Annexure A

Comments / inputs on the Draft Physical Agents Regulations as proposed by the Department of Employment and Labour.

Kindly provide inputs, corrections and/ or comments in writing on the proposed Draft Physical Agents Regulations in the following format:

Name and Surname:												E- mail		Phone number:
Company name (if applicable)														
Government		Industry		Union		Consultancy		Private		Other				

1	Regulation and/or sub regulation from the draft, referring to	Comment/ Input/ Correction/ Proposal Plus motivation
Will the proposed regulation have an impact on any other regulation? If so, which regulation and what will be the impact?		
2	Regulation and/or sub regulation from the draft, referring to	Comment/ Input/ Correction/ Proposal Plus motivation
Will the proposed regulation have an impact on any other regulation? If so, which regulation and what will be the impact?		
3	Regulation and/or sub regulation from the draft, referring to	Comment/ Input/ Correction/ Proposal Plus motivation
Will the proposed regulation have an impact on any other regulation? If so, which regulation and what will be the impact?		

General comments:	

Signature: _____

Date:_____

Provide inputs to Department of Employment and Labour by e-mailing this completed document to warren.mallon@labour.gov.za and Alukhethi.Munzhedzi@LABOUR.gov.za

Physical Agents Regulations

SCHEDULE

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Definitions

1. In these Regulations any word or expression to which a meaning has been assigned in the Act has the meaning so assigned and, unless the context indicates otherwise-

"action level" means the level of an agent at which specified actions or counter measures which must to be taken;

"air velocity" means the rate of motion of air in a given direction, measured as distance per unit time;

“air temperature” means the temperature of air as determined by a standard thermometer, with units expressed in degrees Celsius (°C);

“artificial ventilation” means the system in which air is caused to circulate through a room by means of a mechanical apparatus which forces air into or extracts air from such a room;

“clothing adjustment factor” means the single number that is added to the environmental WBGT to represent the effects of clothing worn during an activity;

"Chief Director: Provincial Operations" means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003, published as Government Notice R.929 in Gazette No. 25129 of 25 June 2003;

“competent person” means

a) has, in respect of the work or task to be performed, the required knowledge, training and experience in the physical agent and, where applicable, the relevant qualifications specific to the physical agent: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and
b) is familiar with the Act and the applicable regulations made under the Act;

“electromagnetic field” means the static electric, static magnetic and time-varying electric, magnetic and electromagnetic fields with frequencies up to 300 GHz;

“equivalent chill temperature” means the expression of wind-chill reflecting the cooling power of wind on exposed flesh;

“exposure” means the condition of being affected by a physical agent at the workplace, and includes potential, accidental or possible exposure, and exposed has a derivative meaning;

“exposure monitoring” means the systematic process of measuring the magnitude, frequency and duration of exposure to a physical agent;

“flicker” means the perception of visual unsteadiness induced by a light stimulus the luminance or spectral distribution of which fluctuates with time, for a static observer in a static environment;

“glare” means the condition of vision that is caused by luminance that sufficiently exceeds the luminance to which the eyes are adapted and that causes annoyance or discomfort or reduction in visual performance and visibility;

“hand-arm vibration” means the mechanical vibration which is transmitted into the hands and arms during a work activity;

“illuminance” means the expressed amount of light falling upon a surface, and measured in the unit of lux;

“indoor air quality” means the totality of attributes of indoor air that affect a person’s health and wellbeing;

“lighting” means the application of light to a scene, objects or their surroundings so that they may be seen, and illumination has a corresponding meaning;

“natural ventilation” means the movement of air through a building due to natural causes;

“non-ionising radiation” means the series of energy waves composed of oscillating electric and magnetic fields traveling at the speed of light, and includes the spectrum of ultraviolet, visible light, infrared, microwave, radio frequency, and extremely low frequency;

“occupational exposure level” means the limit value set by the Minister for a physical agent in the workplace;

“optical radiation” means the part of the electromagnetic spectrum, and includes infrared radiation, visible light and ultraviolet radiation;

“physical agents” means a source of energy which may result in injury or disease after exposure, and includes, but not limited to cold stress, heat stress, vibration, non-ionising radiation and illumination;

“physical agents risk assessment” means a risk assessment and risk categorisation of potential exposure to a physical agent;

“physical agents technical committee” means a committee established in terms of regulation 18;

“relative humidity” means the ratio of the quantity of water vapour present in the air to the quantity that would saturate it at any specific temperature;

“SANS 10114, part 1” means the South African National Standards’ Code of Practice for interior lighting, part 1: artificial lighting of interiors;

“SANS 10114, part 2” means the South African National Standards’ Code of Practice for interior lighting, part 2: emergency lighting;

“SANS 10389, part 1” means the South African National Standards’ Code of Practice for exterior lighting, part 1: artificial lighting of exterior areas for work and safety;

“SANS 10400, part O” means the South African National Standards’ Code of Practice for the application of the national building regulations, part O: lighting and ventilation;

“SANS 2631” means the South African National Standards’ Code of Practice for interior lighting, part 2: emergency lighting;

“SANS 7243” means the South African National Standards’ Code of Practice for hot environments – estimation of the heat stress on working man, based on the WBGT-Index (wet bulb globe temperature);

“specialised” means working environments or workplaces that may require specialist guidance and analysis of the visual task, application that may result in more special requirements for the illumination of the workplace, task area;

“time weighted average” means a level over a defined period of time to which nearly all workers may be exposed repeatedly, day after day, without adverse effects;

“thermal comfort” means the description of the human satisfactory perception of the thermal environment;

"uniformity of illuminance" means the ratio of the minimal illuminance over the area weighted average illuminance (Ehmin/Ehav) or area weighted maximum illuminance (Ehmin/Ehmax);

"vibration" means the mechanical oscillations of an object about an equilibrium point;

"vulnerable employee" means an employee who is at a higher risk of injury, disease or complications;

"Wet bulb globe temperature Index or WBGT Index" means the combination of the effect of the four main thermal components affecting heat stress: air temperature, humidity, air velocity, and radiation, as measured by the dry bulb (Tdb), natural wet bulb (Tnwb), and globe (Tg) temperatures;

"whole body vibration" means mechanical vibration which is transmitted into the body, when seated or standing, through the supporting surface, during a work activity;

Scope of application

2. (1) These Regulations will apply to:

(a) any employer or self-employed person who carries out work at a workplace, which may expose any person to a physical agent in that workplace; and

(b) a designer, manufacturer, importer or supplier of machinery or plant for use at a workplace.

(2) The provision of regulation 3 shall not apply to a self-employed person.

Information, instruction and training

3. (1) An employer who undertakes work which exposes an employee to a physical agent must inform and consult the relevant health and safety representatives or health and safety committee for that workplace of the intention to conduct:

(a) a physical agents risk assessment contemplated in regulation 6;

(b) physical agents exposure monitoring contemplated in regulation 7; and

(c) a training programme contemplated in sub-regulation (4).

(2) An employer who undertakes work which exposes an employee to a physical agent must inform the relevant health and safety representatives or health and safety committee for that workplace of the intention to conduct medical surveillance contemplated in regulation 8;

(3) An employer must inform the relevant health and safety representatives or health and safety committee for that workplace of the documented outcomes of the:

(a) physical agents risk assessment contemplated in regulation 6;

(b) physical agents exposure monitoring contemplated in regulation 7; and

(c) medical surveillance contemplated in regulation 8.

(4) Every employer who undertakes work which is liable to expose an employee to a physical agent risks must, before any employee is exposed or may be exposed, after consultation with the health and safety committee established for that section of the workplace, establish a training programme, which incorporates the following:
(a) the content and scope of these Regulations;
(b) the potential sources of exposure to a physical agent;
(c) the nature of the physical agent;
(d) the potential risk to health and safety associated with physical agent;
(e) the differing effects of exposure to physical agents to men, women, young employees and vulnerable employees, where such difference may exist;
(f) the control measures that are in place to prevent exposure to a physical agent;
(g) the necessity, correct use, maintenance and limitations of such control measures;
(h) the procedure for reporting physical agent risks to the health and safety representative or employer;
(i) the precautions to be taken by an employee to protect himself against physical agent risks;
(j) the reason for and the outcomes of the physical risk assessment and monitoring of exposure, the necessity for medical surveillance and the long-term benefits of undergoing such surveillance;
(k) the occupational exposure limit for the physical agent and its meaning; and
(l) access to records of physical risk assessment, physical agents exposure monitoring and personal medical records.

