



# The Scope and Specific Criteria of Compensation for Occupational Diseases in Korea

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The range of diseases covered by workers' compensation is constantly expanding. However, new regulations are required for the recognition of occupational diseases (ODs) because OD types evolve with changes in industrial structures and working conditions. OD criteria are usually based on medical relevance, but they vary depending on the social security system and laws of each country. In addition, the proposed range and extent of work-relatedness vary depending on the socio-economic conditions of each country. The Labor Standards Act (LSA) and the Industrial Accident Compensation Insurance Act (IACIA) of Korea employ lists based on their requirements without listing causes and diseases separately. Despite a considerable reshuffle in 2003, the basic framework has been maintained for 50 yr, and many cases do not fit into the international disease classification system. Since July 1, 2013, Korea has expanded the range of occupational accidents to include occupational cancers and has implemented revised LSA and IACIA enforcement decrees. There have been improvements to OD recognition standards with the inclusion of additional or modified criteria, a revised and improved classification scheme for risk factors and ODs, and so on.

**Keywords:** Workers' Compensation; Occupational Diseases; Korea

## INTRODUCTION

Workers' compensation is a form of social insurance providing wage replacement and medical benefits to employees injured at work. Industrialization spread rapidly across Europe in the 1800s, and in 1838, Germany took the first step to protect injured workers by passing legislation to cover railroad employee accidents. Otto von Bismarck later introduced an Insurance Plan (1881), and in 1884, he enacted a compulsory system of "Sick and Accident Laws," which constitutes the world's first modern workers' compensation system (1).

The development of the workers' compensation system in Korea dates back to 1963, when the first social insurance system called Industrial Accident Compensation Insurance (IACI) was introduced. It is stipulated in the Constitution of Korea that "The State shall endeavor to promote the employment of workers and to guarantee optimum wages through social and economic means and shall enforce a minimum wage system under the conditions as prescribed by the Act" in Article 32 (2), and "Citizens who are incapable of earning a livelihood due to a physical disability, disease, old age, or other reasons shall be protected by the State under the conditions as prescribed by the Act" in Article 34 (3). Labor standard laws (1953) (4) and IACI (1963) (5) laws have been enacted in accordance with the constitution.

## International trends in the recognition criteria for occupational diseases

The recognition criteria for occupational diseases (ODs) are based on medical relevance but are formulated within the social security system and laws of each country, and different ranges and levels of work-relatedness are set depending on the prevailing socio-economic conditions.

The International Labor Organization (ILO) has put together a list of ODs by collecting and analyzing the ODs of each country, and the scheme of the OD list proposed in 2010 maintains the mix of logical and systematic classifications proposed in 2002 (6). In addition, the connections between risk factors and the corresponding diseases are not specified, and the risk factors and diseases are listed separately. The causes and diseases not listed in each classification system are covered by a general clause, and this clause provides the guidelines for creating the list of ODs by considering the social consensus, legal situation, and the causes and causal relevance (6).

## A historical perspective on workers' compensation in Korea

The IACI Act (IACIA) aims to compensate workers rapidly and fairly for work-related diseases and illnesses by carrying out industrial accident compensation insurance activities, to establish and operate insurance facilities for promoting the rehabilitation of accident victims and their return to society (or to work),

and to contribute to worker protection through accident prevention and other projects promoting workers' welfare (4). The "Labor Standards Act (LSA)" stipulates the standards for labor conditions in conformity with the constitution, thereby securing and improving the living standards of workers and achieving well-balanced national economic development (5).

