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Mining — Classification of mine accidents

Mines — Classification des accidents dans les mines

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 82, *Mining*.

Introduction

The primary purpose of this document on classification of mine accidents is to promote uniformity and comparability of mine accidents statistics, which has as an ultimate goal to prevent accidents.

Although mine accidents are very complex realizations and many factors can contribute to their occurrence, much thought has been given to the study of causes and consequences of the accidents and many investigations have been carried out on the subject.

An accident, mishap or misadventure is an unforeseen and unplanned event or circumstance, often with lack of intention or necessity. It usually implies a generally negative outcome which might have been avoided or prevented.

A mine accident is an accident that occurs during the process of mining. Thousands of miners die from mine accidents every year. And although safer modern mining methods have been introduced, mine accidents are still the cause of casualties and financial losses.

Mine accidents can have a variety of causes, including leaks of poisonous gases such as hydrogen sulphide or explosive natural gases, especially firedamp or methane, dust explosions, collapsing of mine stopes, toxic gases arising from mine fires, mining-induced seismicity, flooding, or general mechanical errors from improperly used or malfunctioning mining equipment. Mine accidents mainly occur in the coal mining and underground mines sector. Initially, this document had a focus on coal and underground mines risks, but it has been extended to cover all mining environments.

While available accident reports are very detailed, this International Standard provides a tool to look at a broader picture. The advantage of the classification given in this International Standard is that statistical methods can be used to gain more insight into mine accident causation and probable results. By analysing a multitude of mine accidents and applying this standardized classification scheme, the users of this International Standard will be able to both detect patterns for the development of mine accidents and to derive correlations.

Mining — Classification of mine accidents

1 Scope

This document establishes a classification of mine accidents by their origin or causes, by the type of accident, and by their results or consequences. The latter includes only the accidents resulting into consequences on people, not equipment or machinery.

Different categories of causes, types and consequences of mine accidents are briefly defined, and a 3-digit code is assigned to each category. These can be combined to ultimately allocate a unique 15-digit code to each type of mine accident. This code can then be used in statistical analysis. Similarly, an allocated code clearly shows to which categories of causes, type of accident and resulting consequences the mine accident belongs to.

This document is applicable to all surface and underground mines.

NOTE Accidents can be classified in terms of other items than those given in this document, especially in researches and in other classification schemes. These can be, e.g. classifications based on the level of financial damages; gender, age, professional skills, terms of service and academic degree of the personnel; days of week, month, year, hour of accident; area of site, etc. While these classifications can be useful to enable certain decisions to be taken by the health and safety executives, they are not considered in this document

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
accident
unplanned event that can result in injury or ill health of people, and/or damage to or loss of property, plants, materials, machinery, processes or the environment, and business opportunity

3.2
accident cause
factor or factors that act together to produce an accident

3.3
air blast
airborne shock wave or acoustic transient generated by an explosion

3.4
backfilling
filling in again of a place from which the rock or ore has been removed

3.5
blocking
obstruction of the ore passes by ore material or rock that refuses to pass

3.6
brattice curtain
line brattice
line canvas
line curtain
fire-resistant fabric or plastic partition used in a mine passage to confine the air and force it into the working place

3.7
detonation
explosion where the shock waves are supersonic

Note 1 to entry: Detonation involves a supersonic exothermic front accelerating through a medium that eventually drives a shock front propagating directly in front of it.

Note 2 to entry: Detonations are observed in both conventional solid and liquid explosives, as well as in reactive gases. The velocity of detonations in solid and liquid explosives is higher than that in gaseous ones, which allows the wave system to be measured with greater detail.

3.8
dust
fine particles of a solid that can remain suspended in air with a particle size larger than that of a fume

Note 1 to entry: Dusts are produced by mechanical action, such as grinding.

Note 2 to entry: Some dusts can be harmful to an employee's health.

3.9
dust explosion
fast combustion of dust particles suspended in the air in an enclosed location

Note 1 to entry: Coal dust explosions are a frequent hazard in underground coal mines, but dust explosions can occur where any powdered combustible material is present in an enclosed atmosphere or, in general, in high enough concentrations of dispersed combustible particles in atmosphere or other suitable gaseous medium such as molecular oxygen.

3.10
explosive
chemical which detonates after introduction of a stimulus appropriate initiation, so that the reaction front moves through the explosive at a higher speed than the sonic velocity of the material

Note 1 to entry: Upon detonation, an explosive releases large volumes of gaseous products and energy on the surrounding rock, which causes fragmentation, shattering, or shearing.

Note 2 to entry: The ingredients of an explosive, which are combinations of fuels and oxidizers, are converted to high pressure, high temperature gases upon detonation.

3.11
face
exposed area of a working place from which a mineral, rock, ore or coal is being extracted

3.12
failure
<of rocks> rock instability occurring when applied force exceeds maximum rock strength

3.13
failure
<of objective> state or condition of not meeting a desirable or intended objective

3.14
fly rock
fugitive rock fragments propelled from the blast area by the force of an explosion

3.15
injury
damage to a biological organism caused by physical harm

3.16
noise
unwanted sound that can lead to hearing loss or stress, or to interfere with the ability to hear other sound or to communicate

3.17
outburst
violent evolution of combustible gases (usually together with large quantities of coal dust) from a working face

Note 1 to entry: The occurrence is violent and can overwhelm the workings and fill the entire district with gaseous mixtures.