(5) The employer must conduct refresher training at intervals that may be recommended by the health and safety committee or the health and safety representative.

Duties of persons exposed to physical agents

4. (1) Any person who is exposed or may be exposed to a physical agent must obey any lawful instruction issued by the employer or self-employed person or by anyone authorised by the employer or self-employed person, regarding:
(a) the use and failure of measures adopted to control physical agents;
(b) cooperation with the employer in determining the employee's exposure to physical agents;
(c) the reporting of potential physical agent risks to the health and safety representative or the employer;
(d) reporting for medical surveillance as required by regulation 8; and
(e) information, instruction and training received as contemplated in regulation 3.

Duties of designers, manufacturers, importers and suppliers

5. (1) Any designer, manufacturer, importer or supplier of machinery or plant for use at work must:
(a) as far as is reasonably practicable, ensure that machinery or plant to minimise the exposure to a physical agent;
(b) as far as is reasonably practicable, supply machinery or plant that can be transported, received, stored and handled in a manner that minimise the exposure to a physical agent;
(c) provide information, instruction and training as deemed necessary to minimise the exposure to a physical agent during use of machinery or plant;
(d) as far as is reasonably practicable, install machinery or plant in a manner that minimise the exposure to a physical agent; and
(e) provide information to potential users on the appropriate maintenance of machinery or plant to ensure safe operation and use.

Physical agents risk assessment

6. (1) An employer or self-employed person must carry out a documented physical agent risk assessment, as far as is reasonably practicable, immediately, by a competent person.

(2) The physical agents risk assessment contemplated in sub-regulation (1) must–

(a) be conducted at intervals not exceeding 24 months; and

(b) includes:

(i) a complete hazard identification;

(ii) the identification of all persons who may be affected by the physical agents risks;

(iii) how employees may be affected by the physical agents risks;

(iv) the analysis and evaluation of the physical agents risks; and

(v) the prioritisation of physical agents risks.

(3) The risk assessment conducted in terms of sub-regulation (1) must take into account specific effects of exposure to men, women, young employees and vulnerable employees, where applicable;

(4) An employer must, in terms of the physical agents risk assessment;

(a) consider the recommendations identified by the competent person in the physical agents risk assessment; and

(b) develop a documented action plan for the implementation of the recommendations.

(5) An employer must review the relevant physical agents risk assessment made in accordance with sub-regulation (1) if:

(a) such assessment is no longer valid;

(b) control measures are no longer effective;

(c) technological or scientific advances allow for more effective control methods;

(d) there has been a change in–

(i) the workplace or work methods;

(ii) the type of work carried out; or

(iii) the type of machinery, plant or personal protective equipment used to control the exposure;

(e) an incident occurs;

(f) medical surveillance reveals an adverse health effect, where a physical agent risk are identified as a contributing factor.

Physical agent exposure monitoring

7. (1) Where a physical agent risk assessment or a review of such assessment indicates that any employee may be exposed to a physical agent at or above a level above the occupational exposure limit, an employer must ensure that a physical agents exposure monitoring programme at that workplace is:

(a) representative of the employees' exposure to a physical agent; and

(b) conducted by a competent person in the identified physical agent;

(2) The physical agents exposure monitoring programme referred to in sub-regulation (1) must include the quantification of exposure levels and comparison to occupational exposure limits for the particular physical agent;

(3) An employer must conduct the physical agents exposure monitoring, referred to in sub-regulation (1), at a frequency determined by the physical agents risk assessment, or at intervals not exceeding 24 months;

(4) An employer must, in terms of physical agents exposure monitoring-

(a) consider the recommendations identified by the competent person in the physical agents exposure monitoring report; and

(b) develop a documented action plan for the implementation of the recommendations.

Medical surveillance

8. (1) An employer shall establish, implement and maintain a documented system of medical surveillance, which is overseen by an occupational medicine practitioner, if;

(a) the physical agents risk assessment or the exposure monitoring for physical agents indicates the need for the employee to be placed under medical surveillance; or

(b) in the opinion of an occupational health practitioner that relevant employees must be under medical surveillance, in which case the employer may call upon an occupational medicine practitioner to ratify the appropriateness of such recommendation; and

(c) there are techniques to identify the disease or adverse health effect, as far as is reasonably practicable;

(2) In order to comply with sub-regulation (1), an employer shall, as far as is reasonably practicable, ensure that the documented system of medical surveillance shall include at least the following:

(a) an initial health evaluation carried out by an occupational health practitioner immediately before a person commences employment or placement, where any exposure exists or may exist of;

(i) an evaluation of the employee's medical, occupational and exposure history;

(ii) an appropriate clinical examination; and

(iii) any other medical test which in the opinion of the occupational health practitioner is necessary in order to enable such practitioner to perform an appropriate evaluation;

(b) a periodic health evaluations of the employee under medical surveillance by an occupational health practitioner, must be performed at intervals corresponding with the health risks and the health status of the employee, but which must not exceed intervals of twenty-four months and consists of

(ii) an appropriate clinical examination; and

(iii) any other medical test which in the opinion of the occupational health practitioner is necessary in order to enable such practitioner to perform an appropriate evaluation; and

(c) an analysis of the health data to identify trends that may indicate adverse health effects of exposure to a physical agent, where the results of the analysis shall be recorded as required by regulation 17;

(d) an exit health evaluations of the employee under medical surveillance by an occupational health practitioner which consists of:

(ii) an appropriate clinical examination; and

(iii) any other medical test which in the opinion of the occupational health practitioner is necessary in order to enable such practitioner to perform an appropriate evaluation;

(3) The documented system of medical surveillance must be approved by an occupational medicine practitioner; and

(4) After concluding the initial or periodic health evaluation, the occupational health practitioner must ensure that the employer is informed, in writing, of the outcome of an employee's health evaluation.

Cold stress

9. (1) Subject to the provisions of sub-regulation (2), no employer must require or permit an employee to work in an environment in which the average environmental equivalent chill temperature taken over a period of four-hours is below 10 degrees Celsius, unless the

employer takes reasonable measures to protect such employee against the cold and further takes all precautions necessary for the health and safety of such employee;

(2) No employer must require or permit an employee to work in an environment in which the average environmental equivalent chill temperature is below 10 degrees Celsius provided that:

(a) the maximum exposure of the employee does not exceed the periods as indicated in table 3;

(b) the employee is provided with dry, whole body personal protective clothing and equipment, with adequate insulation;

(3) The physical agents exposure monitoring programme referred to in regulation 7 (1), must:

(a) take into account both dry-bulb temperature and air velocity, when determining the average environmental equivalent chill temperature;

(b) taken over a period of at least four hours, during the coldest period of an employee's shift; and

(c) is conducted during the coldest quarter of the year, as determined by the physical agents risk assessment.

Heat stress

10. (1) Subject to the provisions of sub-regulation (2), no employer must require or permit an employee to work in an environment in which the time-weighted average WBGT Index, determined over a period of one hour, does not exceed 30;

(2) An employer must, where the time-weighted average WBGT exceeds the action level of 27:

(a) provide training to exposed employees on adverse health effects relating to heat stress exposure and the precautionary measures to be taken; and

(b) subject exposed employees to a heat acclimatisation programme.

(3) No employer must require or permit an employee to work in an environment in which the time-weighted average WBGT Index is above 30, provided that:

(a) appropriate means of ventilation systems are implemented;

(b) a work rest cycle is established and implemented for that workplace;

(c) sufficient amounts of potable water is available at the place of work, in relation to the number of employees exposed;

(d) prompt first aid treatment, specific to adverse health effects from heat stress, is made available; and

(e) the employee is provided with the appropriate personal protective clothing and equipment, taking into account clothing adjustment factor, according to SANS 7243.

