coloured bar.

#### Initial examination

The purpose of the **Initial examination** is to establish, before the beginning of exposure, whether the person already has any defects (inherited or acquired) which could lead to health risks in the job in question. In addition, the documentation of the results of this examination can be of importance in any later claims for compensation because of adverse effects on health.

### Follow-up examination

At the **Follow-up examination** it is the task of the physician to establish whether the person's state of health has altered. The follow-up examinations include also a final examination when a person finishes work in a certain job; this can be useful especially for any later occupational disease litigation.

If the procedures to be carried out (or the assessment criteria) are identical for the two kinds of examination, they are listed under a single bar:

#### Initial examination

#### Follow-up examination

Note: in Germany there is also a third kind of examination, the **Nachgehende Untersuchung** (long-term follow-up examination), which is also carried out on the basis of the Guidelines. These examinations serve to detect adverse effects on health which have a long latency. Many years can pass between the work in a hazardous job and the development of an occupational disease (e.g. cancer). Often the affected employee has long since moved to a different area of work or has retired. The German Social Accident Insurance has therefore set up a central service to ensure that affected persons can also have an occupational medical examination after they have stopped working in a job. Such examinations are offered to persons who have been exposed to carcinogenic substances such as asbestos or benzene.

The kinds of examination covered by a Guideline are summarized in a table together with the intervals between the examinations (example from G 14).

## 1.1 Examinations, intervals between examinations

<b>initial examination</b>	before taking up the job
<b>first follow-up examination</b>	after 12–24 months
<b>further follow-up examinations</b>	after 12–24 months and when leaving the job
<b>premature follow-up examination</b>	<ul style="list-style-type: none"> <li>• after an illness lasting for several weeks or when a physical handicap gives cause for concern about whether the work should be continued</li> <li>• in individual cases when the physician considers it necessary, e.g. when there is short-term concern about the person's health</li> <li>• when requested by an employee who suspects a causal association between his or her illness and work</li> </ul>

The suggested intervals are intended to provide for continual, regular health surveillance. At the discretion of the occupational health professional, given reason in individual cases, a premature follow-up examination may be carried out. An examination carried out at the request of an employee should be medically justifiable on the basis of concrete work-related health risks deducible from the risk assessment.

In the section **Medical examination schedule** the examination procedures are described. They begin with a **General medical examination** which consists of anamnesis and work anamnesis with a general examination. The subsequent **Special medical examination** targets effects of the specific exposure and provides information about the necessary diagnostic methods. When indicated, or when the examination results are unclear, a specific **Supplementary examination** can be necessary. At this point, the works physician may require consultation with other medical specialists, e.g., in the form of a recommendation that the person sees a specialist to clarify the findings or in the form of a referral.

Under **Requirements for the medical examinations** the qualifications necessary to carry out the examinations are specified (in Germany always a specialist in occupational medicine ("Arbeitsmedizin") or a doctor with the additional title "Betriebsmedizin"), as are requirements for further education and apparatus.

Health surveillance is an effective instrument only if its results are evaluated and used to improve health and safety at the workplace. An important aspect of the Guidelines is therefore the aids to interpretation and assessment of the findings and the resulting advice for the employee. The section **Occupational medical assessment and advice** begins with the reminder that, as stipulated in the EU Council Directive and the associated individual directives, a risk assessment is necessary. If the occupational health professional was not involved in making this assessment himself, he must at least have access to its results. Only if the situation at the workplace and the exposure of the individual are known is it possible to assess the medical findings and give the employee appropriate advice.

For standardization of the assessment of whether and to what extent the carrying out of certain jobs is associated with concern about the health of an individual, a step-wise process based on **assessment criteria** is described. With the assessment "**no concern about health**", the physician states that there is no increased health risk for the individual.

If the physician wishes to defer concern about health for a time (e.g. with shorter intervals between follow-up examinations) or to make it dependent on the implementation of protective measures for the individual, he selects the assessment "**no concern about health under certain conditions**".

"**Short-term concern about health**" is an assessment which applies for a limited period because of transient symptoms (e.g. use of hearing protectors not possible because of acute inflammation of the auditory canal or outer ear) which can regress after medical treatment.

