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DEPARTMENT OF EMPLOYMENT AND LABOUR

NO. 4718 **12 April 2024**

OCCUPATIONAL HEALTH SAFETY AND ACT (ACT NO.85 OF AS 1993)

DRIVEN MACHINERY REGULATIONS,2015

DRAFT CODE OF PRACTICE FOR CONVEYOR SYSTEMS FOR PUBLIC COMMENTS

I, Millysind Ruiters, appointed as the Chief Inspector in terms of section 27(1) of the said Act, and by virtue of the powers delegated to me by the Minister of Labour in terms of section 42(1) of the Act, and after consultation with the Advisory Council for Occupational Health and Safety (ACOHS) hereby intend to incorporate The Code of Practice for Conveyor Systems into the Dirven Machinery Regulations.

Interested parties are invited to submit their written comments on the Draft of the Code of Practice for Conveyor Systems to the Director General office within 60 days from the date of publication of this notice.

By hand: Department of Employment and Labour

Laboria House, 215 Francis Baard Street,

Pretoria,

0001

Attention Chief Inspector

1

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Content

2. Introduction

Conveyor systems are probably the most efficient means of transporting bulk materials. However, they are considered dangerous due to the sheer size of the installation which prevents clear and unimpeded visibility down the length of the system. Conveyors can be one of the most hazardous plant equipment installations if safety regulations are not strictly followed or if the conveyors are not properly maintained.

The industry has experienced a significant number of injuries and fatalities over the years. This code intends to ensure the safe operation of conveyor systems. The Code of Practice in association with worldwide standards is to be adopted as a standard.

Background

A belt conveyor is simply an endless strap of a flexible material stretched between two (2) drums and supported at intervals on idler rollers. The belt moves at speed through the structure, carrying volumes of loose cargo of various natures including sticky, abrasive, dusty, or corrosive materials. The conveyor is exposed to harsh industrial environments and random weather conditions. After installation, the conveyor generally receives little maintenance and less consideration. All the circumstances combined create a variety of hazards that can cause injury or death to an untrained or unwary worker. It seems reasonable to assume that everyone knows that belt conveyors can be dangerous. Particularly, people who work around conveyors should know just how dangerous they are. But despite this knowledge, workers are still maimed and killed by conveyors every year. The Code of Practice is specifically designed as a basis for safety codes and as a guide for the Authorities in the formulation of safety rules and regulations.

2. Scope

The purpose of this Code of Practice is to serve as a minimum specification for the design and safe operating conditions and the fulfilment of safety requirements for conveyors systems. The intent is to cover all installations of the related materials handling, either where the installations are nature permanent or are only temporary, or where installations for permanent use are arranged for portable operation.

The Code of Practice (COP) provides practical guidance on how to manage the health and safety risks of plants in the workplace, from conveyor installation, commissioning, and use through to decommissioning and dismantling.

It will provide the minimum safety requirements for the design, installation, and guarding of conveyors and conveyor systems. It includes requirements for users and provides inspections, maintenance, training, and implementation of safe work practices for conveyor belt installations.

1. Definitions and Abbreviations

1.1 Definitions

"Competent Person"	to this code of practice, means any person who. (a) has in respect of the work or task to be performed the required knowledge, training, and experience and, where applicable, qualifications specific to that work or task.
"Live"	means electrically charged;
"The Act"	means the Occupational Health and SAFETY Act, Act 85 of 1993.
"Operator"	means any person who has the necessary knowledge and experience to ensure the safe use of a conveyor system;
"Conveyor"	means apparatus or equipment operating by any power other than manual, by which loads are raised, lowered, or transportation or are

	capable of being raised, lowered, transported, or continuously driven by: A belt conveyor is simply an endless strap of flexible material stretched between two (2) drums and supported at intervals on idler rollers.
"Conveyor Systems"	means an installation comprising one conveyor, or multiple conveyors whose control is integrated:
"Bulk Material Handling (BMH) Belt Conveyor"	means a conveyor using a moving belt for conveying bulk materials;
"Guards"	means a physical barrier that is most effective for the protection of hazardous points on conveyors
"Pinch/nip Point"	Is the dangerous pinch zone which occurs at the line of contact between the rotating drum or roller and the moving conveyor belt on the in-running side of the drum or roller.
"Nip Guard"	An effective guard or barrier installed across the width of the belt protects any part of the body from reaching the pinch/nip point.
"Residual Energy"	means stored energy can be mechanical, gravitational, hydraulic, or pneumatic.
Belt Slip	Belt slip is the loss in transmission of tension from the drive pulley(s) to the belt cover and can destroy a belt or drive pulley
Belt Tensioning	The needed tension can be provided in several ways by suitable arrangements like pulling back the tail drum or idler pulley and by providing a 'drop-weight' or 'gravity take-up' device. Hydraulically or electrically powered automatic take-ups are also available which rely

	on a load-sensitive device to move the tensioning pulley in response to changes in the operating conditions of the belt.
Conveyor Ploughs	The purpose of a belt conveyor plough is for applications where more than one conveyor discharge position is required and to divert product from the primary belt conveyor onto an intermediate secondary/intermediate bypass facility. Belt ploughs are designed to increase a belt conveyor's material discharge control capabilities.
Deck Plates or Dip Plates	Commonly known as a catch plat used to protect the entrapment of spillage material between the rotating pulleys and the belt,