(4) The physical agents exposure monitoring programme referred to in regulation 7 (1), must:

(a) be conducted in accordance with the latest version of SANS 7243; and

Lighting

11. (1) An employer must provide illumination in the workplace in the form of either natural light, artificial light or a combination thereof;

(2) An employer must ensure that, as far as reasonably practicable, illumination be provided in the workplace to carry out work, without risk to health and safety by taking into account:

(a) illuminance levels;

(b) glare;

(c) uniformity;

(d) flicker;
(e) hazardous or specialised workplaces; and
(f) hazardous or specialised operations;

(3) With respect to the illumination to be provided in terms of sub-regulation (1), the employers must ensure that:
(a) illuminance provided for the workplace is in accordance with the minimum illuminance values specified:

(i) in table 5 for interior workplaces: Provided that where a workplace is not referenced in table 5, the minimum illuminance levels in table 6 will apply; and

(ii) in table 7 for exterior workplaces of these Regulations: Provided that where a workplace is not referenced in table 7, the minimum illuminance levels in table 8 will apply.
(b) glare within the workplace must not exceed the maximum glare values specified:

(i) in table 5 for interior workplaces: Provided that where a workplace is not referenced in table 5, the maximum glare values must be informed by the physical agents risk assessment; and

(ii) in table 7 for exterior workplaces: Provided that where a workplace is not referenced in table 7, the maximum glare values in table 8 will apply.
(c) the average uniformity of illuminance at any working plane:

(i) for interior workplaces, within five meters of a working plane, is not less than one fifth of the average illuminance on that working plane and on the adjacent floors; and

(ii) for exterior workplaces, must be in accordance with the values listed in table 7: Provided that where a workplace is not referenced in table 7, the average uniformity in table 8 will apply;
(d) flicker in the workplace must be eliminated;
(e) specialised lighting must be required for use in hazardous or specialised workplaces, as identified by the physical agents risk assessment; and
(f) specialised lighting must be required for use in hazardous or specialised operations, as identified by the physical agents risk assessment;

(4) With a view to the emergency evacuation of interior workplaces, every employer must, in such workplaces, provide emergency sources of lighting which are such that, when activated, an illuminance for:
(a) escape route lighting must not be less than 1 lux at floor level;
(b) emergency escape lighting must not be less than 5 lux at floor level to emphasise the existence of potential workplace hazards and the location of safety equipment;
(c) lighting at an emergency exit must not be less than 5 lux at floor level; and
(d) workplaces or operations where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance must not be less than 20 lux at floor level;

(5) An employer shall ensure that the emergency sources of lighting prescribed by sub-regulation (3):
(a) are capable of being activated within:

(i) 25 seconds of the failure of the lighting prescribed by sub-regulation (3) (a), (b) and (c); and

(ii) 0,5 seconds of the failure of the lighting prescribed by sub-regulation 3 (d);
(b) will last long enough to ensure the safe evacuation of the workplace;
(c) are mounted at a height of not less than two meters above floor level and are not aimed between 10° above and 45° below the horizontal line on which they are installed; and
(d) are kept clean, in good working order and tested for efficient operation at intervals of not more than three months;

(6) The lighting measurement and monitoring programme must be conducted according to;

(a) SANS 10114-1, for interior lighting;

(b) SANS 10389-1, for exterior lighting;

(c) SANS 10114-2, for emergency lighting; and

(d) the lighting measurement contemplated in sub-regulation (6)(a), (b) and (c) must be conducted by a competent person;

(7) In order to ensure that lighting levels meet the minimum illumination levels prescribed in sub-regulation (2) (a), an employer must ensure that;

(a) luminaires and lamps are maintained, kept clean, in good working order and must be replaced or repaired when defective; and

(b) windows and other sources of natural lighting are kept clean, replaced and repaired when defective;

(8) An employer engaged in building work shall cause all workplaces where danger may exist through the lack of natural light, to be illuminated such that it will be safe in terms of the physical agents risk assessment.

Indoor air quality

12. (1) An employer must ensure good indoor air quality for a workplace, by:

(a) introducing and distributing the ventilation of air;

(b) controlling airborne contaminants; and

(c) maintaining air temperature, air velocity and relative humidity;

(2) The employer shall ensure that risk from the exposure of employees to hazardous biological, chemical and physical agents impacting indoor air quality is, as far is reasonably practicable, either eliminated at source, diluted through either natural ventilation or an artificial ventilation system or filtered through the use of a filtration system;

(3) The employer must ensure that the artificial ventilation system referred to in sub-regulation (2) complies with the air requirements for different types of occupancies, listed in Part-O of the National Building Regulations, SANS 10400;

(4) The employer must ensure that the artificial ventilation system referred to in sub-regulation (2) is tested, by a competent person, at intervals as per the original manufacturer specifications but not exceeding 24 months;

(5) The employer must ensure that the artificial ventilation system is maintained as per the original manufacturer specifications: Provided that in the absence of the original manufacturer specifications, a risk based approach is undertaken;

(6) The physical agents exposure monitoring referred to in regulation 7(1), must take into account the following parameters:

(a) thermal comfort, including:

(i) Air temperature;

(ii) Air velocity; and

(iii) Relative humidity;

(b) airborne contaminants, including:

(i) carbon monoxide;

(ii) carbon dioxide;

(iii) other applicable hazardous chemical agents;

(iv) mould; and

(v) other applicable hazardous biological agents;

(c) air changes per type of occupancy.

Vibration

13. (1) Subject to the provisions of sub-regulation (2), no employer must require or permit an employee to work in an environment in which the time-weighted average occupational exposure limit, determined over a period of eight hours, does not exceed OEL for hand-arm vibration or whole body vibration, stipulated in table 1;

(2) An employer shall ensure that risk from the exposure of employees to vibration is either eliminated at source or, where this is not reasonably practicable, reduced to as low a level as is reasonably practicable, provided that:

(a) Where it is not reasonably practicable to eliminate risk referred to in sub-regulation (2), and an action level for hand arm vibration or whole body vibration, as stipulated in table 1, is likely to be reached or exceeded, the employer must reduce exposure to as low a level as is reasonably practicable by establishing and implementing:

(i) other working methods which eliminate or reduce exposure to vibration;

(ii) choice of plant and machinery designed to produce the least possible vibration;

(iii) maintenance programmes for plant and machinery, the workplace and workplace systems;

(iv) the design and layout of workplaces, workstations and rest facilities;

(v) provide training to exposed employees on adverse health effects relating to vibration exposure and the precautionary measures to be taken;

(vi) review medical surveillance, physical agents exposure monitoring program and physical agents risk assessment;

(vii) limitation of the duration and magnitude of exposure to vibration;

(viii) appropriate work schedules with adequate rest periods; and

(ix) the provision of clothing to protect employees from cold and damp.

(b) Subject to sub-regulation 2(a), the employer must ensure that employees are not exposed to vibration above an occupational exposure limit, and where such limit is exceeded, must:

(i) reduce exposure to vibration to below the occupational exposure limit;

(ii) identify the reason for that limit being exceeded; and

(iii) modify the control measures taken in accordance with sub-regulation (2)(a) to prevent it being exceeded again;

(3) The physical agents exposure monitoring programme referred to in regulation 7 (1), must:

(a) for whole body vibration, be conducted in accordance with the latest version of SANS 2631;

(b) for hand-arm vibration, for monitoring to be representative of an employee's exposure, it must;

(c) be conducted along each axis for roll, pitch and yaw;

(d) be a minimum of one exposure cycle, normalised to an eight-hour time weighed average. Provided: for the event of multiple sources of vibration, the partial exposure values are combined and normalised to an eight-hour time weighed average;

(e) in the case of plant or machinery which need to be held with both hands, monitoring must be conducted on each hand, whereby the exposure is determined by reference to the higher value of the two; and

(f) be conducted during the coldest period of an employee's shift.

Non-ionising radiation

14. (1) Subject to the provisions of sub-regulation (2), no employer must require or permit an employee to work in an environment in which the time-weighted average occupational exposure limit, does not exceed the occupational exposure limit for the type of non-ionising radiation, stipulated in tables 1 and 2;

(2) An employer must ensure that risk from the exposure of employees to non-ionising radiation is either eliminated at source or, where this is not reasonably practicable, reduced to as low a level as is reasonably practicable;

(3) An employer must ensure that employees are not exposed to non-ionising radiation above an occupational exposure limit, and where such limit is exceeded, must:

(a) reduce exposure to non-ionising radiation to below the occupational exposure limit;

(b) identify the reason for that limit being exceeded; and

(c) modify the control measures taken in to prevent the limit from being exceeded again;

(4) The physical agents exposure monitoring referred to in regulation 7(1), must take into account:

(a) the source of the non-ionising radiation;

(b) the type of non-ionising radiation:

(i) optical radiation; and

(ii) electromagnetic fields

(c) a methodology that is conducted according to an internationally recognised standard for the type of non-ionising radiation;

(5) Signage must be;

(a) provided for:

(i) identified source of the non-ionising radiation; and

(ii) the effect of electromagnetic interference on heart pacemakers;

b) in the form specified in Annexure 1, which:

(i) is clearly visible; and

(ii) with the number of labels, based on the physical agents risk assessment, serving as a warning of exposure.

