Instructions of Identifying the Types of Sources of Occupational Hazards in the Work Environment and the Necessary Preventive Precautions and Measures issued pursuant to the provisions of Article (79) of Labor Law No. (8) Of 1996 and Article (10) of the Regulation on Occupational Safety and Health and Prevention of Occupational Hazards in Institutions No. (31) Of 2023

Article (1) These instructions shall be cited as (Instructions for Identifying the Types of Sources of Occupational Hazards in the Work Environment and the Necessary Preventive Precautions and Measures of the Year 2023) and shall come into effect from the date of its publication in the Official Gazette.

Article (2) These instructions identify the types of sources of occupational hazards in the work environment and the precautions and measures that shall be undertaken to prevent these hazards and provide a safe and appropriate work environment.

Article (3)

a. The following terms and phrases appearing in these instructions shall have the meaning assigned thereto hereunder unless the context indicates otherwise:

The Law:	Labor Law.
The Ministry:	Ministry of Labor.
The Minister:	Minister of Labor.
Work Environment:	The place and working conditions that fall under the supervision of the institution and where the worker is required to be present for work purposes.
Occupational Hazards:	Potential harm emanating from sources of occupational hazards.

b. The definitions contained in the Law and the Regulations issued pursuant thereto shall be adopted wherever they are stated in these instructions unless the context indicates otherwise.

Article (4)

a. The employer shall identify the occupational hazards in the work environment and those exposed to the hazards, and shall take the necessary precautions and measures to protect workers from:
   1. Machinery and equipment hazards.
   2. Hand tools hazards.
   3. Elevators and lifting equipment hazards.
   4. Working at heights, ladders, and scaffolds hazards.
   5. Working in confined spaces hazards.
   6. Working in excavations hazards.
   7. Boiler hazards.
   8. Electricity hazards.
   9. Fire hazards.
   10. Chemical hazards.
   11. Biological hazards.
   12. Noise hazards.
   13. Vibration hazards.
   14. Lighting hazards.
   15. Heat stress and cold stress hazards.

16. Radiation hazards.
17. Manual handling hazards.
18. Ergonomic hazards (compatibility).
19. Office work hazards.
20. Psychosocial hazards.
21. Any other occupational hazards should be determined by a decision of the Minister.

b. The employer shall involve their workers in the process of identifying occupational hazards and preventive measures.

Article (5) The employer shall take precautions and actions to provide a safe working environment in accordance with the following:

1. Training workers and familiarizing them with the hazards associated with their work to which they may be exposed, and the training must be compatible with the hazards associated with the profession or occupation of the worker, and the necessary measures to prevent them, and this shall be documented in a special registry.
2. Keeping the workplace tidy, clean, and free of any obstacles, and keeping the work floors flat, non-slippery, and free of holes and any obstacles that may cause the risk of tripping, slipping, or falling.
3. Providing drinking water during working hours in sufficient quantities.
4. Disposing of all types of waste in a safe manner and in accordance with relevant applicable legislation(s).
5. Establishing procedures to manage vehicular and pedestrian traffic in the workplace, including separating vehicular traffic from pedestrian traffic through the use of barriers or ground markings.
6. Ensuring good organization when storing materials by marking the locations of the stored materials with clear ground markings and placing them on shelves, provided that the distance between the stored materials and the ceiling is not less than half a meter, while providing safe ladders for storing materials or taking them off the shelves.
7. Providing loading spaces and sloping surfaces/ramps that are proportionate to the dimensions and weights of the loads to be transported.
8. Providing loading areas with at least one exit point.
9. Implementing measures to protect workers and vehicles from falling off sloping surfaces/ramps and loading spaces.
10. Keeping the corridors and staircases in good condition and free of obstacles and installing railings and anti-slips on staircases.
11. Placing appropriate marks at the level of vision on transparent doors to avoid bumping into them.
12. Maintaining the necessary records for the purpose of implementing the provisions of these instructions in accordance with a decision issued by the Minister.
13. If the nature of the work requires obtaining work authorizations, such necessary authorizations must be obtained and must include the following:
    a. Ensuring that the worker is qualified to do the work required.
    b. Ensuring that the worker adheres to all necessary occupational safety and health requirements and wears personal protective equipment suitable to the nature of the work.

c. Ensuring the safety of the work environment.

14. Providing appropriate personal protective equipment to protect workers exposed to hazards and requiring them to wear it wherever it is stated in these instructions, according to Annex No. (1), while ensuring the following:
    a. It must be able to eliminate or reduce the damage resulting from hazards to the permissible safe extent possible to ensure worker protection.
    b. It must comply with Jordan's approved standards and metrologies.
    c. Personal protective equipment should be checked by a qualified person so that it is appropriate and suitable for the worker and for the nature of the work and does not cause any inconvenience to the worker while using it.
    d. Training workers on how to optimally use personal protective equipment, store it correctly, and follow disposal procedures in a safe manner and in accordance with the manufacturer's instructions.
    e. Involving workers in selecting personal protective equipment.
    f. If the worker needs to use more than one type of personal protective equipment simultaneously, the equipment must be compatible and effective against hazards.

Article (6) **<u>Machinery and equipment hazards</u>**

The employer shall identify hazards associated with the use of machinery and equipment and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Selecting the safest machinery, equipment, and technologies.
2. Ensuring that all machinery and equipment are installed and used in a safe manner and guaranteeing the following:
    a. The workplace floor must not be in contact directly with machinery, equipment, raw materials or products and adequate spaces must be left around the machines to allow workers freedom of movement to perform their work and in a way that does not hinder the repair of machinery, or the transportation of materials used in the work.
    b. Connections to power sources must be suitable and safe.
    c. Providing means to lock and isolate the power source from the machine during maintenance operations.
    d. The operation of machinery or equipment does not affect the safety of other working machinery and equipment or the safety of workers.
3. Ensuring that machinery and equipment meet nationally approved safety requirements and standards - if any - and follow international standards in the absence of nationally approved requirements and standards.
4. Committing not to possess, sell, rent, or transfer machinery and equipment which dangerous parts are not provided with adequate protection.
5. Putting in place a maintenance plan and a mechanism to periodically check, examine and test all machinery and their accessories in the workplace, and it shall be implemented by a qualified person and in accordance with the manufacturer's instructions, and the results shall be documented and included in a special logbook for periodic checks and examinations of means of protection.
6. Preparing the necessary instructions, guidelines and warning signs for operating machinery and equipment in comprehensible language for workers and training them to use them safely and place them in visible locations and across various operations areas.

7. Ensuring that the installation and use of the machine or equipment is in accordance with the manufacturer's instructions.
8. Not allowing any worker to operate any machine without its guards in place, and no worker may be requested to operate any machine which guards are not installed in place unless the machine or equipment switched-off, provided that the guards are returned to their place before restarting the machine.
9. When a worker is hired for the first time to operate a dangerous machine or equipment, the worker must receive adequate and appropriate training under the supervision of the direct supervisor.
10. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with machinery and equipment, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (7) **Hand tools hazards**

The employer shall identify hazards associated with the use of hand tools and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Automating or mechanizing the process to the extent possible.
2. Checking hand tools before using them.
3. Using hand tools that are appropriate for the work to be performed correctly to avoid accidents resulting from their use.
4. When making any modifications to hand tools; they should be suitable and safe to use.
5. Maintaining hand tools on a regular basis to keep them in a good and safe working condition.
6. Keeping hand tools in places specially designated for them and not throwing them on the ground or placing them on the edges of machinery or on high surfaces to reduce the risk of tools falling.
7. Establishing clear administrative guidelines regarding the usage, conveyance, entry, and relocation of hand tools to and from the institution.
8. Ensuring that the hand tools used meet the requirements for body compatibility with regard to ease of use, and that their weights and dimensions and handle design are compatible with the abilities of the workers who operate them.
9. Training workers on the use of hand tools and briefing them of their dangers before using them.
10. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with the use of hand tools, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (8) **Elevators and lifting equipment hazards**

The employer shall identify hazards associated with elevators and lifting equipment and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Ensuring that the design, installation, construction, and operation of elevators and lifting equipment are in accordance with relevant applicable legislation(s).
2. Choosing lifting equipment that is compatible with the nature of the work and the environmental conditions to avoid breakage, corrosion, or any damage and to provide an appropriate Safety Factor.
3. Taking effective and appropriate measures to resist overturning and to ensure adequate stability of the lifting equipment.

4. If the lifting equipment is intended for lifting people, it must be differentiated from other lifting equipment by special signs and must ensure the following:
    a. All people-lifting equipment must be equipped to protect the person using it from getting crushed, trapped, collided with, or falling off, in a manner that ensures they are not exposed to danger and that they can quickly exit in a safe manner, and the equipment must be fitted with proper devices to prevent the risk of the platform falling (In cases where this is not possible, the platform must be secured with a rope or chain reinforced with a safety factor, and the rope or chain must be examined by a qualified person upon each use).
    b. Placing or installing lifting equipment in a manner that ensures non-exposure to the risk of collision, falling, crushing, drifting or similar incidents.
5. Setting barriers and signs to identify the work area of the lifting equipment to ensure that people do not collide with the lifting equipment or be exposed to the risk of falling objects.
6. Developing an action plan for each lifting operation by a qualified person, with appropriate supervision to implement it safely.
7. Placing an illustrative card showing the capacity and load of the elevator or load-lifting equipment and its accessories to ensure that they are used safely and in accordance with the manufacturer's instructions.
8. Shutting down elevators and lifting equipment and preventing access to them or operating them in the event of a work accident resulting from their use or if part of them is damaged. Moreover, elevators and lifting equipment must be examined by a qualified person and the findings must be recorded.
9. Developing a maintenance plan and a mechanism to check, examine, and test all elevators and lifting equipment in the workplace by a qualified person, and these procedures must be carried out periodically and in accordance with the manufacturer's instruction, and must ensure that any defects are repaired appropriately and that all findings are fully documented.
10. The inspection process must be repeated if the equipment is moved, or in the event of any exceptional circumstances that would jeopardize the safety of elevators and lifting equipment, or if they are used for the first time, re-assembled, or have recurring malfunctions, and whenever necessary.
11. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with the use of elevators and lifting equipment, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (9) **<u>Hazards of working at heights, on ladders, and scaffolds</u>**

The employer shall identify hazards associated with working at heights, on ladders, and scaffolds, and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Avoiding working at heights, on ladders, and scaffolds, or minimizing it by using safer alternative methods to the extent possible.
2. If it is not possible to avoid working at heights, on ladders, and scaffolds, work must be carried out in accordance with the following requirements:
    a. Designing and building scaffolds, ladders and all equipment used for work in a manner that they are safe and suitable for workloads, people, and equipment, and for any additional loads in accordance with relevant legislation(s).

b. Ensuring that decks/surfaces and walls are securely and appropriately fenced to prevent people from falling through openings in surfaces decks/surfaces and walls.
c. Installing railings to protect workers from falling and installing ledges and other similar barriers to prevent objects from falling from the work deck/surface.
d. Following the manufacturer's instructions and any printed instructions or manuals prepared for installers and users, and performing engineering design calculations for any design that differs from the manufacturer's design.
e. Work platforms and scaffolds flooring must be of a width and strength proportional to the nature of the work, materials used, and movement. Also, they must be supported and securely fitted to prevent movement, and must not contain any holes or cracks.
f. Placing instruction signs indicating the maximum loads that are considered safe for all equipment, such as ladders, scaffolds, and mobile elevated work platforms.
g. Placing illustration cards on ladders or scaffolds indicating the date of the last check and that they are safe for use.
h. Providing protection for workers who are exposed to the risk of falling from high places, ladders or scaffolds or to the risk of falling objects by providing means of Collective Protection; including but not limited to, safe work platforms, guardrails and barriers and safety nets designed by a qualified person; and training workers on the correct use of means of protection and the steps they must follow when using them, and ensuring that the instructions are written in a comprehensible language for workers.

3. Workers who work at heights that expose them to the risk of falling must be provided with a safety harness to protect against the risk of falling, taking into consideration the following conditions:
    a. Both the hired worker and the rest of the workers present at the worksite must have received appropriate and adequate training to carry out their work.
    b. The safety harness that protects people from falling must be suitable, fitting, and of sufficient strength and durability for the purpose for which it was designed and for the loads it is expected to carry and must be compatible and fitting for the person using it, and properly and correctly fastened.
    c. The fastening devices must be suitable and of sufficient strength and durability and must be securely installed.
4. If it is possible to control the fall, for example by stopping the fall with a harness, a plan must be developed to enable the worker to be rescued and evacuated to a safe place in a timely manner to prevent injury from the worker remaining suspended.
5. Keeping any information related to the design, installation or use of equipment used for working at heights within a special record that is easy to refer to.
6. Surrounding the workplace with a sturdy and secure fence and placing warning signs on it to prevent unauthorized persons from entering.
7. **When using ladders, the following must be taken into consideration:**

a. The ladder must be suitable for the purpose for which it is to be used, considering other risks arising from the work, such as the use of special ladders that are not electrically conductive where electricity is a hazard.
b. The ladder must be designed and constructed of a suitable and sturdy structure to accommodate the weight of the person and any intended tools or loads.
c. Ladders of all types must be stored and moved in a proper manner to avoid damage, their safety must be ensured before use, and the manufacturer's instructions must be followed when using them.
d. Ladders should be placed on a solid, level ground and set up at an angle of 1:4 (75 degrees) so that they are secured and fitted from the base or tied from the top or by a person holding the ladder in a way that prevents slipping when in use, and the workspace must be enclosed to prevent any moving object from colliding with it.
e. Maintaining three points of contact throughout the work on the ladder.
f. The length of the ladder must be suitable, with a height of one meter above the work platform, so that the worker can safely ascend and descend to and from the work platform.
g. There should not be more than one person on the ladder at the same time.
h. Ensuring that all ladders used are safe after they have been checked by a qualified person, and documenting this in a special log for this purpose, and that includes periodic checks and tests of the means of protection.

8. When using scaffolds, the following must be taken into consideration:

a. Using steps or ramps/sloping surfaces to reach the scaffold instead of ladders whenever possible, especially if the work requires lifting a load.
b. The scaffold must be designed, installed, modified or dismantled by a qualified person.
c. Ensuring that all scaffolds used and their annexes, such as ladders, are safe after being checked by a qualified person and documenting this in a special log for this purpose, and that includes periodic checks and tests of the means of protection.
d. All types of scaffolding must be stable on a solid, flat surface and fitted with an additional weight at the base in accordance with the manufacturer's instructions or tied down if necessary. In the case of wheeled scaffolds, the wheels must have a secure lock when in use, and they must only be moved from underneath without anyone being on top of them.

9. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with working at heights, on ladders, and scaffolds, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (10) **<u>Working in confined spaces hazards</u>**

The employer shall identify hazards associated with working in confined spaces - spaces that are of a closed nature and limited means for entry and/or exit, which may lead to the accumulation of toxic, combustible or flammable materials, or a lack of oxygen in them - and those exposed to these hazards, and shall take the necessary precautions and measures to protect workers as follows:

1. Designing the workplace in a way that it is not confined and accessible through multiple entry points to the extent possible.

2. Using a method, technology, or mechanism to avoid workers entering the confined workspace to the extent possible, such as remote control, using devices or robots for this purpose, or conducting checks using cameras.
3. If it is not possible to avoid working in confined spaces, work must be carried out in accordance with the following requirements:
   a. Detecting the lack or increase in oxygen and the concentration of fumes, vapors, toxic gases, flammable or explosive materials, and the detection must be carried out by a qualified person and using calibrated devices throughout the work period.
   b. Taking appropriate and adequate measures for fire prevention and control.
   c. Providing additional ventilation or air conditioning systems to avoid excessive low or high temperatures that may arise from the ongoing process in the confined space.
   d. Controlling the flow of liquid, solid and gaseous materials and providing the necessary equipment to protect workers from engulfment, drowning or suffocating.
   e. Providing an effective communication mechanism with the workers in the confined space by means of an appropriate communication system and a specialized person (an external observer) who communicates with the workers and is not assigned any tasks other than monitoring in order to act in emergency situations.
   f. Ensuring continued assessment of confined workplaces, identifying the hazards and those exposed to them, and ensuring the necessary precautions and measures and safe work procedures, such as issuing work authorizations to protect workers every time they enter the confined space, in order to ensure a safe working environment throughout the period of work in the confined space, in accordance with what is stated in Clause (13) of Article (5) of these instructions.
   g. Ensuring the fitness and ability of workers to work in confined spaces, training them to work in such places, and briefing them on the hazards of the profession.
   h. Implementing a rotation system for workers in confined spaces to reduce their exposure to the risks of working in confined spaces for long periods.
   i. The safety procedures of the organization must contain emergency plan and special procedures for evacuating, rescuing and salvaging workers in confined spaces while ensuring the safety of the competent rescue team.
4. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with working in confined spaces, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (11) **Hazards of working in excavations**

The employer shall identify hazards associated with excavations and those exposed to them, and shall take the necessary precautions and measures to protect workers from these hazards as follows:

1. Avoiding working inside the excavation or conducting the excavation process by using an alternative mechanism or technology to the extent possible.
2. If it is not possible to avoid working inside the excavation or carrying out the excavation process, work must be carried out in accordance with the following

requirements, taking into consideration the relevant legislation(s) in force when carrying out excavations:

a. Conducting excavation work while ensuring the prevention of any cave-ins by creating slopes or an appropriate support system to reduce potential risks to workers working in the excavation and to equipment in the vicinity or surrounding the excavation, such as scaffolds, structures, and machinery.
b. Providing safe means of entry and exit to and from the excavation.
c. Detecting infrastructure services in coordination with the relevant authorities prior to initiating drilling work and taking measures to protect workers from any damage resulting from it.
d. Controlling the entry of water into excavations, including procedures for dealing with instability of the support system due to water flow.
e. Surrounding the excavation with a durable and secure fencing, posting warning signs on it, and providing appropriate lighting to help identify those excavations at night, and taking appropriate measures to prevent vehicles from falling into the excavation.
f. Ensuring the continued assessment of the excavation site, identifying hazards and those exposed to them, and ensuring the necessary precautions, measures and safe work procedures, such as issuing work authorizations in accordance with what is stated in Clause (13) of Article (5) of these instructions in order to protect workers, and checking the excavation and ensuring the presence of good ventilation and support system by a qualified person before initiating work at each work shift, to ensure a safe working environment throughout the period of work in the excavation.

3. Training excavation workers and briefing them on the hazards associated with their occupation.

4. Providing appropriate personal protective equipment to protect workers exposed to the hazards of working in excavations, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (12) **Boiler Hazards**

The employer shall identify hazards associated with boilers and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Avoiding using boilers and replacing them with other safer methods or mechanisms to the extent possible.
2. Boilers must be designed, installed, operated, and checked by a qualified and trained person, and must be installed and positioned in the appropriate place in a manner that prevents overturning or spilling and protects the boilers from damage, and in accordance with the manufacturer's instructions.
3. Avoiding hazards resulting from the type of fuel used to operate boilers and adhering to measuring the concentrations of gases resulting from fuel combustion periodically, at least once a year.
4. Taking appropriate measures to ensure that the ventilation system is suitable and that combustion residues are safely disposed of.
5. All boilers must have an alarm and fire suppression system and appropriate measures to detect, prevent and combat fires in accordance with relevant legislation(s) and codes.

6. Ensuring that there is a manual shut-off mechanism for boilers in the event of a fire or high temperature.
7. Posting clear signs on boiler controls to facilitate access by concerned persons.
8. Placing protective barriers to prevent contact with hot surfaces that may cause harm.
9. Ensuring that there is an automatic safety valve to regulate pressure and relieve excess pressure in a safe manner and maintaining the valve at least every six months and whenever necessary.
10. Checking and maintaining boilers periodically by a qualified and trained person, taking into consideration the expected operational life of the boilers and in accordance with the manufacturer's instructions, at least once a year, provided that a special log is created in which the date of the check, the name of the person who conducted it, and their notes are recorded.
11. Developing the necessary operating instructions, guidelines and warning signs in a comprehensible language for workers and training to use them safely.
12. Designating a separate, suitable room for boilers and not using it for other purposes, such as storage, in accordance with relevant legislation(s) and codes.
13. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with boilers, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (13) **Electricity hazards**

The employer shall identify hazards associated with electricity and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Choosing electrical connections, devices, and equipment that are less hazardous to workers, as follows:
   a. Any electrical device, machinery, cables, wires, connections, or switches must be of the type approved for use in accordance with the approved standard metrological specifications appropriate to the conditions and nature of the workplace.
   b. Their capacity must be compatible with the electrical system to which they will be connected to avoid hazards resulting from their breakdown, taking into consideration the ability of electrical connections, devices, and equipment to withstand any expected increase in the electrical load in the future.

2. Providing the necessary protection for electrical devices and equipment from mechanical impacts, natural factors, humidity, dirt, dust, and other factors that lead to damage to any of its parts.

3. All electrically operated machinery, equipment and tools must be equipped with a switch to cut off the electrical current, provided that these switches are secure and appropriate to the nature of the work in its various locations, and located in visible places that can be easily reached in the event of an emergency.

4. Any electrical device or machinery must be operated in a safe manner that prevents electrical short circuits from occurring to prevent electrical hazards.

5. Taking the necessary measures to avoid working near live conductors to the extent possible, and providing appropriate means of protection in cases that require working near these conductors.

6. Covering all conductors with an insulating and effectively protected material to prevent hazard, or placing and maintaining them in a way that prevents hazards to the greatest extent practically possible. Likewise, equipment and tools used for electrical maintenance purposes must be insulated against electrical short circuits.
7. Providing an outline that specifies the paths of underground cables and taking all necessary preventive measures to ensure the safety of workers when carrying out excavation work.
8. Providing efficient and appropriately specified means of disconnecting the electrical voltage from any part of the electrical system to the extent necessary to avoid the hazard.
9. Providing effective means to prevent the electrical current intensity from increasing beyond safe values in every part of the electrical system.
10. Taking the necessary precautions to protect workers from electrical hazards associated with electric shocks and arcs, and providing them with the necessary means of prevention and rescue.
11. Electricity distribution panels must meet the following requirements:
    a. Electricity distribution panels must be installed in a safe place and connected to all electrical devices or circuits in a safe manner, and access to them must be prohibited except to the authorized person, with warning signs placed to indicate their presence.
    b. The process of controlling electrical circuits through these panels should be user friendly, and all parts that need to be adjusted should be within the reach of the worker in charge of doing so.
    c. The route of each conductor should be easy to track in case of necessity.
    d. Installing automatic circuit breakers to cut off the current in the event of any voltage surge or electrical short circuit.
    e. The floor space under the electrical distribution and control panels must be insulated to protect any worker near them.
    f. Providing a suitable, adequate, and continuous lighting source where electrical panels are located; to provide safety and security for workers performing maintenance in the event of electrical current disconnection.
    g. The main electrical distribution and control panels must be embedded with warning light signals that indicate that the device or machine is connected to electricity and warn of any electrical malfunction to identify it quickly and facilitate the necessary maintenance operations.
12. Taking the necessary procedures and measures to prevent explosions and fires resulting from electrical hazards, including:
    a. All conductors and devices located in a flammable environment or in an explosive atmosphere must be designed or equipped with adequate protective means to prevent hazards resulting from such inflammation or explosion and in accordance with the approved standard specifications.
    b. Using explosion-proof lighting can contain any sparks inside and prevent any sparks escaping into the surrounding atmosphere and causing a fire, especially in places where flammable gases and vapors accumulate.
    c. Providing various necessary equipment and supplies that are suitable for fighting fires resulting from electrical hazards and training workers to use them.

13. Grounding electrical connections and equipment or applying any appropriate method to avoid exposure to electric shocks during work, and ensuring the integrity of the electrical conductors that are used for grounding, and ensuring the grounding of all parts that do not carry electrical currents and that are feared to be easy to charge electrically.
14. Conducting a periodic check of all cables, wires, connections, and electrical devices, and carrying out the necessary repairs and periodic checks to ensure that they are always in good condition, provided that any defect discovered is repaired immediately. Before performing maintenance on the electrical wirings or equipment, the following is taken into consideration :
    a. Obtaining work authorizations in accordance with what is stated in Clause (13) of Article (5) of these instructions and ensuring that all necessary preventive measures are taken to avoid maintenance work having a negative impact on the safety of other workers.
    b. Placing a warning sign indicating that maintenance work is being carried out.
    c. Disconnecting the electrical current from the electrical equipment and devices to be maintained and isolating them from the power source.
    d. Grounding electrical equipment and devices to be maintained.
    e. Taking precautions to prevent electricity from accidentally reaching equipment and devices during maintenance.
    f. Testing each circuit before performing maintenance work to ensure that the power has been disconnected from it.
    g. Taking all necessary precautions to reconnect electrical equipment and devices to the power source after maintaining them.
15. Developing written work procedures to deal with every process that could expose the worker to hazards resulting from electricity, in a manner clarifying the safety requirements that must be taken step by step before, during, and after completing the work, and they should be disseminated in visible places in work sites that include such operations, and all workers are required to adhere to them while working.
16. Taking all measures to prevent hazards associated with static electricity, and developing prevention programs based on the findings of a detailed assessment of the conditions and situations in which static electricity is generated or accumulated, and conducting an assessment of the intensity of electrostatic fields in all cases that require this.
17. Taking the necessary measures and precautions at work sites to prevent hazards associated with lightning, based on the findings of a detailed assessment of the conditions and situations in which they may occur.
18. Installing electrical devices, machines, and connections in an appropriate and safe manner, and checking that they are operating properly and safely on a regular basis by a qualified person for this purpose and recording the findings in a special log kept by the institution.
19. Posting instructional and warning signs in a prominent and visible place to prevent electrical hazards, and placing the necessary cautionary signs clearly in hazardous work sites.

20. Placing cautionary instructions next to high-current devices and connectors, indicating the current going through them, provided that they are clear and easy to read.
21. Taking preventive measures and precautions against the hazards of high voltage, taking into account the necessary technical conditions, whether in power plants, electrical transformers or electrical power transmission networks, and put up warning signs indicating the existence of high voltage, and take the necessary measures to minimize the need to enter them, providing as many possibilities as possible for external control of the equipment, and prevent access to the substation except for authorized persons and through the designated entrance, taking into account what is stated in article (5), paragraph (13) of these instructions, and prohibit the use of metal ladders or uninsulated hand tools when working on electrical equipment inside the substation.
22. Providing workers with appropriate personal protective equipment to prevent electrical hazards, and training workers in the use, preserve and maintenance of such equipment, obliging workers to use such equipment, considering what is stated in clause (14) of Article (5) of these instructions.