#### Workers' compensation laws

As the first social insurance system in Korea, IACIA has significantly developed benefits, contents, and claim systems over 50 yr. It has protected injured workers and their families, while evolving into a system that can also cope with the financial burden on employers as well as their responsibilities (7). IACIA came into effect in 1964, but it applied only to workers in mines and large manufacturing industries until July 1, 2000, when it was extended to all workers (Fig. 1) (8-12). The LSA has applied to workers in all types of businesses and companies since 1989, central and local government employees since 2001, and independent contractors since 2008 (13). In 2008, in addition to this extension of coverage, there were significant improvements in the work-related disease compensation approval process, duration of medical care, and rehabilitation programs (14). The LSA and the IACIA of Korea adopted a list based on need, without separate lists for causes and diseases. The LSA does not specify the range of diseases when itemizing risk factors, and the IACIA requires specification of causes and the resulting diseases. However, in practice, agents such as chrome, trichloroethylene, carbon bisulfide, tar, or abnormal air pressure may be singled out as the cause of the disease, but in some, a more complex structure like organic solvents or chemicals, for example, hydrogenated carbon or aromatic compounds may be described. Moreover, the classification of diseases mixes anatomic and systemic categories, as well as causal factors, as in diseases due to certain pathogens, occupational liver diseases, and occupational skin diseases. Despite considerable restructuring in 2003, the basic

framework has been maintained for 50 yr, and many cases do not follow the international disease classification system.

#### Criteria for recognition of occupational diseases before the amendments of 2013

The OD criteria in Korea are presented in "The scope of occupational diseases of the Enforcement Decree of LSA (ED-LSA), Schedule 5" and "The specific criteria for the recognition of occupational diseases of the Enforcement Decree of the IACIA (ED-IACIA), Schedule 3". The former ED-LSA consisted of 38 items and focused on categorizing risk factors. Meanwhile, the ED-IACA contained 23 items including a list of risk factors; highly related symptoms, signs, and diseases; and proposed recognition criteria for organs including the brain, cardiovascular system, musculoskeletal system, as well as occupational skin diseases and liver diseases. In fact, it also redundantly proposed the recognition criteria in the ED-IACIA (15). Schedule 3 of the ED-IACIA started with a rule established by the Ministry of Labor in 1982 and proposed recognition standards for six items, namely respiratory diseases, lower back pain, benzene, trichloroethylene, lead, and mercury. A few of the risk factors and diseases were added by 1994, and the rule established in 1995 listed 22 items that were generally similar to the current items in the table of established rules. In 1999, dissecting aortic aneurysm was added to cerebro- or cardiovascular diseases, the standard exposure level for noise-induced deafness was lowered from 90 dB to 85 dB, and the minimum exposure period for recognition was reduced from 5 to 3 yr. The revision of 2000 reduced the minimum exposure period for the recognition of chronic occupational lower back pain from 10 to 5 yr, and the revision of 2003 added liver diseases, occupational skin diseases, and target diseases as consequences of certain risk factors. The revision of 2008 limited occupational cerebro- or cardiovascular diseases to work-related cases, and work-related musculoskeletal diseases were recognized if the existing disease worsened (15). In contrast, the LSA has barely been changed since its establishment. In many cases, the ED-LSA uses comprehensive names rather than proposing specific risk factors and diseases. It employs a few terms that differ from the current ED-IACIA or are excluded from the latter.

The range of diseases covered by workers' compensation and the number of beneficiaries are increasing steadily. However, new regulations are required for the recognition of industrial diseases because many types of industrial accidents result from changes in industrial structures and working conditions. The potential for OD due to new factors is growing, and the types of diseases are changing. In particular, society's interest in occupational cancer, respiratory diseases, and neuropsychiatric diseases has increased, thereby provoking robust discussion on the range of recognized ODs and compensation levels. Consequently, Korea has established new recognition criteria based

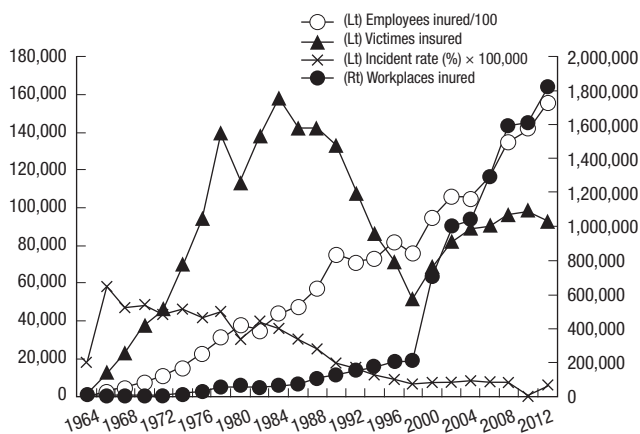


Fig. 1. Number of insured workplaces, employees, and industrial disaster victims, and incidence rate of industrial accidents by year.