Control of exposure to physical agents

15. (1) An employer or self-employed person must ensure that the exposure of a person to a physical agent is either prevented or, where this is not reasonably practicable, adequately controlled;

(2) In order to comply with sub-regulation (1), an employer or self-employed person must, as far as is reasonably practicable, reduce exposure to a physical agent to levels below the limits referred to in tables 1 and 2 by implementing a combination of the hierarchy of control measures including, but not limited:

(a) engineering control measures;

(b) administrative control measures; and

(c) the use of personal protective equipment and facilities;

(3) An employer must ensure that an employee who is exposed to a physical agent receives information, instructions and training with regard to the correct inspection and use, and reporting of failures of control measures implemented in sub-regulation (2).

Personal protective equipment and facilities

16. (1) If it is not reasonably practicable to ensure that the exposure of an employee is controlled as contemplated in regulation 15, the employer must provide the employee with suitable personal protective equipment;

(2) Where personal protective equipment is provided, the employer must ensure that:

(a) the relevant personal protective equipment is capable of reducing the exposure to the physical agent concerned;

(b) selection of the relevant personal protective equipment takes into consideration:

(i) the nature of the physical agent;

(ii) the type of work to be done;
(iii) the physical effort required to do the work;
(iv) the length of time it will have to be worn;
(v) the requirements in relation to the work for visibility, comfort and employee communication; and
(vi) compatibility with any other personal protective equipment that may be needed;
(c) information, instructions, training and supervision are provided with regard to the correct inspection, use, care and disposal of the personal protective equipment, to exposed persons;
(d) reusable personal protective equipment is kept in hygienic condition and efficient working order;
(e) the relevant personal protective equipment is readily available to exposed persons;
(f) storage facilities for personal protective equipment are provided when not in use; and
(g) personal protective equipment is used or worn by the worker, by enforcing its use through providing adequate supervision;

(3) The employee must, where there is the requirement to use personal protective equipment as contemplated in sub-regulation (1);
(a) inspect, use, wear, store and dispose of the personal protective equipment in accordance with any information, training or lawful instruction given by the employer;
(b) not intentionally misuse or damage the personal protective equipment; and
(c) immediately inform the employer of any damage, defect, or any need to clean or replace any of the personal protective equipment.

Maintenance of control measures

17. (1) Every employer or self-employed person must ensure that any control measures that are provided for the benefit of employees in compliance with duties assigned under these regulations:
(a) is fully and properly used;
(b) is inspected, maintained in an efficient state, in good working order, repair and cleanliness; and
(c) reviewed for effectiveness, at intervals not exceeding 24-months.

Records

18. (1) An employer or self-employed person must:
(a) keep record of:
(i) training, as contemplated in regulation 3;
(ii) physical agents risk assessments and action plan, as contemplated in regulation 6;
(iii) physical agents exposure monitoring and action plan, as contemplated in regulation 7;
(iv) medical surveillance reports, as contemplated in regulation 8; and
(v) maintenance of control measures, as contemplated in regulation 17;
(b) keep records for a minimum period of–
(i) 40-years for records contemplated in regulations 6, 7 and 8;
(ii) five years for records contemplated in regulations 17;
(iii) the length of time the employee remains at the workplace for records contemplated in regulation 3;
(c) make available to;
(i) the relevant health and safety representative, health and safety committee or to an inspector, the records contemplated in regulations 3, 6, 7 and 17;

(ii) any person, the records contemplated in regulation 8, subject to formal written consent of the employee; and

(d) submit all records, as contemplated in sub-regulation 1(a) to the relevant chief director: provincial operations, when they cease activity.

Physical agents technical committee

19. (1) The Council must, after consultation with the Minister, establish a physical agents technical committee which must consist of:

(a) a chairperson;

(b) one person designated by the chief inspector from the employees of the Department of Employment and Labour;

(c) three persons designated by employer's organisations to represent employers;

(d) three persons designated by employees' organisations to represent the federation of unions;

(e) one person to represent a professional body recognised by the chief inspector;

(f) one person representing a higher educational institution;

(g) one person representing occupational medicine; and

(h) persons who are competent in respect of the matters to be dealt with by the physical agents technical committee who have been co-opted by the committee with the authorisation of the council;

(2) The Council:

(a) must appoint members of the physical agents technical committee for a period that the council may determine at the time of the appointment;

(b) must, after having afforded a member a reasonable opportunity to respond, discharge such a member at any time, for reasons that are fair and just; and

(c) must appoint a new member in the place of a member who is discharged in terms of sub-regulation (2)(b).

(3) The physical agents technical committee must:

(a) advise the Council on physical agents related matters, including, but not limited to, codes, standards and training requirements;

(b) make recommendations and submit reports to the Council regarding any matter to which these Regulations apply;

(c) advise the Council regarding any matter referred to the physical agents technical committee by the Council;

(d) perform any other function for the administration of a provision of these Regulations that may be requested by the Council; and

(e) conduct its work in accordance with the instructions and rules of conduct framed by the Council.

Offences and penalties

20. Any person who contravenes or fails to comply with any provision of regulation 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,14, 15, 16, 17 or 18 shall be guilty of an offence and liable on conviction to a fine or to imprisonment for a maximum of 12 months and, in the case of a continuous offence, to an additional fine of R200 for each day on which the offence continues or additional imprisonment of one day for each day on which the offence continues: Provided that the period of such additional imprisonment shall in no case exceed 90 days.

Annexure 1 - Signage

Beware of non-ionising radiation

Beware of electromagnetic interference on heart pacemaker

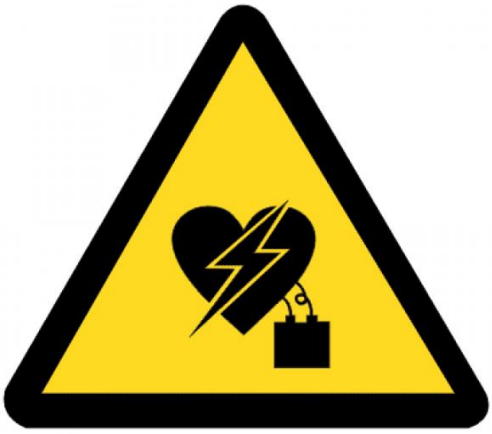

Table 1: Occupational Exposure Limits and Action Levels for Physical Agents.

Physical Agent	Action Level	Occupational Exposure Limit	Unit	Duration	Target organ
Cold Stress	-	10	°C	1-hour	-
Heat Stress	27	30	WBGT	4-hours	-
Hand-arm vibration	2,5	5	m/s^2	8-hours	-
Whole-body vibration	0,5	1,15	m/s^2	8-hours	-

UV-C (Wavelength 270nm)	-	0.1	microwatt per square centimetre ($\mu W/cm^2$)	8-hours	Skin and eye
Infrared (Wavelength 770nm – 3000 nm)	-	10	milliwatt per square centimetre (mW/cm^2)	1000 seconds	Cornea and lens

Table 2: Occupational exposure limits for electromagnetic fields.

Frequency range	**E-field strength (V/m^{-1})**	**H-field strength (A/m^{-1})**	**B-field strength (μT)**	**Equivalent plane wave power density (W/m^{-2})**
Up to 1 Hz	-	1.63×10^5	2×10^5	-
1 to 8 Hz	20 000	$1.63 \times 10^5 / f^2$	$2 \times 10^5 / f^2$	-
8 to 25 Hz	20 000	$2 \times 10^4 / f$	$2.5 \times 10^4 / f$	-
0.025 to 0.82 kHz	$500/f$	$20/f$	$25f$	-
0.82 to 65 kHz	610	24.4	30.7	-
0.065 to 1 MHz	610	$1.6f$	$2.0/f$	-
1 to 10 MHz	$610/f$	$1.6/f$	$2.0/f$	-
10 to 400 MHz	61	0.16	0.2	10
400 to 2 000 MHz	$3f^{-1/2}$	$0.008f^{-1/2}$	$0.01f^{-1/2}$	$f/40$
2 to 300 GHz	37	0.36	0.45	50

Table 3: Cold Stress Exposure period.

Temperature °C	**Maximum exposure**
<10° to -18°	No limit.
Lower than -18° but not lower than -34° degrees	Maximum continuous exposure during each hour = 50 minutes. After every exposure in a low-temperature area at least 10 minutes must be spent, under supervisions, in a comfortably warm environment.

Lower than -34° but not lower lower than -57°	Two periods of 30 minutes each, at least 4 hours apart. Total low-temperature exposure: 1 hour per day.
Lower than -57°	Maximum permissible exposure = 5 minutes during any 8-hour period.