1.2 Abbreviations

In this document, the following are used as abbreviations will apply:

SANS	South African National Standard
DIN	Deutsch Industry Normen
ISO	International Standards Organisation
CMA	Conveyor Manufacturers Association of SA Limited
NFPA	National Fire Protection Association

2. Roles and Responsibilities

Roles	Responsibility
Engineer	Provide a capacity testing procedure and facilitate the testing and analyse of the data.
Plant Operator	Make the plant available for testing and monitoring of the plant during the test.
Plant Maintenance	Ensure the plant is properly maintained to undergo testing and there are no outstanding defects.
Designer /	The responsibility of the design should be under the resort with the design engineer

3. Design

All conveyor systems must be designed and constructed in accordance with a generally accepted technical standard.

4. List of Conveyors Covered Under COP

The mentioned below-mentioned list is the most used types of conveyors however this list is not exhaustive.

- **Belt Conveyor** – An endless fabric, rubber, plastic, leather, or metal belt that carries bulk materials, packages, or objects, placed directly upon it; pulleys for changing the direction of belt travel, driving, and adjusting; and rollers, troughing idlers, or wooden or metal bed supporting the belt and its load.
- **Bucket Conveyor/elevator –** Any type of conveyor in which the material is carried in a series of buckets, or which operates in paths vertical or inclined path. **Chain Conveyor –** Any type of conveyor in which one or more chains act as a conveying element. Specific applications – Drag, Rolling, Sliding Chain Conveyors.
- **Live Roller Conveyor –** A series of rollers over which packages or objects are moved by the application of suitable power means to all or part of the rollers.

- **Pneumatic Conveyors** – A series of tubes or ducts through which objects or bulk materials are conveyed in a pressurized and/or vacuum system.
- **Portable Conveyors** – Any type of transportable conveyor usually mounted on mobile supports.
- **Power Conveyors** – Any type of conveyor to which electrical, mechanical, hydraulic, or pneumatic energy is applied.
- **Reciprocating Conveyor, Vertical** – A power or gravity (counterbalanced) actuated carrier that receives packages or objects and discharges them to another or other elevations.
- **Roller Conveyors** – A series of rollers supported in a frame over which packages or objects are moved manually, by gravity, or by power.
- **Screw Conveyor** – A revolving pipe or shaft on which is mounted helically shaped flighting which serves to convey bulk materials along a trough or a defined path.
- **Suspended Tray Conveyor** – One or more endless chains with suitable pendant trays or carriers that receive and deliver packages or objects at one or more locations.
- **Vertical Conveyor** -Generally speaking, any conveyor that transports bulk materials, packages, or objects in a vertical or substantially vertical direction.
- **Vertical Chain Conveyor** – Two or more vertical elevated-conveying units opposed to each other. Each unit consists of one or more endless chains whose adjacent facing runs operated in parallel paths so that pairs of opposing shelves or brackets receive packages or objects and deliver them at any number of elevations.
- **Wheel Conveyor** – A series of wheels supported in a frame over which packages or objects are moved manually, by force of gravity, or by power.
- **Apron Conveyor** – One or more endless chains or other linkage to which overlapping or interlocking plates or shapes are attached to form a continuous mobbing bed for bulk materials, packages, or objects.
- **Arm Conveyor** – An endless belt, one or more chains, or other linkages to which are attached projecting arms, or shelves for handling packages or objects in a vertical, inclined, or horizontal path.
- **Assembly Conveyor** – Any of several types of conveyors adapted to conveyor assemblies, or parts through a series of progressive assemble operations.
- **Booster Conveyor** – One of several types of powered conveyors used to regain elevation lost in gravity-actuated conveyor lines.
- **Carrousel Conveyor** – A continuous platform or series of spaced platforms that move in a circular path. It may also be termed ‘carrousel’ and has been applied to other forms of conveyors such as car-type and palate-type.