Note 2 to entry: Roadways advancing into virgin and stressed areas of coal are particularly prone to outbursts in certain seams and faults often intersect in the area.

3.18
rock burst
sudden and often violent breaking of a mass of rock from the walls of a tunnel, mine, or deep quarry, caused by failure of highly stressed rock and the rapid or instantaneous release of accumulated strain energy

3.19
roof fall
mine cave-in, especially in permanent areas such as entries

3.20
spalling
violent formation of slabs which separate from a strained surface

Note 1 to entry: If the force is sufficient for the slab to be ejected from the surface this would constitute one form of strainburst.

3.21
stowing
debris of a vein thrown back from a continuous miner machine and which supports the roof or hanging wall of the excavation

4 Classification

4.1 General

This document defines three major categories to classify mine accidents. As shown in Figure 1, one category is the origin or cause of mine accidents, the second one is the type of accidents and the third one is their resulting consequences. In this regard, all mine accidents can be placed into the categories, given in 4.2 to 4.4.

4.2 Classification of mine accidents based on their origin or cause

This category comprises the following mutually exclusive sub-categories:

— Chemical-based accidents (see 5.1)

— Electrical-based accidents (see 5.2)

— Environmental-based accidents (see 5.3)

— Geo-chemical-based accidents (see 5.4)

— Geo-mechanical-based accidents (see 5.5)

— Equipment-based accidents (see 5.6)

— Mechanical-based accidents (see 5.7)

— Human errors-based accidents (see 5.8)

4.3 Classification of mine accidents based on type of accident

This category comprises the following mutually exclusive sub-categories:

— Contact with objects and equipment (see 6.1)

— Falls (see 6.2)

— Bodily reaction and exertion (see 6.3)

— Exposure to harmful substances or environments (see 6.4)

— Fires and explosions (see 6.5)

— Unclassifiable (see 6.6)

4.4 Classification of mine accidents based on their consequences

This category comprises the following mutually inclusive sub-categories:

— Degree of disability (see 7.1)

— Nature of injury (see 7.2)

— Location of injury (see 7.3)

4.5 Coding

A unique combined code in the form of "***1xx.2xx.3xx.4xx.5xx***" can then be allocated to any accident, where:

"***1xx***" is for the origin or cause of the accident.

"***2xx***" is for the type of accident.

"***3xx***" is for its consequences by degree of disability.

"***4xx***" is for its consequences by nature of injury.

"***5xx***" represents its consequences by part of the body injured.

EXAMPLE Code "194.292.311.409.517" shows that the origin of the accident is "Errors caused by violating procedures, instructions and regulations", type of accident is "Explosion", degree of disability is "Death", the nature of injury is "Burns" and location of injury is "Head, multiple locations".

Clause 5 describes the codes for the origin or cause of the accident, Clause 6 describes the codes for the type of accident, and Clause 7 describes the codes for the consequences of the accident by degree of disability (7.1), by nature of injury (7.2) and by part of the body injured (7.3). Annex A gives a complete list of the codes.