Table 4: Guideline levels for indoor air quality parameters.

IAQ Parameter	**Level**	**Unit**
Air temperature	20 to 28 (dry bulb temperature)	Degrees Celsius
Air velocity	0.1 to 0.8	meters per second (m/s)
Relative humidity	30 to 60	%
Carbon Dioxide	Not exceed the outdoor concentration by more than 600ppm	Parts per million (ppm)
Carbon Monoxide	10	mg/m^3

Table 5: Minimum maintained illuminance values for interior workplaces.

Type of interior, area, task, or activity	**Minimum maintained average illuminance** (lux)	**Maximum glare rating (UGR)**
General building areas		
Entrance halls	100	22
Lounges	200	22
Circulation areas and corridors	100	28
Stairs, escalators and travelators	150	25
Loading ramps/bays	150	25
Canteens	200	22
Rest rooms	100	22
Rooms for physical exercise	300	22
Cloakrooms, washrooms, bathrooms, toilets	200	25
Sick bays	500	19
Rooms for medical attention	500	16
Plant rooms, switch-gear rooms	200	25
Post rooms, switchboards	500	19
Stores, stockrooms, cold stores	100	25
Stores, stockrooms, cold stores (continuously occupied)	200	25

Dispatch packing and handling areas	300	25
Control stations	150	22
Control stations (continuously occupied)	200	22
Abattoirs		
Cold store, casting and stunning pen	150	25
Bleeding area	200	25
Dressing, evisceration, washing tripery and skin sorting	300	25
Inspection and grading	500	25
By-products manufacturing, e.g. digesters, grinding, etc.	200	25
Agriculture		
Loading and operating of goods- handling equipment and machinery	200	25
Feed preparation, utensil washing	200	25
Cutting and sorting of fruit and vegetables	300	25
General work areas	200	25
Bottle inspection	500	22
Bottle filling	500	25
Dispatching	150	25
Airports		
Arrival and departure halls, baggage claim areas	200	22
Connecting areas, escalators, travelators	150	22
Information desks, check-in desks	500	19
Customs and passport control desks	500	19
Waiting areas	200	22
Luggage store rooms	200	28
Security check areas	300	19
Ticket hall and concourse	200	28
Ticket and luggage offices and counters	300	19
Platforms and passenger subways, underpasses	50	28
Testing and repair hangars	500	22
Engine test areas	500	22
Measuring areas in hangars	500	22
Bakeries		
Preparation and baking	300	22
Finishing, glazing and decorating	500	19
Banks		
Counters (see also offices)	500	19
General work areas	500	22
Brewing and distilling		

General work areas	200	25
Brewhouse, bottling and canning plants	300	22
Bottle inspection	500	22
Car parks		
In/out ramps (day)	300	25
In/out ramps (night)	75	25
Traffic lanes	75	25
Parking areas	75	28
Ticket office (manned)	300	19
Ticket vending machine	150	25
Cement, concrete and brick industries		
Drying	50	28
Preparation of materials, work on kilns and mixers	200	28
General machine work	300	25
Rough forms	300	25
Fibrizing, mixing, shredding, agitating, manufacturing of flat sheets, and corrugated sheets and moulded goods (Applies also to gypsum, chalk, and similar products)	300	25
Pipe and pole manufacturing: mixing, spinning, reinforcing, stripping	200	25
Ceramics and glass industry		
Drying	50	28
Furnace rooms, mixing, bending, annealing ovens, forming	200	28
Enamelling, rolling, pressing, shaping simple parts, glazing, glass blowing	300	25
Preparation, general machine work	300	25
Grinding, engraving, glass polishing, shaping precision parts, manufacture of glass instruments	750	19
Decorative work	500	19
Grinding of optical glass, crystal hand grinding and engraving, work on average goods	750	16
Precision work, e.g. decorative grinding, hand painting	1000	16
Manufacture of synthetic precious stones	1500	16
Finishing, bevelling, etching, silvering	500	22
Brilliant cutting	800	19
Inspection – General	300	19

Inspection – Fine	800	19
Clay and pottery		
Grinding, filter pressing, kiln rooms, moulding, pressing, cleaning, trimming, firing	400	25
Enamelling, colouring, decorating	600	19
Chemical, plastics and rubber industries		
Remote-operated processing installations	50	-
Processing installations with limited manual intervention	150	28
Chemical		
Hand furnaces, boiling tanks, stationary driers, or gravity crystallizers	150	22
Mechanical driers	150	22
Evaporators, filtration plants	150	22
Mechanical crystallizing, bleaching	200	22
Extractors, percolators, nitrators, electrolytic cells	200	22
Controls, gauges, valves, etc.	100	22
Control rooms: vertical control panelface (vertical illuminance)	400	19
Control desks	400	19
General work area	150	22
Inspection	1000	19
Plastics		
Processing: calendering, extruding	300	25
Moulding: compression, injection	300	25
Sheet: shaping,	300	25
Trimming, machining, polishing	400	25
Colour matching and inspection	1000	19
Rubber		
Fabric preparation creels	200	25
Dipping, moulding, compounding calenders	500	25
Tyre and tube making	400	25
Curing	400	25
Inspection	1000	19
Churches, mosques, synagogues and temples		
General interior	150	25
Pulpit and lectern areas, chancel, choir	200	22
Altar, communion table	200	22
Vestries	200	22
Courtrooms		
Seating	200	22

Court	500	25
Dye works		
Reception, "grey" perching	600	25
Wet processes	300	22
Dry processes	300	22
Dyers office	800	19
Final perching	2000	16
Educational buildings		
Playschool room	300	19
Nursery class	300	19
Nursery craft room	300	19
Classrooms, tutorial rooms	300	19
Classroom for evening classes and adult education	500	19
Lecture hall	500	19
Chalk board (vertical illuminance)	500	19
Demonstration table	500	19
Demonstration table (in a lecture hall)	750	19
Art and craft rooms	500	19
Art rooms in art schools	750	19
Technical drawing rooms	750	16
Practical rooms and laboratories	500	19
Teaching workshops	500	19
Music practice rooms	500	19
Computer practice rooms	500	19
Language laboratories	300	19
Preparation rooms and workshops	500	22
Student common rooms and assembly halls	200	22
Assembly hall for exams	500	22
Teachers' rooms	300	22
Library shelves, stacks (vertical illuminance)	300	22
Reading tables	400	19
Dormitories	100	25
Corridors and stairs	150	28
Electrical manufacturing		
Cable and wire manufacturing	300	25
Coil winding – large coils	300	25
– medium coils	500	22
– small coils	750	19
Coil impregnating	300	25
Coil and armature processes, general	400	25
Galvanizing	300	25

Assembly – rough, e.g. large transformers	300	25
– medium, e.g. switchboards	500	22
– fine, e.g. telephones	750	19
Precision, e.g. measuring equipment	1000	16
Electronic workshops, testing, adjusting	1500	16
Electricity generating stations		
Turbine halls (operating floor)	300	25
Blowers, auxiliary generators	150	25
Cable, screens, and transformer chambers	100	25
Cable tunnel, covered walkways, storage tanks	50	25
Battery and charging equipmentrooms	150	25
Coal and ash handling	100	28
Boiler rooms	100	28
Boiler front (operating floor)	150	25
Between boilers (operating floor), stairs, galleries, operating platforms, and precipitator high-voltage chamber	150	25
Pulverizers, feeders, ash-plants, conveyors, (tunnel, junction tower)	100	25
Overland conveyor housing walkways	100	25
Boiler house and turbine house basements	150	25
Pump houses and rooms, water treatment plant	150	25
Control rooms, control panel face (vertical illuminance)	300	19
Control desks with visual display units	400	19
Rear of control panels	150	22
Computer rooms	500	19
Switch houses and rooms	200	22
Relay and telecommunicationsrooms	300	25
Nuclear reactors, steam raising plant, reactor areas, boilers, galleries	200	25
Gas circulator bays	200	25
Reactor charge/discharge face	200	25
High-voltage substations (indoor)	200	25
Entertainment		
Cinemas		
Projection room	200	22
Corridors, stairs	150	22
Foyers	100	25