on an analysis of the problems with the previous specific OD recognition standards and on complementary studies. This study aims to provide a list of risk factors and established causal relationships of ODs, to revise the scope and recognition criteria in the light of domestic exposure conditions, and to specify the criteria and systematize the process of OD recognition in Korea.

## MATERIALS AND METHODS

The authors reviewed the scope of ODs in the ED-LSA (13) and the specific OD recognition criteria in the ED-IACIA (15) because these two acts are closely related. The authors excluded diseases due to accidents, and pneumoconiosis, to which special regulations apply. The ILO list of ODs (6) was reviewed in detail, and cases from a few other countries and their OD lists were consulted. For identifying new risk factors and ODs, cases investigated by the Korea Occupational Safety and Health Agency (KOSHA) and the Occupational Lung Diseases Institute of Korea Workers' Compensation and Welfare Service (OLDI of KCOMWL), those recognized as work-related, official domestic exposure status, and the recent scientific literature were reviewed, and opinion was invited from occupational medicine professionals.

## RESULTS

### Scope and recognition standards for occupational diseases

The risk factors in the ED-IACIA that were not reflected in the LSA, or in cases where different terms were used, were replaced with the latest ones, and the classification of diseases now follows the Korean Version of ICD-10 (KICD-10). The items in the recognition standards specified in Schedule 4 of ED-IACIA that required revision involved the health impact of the chemicals referred to in the old version of the ILO OD. A few issues affect-

ing Korea were resolved, but not others. Although less attention is now needed for cases of exposure to high concentrations of chemicals, prolonged exposure to low concentrations of chemicals, which can cause problems, has emerged as an important issue. The associated lists have been updated by considering relevant cases, recent scientific evidence, and local exposure conditions, and by classifying ODs according to the affected organ system such as respiratory or skin, and as neuropsychiatric diseases and cancer, which have the widest international representation (6). For simplifying the ED-IACIA recognition procedure, it is desirable to provide specific standards of exposure levels, exposure duration, and accumulated exposure to act as definitive standards for approval. However, these are not only based on science but also require social consensus, and there is a possibility that they could be abused as exclusion criteria. Therefore, existing items involving scientific errors are omitted, and cases based on new evidence are added (Tables 1 and 2).

### Adding and upgrading risk factors and occupational diseases

The standards for recognition of ODs registered in the IACIA have been revised or expanded in response to social issues. Some ODs such as WMSDs, liver diseases, cancer of the lymphatic or hematopoietic system, cancer due to asbestos, pneumoconiosis, and health disorders due to various chemicals have very specific recognition criteria, but others do not. Therefore, this revision specifies risk factors in a form that meets international standards and increases user convenience (16). The LSA consists of diseases with relatively clear causalities, and chemical, physical, and biological factors with lists of diseases as before. However, it clearly states that the diseases are due to specific risk factors such as chemical factors and disease groups involving respiratory, skin, and musculoskeletal problems (16).

**Table 1.** Main categories of scope of occupational diseases in Enforcement Decree of the Labor Standards Act, Schedule 5

| Categories of occupational diseases  |
|--|
| A. Diseases caused by occupational injury  |
| B. Diseases caused by physical factors   |
| C. Diseases caused by chemical agents  |
| D. Diseases caused by biological agents  |
| E. Occupational cancers  |
| F. Intestinal hernia due to excessive force and musculoskeletal disorders caused or aggravated by high-risk tasks (or factors)   |
| G. Cerebro- or cardiovascular diseases caused or aggravated by work  |
| H. Post-traumatic stress disorder due to psychological trauma related to work  |
| I. In addition to the diseases listed above (A to H), diseases designated by the Ministry of Employment and Labor in consultation with the Industrial Accident Compensation Insurance and Prevention Deliberation Committee on the basis of the Industrial Accident Compensation Insurance Act Article 8 |
| J. In addition to A-I listed above, diseases definitely caused by work   |

The specific lists are described in Annexure 1.

