
Structures for mine shafts —

Part 1: Vocabulary

Structures de puits de mine —

Partie 1: Vocabulaire

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
Bibliography	13

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

A list of all parts in the ISO 19426 series can be found on the ISO website.

Introduction

Many mining companies, and many of the engineering companies that provide designs for mines, operate globally so ISO 19426 was developed in response to a desire for a unified global approach to the safe and robust design of structures for mine shafts. The characteristics of ore bodies, such as their depth and shape, vary in different areas so different design approaches have been developed and proven with use over time in different countries. Bringing these approaches together in ISO 19426 will facilitate improved safety and operational reliability.

The majority of the material in ISO 19426 deals with the loads to be applied in the design of structures for mine shafts. Some principles for structural design are given, but for the most part it is assumed that local standards will be used for the structural design.

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Structures for mine shafts —

Part 1: Vocabulary

1 Scope

This document specifies the terms and definitions related to the structures for mine shafts, used throughout ISO 19426.

Terms used in mining can vary from conventional engineering usage, and they vary quite considerably between different countries. For this reason, alternative terms are provided in many of the entries. The preferred terms, given in bold type, are those used throughout ISO 19426.

It is assumed that users of this document are familiar with mining, so common terms with normal dictionary usage are not defined. Also, no definitions are provided for terms that can be widely used in mining but are not explicitly used in ISO 19426.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

There are no normative references in this document.

3 Terms and definitions

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

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org>

3.1

bank level

shaft collar
top of the shaft

3.2

bank door

collar door
shaft door

door installed at *bank level* (3.1) that prevents personnel, equipment and material from falling down the shaft

3.3

bottom transom

structural member, or group of members, located at the bottom of the *bridle* (3.7) and used to transfer *underslung loads* (3.85) or tail-rope loads to the *bridle hangers* (3.8)

Note 1 to entry: See [Figures 1, 2 and 3](#).

3.4

box front

gate

structure located at the lower end of a *rock pass* (3.62) used to control *rock* (3.61) flow

3.5

brattice screen

screen to partition off a portion of the shaft to prevent falling objects or spillage moving from one area of the shaft to another

Note 1 to entry: This is usually placed around personnel hoisting compartments to ensure safe hoisting conditions.

3.6

brattice wall

airtight dividing wall partitioning a shaft into two distinct ventilation compartments, one being an upcast compartment and the other a downcast compartment

3.7

bridle

structural frame that includes the *top transom* (3.81), the *bottom transom* (3.82) and the *bridle hangers* (3.8) to form a frame that carries the *cage* (3.11) or *skip* (3.73) body

Note 1 to entry: See [Figures 1, 2](#) and [3](#).

3.8

bridle hanger

structural member, or group of members, that transfers loads between the *top transom* (3.81) and *bottom transom* (3.82)

Note 1 to entry: See [Figures 1, 2](#) and [3](#).

3.9

brow beam

beam that supports the concrete layer that stabilizes the hanging wall at a station

3.10

bunton

structural member (usually horizontal) that primarily provides support to the *conveyance* (3.15) *guides* (3.38)

3.11

cage

single or multiple deck *conveyance* (3.15) used for the transportation of personnel, equipment or material (or both) in the shaft

Note 1 to entry: See [Figure 1](#).

3.12

camelback

raised portion of the path traversed by a roller, used for tipping hoppers in *decline shafts* (3.21) or for providing a gravity locking mechanism on *skips* (3.73) in vertical shafts

3.13

canopy

cover or roof structure, offering protection to persons on the top deck of the *stage* (3.75) or on a *conveyance* (3.15)