Auditoriums (other than during performances)	100	22
Booking area	300	25
Concert halls		
Foyers	100	25
Auditoriums (other than during performances)	100	25
Platforms	200	
Stairs and corridors	150	22
Booking offices	300	25
Multi-purpose halls		
General	300	22
Theatres		
Foyers	150	25
Auditoriums (other than during performances)	100	25
Corridors, stairs	150	22
Fire stations		
Appliance rooms	150	25
Food industry		
Workplaces and zones in breweries, malting floor, area for washing, barrel filling, cleaning, sieving, peeling, cooking in preserve and chocolate factories, fermentation cellars	200	25
Sorting and washing of products, milling, mixing, packing	300	25
Workplaces and zones in slaughter houses, butcheries, dairies, mills, filtering floors	500	25
Cutting and sorting of fruit and vegetables	300	25
Manufacturing of delicatessen foods, kitchens	500	22
Inspection of glasses and bottles, product control, trimming, sorting, decoration	500	22
Laboratories	500	19
Colour inspection	1000	16
Canning and preserving		
Inspection of produce	500	22
Preparation, kettle areas, mechanical cleaning, dicing, trimming	400	25
Retorts for canned and bottled goods	200	25
High-speed labelling lines	400	25

Can inspection	400	22
Automatic processes	200	25
Sugar refinery		
General workplaces and zones	200	25
Crushing, settling, evaporating, boiling, curing, drying, packing	200	25
Centrifuging, metering, filtering, condensing	200	25
Panning, mixing, drying	300	25
Foundries and metal casting		
Man-size underground tunnels, cellars	50	28
Platforms	100	25
Sand preparation	200	25
Dressing rooms	200	25
Workplaces at cupola and mixer	200	25
Casting bay	200	25
Shake out areas	200	25
Machine moulding	200	25
Hand and core moulding	300	25
Die casting	300	25
Model building	500	22
Furniture industry		
Raw material store	100	25
Finished goods store	100	25
Wood machining and assembly	300	22
Rough sawing and cutting	200	25
Machining, sundry and assembly of components	350	22
Cabinet making		
Veneer sorting and preparation	500	22
Veneer pressing	400	22
Marquetry, inlay work	750	22
Components store	100	25
Fitting, final inspection	500	22
Upholstery		
Cloth inspection	800	22
Filling, covering	500	22
Slipping	500	22
Cutting, sewing	500	22
Mattress making		
Assembly	400	22
Tape edging	500	22
Tool rooms		
General	300	25
Benches	400	22

Spray booth		
Colour finishing	600	22
Clear finishing	400	22
Joinery		
Bench gluing, assembly	300	25
Machine turning, fluting, dressing, rebating, grooving, cutting, sawing, sinking	500	19
Quality control	1000	19
Gas works		
Retort houses, oil gas plants, water gas plants, purifiers, coke screening and coke handling plants	50	28
Governor, meter, compressor, booster, exhauster houses	250	25
Hat making		
Stiffening, braiding, cleaning, refining, forming, pouncing	300	22
Flanging, finishing, ironing	400	22
Inspection	1000	19
General work area	400	22
Health care premises		
Waiting rooms	200	22
Stairs and corridors during the day	200	22
Stairs and corridors at night	50	22
Day rooms	200	22
Casualty and outpatient departments	200	19
Staff office	500	19
Staff rooms	300	19
Wards		
General lighting	100	19
Reading lighting	300	19
Simple examination	300	19
Examination and treatment	1000	19
Night lighting, observation lighting	5	19
Bathrooms and toilets for patients	200	22
Examination room general	500	19
Reading and colour vision test with vision charts	500	16
Scanners with image enhancers and television systems	50	19
Dialysis rooms	500	19
Dermatology rooms	500	19
Dispensaries	400	19
Endoscopy rooms	300	19
Plaster rooms	500	19
Medical baths	300	19

Massage and radiotherapy rooms	300	19
Pre-op and recovery rooms	500	19
Operating theatre	1000	19
Operating cavity	10 000	
Intensive care		
General lighting	100	19
Simple examination	300	19
Examination and treatment	1000	19
Night watch	20	19
Sterilization rooms	300	22
Disinfection rooms	300	22
Autopsy rooms and mortuaries	500	19
Autopsy table and dissecting table	5000	
Dentistry		
General lighting	500	19
At the patient	1000	
Operating cavity	5000	
White teeth matching	5000	
Colour inspection (laboratories)	1000	19
Hosiery and knitwear		
Circular and flat knitting machines, universal winders, cutting out, folding and pressing	400	22
Lock-stitch and overlocking machines	500	22
Mending – Light goods	1000	19
Mending – Dark goods	1500	19
Examining and hand-finishing lightgoods	600	19
Examining and hand-finishing dark goods	1000	19
Linking or running on	500	19
Iron and steel works		
Production plants without manual intervention	50	28
Production plants with occasional manual intervention	150	28
Production plants with continual manual intervention	200	25
Slab store	50	28
Furnaces	200	25
Mill train, coiler, shear line	300	25
Control platforms, control panels	300	22
Testing, measurement and inspection	500	22

Underground man-sized tunnels, belt sections, cellars, etc.	50	28
Slab yards, melting shops, ingot stipping, soaking pits, blast furnaces, work areas, pickling and clearing lines, mechanical pump houses, slabbing and large section rolling mills	100	28
Mould preparation, light section wire and cold strip mills, mill motor rooms, slab and bloom inspection and conditioning, sheet and plate finishing, tinning, galvanizing and roll shops	100	28
Inspection	300	25
Tin plate inspection and pulpits (control rooms)	500	22
General work areas	200	25
Inspection areas		
Rough work, e.g. counting, rough checking of stock parts, etc.	300	25
Medium work, e.g. "go" and "no-go" gauges	400	22
Subassemblies	400	22
Fine work, e.g. radio and telecommunication equipment, calibrated scales, precision mechanisms, instruments	600	19
Very fine work, e.g. gauging and inspection of small intricate parts	1200	19
Minute work	1200	19
Jewellery manufacturing		
Working with precious stones	1500	16
Manufacturing of jewellery	1000	16
Watchmaking (manual)	1500	16
Watchmaking (automatic)	500	19
Fine processes	800	19
Minute processes	4000	10
Gem cutting, polishing	1500	19
Laboratories and test rooms		
General laboratories, balance rooms	500	19
Electrical and electronic instrument laboratories	500	19
Calibration scales, precision mechanical instruments	700	19
Laundries and dry cleaning		
Goods receiving, marking and sorting	300	25

Washing and dry cleaning	300	25
Ironing, pressing	300	25
Inspection and repairs	750	19
Leather industry		
Work on vats, barrels, pits	200	25
Fleshing, skiving, rubbing, tumbling of skins	300	25
Saddlery work, shoe manufacture, sewing, polishing, shaping, cutting, punching	500	22
Sorting and grading	1000	19
Leather dyeing (machine)	500	22
Glove making	500	22
Clicking and closing, preparation operations	800	22
Cutting tables and presses, stitching	1000	22
Bottom stock preparation, lasting and bottom finishing	800	22
Shoe rooms	800	22
Quality control	1000	19
Inspection	1000	16
Libraries		
Shelves and stacks (vertical illuminance)	300	22
Carrels, reading rooms, newspapers and magazines, reading tables, counters	500	19
Binding	500	22
Cataloguing, sorting, stock rooms	300	22
General work areas	300	22
Lifts		
Car interior	100	
Motor room	500	25
Material handling premises		
Wrapping, packing and labelling	200	28
Sorting stock	200	
Metal working and processing		
Open die forging	200	25
Drop forging, welding, cold forming	300	25
Rough and average machining, tolerances > 0,1 mm	300	22
Precision machining, grinding, tolerances < 0,1 mm	500	19
Scribing, inspection	750	19
Wire and pipe drawing, shapes	300	25
Plate machining > 5 mm	200	25
Sheet metal-work < 5 mm	300	25

Tool making, cutting equipment manufacture	750	19
Assembly		
Rough	200	25
Medium	300	25
Fine	500	22
Precision	750	19
Galvanizing	300	25
Surface preparation and painting	750	25
Template and jig making, precision mechanics, micro-mechanics	1000	19
Blacksmith		
General work areas	250	28
Tempering	200	25
Machining and fitting		
Rough bench and machine work	200	28
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	400	25
Plating		
Vats and baths	400	22
Final buffing and polishing	600	22
Sheet metal		
Bench work, pressing, punching, shearing, stamping, spinning	300	25
Sheet inspection	500	25
Structural steel fabrication		
General	200	28
Marking off	400	28
Welding and soldering		
Gas and arc welding	250	28
Medium soldering, brazing and spot welding, e.g. domestic hardware	350	25
Fine soldering and spot welding, e.g. instruments, radio set assembly	800	22
Very fine soldering and spot welding, e.g. printed circuits	1500	19
Museums and art galleries		
General	200	16
Offices		
Entrance halls and reception areas	200	22
Corridors and passages	200	22
Conference rooms, general offices, typing and filing	500	19
Computer and business machine operation	500	19
Copying, circulation, etc.	300	19