Article (14) **Fire hazards**

The employer shall list hazardous materials that are flammable and/or explosive, such as solvents, paints, gases, fuels, resins, adhesives, and some dusts, such as sawdust (wood dust), and dust from food material, etc., and shall determine the conditions that lead to their ignition, and identify the sources of ignition and the hazards resulting from fires and those exposed to them, and shall take the necessary precautions and measures to protect workers, taking into consideration the relevant legislation(s) and codes, as follows:

1. Removing flammable and/or explosive hazardous materials or removing potential sources of ignition to the extent possible.
2. Replacing flammable/explosive materials with less flammable/explosive materials to the extent possible.
3. Reducing the amount of flammable/explosive materials stored on site to the extent possible.
4. Separating sources of ignition from flammable/explosive materials.
5. Selecting equipment that does not serve as an ignition source to the extent possible.
6. Selecting and installing explosion-proof equipment in accordance with international standards approved by the relevant authorities when working in potentially explosive conditions.
7. Storing gas cylinders in a well-ventilated place away from heat sources and taking safety precautions when moving and using them.
8. Committing to storing flammable and/or explosive materials according to the instructions contained in the chemical Safety Data Sheet for chemicals used during work.
9. Taking the necessary precautions to prevent the leakage or volatilization of flammable/explosive materials.
10. Ensuring regular maintenance of machinery to avoid fires caused by electricity.
11. Taking precautions to prevent ignition caused by static electricity.
12. Installing suitable ventilation systems to dilute or eliminate flammable gases or vapors.

13. Maintaining cleanliness and order constantly and preventing the accumulation of flammable waste in all work sites.
14. Whether fixed or mobile, the extinguishing devices and tools used must meet the standards and specifications for fire extinguishers, be filled in accordance with the decision made by the relevant authorities (in accordance with the relevant legislation(s) and codes), and be placed in conspicuous, easily accessible locations. Additionally, it must be ensured that the extinguishing means are permanently fit for use, are periodically inspected in accordance with the decision made by the relevant authorities and are repaired and replaced as needed.
15. Providing the necessary firefighting and protective equipment using the latest means, such as providing alarm, warning, isolation, and automatic extinguishing systems whenever possible based on decisions made by the relevant authorities (in accordance with the relevant legislation and codes).
16. Taking measures to designate assembly points and emergency exits and ensuring that the exits and corridors leading to them are obstacles-free, with illuminated signs to indicate them.
17. Training enough workers to use firefighting means to ensure proper conduct when a fire breaks out.
18. Conducting firefighting and evacuation drills at least once a year.
19. Ensuring keeping documented records of all individuals present in the workplace, at all times, to the extent possible, so that they can be counted in emergency situations.
20. Prohibiting smoking outside designated areas, with signage indicating these areas, taking into consideration relevant legislation(s).
21. Adhering to issuing work authorizations in accordance with what is stated in Clause (13) of Article (5) of these instructions for any hot processes such as welding.
22. Reducing the number of people working in high-risk work areas in terms of the possibility of fire occurrence.
23. Providing appropriate personal protective equipment to protect workers exposed to fire hazards, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (15) Chemical hazards

The employer shall identify the hazards associated with chemicals and dusts in the workplace, and conduct the necessary measurements of chemical elements and dusts depending on the nature of the work, and identify those exposed to these hazards and take the necessary precautions and measures to protect workers and ensure they do not exceed the permissible limits, according to Annex No. (2) of these instructions and any updates thereto that are made by a decision issued by the Minister for this purpose, based on the recommendation of the Occupational Safety and Health Directorate in the Ministry, as follows:

1. Avoiding the use of hazardous chemicals to the extent possible.
2. Replacing hazardous chemicals with less hazardous alternatives to the extent possible.
3. Minimizing contact with hazardous chemicals and dusts to the extent possible and taking measures to prevent workers from injury or health effects, and isolating any process that uses or produces hazardous chemicals or dusts to the extent possible.

4. Providing sufficient ventilation to ensure the presence of fresh and healthy air in the workplace and disposing of dust, gases, and other harmful substances from their sources, such as using suction devices or installing an industrial ventilation system.
5. Developing a log of all chemicals in the institution, their quantities, and indicating their hazard level.
6. Following the instructions contained in the chemical Safety Data Sheet for chemicals used during work.
7. Adhering to all necessary requirements for the handling and storing processes and placing chemicals in appropriate containers according to the instructions in the Safety Data Sheet.
8. Using hazardous chemicals only for their intended purpose.
9. Label each container with chemicals inside to specify the name of the substance, chemical composition, trade name, and hazard classification according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
10. Taking necessary precautions to prevent spillage and leakage of chemicals and providing containment basins and spillage handling kits.
11. Providing eye wash utilities or tools for cleaning the eyes or any parts of the body that may be exposed to chemicals.
12. Taking into consideration chemical risks when developing the contingency plan of the institution.
13. Prohibiting eating and drinking while working with chemicals or in places where they are present.
14. Allowing only authorized persons to enter the high-risk area where workers may be exposed to chemical hazards, reducing the number of workers exposed to high-risk chemicals, reducing exposure hours, and implementing a rotation system for workers to reduce their exposure to chemical hazards to the extent possible.
15. Introducing workers to the methods of using chemicals and their safety data and training them on methods of preventing the risks associated with them.
16. Conducting the necessary measurements of chemical factors in the workplace depending on the nature of the work and keeping the findings in a special log.
17. Providing appropriate personal protective equipment to protect workers exposed to chemical hazards, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (16) **Biological hazards**

The employer shall identify biological hazards and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Eliminating the source of biological hazards contamination source to the extent possible.

2. If it is not possible to eliminate the source of biological hazards contamination, work must be carried out in accordance with the following requirements:

a. Providing appropriate isolation methods for high-risk biological hazards to protect workers from infection with bacteria, viruses, fungi, parasites, etc.
b. Providing a ventilation system to ensure a safe working environment.
c. Implementing safe handling, storage, assembly, transportation, and maintenance procedures, and disposing of biological hazards in proper ways in accordance with the relevant applicable legislation(s).

d. Using sterilizers and disinfectants to eliminate microorganisms on surfaces.
e. Providing the necessary utilities and materials for sterilization or disinfection to get rid of contaminants.
f. Prohibiting eating and drinking in areas where there may be exposure to biological hazards.
g. Taking into consideration biological hazards when developing the emergency plan of the institution.
h. Allowing only authorized persons to enter the area where workers may be exposed to biological hazards.
i. Reducing the number of workers exposed to risk and implementing a rotation system for workers to reduce their exposure to biological hazards to the extent possible.
j. Taking the needed measures to ensure that workers obtain the necessary vaccinations to prevent infection with infectious or communicable diseases that may arise due to the nature of their work.

3. Providing appropriate personal protective equipment to protect workers exposed to biological hazards, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (17) **Noise hazards**

The employer shall assess noise levels in the workplace and conduct periodic measurements to identify the hazards associated with it and those exposed to it, and shall take the necessary precautions and measures to protect workers as follows:

1. Establishing preventive measures to protect workers from exposure to noise according to the noise levels shown in the table below:

Noise level	Action
Average 8-hour working day 80 dB (A)-85 dB (A) Lpeak= 135 dB (C) -137 dB (C)	1. Monitoring the health status of workers exposed to noise through conducting the necessary medical examinations. 2. Raising awareness among workers about the health risks resulting from exposure to noise, including the proper use of personal protective equipment.
Average 8-hour working day 85 dB (A)- 87 dB (A) Lpeak = 137 dB (C)- 140 dB (C)	1. Monitoring the health status of workers exposed to noise through conducting the necessary medical examinations. 2. Raising awareness among workers about the health risks resulting from exposure to noise, including the proper use of personal protective equipment. 3. Providing the necessary personal protective equipment, obligating workers to wear it, and training them on the proper use of such equipment. 4. Installing instructional and warning signs to prevent the risks of noise exposure.
Average 8-hour working day higher than 87 dB (A)	Taking immediate measures to reduce the constant noise level to 87 dB (A), taking into consideration Annex No. (3) of these instructions, as follows: 1. Removing/reducing the source of the noise as much as possible as follows:

higher than Lpeak 140 dB (C)	a. Avoiding exposure to noise by using an alternative mechanism or technology. b. Purchasing low-noise equipment, and replacing loud equipment with quieter equipment if possible. c. Redesigning work equipment to eliminate sources of noise. d. Using dampening/quieting materials or adding silencers (noise suppressors) to machinery and equipment. 2. Isolating the noise source from workers by erecting sound panels or barriers between the noise source and workers or using a soundproof chamber or booth. 3. Reducing the number of workers exposed to noise. 4. Minimizing the noise exposure duration in accordance with Annex No. (3) of these instructions. 5. Avoiding constant exposure to noise by providing adequate rest periods. 6. Maintaining equipment and machinery that constitute a source of noise in the workplace, by a qualified person, and such procedures must be carried out periodically and in accordance with the manufacturer's instructions, and the findings should be fully documented. 7. Providing appropriate personal protective equipment to protect workers exposed to noise hazards, taking into consideration what is stated in Clause (14) of Article (5) of these instructions. 8. Monitoring the health status of workers exposed to noise through conducting the necessary medical examinations. 9. Raising awareness among workers about the health risks associated with exposure to noise, including the proper use of personal protective equipment. 10. Installing instructional and warning signs to prevent the hazards of noise exposure.

Article (18) **Vibration hazards**

The employer shall assess the vibrations affecting the work environment and conduct periodic measurements to identify the risks associated with vibrations and those exposed to them, and shall take the necessary precautions and measures to protect workers as follows:

1. Procurement of equipment and machinery that have lower vibration levels.

2.Implementing preventive measures to protect workers from exposure to vibration as per vibration levels shown in the table below:

Vibration level	Action
For hand-arm vibration: The exposure value for an average of 8 working hours	1. Monitoring the health status of workers exposed to vibrations through conducting the necessary medical examinations. 2. Raising awareness among workers about the health risks associated with exposure to vibration, including the proper use of personal protective equipment.

ranges between 2.5 m/s^2 and 5 m/s^2 For whole-body vibration: The exposure value for an average of 8 working hours ranges between 0.5 m/s^2 and 1.1 m/s^2	3. Providing the necessary personal protective equipment, obligating workers to wear it, and training them on the proper use of this equipment
For hand-arm vibration: The exposure value for an average of 8 working hours is higher than 5 m/s^2 For whole-body vibration: The exposure value for an average of 8 working hours is higher than 1.15 m/s^2	1. Monitoring the health status of workers exposed to vibrations through conducting the necessary medical examinations. 2. Raising awareness among workers about the health risks associated with exposure to vibration, including the proper use of personal protective equipment. 3. Taking immediate measures to reduce the level of hand-arm vibration to 1.15 m/s^2, taking into consideration Annex No. (4) to these instructions, and to reduce the level of whole-body vibration to 5 m/s^2, taking into consideration Annex No. (5) of these instructions, as follows: 1. Using and installing sound suppressors (silencers) on machinery to reduce vibration. 2. Consumable machinery parts must be of appropriate quality and replaced when needed. 3. Taking the necessary measures to control the operating forces of equipment and machinery. 4. Providing the necessary measures to reduce the hand grip force necessary to operate equipment and machinery safely. 5. Fixing uneven roads and floors across all sites so they fit with the machinery. 6. Placing insulating layers on the floors. 7. Developing a maintenance plan for equipment and machinery that constitute a source of vibration by a qualified person, and these procedures must be carried out periodically and in accordance with the manufacturer's instructions, and the findings must be fully documented. 8. Reducing the number of workers exposed to vibrations in the workplace. 9. Avoiding constant exposure to vibration by providing adequate rest periods. 10. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with vibration, taking into consideration what is stated in Clause (14) of Article (5) of these instructions. 11. Monitoring the health status of workers exposed to vibration through conducting the necessary medical tests. 12. Raising awareness among workers about the health risks associated with exposure to vibration, including the proper use of personal protective equipment.

Article (19) **<u>Lighting hazards</u>**

The employer shall assess the levels of lighting in the work environment and conduct periodic measurements to determine the risks associated with it and those exposed to it, and shall take the necessary precautions and measures to provide adequate and sufficient lighting, whether natural or artificial, for the type of work being carried out as follows:

1. Design the workplace so that the distribution of windows, skylights and daylight openings allows light to be distributed as evenly as possible throughout the workplace.
2. Providing lighting that is sufficient and appropriate for the type of work being carried out to enable workers to work and move safely in the workplace in accordance with Annex (6) on Indoor Workplaces and Annex (7) on Outdoor Workplaces, taking into consideration what is stated in Jordanian Standard Specifications No. 2253-1 and 2253-2 and any amendments thereto.
3. Ensuring that natural and artificial lighting sources provide uniform lighting without direct glare and reflected light.
4. Installing artificial lighting sources in a safe manner.
5. Avoiding large variations in light distribution in close quarters.
6. Regularly maintaining and cleaning lamps and lighting devices.

Article (20) **Heat stress and cold stress hazards**

a. Heat stress:
The employer shall assess heat stress based on the Wet-Bulb Globe Temperature (WBGT) index in the work environment and conduct periodic measurements to identify the risks associated with heat stress and those exposed to it, and shall take the necessary precautions and measures to protect workers as follows:
1. Performing periodic measurements of the Wet-Bulb Globe Temperature index at the time of the year where heat stress is likely to occur, which is during the summer, and conducting the measurement during the middle of the day, or the exposure period that is most likely to lead to heat stress, and if work over the course of a day is divided into different types or categories, separate measurements and assessments must be conducted for different types of work.
2. Ensuring that the Wet-Bulb Globe Temperature index in workplaces is within the limits stated in Annex No. (8), taking into consideration Jordanian Standard Specification No. 2299:2021 and any amendments thereto, and evaluating the metabolic rate classification according to Annex No. (9), taking into consideration Jordanian Standard Specification No. 2299:2021 and any amendments thereto.
3. If the Wet-Bulb Globe Temperature indexes in the workplace are not within the limits stated in Annex No. (8):

a. Designing operations in the work environment in such a way as to reduce the need for heavy physical effort as much as possible, in accordance with the limits indicated in Annex No. (8).
b. Taking the necessary precautions to reduce the leakage of water vapor into the work environment and control the humidity level within the work environment.
c. Providing sun shades to protect workers from direct sunlight and reduce their exposure to the extent possible.
d. Implementing possible preventive measures for hot sources and surfaces that affect the workplace or that can be accessed easily, such as insulation, the use of barriers, placing warning signs showing the temperature values at these surfaces, and training workers on ways to deal with and avoid them, and the employer may be guided by Jordanian Standard Specification No. 2328-1:2023 and any amendments thereto.

e. Taking the necessary procedures and measures to protect workers from the hazards of heat stress, such as thermal insulation and air conditioning.
f. Taking into consideration newly hired workers or workers returning or coming back to workplace; by allowing them sufficient time to acclimatize to the nature and conditions of work, such as progressing in working hours if their work requires them to be in places with risks associated with heat stress.
g. Raising health awareness among workers about the importance of drinking enough drinking water and appropriate fluids, while committing to providing them to workers.
h. Reducing the duration of exposure to heat stress and providing adequate rest periods in appropriate places.
i. Adopting a rotation system for workers exposed to risks associated with heat stress.
j. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with heat stress, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

4. Adhering to the decisions issued by the Ministry in relation to putting workers to work in exceptional weather conditions.

b. Cold stress:

The employer who hires workers to work in places exposed to low temperatures, such as walk-in refrigerators, shall identify the risks associated with cold stress and those exposed to it, and shall take the necessary precautions and measures to protect the workers as follows:

1. Contact monitoring of the exposed workers and raising their awareness about the hazards of exposure to low temperatures.
2. Adopting a rotation system for workers exposed to risks associated with cold stress.
3. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with cold stress, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.
4. Adhering to the approved standard metrology issued in this regard.

Article (21) **<u>Radiation hazards</u>**

a. Ionizing radiation:

Taking into consideration the relevant applicable legislation(s), the employer shall identify the hazards associated with ionizing radiation (such as X-rays, gamma rays, beta particles, alpha particles, heavy ions, neutrons and their uses) and those exposed to it, and shall take the necessary precautions and measures to protect workers as follows:

1. Isolating processes and functions that contain ionizing radiation from the remaining work sites using physical barriers.
2. Designing and installing all equipment according to the manufacturer's instructions.

3. Following the principles of proper storage for all sources of radioactive materials.
4. Disposing of radioactive waste in a safe manner and in accordance with relevant applicable legislation(s).
5. Using automated handling of high-risk radioactive materials whenever possible.
6. Checking and maintaining equipment regularly, repairing or replacing it in the event of a defect or malfunction, and documenting that in a special log.
7. Monitoring the level and duration of exposure to ionizing radiation through measuring devices created for this purpose.
8. Posting instructional signs and warning signs of radiation hazards in the workplace and prohibiting unauthorized persons to access it.
9. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with ionizing radiation, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

b. Non-ionizing radiation:

Taking into consideration the relevant applicable legislation, the employer shall identify hazards associated with non-ionizing radiation (such as ultraviolet (UV) and infrared (IR) radiation) and those exposed to it, and shall conduct periodic measurements while taking the necessary precautions and measures to protect workers as follows:

1. To the extent possible, using modern methods and equipment reduces the risk of radiation.
2. Procurement of equipment that complies with applicable safety standards.
3. Installing all equipment according to the manufacturer's instructions.
4. Reducing exposure to non-ionizing radiation by providing appropriate barriers and shields.
5. Isolating tasks and processes that contain non-ionizing radiation from the remaining work sites using physical barriers.
6. Providing sunshades to protect workers from direct sunlight to reduce their exposure to the extent possible.
7. Checking and maintaining equipment regularly, repairing or replacing it in the event of a defect or malfunction, and documenting that in a special log.
8. Posting instructional signs and warning signs of non-ionizing radiation hazards in the workplace.
9. Informing workers of the potential risks of non-ionizing radiation and giving them the necessary training.
10. Reducing exposure time to non-ionizing radiation.
11. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with non-ionizing radiation, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (22) **Manual handling hazards**

The employer shall identify the hazards associated with manual handling and those exposed to it, and shall take the necessary precautions and measures to protect workers as follows:

1. Avoiding manual handling by using an alternative mechanism or technology to the extent possible.
2. If manual handling cannot be avoided, work must be carried out in accordance with the following requirements:
   a. Distributing the load to as few weights as possible.
   b. Minimizing the distance of manually transported goods.
   c. Planning the work in such a way that the weights lifted manually without the assistance of others do not exceed 25 kg for male workers and 16 kg for female workers, taking into consideration the relevant Jordanian standard metrological and technical regulations.
   d. Planning and managing work in such a way that prevents twisting and bending while lifting and carrying weights, and avoiding lifting from ground level or above shoulder height.
   e. Establishing safe and proper procedures for manual lifting of heavy loads and training workers on them.
3. Providing appropriate personal protective equipment to protect workers exposed to hazards associated with manual handling, taking into consideration what is stated in Clause (14) of Article (5) of these instructions.

Article (23) **Ergonomic hazards**

The employer shall identify ergonomic hazards associated with incompatibility between workers and the work they do, the tools and equipment they use, and the environment in which they work, and shall identify those exposed to them and take the necessary precautions and measures to protect workers as follows:

1. Using powered tools instead of hand tools to reduce the number of movements needed to perform the work.
2. Selecting lightweight equipment with a design that is compatible with the nature of the work and the user, in such a way that reduces the force needed to perform the work.
3. Providing adequate spaces that allow workers to work and move freely and easily.
4. Arranging workplaces and equipment in a manner that fits with the body of the worker and the pace of their work and limits repetitive movements to perform the work.
5. Providing suitable and adjustable seats with a backrest if the work requires the worker to sit and ensuring that the worker can rest their feet on the ground.
6. Providing tall chairs (stools) if the nature of the work requires the worker to complete the work in a standing position. If this is not possible, an anti-fatigue mat must be placed under the feet, while giving short periods of rest.
7. Organizing work and rest periods to ensure that workers are not exposed to stress.

Article (24) **Office work hazards**

The employer shall identify hazards associated with office work, including remote work and other work that requires the use of screens, and shall identify those

exposed to these hazards, and take the necessary precautions and measures to protect workers as follows:

1. Organizing and arranging office furniture and equipment necessary for work to ensure there is adequate workspace that allows workers to work and move freely and easily.
2. Providing comfortable, adjustable seating with a backrest in such a manner that the forearms are nearly horizontal and the user's eyes are at the same level as the top of the screen.
3. Arranging and setting up the office in such a way that prevents the reflection of sunlight on the screen.
4. Providing a mouse and keyboard, and placing them in a way that makes them easy to use when the worker needs them.
5. Adjusting the brightness and contrast controls of the screen to suit the lighting conditions in the room so that the characters on the screen are clear, without flickering.
6. Making sure to clean the screen surface regularly.
7. Directing workers to change working positions to avoid working in the same position for long periods.
8. Training workers whose work nature requires the use of screens on the necessary measures to prevent the associated risks, including performing simple stretching and relaxation exercises.
9. Providing a log that contains occupational safety and health procedures for remote workers.
10. Ensuring that the noise level in offices for routine office work does not exceed (55) dB (A) and for work that requires concentration or in meeting rooms does not exceed (45) dB (A) in accordance with the Jordanian Specification (2352-1), taking into consideration any amendments or updates occurring thereto.

Article (25) **Psychosocial hazards**

a. The employer shall identify the psychological and social hazards resulting from work, such as violence, harassment, discrimination, and stress, and shall take the necessary precautions and measures to protect workers as follows:

1. Adhering to the policy of protection from violence, harassment and discrimination in the workplace approved by the Ministry, and the guidelines for implementing this policy.

2. Taking appropriate measures to prevent stress and associated risks resulting from work, such as organizing work and rest periods to ensure that workers are not exposed to work-related stress.

b. When determining the psychosocial risks associated with work and taking the necessary precautions and measures to protect workers, the employer may refer to the Jordanian Standard Specification ISO (45003) Occupational Safety and Health Management – Psychological Health and Safety at work - Guidelines for managing psychosocial risks -

Article (26) **Facilities that must be available in workplaces**

The employer shall provide the following facilities:

1. A place to rest and eat during breaks according to the following conditions:

a. It must be free of pollution and located far from sources of pollution in all its forms.
b. It must be of an appropriate space, and the break rooms should have a minimum number of comfortable tables and chairs to accommodate the number of workers who are likely to be present during the break or shift.
c. It should be well ventilated.
d. It must have adequate lighting with a minimum of 200 lux.
e. Cleanliness and order must be maintained.
f. The noise level must be within the permissible limits (not to exceed 55 dB (A)).
g. The temperature must be appropriate, provided that the differences between indoor and outdoor temperatures are not large.
h. The floors must be level and non-slippery.
i. Ensuring that workers exposed to pollutants do not enter these rooms during breaks except after changing their clothes or showering.
j. It must be easily accessible with signs indicating the direction to it.
k. Providing trash cans with tight lids.
l. Establishing appropriate measures to prevent crowding and jostling.

2. If there is a place where food and beverages are prepared and served, the following guidelines shall be followed:
a. Using a local ventilation system to extract food vapors and odors, especially in food preparation areas.
b. Connecting gas stoves to gas cylinders with metal pipes in the form of extensions starting from the location of the cylinders (outside the kitchen) to the gas stoves, and ensuring that the valves are of good quality and maintaining them periodically to avoid gas leakage.
c. It must have refrigerators that are sized to accommodate materials that can be refrigerated and stored, with a special thermometer and a freezer for materials that need long-term storage.
d. Kitchen workers must be provided with aprons and fixed covers to cover the hair and beard, and suitable shoes.
e. It must be equipped with insect-control systems.
f. Keeping knives in special, locked places and prohibiting workers from tampering with them.
g. Conducting the necessary medical examinations for workers preparing and serving food and drinks at the competent authorities and keeping copies of the results of such examinations.
h. Taking the necessary measures to protect workers from fire hazards in accordance with the relevant applicable legislation(s).

3. Sanitary facilities and bathrooms according to the following conditions:
a. They must be in sufficient numbers commensurate with the number of workers and distributed in a way that ensures accessibility.
b. Separating sanitary facilities for females and male workers.
c. Providing hot and cold water and special soap for handwashing.
d. Providing hand dryers.
e. Tiling the walls and floors of health facilities.
f. Designating places for showering in workplaces that produce pollutants.

g. Cleaning and sterilizing them constantly during working hours.

4. Locker rooms according to the following conditions:
   a. Providing suitable locker rooms for workers if they must wear special work clothes, and it should be of a sufficient space with seats provided and must be easily accessible.
   b. Designating separate locker rooms for female workers.
   c. Providing a locker with a lock for each worker during working hours, with the necessity to separate dirty clothes from clean clothes.
   d. Providing adequate lighting and ventilation.
   e. Locker rooms must be divided into two sections if the materials that workers deal with are toxic, one would be for changing work clothes and the other for changing regular clothes, and the first section must contain baskets for collecting work clothes contaminated with toxic materials.

Article (27) Upon termination of service, the employer shall give the worker, upon worker's request, a copy of worker's medical record, including initial and periodic medical tests.

Article (28) The 1996 Instructions for Protection of Workers and Institutions from Workplace Hazards shall be repealed.

Article (29) The Minister may issue the necessary decisions to implement the provisions of these instructions.

Nadia Abdel Raouf Al Rawabdeh
Minister of Labor

Annex (1) to the instructions for identifying the types of sources of occupational hazards in the work environment and the necessary preventive precautions and measures

*Non-exhaustive list of personal protective equipment used to protect workers from hazards in the workplace

Hazards	Type of Personal Protective Equipment															Remarks
	Reflective vest	Helmet	Protective cap	Hearing protectors	Safety goggles	Protective face shield	Respiratory protective equipment[1]	Gloves	Other types of arm protective equipment[2]	Safety boots	Other types of leg protective equipment[3]	Skin protection products	Body parts protective equipment[4]	Protective clothing	Fall protection PPE	
Dynamic hazards and work equipment, specific safety hazards																
Mechanical injuries (abrasion, puncture, cuts, bites, or penetrating wounds)					√	√		√	√	√	√		√			Safety goggles or protection shield
Falling or flying objects		√			√	√				√			√			Safety goggles or protection shield
Collision with obstacles			√													-
Slipping and tripping										√						-

[1] A worker working in an atmosphere contaminated with gases, dusts or vapors at a concentration higher than the approved thresholds limits shall be provided with cotton or filter masks covering the mouth and nose, protective face masks without oxygen, protective face masks supplied with oxygen, or respirators supplied with oxygen, as follows:

a. A cotton mask to protect the worker from harmless and non-toxic dust.
b. A filtering respirator to protect the worker from industrial dust particles that contain silica or industrial dust and harmful dusts of low concentrations.
c. A protective face mask with a filtering respirator and without oxygen to protect the worker from harmful gases or dust and dust of high concentrations.
d. A protective face mask supplied with oxygen to protect the worker from high concentrations of gases, dusts or vapors in the event that the oxygen percentage is less than 18%.In the case of working in confined spaces in which the oxygen percentage is less than 16%, it is not permissible to enter except by using a respirator supplied with oxygen.