**Table 2.** Main categories of specific criteria for the recognition of occupational diseases in Enforcement Decree of the Industrial Accident Compensation Insurance Act, Schedule 3

| Categories of occupational diseases  |
|--|
| A. Diseases of the cerebro- or cardiovascular system   |
| B. Diseases of the musculoskeletal system  |
| C. Diseases of the respiratory system  |
| D. Neurological and mental diseases  |
| E. Diseases of the lymph and hematopoietic system  |
| F. Diseases of the skin  |
| G. Diseases of the eye and ear   |
| H. Diseases of the liver   |
| I. Infectious diseases   |
| J. Occupational cancers  |
| K. Diseases caused by chemical agents  |
| L. Diseases caused by physical factors   |
| M. If there is a clear relationship between the disease of a worker and his/her work conditions, the disease shall be recognized as an occupational disease. |

The specific lists are described in Annexure 2.

The chemical causes include 108 organic chemicals, 19 metals, 8 acids and alkalis, 14 gases, 13 materials that must be licensed for use, and 6 types of dusts containing materials that require a specific medical examination (for workers). The physical features are risk factors requiring a specific medical examination including noise, vibration, radiation, low air pressure, high air pressure, and harmful rays (IR, UV, microwaves, and radio waves). Prior to this revision, the recognition criteria defined only seven carcinogenic factors and were criticized for a lack of standards compared with those of the ILO and other countries (Plan to rationalize recognition criteria for ODs including occupational cancer (17)). Therefore, this analysis establishes a new classification for occupational cancers and includes cases with sufficient evidence of previous exposure and frequent cancers by reviewing carcinogenic materials above IARC group 1, as well as locally recognized examples, with sub-categories for each organ (Tables 1 and 2).

### Improvements in the classification schemes for risk factors and occupational diseases

The ILO has analyzed data from 88 countries since 2005 and lists ODs with groupings and classification by agent, target organ system, and occupation; further, many countries follow this scheme (6). Korea applies these standards and adds the social element that stress and work overload are related to the worsening of liver complaints due to the high prevalence of hepatitis. However, redundancy is inevitable in lists that separate causes from the resulting diseases, as suggested by the ILO (6). For example, chemical causes mostly result in respiratory diseases, and skin and nervous diseases are mostly listed under chemical causes and diseases, and some diseases are redundantly listed on the cancer list. Therefore, any information that permits an assessment of the relationship with work and applies to industrial accident insurance for workers diagnosed with a disease, while providing a systematic classification, will increase user convenience. Meanwhile, the classification of risk factors facilitates the development of specific standards, increases their relevance to preventive policies, and enhances user-friendliness because of its familiar structure. Therefore, a redundant proposal system continues to be the most convenient, provided that legal brevity and the system of laws are considered. Further, some may consider that legal brevity is an important factor. Fortunately, the fact that OD regulations in Korea consist of the LSA and the IACIA, and that the ED-IACIA is based on a systematic classification of diseases, while the ED-LSA is based on chemical, physical, and biological factors, ensures integrity of the two laws and establishes a complementary structure (Tables 1 and 2).

### Miscellaneous

In addition, the study includes chronic obstructive pulmonary

disease, which is on the occupational disease list of the ILO (18) but excluded from similar Korean lists. The recognition standard for cerebro- and cardiovascular diseases is objective because it is based on working hours and clarifies “the consideration whether the degenerative changes are worsened by the work.” Moreover, unlike in the past, psychological disturbance due to work is covered under industrial insurance.