Reception desk	300	22
Archives	200	25
Writing, reading, data processing	500	19
Technical drawing	750	16
CAD workstation	500	19
Paint industry		
General automatic processes	200	25
Special batch mixing	400	22
Colour matching	600	19
Paint shops and spray booths		
Rubbing, dipping, ordinary painting, spraying and finishing	400	22
Fine painting, spraying and finishing	700	22
Re-touching and matching	1000	22
Paper industry		
Pulp mills, edge runners	200	25
Paper manufacturing and processing, paper and corrugating machines, cardboard manufacturing	300	25
Paper and board making, machine houses, calendaring, preparation plants, cutting, trimming, finishing	300	25
Inspection and sorting (overhauling)	400	25
Paper converting process, general	300	25
Associated printing	300	22
Paper bag, carton, and box making		
Corrugated boards, cartons, containers and paper box manufacturing	200	25
Coating and laminating process	300	22
Associated printing	300	22
Pharmaceutical and fine chemical		
Raw material storage	200	28
Control laboratories and testing	500	19
Pharmaceuticals manufacturing, grinding, granulating, mixing and drying, tableting, sterilizing and washing	500	25
Preparation of solutions and filling, labelling, capping, inspection	400	25
Fine chemical plant processing	200	25
Fine chemical finishing	500	25
Photographic		
Safety-light darkrooms	10	
Post offices		
Circulation	200	22

Counters	500	22
Sorting of mail	500	25
Printing industry		
Cutting, gilding, embossing, block engraving, work on stones and platens, printing machines, matrix making	500	19
Paper sorting and hand printing	500	19
Type setting, re-touching, lithography	1000	19
Colour inspection in multi-coloured printing	1500	16
Steel and copper engraving	2000	16
Standard bookbinding work, e.g. folding, sorting, gluing, cutting, embossing, sewing	500	22
Type foundries: dressing type, hand and machine casting	300	25
Front assembly, sorting	500	22
Printing plants: machine composition, imposing stones	300	25
Presses	400	25
Composition room	400	19
Proofreading casting	500	19
Electrotyping: block making, electroplating, washing, backing	500	25
Moulding, finishing, routing	400	25
Photoengraving: Block making, etching, masking	400	25
Finishing, routing	500	25
Colour printing: inspection area	1000	19
Refrigeration		
Chilling and cold rooms, ice-making	200	25
Restaurants and hotels		
Reception/cashier desk, porter's desk	300	22
Kitchen	500	22
Restaurant, dining room, function room, bars	200	22
Self-service restaurant	200	22
Buffet	300	22
Conference rooms	500	19
Corridors	100	25
Stairs	150	25
Entrance halls	200	
Lounges	150	19
Bedrooms: general	100	
Dressing table, headboards, etc.	200	

Billiard rooms: general	200	
Card rooms	300	22
Laundries	300	22
Goods and passenger lifts	100	
Cloakrooms and toilets	150	
Bathrooms	100	
Self-service counters	300	22
General work areas	300	22
Retailing		
Sales areas (small)	300	22
Sales areas (large)	500	22
Till area, wrapper table	500	19
General work areas	300	22
Stairs and corridors	200	22
Stockrooms	200	25
Soap manufacturing		
All processes e.g. kettle houses and ancillaries, batch or continuous soap rooting, soap stamping, etc.	300	25
General areas	300	25
Auto processes	200	25
Control panel face (vertical illuminance)	200	25
Product processing and packing	200	25
Telephony		
Manual exchange rooms (on desk)	300	22
Main distribution frame rooms in automatic exchanges	300	25
Battery rooms	150	25
Textile industry		
Workplace and zones in baths, bale opening	200	25
Carding, washing, ironing, drawing, combing, sizing, card cutting, pre-spinning	300	22
Spinning, plying, reeling, winding, warping, weaving, braiding, knitting	500	22
Sewing, fine knitting, taking up stitches	750	22
Manual design, drawing patterns	750	22
Finishing, dyeing	500	22
Drying room	100	28
Automatic fabric printing	500	25
Burling, picking, trimming	1000	19
Colour inspection, fabric control	1000	16
Invisible mending	1500	19

Hand tailoring	1000	19
Cotton or linen		
Bale breaking, blowing, carding	300	25
Roving, slubbing, spinning (ordinary counts), winding, hackling, spreading, cabling	300	22
Warping, slashing, dressing and dyeing, doubling (fancy), spinning (fine counts)	300	25
Healding (drawing in)	800	19
Weaving: patterned cloths	800	19
Weaving: plain "grey" cloths	800	19
Cloth inspection	1000	19
Jute		
Weaving, spinning flat, Jacquard carpet looms, cop winding	300	25
Yarn calender	400	25
Silk or synthetics		
Soaking, fugitive tinting, conditioning or setting of twist	500	25
Spinning	500	25
Winding, twisting, rewinding and coning, quilling, slashing	350	25
Warping	400	25
Healding (drawing in)	800	19
Weaving	800	19
Inspection	1000	19
Woollens		
Preparing, raising, brushing, pressing, backwashing, gilling, grabbing, and blowing	300	25
Blending, carding, combing (white), tentering, drying, cropping	300	25
Spinning, roving, winding, warping, combing (coloured), twisting	500	25
Healding (drawing in)	800	19
Weaving: fine worsteds	800	19
medium worsteds, fine woollens	500	19
heavy woollens	400	19
burling and mending	800	19
Perching: "Grey"	800	19
Finals	2000	19
Tobacco		
Primary manufacturing: weighing, blending, conditioning, threshing, cutting	250	22
Cigarette making machines, filter plug makers	500	22

Catcher (inspection)	1000	22
Hand processes	750	
Cigarette or tobacco packing	600	22
Transport terminals, bus, rail, sea		
Reception areas (desks), customs and immigration halls, lounges, luggage collection, security check	300	22
Check-in counters, customs and passport control	500	22
Circulation, platforms, dispatch	150	25
Vehicle construction/servicing		
Body work and assembly	500	22
Painting, spraying chamber, polishing chamber	750	22
Painting: touch-up, inspection	1000	16
Upholstery manufacture	1000	19
Final inspection	1000	19
General assemblies, chassis assemblies, car assembly, trim shops, body subassemblies	400	25
Final inspection	500	22
Servicing		
Parking areas	50	28
Washing, polishing, greasing	200	25
Servicing pits	200	22
Repairs	350	22
Workbenches	400	22
Fuel pumps	200	28
Warehousing		
Small material, racks, packing and dispatch (vertical illuminance)	200	25
Issue counters	300	25
Loading bays, large material	100	28
Inactive storage and automatic stores	50	28
Woodworking and sawmilling		
Rough sawing and bench work, sizing, planning, rough sanding	250	25
Medium machine and bench work, gluing, cooperage	300	25
Fine bench and machine work, fine sanding and finishing	500	22
Automatic processing, e.g. drying, plywood manufacturing	50	28
Steam pits	150	28
Saw frame	300	25

Table 6: Minimum maintained illuminance values for interior workplaces not listed in Table 5.

Type of area, task or activity	**Illuminance range** (lux)
Outdoor circulation and work areas	20 – 50
Circulation areas, simple orientation or short temporary visits	50 – 150
Rooms not used continuously for working purposes	100 – 200
Tasks with simple visual requirements	200 – 500
Tasks with medium visual requirements	300 – 750
Tasks with demanding visual requirements	500 – 1 000
Tasks with difficult visual requirements	750 – 1 500
Tasks with special visual requirements	1 000 – 2 000
Performance of very exacting visual tasks	> 2 000

Table 7: Minimum maintained illuminance values for exterior workplaces.