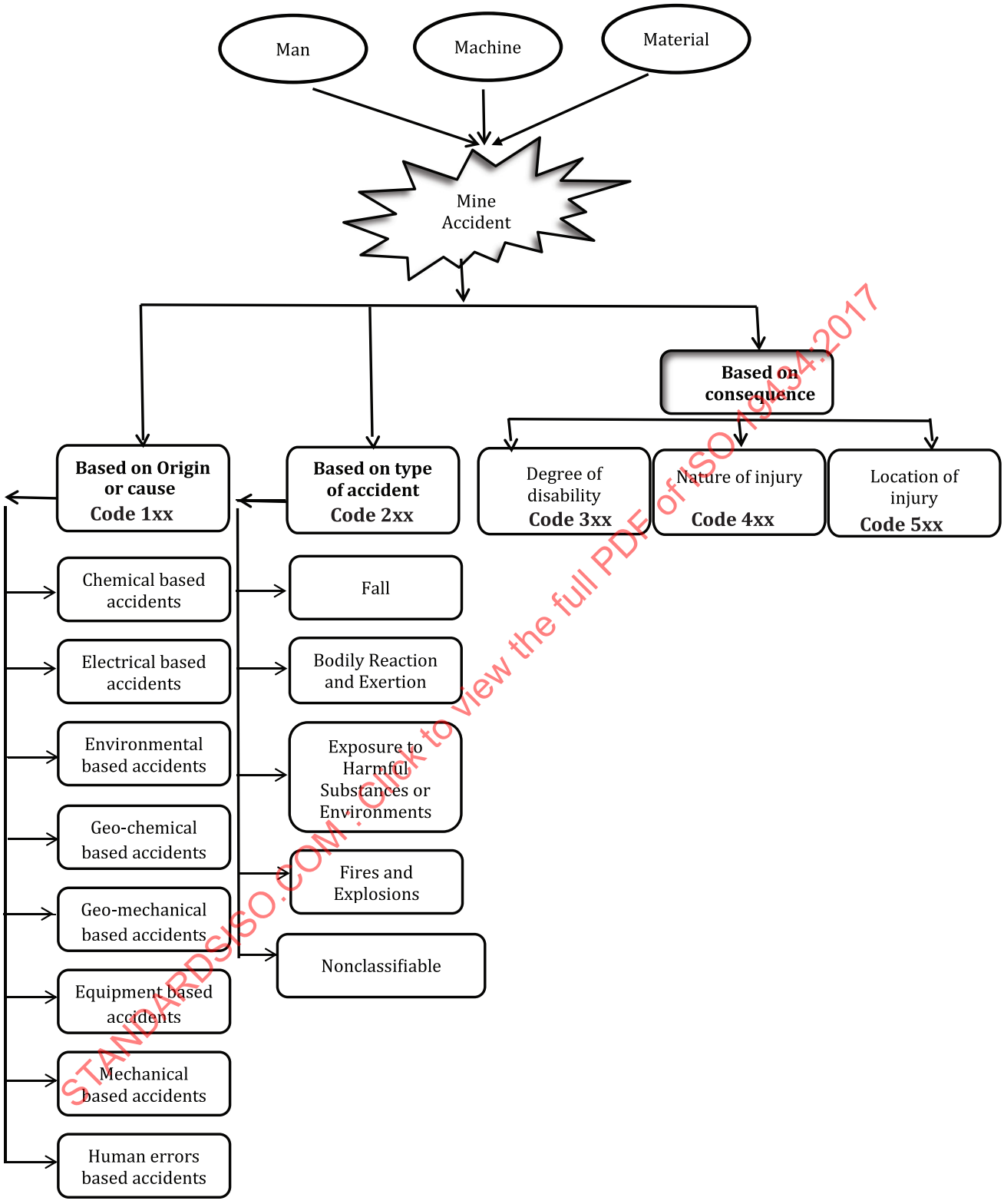

Figure 1 — Classification of mine accidents

5 Classification of mine accidents based on their origin or cause: Code 1xx

5.1 Chemical-based accidents: Code 10x, unspecified is 100

5.1.1 Explosives and accessories: Code 101

Accidents involving the detonation of manufactured explosives that can cause unbalancing oxygen, flying debris, fly rock, concussive forces and fumes are included in this category.

These accidents can occur during blasting operations, charging, handling and withdrawing charges.

5.1.2 Chemical compounds: Code 102

In this category, chemical compounds such as acids and alkalis are most directly tied to the resulting accident and injury.

5.1.3 Fire: Code 103

Accidents classified in this group are caused by fire accidents. Fires include:

a) Open fires, which result from friction, welding, firing, gas explosion and cable short circuiting.

b) Spontaneous combustion: in this process, charcoal temperature increases due to oxygen surface absorption and causes an increase in chemical reactions and the production of carbon monoxide, carbon dioxide, methane, hydrogen and various carbohydrates. In case of oxygen sufficiency and lack of an efficient ventilation system to transmit the resulted heat, spontaneous combustion and eventually fire occur in the mine. The events relating to spontaneous combustions are classified in subclause 5.4.

5.1.4 Chemical apparatus and material: Code 104

The events classified in this group are caused by defective or broken equipment and chemicals used in mines, such as: failure of the brattice curtain (plastic and canvas) and catalytic heating equipment and damage of rubber/plastic/fibreglass/fabric material.

5.2 Electrical-based accidents: Code 110

In this category, electric current (DC or AC) is most directly responsible for the resulting accident.

Electrical energy is used in mines in four settings: lighting (lights), power distribution network (cables), electrical mining machines such as ventilation machines, and electric shot firing. Accidents occurring in these four settings are classified in this group.

5.3 Environmental-based accidents: Code 12x, unspecified is 120

Mining accidents in this group occur due to working and natural environment conditions.

5.3.1 Working environment: Code 121

Conditions occurring due to mining operations and construction activities, such as inrush of water and mud, audio contamination, slippery surfaces or geographical topology such as ponds and lakes or stuck in facilities.

Conditions related to the environmental situation of the workplace such as temperature and pressure, diesel particulate matter (DPM), fog, disturbing animals, and light intensity.

5.3.2 Natural environment: Code 122

Conditions occurring due to natural disasters, such as earthquakes, floods, lightning, and volcanic eruptions among others.

5.4 Geo-chemical-based accidents: Code 130

Accidents of this group are associated to changes in the elemental particles of the materials available in the mines, such as radioactivity materials, charcoal spontaneous combustion, dispersion and explosion of mine gases.

5.5 Geo-mechanical-based accidents: Code 140

Accidents of this group are relevant to soil and rock mechanical behaviour and are mainly caused by instability of mine segments such as wall, surface mining or underground mine, roof, floor, face or galleries, manifested as collapse, rock burst, outburst, roof fall, floor heave up, subsidence, run of materials, stowing, backfilling and spalling.

Some of the collapses cause accidents directly and some other through generation of windblast, air blast or blocking.

NOTE Many of the geo-mechanical aspects are overlapped with geo-technical engineering related aspects such as landslide. In this document, seismology, continuum mechanics, fracture mechanics and mechanics of non-continuous environments are included in geo-mechanics.