## DISCUSSION

Korea has expanded the range of ODs including occupational cancers and has implemented the revised ED-LSA and the ED-IACIA, which use a classification system based on diseases, since July 1, 2013. However, despite continuous efforts to provide disaster compensation for workers, a few difficult tasks remain pending. First, the Korea Workers' Compensation and Welfare Service will carefully implement a process to formulate specific recognition conditions before enforcing the new recognition criteria. Various conditions including the presence of the relevant risk factors in the workplace, confirmation of exposure, and presence of the disease process will be proposed specifically. Second, there is a need to establish and operate a permanent committee of the Ministry of Employment and Labor or the Korea Workers' Compensation and Welfare Service that sets recognition criteria reflecting recent opinion regarding a fair society by maintaining consistency of operation and legal stability. Third, there needs to be investment and interest in regulating the recognition criteria on substantive grounds. Finally, Korea has not yet ratified ILO Convention No. 130, which covers the sickness benefits proposed by the Medical Care and Sickness Benefits Convention (1969) (18). This requires that workers receive social welfare including a disabled person's salary, as well as the medical expenses covered by medical insurance for diseases other than ODs. Without a sickness benefit system, social conflict could develop around the recognition of ODs.

## DISCLOSURE

The authors declare that they have no conflicts of interest to disclose.

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**Annexure 1.** Scope of occupational diseases in Enforcement Decree of the Labor Standards Act of the Republic of Korea, Schedule 5, <Amended by Presidential Decree, June 28, 2013>

List of occupational diseases

1. Scope of occupational diseases

A. Diseases caused by occupational injury

B. Diseases caused by physical factors

- 1) Diseases caused by harmful radiations such as X-rays, gamma rays, ultraviolet light, and infrared radiation
- 2) Diseases such as sunstroke, heatstroke, and burns due to hot environments or handling hot objects
- 3) Diseases such as frostbite and hypothermia due to cold environments or handling cold objects
- 4) Diseases such as decompression due to high/low atmospheric pressure or sudden changes in the atmospheric pressure
- 5) Ear diseases due to intense noise
- 6) Diseases due to vibrations
- 7) Nystagmus in underground workers

C. Diseases caused by chemical agents

- 1) Pneumoconiosis and other diseases due to dust
- 2) Cellulitis and other skin diseases due to irritants or allergens such as soot, mineral oil, Chinese lacquer, tar, and cement
- 3) Metal fume fever due to zinc fumes, etc.
- 4) Burns, conjunctivitis, or other diseases due to corrosive or irritant agents such as acid, base, chlorine, fluorine, and phenol
- 5) Poisoning or diseases due to lead, mercury, manganese, arsenic, phosphorus, cadmium, or hydrogen cyanide
- 6) Poisoning and diseases caused by the following chemicals or their compounds
  - a) Chromium, nickel, aluminum, and cobalt
  - b) Organotin
  - c) Nitrogen dioxide or sulfur dioxide
  - d) Hydrogen sulfide
  - e) Carbon disulfide
  - f) Carbon monoxide
  - g) Benzene or its homologues, and nitro- and amino-derivatives
  - h) Organic solvents such as toluene and xylene
  - i) Aliphatic or aromatic hydrocarbons other than g) and h)
  - j) Toxic, irritant, and other hazardous chemicals other than from 2)–5) and from a)–i)

D. Diseases caused by biological agents

- 1) Infectious diseases occurring in healthcare workers in the course of medical procedures
- 2) Leptospirosis occurring in workers working in a wet place
- 3) Tsutsugamushi disease or hemorrhagic fever with renal syndrome occurring in outdoor workers
- 4) Anthrax, erysipelas, etc., occurring in workers handling animals or their carcasses, animal hair and leather, other animal body parts, rags, antiques, etc.