[2] An example of other types of arm protective equipment are protective arm sleeves.
[3] An example of other types of leg protective equipment are knee guards and shoe covers.
[4] An example of body parts protective equipment is an apron, safety pants when working with a chainsaw, or a reflective vest.

Hazards	Type of Personal Protective Equipment															
	Reflective vest	Helmet	Protective cap	Hearing protectors	Safety goggles	Protective face shield	Respiratory protective equipment[1]	Gloves	Other types of arm protective equipment[2]	Safety boots	Other types of leg protective equipment[3]	Skin protection products	Body parts protective equipment[4]	Protective clothing	Fall protection PPE	Remarks
Falling from a height		√						√		√					√	Helmet with chin strap
Falling from scaffolds	√	√						√		√			√			-
Engulfment inside the excavation	√	√						√		√			√			-
Confinement or compression of body parts		√								√			√			-
Hot surfaces								√								-
Splashing of hot liquids					√	√		√		√			√			-
Moving vehicles, blurred vision	√												√			-
Electricity hazards																
Electric shock (direct or indirect contact)		√			√	√		√		√						Safety goggles or protection shield All protective equipment must be resistant to electricity
Static								√		√			√	√		-

Hazards		Type of Personal Protective Equipment															
	Reflective vest	Helmet	Protective cap	Hearing protectors	Safety goggles	Protective face shield	Respiratory protective equipment[1]	Gloves	Other types of arm protective equipment[2]	Safety boots	Other types of leg protective equipment[3]	Skin protection products	Body parts protective equipment[4]	Protective clothing	Fall protection PPE	Remarks
electricity																
Physical hazards																
Noise				√												-
Vibration								√		√						Based on the type of vibration
Heat, humidity			√											√		-
Cold temperatures			√					√		√				√		-
Rain and other adverse weather conditions			√					√		√			√			-
Ionizing radiation					√		√	√					√			Depending on the type of work, other equipment may be needed, for example a thyroid protective shield/ collar
Non-ionizing radiation						√						√				
Chemical hazards and dust																
Solids, dust, dirt and fibers					√	√	√	√					√	√		

Hazards		Type of Personal Protective Equipment															
	Reflective vest	Helmet	Protective cap	Hearing protectors	Safety goggles	Protective face shield	Respiratory protective equipment[1]	Gloves	Other types of arm protective equipment[2]	Safety boots	Other types of leg protective equipment[3]	Skin protection products	Body parts protective equipment[4]	Protective clothing	Fall protection PPE	Remarks
Liquids, spillage and splashing					√	√	√	√	√	√		√	√	√		
Dirt, dust on surfaces								√				√	√			
Lack of oxygen							√									-
Biological hazards																
Solids and liquids, splashing					√	√	√	√					√			-
Biological agents in the air							√	√			√		√	√		-
Contact with blood						√		√		√			√			-
Contact with animals						√		√		√			√			-
Ergonomic hazards (compatibility)																
Manual handling								√		√						-

(√) (Personal protective equipment must be provided)

Annex No. (2) *to the Instructions for Identifying the Types of Sources of Occupational Hazards in the Work Environment, and the Necessary Preventive Precautions and Measures: Threshold Limits Values (TLVs) for chemicals and dusts

Threshold Limit Values (TLV): The concentration level of a chemical substance to which exposure is permissible in the atmosphere under certain working conditions, such that almost all workers can be exposed to it repeatedly, day after day, over a working lifetime without adverse health effects. These values are published by the American Conference of Governmental Industrial Hygienists (ACGIH), and they are considered guidelines that should be used by occupational safety and health professionals to help evaluate and control potential health risks in the workplace. However, they do not represent fixed safety standards and are not considered the fine lines that separate safe working conditions from hazardous ones.

Time-Weighted Average (TLV-TWA): The concentration level to which exposure is permissible during an 8-hour workday and a 40-hour workweek, such that almost all workers can be exposed to it repeatedly, day after day, over a working lifetime without adverse health effects.

Short-Term Exposure Limit (TLV-STEL): The concentration level permissible within 15 minutes that cannot be exceeded at any time during work, such that almost all workers can be exposed to it continuously for a short period of time without suffering from irritation, chronic tissue damage, toxicity or numbness. It is worth noting that adhering to this concentration level does not guarantee protection against these health effects if the daily exposure limit (TLV-TWA) is surpassed. (TLV-STEL) is regarded as an additional safety measure along with (TLV-TWA) to protect against chronic toxic effects. Exposure to a chemical in the atmosphere with an exposure level between (TLV-TWA) and (TLV-STEL) must be limited to less than 15 minutes, occurring no more than four times a day, with each exposure period separated by at least one hour.

Ceiling Exposure (TLV-C): The highest concentration level of a chemical substance in the atmosphere that cannot be exceeded during any working time. If measuring the concentration of the chemical is not available instantaneously, samples should be taken for the shortest possible time periods to ensure that the (TLV C) value is not exceeded.

***Reference: Arab Labor Organization, 2018, Guideline "Standards, Limits and Indicators of Occupational Exposure."**

No.	Name of chemical substances in English	CAS No.	Recommended Threshold Limit Value TLVs as per the 2017 regulation issued by the American Conference of Governmental Industrial Hygienists		Molecular weight (for converting the threshold limit value from volume to weight or vice versa)	Coding	Basis for evaluating threshold exposure limits	Remarks	Classification of the substance as a carcinogen according to the International Agency for Research on Cancer of the World Health Organization (WHO-IARC)
			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
1.	Acetaldehyde	75-07-0	____	C 25 ppm	44.05	A2 suspected human carcinogen	Irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans
2.	Acetamide*	60-35-5	1 ppm (IFV)	____	59.07	A3 confirmed animal carcinogen with unknown relevance to humans	Liver cancer and liver damage		Category (2B) possibly carcinogenic to humans
3.	Acetic acid	64-19-7	10 ppm	ST 15 ppm	60.00	____	Irritation of the upper respiratory tract and eyes, lung functions disorder		
4.	Acetic anhydride	108-24-7	1 ppm	ST 3 PPM	102.09	A4 not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract		
5.	Acetone	67-64-1	250 ppm	ST 500 ppm		A4,BEI not classifiable as a human carcinogen, biological exposure indices	Irritation of the upper respiratory tract and eyes, central nervous system disorder		
6.	Acetone cyanohydrins, as CN	75-86-5	____	C 5 mg/m^3	85.10	Skin	Irritation of the upper respiratory tract, headache, hypoxia/cyanosis		
7.	Acetonitrile	75-05-8	20 ppm	____	41.05	A4, skin, not classifiable as a human carcinogen	Irritation of the respiratory tract		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
8.	Acetophenone	98-86-2	10 ppm	____	120.15	____	Irritation of the upper respiratory tract, central nervous system disorder, fetal loss		
9.	Acetylene*	74-86-2	Appendix (F): Minimum Oxygen Content (D, EX)		26.04		Asphyxia		
10.	Acetyl salicylic acid	50-78-2	5 mg/ m^3	____	180.15	____	Skin and eye irritation		
11.	2-Acetylaminofluorene See CFR 1910.1014	53-96-3	____					(OSHA) (California)	
12.	Acetylene tetrabromide	79-27-6	1 ppm					(OSHA) (California)	
13.	Acrolein	107-02-8	____	C 0.1 ppm	56.06	A4, skin, not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract, pulmonary edema and emphysema		Category (3) not classifiable as to their carcinogenicity to humans
14.	Acrylamide	79-06-1	0.03 mg/ $m^{3(IFV)}$	____	71.08	A3,skin, confirmed animal carcinogen with unknown relevance to humans	Central nervous system disorder		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
15.	Acrylic acid	79-10-7	2 ppm	____	72.06	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
16.	Acrylonitrile	107-13-1	2 ppm	____	53.05	A3,skin, confirmed animal carcinogen with unknown relevance to humans	Central nervous system disorder, irritation of the lower respiratory tract		Category (2B) possibly carcinogenic to humans
17.	Adipic acid	124-04-9	5 mg / m^3	____	146.14	____	Irritation of the upper respiratory tract, central nervous system disorder		
18.	Adiponitrile	111-69-3	2 ppm	____	108.10	Skin	Irritation of the upper and lower respiratory tracts		
19.	Alachor	15972-60-8	1 mg/$m^{3\ (IFV)}$	____	269.8	A3, DSEN, confirmed animal carcinogen with unknown relevance to humans, dermal sensitization	Iron accumulation in the spleen, liver, and kidneys (hemosiderosis)		
20.	Aldrin	309-00-2	0.05 mg/$m^{3(IFV)}$	____	364.93	A3,skin, confirmed animal carcinogen with unknown relevance to humans	Central nervous system disorder, liver and kidney damage		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
21.	Allyl Alcohol	107-18-6	0.5 PPM	____	58.08	A4, skin, not classifiable as to their carcinogenicity to humans	Eye and upper respiratory tract irritation		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
22.	Allyl bromide	106-95-6	0.1 PPM	ST 0.2 ppm	120.99	A4, skin, not classifiable as a human carcinogen	Eye and upper respiratory tract irritation		
23.	Allyl chloride	107-05-1	1 ppm	ST 2 ppm	76.5	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Eye and upper respiratory tract irritation, liver and kidney damage		Category (3) not classifiable as to their carcinogenicity to humans
24.	Allyl glycidyl ether (AGE)	106-92-3	1 ppm	____	114.14	A4, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin, dermatitis		
25.	Allyl propyl disulfide	2179-59-1	0.5 ppm	____	148.16	DSEN, dermal sensitization	Irritation of the eyes and upper respiratory tract		
26.	Alpha – Alumina (aluminum oxide)	1344-28-1		See particles (insoluble or poorly soluble) not otherwise regulated				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5mg/m^3					(OSHA) (California)	

No.	Name of chemical substances in English	CAS No.	Recommended Threshold Limit Value TLVs as per the 2017 regulation issued by the American Conference of Governmental Industrial Hygienists		Molecular weight (for converting the threshold limit value from volume to weight or vice versa)	Coding	Basis for evaluating threshold exposure limits	Remarks	Classification of the substance as a carcinogen according to the International Agency for Research on Cancer of the World Health Organization (WHO-IARC)
			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
27.	Aluminum Metal and insoluble compounds	7429-90-5	1 mg/m^3*	____	26.98 Variable	A4, not classifiable as a human carcinogen	Pneumoconiosis, lower respiratory tract irritation, neurotoxicity		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
28.	4-Aminodiphenyl	92-67-1	____L)	____	169.23	A1, skin, confirmed human carcinogen	Bladder and liver cancer		Category (1) confirmed human carcinogen (in the bladder)
29.	2-Aminopyridine	504-29-0	0.5 ppm	____	94.12	____	Headache, nausea, central nervous system disorder, dizziness		
30.	Amitrole	61-82-5	0.2 mg/m^3	____	84.08	A3, confirmed animal carcinogen with unknown relevance to humans	Impacts on the thyroid gland		Category (3) not classifiable as to their carcinogenicity to humans
31.	Ammonia	7664-41-7	25 ppm	ST 35 ppm	17.03	____	Eye damage, upper respiratory tract irritation		
32.	Ammonium chloride, (fume)	12125-02-9	10 mg/m^3	ST 20 mg/m^3	53.3	____	Eye and upper respiratory tract irritation		
33.	Ammonium perfluoroocta noate	3825-26-1	0.01 mg/m^3	____	431.00	A3,skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
34.	Ammonium sulfamate	7773-06-0	10 mg/m^3	____	114.13	____	____		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
35.	n–Amyl acetate	628-63-7		ST 100 ppm				(OSHA) (California)	
36.	sec–Amyl acetate	626-38-0		ST 100 ppm				National Occupational Safety and Health Administration (OSHA)	
37.	Tert—amyl methyl ether	994-05-8	20 ppm	____	102.20	____	Central nervous system disorder, damage to the embryo/fetus		
38.	Aniline and homologs	62-53-3	2 ppm (only Aniline)	____	93.12	A3, BEI_M, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
39.	o-anisidine	90-04-0	0.5 mg/m^3	____	123.15	BEI_M, A3, skin, biological exposure indices to methemoglobin inducers, skin, confirmed animal carcinogen with unknown relevance to humans	Presence of methemoglobin in the blood		Category (2B) possibly carcinogenic to humans
40.	p-anisidine	104-94-9	0.5 mg/m^3	____	123.15	BEI_M, A4, skin, biological exposure indices to methemoglobin inducers, not classifiable as a human carcinogen	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans
41.	Antimony and compounds (as Sb)	7440-36-0	0.5 mg/m^3	____	121.75	____	Irritation of the skin and the upper respiratory tract		
42.	Antimony hydride	7803-52-3	0.1 ppm	____	124.78	____	Hemolysis, kidney damage, irritation of the lower respiratory tract		
43.	#Antimony trioxide, production	1309-64-4	(-$^{(L)}$)	____	291.5	(A2) suspected human carcinogen	(Lung cancer, pneumoconiosis)		Category (2B) possibly carcinogenic to humans
44.	ANTU (alpha Naphthylthiourea)	86-88-4	0.3 mg/m^3	____	202.27	A4, skin, not classifiable as a human carcinogen	Effect on the thyroid gland, nausea		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
45.	Argon	7440-37-1	See Appendix (F): Minimum Oxygen Content (D)	See Appendix (F): Minimum Oxygen Content (D)	39.95		Asphyxia		
46.	Arsenic and inorganic compounds (as As)	7440-38-2	0.01 mg/m^3	____	74.92 Variable	A1, BEI, confirmed human carcinogen, biological exposure indices	Lung cancer		Category (1) confirmed human carcinogen (in the lung, bladder and skin)
47.	Arsenic, and its salt (as As)	7778-39-4	0.01 mg/m^3	____		____		(OSHA) (California)	
48.	Arsine	7784-42-1	0.005 ppm	____	77.95	____	Peripheral nervous system disorder, vascular system disorder, kidney and liver disorder		
49.	Asbestos, all forms	Variable depending on the type of asbestos	0.1 f/cc(F)	____	____	A1 confirmed human carcinogen	Pneumoconiosis, lung cancer, pleural cancer (mesothelioma)		Category (1) confirmed human carcinogen (in the lung, mesothelium, larynx, and ovary)
50.	Asphalt (Bitumen) fumes, As benzene-soluble aerosol	8052-42-4	0.5 mg/m^3(I)	____	____	BEIP, A4, not classifiable as a human carcinogen, biological exposure indices to polycyclic aromatic hydrocarbons	Irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
51.	Atrazine (and related symmetrical triazines)	1912-24-9	2 mg/m$^{3(I)}$	____	215.69	A3 confirmed animal carcinogen with unknown relevance to humans	Effects on blood, reproduction and growth		Category (3) not classifiable as to their carcinogenicity to humans
52.	Azinphos-methyl	86-50-0	0.2 mg/m$^{3(IFV)}$	____	317.34	BEI$_A$,A4, DSEN, skin, dermal sensitization, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
53.	Barium, soluble compounds (as Ba)	7440-39-3	0.5 mg/m^3	____	137.30	A4 not classifiable as a human carcinogen	Irritation of the eye and skin, digestive system irritation, muscle stimulation		
54.	Barium sulfate	7727-43-7	5 mg/m$^{3\ (I,E)}$	____	233.43	____	Pneumoconiosis		
	Total dust		5 mg/ m^3 (without asbestos and crystalline silica less than 1%)						
	Respirable fraction								

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
55.	Benomyl	17804-35-2	1 mg/m$^{3(I)}$	____	290.32	A3, DSEN, dermal sensitization, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, damage to male reproduction, testicles and the embryo/fetus		
56.	Benz(a)anthracene	56-55-3	(-)^{L}	____	228.30	BEI$_{P}$, A2 biological exposure indices to polycyclic aromatic hydrocarbons, suspected human carcinogen	Melanoma		Category (2B) possibly carcinogenic to humans
57.	Benzene	71-43-2	0.5 ppm	ST 2.5 ppm	78.11	BEI, A1, skin biological exposure indices, confirmed human carcinogen	Leukemia		Category (1) confirmed human carcinogen (Acute myeloid leukemia and acute non-lymphocytic leukemia)
58.	Benzidine	92-87-5	(-)^{L}	____	184.11	A1, skin, confirmed human carcinogen	Bladder cancer		Category (1) confirmed human carcinogen (in the bladder)
59.	Benzo(b)fluoranthene	205-99-2	(-)^{L}	____	252.3	BEI$_{P}$, A2 biological exposure indices to polycyclic aromatic hydrocarbons, suspected human carcinogen	Cancer		Category (2B) possibly carcinogenic to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
60.	Benzo(a)pyrene; see Coal tar pitch volatiles	50-32-8	(-)[L]	____	252.3	BEI_P, A2 biological exposure indices to polycyclic aromatic hydrocarbons, suspected human carcinogen	Cancer		Category (1) confirmed human carcinogen (in the lung)
61.	Benzotrichloride	98-07-7	____	C 0.1 ppm	195.5	A2, skin, suspected human carcinogen	Irritation of the eyes, skin and upper respiratory tract		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
62.	Benzoyl chloride	98-88-4	____	C 0.5 ppm	140.57	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
63.	Benzoyl peroxide	94-36-0	5 mg/m^3	____		A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and skin		Category (3) not classifiable as to their carcinogenicity to humans
64.	Benzyl acetate	140-11-4	10 ppm	____	150.18	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
65.	Benzyl chloride	100-44-7	1 ppm	____	126.58	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes, skin and upper respiratory tract		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
66.	Beryllium and beryllium compounds (as Be)	7440-41-7	0.00005 $mg/m^{3(I)}$	____	9.01	RSEN, DSEN, A1 dermal and respiratory sensitization, confirmed human carcinogen	Beryllium poisoning (chronic Beryllium disease)		Category (1) confirmed human carcinogen (in the lung)
67.	Biphenyl	92-52-4	0.2 PPM	____	154.2	____	Lung functions disorder		
68.	Bismuth telluride, Undoped Se-doped	1304-82-1	10 mg/m^3 5 mg/m^3	____	800.83	A4, not classifiable as a human carcinogen	Damage to lungs	(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
69.	Borate compounds, inorganic	1303-96-4; 1330-43-4; 10043-35-3; 12179-04-3;	2 $mg/m^{3(I)}$	ST 6 $mg/m^{3(I)}$	Variable	A4, not classifiable as a human carcinogen	Irritation of the upper respiratory tract		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
70.	Boron oxide	1303-86-2	10 mg/m^3	____	69.64	____	Irritation of the eyes and upper respiratory tract		
	Total dust		10 mg/m^3						
71.	Boron tribromide	10294-33-4	____	C 0.7 ppm	250.57	____	Irritation of the upper respiratory tract, pneumonia		
72.	Boron trichloride	10294-33-5	____	C 0.7 ppm	117.20	____	Irritation of the upper respiratory tract, pneumonia		
73.	Boron trifluoride	7637-07-2	0.1 ppm	C 0.7 ppm	67.82	____	Irritation of the upper respiratory tract, pneumonia		
74.	Bromacil	314-40-9	10 mg/m^3	____	261.11	A3 confirmed animal carcinogen with unknown relevance to humans	Effects on the thyroid gland		
75.	Bromine	7726-95-6	0.1 ppm	ST 0.2 ppm	159.81		Irritation of the upper and lower respiratory tracts, lung damage		
76.	Bromine pentafluoride	7789-30-2	0.1 ppm	____	174.92	____	Irritation of the eyes, skin and upper respiratory tract		
77.	Bromoform	75-25-2	0.5 ppm	____	252.73	A3 confirmed animal carcinogen with unknown relevance to humans	Liver damage, irritation of the upper respiratory tract and eyes		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
78.	1-bromopropane	106-94-5	0.1 ppm	____	122.99	A3 confirmed animal carcinogen with unknown relevance to humans	Central nervous system disorder, peripheral neuropathy, effect on blood and growth, reproductive toxicity (males and females)		Category (2B) possibly carcinogenic to humans
79.	1,3-Butadiene	106-99-0	2 ppm	____	54.09	A2 suspected human carcinogen	Cancer		Category (1) confirmed human carcinogen (in the blood and lymphatic organs)
80.	*Butane, isomers	75-28-5; 106-97-8	____	ST 1000 ppm (EX)	58.12	____	Central nervous system disorder		
81.	n-butanol	71-36-3	20 ppm	____	74.12	____	Irritation of the eyes and upper respiratory tract		
82.	Sec-butanol	78-92-2	100 ppm	____	74.12	____	Irritation of the upper respiratory tract, central nervous system disorder		
83.	Tert-butanol	75.65.0	100 pm	____	74.12	A4, not classifiable as a human carcinogen	Central nervous system disorder		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
84.	Butenes ,all isomers Isobutene	106-98-9; 107-01-7; 590-18-1; 624-64-6; 25167-67-3; 115-11-7	250 ppm 250 ppm	____	56.11	____ A4, not classifiable as a human carcinogen	Effect on weight, irritation of the upper respiratory tract		
85.	2- butoxyethanol	111-76-2	20 ppm	____	118.17	A3, BEI confirmed animal carcinogen with unknown relevance to humans, biological exposure indices	Irritation of the eyes and upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
86.	2- Butoxyethyl acetate	112-07-2	20 ppm	____	160.2	A3 confirmed animal carcinogen with unknown relevance to humans	Hemolysis		
87.	Butyl acetates, all isomers	105-64-4; 110-19-0; 123-86-4; 540-88-5	50 ppm	ST 150 ppm	116.16	____	Irritation of the eyes and upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
88.	n-Butyl acrylate	141-32-2	2 ppm	____	128.17	A4, DSEN, dermal sensitization, not classifiable as a human carcinogen	Irritation		
89.	n-Butylamine	109-73-9	____	C 5 ppm	73.14	Skin	Headache, irritation of the upper respiratory tract and eyes		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
90.	Butylated hydroxytoluene	128-37-0	2 mg/m^3 (IFV)	____	220.34	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
91.	Tert-butyl chromate, as CrO3	1189-85-1	____	C 0.1 mg/m^3	230.22	Skin	Irritation of the lower respiratory tract and skin		
92.	n-Butyl glycidyl ether	2426-08-6	3 ppm	____	130.21	DSEN, Skin Dermal sensitization	Effects on reproduction, causing sensitization		
93.	n- Butyl lactate	138-22-7	5 ppm	____	146.19	____	Headache, irritation of the upper respiratory tract		
94.	n-Butyl mercaptan	109-79-5	0.5 ppm	____	90.19	____	Irritation of the upper respiratory tract		
95.	o-sec-Butylphenol	89-72-5	5 ppm	____	150.22	Skin	Irritation of the upper respiratory tract, eyes and skin		
96.	P-tert- Butyltoluene	98-51-1	1 ppm	____	148.18	____	Irritation of the eyes and upper respiratory tract, nausea		
97.	Cadmium and compound (as Cd)	7440-43-9	0.01 mg/m^3 (total) 0.002 mg/m^3 (R)	____	112.40 Variable	BEI, A2, biological exposure indices, suspected human carcinogen	Kidney damage		Category (1) confirmed human carcinogen (in the lung)
98.	*Cadusafos	95465-99-9	0.001 mg/mm^3(IFV)	____	270.4	A4, Skin, not classifiable as a human carcinogen	Cholinesterase inhibition		

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99.	#(Calcium chromate) as Cr	13765-19-0	0.001 mg/m^3	(_____)	156.09	A2 suspected human carcinogen	(Lung cancer)		
100.	Calcium Carbonate	1317-65-3		See Appendixes				National Occupational Safety and Health Administration (OSHA)	
	Total dust		10 mg/m^3					(OSHA)	
	Respirable fraction		5mg/m^3					(OSHA) (California)	
101.	Calcium cyanamide	156 – 62 -7	0.5 mg/m^3	____	80.11	A4, not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract		
102.	Calcium hydroxide	1305-62-0	5 mg/m^3	____	74.1	____	Irritation of the eyes, upper respiratory tract and skin		
	Total dust		5 mg/m^3					(OSHA) (California)	
	Respirable fraction							(OSHA) (California)	
103.	Calcium oxide	1305-78-8	2 mg/m^3	____	56.08	____	Irritation of the upper respiratory tract		

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104.	Calcium silicate, naturally occurring as Wollastonite	13983-17-0	1 mg/m ^{3} (I,E)	____	____	A4, not classifiable as a human carcinogen	Pneumoconiosis, lung functions disorder		Category (3) not classifiable as to their carcinogenicity to humans
105.	Calcium sulfate	7778-18-9; 10034-76-1; 10101-41-1; 13397-24-5	10 mg/m ^{3} (I)	____	136.14	____	Nasal symptoms		
106.	Camphor, synthetic	76-22-2	2 ppm	ST 3 ppm	152.23	A4, not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract, loss of sense of smell		
107.	Caprolactam	105-60-2	5 mg/m^{3} (IFV)	____	113.16	A5, not suspected as a human carcinogen	Irritation of the upper respiratory tract		Category (4) probably not carcinogenic to humans
108.	*Captafol	2425-06-1	0.1 mg / m^{3}(IFV)	____	349.1	A3, RSEN, DSEN, Skin, dermal and respiratory sensitization, confirmed animal carcinogen with unknown relevance to humans	Liver and kidney damage, causing dermal sensitization		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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109.	Captan	133-06-2	5 mg/m^3	____	300.6	A3, DSEN, confirmed animal carcinogen with unknown relevance to humans, dermal sensitization	Skin irritation		Category (3) not classifiable as to their carcinogenicity to humans
110.	Carbaryl	63-25-2	0.5 mg / $m^{3(IFV)}$	____	201.2	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition, male reproductive system, harm to the fetus		Category (3) not classifiable as to their carcinogenicity to humans
111.	Carbofuran	1563-66-2	0.1 mg / $m^{3(IFV)}$	____	221.3	BEI_A, A4, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
112.	Carbon black	1333-86-4	3 mg/$m^{3(I)}$	____	____	A3 confirmed animal carcinogen with unknown relevance to humans	Bronchitis		Category (2B) possibly carcinogenic to humans
113.	Carbon dioxide	124-38-9	5000 ppm	ST 30,000 ppm	44.01	____	Asphyxia		
114.	Carbon disulfide	75-15-0	1 ppm	See Annotated Z-2	76.14	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices	Peripheral nervous system disorder		