5.6 Equipment-based accidents: Code 15x, unspecified is 150

This category comprises the mine accidents resulting from equipment (light and heavy) that performs mining functions in both surface and underground mines. This category should only be used for classifying accidents caused by, and during, the operation of the mining equipment.

These accidents are classified as per the sub-categories given in 5.6.1 to 5.6.5.

5.6.1 Hand tools: Code 151

Accidents related to non-powered tools when being used as hand tools. Do not include electric tools or air-powered tools [2].

5.6.2 Non-powered haulage: Code 152

Accidents related to motion of non-powered haulage equipment. Included are accidents involving wheelbarrows, manually pushed mine cars and trucks, etc.[2]

5.6.3 Powered haulage: Code 153

Haulage includes motors and rail cars, conveyors, belt feeders, longwall conveyors, bucket elevators, vertical manlifts, self-loading scrapers or pans, shuttle cars, haulage trucks, front-end loaders, load-haul-dumps, forklifts, cherry pickers, mobile cranes if travelling with a load, etc. The accident is caused by the motion of the haulage unit. Include accidents that are caused by an energized or moving unit or failure of component parts. If a car dropper suffers an injury as a result of falling from a moving car, charge the accident to haulage [2].

5.6.4 Hoisting: Code 154

Damage to hoisting equipment in a shaft or slope which endangers an individual or interferes with use of the equipment for more than 30 min. Hoisting may also be the classification where a victim was injured by hoisting [2].

5.6.5 Machinery: Code 155

Accidents that result from the action or motion of machinery or from failure of component parts. Included are autonomous or tele-operated machines, all electric and air-powered tools and mining machinery such as drills, raise climbers, tuggers, slushers, draglines, power shovels, loading machines, compressors, etc. Include derricks and cranes except when they are used in shaft sinking (see hoisting, 5.6.4) or mobile cranes travelling with a load (see powered haulage, 5.6.3) [2].

5.7 Mechanical-based accidents: Code 160

Accidents of this group are caused by mechanical factors such as abrasion, strike and pressure, and affect the effective lifetime and performance of machines and equipment.

Torn cables, blown tanks and pressurized pipes, technical defects of machinery, unwanted release of mechanical or stored energy and equipment body depreciation or lost mechanical protection of the same are amongst the issues that occur due to mechanical factors, resulting in accidents.

5.8 Human errors-based accidents [4]

5.8.1 General

This classification is partly based on the occurrence of human errors. Humans naturally make mistakes, but there are certain reasons leading to errors which are not directly controlled by the one who commits such errors, and understanding these reasons can help prevent the errors from occurring. Therefore, the human errors-based accidents are classified in the following three groups: person-based (5.8.2, code 17x), situation-based (5.8.3, code 18x), and system-based (5.8.4, code 19x) errors.

5.8.2 Person-based errors: Code 17x, unspecified is 170 [4]

5.8.2.1 Unintentional errors: Code 171 [4]

These errors occur against one's will and unintentionally and notwithstanding the fact that one is decisive to do the job correctly. Such errors sometimes occur due to real time negligence (internal factors) and sometimes due to distraction (external factors). These errors often occur in routine duties.

5.8.2.2 Errors caused by habit: Code 172 [4]

These errors occur when a repetitive action that is made frequently is replaced with another action.

EXAMPLE A worker is used to apply a recurrent suite of actions, but these need to be exceptionally altered.

5.8.2.3 Identification errors: Code 173 [4]

These errors occur when something is identified wrongly. In a study conducted at refineries, 75 % of the human errors have been reported to be the result of defects in labels of equipment and eventually errors in identifying the equipment.

5.8.2.4 Errors resulting from the impossibility of fulfilment of job duties: Code 174 [4]

Some of the job duties are quite complex, difficult and even impossible to fulfil. Therefore, shortcuts are used to fulfil those. In case such shortcuts are not examined well, they may result in the occurrence of errors. The more complex and difficult a job duty is, the more likely the occurrence of error will be. For instance, the high mental load is seen as a complexity, as one may focus on a certain issue at a certain time and, in case excessive information is simultaneously received, this may result in errors.

EXAMPLE Lighting several alarms in the control panel which gives too much information to the operator and eventually results in confusion.

5.8.2.5 Errors resulting from a wrong perception: Code 175 [4]

In this type of error the information entered into the system for decision making is perceived and interpreted wrongly.

5.8.2.6 Errors resulting from a lack of knowledge: Code 176 [4]

The regular course of this type of error is a defect in acquiring proper information from other individuals or organizations which caused insufficient information (especially under non normal conditions) and eventually the operator may act in terms of own assumptions which may be wrong and cause errors.

5.8.2.7 Errors resulting from expectations and habits: Code 177 [4]

It is a certain type of error resulting from the expectations and habits. Inherently, humans fulfil their tasks in terms of their habits and this is sometimes problematic. In many cases, what we see is what we expect, even if there are evidences to neglect the same. This error is known as the daily habits error as well. It is more likely to occur under limited time and stressful conditions.