3.14**catch plate**

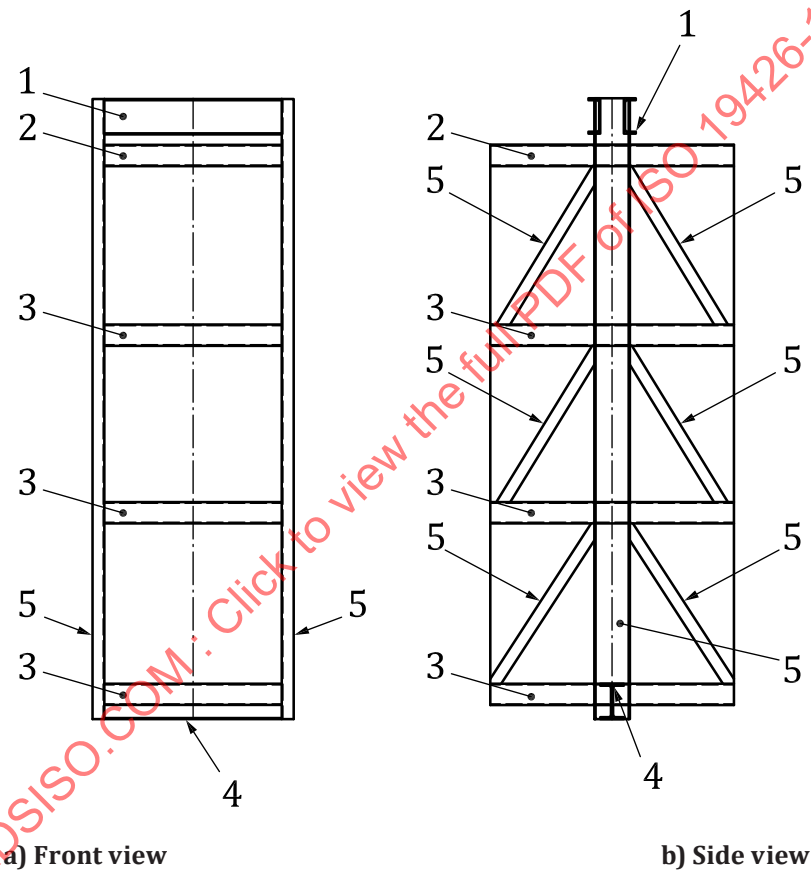
spectacle plate

device for operating and supporting the rope-detaching hook in a final *overwind* (3.56) condition, and that subsequently prevents the detached conveyance (3.15) from running back down the shaft

3.15**conveyance**

container or structure used in a mine shaft to transport a load or perform a task, that includes *counterweight* (3.17), *equipping skeleton* (3.31) cage, inspection platform, *kibble* (3.47), personnel or material cage, *skip* (3.73), sinking cross-head, material cars, hoppers, or cradle

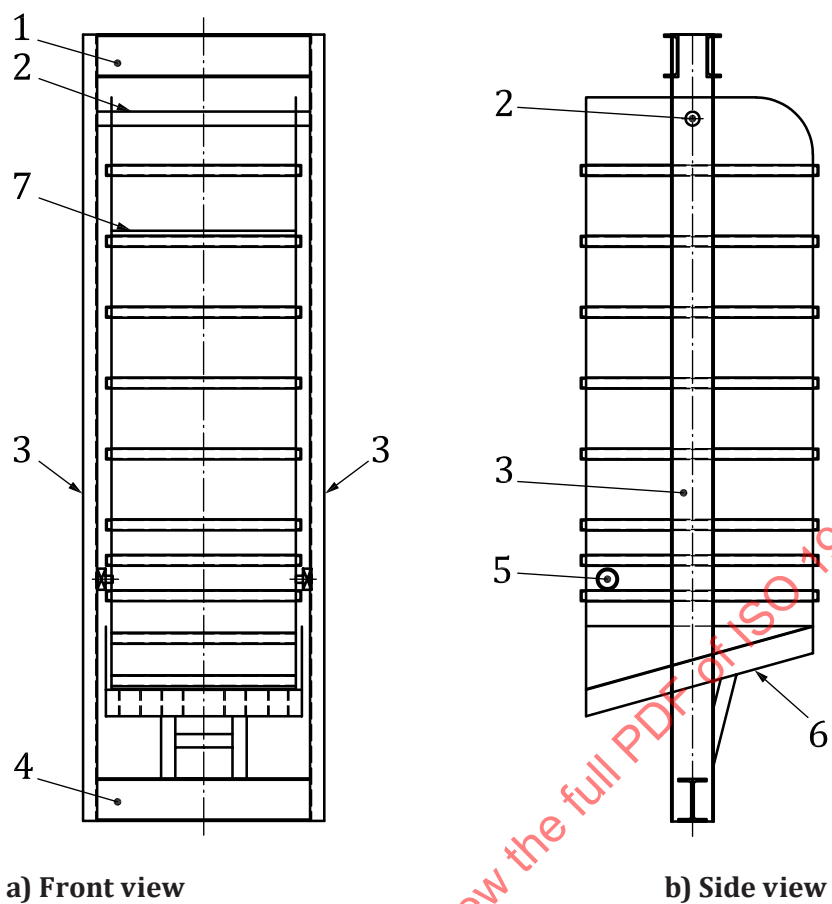
Note 1 to entry: Some typical conveyances are illustrated in Figures 1, 2 and 3.