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115.	Carbon monoxide	630-08-0	25 ppm	____	28.01	BEI biological exposure indices	High carboxyhemoglobin in the blood		
116.	Carbon tetrabromide	558-13-4	0.1 ppm	ST 0.3 ppm	331.65	____	Liver damage, irritation of the eyes, upper respiratory tract and skin		
117.	Carbon tetrachloride	56-23-5	5 ppm	ST 10 ppm		A2, skin, suspected human carcinogen	Liver damage		Category (2B) possibly carcinogenic to humans
118.	Carbonyl fluoride	353-50-4	2 ppm	ST 5 ppm	66.01	____	Irritation of the lower respiratory tract, bone damage		
119.	Carbonyl sulfide	463-58-1	5 ppm	____	60.08	____	Central nervous system disorder		
120.	Catechol	120-80-9	5 ppm	____	110.11	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes and upper respiratory tract, dermatitis		Category (2B) possibly carcinogenic to humans
121.	Cellulose	9004- 34-6	10 mg/m^3	____	____	N/A	Irritation of the upper respiratory tract		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3			____		(OSHA) (California)	

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122.	Cesium hydroxide	21351-79-1	2 mg/m^3	____	149.92	____	Irritation of the upper respiratory tract, skin and eyes		
123.	Chlordane	57-74-9	0.5 mg/m ^{3}	____	409.8	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2B) possibly carcinogenic to humans
124.	Chlorinated camphene	8001-35-2	0.5 mg/m ^{3}	ST 1 mg/m^3	414.00	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Central nervous system convulsions, liver damage		Category (2B) possibly carcinogenic to humans
125.	o-Chlorinated diphenyl oxide	31242-93-0	0.5 mg/m ^{3}	____	377.00	____	Chloracne, liver damage		
126.	Chlorinated diphenyl oxide	55720-99-5	0.5 mg/m ^{3}	____				(OSHA) (California)	
127.	#Chlorine	7782-50-5	(0.5 ppm)	ST (1 ppm)	70.91	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		
128	#Chlorine dioxide	10049-04-4	(0.1 ppm)	ST (0.3 ppm)	67.46	____	Irritation of the lower respiratory tract, bronchitis		
129.	Chlorine trifluoride	7790-91-2	____	C 0.1 ppm	92.46	____	Irritation of the eyes and upper respiratory tract, lung damage		
130.	Chloroacetaldehyde	107-20-0	____	C 1 ppm	78.50	____	Irritation of the upper respiratory tract and eyes		

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131.	Chloroacetone	78-95-5	____	C 1 ppm	92.53	Skin	Irritation of the eyes and upper respiratory tract		
132.	2-Chloroacetophenone	532-27-4	0.05 ppm	____	154.59	A4, not classifiable as a human carcinogen	Irritation of the eyes, upper respiratory tract and skin		
133.	Chloroacetyl chloride	79-04-9	0.05 ppm	ST 0.15 ppm	112.95	Skin	Irritation of the upper respiratory tract		
134.	Chlorobenzene	108-90-7	10 ppm	____	112.56	BEI, A3, biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	Liver damage		
135.	o-Chlorobenzylidene malononitrile	2698-41-1	____	C 0.05 ppm	188.62	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, dermal sensitization		
136.	Chlorobromo methane	74-97-5	200 ppm	____	129.39	____	Central nervous system disorder, liver damage		
137.	Chlorodifluoro methane	75-45-6	1000 pmm	____	86.47	A4, not classifiable as a human carcinogen	Central nervous system disorder, Asphyxia, cardiac sensitization		Category (3) not classifiable as to their carcinogenicity to humans
138.	Chlorodiphenyl (42% chlorine (PCB))	53469-21-9	1 mg/m^3	____	266.50	Skin	Liver damage, eye irritation, chloracne		

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139.	Chlorodiphenyl (54% Chlorine) (PCB)	11097-69-1	0.5 mg/m^3	____	328.4	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, liver damage, chloracne		
140.	Chloroform (Trichloromethane)	67-66-3	10 ppm	____	119.38	A3, confirmed animal carcinogen with unknown relevance to humans	Liver damage, fetus/embryo damage, central nervous system disorder		Category (2B) possibly carcinogenic to humans
141.	Bis (chloromethyl) ether	542-88-1	0.001 ppm	____	114.96	A1, confirmed human carcinogen	Lung cancer		Category (1) confirmed human carcinogen (in the lung)
142.	Chloromethyl methyl ether	107-30-2	(-) L	____	80.50	A2 suspected human carcinogen	Lung cancer		Category (1) confirmed human carcinogen (in the lung)
143.	1-chloro-1-nitropropane	600-25-9	2 ppm	____	123.54	____	Irritation of the eyes and upper respiratory tract, pulmonary edema		
144.	Chloropentaflu oroethane	76-15-3	1000 ppm	____	154.47	____	Causing cardiac sensitization		
145.	chloropicrin	76-06-2	0.1 ppm	____	164.39	A4, not classifiable as a human carcinogen	Irritation of the eyes, pulmonary edema		
146.	*Beta- chloroprene	126-99-8	1 ppm	____	88.54	A2, skin, suspected human carcinogen	Lung cancer, irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans

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147.	1-Chloro-2propanol and 2-Chloro-1propanol	127-00-4 78-89-7	1 ppm	____	94.54	A4, skin, not classifiable as a human carcinogen	Liver damage		
148.	2–Chloropropionic acid	598-78-7	0.1 ppm	____	108.53	Skin	Harms male reproduction		
149.	o- chlorostyrene	2039-87-4	50 ppm	ST 75 ppm	138.6	____	Central nervous system disorder, peripheral neuropathy		
150.	o- chlorotoluene	95-49-8	50 ppm	____	126.59	____	Irritation of the upper respiratory tract, eyes and skin		
151.	Chlorpyrifos	2921-88-2	0.1 $mg/m^{3(IFV)}$	____	350.57	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
152.	#(Chromite ore processing (chromate),as Cr)	____	0.05 mg/m^3	____	____	A1 confirmed human carcinogen	Lung cancer		
153.	#Chromium (II) or (III) compounds (as Cr)	7440-47-3	0.05 mg/m^3	____	Variable	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and skin	Chromium (II) from (OSHA) (California)	Category (3) not classifiable as to their carcinogenicity to humans

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154.	Chromium (VI) compounds see CFR 1910.1026[K]		0.05 mg/m^3 (Water-soluble compounds include chromic acid and chromate compounds)	____	Variable	BEI, A1, confirmed human carcinogen, biological exposure indices	Irritation of the upper respiratory tract, cancer		Category (1) confirmed human carcinogen (in the lung)
155.	Chromium VI metal and insol. salts (as Cr)	7440-47-3	0.01 mg/m^3	____	Variable	A1 confirmed human carcinogen	Lung cancer		Category (1) confirmed human carcinogen (in the lung)
156.	#Chromyl chloride	14977-61-8	0.025 ppm	____	154.92	____	Irritation of the upper respiratory tract and skin		
157.	Chrysene	218-01-9	(-)[L]	____	228.3	BEI$_P$, A3 biological exposure indices to polycyclic aromatic hydrocarbons	Cancer		Category (2B) possibly carcinogenic to humans
158.	Citral	5392-40-5	5 ppm (IFV)	____	152.24	A4, DSEN, Skin, not classifiable as a human carcinogen, skin, dermal sensitization	Effect on weight, irritation of the upper respiratory tract, eye damage		
159.	Clopidol	2971-90-6	3 mg/m^3(IFV)	____	192.06	A4 not classifiable as a human carcinogen	Mutagenic effect		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	

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160.	Coal dust Anthracite Bituminous or Lignite	8029 -10-5 308062-82-0	0.4 mg/m$^{3(R)}$ 0.9 mg/m$^{3(R)}$	____ ____	____ ____	A4 not classifiable as a human carcinogen A4 not classifiable as a human carcinogen	Lung damage and pulmonary fibrosis		
161.	Coal tar pitch volatiles (as benzene soluble aerosol)	65966-93-2	0.2 mg/m^3	____	____	(BEI_P,A1) confirmed human carcinogen, biological exposure indices to polycyclic aromatic hydrocarbons	Cancer		Category (1) confirmed human carcinogen (in the lung and skin “malignant growths other than melanoma”)
162.	#Cobalt metal, dust, and fume (as Co)	7440-48-4	0.02 mg/m^3	____	58.93	BEI, A3 biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	(Asthma, lung functions disorder, effect on the heart muscle)		Category (2B) possibly carcinogenic to humans
163.	Cobalt carbonyl as Co	10210-68-1	0.1 mg/m^3	____	341.94	____	Pulmonary edema, spleen damage		
164.	Cobalt Hydrocarbonyl	16842-03-8	0.1 mg/m^3	____	171.98	____	Pulmonary edema, lung damage		
165.	Copper	7440-50-8	0.2 mg/m^3	____	63.55	____			
166.	Fume (as Cu)		0.2 mg/m^3	____		____	Digestive irritation and disorders, metal fume fever		
167.	Dusts and mists (as Cu)		1 mg/m^3	____		____			

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168.	Cotton dust(I), raw, untreated		0.1 $mg/m^{3(T)}$	____	____	A4 not classifiable as a human carcinogen	Byssinosis, bronchitis, lung function disorder		
169.	Coumaphos	56-72-4	0.05 $mg/m^{3(IFV)}$	____	362.80	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
170.	Cresol, all isomers	1319-77-3; 108-39-4; 106-44-5; 95-48-7	20 mg/m^3	____	108.14	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
171.	Crotonaldehyde	4170-30-3	____	C 0.3 ppm	70.09	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes and upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
172.	Crufomate	299-86-5	5 mg/m^3	____	291.71	BEI_A, A4, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		

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173.	Cumene	98-82-8	50 ppm	____	120.19	____	Irritation of the eyes, skin and upper respiratory tract, central nervous system disorder		Category (2B) possibly carcinogenic to humans
174.	Cyanamide	420-04-2	2 mg/m^3	____	42.04	____	Irritation of the skin and eyes		
175.	Cyanides (as CN)	Varies depending on the compound		C 5 mg/m^3 salts				(OSHA) (California)	
176.	Cyanogen	460-19-5	____	C 5 ppm	52.04	____	Irritation of the eyes and upper respiratory tract		
177.	Cyanogen bromide	506-68-3	____	C 0.3 ppm	105.92	____	Irritation of the eyes and respiratory tract, pulmonary edema		
178.	Cyanogen chloride	506-77-4	____	C 0.3 ppm	61.48	____	pulmonary edema, irritation of the eyes, skin and upper respiratory tract		
179.	Cyclohexane	110-82-7	100 ppm	____	84.16	____	Central nervous system disorder		
180.	Cyclohexanol	108-93-0	50 ppm	____	100.16	Skin	Irritation of the eyes, Central nervous system disorder		

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181.	Cyclohexanone	108-94-1	20 ppm	ST 50 ppm	98.14	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes and lower respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
182.	Cyclohexene	110-83-8	300 ppm	____	82.14	____	Irritation of the lower respiratory tract and eyes		
183.	Cyclohexylamine	108-91-8	10 ppm	____	99.17	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		
184.	Cyclonite	121-82-4	0.5 mg/m^3	____	222.26	A4, skin, not classifiable as a human carcinogen	Liver damage		
185.	Cyclopentadiene	542-92-7	75 ppm	____	66.1	____	Irritation of the upper respiratory tract and eyes		
186.	Cyclopentane	287-92-3	600 ppm	____	70.13	____	Irritation of the upper respiratory tract, eyes and skin, central nervous system disorder		
187.	Cyhexatin	13121-70-5	5 mg/m^3	____	385.16	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, effect on weight, kidney damage		

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188.	*2,4-D (Dichlorophen-oxyacetic acid)	94-75-7	10 $mg/m^{3(I)}$	____	221.04	A4 not classifiable as a human carcinogen	Effect on thyroid gland, renal tubular damage		Category (2B) possibly carcinogenic to humans
189.	DDT	50-29-3	1 mg/m^3	____	354.50	A3 confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
190.	Decaborane	17702-41-9	0.05 ppm	ST 0.15 ppm	122.31	Skin	Convulsions in the central nervous system, cognitive dissonance		
191.	Demeton	8065-48-3	0.05 $mg/m^{3(IFV)}$	____	258.34	BEI_A,, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
192.	Demeton-S-methyl	919-86-8	0.05 $mg/m^{3(IFV)}$	_____	230.30	BEI_A,A4, DSEN, skin, dermal sensitization, biological exposure indices to acetylcholinesterase inhibitor pesticides, not classifiable as a human carcinogen	Cholinesterase inhibition		

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193.	Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50 ppm	____	116.16	____	Irritation of the upper respiratory tract and eyes		
194.	Diacetyl	431-03-8	0.01 ppm	ST 0.02 ppm	86.1	A4, not classifiable as a human carcinogen	Lung damage (a disease similar to bronchiolitis obliterans)		
195.	Diazinon	333-41-5	0.01 $mg/m^{3(IFV0}$	____	304.36	BEI_A,A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
196.	Diazomethane	334-88-3	0.2 ppm	____	42.04	A2, suspected human carcinogen	Irritation of the upper respiratory tract and eyes		Category (3) not classifiable as to their carcinogenicity to humans
197.	Diborane	19287-45-7	0.1 ppm	____	27.69	____	Irritation of the upper respiratory tract, headache		
198.	1,2 -Dibromo-3-chloropropane (DBCP); see CFR 1910.1044	96-12-8	0.001 ppm					(OSHA) (California)	Category (2B) possibly carcinogenic to humans
199.	2- N-Dibutylaminoethanol	102-81-8	0.5 ppm	___	173.29	BEI_A, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Irritation of the eyes and upper respiratory tract		

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200.	Dibutyl phenyl phosphate	2528-36-1	0.3 ppm	____	286.26	BEI_A, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition, irritation of the upper respiratory tract		
201.	Dibutyl phosphate	107-66-4	5 $mg/m^{3(IFV0}$	____	210.21	Skin	irritation of the bladder, eyes, and upper respiratory system		
202.	Dibutyl phthalate	84-74-2	5 mg/m^3	____	278.34	____	Testicular damage, irritation of the eyes and upper respiratory tract		
203.	Dichloroacetic acid	79-43-6	0.5 ppm	____	128.95	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, testicular damage		Category (2B) possibly carcinogenic to humans
204.	Dichloroacetylene	7572-29-4	____	C 0.1 ppm	94.93	A3 confirmed animal carcinogen with unknown relevance to humans	Nausea, damage to the peripheral nervous system		Category (3) not classifiable as to their carcinogenicity to humans
205.	o-Dichlorobenzene	95-50-1	25 ppm	(ST) 50 ppm	147.01	A4 not classifiable as a human carcinogen	irritation of the upper respiratory tract and eyes, liver damage		Category (3) not classifiable as to their carcinogenicity to humans

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206.	p-Dichlorobenzene	106-46-7	10 ppm	____	147.01	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes, kidney damage		Category (2B) possibly carcinogenic to humans
207.	3,3'-Dichlorobenzidine	91-94-1	(-)[L]	____	253.13	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Bladder cancer, eye irritation		Category (2B) possibly carcinogenic to humans
208.	1,4-Dichloro-2-butene	764-41-0	0.005 ppm	____	124.99	A2, Skin, suspected human carcinogen	Irritation of the upper respiratory tract and eyes		
209.	Dichlorodifluoromethane	75-71-8	1000 ppm	____	120.91	A4 not classifiable as a human carcinogen	Causing cardiac sensitization		
210.	1,3- Dichloro-5,5-dimethyl hydantoin	118-52-5	0.2mg/m^3	ST 0.4 mg/m^3	197.03	____	Irritation of the upper respiratory tract		
211.	1,1- Dichloroethane	75-34-3	100 ppm	____	98.97	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes, liver and kidney damage		
212.	1,2- Dichloroethylene, all isomers	540-59-0; 156-59-2; 156-60-5	200 ppm	____	96.95	____	Central nervous system disorder, eye irritation		

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213.	Dichloroethyl ether	111-44-4	5 ppm	ST 10 ppm	143.02	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes, nausea		Category (3) not classifiable as to their carcinogenicity to humans
214.	Dichlorofluoro methane	75-43-4	10 ppm	____	102.92	____	Liver damage		
215.	Dichloromethane	75-09-2	50 ppm	____	84.93	BEI, A3, biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	High carboxyhemoglobin in the blood, central nervous system disorder		Category (A2) probably carcinogenic to humans and confirmed animal carcinogen
216.	Dichloromono fluoromethane	75-43-4	10 ppm	____				(OSHA) California	
217.	1,1-Dichloro-1-nitroethane	594-72-9	2 ppm	____	143.96	____	Irritation of the upper respiratory tract		
218.	1,3-Dichloropropene	542-74-6	1ppm	____	110.98	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Kidney damage		
219.	2,2-Dichloropropionic acid	75-99-0	5 mg/m^3 (I)	____	143.00	A4 not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract		
220.	1,2-Dichloropropane; See propylene dichloride	78-87-5	10 ppm		112.99	A4, DSEN, not classifiable as a human carcinogen, dermal sensitization	Irritation of the upper respiratory tract, effect on body weight		Category (1) confirmed human carcinogen (in the liver)

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221.	Dichlorotetrafluoroethane	76-14-2	1000 ppm	____	170.93	A4 not classifiable as a human carcinogen	Effect on lung functions		
222.	Dichlorvos (DDVP)	62-73-7	0.1 $mg/m^{3(IFV)}$	____	220.98	BEI_A, A4, DSEN, skin, dermal sensitization, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		Category (2B) possibly carcinogenic to humans
223.	Dicrotophos	141-66-2	0.05 $mg/m^{3(IFV)}$	____	237.21	BEI_A,A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
224.	Dicyclopentadiene	77-73-6	5 ppm	____	132.21	____	Irritation of the upper and lower respiratory tracts and eyes		
225.	Dicyclopentadienyl iron, as Fe	102-54-5	10 mg/m^3	____	186.03	____	Liver damage		
	Total dust		10 mg/m^3	____				(OSHA) (California)	
	Respirable fraction		5 mg/m^3	____				(OSHA) (California)	

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226.	Dieldrin	60-57-1	0.1 mg/m^3 (IFV)	____	380.93	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage, effect on reproduction, central nervous system disorder		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
227.	Diesel fuel	(68334-30-5; 68476-30-2; 68476-31-3; 68476-34-6; 77650-28-3) As total Hydrocarbons	100 mg/m^3 (IFV)	____	Variable	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Dermatitis		
228.	Diethanolamine	111-42-2	1 $mg/m^{3(IFV)}$	____	105.14	A3, Skin, confirmed animal carcinogen with unknown relevance to humans	Liver and kidney damage		Category (2B) possibly carcinogenic to humans
229.	Diethylamine	109-89-7	5 ppm	ST 15 ppm	73.14	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin		

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230.	2-Diethylaminoethanol	100-37-8	2 ppm	____	117.19	Skin	Irritation of the upper respiratory tract, convulsions in the central nervous system		
231.	Diethylene glycol monobutylether	112-34-5	10 ppm (IFV)	____	162.23	____	Blood, liver and kidneys are affected		
232.	Diethylenetriamine	111-40-0	1 ppm	____	103.17	Skin	Irritation of the upper respiratory tract and eyes		
233.	Di(2 – ethylhexylphthalate)	117-81-7	5 mg/m^3	____	390.54	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the lower respiratory tract		Category (2B) possibly carcinogenic to humans
234.	N,N-Diethylhydroxylamine	3710-84-7	2 ppm	____	89.14	____	Irritation of the upper respiratory tract		
235.	Diethyl ketone	96-22-0	200 ppm	ST 300 ppm	86.13	____	Irritation of the upper respiratory tract, central nervous system disorder		
236.	Diethyl phthalate	84-66-2	5 mg/m^3	____	222.23	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		

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237.	Difluorodibromomethane	75-61-6	100 ppm	____	209.83	____	Irritation of the upper respiratory tract, central nervous system disorder, liver damage		
238.	Diglycidyl ether (DGE)	2238-07-5	0.01 ppm	____	130.14	A4 not classifiable as a human carcinogen	Irritation of the eyes and skin, disorder in the male reproductive system		
239.	Diisobutyl ketone	108-83-8	25 ppm	____	142.23	____	Irritation of the upper respiratory tract and eyes		
240.	Diisopropylamine	108-18-9	5 ppm	____	101.19	Skin	Irritation of the upper respiratory tract, eye damage		
241.	#(N,N-Dimethylacetamide)	127-19-5	10 ppm	____	87.12	BEI, A4, skin, not classifiable as a human carcinogen, biological exposure indices	Damage to the liver and fetus/embryo		
242.	Dimethylamine	124-40-3	5 ppm	ST 15 ppm	45.08	DSEN, A4, dermal sensitization, not classifiable as a human carcinogen	Irritation of the upper respiratory tract and digestive system		
243.	Bis(Dimethylaminoethyl) Ether	3033-62-3	0.05 ppm	ST 0.15 ppm	160.26	Skin	Irritation of the upper respiratory tract, eyes and skin		

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244.	Dimethylaniline	121-69-7	5 ppm	ST 10 ppm	121.18	BEI, A4, skin, not classifiable as a human carcinogen, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans
245.	Dimethyl carbomyol chloride	79-44-7	0.005 ppm	____	107.54	A2, skin, suspected human carcinogen	Nasal cancer, irritation of the upper respiratory tract		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
246.	Dimethyl disulfide	624-92-0	0.5 ppm	____	94.20	Skin	Irritation of the upper respiratory tract, central nervous system disorder		
247.	Dimethylethoxysilane	14857-34-2	0.5 ppm	ST 1.5 ppm	104.2	____	Irritation of the upper respiratory tract and eyes, headache		
248.	Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate	300-76-5	3 mg/m $^{3(IFV)}$	____				(OSHA) (California)	
249.	#Dimethylformamide	68-12-2	10 ppm	____	73.09	BEI, A4, skin, biological exposure indices, not classifiable as a human carcinogen	Liver damage		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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250.	1,1-Dimethylhydrazine	57-14-7	0.01 ppm	____	60.12	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, nasal cancer		Category (2B) possibly carcinogenic to humans
251.	Dimethyl phthalate	131-11-3	5 mg/m^3	____	194.19	____	Irritation of the eyes and upper respiratory tract		
252.	Dimethyl sulfate	77-78-1	0.1 ppm	____	126.10	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes and skin		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
253.	Dimethyl sulfide	75-18-3	10 ppm	____	62.14	____	Irritation of the upper respiratory tract		
254.	Dinitrobenzene (all isomers)	99-65-0; 100-25-4; 528-29-0; 25154-54-5;	0.15 ppm	____	168.11	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood, eye damage		
255.	Dinitro-o-cresol	534-52-1	0.2 mg/m^3	____	198.13	Skin	Effect on metabolism		
256.	3,5-dinitro-o-toluamide	148-01-6	1 mg/m^3	____	225.16	A4 not classifiable as a human carcinogen	Liver damage		

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257.	Dinitrotoluene	25321-14-6	0.2 mg/m^3	____	182.15	BEI_M, A3, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Heart disorder, effect on reproduction		
258.	1,4-Dioxane (Diethylene dioxide)	123-91-1	20 ppm	____	88.1	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2B) possibly carcinogenic to humans
259.	Dioxathion	78-34-2	0.1 $mg/m^{3(IFV)}$	____	456.54	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
260.	1,3-Dioxolane	646-06-0	20 PPM	____	74.08	____	Effect on blood		
261.	Diphenylamine	122-39-4	10 mg/m^3	____	169.24	A4 not classifiable as a human carcinogen	Liver and kidney damage, effect on blood		
262.	Dipropylene glycol methyl ether	34590-94-8	100 PPM	ST 150 ppm				(OSHA) (California)	

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263.	Dipropyl ketone	123-19-3	50 PPM	____	114.8	____	Irritation of the upper respiratory tract		
264.	Diquat	85-00-7; 2764-72-9; 6385-62-2	0.5 $mg/m^{3)I)}$ 0.1 $mg/m^{3(R)}$	____	Variable	A4, skin, not classifiable as a human carcinogen	Irritation of the lower respiratory tract, cataracts in the eyes		
265.	Disulfiram	97-77-8	2 mg/m^3	____	296.54	A4 not classifiable as a human carcinogen	Dilatation of blood vessels, nausea		Category (3) not classifiable as to their carcinogenicity to humans
266.	Disulfoton	298-04-4	0.05 $mg/m^{3(IFV)}$	____	274.38	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
267.	Diuron	330-54-1	10 mg/m^3	____	233.1	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
268.	Divinylbenzene	1321-74-0	10 ppm	____	130.19	____	Irritation of the upper respiratory tract		
269.	Dodecyl Mercaptan	112-55-0	0.1 ppm	____	202.40	DSEN dermal sensitization	Irritation of the upper respiratory tract		
270.	Di-sec octyl phthalate (Di- (2-ethylhexyl) phthalate)	117-81-7	5 mg/m^3	____				(OSHA) (California)	Category (2B) possibly carcinogenic to humans

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271.	Endosulfan	115-29-7	0.1 mg/m^3	____	406.95	A4, skin, not classifiable as a human carcinogen	Irritation of the lower respiratory tract, liver and kidney damage		
272.	Endrin	72-20-8	0.1 mg/m^3	____	380.93	A4, skin, not classifiable as a human carcinogen	Liver damage, central nervous system disorder, headache		Category (3) not classifiable as to their carcinogenicity to humans
273.	Enflurane	13838-16-9	75 ppm	____	184.50	A4 not classifiable as a human carcinogen	Central nervous system and heart disorder		
274.	Epichlorohydrin	106-89-8	0.5 ppm	____	92.53	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, effect on male reproduction		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
275.	EPN	2104-64-5	0.1 mg/m$^{3(I)}$	____	323.31	BEI$_A$, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
276.	*Ethane	74-84-0	See Appendix (F): Minimum Oxygen Content (D,EX)	See Appendix (F): Minimum Oxygen Content (D,EX)	30.07		Asphyxia		