5.8.2.8 Reasoning errors: Code 178 [4]

These errors occur when one acquires correct information for decision making and acting, while fails to do correct analysis and conclusion. Lack of training and experience intensifies the occurrence of such errors.

5.8.2.9 Errors resulting from a lack of compliance between the employee and the job: Code 179 [4]

These errors are mainly the result of human factors, where one is not suitable for the job assigned.

EXAMPLE The height of the operator is not appropriate for driving the relevant vehicle.

5.8.3 Situation-based errors: Code 18x, unspecified is 180 [4]

5.8.3.1 Environment: Code 181 [4]

Occurrence of the errors depends on environmental factors.

EXAMPLES Lack of work space, high temperatures, weak light, strong light, etc. can cause such errors.

5.8.3.2 Stress: Code 182 [4]

Decision making under stressful conditions can cause errors; some references indicate that human-based error potential under stressful conditions reaches 50 %[4].

5.8.3.3 Time: Code 183 [4]

Some of the errors occur due to time limitations. Limited time results in that one does a certain action and/or makes a certain decision resulting in errors and/or no action is taken at all within such limited period of time.

5.8.4 System-based errors: Code 19x, unspecified is 190 [4]

These errors are intensified by system elements. They comprise the errors in 5.8.4.1 to 5.8.4.4.

5.8.4.1 Errors resulting from others' actions: Code 191 [4]

Many of the errors are in fact a chain of errors triggered by a fundamental error. This issue is the result of uncontrolled accepting of the information, action of others, etc.

5.8.4.2 Errors resulting from incorrect equipment design: Code 192 [4]

EXAMPLE In a control board, the pressure gauge is located at a 3 m distance from the left hand of the operator's seat and the thermometer is on the right side and within a 2 m distance. The operator reads the two figures at the same time and registers them in the report. Therefore, this incorrect design can cause errors.

5.8.4.3 Instructions-based errors: Code 193 [4]

Sometimes the instructions are wrong and are not suitable to the work being conducted. Such instructions result in confusion of the operator and errors.

5.8.4.4 Errors caused by violating procedures, instructions and regulations: Code 194 [4]

Violating regulations are intentional errors and are defined as failing to accept the regulations. These errors occur when people feel the procedures, and/or regulations, are not relevant for them.

6 Classification of mine accidents based on type of accident: Code 2xx, unclassifiable is 200 [1]

The type of accident relates to the manner in which the object or substance causing the injury comes into contact with the injured person, or to the movement of the person which resulted in the injury.

6.1 Contact with objects and equipment: Codes 210 (for unspecified), 22x, 23x, 24x or 25x [1]

Codes in this division apply to injuries produced by contact between the injured person and the source of injury except when contact is due to falls, fires and explosions. Contact may be denoted by a statement that the injured person struck or was struck by an object, was caught in an object, rubbed against an object, or by words such as "hit by," or "hit," "bumped into," "crushed by," or "banged".

6.1.1 Struck against object: Code 22x, unspecified is 220

The "struck against" codes apply to injuries produced by forcible contact or impact between the injured person and the source of injury when the motion producing the contact is primarily that of the injured person. This major group includes bumping into objects, stepping on objects, kicking objects, and being pushed or thrown into or against objects. If a person strikes against an object due to falling, the injury is classified in subclause 6.2, Falls.

6.1.1.1 Stepped on object: Code 221

6.1.1.2 Struck against stationary object: Code 222

6.1.1.3 Struck against moving object: Code 223

6.1.2 Struck by object: Code 23x, unspecified is 230

The "struck by" codes apply to injuries produced by forcible contact or impact between the injured person and the source of injury when the motion producing the contact is primarily that of the source of injury rather than the person.

6.1.2.1 Struck by falling object: Code 231

Struck by falling object should be selected when the source of injury is falling from an elevation to a lower level. This includes instances where the injured person is crushed, pinned, or caught under a falling object, other than collapsing material or structures.

6.1.2.2 Struck by flying object: Code 232

Struck by flying object codes should be selected when the source of injury has been thrown, hurled, or is being propelled across space.

6.1.2.2.1 Struck by dislodged flying object or particle: Code 233

Struck by dislodged flying object or particle includes instances when a piece of material separates from a tool, machine or other equipment, for example, a piece of a drill bit breaks off, striking a worker.

6.1.2.2.2 Struck by discharged object or substance: Code 234

Struck by discharged objects or substance refers to instances where the object is ejected under power by a tool or equipment usually designed for that purpose. Examples include a nail discharged from a nail gun, water discharged from a pressure cleaner and a staple from a staple gun.

6.1.2.3 Struck by swinging or slipping objects: Code 235

Struck by swinging or slipping object refers to objects which are not free standing; that is, they are attached at some point or are being held by the worker.

6.1.2.3.1 Struck by or slammed in swinging door or gate: Code 236

6.1.2.3.2 Struck by slipping hand-held object: Code 237

Struck by slipping hand-held objects includes cases where the worker is holding a tool or other instrument that slips and injures the worker.

6.1.2.4 Struck by rolling, sliding objects on floor or ground level: Code 238

Struck by rolling, sliding objects on floor or ground level (Code 238) generally refers to an object which is rolling, moving, or sliding on the same level at which the employee is located (i.e. the object is not falling from above, nor is it flying through space). Cases involving contact with moving vehicles which are not in normal operation are coded here.