**Key**

- 1 top transom (3.81)
- 2 roof beam
- 3 floor beam

- 4 bottom transom (3.3)
- 5 bridle hanger (3.8)

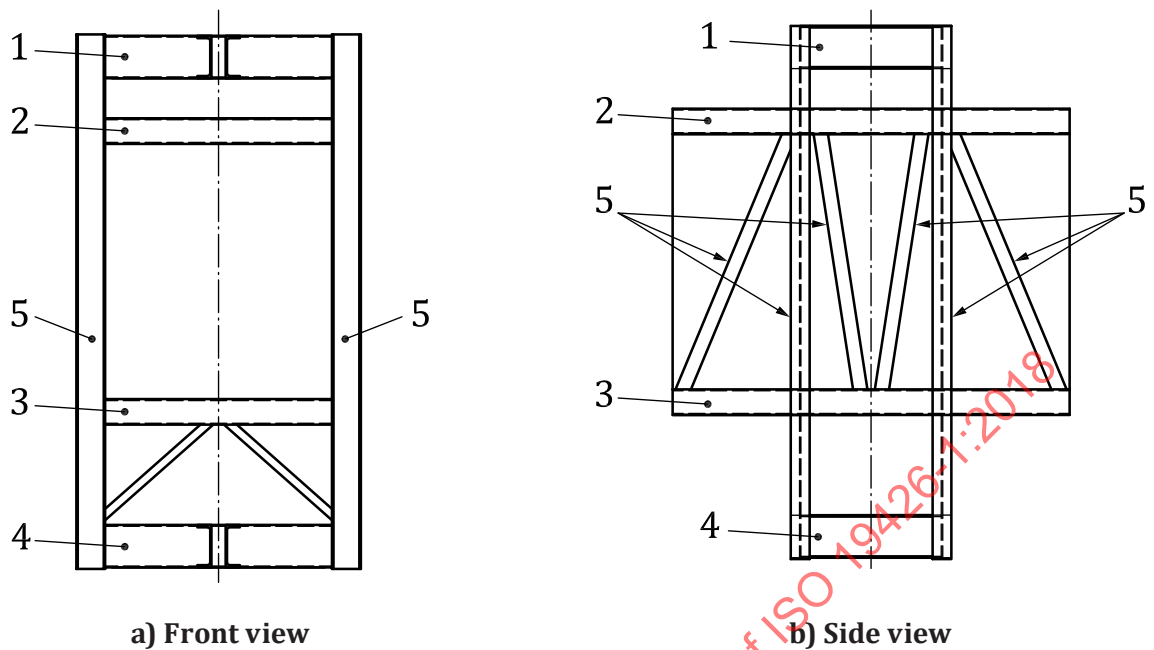
Figure 1 — Typical 3 deck cage components



Key

- | | | | |
|---|--|---|----------------|
| 1 | top transom (3.81) | 5 | tipping roller |
| 2 | pivot bar | 6 | door |
| 3 | bridle hanger (3.8) | 7 | loading lip |
| 4 | bottom transom (3.3) | | |

Figure 2 — Typical skip components

**Key**

- | | | | |
|---|--------------------|---|----------------------|
| 1 | top transom (3.81) | 4 | bottom transom (3.3) |
| 2 | roof beam | 5 | bridle hanger (3.8) |
| 3 | floor beam | | |

Figure 3 — Typical single deck cage components

3.16 control conveyance

pilot car

conveyance (3.15) in a *decline shaft* (3.21), attached to the haulage rope or the *winding rope* (3.88), that can contain an operator who is in communication with the haulage engine or *winder* (3.87) and that controls the operation of the train

3.17 counterweight

balance mass in a *conveyance* (3.15) winding system

3.18 crash beam

beam intended to stop the *conveyance* (3.15) in the event of a final *overwind* (3.56)

3.19 critical load bearing component

structural components, failure of which would be catastrophic

Note 1 to entry: For *conveyances* (3.15), this includes all *top transoms* (3.81) and *bottom transoms* (3.3), *bridle hangers* (3.8), floor beams and their immediate connecting elements.

3.20 cross beam

beam spanning between the *shaft walls* (3.69) for the purposes of suspending a *stage* (3.75)

3.21

decline shaft

incline shaft

inclined excavation equipped with tracks where people, material or *rock* (3.61) are regularly transported by means of a *winder* (3.87)

Note 1 to entry: The term incline shaft is used if the shaft was excavated from the lower end upwards.