The assessment “**long-term concern about health**” is only possible if no way can be found by workplace-related measures, conditions or limitations to counteract a health risk for the employee which can be associated with grave consequences. For the person being examined, this means that from the medical point of view there is no way that he can continue working in the current job. This assessment can result in his being transferred to another workplace or even in the loss of his job. Of course, the occupational health professional will make use of this assessment only after careful consideration of its consequences (the weighing up of the risks for health against the risk of job loss). In Germany this assessment is also associated with serious consequences for the employer. He has to arrange occupational medical examinations for all persons he employs at similar workplaces and also to prove that the workplace is safe or document the measures he has taken to improve its occupational hygiene. In practice, whenever it is medically defensible, the physician will prefer to produce the assessment “short-term concern about health” or “no concern about health under certain conditions”. The medical findings on which the assessment criteria are based are given in detail in each Guideline.

The personal contact between the occupational health professional and the employee during the occupational medical examination makes it possible to offer the employee individual advice, an essential measure for effective health and safety at the workplace. The advice should be commensurate with the workplace situation and the results of the medical examinations and should include explanations of the risks associated with the job and medical recommendations for dealing with the risk. On this point, under the title **Medical advice**, the Guidelines offer further information for the occupational health professional including topics such as general hygienic measures, use of personal protective equipment, carcinogenicity of substances, alcohol consumption, smoking and also specific information for pregnant women.

Section 3 of each Guideline provides the background information necessary for an occupational medical examination. Here not only **occurrence** and **sources of hazards** are discussed but also **functional disorders** and **symptoms**. In addition, this chapter lists additional properties of hazardous substances and of freely available sources of further information in the English language (GESTIS databases, see Supplementary notes) from which details of threshold limit values, substance classification and evaluation and other substance-specific information may be obtained. In cases for which soundly based biomonitoring data is available (see also Appendix1), the internationally recognized reference values for occupational exposures published by the DFG Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (MAK Commission) are given for orientation purposes. Under **References** the directives and recommendations of the European Union, international standards and other generally available literature and information sources are listed.

Practical experience has shown that printed forms are a help in the proper carrying out and documentation of medical examinations and that they reduce the amount of

work involved. Because of the different situations in different countries, it is difficult to design such forms for universal use. For the Guidelines listed below, an attempt has been made:

Guideline	Form
G 1.1-1.3 "Mineral dust"	Protocol sheet for anamnesis
G 20 "Noise"	Screening test NOISE I, Supplementary examination NOISE II, Extended supplementary examination NOISE III
G 37 "VDU workplaces"	Examination form G 37 "VDU workplaces"
G 46 "Strain on the musculoskeletal system (including vibration)"	Anamnesis questionnaires: 1 Self-reported musculoskeletal disorders 2 Medical anamnesis of musculoskeletal disorders and hand-arm vibration exposure Questionnaire for the supplementary examination of persons exposed to hand-arm vibration

If the forms should not meet the specific local requirements, they can nonetheless serve for orientation purposes and can be modified as necessary. The forms are to be found in the internet at [www.dguv.de/guidelines](http://www.dguv.de/guidelines) and may be downloaded.

## 1.4 Supplementary Notes

The Committee for occupational medicine of the German Social Accident Insurance (Ausschuss Arbeitsmedizin der DGUV) was set up in 1971. Together with the associated specialized working groups, it develops recommendations for applying occupational medical findings for the protection of employees from work-related health risks, accidents and occupational diseases. The fact that representatives from all the relevant institutions are involved in this process has the effect that the recommendations of the Committee for occupational medicine achieve a high level of acceptance and set the pattern for occupational medical health protection in Germany.

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The **GESTIS-Substance Database** contains information for the safe handling of chemical substances at work, e.g. health effects, necessary protective measures and such in case of danger (incl. First Aid). Furthermore the user is offered information about important physical and chemical properties of these substances as well as any special regulations. The available information relates to about 8,000 substances. Data are updated immediately after publication of new official regulations or after the issue of new scientific results.

Internet: [www.dguv.de/bgia/gestis-database](http://www.dguv.de/bgia/gestis-database)

**GESTIS International limit values for chemical agents.** This database contains a collection of occupational limit values for hazardous substances gathered from various EU member states, Canada (Quebec), Japan, Switzerland, and the United States. Limit values for more than 1,000 substances are listed.

Internet: [www.dguv.de/bgia/gestis-limit-values](http://www.dguv.de/bgia/gestis-limit-values)

The GESTIS-Databases are maintained by the BGIA – Institute for Occupational Health and Safety of the German Social Accident Insurance.