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277.	Ethanol	64-17-5	____	ST 1000 ppm	46.07	A3 confirmed animal carcinogen with unknown relevance to humans	Asphyxia		
278.	Ethanolamine	141-43-5	3 ppm	ST 6 ppm	61.08	_____	Irritation of the skin and eyes		
279.	Ethion	563-12-2	0.5 $mg/m^{3(IFV)}$	____	384.48	BEI_A, A4, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
280.	2- Ethoxyethanol (Cellosolve)	110-80-5	5 ppm	____	90.12	BEI, Skin, biological exposure indices	Damage to the male reproductive system and the embryo/fetus		
281.	2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	5 ppm	____	132.16	BEI, Skin, biological exposure indices	Damage to the male reproductive system		
282.	Ethyl acetate	141-78-6	400 ppm	____	88.10	____	Irritation of the upper respiratory tract and eyes		
283.	Ethyl acrylate	140-88-5	5 ppm	ST 15 ppm	100.11	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and digestive system, central nervous system disorder		Category (2B) possibly carcinogenic to humans

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284.	Ethylamine	75-04-7	5 ppm	ST 15 ppm	45.08	Skin	Irritation of the upper respiratory tract		
285.	Ethyl amyl ketone	541-85-5	10 ppm	____	128.21	____	Neurotoxicity		
286.	Ethyl benzene	100-41-4	20 ppm	____	106.16	A3, BEI, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices	Irritation of the upper respiratory tract, kidney damage, cochlear disorder		Category (2B) possibly carcinogenic to humans
287.	Ethyl bromide	74-96-4	5 ppm	____	108.98	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
288.	Ethyl tert-butyl ether	637-92-3	25 ppm	____	102.18	A4 not classifiable as a human carcinogen	Irritation of the upper and lower respiratory tracts, central nervous system disorder		
289.	Ethyl butyl ketone	106-35-4	50 ppm	ST 75 ppm	114.19	____	Irritation of the skin and eyes, central nervous system disorder		
290.	Ethyl chloride	75-00-3	100 ppm	____	52.64	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (3) not classifiable as to their carcinogenicity to humans

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291.	#Ethyl cyanoacrylate	7085-85-0	0.2 ppm	____	125.12	____	Irritation of the upper respiratory tract and skin		
292.	Ethylene	74-85-1	200 ppm	____	28.05	A4 not classifiable as a human carcinogen	Asphyxia		Category (3) not classifiable as to their carcinogenicity to humans
293.	Ethylene chlorohydrin	107-07-3	____	C1 ppm	80.52	A4, skin, not classifiable as a human carcinogen	Central nervous system disorder, liver and kidney damage		
294.	Ethylenediamine	107-15-3	10 ppm	____	60.10	A4, skin, not classifiable as a human carcinogen	____		
295.	Ethylene dibromide	106-93-4	____	____	187.88	A3, skin, confirmed animal carcinogen with unknown relevance to humans	____		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
296.	Ethylene dichloride	107-06-2	10 ppm	____	98.96	A4 not classifiable as a human carcinogen	Liver disorder, nausea		Category (2B) possibly carcinogenic to humans
297.	*Ethylene glycol	107-21-1	25 ppm (V)	ST 50 ppm(V) ST 10 mg/m³ (I,H)	62.07	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
298.	Ethylene glycol dinitrate	628-96-6	0.05 ppm	____	152.06	Skin	Dilatation of blood vessels, headache		

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299.	Ethylene oxide	75-21-8	1 ppm	____	44.05	A2 suspected human carcinogen	Cancer, central nervous system disorder		Category (1) confirmed human carcinogen (there is an increase in the cases of Non-Hodgkin lymphoma, multiple myeloma, chronic lymphocytic leukemia, and breast cancer)
300.	Ethylene imine	151-56-4	0.05 ppm	ST 0.1 ppm	43.08	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, liver and kidney damage		Category (2B) possibly carcinogenic to humans
301.	Ethyl ether	60-29-7	400 ppm	ST 500 ppm	174.14	____	Central nervous system disorder, irritation of the upper respiratory tract		
302.	Ethyl formate	109-94-4	____	ST 100 ppm	74.08	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		
303.	2- Ethylhexanoic acid	149-57-5	5 $mg/m^{3(IFV)}$	____	144.24	____	Teratogenic effect		
304.	Ethylidene norbornene	16219-75-3	2 PPM	ST 4 ppm	120.19	____	Irritation of the upper respiratory tract and eyes		
305.	Ethyl isocyanate	109-90-0	0.02 ppm	ST 0.06 ppm	71.10	DSEN, Skin, dermal sensitization	Irritation of the upper respiratory tract and eyes		

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306.	Ethyl mercaptan	75-08-1	0.5 ppm	____	62.13	____	Irritation of the upper respiratory tract, central nervous system disorder		
307.	N-Ethylmorpholine	100-74-3	5 ppm	____	115.18	Skin	Irritation of the upper respiratory tract, eye damage		
308.	Ethyl silicate	78-10-4	10 ppm	____	208.30	____	Irritation of the upper respiratory tract and eyes, kidney damage		
309.	Fenamiphos	22224-92-6	0.05 $mg/m^{3(IFV)}$	____	303.40	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
310.	Fensulfothion	115-90-2	0.01 $mg/m^{3(IFV)}$	____	308.35	BIES, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		

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311.	Fenthion	55-38-9	0.05 $mg/m^{3(IFV)}$	____	278.34	BIES, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
312.	Ferbam Total dust	14484-64-1	5 $mg/m^{3(I)}$ 10 $mg/m^{3(I}$	____	416.50	A4 not classifiable as a human carcinogen	Central nervous system disorder, spleen damage, effect on body weight	(OSHA) (California)	Category (3) not classifiable as to their carcinogenicity to humans
313.	Ferrovanadium dust	12604-58-9	1 mg/m^3	ST 3 mg/m^3	____	____	Irritation of the eyes and upper and lower respiratory tracts		
314.	Flour dust		0.5 $mg/m^{3(I)}$	____	____	RSEN respiratory sensitization	Asthma, irritation of the upper respiratory tract, bronchitis		
315.	Fluorides, (as F)	Varies depending on the compound	2.5 mg/m^3	____	Variable	BEI, A4, biological exposure indices, not classifiable as a human carcinogen	Bone damage, fluorosis		Category (3) not classifiable as to their carcinogenicity to humans
316.	Fluorotrichlor omethane (Trichlorofluorometha ne)	75-69-4	____	C 1000 ppm				(OSHA) (California)	

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317.	Fluorine	7782-41-4	1 ppm	ST 2 ppm	38	____	Irritation of the upper respiratory tract, eyes and skin		
318.	*Folpet	133-07-3	1 $mg/m^{3(I)}$	____	296.60	A3, DSEN, dermal sensitization, confirmed animal carcinogen with unknown relevance to humans	Liver damage, effect on weight		
319.	Fonofos	944-229	0.1 $mg/m^{3(IFV)}$	____	246.32	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
320.	*Formaldehyde	50-00-0	0.1 ppm	ST 0.3 ppm	30.03	DSEN, RSEN, A1 dermal and respiratory sensitization, confirmed human carcinogen	Irritation of the upper respiratory tract and eyes, cancer in the upper respiratory tract		Category (1) confirmed human carcinogen (in the nasopharynx, leukemia also occurs)
321.	Formamide	75-12-7	10 ppm	-____	45.04	Skin	Irritation of the eyes and skin, kidney and liver damage		
322.	Formic acid	64-18-6	5 ppm	ST 10 ppm	46.02	____	Irritation of the upper respiratory tract, eyes and skin		

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323.	*Furfural	98-01-1	0.2 ppm	____	96.08	A3, BEI, Skin, biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes		Category (3) not classifiable as to their carcinogenicity to humans
324.	*Furfuryl alcohol	98-00-0	0.2 ppm	____	98.10	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans
325.	Gallium arsenide	1303-00-0	0.0003 $mg/m^{3(R)}$	____	144.64	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the lower respiratory tract		
326.	Gasoline	86290-81-5	300 ppm	ST 500 ppm	Variable	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, central nervous system disorder		Category (2B) possibly carcinogenic to humans
327.	Germanium Tetrahydride	7782-65-2	0.2 ppm	____	76.63	____	Effect on blood		
328.	Glutaraldehyde Activated or un-activated	111-30-8	____	C 0.05 ppm	100.11	DSEN, RSEN, A4 dermal and respiratory sensitization, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin, central nervous system disorder		

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329.	Glycidol	556-52-5	2ppm	____	74.08	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, metaplasia of the larynx		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
330.	Glyoxal	107-22-2	0.1 $mg/m^{3(IFV)}$	____	58.04	DSEN, A4 dermal sensitization, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin		
331.	Grain dust (oat, wheat, barley)		4 mg/m^3	____	N/A	____	Bronchitis, irritation of the upper respiratory tract, effect on lung functions		
332.	Glycerin (mist)	56-81-5		Particles (insoluble or poorly soluble) not otherwise regulated				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
333.	Graphite, (all forms except graphite fibers) natural respirable dust	7782-42-5	2 $mg/m^{3\ (R)}$	See Annotated Z-3 ___		___	Pneumoconiosis	(OSHA) (California)	

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334.	Graphite, synthetic							(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3	2 mg/m^3 All forms except fibers				(OSHA) (California)	
335.	Gypsum	13397-24-5		See calcium sulfate				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
336.	Hafnium and compounds, as HF	7440-58-6	0.5 mg/m^3	____	178.49	____	Irritation of the upper respiratory tract and eyes, liver damage		
337.	Halothane	151-67-7	50 ppm	____	197.39	A4 not classifiable as a human carcinogen	Liver damage, central nervous system disorder, dilated blood vessels		
338.	Hard metals containing cobalt and tungsten carbide (as Co)	7440-48-4 12070-12-1	0.005 mg/m$^{3(T)}$	____	____	RSEN, A2, respiratory sensitization, suspected human carcinogen	Pneumonia		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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339.	Helium	7440-59-7	See Appendix (F): Minimum Oxygen Content[(D)]	See Appendix (F): Minimum Oxygen Content[(D)]	4.00		Asphyxia		
340.	Heptachlor Heptachlor epoxide	76-44-8 1024-57-3	0.05 mg/mv^3	____	373.32 389.40	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2B) possibly carcinogenic to humans
341.	Heptane, isomers	(108-08-7; 142-82-5; 565-59-3; 589-34-4; 590-35-2; 591-76-4); 142-82-5	400 ppm	ST 500 ppm	100.20	____	Central nervous system disorder, irritation of the upper respiratory tract		
342.	Hexachlorobenzene	118-74-1	0.002 mg/m^3	____	284.78	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Porphyrin affected – skin damage, central nervous system disorder		Category (2B) possibly carcinogenic to humans
343.	Hexachlorobutadiene	87-68-3	0.02 ppm	_____	260.76	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Kidney damage		Category (3) not classifiable as to their carcinogenicity to humans
344.	Hexachlorocyclopentadiene	77-47-4	0.01 ppm	____	272.75	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		

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345.	Hexachloroethane	67-72-1	1 ppm	____	236.74	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver and kidney damage		Category (2B) possibly carcinogenic to humans
346.	Hexachloronaphthalene	1335-87-1	0.2 mg/m^3	____	334.74	Skin	Liver damage, chloracne		
347.	Hexafluoroacetone	684-16-2	0.1 ppm	____	166.02	Skin	Testicular and kidney damage		
348.	Hexafluoropropylene	116-15-4	0.1 ppm	____	150.02	____	Kidney damage		
349.	Hexahydrophthalic anhydride, all isomers	(85-42-7; 13149-00-3; 14166-21-3)	___	C 0.005 mg/m$^{3(IFV)}$	154.17	RSEN respiratory sensitization	Causing sensitization		
350.	Hexamethylene diisocyanate	822-06-0	0.005 ppm	____	168.22	____	Irritation of the upper respiratory tract – respiratory sensitization		
351.	Hexamethyl phosphoramide	680-31-9	____	____	179.20	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Cancer of the upper respiratory tract		Category (2B) possibly carcinogenic to humans
352.	n-Hexane	110-54-3	50 ppm	____	86.18	BEI, skin, biological exposure indices	Central nervous system disorder, peripheral neuropathy, eye irritation		

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353.	Hexane isomers, other than n-Hexane	75-83-2; 79-29-8; 96-14-0; 107-83-5	500 ppm	ST 1000 ppm	86.17	____	Central nervous system disorder, irritation of the upper respiratory tract and eyes		
354.	1,6-Hexanediamine	124-09-4	0.5 ppm	____	116.21	____	irritation of the upper respiratory tract and skin		
355.	1-Hexene	592-41-6	50 ppm	____	84.16	____	Central nervous system disorder		
356.	Sec-Hexyl acetate	108-84-9	50 ppm	____	144.21	____	irritation of the upper respiratory tract and eyes		
357.	*Hexylene glycol	107-41-5	25 ppm (V)	ST 50 ppm (V) ST 10 $mg/m^{3(I,H)}$	118.18	____	irritation of the upper respiratory tract and eyes		
358.	2-Hexanone (Methyl n-butyl ketone)	591-78-6	5 ppm	ST 10 ppm				(OSHA) (California)	
359.	Hexone (Methyl isobutyl ketone)	108-10-1	20 ppm	ST 75 ppm				(OSHA) (California)	Category (2B) possibly carcinogenic to humans
360.	Hydrazine	302-01-2	0.01 ppm	____	32.05	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Cancer of the upper respiratory tract		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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361.	*Hydrogen	1333-74-0	See Appendix (F): Minimum Oxygen Content (D, EX)	See Appendix (F): Minimum Oxygen Content (D, EX)	1.01		Asphyxia		
362.	Hydrogenated terphenyls (non-irradiated)	61788-32-7	0.5 ppm	____	241.00	____	Liver damage		
363.	Hydrogen bromide	10035-10-6	____	C 2 ppm	80.92	____	Irritation of the upper respiratory tract		
364.	Hydrogen chloride	7647-01-0	____	C 2 ppm	36.47	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
365.	Hydrogen cyanide and cyanide salts, as CN	74-90-8 (143-33-9; 1515-8; 592-01-8)	____ ____	C 4.7 ppm C 5 mg/m^3	27.03 Variable	Skin Skin	Irritation of the upper respiratory tract, headache, nausea, effect on the thyroid gland		
366.	Hydrogen fluoride (as F)	7664-39-3	0.5 ppm	C 2 ppm	20.01	BEI, skin, biological exposure indices	Irritation of the upper and lower respiratory tracts, skin and eyes, fluorosis		
367.	Hydrogen peroxide	7722-84-1	1 ppm	____	34.02	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes, upper respiratory tract and skin		Category (3) not classifiable as to their carcinogenicity to humans

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368.	Hydrogen selenide (as Se)	7783-07-5	0.05 ppm	____	80.98	____	Irritation of the eyes and upper respiratory tract, nausea		
369.	Hydrogen sulfide	7783-06-4	1 ppm	ST 5 ppm	34.08	____	Irritation of the upper respiratory tract, central nervous system disorder		
370.	Hydroquinone	123=31-9	1 mg/m^3	____	110.11	DSEN, A3, dermal sensitization, confirmed animal carcinogen with unknown relevance to humans	Eye irritation, eye damage		Category (3) not classifiable as to their carcinogenicity to humans
371.	2-Hydroxypropyl acrylate	999-61-1	0.5 ppm	____	130.14	DSEN, skin, dermal sensitization	Irritation of the eyes and upper respiratory tract		
372.	Indene	95-13-6	5 ppm	____	116.15	____	Liver damage		
373.	Indium and compounds, as In	7440-74-6	0.1 mg/m^3	____	114.82	____	Pulmonary edema, pneumonia, dental erosion, apathy		
374.	Iodine and Iodides Iodine Iodides	7553-56-2	0.01 ppm(IFV) 0.01 ppm(IFV)	ST 0.1 ppm(V) ____	126.91 Variable	A4 not classifiable as a human carcinogen A4 not classifiable as a human carcinogen	Hypothyroidism, irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
375.	#Iodoform	75-47-8	0.6 ppm	____	393.73	____	(Central nervous system disorder)		

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376.	Iron oxide (Fe2O3)	1309-37-1	5 mg/m$^{3(R)}$	____	159.70	A4 not classifiable as a human carcinogen	Pneumoconiosis		Category (3) not classifiable as to their carcinogenicity to humans
377.	Iron pentacarbonyl as Fe	13463-40-6	0.1 ppm	ST 0.2 ppm	195.90	____	Pulmonary edema, central nervous system disorder		
378.	Iron salts, soluble as Fe		1 mg/m^3	____	Variable	____	Irritation of the upper respiratory tract and skin		
379.	Isoamyl acetate	123-92-2	50 ppm	ST 100 ppm	____	____		(OSHA) (California)	
380.	Isoamyl alcohol	123-51-3	100 ppm	ST 125 ppm	88.15	____	Irritation of the upper respiratory tract and eyes		
381.	#Isobutyl acetate	110-19-0	50 ppm	ST 150 ppm	____	____	Irritation of the upper respiratory tract and eyes	(OSHA) (California)	
382.	Isobutanol	78-83-1	50 ppm	____	74.12	____	Irritation of the skin and eyes		
383.	Isobutyl nitrite	542-56-3	____	C 1 ppm (IFV)	103.12	A3, BEIM, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Dilatation of blood vessels, presence of methemoglobin in the blood		
384.	Isooctyl alcohol	26952-21-6	50 ppm	____	130.23	Skin	Irritation of the upper respiratory tract		

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385.	Isophorone	78-59-1	____	C 5 ppm	138.21	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, central nervous system disorder, apathy, fatigue		
386.	Isophorone diisocyanate	4098-71-9	0.005 ppm	___	222.30	___	Respiratory sensitization		
387.	2-Isopropoxyethanol	109-59-1	25 ppm	___	104.15	Skin	Effect on blood		
388.	(Isopropyl acetate)	108-21-4	100 ppm	ST (200 ppm)	(102.13)	(___)	(Irritation of the eyes and upper respiratory tract, central nervous system disorder)		
389.	Isopropyl alcohol	67-63-0	500 ppm	ST 400 ppm				(OSHA) (California)	Category (3) not classifiable as to their carcinogenicity to humans
390.	Isopropylamine	75-31-0	5 ppm	ST 10 ppm	59.08	___	Irritation of the upper respiratory tract, eye damage		
391.	N-Isopropylaniline	768-52-5	2 ppm	___	135.21	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		
392.	Isopropyl ether	108-20-3	250 ppm	ST 310 ppm	102.17	___	Irritation of the upper respiratory tract and eyes		

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393.	Isopropyl glycidyl ether (IGE)	4016-14-2	50 ppm	ST 75 ppm	116.18	———	Irritation of the upper respiratory tract and eyes, dermatitis		
394.	Kaolin	1332-58-7	2 $mg/m^{3(E,R)}$	———	———	A4 not classifiable as a human carcinogen	Pneumoconiosis		
	Total dust							(OSHA) (California)	
	Respirable fraction			2 mg/m^3 (without asbestos and crystalline silica less than 1%)				(OSHA) (California)	
395.	Kerosene jet fuels, as total hydrocarbon vapour	8008-20-6; 64742-81-0	200 $mg/m^{3(P)}$	———	Variable	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the skin and upper respiratory tract, central nervous system disorder		
396.	Ketene	463-51-4	0.5 ppm	ST 1.5 ppm	42.04	———	Irritation of the upper respiratory tract, pulmonary edema		
397.	Lead and inorganic compounds (as Pb)	7439-92-1	0.05 mg/m^3	———	207.20 Variable	A3, BEI, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices	Central and peripheral nervous system disorder, effect on blood		Category (2B) possibly carcinogenic to humans

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398.	#Lead chromate, as pb as Cr	7758-97-6	(0.05 mg/m^3) (0.012 mg/m^3)	(-) (-)	(323.22)	(A2, BEI) biological exposure indices, suspected human carcinogen (A2) suspected human carcinogen	Male reproductive disorder, teratogenic effect, vasoconstriction		
399.	Limestone	1317-65-3		See calcium carbonate				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
400.	Lindane	58-89-9	0.5 mg/m^3	_____	290.85	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage, central nervous system disorder		Category (1) confirmed human carcinogen (Non-Hodgkin lymphoma occurs)
401.	Lithium hydride	7580-67-8	_____	C 0.05 mg/m$^{3(I)}$	7.95	_____	Irritation of the eyes and respiratory tracts		
402.	*L.P.G. (Liquified Petroleum Gas)	68476-85-7	See Appendix (F): Minimum Oxygen Content (D, EX)	See Appendix (F): Minimum Oxygen Content (D, EX)	_____		Asphyxia		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
403.	Magnesite	546-93-0		See Appendixes				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
404.	Magnesium oxide	1309-48-4	10 $mg/m^{3(I)}$	____	40.32	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, metal fume fever		
405.	Malathion	121-75-5	1 $mg/m^{3(IFV)}$	____	330.36	BEI_A, A4, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides, not classifiable as a human carcinogen	Cholinesterase inhibition		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen (non-dust form)
406.	Maleic anhydride	108-31-6	0.01 $mg/m^{3(IFV)}$	____	98.06	DSEN, RSEN, A4 dermal and respiratory sensitization, not classifiable as a human carcinogen	Respiratory sensitization		
407.	Manganese, elemental and inorganic compounds (as Mn)	7439-96-5	0.02 $mg/m^{3(R)}$ 0.1 $mg/m^{3(I)}$	____	54.94 Variable	A4 not classifiable as a human carcinogen	Central nervous system disorder		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
408.	Manganese cyclopentadienyl tricarbonyl, as Mn	12079-65-1	0.1 mg/m^3	_____	204.10	Skin	Skin irritation, central nervous system disorder		
409.	Manganese fume (as Mn)	7439-96-5	0.02 $mg/m^{3(R)}$ 0.1 $mg/m^{3(I)}$ (for elemental and inorganic compounds)					(OSHA) (California)	
410.	Marble	1317-65-3						(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
411.	Mercury (organic) alkyl compounds (as Hg)	7439-97-6	0.01 mg/m^3	ST 0.03 mg/m^3	Variable	Skin	Central and peripheral nervous system dysfunction, kidney damage		Category (3) not classifiable as to their carcinogenicity to humans
412.	Mercury, all forms except alkyl (as Hg) Aryl compounds elemental and inorganic forms	7439-97-6	0.1 mg/m^3 0.025 mg/m^3	____ ____	200.59 Variable	Skin BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices	Central nervous system disorder, kidney damage Central nervous system disorder, kidney damage		Category (2B) possibly carcinogenic to humans

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413.	Mesityl oxide	141-79-7	15 ppm	ST 25 ppm	98.14	____	Irritation of the eyes and upper respiratory tract, central nervous system disorder		
414.	Methacrylic acid	79-41-41	20 ppm	____	86.09	____	Irritation of the skin and eyes		
415.	#Methane	74-82-8	See Appendix (F): Minimum Oxygen Content		16.04	____	Asphyxia		
416.	Methanol	67-56-1	200 ppm	ST 250 ppm	32.04	BEI, skin, biological exposure indices	Headache, eye damage, dizziness, nausea		
417.	Methomyl	16752-77-5	0.2 $mg/m^{3(IFV)}$	____	162.20	BEI_A, A4, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides, not classifiable as a human carcinogen	Cholinesterase inhibition		
418.	Methoxychlor	72-43-5	10 mg/m^3	____	345.65	A4 not classifiable as a human carcinogen	Liver damage, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
419.	2-Methoxyethanol; (Methyl cellosolve)	109-86-4	0.1 ppm	____	76.09	BEI, skin, biological exposure indices	Effect on blood and reproduction		
420.	2-Methoxyethyl acetate (Methyl cellosolve acetate)	110-49-6	0.1 ppm	____	118.13	BEI, Skin, biological exposure indices	Effect on blood and reproduction		
421.	(2-Methoxy methylethoxy) Propanol	34590-94-8	100 ppm	ST 150 ppm	148.20	Skin	Irritation of the eyes and upper respiratory tracts, central nervous system disorder		
422.	4-Methoxyphenol	150-76-5	5 mg/m^3	____	124.15	____	Eye irritation, skin damage		
423.	1-Methoxy- 2-propanol	107-98-2	50 ppm	ST 100 ppm	90.12	A4 not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract		
424.	Methyl acetate	79-20-9	200 ppm	ST 250 ppm	74.08	____	Headache, dizziness, nausea, eye damage (nodular cell degeneration in the retina)		
425.	*Methylacetylene	74-99-7	1000 ppm (EX)	____	40.07	____	Central nervous system disorder		
426.	*Methylacetylene-propadiene mixture (MAPP)	56960-91-9	1000 ppm (EX)	ST 1250 ppm(EX)	40.07	____	Central nervous system disorder		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
427.	Methyl Acrylate	96-33-3	2 ppm	____	86.09	DSEN, A4, skin, dermal sensitization, not classifiable as a human carcinogen	Irritation of the eyes, skin and upper respiratory tract, eye damage		Category (3) not classifiable as to their carcinogenicity to humans
428.	Methylacrylonitrile	126-98-7	1 ppm	____	67.09	A4, skin, not classifiable as a human carcinogen	Central nervous system disorder, irritation of the eyes and skin		
429.	Methylal (Dimethoxy-methane)	109-87-5	1000 ppm	____	76.10	____	Central nervous system disorder, eye irritation		
430.	Methyl alcohol	67-56-1	200 ppm	ST 250 ppm C 1000 ppm		____		(OSHA) (California)	
431.	Methylamine	74-89-5	5 ppm	ST 15 ppm	31.06	____	Irritation of the skin, eyes and upper respiratory tract		
432.	Methyl n-amyl ketone	110-43-0	50 ppm	____	114.18	____	Irritation of the eyes and skin		
433.	N-Methylaniline	100-61-8	0.5 ppm	____	107.15	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood, central nervous system disorder		
434.	Methyl bromide	74-83-9	1 ppm	____	94.95	A4, skin, not classifiable as a human carcinogen	Irritation of the skin and upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
435.	Methyl tert-butyl ether	1634-04-4	50 ppm	____	88.17	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, kidney disorder		Category (3) not classifiable as to their carcinogenicity to humans
436.	Methyl n-butyl ketone, see 2-Hexanone	591-78-6	5 ppm	ST 10 ppm	100.16	BEI, skin, biological exposure indices	Peripheral neuropathy, testicular damage		
437.	Methyl chloride	74-87-3	50 ppm	ST 100 ppm	50.49	A4, skin, not classifiable as a human carcinogen	Central nervous system disorder, damage to the liver, kidneys and testicles, teratogenic effect		Category (3) not classifiable as to their carcinogenicity to humans
438.	Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	350 ppm	ST 450 ppm	133.42	A4, BEI, biological exposure indices, not classifiable as a human carcinogen	Central nervous system disorder, liver damage		Category (3) not classifiable as to their carcinogenicity to humans
439.	#(Methyl 2-cyanoacrylate)	137-05-3	(0.2 ppm)	(____)	(111.10)	(____)	(Irritation of the upper respiratory tract and eyes)		
440.	Methylcyclohexane	108-87-2	400 ppm	____	98.19	____	Irritation of the upper respiratory tract, central nervous system disorder, kidney and liver damage		
441.	Methylcyclohexanol	25639-42-3	50 ppm	____	114.19	____	Irritation of the upper respiratory tract and eyes		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
442.	o-Methylcyclohexanone	583-60-8	50 ppm	ST 75 PPM	112.17	Skin	Irritation of the upper respiratory tract and eyes, central nervous system disorder		
443.	2-Methylcyclopentadienyl manganese tricarbonyl as Mn	12108-13-3	0.2 mg/m3	____	218.10	Skin	Central nervous system disorder, lung, liver and kidney damage		
444.	Methyl demeton	8022-00-2	0.05 $mg/m^{3(IFV)}$	____	230.30	BEI_A, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
445.	Methylene bisphenyl isocyanate	101-68-8	0.005 ppm	____	250.26	____	Respiratory sensitization		Category (3) not classifiable as to their carcinogenicity to humans
446.	4,4-Methylene bis (2-chloroaniline)	101-14-4	0.01 ppm	____	267.17	BEI, A2, skin, biological exposure indices, suspected human carcinogen	Bladder cancer, presence of methemoglobin in the blood		
447.	Methylene bis (4-cyclohexylisocyanate)	5124-30-1	0.005 ppm	____	262.32	____	Respiratory sensitization, irritation of the lower respiratory tract		
448.	4,4 Methylene dianiline	101-77-9	0.1 ppm	____	198.26	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2B) possibly carcinogenic to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
449.	Methyl ethyl ketone (MEK), see 2-Butanone	78-93-3	200 ppm	ST 300 ppm	72.10	BEI, biological exposure indices	Irritation of the upper respiratory tract, central and peripheral nervous system disorder		
450.	Methyl ethyl ketone peroxide	1338-23-4	____	C 0.2 ppm	176.24	____	Irritation of the skin and eyes, liver and kidney damage		
451.	Methyl formate	107-31-3	50 ppm	ST 100 ppm	60.05	Skin	Central nervous system disorder, irritation of the upper respiratory tract, eye damage		
452.	Methyl hydrazine	60-34-4	0.01 ppm	____	46.07	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, lung cancer, liver damage		
453.	Methyl iodide	74-88-4	2 ppm	____	141.95	Skin	Eye damage, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
454.	Methyl isoamyl ketone	110-12-3	20 ppm	ST 50 ppm	114.20		Irritation of the upper respiratory tract, central nervous system disorder		
455.	Methyl isobutyl carbinol	108-11-2	25 ppm	ST 40 ppm	102.18	Skin	Irritation of the upper respiratory tract and eyes, central nervous system disorder		