- **Car-Type Conveyors** – A series of cars attached to and propelled by an endless chain or other linkage that operates in a defined path.
  - **Closed Belt Conveyor** – A moving, endless, flexible, tubular, bag-shaped belt which may be opened or closed to load or discharge while the belt is in motion.
  - **Crossbar Conveyor** – Single or double strands of endless chain supporting spaced, removable, or attached "sticks", or cross members from which materials are hung or festooned while being processed.
  - **Double Helical Bag Conveyor** – Closed-spaced parallel tubes which right and left-hand rounded helical threads rotating in opposite directions on which bags of other objects are carried while being conveyed.
  - **Dry Chain Conveyor** – On or more endless chains that drag bulk materials in a trough or along a defined path.
  - **Air Slide Conveyor** - With minimal fluidizing air and a gentle incline, Air-slide Conveyors **transport dry and fine-grained mineral bulk materials economically and efficiently**.

  - **En Masse Conveyor** – A series of skeleton or solid flights on an endless chain or other linkage that operates in horizontal, inclined, or vertical paths within a closely fitted casing for carrying run. The bulk material is conveyed and elevated "en masse" in a substantially continuous stream with full cross-section of the casing.

  - **Form Elevator** – A term applied to any of several types of inclined, portable, or fixed conveyors adapted for use on farms to store and move grains, corn ensilage, and other materials.
  - **Feeder** – A conveying device by which the rate of delivery of bulk materials, packages, or objects may be controlled.
  - **Flight Conveyor** – One or more endless propelling mediums such as chains, or other linkage, to which flights are attached to move bulk materials along a defined path.
  - **Floor Conveyor** – Any of serval types of conveyors using chain, cable, or other linkage mounted near or flush with the floor.
  - **Gravity-Discharge Conveyor** – Buckets attached between two (2) endless chains that may operate in horizontal, inclined, and vertical paths. Bulk materials are elevated in the buckets or over the rails to unload bulk materials from the hopper bottom rail wagon.
  - **Roller Spiral** – Curved sections or roller conveyors which wind helically, and over which packages and objects are lowered by gravity.

- **Shuttle Conveyor** – Any conveyor such as belt, chain, pan, apron, screw, etc…, in a self-contained structure movable in a defined path parallel to the flow of the material.
- **Telescopic Conveyor** – A continuous series of pulleys which permit extension or retraction of the conveyor length.
- **Thrower or Spreader Conveyor** – A short high-speed belt conveyor for throwing loose bulk material into otherwise inaccessible areas typically loading ships.
- **Walled Conveyor** – A conveyor consisting of a moving belt having a flat carrying face extended to form side walls of limited height.
- **Wheel Spiral** – Curved sections of a wheel conveyor which winds helically, and over which packages or objects are lowered by gravity.

5. Safety Around Conveyor systems

Emphasis is given to operational safety and the protection afforded to Operators, Maintenance personnel, or other persons who may be exposed to risks to health and safety associated with conveyor belt installations.

6. Stored Energy

When maintenance is required on a conveyor system, it is important to remember the danger presented by residual energy stored within the system and to address this adequately.

Thus, it is necessary to isolate the stored energy from the work area or to completely release all stored energy from the system, so that work can be performed in a safe environment. This can be done by applying clamps to isolate this energy from the work area or by releasing the energy applied by the take-up system. The system tensions may also be relieved by the controlled lifting of the counterweight or the controlled pay-out of the take-up winch system.

Where belt clamps are utilized, these must be securely anchored to the structure. This applies to both permanent and temporary belt-pulling clamps. Belt clamps must be inspected and tested before attachment to ensure that they can withstand the belt tensions in the localized area.

7. Lighting

The lighting on conveyor systems should be in terms of the Environmental Regulations for Workplace.

8. Dust Suppression

Dust particles can enter the respiratory system, which can cause occupational diseases or death. Further, it can result in the risk of a dust explosion if not effectively managed. Conveyor systems that transport dust-generating material must be equipped with a dust suppression system. These systems spray the material at selected transfer and loading points.

Dust suppression is a process used to restrict airborne dust particles, which will be mandatory in the presence of dust.

9. Fire Protection / Detection / Suppression

Conveyor systems, their structures, and supports shall be constructed from non-combustible materials where possible. Where the construction of the conveyor system cannot be carried out in open air (i.e., open construction) an explosion venting system should be considered during the Fire Protection/Detection Assessment process and incorporated into the design. Any system should take into consideration the recommendations within NFPA 68.

10. Basics of Conveyor Guard Design

Unguarded conveyor systems have the potential to injure persons because of unprotected moving parts. All conveyor systems should be guarded or fenced and constructed to prevent a person from reaching the danger and or nip points.