6.1.3 Caught in or compressed by equipment or objects: Code 24x, unspecified is 240

This major group includes cases in which the injury was produced when a person or part of a person was injured by being squeezed, crushed, pinched or compressed between two or more objects, or between parts of an object. Codes in this event group apply when a person, or part of a person's body, was squeezed, pinched, compressed, or crushed in operating equipment, between other meshing objects, between a moving and stationary object, or between two or more moving objects.

Codes in this major group do not apply when the source of injury is free flying or falling, or collapsing material. When the source of injury is falling or freely flying, or collapsing, the event should be coded in the major group in 6.1.2, Struck by, or the major group in 6.1.4, Caught in or crushed in collapsing materials.

6.1.3.1 Caught in running equipment or machinery: Code 241

Injuries occurring when the injured part of body is inside a machine or equipment or between two or more parts of the source of injury should be included here. Strangulation injuries occurring when clothing is caught in running equipment should be coded 241.

6.1.3.2 Compressed or pinched by rolling, sliding, or shifting objects: Code 242

Injuries occurring when a part of the injured person's body is crushed, pinched, or caught under a rolling or sliding object such as a cart or a vehicle not in operation should be coded 242.

6.1.4 Caught in or crushed in collapsing materials: code 25x, unspecified is 250

Caught in or crushed in collapsing materials applies when a person, or part of a person's body was squeezed, pinched, compressed or crushed in landslides, cave-ins, or collapsing structures, or other collapsing materials unless the collapse was due to a fire or explosion.

6.1.4.1 Excavation or trenching cave-in: Code 251

6.1.4.2 Other cave-in: Code 252

6.1.4.3 Landslide: Code 253

The code 253, Landslide, includes avalanches.

6.1.4.4 Caught in or crushed in collapsing structure: Code 254

6.2 Falls: Code 26x, unspecified is 260 [1]

Falls are events in which the injury was produced by impact between the injured person and the source of injury when the motion producing contact was generated by gravity.

6.2.1 Fall of person to lower level: Code 261

Falls of persons from heights (e.g. buildings, mine trenches, scaffolds, ladders, machines, vehicles) and into depths (e.g. wells, ditches, excavations, shafts, holes in the ground).

6.2.2 Falls of persons on the same level: Code 262

Fall on same level applies to instances in which the injury was produced by impact between the injured person and the source of injury, the motion producing the contact being that of the person, under the following circumstances:

— the motion of the person was generated by gravity following the employee's loss of equilibrium (the person was unable to maintain an upright position) and,

— the point of contact with the source of injury was at the same level or above the surface supporting the person at the inception of the fall.

6.2.3 Fall of material or structures: Code 263

Includes:

— cave-ins (earth, rocks, stone),

— cave-in or fall of roof,

— cave-in or fall of side and face,

— cave-in or collapse of shaft,

— premature collapse of ground,

— bumps and rock-bursts,

— slides (earth, rock, stone, snow),

— subsidence of ground,

— collapse of buildings, walls, scaffolds, ladders, piles of goods, and etc.

6.3 Bodily reaction and exertion: Code 27x, unspecified is 270 [1]

Codes in this division apply to cases, usually non-impact, in which injury results from free bodily motion, from excessive physical effort, or from repetition of a bodily motion.

6.3.1 Over-exertion in lifting objects: Code 271

6.3.2 Over-exertion in pushing or pulling objects: Code 272

6.3.3 Over-exertion in handling or throwing objects: Code 273

6.3.4 Wrong movements: Code 274

6.4 Exposure to harmful substances or environments: Code 28x, unspecified is 280 [1]

Codes in this division apply to cases in which the injury or illness resulted from contact with, or exposure to, a condition or substance in the environment.

6.4.1 Contact with electric current: Code 281

Contact with electric current applies only to cases in which the injury or illness resulted from contact with electricity, including lightning. Cases of electric shock and electrocution are classified here. Contact may be made directly from the power source to the person or indirectly, such as when a pipe being held contacts a power line.

6.4.2 Contact or exposure to temperature extremes: Code 282

Contact with temperature extremes applies to cases in which the injury or illness resulted from contact with, or exposure to, either hot or cold objects or substances, or general heat or cold in the environment. Injuries or illness in this major group include thermal burns which resulted from contact with controlled or intentional heat sources, heat exhaustion, heat stroke, freezing, frostbite, hypothermia, etc.

6.4.3 Exposure to noise: Code 283

Codes in this major group apply only to non-impact cases in which the injury or illness resulted from exposure to noise. Hearing impairments resulting from exposure to a single loud noise (with the exception of explosions) or to prolonged noise over time are classified here.

6.4.4 Exposure to radiation: Code 284

Contact with radiation applies to cases in which the injury or illness resulted from exposure to any type of radiation either ionizing or nonionizing. Common forms of nonionizing radiation include: ultraviolet, visible light, infrared, microwaves and radio waves, radars, lasers, and power frequencies. This major group is appropriate for burns from the sun's rays or other radiation as well as for general radiation sickness.