E. Occupational cancer

Cancer caused by carcinogenic agents such as soot, coal tar, coal tar pitch, unrefined mineral oil, hexavalent chromium or its compounds, vinyl chloride, benzene, and asbestos; hepatitis B or C virus; ionizing radiation such as x-rays or gamma rays; inorganic arsenic or its compounds; nickel compounds; cadmium or its compounds; beryllium or its compounds; wood dust; benzidine; beta-naphthylamine; crystalline silica; formaldehyde; 1,3-butadiene; radon-222 or its decay products; ethylene oxide; or spray painting

F. Intestinal hernia due to excessive force and musculoskeletal disorders caused or aggravated by high-risk tasks (or factors)

G. Cerebro- or cardiovascular diseases caused or aggravated by work

H. Post-traumatic stress disorder due to psychological trauma related to work

I. In addition to the diseases listed above (A to H), diseases designated by the Ministry of Employment and Labor in consultation with the Industrial Accident Compensation Insurance and Prevention Deliberation Committee on the basis of the Industrial Accident Compensation Insurance Act, Article 8

J. In addition to A-I listed above, diseases definitely caused by work

**Annexure 2.** Specific criteria for the recognition of occupational diseases in Enforcement Decree of the Industrial Accident Compensation Insurance Act of the Republic of Korea, Schedule 3, <Amended by Presidential Decree, June 28, 2013>

#### List of occupational diseases

1. Diseases of the cerebro- or cardiovascular system  
Intracerebral hemorrhage, subarachnoid hemorrhage, cerebral infarction, myocardial infarction, and dissecting aortic aneurysm caused or aggravated by work
2. Diseases of the musculoskeletal system  
Musculoskeletal disorders of arms, legs, or lower back caused or aggravated by high-risk tasks (or factors)
3. Diseases of the respiratory system
  - A. Asbestosis due to asbestos
  - B. Asthma due to wood dust, grain dust, flour, animal hair dust, antibiotics, chromium or its compounds, diisocyanates, reactive dyes, nickel, cobalt, formaldehyde, aluminum, acid anhydride, and others, or aggravated by work
  - C. Reactive airway dysfunction syndrome due to diisocyanates, chlorine, hydrogen chloride, hydrochloric acid, etc.
  - D. Hypersensitivity pneumonitis due to diisocyanates, epoxy resin, acid anhydride, etc.
  - E. Allergic rhinitis due to wood dust, animal hair, antibiotics, etc.
  - F. Metal fume fever due to metal fumes such as zinc and copper
  - G. Chronic obstructive pulmonary disease due to coal mine dust, cadmium fumes, etc.
  - H. Pneumonia due to manganese or its compounds, chromium or its compounds, cadmium or its compounds, etc.
  - I. Ulceration or perforation of the nasal septum due to chromium or its compounds
  - J. Respiratory diseases such as inflammation of the respiratory tract mucosa due to pyrolysis of synthetic resins, etc.
  - K. Rhinitis due to organic solvents
4. Neurological and mental diseases
  - A. Diseases of the central nervous system (CNS) due to organic solvents
  - B. Peripheral neuropathy
    - a) Peripheral neuropathy due to organic solvents, acrylamide, arsenic, etc.