Areas to be lit, operation performed	**Minimum maintained average illuminance** (lux)		**Minimum uniformity ratio** Ehmin/ Ehav	**Minimum uniformity ratio** Ehmin/Ehmax	**Maximum glare rating** GRmax.
	Horizontal Ehav	**Vertical** Evav			
Airports					
Apron parking areas	20	20	0,25	0,2	50
Areas adjacent to apron	10		0,25	0,2	50
Taxiway between aprons	5	15	0,25	0,2	50
Building sites					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,4	0,2	50
Accurate work	100		0,4	0,2	45
Fine work	200		0,5	0,2	45
Traffic areas Pedestrian passages, vehicle turning, loading and unloading points	50		0,4	0,2	50

Safety and security General lighting on building site, element mould, timber and steel storage, building foundation hole and working areas on sides ofthe hole	50		0,4	0,2	50
Canals and locks Outport embankment ballasting		1 to 10			
Waiting quays	10		0,25	0,125	50
Locking chamber walls: • Wall height below 10 m • Wall height over 10 m		25			
Filling and service stations					
Entry and exit drive ways: light environment (cities) dark environment	50 20		0,4 0,4	0,2 0,2	45 45
Meter reading area: light environment (cities) dark environment	300 150		0,5 0,5	0,333 0,333	45 45
Air pressure and water checking points and other service areas	75		0,4	0,2	45
Vehicle parking and storage area (see also parking areas)	5		0,25	0,1	50
Harbours					
Work area or task					
Cargo handling, loading and unloading	20		0,25	0,125	55
Coupling of hoses and pipes	50			0,167	50
Traffic area					
Walking passages exclusively for pedestrians	10		0,25	0,125	50
Passengers areas in passenger harbours	50		0,4	0,2	50
Vehicle traffic areas	20		0,4	0,167	45
Dangerous part of walkways and driveways	50		0,4	0,2	45
Safety and security					
General lighting	10		0,25	0,125	50

Medium risk areas	20		0,4	0,167	50
High risk areas	50		0,4	0,2	45
Industrial yards and storage areas					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,40	0,2	50
Accurate work	100		0,50	0,33	45
Fine work	200		0,50	0,33	45
Traffic areas					
Walkways exclusively for pedestrians	5		0,25	0,1	50
Traffic areas for slowly moving vehicles (max. 10 km/h)	10		0,4	0,2	50
Regular vehicle (max. 40 km/h)	20		0,4	0,2	45
Safety and security					
Low risk areas	5		0,25	0,125	55
Medium risk areas	20		0,4	0,167	50
High risk areas	50		0,4	0,2	45
Parking lots					
Parking lots and pedestrian areas					
Light traffic	5		0,25	0,1	55
Medium traffic	10		0,25	0,125	50
Heavy traffic	20		0,25	0,125	55
Vehicle driveways					
Light traffic	5		0,25	0,1	50
Medium traffic	10		0,4	0,167	50
Heavy traffic	20		0,4	0,2	55
Petrochemical industries and other hazardous industries					
Working area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,4	0,2	50
Accurate work	100		0,4	0,2	45
Fine work	200		0,5	0,33	45

Traffic areas					
Walkways exclusively for pedestrians	5		0,25	0,1	50
Traffic areas for slowly moving vehicle traffic (max. 10 km/h)	10		0,4	0,167	50
Regular vehicle traffic (max. 40 km/h)	20		0,4	0,2	45
Safety and security					
Low risk areas	10		0,4	0,167	50
Medium risk areas	20		0,4	0,167	50
High risk areas	50		0,4	0,2	45
Fuel loading and unloading sites	100		0,4	0,2	45
Power, electricity, gas and heat plants					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,4	0,2	50
Accurate work	100		0,4	0,2	45
Fine work	200		0,5	0,33	45
Traffic areas					
Pedestrian movements within electrically safe areas	5		0,25	0,1	50
Traffic areas for slowly moving vehicles traffic (max. 10 km/h)	10		0,4	0,167	50
Regular vehicle traffic (max. 40 km/h)	20		0,4	0,2	45
Safety and security					
Low risk areas	5		0,25	0,1	55
Medium risk areas	20		0,4	0,167	50
High risk areas	50	50	0,4	0,2	45
Railways areas					
Passenger areas					
Open platforms, small stations	10		0,25	0,125	50
Open platforms, medium-size stations	20		0,4	0,33	45
Open platforms, large stations	50		0,4	0,33	45
Covered platforms, small stations	50		0,4	0,33	45
Covered platforms, large stations	100		0,5	0,33	45
Stairs, small and medium-size	50		0,4	0,33	45

stations					
Stairs, large stations	100		0,5	0,33	45
Walkways, small and medium-size stations	20		0,4	0,167	50
Walkways, big stations	50		0,4	0,2	45
Freight areas					
Freight track, temporary, or quick operation	10		0,25	0,125	50
Freight track, continuous operation	20		0,4	0,167	50
Open platforms	20		0,4	0,167	50
Covered platforms, temporary or quick operation	50		0,4	0,33	45
Covered platform, continuous operation	100		0,5	0,33	45
Traffic areas for mobile cranes and cars	20		0,4	0,167	50
Container handling areas	20		0,5	0,167	50
Container storage areas	10		0,25	0,125	50
Track for trailer loading on wagon	20		0,4	0,167	50
Railway yards					
Flat marshalling yards					
switching area	10		0,25	0,125	50
central area of yard, temporary or quick	10		0,4	0,167	50
central area of yard continuous operation	15		0,4	0,2	45
turn-out track, uncoupling area	10		0,5	0,33	50
Retarder marshalling yards					
switching area	10		0,25	0,125	50
central area of yard	15		0,4	0,2	45
Hump area					
wagon inspection pit		100			
uncoupling area	50	20	0,4	0,33	45
hump crest, wagon numbering reading	20	50	0,4	0,33	45
Classification yards					
a) Hard operated wagon rolling, switching and braking					

braking rail with brake shoe	20		0,4	0,33	45
switching area, head end	15				
brake area with brake shoe	15		0,4	0,2	45
b) Automatic wagon rolling and switching					
retarders		50		0,33	45
continuous retarders	15		0,4	0,2	45
switching area, head end	15		0,4	0,2	45
central area of classification yard	15		0,4	0,2	45
Switching area, central area of yard	10		0,25	0,125	50
Tracks on passenger station areas Switching area, central area of yard	10		0,25	0,125	50
Servicing and stabling tracks for cars, trains and locomotives					
passenger car cleaning area	10		0,25	0,125	50
passenger car servicing area	20	20	0,4	0,2	45
passenger car washing area	20	20	0,4	0,2	45
stabling tracks for wagons and cars	5		0,25	0,125	50
Stabling tracks for locomotives	20		0,4	0,2	50
Level crossings	20		0,4	0,2	45
Saw mills					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,4	0,33	50
Accurate work	100		0,4	0,2	45
Fine work	200		0,5	0,33	45
Very fine work	300		0,50	0,25	45
Traffic areas					
Walkways exclusively for pedestrians	5		0,25	0,1	50
Traffic areas for slowly moving vehicle traffic (max. 10 km/h)	10		0,25	0,125	50
Regular vehicle traffic (max. 40 km/h)	20		0,4	0,2	45
Safety and security					

Small risk areas	5		0,25	0,1	55
Medium risk areas	10		0,4	0,167	50
High risk areas	50		0,4	0,2	50
Shipyards and docks					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,25	0,2	50
Accurate work	100		0,4	0,2	45
Fine work, mounting of electrical and mechanical components	200		0,5	0,33	45
Traffic areas					
Walking passages exclusively for pedestrians	5		0,25	0,125	55
Traffic areas for slowly moving (max. 10 km/h)	10		0,4	0,2	50
Regular vehicle traffic (max. 40 km/h)	20		0,4	0,167	50
Safety and security					
General lighting on shipyard area, storage areas for prefabricated goods	20		0,25	0,125	55
Water and sewage plants					
Work area or task					
Very rough work	20		0,25	0,125	55
Rough work	50		0,4	0,2	45
Accurate work	100		0,4	0,2	45
Fine work	200		0,5	0,33	45
Traffic areas					
Walkways exclusively for pedestrians	5		0,25	0,1	55
Traffic areas for slowly moving vehicle traffic (max. 10 km/h)	10		0,40	0,167	55
Regular vehicle traffic (max. 40 km/h)	20		0,40	0,2	45
Safety and security					

Low risk areas	5		0,25	0,1	55
Medium risk area	20		0,4	0,167	50

Table 8: Minimum maintained illuminance values for exterior workplaces not mentioned in Table 7.

Work	**Minimum maintained average horizontal illuminance** Ehav (lux)	**Minimum uniformity ratio**		**Glare limit** GRmax
		Emin/Eav	Emin/Emax.	
Very rough	20	0,25	0,125	55
	20	0,4	0,1666	50
	20	0,4	0,2	45
	20	0,4	0,333	45
	50	0,4	0,2	50
Rough	50	0,4	0,2	45
	50	0,4	0,333	45
Accurate	100	0,4	0,2	45
	100	0,5	0,333	45
Fine	200	0,5	0,333	45