6.4.5 Oxygen deficiency: Code 285

Oxygen deficiency applies only to cases in which the injury or illness resulted from a lack of oxygen, without the involvement of harmful substances. Generally cases of suffocation or strangulation should be classified in this major group. Cases involving lack of oxygen in combination with inhalation of other substances such as smoke or sewer gas are not classified under this major group.

6.4.6 Contact with chemicals: Code 286

6.5 Fires and explosions: Code 29x, unspecified is 290 [1]

Codes in this division apply to cases in which the injury or illness resulted from an explosion or fire. Included are cases in which the person fell, jumped, inhaled a harmful substance, or was struck by or struck against an object as a result of an explosion or fire.

6.5.1 Fires- unintended or uncontrolled: Code 291

Codes in this major group apply only to cases in which the injury or illness resulted from the unintended ignition of an object/substance or from an uncontrolled fire which may have originated at an intentional heat source.

6.5.2 Explosion: Code 292

Codes in this major group apply only to cases in which the injury or illness resulted from an explosion. An explosion is a rapid expansion, outbreak, bursting, or upheaval such as gas and dust explosion. They apply to unintentional and intentionally-set explosions.

6.6 Unclassifiable: Code 200 [1]

This code should be used when the type of accident is not known.

7 Classification of mine accidents based on their consequences: Codes 3xx, 4xx and 5xx

7.1 Based on the degree of disability: Code 3xx, unspecified is 300 [3]

In cases where different disabilities have occurred for several workers, the worst case shall be used to assign the code.

7.1.1 Resulting in death or disability, Code 31x

7.1.1.1 Death: Code 311 [3]

7.1.1.2 Total disability: Code 312 [3]

The working power of the worker, as per the opinion of the medical commission, is reduced by 66 % and more.

NOTE The first instance and appeal medical commissions members, venue of meetings (mainly health centres) and other requirements of this commission can be determined by law.

7.1.1.3 Partial disability: Code 313 [3]

The working power of the worker, as per the opinion of the medical commission, is reduced between 33 % and 66 %.

7.1.1.4 Disability equal to maim: Code 314 [3]

The working power of the worker, as per the opinion of the medical commission, is reduced between 10 % and 33 %.

7.1.1.5 Mild disability: Code 315

The working power of the worker, as per the opinion of the medical commission, is reduced by less than 10 %.

7.1.2 Without disability: Code 32x, unspecified is 320

7.1.2.1 Without injury: Code 321

Accidents of this group do not record injuries, regardless of whether they result in any financial damages.

7.1.2.2 Need of first aid: Code 322

The injured person(s) by the accidents of this group resume their activities after first aid.

7.1.2.3 Losing working days: Code 323

After being inpatient, and following completion of the recovery term, the injured person(s) can resume their activities. The accidents of this group result in losing working days.

7.2 Based on the nature of injury: Code 4xx, unspecified is 400 [5]

This identifies the injury in terms of its principal physical characteristics.

7.2.1 Fractures: Code 401

Includes simple fractures; fractures with injuries to soft parts of the body (compound fracture); fractures with injuries to articulations (dislocations, etc.); fractures with internal or nerve injuries.

7.2.2 Dislocations: Code 402

Includes subluxations and displacements.

Excludes fracture dislocations.

7.2.3 Sprains and strains: Code 403

Includes, unless associated with an open wound, the ruptures, tears, and lacerations of muscles, tendons, ligaments and joints, as well as hernias due to over exertion.

7.2.4 Concussions and other internal injuries: Code 404

Includes, unless fractures are involved, all internal contusions, haemorrhages, lacerations, ruptures.

Excludes those injuries with fractures

7.2.5 Amputations and enucleations: Code 405

Includes traumatic avulsion of eye.

7.2.6 Other wounds: Code 406

Includes lacerations, open wounds, cuts, contusions with wounds, scalp wounds, as well as loss of nails or ears; includes wounds involving injury to nerves.

Excludes traumatic amputations, enucleations; avulsion of eye; compound fracture; burns with open wounds; superficial injuries.

7.2.7 Superficial injuries: Code 407

Includes abrasions, scratches, blisters, bites of non-venomous insects, superficial wounds; also includes superficial injuries due to foreign bodies entering in the eye.

7.2.8 Contusions and crushings: Code 408

Includes haemarthrosis, haematoma and bruises; contusions and crushing associated with superficial injuries.

Excludes concussions; contusions and crushing with fracture; and contusions and crushings with an open wound.

7.2.9 Burns: Code 409

Includes burns from hot objects; from fire; scales; friction burns; radiation burns (infrared); chemical burns (external burns only); burns with open wounds.

Excludes burns due to swallowing a corrosive or caustic substance; sunburn; effects of lightning; burns due to electric current; and radiation effects other than burns.

7.2.10 Acute poisonings: Code 410

Includes the effects of the injection, ingestion, absorption or inhalation of toxic, corrosive or caustic substances; bites of venomous insects or animals; asphyxiation by carbon monoxide or other toxic gases.

Excludes external chemical burns.

7.2.11 Effects of weather, exposure and related conditions: Code 411

Includes effects of reduced temperature (frost-bite); the effect of heat and isolation (heat strokes, sunstrokes); barotrauma (effects of high altitude decompression caused due to working in compressed air well); the effects of lightning; sound trauma (total or partial loss of hearing as a separate injury, not a sequel to another injury).