3.22

distributor

kettle

reservoir supported on the *stage* (3.75), that contains the concrete before it is placed in the shaft formwork

3.23

dogging system

device mounted on a *conveyance* (3.15) and intended to stop the conveyance by engaging onto the *guides* (3.38) in the event of loss of *head rope* (3.42) tension

3.24

doubling-down

procedure where a rope is doubled by use of a sheave temporarily attached to the *conveyance* (3.15) to carry out any of the following:

- a) installation and changing of *winding ropes* (3.88);
- b) cutting of winding rope back ends;
- c) lowering of abnormal loads; or
- d) tightening of winding rope coils on the *winder* (3.87) drum

3.25 Dropsets

3.25.1

emergency arresting dropset

dropbeam

hinged beam or beams installed in a *decline shaft* (3.21) to arrest a runaway *conveyance* (3.15)

3.25.2

station dropset

pair of hinged beams and tracks that is used to divert a *conveyance* (3.15) from its inclined plane of travel to a horizontal plane at a station

3.26

drop test

test performed by dropping a *conveyance* (3.15) to confirm the adequate performance of the *dogging system* (3.23)

Note 1 to entry: Where the conveyance falls a specified distance before dogging activates, this can be referred to as a free fall test.

3.27

ducksfoot support

<piping system> support fitted to the bend at the bottom of a pipe to permit the direct load of the pipework, fittings and pipe contents to be transferred to the floor, foundation, or associated installations

3.28

ductile material

material where the tensile strength exceeds the yield strength by not less than 20 % and the elongation at rupture is not less than 15 %

3.29**emergency arresting structure**

structure mounted in a shaft or headframe for preventing a vehicle from plunging down a shaft, or to arrest a *conveyance* (3.15) in the event of an *overwind* (3.56), or mounted at a station or *bank level* (3.1) for preventing a vehicle plunging into the shaft

3.30**emergency stopping device**

device mounted on a *conveyance* (3.15) to slow and stop a conveyance in the event of loss of *winding rope* (3.88) tension, that includes *dogging systems* (3.23) in vertical shafts and emergency braking systems in *decline shafts* (3.21)

3.31**equipping skeleton**

conveyance (3.15) used for the equipping and maintenance of a shaft

3.32**fall back arrestor**

jack catch

device that prevents a *conveyance* (3.15) from falling back into the shaft after detaching from the rope in a final *overwind* (3.56)

3.33**fall back arrestor lug**

component that, during fall back after an *overwind* (3.56), engages on *fall back arrestors* (3.32) installed in the headframe

3.34**fall back arrestor support**

conveyance (3.15) element to which a *fall back arrestor lug* (3.33) is attached

3.35**fixed rope winder**

single drum or multi-drum *winder* (3.87) in which one end of a rope is fixed to the drum(s)

3.36**formwork winch**

winch on the *stage* (3.75), used for the handling of formwork

3.37**friction winder**

winder (3.87) that drives a rope (or ropes) by friction between the rope and the drum

Note 1 to entry: The rope is not attached to the winder drum.

3.38**guide**

vertical structural member or suspended steel wire rope located in a mine shaft to limit lateral movement of a *conveyance* (3.15)

3.38.1**guide backer**

vertical structural member located behind the *guide* (3.38) and serving to improve the strength of the guide, particularly when timber guides are used

3.38.2**flare guide**

guide (3.38) that tapers outwards to a larger size towards one end to receive a *conveyance* (3.15) from *rope guides* (3.65) onto fixed guides

3.38.3

spear guide

guide (3.38) that tapers inwards to a smaller size towards one end to receive a *conveyance* (3.15) from *rope guides* (3.65) onto fixed guides

3.39

guide roller

roller that guides a *conveyance* (3.15) on the shaft *guides* (3.38)

3.40

guide shoe

housing for *slipper plates* (3.72) or *rubbing blocks* (3.66), that prevents a *conveyance* (3.15) from disengaging from the *guides* (3.38)

3.41

guide tower

structure that forms part of the headframe, and supports the *conveyance* (3.15) *guides* (3.38), loading, unloading, and tipping arrangements

Note 1 to entry: The guide tower often houses the arresting and detaching devices.