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456.	Methyl isobutyl ketone	108-10-1	20 ppm	ST 75 ppm	100.16	A3, BEI, biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, dizziness, headache		Category (2B) possibly carcinogenic to humans
457.	Methyl isocyanate	624-83-9	0.02 ppm	ST 0.06 ppm	57.05	DSEN, skin, dermal sensitization	Irritation of the upper respiratory tract and eyes		
458.	Methyl isopropyl ketone	563-80-4	20 ppm	____	86.14	___	Damage to the fetus/embryo, toxicity in newborns		
459.	Methyl mercaptan	74-93-1	0.5 ppm	____	48.11	___	Liver damage		
460.	Methyl methacrylate	80-62-6	50 ppm	ST 100 ppm	100.13	DSEN, A4, dermal sensitization, not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes, effect on body weight, pulmonary edema		Category (3) not classifiable as to their carcinogenicity to humans
461.	1-Methylnaphthalene, 2-Methylnaphthalene	90-12-0 91-57-6	0.5 ppm	____	142.20	A4, skin, not classifiable as a human carcinogen	Irritation of the lower respiratory tract, lung damage		

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462.	Methyl parathion	298-00-0	0.02 mg/m3(IFV)	____	263.20	BEI_A, A4, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		Category (3) not classifiable as to their carcinogenicity to humans
463.	Methyl propyl ketone; see 2-pentanone	107-87-9	_____	ST 150 ppm	86.17	___	Effect on lung functions, eye irritation		
464.	Methyl silicate	681-84-5	1 ppm	___	152.22	___	Irritation of the upper respiratory tract, eye damage		
465.	Alpha-Methylstyrene	98-83-9	10 ppm	___	118.18	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, damage to the kidneys and the female reproductive system		Category (2B) possibly carcinogenic to humans
466.	Methyl vinyl ketone	78-94-4	___	C 0.2 ppm	70.10	DSEN, skin, dermal sensitization	Irritation of the upper respiratory tract and eyes, central nervous system disorder		
467.	Metribuzin	21087-64-9	5 mg/m^3	___	214.28	A4 not classifiable as a human carcinogen	Liver damage, effect on blood		

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468.	Mevinphos	7786-34-7	0.01 $mg/m^{3(IFV)}$	___	224.16	BEI_A, A4, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides, not classifiable as a human carcinogen	Cholinesterase inhibition		
469.	Methylene bisphenyl isocyanate (MDI)	101-68-8	0.005 ppm	___	___			(OSHA) (California)	Category (3) not classifiable as to their carcinogenicity to humans
470.	Mica; see Silicates	12001-26-2	3 $mg/m3^{(R)}$	___	___	___	Pneumoconiosis	(OSHA) (California)	
471.	Mineral oil, excluding metal working fluids pure, highly and severely Refined poorly and mildly refined		5 $mg/m^{3(I)}$ ---(L)	___ ___	Variable	A4 not classifiable as a human carcinogen A2 suspected human carcinogen	Irritation of the upper respiratory tract		
472.	Molybdenum, as Mo Soluble compounds Metal and insoluble compounds	7439-98-7	0.5 $mg/m^{3(R)}$ 10 $mg/m^{3(I)}$ 3 $mg/m^{3(R)}$	___ ___ ___	95.95	A3 confirmed animal carcinogen with unknown relevance to humans __ __	Irritation of the lower respiratory tract		Category (2B) possibly carcinogenic to humans
473.	Monochloroacetic acid	79-11-8	0.5 ppm (IFV)	___	94.50	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract		

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474.	Monocrotophos	6923-22-4	0.05 $mg/m^{3(IFV)}$	_____	223.16	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
475.	Morpholine	110-91-8	20 ppm	_____	87.12	A4, skin, not classifiable as a human carcinogen	Eye damage, irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
476.	Naled	300-76-5	0.1 $mg/m^{3(IFV)}$	_____	380.79	BEI_A, A4, DSEN, skin, dermal sensitization, biological exposure indices to acetylcholinesterase inhibitor pesticides, not classifiable as a human carcinogen	Cholinesterase inhibition		
477.	Naphthalene	91-20-3	1O ppm	_____	128.19	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, cataracts in the eyes, hemolytic anemia		Category (2B) possibly carcinogenic to humans
478.	B-Naphthylamine	91-59-8	___ L)	_____	143.18	A1 confirmed human carcinogen	Bladder cancer		Category (1) confirmed human carcinogen (in the bladder)

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479.	# Natural gas	8006-14-2	See Appendix (F): Minimum Oxygen Content	See Appendix (F): Minimum Oxygen Content	___		Asphyxia		
480.	Natural rubber latex, As inhalable allergenic proteins	9006-04-6	0.0001 $mg/m^{3(I)}$	_____	Variable	DSEN, RSEN, Skin dermal and respiratory sensitization	Respiratory sensitization		
481.	Neon	See Appendix (F): Minimum Oxygen Content (D)	See Appendix (F): Minimum Oxygen Content (D)	See Appendix (F): Minimum Oxygen Content (D)	20.18	____	Asphyxia		
482.	Nickel Elemental metal	7440-02-0	1.5 $mg/m^{3(I)}$	___	58.71	A5 not suspected as a human carcinogen	Dermatitis, Pneumoconiosis		
483.	Soluble inorganic compounds (NOS)		0.1 $mg/m^{3(I)}$	____	Variable	A4, not classifiable as a human carcinogen	Lung damage, nasal cancer		
484.	Insoluble inorganic compounds (NOS)		0.2 $mg/m^{3(I)}$	___	Variable	A1 confirmed human carcinogen	Lung cancer		Category (1) confirmed human carcinogen (in the lungs, nose and sinuses)
485.	Nickel subsulfide	12035-72-2	0.1 $mg/m^{3(I)}$	___	240.19	A1 confirmed human carcinogen	Lung cancer		Category (1) confirmed human carcinogen (in the lungs, nose and sinuses)

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486.	Nickel carbonyl (as Ni)	13463-39-3	___	C 0.05 ppmC	170.73	A3 confirmed animal carcinogen with unknown relevance to humans	Lung irritation		
487.	Nicotine	54-11-5	0.5 mg/m^3	___	162.23	Skin	Digestive system damage, central nervous system and heart disorder		
488.	Nitrapyrin	1929-82-4	10 mg/m^3	ST 20 mg/m^3	230.93	A4 not classifiable as a human carcinogen	Liver damage		
489.	Nitric acid	7697-37-2	2 ppm	ST 4 ppm	63.02	___	Irritation of the upper respiratory tract and eyes, dental erosion		
490.	Nitric oxide	10102-43-9	25 ppm	___	30.01	BEI$_M$, biological exposure indices to methemoglobin inducers	Hypoxia/cyanosis, formation of nitrosyl-hemoglobin, irritation of the upper respiratory tract		
491.	p-Nitroaniline	100-01-6	3 mg/m^3	___	138.12	BEI$_M$, A4, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood, liver damage, eye irritation		

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492.	Nitrobenzene	98-95-3	1 ppm	___	123.11	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Presence of methemoglobin in the blood		Category (2B) possibly carcinogenic to humans
493.	p-Nitrochlorobenzene	100-00-5	0.1 ppm	___	157.56	BEI_M, A3, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans
494.	4–Nitrodiphenyl; see CFR 1910.1003	92-93-3	_ (L)	__	199.20	A2, skin, suspected human carcinogen	Bladder cancer		Category (3) not classifiable as to their carcinogenicity to humans
495.	Nitroethane	79-24-3	100 ppm	___	75.07		Liver damage, central nervous system disorder, irritation of the upper respiratory tract		
496.	Nitrogen dioxide	10102-44-0	0.2 ppm	___	46.01	A4 not classifiable as a human carcinogen	irritation of the lower respiratory tract		
497.	Nitrogen trifluoride	7783-54-2	10 ppm	__	71.00	BEI_M, biological exposure indices to methemoglobin inducers, suspected human carcinogen	Liver and kidney damage, presence of methemoglobin in the blood		
498.	Nitroglycerin	55-63-0	0.05 ppm	___	227.09	Skin	Dilatation of blood vessels		

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499.	Nitromethane	75-52-5	20 ppm	___	61.04	A3 confirmed animal carcinogen with unknown relevance to humans	Effect on thyroid gland, irritation of the upper respiratory tract, lung damage		Category (2B) possibly carcinogenic to humans
500.	1-Nitropropane	108-03-2	25 ppm	___	89.09	A4 suspected human carcinogen	Irritation of the upper respiratory tract and eyes, liver damage		
501.	2-Nitropropane	79-46-9	10 ppm	___	89.09	A3 confirmed animal carcinogen with unknown relevance to humans	Liver damage, liver cancer		Category (2B) possibly carcinogenic to humans
502.	N-Nitrosodimethylamine;	62-75-9	___(L)	___	74.08	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver and kidney cancer, liver disorder		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
503.	Nitrotoluene (all isomers)		2 ppm	____	137.13	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		
	o-isomer	88-72-2	2 ppm	____	137.13	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
	m-isomer	99-08-1	2 ppm	____	137.13	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans
	p-isomer	99-99-0	2 ppm	____	137.13	BEI_M, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		Category (3) not classifiable as to their carcinogenicity to humans
504.	5- Nitro-o-toluidine	99-55-8	1 mg/m3(I)	____	152.16	A3 confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (3) not classifiable as to their carcinogenicity to humans
505.	Nitrous Oxide	10024-97-2	50 ppm	____	44.02	A4 not classifiable as a human carcinogen	Central nervous system disorder, effect on blood, fetus/embryo damage		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
506.	Nonane	111-84-2	200 ppm	____	128.26	_____	Central nervous system disorder		
507.	Octachloronaphthalene	2234-13-1	0.1 mg/m^3	ST 0.3 mg/m^3	403.74	Skin	Liver damage		
508.	Octane	111-65-9	300 ppm	____	114.22		Irritation of the upper respiratory tract		
509.	Oil mist, mineral	8012-95-1		5 mg/m^3 (excluding dust)				(OSHA) (California)	
510.	Osmium tetroxide (as Os)	20816-12-0	0.0002 ppm	0.0006 ppm ST	254.20	_____	Irritation of the skin, eyes, and upper respiratory system		
511.	Oxalic acid, anhydrous	144-62-7	1 mg/m^3	ST 2 mg/m^{3}S	90.04	_____	Irritation of the skin, eyes, and upper respiratory system		
512.	Oxalic acid, dihydrate	6153-56-6	1 mg/m^3	ST 2 mg/m^3	126.00	_____	Irritation of the skin, eyes, and upper respiratory tract		
513.	P,p`- Oxybis (benzene sulfonyl hydrazide)	80-51-3	1 mg/m^3 (I)	____	358.40	____	Teratogenic effect		
514.	Oxygen difluoride	7783-41-7	____	C 0.05 ppm	54.00	____	Headache, pulmonary edema, irritation of the upper respiratory tract		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
515.	Ozone Heavy work Moderate work Light work Light or moderate or heavy (<=2 hours)	10028-15-6	0.05 ppm 0.08 ppm 0.10 ppm 0.20 ppm	____ ____ ____ ____	48.00	A4 not classifiable as a human carcinogen A4 not classifiable as a human carcinogen A4 not classifiable as a human carcinogen A4 not classifiable as a human carcinogen	Effect on lung functions		
516.	Paraffin wax fume	8002-74-2	2 mg/m^3	____	___	___	Irritation of the upper respiratory tract, nausea		
517.	#Paraquat, as paraquat	4685-14-7	(0.5 mg/m^3) (0.1 $mg/m^{3(R)}$	(____) (____)	257.18	(____) (____)	(Lung damage)		
518.	Parathion	56-38-2	0.05 $mg/m^{3(IFV)}$	____	291.27	BEI, A4, skin, not classifiable as a human carcinogen, biological exposure indices	Cholinesterase inhibition		Category (2B) possibly carcinogenic to humans
519.	Particles (insoluble or poorly soluble) Not Otherwise Regulated (PNOR)[(i)]			See *TLV book* Appendix B					

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
520.	Pentaborane	19624-22-7	0.005 ppm	ST 0.015 ppm	63.17		Central nervous system disorders and convulsions		
521.	Pentachloronaphthalene	1321-64-8	0.5 mg/m^3	____	300.40	Skin	Liver damage, chloracne		
522.	Pentachloronitrobenzene	82-68-8	0.5 mg/m^3	____	295.36	A4 not classifiable as a human carcinogen, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (3) not classifiable as to their carcinogenicity to humans
523.	Pentachlorophenol	87-86-5	0.5 $mg/m^{3(IFV)}$	ST 1 $mg/m^{3\ (IFV)}$	266.35	BEI, A3, skin, biological exposure indices, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, central nervous system and heart disorder		
524.	Pentaerythritol	115-77-5	10 mg/m^3	____	136.15	____	Irritation of digestive system		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
525.	Pentane, all isomers	78-78-46 463-82-1	1000 ppm	____	72.15	___	Irritation of the respiratory tract, numbness		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
526.	2,4- Pentanedione	123-54-6	25 ppm	____	100.12	Skin	Neurotoxin, central nervous system disorder		
527.	2-Pentanone (Methylpropyl ketone)	107-87-9	250 ppm	ST 200 ppm				(OSHA) (California)	
528.	Pentyl acetate, all isomers	(123-92-2, 620 -11-1, 624-41-9, 625-16-1, 626-38-0, 628-63-7)	50 ppm	ST 100 ppm	130.20	___	Irritation of the upper respiratory tract		
529.	Peracetic acid	79-21-0	___	ST 0.4 ppm (IFV)	76.05	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin		
530.	Perchloroethylene (tetrachloroethylene)	127-18-4		See Annotated Z-2					Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
531.	Perchloromethyl mercaptan	594-42-3	0.1 ppm	____	185.87	___	Irritation of the upper respiratory tract and eyes		
532.	Perchloryl fluoride	7616-94-6	3 ppm	ST 6 ppm	102.46	___	Irritation of the upper and lower respiratory tracts, presence of methemoglobin in the blood, fluorosis		
533.	Perfluorobutylethylene	19430-93-4	100 ppm	____	246.10	___	Effect on blood		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
534.	Perfluoroisobutylene	382-21-8	____	C 0.01 ppm	200.04	___	Irritation of the upper respiratory tract, effect on blood		
535.	Persulphates, as persulfate	7727-21-1, 7727-54-0, 7775-27-1	0.1 mg/m^3	___ ___ ___	Variable	___	Skin irritation		
536.	Petroleum distillates (Naphtha) (Rubber solvent)			See *TLV book* Appendix H					
537.	Phenol	108-95-2	5 ppm	____	94.11	BEI, A4, skin, biological exposure indices, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, lung damage, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
538.	Phenothiazine	92-84-2	5mg/m^3		199.26	Skin	Skin irritation, photosensitivity		
539.	Phenyl ether, vapor	101-84-8	1 ppm					(OSHA) (California)	
540.	N-phenyl-B-naphthylamine	135-88-6	-----(L)	____	219.29	A4 not classifiable as a human carcinogen	Cancer		
541.	M-Phenylenediamine	108-45-2	0.1 mg/m^3	___	108.05	A4 not classifiable as a human carcinogen	Liver damage, skin irritation		Category (3) not classifiable as to their carcinogenicity to humans
542.	O-phenylenediamine	95-54-5	0.1 mg/m^3	____	108.05	A3 confirmed animal carcinogen with unknown relevance to humans	Anemia		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
543.	P-Phenylenediamine	106-50-3	0.1 mg/m^3	____	108.05	A4 not classifiable as a human carcinogen	Dermal sensitization, irritation of the upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
544.	Phenyl ether, vapor	101-84-8	1 ppm	ST 2 ppm	170.20	___	Irritation of the upper respiratory tract and eyes, nausea		
545.	Phenyl glycidyl ether (PGE)	122-60-1	0.1 ppm	___	150.17	A3, DSEN, skin, dermal sensitization, confirmed animal carcinogen with unknown relevance to humans	Testicular damage		Category (2B) possibly carcinogenic to humans
546.	Phenylhydrazine	100-63-0	0.1 ppm	___		A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and skin, anemia		
547.	Phenyl isocyanate	103-71-9	0.005 ppm	ST 0.015 ppm	119.10	DSEN, RSEN, Skin, dermal and respiratory sensitization	Irritation of the upper respiratory tract		
548.	Phenyl mercaptan	108-98-5	0.1 ppm	___	110.18	Skin	Irritation of the upper respiratory tract and eyes, central nervous system disorder		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
549.	Phenyl phosphine	638-21-1	____	C 0.05 ppm	110.10	___	Dermatitis, effect on blood, testicular damage		
550.	Phorate	298-02-2	0.05 $mg/m^{3(IFV)}$	_____	260.40	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
551.	Phosdrin (Mevinphos)	7786-34-7	0.03 ppm	0.01 $mg/m^{3(IFV)}$				(OSHA) (California)	
552.	Phosgene (Carbonyl chloride)	75-44-5	0.1 ppm	____	98.92	___	Irritation of the upper respiratory tract, pulmonary edema, emphysema		
553.	#Phosphine	7803-51-2	(0.3 ppm)	ST (1 ppm)	34.00	(___)	(Irritation of the upper respiratory tract and digestive system, central nervous system disorder, headache)		
554.	Phosphoric acid	7664-38-2	1 mg/m^3	ST 3 mg/m^3	98.00	___	Irritation of the upper respiratory tract, eyes and skin		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
555.	Phosphorus (yellow)	12185-10-3	0.1 mg/m^3	____	123.92	____	Irritation of the upper and lower respiratory tracts and digestive system, liver damage		
556.	Phosphorous oxychloride	10025-87-3	0.1 ppm	____	153.35	____	Irritation of the upper respiratory tract		
557.	Phosphorus pentachloride	10026-13-8	0.1 ppm	____	208.24	____	Irritation of the upper respiratory tract and eyes		
558.	Phosphorus pentasulfide	1314-80-3	1 mg/m^3	ST 3 mg/m^3	222.29	____	Irritation of the upper respiratory tract		
559.	Phosphorus trichloride	7719-12-2	0.2 ppm	ST 0.5 ppm	137.35	____	Irritation of the upper respiratory tract, eyes and skin		
560.	*Phthalic anhydride	85-44-9	0.002 $mg/m^{3(IFV)}$	ST 0.005 $mg/m^{3(IFV)}$		DSEN, RSEN, A4, skin, dermal and respiratory sensitization, not classifiable as a human carcinogen	Asthma, respiratory sensitization		
561.	m-Phthalodinitrile	626-17-5	5 $mg/m^{3(IFV)}$	___	128.14	____	Irritation of the upper respiratory tract and eyes		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
562.	O-Phthalodinitrile	91-15-6	1 mg/m$^{3(IFV)}$	____	128.13	_____	Central nervous system convulsions, effect on body weight		
563.	Picloram	1918-0-21	10 mg/m^3	____	241.48	A4 not classifiable as a human carcinogen	Liver and kidney damage		Category (3) not classifiable as to their carcinogenicity to humans
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
564.	Picric acid	88-89-1	0.1 mg/m^3	____	229.11	___	Dermal sensitization, dermatitis, eye irritation		
565.	Pindone (2-Pivalyl-1, 3-indandione)	83-26-1	0.1 mg/m^3	____	230.25	___	Coagulation		
566.	Piperazine and salts, as piperazine	110-85-0	0.03 ppm (IFV)	____	86.14	DSEN, RSEN, A4, dermal and respiratory sensitization, not classifiable as a human carcinogen	Asthma, respiratory sensitization		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
567.	Plaster of paris	26499-65-0		See TLV for calcium sulfate				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
568.	Platinum (as Pt) Metal	7440-06-4	1 mg/m^3	____	195.09	____	Asthma, irritation of the upper respiratory tract		
	Soluble salts		0.002 mg/m^3	____	Variable	____	Bronchial asthma, irritation of the upper respiratory tract		
569.	Polyvinyl chloride	9002-86-2	1 mg/m^3 (R)	____	Variable	A4 not classifiable as a human carcinogen	Pneumoconiosis, irritation of the lower respiratory tract, altered lung functions		Category (3) not classifiable as to their carcinogenicity to humans
570.	Portland cement	65997-15-1	1 mg/m$^{3(E,R)}$ (Without asbestos and crystalline silica less than 1%)	____	____	A4 not classifiable as a human carcinogen	Asthma, respiratory symptoms, affected lung functions		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
571.	Potassium hydroxide	1310-58-3	_____	C 2 mg/m3	56.10	____	Irritation of the upper respiratory tract, eyes and skin		
572.	*Propane	74-98-6		See Appendix (F) (D, EX)	44.1		Asphyxia		
573.	Propane sultone	1120-71-4	___(L)	____	122.14	A3 confirmed animal carcinogen with unknown relevance to humans	Cancer		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
574.	n-Propyl alcohol	71-23-8	100 ppm	____	60.09	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		
575.	2-propanol	67-63-0	200 ppm	ST 400 ppm	60.09	BEI, A4, not classifiable as a human carcinogen, biological exposure indices	Irritation of the upper respiratory tract and eyes, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
576.	Propargyl alcohol	107-19-7	1 ppm	____	56.06	Skin	Irritation of the eyes, liver and kidney damage		
577.	Beta-propriolactone; see CFR 1910.1013	57-57-8	0.5 ppm	____	72.06	A3 confirmed animal carcinogen with unknown relevance to humans	Skin cancer, irritation of the upper respiratory tract		Category (2B) possibly carcinogenic to humans
578.	Propion aldehyde	123-38-6	20 ppm	____	58.10	___	Irritation of the upper respiratory tract		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
579.	Propionic acid	79-09-4	10 ppm	____	74.08	____	Irritation of the upper respiratory tract, eyes and skin		
580.	Propoxur	114-26-1	0.5 $mg/m^{3(IFV)}$	____	209.24	BEI_A, A3, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
581.	#(n-Propyl acetate)	109-60-4	(200 ppm)	ST (250 ppm)	(102.13)	(___)	(Irritation of the upper respiratory tract and eyes)		
582.	Propylene	115-07-1	500 ppm	____	42.08	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, Asphyxia		Category (3) not classifiable as to their carcinogenicity to humans
583.	Propylene dichloride	78-87-5	10 ppm	____	112.99	DSEN, A4, not classifiable as a human carcinogen, dermal sensitization	Irritation of the upper respiratory tract, effect on body weight		Category (1) confirmed human carcinogen (in the liver)
584.	Propylene glycol dinitrate	6423-43-4	0.05 ppm	____	166.09	BEI_M, skin, biological exposure indices to methemoglobin inducers	Headache, central nervous system disorder		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
585.	Propylene oxide	75-56-9	2 ppm	___	58.08	DSEN, A3, confirmed animal carcinogen with unknown relevance to humans, dermal sensitization	Irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans
586.	Propylene imine	75-55-8	0.2 ppm	ST 0.4 ppm	57.09	A3, skin, confirmed animal carcinogen with unknown relevance to humans, skin	Kidney damage, Irritation of the upper respiratory tract		Category (2B) possibly carcinogenic to humans
587.	n-Propyl nitrate	627-13-4	25 ppm	ST 40 ppm	105.09	BEI_M, biological exposure indices to methemoglobin inducers	Headache, nausea		
588.	Pyrethrum	8003-34-7	5 mg/m^3	___	345 (as an average)	A4 not classifiable as a human carcinogen	Liver damage, Irritation of the lower respiratory tract		
589.	Pyridine	110-86-1	1 ppm	___	79.10	A3 confirmed animal carcinogen with unknown relevance to humans	Skin irritation, liver and kidney damage		Category (2B) possibly carcinogenic to humans
590.	Quinone	106-51-4	0.1 ppm	___	108.09	___	Eye irritation, skin damage		Category (3) not classifiable as to their carcinogenicity to humans
591.	Resorcinol	108-46-3	10 ppm	ST 20 ppm	110.11	A4 not classifiable as a human carcinogen	Eye and skin irritation		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
592.	Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6	1 mg/m^3	___	Variable	A4 not classifiable as a human carcinogen	Metals: irritation of the upper respiratory tract. Insoluble compounds: irritation of the lower respiratory tract		
593.	Rhodium (as Rh), soluble compounds	7440-16-6	0.01 mg/m^3	___	Variable	A4 not classifiable as a human carcinogen	Asthma		
594.	Ronnel	299-84-3	5 mg/m$^{3(IFV)}$	___	321.57	BEI$_A$, A4, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
595.	Rouge			See Appendix (D)				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
596.	Rosin core solder thermal decomposition products, colophony	8050-09-7	---(L)	___	N/A	DSEN, RSEN dermal and respiratory sensitization	Skin infections, dermal sensitization, asthma		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
597.	Rotenone (commercial)	83-79-4	5 mg/m^3	___	391.41	A4 not classifiable as a human carcinogen	Irritation of the eyes and upper respiratory tract, central nervous system disorder		
598.	Selenium and compounds (as Se)	7782-49-2	0.2 mg/m^3	____	78.96	____	Irritation of the eyes and upper respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
599.	Selenium hexafluoride (as Se)	7783-79-1	0.05 mg/m^3	____	192.96	____	Pulmonary edema		
600.	Sesone	136-78-7	10 mg/m^3	____	309.13	A4 not classifiable as a human carcinogen	Digestive system irritation		
601.	Silica, amorphous, precipitated and gel	112926-00-8		See Annotated Z- 3				(OSHA) (California)	
602.	Silica, amorphous, diatomaceous, earth, containing less than 1% crystalline silica	61790-53-2		See Annotated Z- 3				(OSHA) (California)	
603.	Silica, crystalline, respirable dust						Pulmonary fibrosis, lung cancer		Category (1) confirmed human carcinogen (in the lung)
604.	Cristobalite; see 1910.1053^m	14464-46-1	0.025 mg/m^3 (R)	___	60.09	A2 suspected human carcinogen			Category (1) confirmed human carcinogen (in the lung)
605.	Quartz; see 1910.1053 ^{m}	14808-60-7	0.025 mg/m^3 (R)	___	60.09	A2 suspected human carcinogen			Category (1) confirmed human carcinogen (in the lung)