    - b) Trigeminal nerve palsy due to trichloroethylene
    - c) Anosmia due to cadmium or its compounds
  - C. Disorders of the CNS, peripheral neuropathy, or muscle paralysis due to lead or its compounds (organic leads will be excluded)
  - D. Disorders of the CNS and peripheral neuropathy due to exposure to mercury or its compounds
  - E. Parkinsonism, dystonia, or manganese psychosis due to manganese or its compounds
  - F. Post-traumatic stress disorder due to psychological trauma related to work
5. Diseases of the lymph and hematopoietic system
  - A. One of the following diseases due to benzene exposure
    - 1) Anemia, leukopenia, thrombocytopenia, and pancytopenia
    - 2) Myelodysplastic syndrome or aplastic anemia
  - B. Anemia due to exposure to lead or its compounds (except organic leads)
6. Diseases of the skin
  - A. Contact dermatitis due to soot; mineral oil; Chinese lacquer; cement; tar; chromium or its compounds; organic solvents; mechanical stimulants such as glass fiber; cannabis and substances with irritants; allergic, phototoxic, or photoallergic components; ultraviolet light; etc.
  - B. Vitiligo due to phenols, hydroquinones, and tar
  - C. Erythema multiforme and Stevens-Johnson syndrome due to trichloroethylene
  - D. Chemical burns due to acids or bases
  - E. Chloracne, telangiectasia, and warts due to tar
  - F. Miliria or burns due to working at high temperatures or with hot objects
  - G. Chilblain or frostbite due to working at low temperatures or with cold objects
  - H. Sunburn, chronic actinic dermatitis, or actinic keratosis due to exposure to sunlight while working outdoors
  - I. Skin ulcer or radiation dermatitis due to ionizing radiation
  - J. Cellulitis due to bacterial infection secondary to skin injury at work
  - K. Infectious skin diseases due to working directly with bacteria, viruses, molds, parasites, etc., or with material contaminated by such agents
7. Diseases of the eye and ear
  - A. Cortical cataract or corneal degeneration due to ultraviolet light
  - B. Retinal burns or cataract due to infrared radiations
  - C. Mechanical injuries such as retinal detachment, hemorrhage, perforation due to lasers, or heat injuries such as retinal burns
  - D. Cataract due to microwaves
  - E. Corneal dystrophy or corneal ulcers due to tar
  - F. Conjunctivitis or conjunctival ulcers due to chromium or its compounds
  - G. Mucosal irritation such as keratitis and conjunctivitis due to organic solvents
  - H. Keratitis or conjunctivitis due to diisocyanates
  - I. Mucosal irritation such as keratitis and conjunctivitis due to pyrolysis of synthetic resins (fluoride resin, acrylic resin, or sulfur dioxide)
  - J. Noise-induced hearing impairment  
Sensorineural hearing loss greater than 40 decibels per ear due to noise at work exceeding 85 decibels for 3 years or longer
8. Diseases of the liver
  - A. Toxic hepatitis due to trichloroethylene, dimethylformamide, etc.
  - B. Liver cirrhosis due to vinyl chloride
  - C. Liver diseases occurring, or aggravated, in the course treatment of an existing disease that is recognized as an occupational disease