3.42

head rope

rope attached to the *top transom* (3.81), that runs over the *winder* (3.87) or sheaves to safely lift and lower the *conveyance* (3.15) in a friction winder system

3.43

holding device

chairing device

device used to hold the *conveyance* (3.15) in position during loading and unloading and maintenance

3.44

inspection basket

conveyance (3.15) that can be slung underneath or mounted on top of the main conveyance, used for the inspection of, and minor repairs to, the shaft and shaft equipment

3.45

intermediate platform

flat area provided in a long ladder or stair, to ensure that the ladder or stair is not too long from a safety perspective and allows personnel to rest when using the ladder or stair

3.46

jumbo unit

drilling rig suspended below a *stage* (3.75) and used for drilling holes to contain explosives for blasting during shaft sinking

3.47

kibble

bucket

large cylindrical bucket supported by detachable chains, that serves as a means of conveying personnel, equipment, material, *rock* (3.61) and water during the sinking of a shaft

3.48

kibble cross-head

frame that guides the *kibble* (3.47) on the *stage* (3.75) ropes

3.49

kibble cross-head support

structure located on the top deck of the *stage* (3.75) to support the cross-head while the *kibble* (3.47) is in, or below, the stage

3.50**lashing unit**

mucking unit

mechanical equipment mounted below the bottom deck of a *stage* (3.75) and equipped with a cactus grab used for loading broken *rock* (3.61) into the *kibble* (3.47)

3.51**ladderway**

means of ascent or descent consisting of two stringers with an inclination to the horizontal of between 65° and 90° and connected together by rungs or steps

3.52**ledge**

opening in the shaft lining used for purposes of supporting the *cross beams* (3.20) from which a *stage* (3.75) is suspended

3.53**moving beam misalignment of a guide**

lateral displacement of a *guide* (3.38) at a *bunton* (3.10), measured from a straight line that connects the guide position at the bunton above the one in question to the guide position at the bunton below the one in question

3.54**operational arresting structure**

structure that prevents a *conveyance* (3.15) from moving below a specific level, or beyond a specific point in a *decline shaft* (3.21)

3.55**overspeed device**

device mounted on a *conveyance* (3.15) [usually the *control conveyance* (3.16) in a *decline shaft* (3.21)] intended to register if the conveyance, or train, is in an overspeed condition, and activate a brake or other device to stop the conveyance

3.56**overwind**

unintentional travel of either an ascending or a descending *conveyance* (3.15) beyond its normal operating limits

3.57**payload**

maximum load a *conveyance* (3.15) is designed to carry during normal use

3.58**pipe anchor supports**

pipe supports that resist all static, dynamic, thermal, stability and transient loads at the point of support and include loads that react in three dimensions

3.59**protective platform**

bulkhead

platform constructed across the entire shaft cross section to provide protection for workers in the shaft below the platform whilst hoisting operations proceed in the shaft above the platform

3.60**replaceable members**

structural members of the *stage* (3.75), where mechanical damage is acceptable to the parties concerned, and that are replaced as necessary, as part of the normal maintenance routine for the stage

Note 1 to entry: Replaceable members can include the *kibble* (3.47) *guides* (3.38) through the stage, the bell mouth, the stage deck plates, and the *stage skids* (3.78).

3.61

rock

muck

material transported in *skips* (3.73) or *kibbles* (3.47), including ore and waste, of whatever size from fines up to large pieces

3.62

rock pass

steeply inclined or vertical excavation serving to transfer *rock* (3.61) from a mining level to a lower level

Note 1 to entry: This may also be referred to more specifically as an ore pass or a waste pass.

3.63

rope attachments

element or assembly of elements that transfer loads between the transom and the *winding rope* (3.88) or balance rope, including, where appropriate, thimble, cappel, detaching hook, draw bar, dead eyes and compensating sheaves

3.64 Rope breaking loads

3.64.1

actual rope breaking load

load obtained by testing to destruction a specimen of the unused rope

3.64.2

estimated rope breaking load

minimum strength of the rope calculated by wire rope manufacturers to ensure that the *actual rope breaking load* (3.64.1) for 99 % of ropes equals or exceeds this value

3.64.3

nominal aggregate rope breaking load

calculated product of the total nominal cross sectional areas and the nominal tensile strength of all the wires in the rope

3.65

rope guide

tensioned rope that guides the *conveyance* (3.15) in the shaft

3.66

rubbing block

wearing material on the *conveyance* (3.15), located at the *rope guide* (3.65) contact area, used to protect the *guide shoe* (3.40) and *guide* (3.38) rope

3.67

rubbing rope

tensioned rope that prevents collisions between *conveyances* (3.15) guided by *rope guides* (3.65)

3.68

shaft

vertical or inclined excavation equipped with a *winder* (3.87) and intended to provide access to an underground mine

3.69

shaft wall

rock or lining that forms the perimeter of a shaft

3.70

shaft zone

segment of the shaft in which the rock strain is within a given range

Note 1 to entry: See Annex A of ISO 19426-5:2018.