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606.	Tripoli (as quartz); see 1910.1053 [m] Alpha quartz	1317-95-9	0.025 mg/m^3 [(R)]	____	60.09	A2 suspected human carcinogen			
607.	Tridymite; see 1910.1053[m]	15468-32-3		See Appendix (G)					
608.	Silica, fused, respirable dust	60676-86-0		See Annotated Z-3				(OSHA) (California)	
609.	Silicates (less than 1% crystalline silica)							(OSHA) (California)	
610.	Mica (respirable dust)	12001-26-2		See Annotated Z-3				(OSHA) (California)	
611.	Soapstone, total dust			See Annotated Z-3					
612.	Soapstone, respirable dust			See Annotated Z-3					
613.	Talc (containing asbestos); use asbestos limit: see 29 CFR 1910.1001			See Annotated Z-3					
614.	Talc (containing no asbestos), respirable dust	14807-96-6		See Annotated Z-3					
615.	Tremolite, asbestiform; see 1910.1001			See Annotated Z-3					
616.	Silicon	7440-21-3							
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	

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617.	Silicon carbide Total dust	409-21-2	10 mg/m^3	____	40.10	A2 suspected human carcinogen	Irritation of the upper respiratory tract – mesothelioma Irritation of the upper respiratory tract		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
618.	Silicon tetrahydride	7803-62-5	5 ppm	____	32.12	____	Irritation of the upper respiratory tract		
619.	Silver, metal and soluble compounds (as Ag)	7440-22-4	For metal, dust and fume: 0.1 mg/m^3 For soluble compounds, such as silver: 0.01 mg/m^3	____ ____	107.87 Variable	____	Argyria		
620.	Simazine	122-34-9	0.5 mg/m^3 (I)	____	201.60	A3 confirmed animal carcinogen with unknown relevance to humans, skin	Effect on blood		Category (3) not classifiable as to their carcinogenicity to humans

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621.	Sodium azide	26628-22-8	____	(C) 0.29 mg/m^3	65.02	A4 not classifiable as a human carcinogen	Heart disorder, lung damage		
622.	As hydrazoic acid vapor		____	C 0.11 ppm		A4 not classifiable as a human carcinogen			
623.	Sodium bisulfite	7631-90-5	5 mg/m^3	____	104.07	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract, eyes and skin		
624.	Sodium fluoroacetate	62-74-8	0.05 mg/m^3	____	100.02	Skin	Nausea, central nervous system and heart disorder		
625.	Sodium hydroxide	1310-73-2	___	C 2 mg/m^3	40.01	____	Irritation of the upper respiratory tract, eyes and skin		
626.	Sodium metabisulfite	7681-57-4	5 mg/m^3	____	190.13	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
627.	Starch	9005-25-8	10 mg/m^3	____	____	A4 not classifiable as a human carcinogen	Dermatitis		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	

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628.	Stibine	7803-52-3		0.1 ppm				(OSHA) (California)	
629.	*Stearates (J)	57-11-4, 557-04-0, 557-05-1, 882-16-2	10 mg/m$^{3(I)}$ 3 mg/m$^{3(R)}$	____ ____	Variable	A4 not classifiable as a human carcinogen	Irritation of the lower respiratory tract		Category (3) not classifiable as to their carcinogenicity to humans
630.	Stoddard solvent	8052-41-3	100 ppm	____	140.0	____	Skin, eyes and kidney damage, central nervous system disorder, nausea		
631.	#(Strontium chromate)	7789-06-2 as Cr	(0.0005 mg/m^3)	(____)	(203.61)	(A2) suspected human carcinogen	(Cancer)		
632.	Strychnine	57-24-9	0.15 mg/m^3	____	334.40		Central nervous system disorder		
633.	Styrene (Monomer)	100-42-5	20 ppm	ST 40 ppm	104.16	A4, BEI, not classifiable as a human carcinogen, biological exposure indices	Central nervous system disorder, peripheral neuropathy, irritation of the upper respiratory tract		Category (2B) possibly carcinogenic to humans
634.	Subtilisins, as 100% crystalline active pure enzyme	1395-21-7, 9014-01-1	___	C 0.00006 mg/m^3	____	____	Irritation of the upper and lower respiratory tracts and skin, asthma		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
635.	Sucrose	57-50-1				A4 not classifiable as a human carcinogen	Dental erosion		
	Total dust		10 mg/m^3		342.30	A4 not classifiable as a human carcinogen			
	Respirable fraction							(OSHA) (California)	
636.	Sulfometuron methyl	74222-97-2	5 mg/m^3	____	364.38	A4 not classifiable as a human carcinogen	Effect on blood		
637.	Sulfotepp	3689-24-5	0.1 $mg/m^{3(IFV)}$	____	322.30	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
638.	Sulfur dioxide	7446-09-5	____	ST 0.25 ppm	64.07	A4 not classifiable as a human carcinogen	Irritation of the lower respiratory tract, effect on lung functions		Category (3) not classifiable as to their carcinogenicity to humans
639.	Sulfur hexafluoride	2551-62-4	1000 ppm	____	146.07		Asphyxia		
640.	Sulfuric acid	7664-93-9	0.2 $mg/m^{3(T)}$	____	98.08	$A2^{(M)}$ suspected human carcinogen	Effect on lung functions		

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641.	Sulfur monochloride	10025-67-9	____	C 1 ppm	135.03	____	Irritation of the upper respiratory tract, eyes and skin		
642.	Sulfur pentafluoride	5714-22-7	____	C 0.01 ppm	254.11	____	Irritation of the upper respiratory tract, lung damage		
643.	Sulfur tetrafluoride	7783-60-0	____	C 0.1 ppm	108.07	____	Irritation of the upper respiratory tract and eyes, lung damage		
644.	Sulfuryl fluoride	2699-79-8	5 ppm	ST 10 ppm	102.07	____	Central nervous system disorder		
645.	2, 4, 5–T (2, 4, 5- tri-chlorophenoxyacetic acid)	93-76-5	10 mg/m^3	____	255.49	A4 not classifiable as a human carcinogen	Peripheral nervous system disorder		
646.	Sulprofos	35400-43-2	0.1 $mg/m^{3(IFV)}$	____	322.43	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
647.	Synthetic vitreous fibers								
648.	Continuous filament glass fibers		1 f/cc [f]	____	____	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		

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649.	Continuous filament glass fibers		5 $mg/m^{3(I)}$	____	____	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
650.	Glass wool fibers		1 f/ cc (F)	____	____	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of skin and mucous membranes		
651.	Rock wool fibers		1 f/cc (F)	____	____	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of skin and mucous membranes		Category (3) not classifiable as to their carcinogenicity to humans
652.	Slag wool fibers		1 f/cc (F)	____	____	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of skin and mucous membranes		Category (3) not classifiable as to their carcinogenicity to humans
653.	Special purpose glass fibers		1 f/cc (F)	____	____	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of skin and mucous membranes		
654.	Refractory ceramic fibers		0.2 f/cc (F)	____	____	A2 suspected human carcinogen	Lung fibrosis, affected lung functions		

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655.	Talc	14807-96-6	(Does not contain asbestos) 2 mg/m^3 (E,R)	———	———	A4 not classifiable as a human carcinogen	Lung fibrosis, affected lung functions		Category (3) not classifiable as to their carcinogenicity to humans
			For asbestos-containing, use TLV for asbestos (K)	———	———	A1 confirmed human carcinogen			Category (1) confirmed human carcinogen (See Asbestos)
656.	Tellurium and compounds (as Te)	13494-80-9	0.1 mg/m^3	———	127.60	———	Halitosis (bad breath)		
657.	Tellurium hexafluoride (as Te)	7783-80-4	0.02 ppm	———	241.61	———	Irritation of the lower respiratory tract		
658.	Temephos	3383-96-8	1 $mg/m^{3(IFV)}$	———	466.46	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
	Total dust								
	Respirable fraction								
659.	Tantalum, metal and oxide dust	7440-25-7	See Appendix (G)	See Appendix (G)					

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660.	Tetraethyl Dithiopyrophosphate – TEDP (Sulfotep)	3689-24-5		0.1 mg/m$^{3(IFV)}$					
661.	Terbufos	13071-79-9	0.01 mg/m$^{3(IFV)}$	____	288.45	BEI_A, A4, skin, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
662.	Terephthalic acid	100-21-0	10 mg/m^3	____	166.13	____			
663.	Terphenyls, all isomers	26140-60-3	____	C 5 mg/m^3	230.31	____	Irritation of the upper respiratory tract and eyes		
664.	1,1,2,2-tetrabromoethane	79-27-6	0.1 ppm$^{(IFV)}$	____	345.70	____	Irritation of the upper respiratory tract and eyes, pulmonary edema, liver damage		
665.	1,1,1,2 tetrachloro-2,2-difluoroethane	76-11-9	100 ppm	____	203.83	____	Liver and kidney damage, central nervous system disorder		
666.	1,1,2,2 tetrachloro-1,2-difluoroethane	76-12-0	50 ppm	____	203.83	____	Liver and kidney damage, central nervous system disorder		

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667.	1,1,2,2-tetrachloroethane	79-34-5	1 ppm	____	167.86	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (2B) possibly carcinogenic to humans
668.	Tetrachloroethylene; see perchloroethylene	127-18-4	25 ppm	ST 100 ppm	165.80	A3, BEI, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices	Central nervous system disorder		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
669.	Tetrachloromethane; see carbon tetrachloride								
670.	Tetrachloronaphthalene	1335-88-2	2 mg/m^3	____	265.96	____	Liver damage		
671.	Tetraethyl lead (as Pb)	78-00-2	0.1 mg/m^3	____	323.45	A4, skin, not classifiable as a human carcinogen	Central nervous system disorder		
672.	TEPP (Tetraethyl pyrophosphate)	107-49-3	0.01 mg/m^3 (IFV)	____	290.20	BEI_A, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		
673.	Tetrafluoroethylene	116-14-3	2 ppm	____	100.20	A3 confirmed animal carcinogen with unknown relevance to humans	Liver and kidney damage, liver and kidney cancer		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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674.	Tetrahydrofuran	109-99-9	50 ppm	ST 100 ppm	72.10	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract, central nervous system disorder, kidney damage		Category (2B) possibly carcinogenic to humans
675.	Tetrakis (hydroxymethyl) phosphonium salts tetrakis phosphonium chloride	124-64-1	2 mg/m^3	____	190.56	DSEN, A4 dermal sensitization, not classifiable as a human carcinogen	Liver damage		
676.	Tetrakis phosphonium sulfate	55566-30-8	2 mg/m^3	____	406.26	DSEN, A4 dermal sensitization, not classifiable as a human carcinogen	Liver damage		
677.	Tetramethyl lead, (as Pb)	75-74-1	0.15 mg/m^3	____	267.33	Skin	Central nervous system disorder		
678.	Tetramethyl succinonitrile	3333-52-6	0.5 ppm	____	136.20	Skin	Central nervous system convulsions, nausea, headache		
679.	Tetranitromethane	509-14-8	0.005 ppm	____	196.04	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes, cancer in the upper respiratory tract		Category (2B) possibly carcinogenic to humans
680.	Tetryl (2,4,6-trinitrophenyl methylnitramine)	479-45-8	1.5 mg/m^3	____	287.15	____	Irritation of the upper respiratory tract		

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681.	Thallium and compounds (as Tl)	7440-28-0	0.02 mg/m$^{3(I)}$	____	204.37 Variable	Skin	Digestive system damage, peripheral neuropathy		
682.	4,4` - Thiobis (6 - tertButyl-m-cresol)	96-69-5	1 mg/m$^{3(I)}$	____	358.52	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract		
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
683.	#(Thioglycolic acid)	68-11-1	1 ppm	____	92.12	Skin	Skin and eye irritation		
684.	Thionyl chloride	7719-09-7	____	C 0.2 ppm	118.98	____	Irritation of the upper respiratory tract		
685.	Thiram	137-26-8	0.05 mg/m^3 (IFV)	____	240.44	DSEN, A4, not classifiable as a human carcinogen, dermal sensitization	Effect on blood and body weight		Category (3) not classifiable as to their carcinogenicity to humans
686.	Tin, inorganic compounds (except oxides) (as Sn) Oxide and inorganic compounds	7440-31-5	2 mg/m^3 2 mg/m^3		118.69 Variable	____	Stannosis (pneumoconiosis)		

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687.	Tin, organic compounds (as Sn)	7440-31-5	0.1 mg/m^3	ST 0.2 mg/m^3	Variable	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes, headache, nausea, effect on central nervous system and immunity		
688.	Titanium dioxide – total dust	13463-67-7	10 mg/m^3	____	79.90	A4 not classifiable as a human carcinogen	Irritation of the lower respiratory tract		Category (2B) possibly carcinogenic to humans
689.	o-Tolidine	119-93-7	____	____	212.28	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Irritation of the eyes, kidneys and bladder, bladder cancer, presence of methemoglobin in the blood		Category (2B) possibly carcinogenic to humans
690.	Toluene	108-88-3	20 ppm	____	92.13	BEI, A4, not classifiable as a human carcinogen, biological exposure indices	Effect on the female reproductive system, loss of fetuses, vision disorder		Category (3) not classifiable as to their carcinogenicity to humans
691.	Toluene diisocyanate 2,4-or 2,6 – (or as a mixture)	584-84-9 91-08-7	0.001 ppm (IFV)	ST 0.005 ppm (IFV)	174.15	A3, RSEN, DSEN, skin, confirmed animal carcinogen with unknown relevance to humans, dermal and respiratory sensitization, skin	Asthma, effect on lung functions, eye irritation		

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692.	m- toluidine	108-44-1	2 ppm	____	107.15	BEI_M, A3, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Irritation of the eyes, bladder and kidneys, presence of methemoglobin in the blood		
693.	o- Toluidine	95-53-4	2 ppm	____	107.15	BEI_M, A3, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Irritation of the eyes, bladder and kidneys, presence of methemoglobin in the blood		Category (1) confirmed human carcinogen (in the bladder)
694.	p- Toluidine	106-49-0	2 ppm	____	107.15	BEI_M, A3, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood		
695.	Toxaphene; see chlorinated camphene								Category (2B) possibly carcinogenic to humans
696.	Tremolite			See Annotated Z-3				(OSHA) (California)	

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697.	Tributyl phosphate	126-73-8	5 mg/m $^{3(IFV)}$	____	266.31	BEI_A, A3 confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to acetylcholinesterase inhibitor pesticides	Irritation of the upper respiratory tract, eyes and bladder		
698.	Trichloroacetic acid	76-03-9	0.5 ppm	____	163.39	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper respiratory tract and eyes		Category (2B) possibly carcinogenic to humans
699.	1, 2, 4 – Trichlorobenzene	120-82-1	____	C 5 ppm	181.46	____	Irritation of the upper respiratory tract and eyes		
700.	1, 1, 2-Trichloroethane	79-00-5	10 ppm	____	133.41	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Liver damage, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
701.	Trichloroethylene	79-01-6	10 ppm	ST 25 ppm	131.40	BEI, A2, suspected human carcinogen, biological exposure indices	Central nervous system disorder, nephrotoxicity, cognitive deviations		Category (1) confirmed human carcinogen (in the kidney)
702.	Trichlorofluoromethane	75-69-4	____	C 1000 ppm	137.38	A4 not classifiable as a human carcinogen	Cardiac sensitization		

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703.	Trichloromethane; see Chloroform								
704.	Trichloronaphthalene	1321-65-9	5 mg/m^3	____	231.51	Skin	Liver damage, chloracne		
705.	1,2,3 – Trichloropropane	96-18-4	0.005 ppm	____	147.43	A2 suspected human carcinogen	Cancer		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
706.	1,1,2- Trichloro- 1,2,2-trifluoroethane	76-13-1	1000 ppm	ST 1250 ppm	187.40	A4 not classifiable as a human carcinogen	Central nervous system disorder		
707.	Trichlorophon	52-68-6	1 mg/m$^{3(I)}$	____	257.60	BEI$_A$, A4, not classifiable as a human carcinogen, biological exposure indices to acetylcholinesterase inhibitor pesticides	Cholinesterase inhibition		Category (3) not classifiable as to their carcinogenicity to humans
708.	Triethanolamine	102-71-6	5 mg/m^3	____	149.22	____	Eye and skin irritation		Category (3) not classifiable as to their carcinogenicity to humans
709.	Triethylamine	121-44-8	0.5 ppm	ST 1 ppm	101.19	A4, skin, not classifiable as a human carcinogen	Irritation of the upper respiratory tract, vision disorder		Category (3) not classifiable as to their carcinogenicity to humans
710.	Trifluorobromomethane	75-63-8	1000 ppm	____	148.92	____	Central nervous system and heart damage		

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
711.	1,3,5 – triglycidyl -s-triazinetrione	2451-62-9	0.05 mg/m^3	____	297.25	____	Male reproductive system damage		
712.	Trimellitic anhydride	552-30-7	0.0005 mg/m$^{3(IFV)}$	ST 0.002 mg/m$^{3(IFV)}$	192.12	RSEN, DSEN, Skin, dermal and respiratory sensitization	Respiratory sensitization		
713.	Trimethylamine	75-50-3	5 ppm	ST 15 ppm	59.11	____	Irritation of the eyes, upper respiratory tract and skin		
714.	Trimethylbenzene (mixed isomers)	25551-13-7	25 ppm	____	120.19	____	Central nervous system disorder, effect on blood, asthma		
715.	Trimethylphosphite	121-45-9	2 ppm	____	124.08	____	Eye irritation, cholinesterase inhibition		
716.	2,4,6 – trinitrophenol; see Picric acid	118-96-7	0.1 mg/m^3		227.13	BEI$_M$, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood, liver damage, cataract in the eye		
717.	2,4,6 – Trinitrophenyl-methyl nitramine; see Tetryl								
718.	2,4,6 – Trinitrotoluene (TNT)	118-96-7	0.1 mg/m^3	____	227.13	BEI$_M$, skin, biological exposure indices to methemoglobin inducers	Presence of methemoglobin in the blood, liver damage, cataract in the eye		Category (3) not classifiable as to their carcinogenicity to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
719.	Triorthocresyl phosphate	78-30-8	0.02 $mg/m^{3(IFV)}$	____	368.37	BEI_A, skin, biological exposure indices to acetylcholinesterase inhibitor pesticides, skin	Neurotoxicity, cholinesterase inhibition		
720.	Triphenyl phosphate	115-86-6	3 mg/m^3	____	326.28	A4 not classifiable as a human carcinogen	Cholinesterase inhibition		
721.	* Tungsten and compounds in the absence of cobalt as W	7440 -33- 7	3 $mg/m^{3(R)}$	____	74.00 Variable		Lung damage		
722.	Turpentine and selected monoterpenes	8006-64-2, 80-56-8, 127-91-3, 13466-78-9	20 ppm	____	136.00 Variable	DSEN, A4, not classifiable as a human carcinogen, dermal sensitization	Lung irritation		
723.	Uranium (natural) (as U)	7440-61-1					Kidney damage		
	Soluble compounds		0.2 mg/m^3	ST 0.6 mg/m^3	238.03	A1, BEI, confirmed human carcinogen, biological exposure indices	Kidney damage		Category (1) confirmed human carcinogen (in different locations)
	Insoluble compounds		0.2 mg/m^3	ST 0.6 mg/m^3	Variable	A1, BEI, confirmed human carcinogen, biological exposure indices	Kidney damage		Category (1) confirmed human carcinogen (in different locations)

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
724.	n-Valeraldehyde	110-62-3	50 ppm	____	86.13	____	Irritation of the eyes, upper respiratory tract and skin		
725.	Vanadium pentoxide, as V	1314-62-1	0.05 $mg/m^{3(I)}$	____	181.88	A3 confirmed animal carcinogen with unknown relevance to humans	Irritation of the upper and lower respiratory tracts		Category (2B) possibly carcinogenic to humans
	Respirable dust (as V_2O_5)								
	Fume (as V_2O_5)								
726.	Vegetable oil mist			See Appendixes					
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
727.	Vinyl benzene; See Styrene								
728.	Vinyl acetate	108-05-4	10 ppm	ST 15 ppm	86.09	A3 confirmed animal carcinogen with unknown relevance to humans,	Irritation of the eyes, upper respiratory tract and skin, central nervous system disorder		Category (2B) possibly carcinogenic to humans
729.	Vinyl bromide	593-60-2	0.5 ppm	____	106.96	A2 suspected human carcinogen	Liver cancer		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
730.	Vinyl chloride; see CFR 1910.1017	75-01-4	1 ppm	____	62.50	A1 confirmed human carcinogen	Lung cancer, liver damage		Category (1) confirmed human carcinogen (in the liver)
731.	Vinyl cyanide; see Acrylonitrile								
732.	4- Vinyl cyclohexene	100-40-3	0.1 ppm	____	108.18	A3 confirmed animal carcinogen with unknown relevance to humans	Damage to the male and female reproductive systems		
733.	Vinyl cyclohexene dioxide	106-87-6	0.1 ppm	____	140.18	A3, skin, confirmed animal carcinogen with unknown relevance to humans	Damage to the male and female reproductive systems		Category (2B) possibly carcinogenic to humans
734.	Vinyl fluoride	75-02-5	1 ppm	____	46.05	A2 suspected human carcinogen	Liver damage and cancer		Category (2A) probably carcinogenic to humans and confirmed animal carcinogen
735.	N- Vinyl -2-pyrrolidone	88-12-0	0.05 ppm	____	111.16	A3 confirmed animal carcinogen with unknown relevance to humans	Liver damage		Category (3) not classifiable as to their carcinogenicity to humans
736.	Vinylidene chloride	75-35-4	5 ppm	____	96.95	A4 not classifiable as a human carcinogen	Liver and kidney damage		Category (2B) possibly carcinogenic to humans

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			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
737.	Vinylidene fluoride	75-38-7	500 ppm	____	64.04	A4 not classifiable as a human carcinogen	Liver damage		Category (3) not classifiable as to their carcinogenicity to humans
738.	Vinyl toluene	25013-15-4	50 ppm	ST 100 ppm	118.18	A4 not classifiable as a human carcinogen	Irritation of the upper respiratory tract and eyes		Category (3) not classifiable as to their carcinogenicity to humans
739.	Warfarin	81-81-2	0.01 $mg/m^{3(I)}$	____	308.32	Skin	Hemorrhage, teratogenic effects		
740.	Wood dust- Western red cedar		0.5 $mg/m^{3(I)}$	____	N/A	DSEN, RSEN, A4, not classifiable as a human carcinogen, dermal and respiratory sensitization	Bronchial asthma, effect on respiratory functions, irritation of the upper and lower respiratory tracts		
741.	All other species		1 $mg/m^{3(I)}$	____	N/A	**Oak and beech** A1 confirmed human carcinogen **Birch, mahogany, teak, walnut** A2 suspected human carcinogen A4 not classifiable as a human carcinogen	Effect on lung functions, irritation of the upper and lower respiratory tracts Dust of all other species		Category (1) confirmed human carcinogen (in the nasal cavity, sinuses, and nasopharynx)

No.	Name of chemical substances in English	CAS No.	Recommended Threshold Limit Value TLVs as per the 2017 regulation issued by the American Conference of Governmental Industrial Hygienists		Molecular weight (for converting the threshold limit value from volume to weight or vice versa)	Coding	Basis for evaluating threshold exposure limits	Remarks	Classification of the substance as a carcinogen according to the International Agency for Research on Cancer of the World Health Organization (WHO-IARC)
			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
742.	Xylenes (o-, m-, p-isomers)	1330-20-7 95-47-6, 106-42-3, 108-38-3	100 ppm	ST 150 ppm	106.16	A4, BEI, not classifiable as a human carcinogen, biological exposure indices	Irritation of the upper respiratory tracts and eyes, central nervous system disorder		Category (3) not classifiable as to their carcinogenicity to humans
743.	m-Xylene alpha, alpha'- diamine	1477-55-0	____	C 0.1 mg/m^3	136.20	Skin	Irritation of the eyes, skin and digestive system		
744.	Xylidine (mixed isomers)	1300-73-8	0.5 ppm (IFV)	____	121.18	BEI_M, A3, skin, confirmed animal carcinogen with unknown relevance to humans, biological exposure indices to methemoglobin inducers	Liver damage, presence of methemoglobin in the blood		
745.	Yttrium and compounds, as Y	7440-65-5	1 mg/m^3	____	88.91	____	Lung fibrosis		
746.	Zinc chloride fume	7646-85-7	1 mg/m^3	ST 2 mg/m^3	136.29	____	Irritation of the upper and lower respiratory tracts		
747.	#(Zinc chromates), as Cr	11103-86-9, 13530-65-9, 37300-23-5	(0.01 mg/m^3)	(____)	(Variable)	(A1) confirmed human carcinogen	(Nasal cancer)		