7.2.12 Asphyxia: Code 412

Includes drowning asphyxiation or suffocation by compression, constriction or strangulations; also includes asphyxiation by suppression or reduction of oxygen in the surrounding atmosphere and asphyxiation by foreign bodies in the respiratory tract.

Excludes asphyxiation by carbon monoxide or other toxic gases.

7.2.13 Effects of electric currents: Code 413

Includes electrocution; electrical shock and burn due to electric current.

Excludes burns caused by electrical heating appliances and the effects of lightning.

7.2.14 Effects of radiations: Code 414

Includes effects caused by X-rays, radio-active substances, ultraviolet rays, ionising radiations.

Excludes burns due to radiations and sunstrokes.

7.2.15 Multiple injuries of different nature: Code 415

This group should be used only for those cases where the injured person sustained several injuries of different nature and no injury is obviously more severe than the others.

In case of multiple injuries suffered in one accident where one of the injuries is obviously more severe than the others, then this accident should be classified in the group corresponding to the nature of the more obviously severe injury.

7.2.16 Others and unspecified injuries: Code 400

This group should only be used to classify injuries which cannot be classified elsewhere.

Includes various early complications of trauma and pathological reaction which should be classified in this group only when the nature of the antecedent injury is unknown.

7.3 Based on location of injury: Code 5xx, unspecified is 500 [5]

Location of injury identifies the part of the injured person's body directly affected by the injury identified.

The groups relating to multiple locations should be used only to classify cases where the victim suffers from several injuries to different parts of the body and no injury obviously is more severe than the others. When in an accident which caused multiple injuries located at different parts of the body one of these injuries is obviously more severe than the others, this accident, should be classified in the group corresponding to the location of the obviously more severity injury. For example, a fracture of the leg accompanied by the scratch of the hand should be classified in group Leg (lower leg).

a) Head: Code 51x, unspecified is 510 [5]
    1) Cranium region (skull brain, scalp): Code 511
    2) Eye (including orbit and optic nerve): Code 512
    3) Ear: Code 513
    4) Mouth (including lips, teeth and tongue): Code 514
    5) Nose: Code 515
    6) Face, locations not classified elsewhere: Code 516
    7) Head, multiple locations: Code 517
b) Neck (including throat and cervical vertebrae): Code 520 [5]
c) Trunk: Code 53x, unspecified is 530 [5]
    1) Back (spinal column and adjoining muscles, spinal cord): Code 531
    2) Chest (ribs, sternum, internal organs of the chest): Code 532
    3) Abdomen (including internal organs): Code 533
    4) Pelvis: Code 534
    5) Trunk, multiple locations: Code 535
d) Upper limb: Code 54x, unspecified is 540 [5]
    1) Shoulder (including clavicle and shoulder blade): Code 541
    2) Arm: Code 542
    3) Elbow: Code 543
    4) Forearm: Code 544

5) Wrist: Code 545

6) Hand (except fingers alone): Code 546

7) Fingers: Code 547

8) Upper limb, multiple locations: Code 548

e) Lower limb: Code 55x, unspecified is 550 [5]

1) Hip: Code 551

2) Thigh (upper leg): Code 552

3) Knee: Code 553

4) Leg (lower leg): Code 554

5) Ankle: Code 555

6) Foot (except toes alone): Code 556

7) Toes: Code 557

8) Lower limb, multiple locations: Code 558

f) Multiple Locations: Code 56x, unspecified is 560 [5]

1) Head and trunk, head and one or more limbs: Code 561

2) Trunk and one or more limbs: Code 562

3) One upper limb and one lower limb or more than two limbs: Code 563

4) Other multiple locations: Code 564

g) Internal injuries: Code 57x, not specified is 570 [5]

This group should be used only when the functioning of an active body system has been affected without a specific injury (for example, poisoning, etc.); when the systemic damage results from an injury a specific part of the body (for example, a fracture of the spinal column involving injury to the spinal cord) the location of the injury to this part of the body (in this case the spinal column) should be coded.

1) Circulatory system in general: Code 571

2) Respiratory system in general: Code 572

3) Digestive system in general: Code 573

4) Nervous system in general: Code 574

5) Other general injuries: Code 575

h) Unspecified location of injury: Code 500 [5]

This group should only be used when no information is available to identify the part of the body affected.

Annex A
(informative)

Code list

A.1 Classification of mine accidents based on their origin or causes [First digit is 1]

Chemical-based accidents 10x	Unspecified	100
	Explosives and accessories	101
	Chemical compounds	102
	Fire	103
	Chemical apparatus and material	104
Electrical-based accidents	Unspecified	110
Environmental-based accidents 12x	Unspecified	120
	Working environment	121
	Natural environment	122
Geo-chemical-based accidents	Unspecified	130
Geo-mechanical-based accidents	Unspecified	140
Equipment-based accidents 15x	Unspecified	150
	Hand tools	151
	Non-powered haulage	152
	Powered haulage	153
	Hoisting	154
	Machinery	155
Mechanical-based accidents	Unspecified	160