(continued to the next page)

## Annexure 2. continued

## List of occupational diseases

9. Infectious diseases
  - A. Infectious diseases occurring in healthcare workers or workers in group accommodation facilities, such as blood-borne diseases (hepatitis B, hepatitis C, syphilis, AIDS, etc.), air-borne diseases (tuberculosis, rubella, measles, influenza, etc.), and other infectious diseases (hepatitis A, etc.)
  - B. Leptospirosis occurring due to working in wet places
  - C. Tsutsugamushi disease or hemorrhagic fever with renal syndrome occurring in outdoor workers
  - D. Anthrax, erysipelas, or brucellosis occurring in workers handling animals or their carcasses, animal hair and leather, other animal body parts, rags, antiques, etc.
  - E. Malaria occurring in outdoor workers in an endemic area
  - F. Legionellosis due to contaminated cooling water
  - G. Infectious diseases occurring in laboratory or other workers handling pathogens or materials contaminated by pathogens
10. Occupational cancers
  - A. Lung cancer, malignant mesothelioma, laryngeal cancer, or ovarian cancer due to asbestos
  - B. Lung cancer or nasal cavity or paranasal sinus cancer due to hexavalent chromium or its compounds, and nickel compounds
  - C. Lung cancer due to coal tar pitch, Radon-222 or its decay products, cadmium or its compounds, beryllium or its compounds, and crystalline silica
  - D. Lung cancer or skin cancer due to soot
  - E. Skin cancer due to coal tar and unrefined mineral oil
  - F. Lung cancer, bladder cancer, or skin cancer due to arsenic and inorganic arsenic compounds
  - G. Lung cancer or bladder cancer occurring in spray-coating workers
  - H. Bladder cancer due to benzidine and beta-naphthylamine
  - I. Nasopharyngeal cancer or nasal cavity or paranasal sinus cancer due to wood dust
  - J. Leukemia or multiple myeloma due to benzene
  - K. Leukemia or nasopharyngeal cancer due to formaldehyde
  - L. Leukemia due to 1,3-butadiene
  - M. Lymphoid leukemia due to ethylene oxide
  - N. Hemangioma or hepatocellular carcinoma due to vinyl chloride
  - O. Hepatocellular carcinoma due to hepatitis B or C
  - P. Salivary gland tumor, esophageal cancer, gastric cancer, colon cancer, lung cancer, bone tumor, basal cell carcinoma of skin, breast cancer, renal cell carcinoma, bladder cancer, brain tumor, central nervous system tumor, thyroid cancer, acute lymphoid leukemia, or (acute or chronic) myeloid leukemia due to ionizing radiation
11. Diseases caused by chemical agents
  - A. Acute intoxication
    - 1) Symptoms or signs such as diseases of the CNS due to temporary massive exposure to vinyl chloride, organotin, methyl bromide, and carbon monoxide
    - 2) Symptoms or signs such as lead pallor, abdominal colic, and arthralgia due to lead (except organic lead) or its compounds
    - 3) Symptoms or signs such as chill, high fever, pyorrhea, diarrhea, and proteinuria due to temporary massive exposure to mercury (except organic mercury) or its compounds
    - 4) Symptoms or signs such as impaired renal tubular function, acute tubular necrosis, or acute renal failure due to temporary massive exposure to chromium or its compounds
    - 5) Symptoms or signs such as headache, dizziness, nausea, vomiting, chest tightness, excited state, seizure, delirium, or coma due to temporary massive exposure to benzene
    - 6) Symptoms or signs such as decreased consciousness, seizure, delirium, or arrhythmia due to temporary massive exposure to organic solvents
    - 7) Symptoms or signs such as mucosal irritation, methemoglobinemia, cyanosis, palpitation, and dyspnea due to nitrogen dioxide
    - 8) Symptoms or signs such as loss of consciousness, apnea, pulmonary edema, and olfactory nerve palsy due to sulfur dioxide
    - 9) Symptoms or signs such as mucosal irritation, dyspnea, headache, nausea, and vomiting due to hydrogen cyanide or its compounds
    - 10) Symptoms or signs such as mucosal irritation, chemical burns, cyanosis, dyspnea, pulmonary edema, and arrhythmia due to hydrogen fluoride or hydrofluoric acid
    - 11) Symptoms or signs such as skin ulcer, mucous membrane irritation, seizure, pulmonary edema, disorders of the CNS, or disorders of the autonomic nervous system due to phosphorous or its compounds
    - 12) Acute gastrointestinal diseases due to temporary massive exposure to cadmium or its compounds
  - B. Acro-osteolysis, Raynaud's phenomenon, or scleroderma due to vinyl chloride
  - C. Acute renal failure due to lead (except organic lead) or its compounds, or symptoms or signs of lead intoxication
  - D. Oral diseases such as ulcerative stomatitis, excessive salivation, gingivitis and periodontal abscess, renal damage (glomerulonephritis, etc.), or reddish gray pigmentation of the anterior lens capsule due to mercury (except organic mercury) or its compounds
  - E. Oral mucosal disease or periodontitis due to chromium or its compounds
  - F. Renal tubular disease or osteomalacia due to cadmium or its compounds
  - G. Acute tubular necrosis, chronic renal failure, or systemic sclerosis due to organic solvents
  - H. Carbon disulfide intoxication
12. Diseases caused by physical factors
  - A. Decompression sickness, barotrauma, nitrogen narcosis, oxygen poisoning of the CNS, etc. due to high/low atmospheric pressure or sudden change in the atmospheric pressure
  - B. Chronic conditions such as avascular necrosis of bones due to high atmospheric pressure
  - C. Hypoxic anoxia due to a hypoxic environment
  - D. Raynaud's phenomenon, peripheral circulatory disturbance, peripheral neuropathy, or motor function disorder due to vibrations
  - E. Acute radiation sickness, radiation eye injury (cataract, etc.), radiation pneumonia, or hematopoietic diseases (aplastic anemia, osteonecrosis, etc.)
  - F. Diseases such as sunstroke and heatstroke due to hot environments
  - G. Hypothermia due to cold environments
13. If there is a proximate causal relation between the disease of a worker and his/her work conditions, the disease shall be recognized as an occupational disease