No.	Name of chemical substances in English	CAS No.	Recommended Threshold Limit Value TLVs as per the 2017 regulation issued by the American Conference of Governmental Industrial Hygienists		Molecular weight (for converting the threshold limit value from volume to weight or vice versa)	Coding	Basis for evaluating threshold exposure limits	Remarks	Classification of the substance as a carcinogen according to the International Agency for Research on Cancer of the World Health Organization (WHO-IARC)
			Time-Weighted Average (TWA)	Short-Term Exposure Limit (STEL) or Ceiling Limit (C)					
748.	Zinc oxide, fume	1314-13-2	2 mg/m$^{3(R)}$	ST 10 mg/m$^{3(R)}$	81.37	____	Metal fume fever		
	Total dust		10 mg/m^3						
	Respirable fraction		5 mg/m^3					(OSHA) (California)	
749.	Zinc stearate	557-05-1		See TLV documented for stearates				(OSHA) (California)	
	Total dust		10 mg/m^3					(OSHA) (California)	
	Respirable fraction		5 mg/m$^{3(R)}$					(OSHA) (California)	
750.	Zirconium and compounds (as Zr)	7440-67-7	5 mg/m^3	ST 10 mg/m^3	91.22	A4 not classifiable as a human carcinogen	Irritation of the respiratory tract		

Annex (3) to the instructions for identifying the types of sources of occupational hazards in the work environment and the necessary preventive precautions and measures

The permissible duration of exposure to noise that exceeds the exposure limit value (87 dB (A))

Noise exposure level	Permissible exposure time
87 dB (A) (0.447 Pa)	8 hours 00 minutes
88 dB (A) (0.502 Pa)	6 hours 21 minutes
89 dB (A) (0.564 Pa)	5 hours 02 minutes
90 dB (A) (0.632 Pa)	4 hours 00 minutes
91 dB (A) (0.710 Pa)	3 hours 10 minutes
92 dB (A) (0.796 Pa)	2 hours 32 minutes
93 dB (A) (0.893 Pa)	2 hours 00 minutes
94 dB (A) (1.002 Pa)	1 hour 36 minutes
95 dB (A) (1.125 Pa)	1 hour 16 minutes
96 dB (A) (1.262 Pa)	1 hour 00 minutes
97 dB (A) (1.416 Pa) and above	-

Annex (4) to the instructions for identifying the types of sources of occupational hazards in the work environment and the necessary preventive precautions and measures

The permissible duration of exposure to hand-arm vibration, exceeding the standard daily exposure limit value of 5 m/s2 over an eight-hour reference period

Serial number	Daily exposure value for an eight-hour reference period [m/s2]	Permissible vibration exposure duration if personal protective equipment is not used
1.	5.0	8 hours 00 minutes
2.	6.0	5 hours 33 minutes
3.	7.0	4 hours 05 minutes
4.	8.0	3 hours 07 minutes
5.	9.0	2 hours 28 minutes
6.	10.0	2 hours 00 minutes
7.	11.0	1 hour 39 minutes
8.	12.0	1 hour 23 minutes
9.	13.0	1 hour 11 minutes
10.	14.0	1 hour 01 minute
11.	15.0	53 minutes
12.	16.0	47 minutes
13.	17.0	42 minutes
14.	18.0	37 minutes
15.	19.0	33 minutes
16.	20.0	30 minutes

Annex (5) to the instructions for identifying the types of sources of occupational hazards in the work environment and the necessary preventive precautions and measures

The permissible duration of exposure to whole-body vibration, exceeding the standard daily exposure limit value of 1.15 m/s2 over an eight-hour reference period

	Daily exposure value for an eight-hour reference period [m/s2]	Permissible vibration exposure duration if personal protective equipment is not used
1.	1.15	8 hours 00 minutes
2.	1.23	7 hours 00 minutes
3.	1.33	6 hours 00 minutes
4.	1.45	5 hours 00 minutes
5.	1.63	4 hours 00 minutes
6.	1.88	3 hours 00 minutes
7.	2.30	2 hours 00 minutes
8.	3.25	1 hour 00 minutes
9.	4.60	30 minutes
10.	7.97	10 minutes

Annex 6: Table of Lighting Requirements for Indoor Workplaces

The main activity	The Number of reference table in the Standard	The sub-activity	Type of area, task or activity	Ē□ (lx)
Traffic zones inside buildings	5-1	-	Circulation areas and Corridors	100
			Stairs, escalators, travelators	100
			Elevators, lifts	100
			Loading ramps/bays	150
General areas inside buildings	5-2	Break rooms, sanitation and first aid rooms	Canteens , pantries	200
			Rest/Break rooms	100
			Rooms for Physical exercise	300
			washrooms, bathrooms, toilets	200
			Patients room/sick bay	500
			Medical care rooms/rooms for medical attention	500
	5-3	Control rooms	Rooms for devices and control panels , switch gear	200
			Telex, mail/post room, switchboard	500
	5-4	Storage rooms and cold storages	Store and stockrooms	100
			Dispatch packing handling	300
	5-5	Storage shelves areas (racks)	Gangways/Unmanned	20
			Gangways/manned	150
			Control stations	150
			Storage rack face	200
Industrial activities and crafts	5-6	Agriculture	Loading and operating goods, handling equipment and machinery	200
	5-6	Agriculture	Buildings for livestock	50
			Sick animal pens; calving	200
			Feed preparation, dairy, utensil washing	200
	5-7	Bakeries	Preparation and baking	300
			Finishing , glazing and decorating	500
	5-8		Drying	50

		Cement, cement goods, concrete, bricks	Preparing of materials, work on kilns and mixers	200
			General machine work	300
			Rough forms	300
	5-9	Ceramics, tiles, glass, and glassware	Drying	50
			Preparation, general machine work	300
			Enamelling, rolling, pressing, shaping fine parts, glazing, glass blowing	300
			Grinding, engraving, glass polishing, shaping precision parts, manufacturing glass	750
			Grinding of optical glass, crystal, hand grinding and engraving	750
			Precision work e.g. decorative grinding, , hand painting	1000
			Manufacture of synthetic precious stones	1500
	5-10	Chemical, plastic and rubber industries	Remote-operated processing installations	50
Industrial activities and crafts	5-10	Chemical, plastic and rubber industries	Processing installations with limited manual intervention	150
			Continuously manned work stations in in processing installations	300
			Precision measuring rooms, laboratories	500
			Pharmaceutical production	500
			Tire production	500
			Color inspection	1000
			Cutting, finishing , inspection	750
	5-11	Electrical and electronic industry	Cable and wire manufacture	300
			Winding: - Large coils - Medium sized coils - Small coils	300 500 750
			Coil impregnating	300
			Galvanising	300
			Assembly process: - Rough, example large transformers - Medium, example switchboards	 300 500

			- Fine, example telephones, radios and technology equipment - precision, example measuring equipment and printed circuit boards	750 1000
			Electronic workshops, testing and adjusting	1500
Industrial activities and crafts	5-12	Foodstuffs and luxury food industries	Work stations and zones in: - Breweries, malting floor - For washing, barrel filling, cleaning, sieving, peeling, - Cooking in preserve and chocolate factories - work stations and zones in sugar factories - Drying and fermenting raw tobacco , fermentation cellar	200
	5-12	Foodstuffs and luxury food industries	Sorting, washing, grinding, mixing and packaging products	300
			Work stations and sensitive areas in slaughterhouses, butcher shops, dairies and filtration areas in sugar refineries	500
			Cutting and sorting fruits and vegetables	300
			Manufacturing canned foods, kitchen work, and manufacturing of cigars and cigarettes	500
			Inspection of bottles, product monitoring, refining, sorting and decorating	500
			Laboratories	500
			Color inspection	1000
	5-13	Foundries and metal casting	Man-size underfloor tunnels, cellars, etc.	50
			Platforms	100
			Sand preparation	200
			Dressing room	200
			workstations at cupola and mixer	200
			Casting bay	200

Industrial activities and crafts			shake out areas	200
			Machine molding	200
			Hand and core molding	300
			Die-casting	300
			Model building	500
	5-14	Hairdressers	Hairdressing	500
	5-15	Jewelry manufacturing	Working with precious stones	1500
			Manufacture of Jewelry	1 000
			Watch making (manually)	1500
			Watch making (automatic)	500
	5-16	Laundries and dry cleaning	Goods in, marking and sorting	300
			Washing and dry cleaning	300
			Ironing, pressing	300
	5-16	Laundries and dry cleaning	Inspection and repairs	750
	5-17	Leather and leather goods	Work on vats, barrels, pits	200
			Fleshing, skiving, rubbing, tumbling of skins	300
			Saddlery work, shoe manufacture: stitching, sewing, polishing, shaping, cutting, punching	500
			Sorting	500
			Leather dyeing (machine)	500
			Quality control	1 000
			Color inspection	1000
			Shoemaking	500
			Glove making	500
	5-18	Metal working and processing	Open die forging	200
			Drop forging	300
			Welding	300
			Rough and average machining: Tolerances ≥ 0.1mm	300
			Precision machining, grinding: Tolerances < 0.1 mm	500
			Scribing, inspection	750
			Wire and pipe drawing shops; Cold forming	300
			Plate machining: thickness ≥ 5 mm	200
			Sheet metalwork: thickness < 5 mm	300

			Tool making; cutting equipment manufacture	750
			Asembly:	
			- Rough	200
			- Medium	300
			- Fine	500
			- Precision	750
			Galvanising	300
			Surface preparation and painting	750
			Tool, template and jig making, precision mechanics, micromechanics	1000
	5-19	Paper and paper goods	Edge runners, pulp mills	200
Industrial activities and handicrafts	5-19	Paper and paper goods	Paper manufacture and processing, paper and corrugating machines, cardboard manufacture	300
			Standard bookbinding work, e.g. folding, sorting, gluing, cutting, embossing, sewing	500
	5-20	Power stations	Fuel supply plant	50
			Boiler house/room	100
			Machine halls	200
			Side rooms, example pump rooms, condenser rooms etc., switchboards (inside buildings)	200
			Control rooms	500
	5-21	Printers	Cutting, gilding, embossing, block engraving, work on stones and platens, printing machines, matrix making	500
			Paper sorting and hand printing	500
			Type setting, retouching, lithography	1000
			Color inspection in multi-color printing	1500
			Steel and copper engraving	2000
	5-22	Rolling mills , iron , and steel works	Production plants without manual operation	50
			Production plants with occasional manual operation	150
			Production plants with continuous manual operation	200
			Slab store	50
			Furnaces	200

			Mill train; coiler; shear line	300
			Control platforms , control panels	300
			Test, measurement and inspection	500
			Underfloor man-sized tunnels; belt sections, cellars, etc.	50
	5-23	Textile manufacturing and processing	Work stations and zones in baths, bale opening	200
	5-23	Textile manufacturing and processing	Carding, washing, ironing, devilling, machine work, drawing, combing, sizing, card cutting, pre-spinning, jute and hemp spinning	300
			Spinning, plying, reeling, winding	500
			Warping, weaving, braiding, knitting	500
			Sewing, fine knitting, taking up stitches	750
			Manual design, drawing patterns	750
			Finishing , dyeing	500
			Drying room	100
			Automatic fabric printing	500
			Burling, picking, trimming	1 000
			Color inspection, fabric control	1000
			Invisible mending	1500
			Hat manufacturing	500
	5-24	Vehicle construction and repair	Body work and assembly	500
			Painting, spraying chamber, polishing chamber	750
			Painting: touch-up, inspection	1000
			Upholstery manufacture (manned)	1000
			Final inspection	1000
			General vehicle services, repair and testing	300
	5-25	Woodworking and processing	Automatic processing; e.g. drying, plywood manufacturing	50
			Steam pits	150
			Saw frame	300
			Working on a carpentry bench, gluing, assembly	300

			Polishing, painting, fancy joinery	750
			Work on wood working machines, e.g. turning, fluting, dressing, rebating, grooving, cutting, sawing, sinking	500
			Selection of veneer woods	750
Industrial activities and crafts	5-25	Woodworking and processing	Marquetry, inlay work	750
			Quality control ,inspection	1000
Offices	5-26	-	Filing, copying	300
			Writing, printing, reading , data processing	500
			Technical drawing	750
			Computer-Aided Design (CAD) workstations	500
			Conference and meeting rooms	500
			reception desk	300
			archives	200
Retail premises	5-27	-	Sales area	300
			Cash box /till area	500
			Wrapper table	500
Places of public assembly	5-28	General areas	Entrance halls	100
			Cloakrooms	200
			Lounges	200
			Ticket offices	300
	5-29	Restaurants and hotels	Reception/cashier desk, porters' desk	300
			Kitchen	500
			Restaurant, dining room , function room	-
			Self-service restaurant	200
			buffet	300
			Conference rooms	500
			Corridors	100
	5-30	Theaters, concert halls, cinemas , places for entertainment	rehearsal /practice rooms	300
			Dressing rooms	300
			Seating areas - maintenance ,cleaning	200
			Stage area - rigging	300
	5-31	Trade fairs, exhibition halls	General lighting	300
	32-5	Museums	Exhibits , insensitive to light	Lighting is determined

				by the display requirements
	32-5	Museums	exhibits , t sensitive to lights	1. Lighting is determined by the display requirements. 2. Protection against damaging radiation is paramount
	5-33	Libraries	Bookshelves	200
			Reading area	500
			Counters	500
	5-34	Public car parks (indoor)	In/out ramps (during the day)	300
			In/out ramps (at night)	75
			Traffic lanes	75
			Parking areas	75
			ticket office	300
Educational premises	5-36	Nursery school/play school	Play room	300
			Nursery	300
			Handicraft room	300
Educational premises	-5-36	**Educational buildings**	Classrooms, tutorial rooms	300
			Classrooms for evening classes and adults education	500
			Auditorium, Lecture halls	500
			Black, green and white boards	500
			Demonstration table	500
			Arts rooms	500
			Art rooms in art schools	750
			Technical drawing rooms	750
			Practical rooms and laboratories	500
			Handicraft rooms	500
			Teaching workshop	500
			Music practice rooms	300
			Computer training rooms	300
			language laboratory	300
			Preparation rooms and workshops	500
			Entrance halls	200
			Circulation areas, corrid	100
			Stairs	150
			Student common rooms and assembly ha	200

			Teachers' rooms	300
			Library: bookshelves	200
Educational premises	5-36	-	Library: Reading areas	500
			Stock rooms for teaching materials	100
			Sports halls, gymnasiums, swimming pools	300
			School canteens	200
			kitchen	500
Healthcare premises	5-37	Rooms for general use		Too high luminances in the patients' visual field shall be prevented.
			Waiting rooms	200
			Corridors: During the day	100
			Hallways: cleaning	100
			Corridors: During the night	50
			corridors with multi-purpose use	200
			Day rooms	200
			Elevators , lifts for persons and visitors	100
			Service lifts	200
	5-38	Staff rooms	Staff office	500
			Staff rooms	300
	5-39	Wards, maternity wards		Too high luminances in the patients' visual field shall be prevented.
			General lighting	100
			Reading lighting	300
			Simple examinations	300
			Examination and treatment	1000
			Night lighting, observation lighting	5
			Bathrooms and toilets for patients	200
	5-40	Examination rooms (general)	General lighting	500
			Examination and treatment	1000
	5-41		General lighting	500

		Eye examination rooms	examination of the outer eye	1000
			Reading and colour vision tests with vision charts	500
	5-42	Ear examination rooms	General lighting	500
			Ear examination	1000
	5-43	Scanner rooms (radiology)	General lighting	300
			Scanners with image enhancers and television	50
	5-44	Delivery rooms	General lighting	300
			Examination and treatment	1000
	5-45	Treatment rooms (general)	Dialysis	500
Healthcare premises	5-45	Treatment rooms (general)	Dermatology	500
			Endoscopy rooms	300
			Plaster rooms	500
			Medical baths	300
			Massage and radiotherapy	300
	5-46	Operating areas	Pre-operative and recovery rooms	500
			Operating theater	1 000
			Operating cavity	10000 - 100000
	5-47	Intensive Care Unit	General lighting	100
			Simple examinations	300
			Examination and treatment	1000
			Night watch	20
	5-48	Dentists	General lighting	500
			At the patient's seat	1000
			Operating cavity	Specific requirements are listed in EN ISO 9680
			White teeth matching	
	5-49	Laboratories and pharmacies	General lighting	500
			Color inspection	1000
	5-50	Decontamination rooms	Sterilization rooms	300
			Disinfection rooms	300
	5-51		General lighting	500

		Autopsy rooms and mortuaries	autopsy table and dissecting table	5000
Transportation areas	5-52	Airports	Arrival and departure halls, baggage claim areas	200
			Connecting areas	150
			Information desks , check-in desks	500
			Customs and passport control desks	500
			Waiting areas	200
			Luggage store rooms	200
			Security check areas	300
			Air traffic control tower	500
			Testing and repair hangars	500
			Engine test areas	500
			Measuring areas in hangars	500
	5-53	Railway installations	Fully enclosed platforms, small number of passengers	100
			Fully enclosed platforms, large number of passengers	200
Transportation areas	5-53	Railway installations	Passenger subways (underpasses), small number of passengers	50
			Passenger subways (underpasses), , large number of passengers	100
			Ticket hall and encourse	200
			Ticket and luggage offices and counters	300
			Waiting rooms	200
			Entrance halls, station halls	200
			Switch and plant rooms	200
			Access tunnels	50
			Maintenance and servicing sheds	300

Annex 7: Table of Lighting Requirements for Outdoor Workplaces

Composition of the Table

Column 1 gives the safe values for the average illuminance Ēm on the reference surface for areas, tasks or activities as specified in the Jordanian Standard Specification No.2252-2

Column 3 lists those areas, tasks or activities for which specific requirements are given. If the particular area, task or activity is not listed, the values given for a similar, comparable situation should be adopted.

Column 4 gives the maintained illuminance Ēm on the reference surface (see clause 4-3) for the interior (area), task or activity given in Column 3.

Note: The table in this Annex is based on the Jordanian Standard Specification No.2253-1:2020

Ref No. in the Standard	Nature of activity/place	Type of area, task or activity	Ēm (lx)
5-1	General requirements for areas and for cleaning at outdoor workplaces	Walkways exclusively for pedestrians	5
		Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10
		Regular vehicle traffic (max. 40 km/h)	20
		Pedestrian passages, vehicle turning, loading and unloading points	50
		Cleaning and servicing	50
5-2	Airports	Hangar apron	20
		Terminal apron	20
		Loading areas	20
		Fuel depot	50
		Aircraft maintenance stands	200
		Note: For aircraft platform, see ICAO.	
5-3	Building sites	Clearance, excavation and loading	20
		Construction areas, drainpipes mounting, transport, auxiliary and storage tasks	50
		Framework element mounting, light reinforcement work, wooden mould and framework mounting, electric piping and cabling	100
		Element jointing, demanding electrical, machine and pipe mountings	200
5-4	Canals, locks and harbours	Waiting quays at canals and locks	10
		Gangways and passages exclusively for pedestrians	10
		Lock control and ballasting areas	20
		Cargo handling, loading and unloading	30
		Passenger areas in passenger harbours	50
		coupling of hoses, pipes and ropes	50

		Dangerous part of walkways and driveways	50
5-5	Farms	Farmyard	20
		Equipment shed (open)	50
		Animal sorting pen	50
-6	Fuel filling stations	Vehicle parking and storage areas	5
		Entry and exit routes: dark environment	20
		Entry and exit driveways: bright environment	50
5-6	Fuel filling stations	Air pressure and water checking points and other service areas	150
		Meter reading area	150
5-7	Industrial sites and storage areas	Short term handling of large units and raw materials, loading and unloading of solid bulk cargo	20
		Continuous handling of large units and raw materials, loading and unloading of goods, lifting and descending location for cranes, open loading platforms	50
		Reading of addresses, covered loading platforms, use of tools, ordinary reinforcement and casting tasks in concrete plants	100
		Demanding electrical, machine and piping installations, inspection	200
5-8	Offshore gas and oil structures	Sea surface below the rig	30
		Ladders, stairs, walkways	100
		Boat landing areas/transport areas	100
		Helideck	100
		Derrick	100
		Treatment areas	100
		Pipe rack area/deck	150
		Test station, shale shak, wellhead	200
		Pumping areas	200
		Lifeboat areas	200
		Drill floor and monkey board	300
		Mud room, sampling	300
		Crude oil pumps	300
		Device/ Plant areas	300
		Rotary table	500
5-9	Car parking	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5
		Medium traffic, e.g. parking areas of department stores, office buildings,	10

		plants, sports and multipurpose building complexes	
		Heavy traffic, e.g parking areas of major shopping centers, major sports and multi-purpose building complexes	20
5-10	**Oil and other chemical industries**	Handling of servicing tools, utilization of manually regulated valves, starting and stopping motors, lighting of burners	20
		Filling and emptying of container trucks and wagons with risk free substances, inspection of leakage, piping and packing	50
5-10	**Oil and other chemical industries**	Filling and emptying of container trucks and wagons with dangerous substances, replacements of pump packing, general service work, reading of instruments	100
		Fuel loading and unloading sites	100
		Repair of machines and electric devices	200
5-11	**Power, electricity, gas and heating plants**	Pedestrian movement within electricity safe areas	5
		Handling of servicing tools, coal	20
		Overall inspection	50
		General servicing work and reading of instruments	100
		Repair of Electric devices	200
5-12	**Railways and tramways**	Railway areas including light railways, tramways, monorails, miniature rails, metro, etc.	
		Open platforms, very small no. of passengers, e.g. train stops	5
		Tracks in passenger station areas, including stabling	10
		Railway yards: Flat Marshaling, retarder and Classification Yards	10
		Large railway areas (hump areas)	10
		Freight track, short duration operations	10
		Open platforms, small no. of passengers, e.g. rural and local trains	10
		walkways in railway areas, open footbridges	10
		Level crossings	20
		Open platforms, moderate number of passengers, e.g. suburban or, or inter-city services	20
		Freight track, , continuous operation	20
		Open platforms in freight areas	20

		Servicing trains and locomotive	20
		Railway yards handling areas	30
		Coupling area	30
		Stairs, small number of passengers	50
		Open platforms, large number of passengers, e.g. intercity services	50
		Covered platforms, small number of passengers, e.g. suburban trains, regional trains or intercity services	50
		Covered platforms in freight areas, short duration operations	50
		Covered platforms, large number of passengers, e.g. intercity services	100
5-12	**Railways and tramways**	Stairs, a large number of passengers	100
		Covered platforms in freight areas, continuous operation	100
		Inspection pit	100
5-13	**Sawmills**	Timber handling on land and in water, sawdust and chip conveyors	20
		Sorting of timber on land or in water, timber unloading points and sawn timber loading points, mechanical lifting to timber conveyor, stacking	50
		Reading of addresses and markings of sawn timber	100
		Grading and packaging	200
		Feeding into stripping and chopping machines	300
5-14	**Shipyards and docks**	General lighting of the shipyard area, storage areas of prefabricated goods	20
		Short term handling of large units	20
		Scraping, cleaning and painting of ship hull	50
		Painting and welding	100
		Mounting of electrical and mechanical components	200
5-15	**Water and sewage plants**	Handling of service tools, utilization of manually operated valves, starting and stopping of motors, piping packing and raking plants	50
		Handling of chemicals, inspection of leakage, changing of pumps, general servicing work, reading of instruments	100
		Repair of motors and electrical devices	200

Annex 8

Wet-Bulb Globe Temperature (WBGT) index reference values for heat stress*

Metabolic rate (category)	**Metabolic rate** **W**	**WBGT reference limit for people acclimatized to heat** **°C**	**WBGT reference limit for people not acclimatized to heat** **°C**
Category zero Metabolic rate during stillness	115	33	32
Category 1 Low metabolic rate	180	30	29
Category 2 Moderate metabolic rate	300	28	26
Category 3 High metabolic rate	415	26	23
Category 4 Very high metabolic rate	520	25	20

- Wet-Bulb Globe Temperature (WBGT): is a simple indicator of the atmosphere/thermal environment that is taken into consideration along with the metabolic rate to assess the potential for related heat stress among people exposed to hot conditions.

*The table is in accordance with Jordanian Standard Specification No. 2299:2021

Annex 9

Estimated Metabolic Rate*

Class	Average metabolic rate (with range in brackets) W	Examples
/Zero Stillness/ Resting	115 (from 100 to 125)	Resting, sitting at ease
1 Low metabolic rate	180 (from 125 to 235)	Light manual work (writing, typing, drawing, sewing, office work); hand and arm work (small bench tools, inspection, assembly or sorting or light materials); arm and leg work (driving vehicle in normal conditions, operating foot switch or pedal); standing drilling (small parts); milling machine (small parts); coil winding; small armature winding; machining with low power tools; walking up to 2.5 km/h.
2 Moderate metabolic rate	300 (from 235 to 360)	Rep Sustained hand and arm work (hammering in nails, filing); arm and leg work (off-road operation of lorries, tractors or construction equipment); arm and trunk work (work with pneumatic hammer, tractor assembly, plastering, intermittent handling of moderately heavy material, weeding, hoeing, picking fruits or vegetables, pushing or pulling lightweight carts, wheelbarrows, walking at a speed of 2.5 km/h to 5.5 km/h).
3 High metabolic rate	415 (from 360 to 465)	Intense arm and trunk work; carrying heavy material; shoveling; sledgehammer work; sawing; planning or chiseling hard wood; hand mowing; digging; walking at a speed of 5.5 km/h to 7 km/h. Pushing or pulling heavily loaded hand carts or wheelbarrows; chipping castings; concrete block laying.
4 Very high metabolic rate	520 (>465)	Very intense activity at fast to maximum pace; working with an axe; intense shoveling or digging; climbing stairs, ramp or ladder; walking quickly with small steps; running; walking at a speed greater than 7 km/h.

* The table is in accordance with Jordanian Standard Specification No. 2299:2021