'A Direct Physical Guarding' - A physical barrier is your first line of defence against a conveyor accident and is the most effective means of protection from dangerous points on conveyors. It is a means of physically preventing access to dangerous areas and is also a requirement by law. Four (4) key points should always be considered when designing and fitting guards:

1. The guards must make access to the nip point physically impossible

2. The guard must not impede the operation of the plant
3. The guard itself must not create a new manual handling risk:
4. The guard can only be removed with a tool

Three (3) critical main protections that are embedded in modern-day conveyor belt installations namely fixed / distance safety guards, nip or shear points:

- Safety Guards – are designed and provide access to danger zones unless the danger zone is guarded by location or position. Guards shall be included in the design of the conveyor or conveyor belt installations and shall not create a hazard. All guards shall be secured in position so that they cannot be removed without the use of tools unless an interlocking device is provided to automatically stop the conveyor in the event of the removal of the guard and/or guards.
- Nip Guards shall extend for a minimum length from the nip point and across the width of the belt for the full length of the idler or pulley and shall be closely fitted to follow the felt line pulley periphery approaching the nip with a prescribed gap.
- Fixed Distance Guards do not completely enclose a hazard but reduce access by its physical dimensions and its distance from the hazard. It shall be designed and constructed with the object of preventing any part of the body from reaching a hazard. It may take the form of a fixed barrier or fence designed to such a height to prevent normal access to the danger zone, although climbing over this type of safeguard cannot be eliminated.

10.1 Guard and Fences

A guard or fence is only effective if it is constructed to prevent a person from reaching the danger or nip point. A person capable of reaching upwards, over, into, around, or through a guard or fence, and all these aspects must be considered when considering the effectiveness of a guard or fence.

For **belt conveyor installations** the so-called ‘nip guard’, examples of which are shown in the detailed illustrations as part of the document.

Extending the guard's whole pulley width is regarded as a reasonable solution to prevent access to the danger points. Installations of this type of guard are strongly recommended but unfortunately, it is impossible to install it in such a way that a person is completely

prevented from reaching around it. A nip guard alone cannot therefore be regarded as sufficient protection and pulleys must be further guarded or fenced off to meet the requirements. A pinch point or pinch point hazard is a common class of mechanical hazard where injury or damage may be done by one or more objects moving towards each other, crushing, or shearing whatever comes between them. A nip point is a type of pinch point involving rotating objects, such as gears and pulleys.

11. Guarding Against the Dangers of Pinch / Nip Points

A '*pinch point* or *nip point'* is any point at which a person or part of a person's body can be caught between moving parts of a machine between the moving and stationary parts of a machine or between material and any part of the machine. At least one moving part of the machine must have a rotary or circular motion. Typical nip points include gears, rollers, belt drives, and pulleys.

"Pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between moving and stationary parts of a press or auxiliary equipment or between the material and moving part or parts of the press ...

Guards are often exposed to serious spillages, so accessibility is challenging. The preferred option is to 'hang guard sections' which can be removed at times to make spillage / cleaning more simplistic for the cleaning staff. Majority of the newer plants built the pull-key is an integral part of the safeguard so this needs to be handled with care. The following may be provisionally accepted as safe in the absence of facts to the contrary:

12. Nip Points & Guards

Every single conveyor installation should be significantly protected to prevent access under running conditions. This may include safety guards and nip guards at the appropriate pulley arrangement throughout the conveyor belt installation. The use of the Guideline "Ergonomics" as deemed as part of Hazardous Installation Practice's. All conveyor belt installations should be adequately protected.

13. Hazard Locations

13.1 Hazardous nip points may occur at the following locations:

- Drive pulleys.
- Terminal rollers at delivery and return end locations.
- Bend and snub pulleys.
- Loop take-up rollers.
- Transition troughed idlers adjacent to main rollers.
- Carrying and return idlers at convex curves.
- Carrying and return idlers beneath feed hoppers, skirt plates, and where the lift of the belt has been restricted.
- Roller assemblies for conveyor belt tracking.
- Locations affording access to persons e.g., bridges or underpasses, maintenance/storage areas, dinting/cleaning areas.

14. Risk Assessment

However,, due to the energy associated with conveyors, when an incident occurs the consequences are likely to be serious or even catastrophic in nature. Many hazards exist around conveyors (for example: dust, noise, falling objects, heavy equipment, and rotating/moving parts). This document will explain the legislative obligations and provide examples of how you can ensure your plant is safe.

On each activity whereby, work is conducted on conveyor belt installations a comprehensive risk assessment must be compiled upfront as part of the submission to obtain lock-out or permit conditions. The Risk Assessment should be part of the Briefing of the Maintenance Team assigned to the task. Any risks associated to the specific activities must be tabled with the Maintenance Team.

A sample of risk assessment template

14.1.1.1.1 APPENDIX B: RISK ASSESSMENT FORM

DEPARTMENT : **SCOPE AND BOUNDARY :**

DATE : **RISK ASSESSMENT TEAM :**

REVIEW DATE :

REFERENCE NO :

INTRODUCTION
The risk assessment is being done to identify the hazards and assess the risks associated with the new conveyor system on 2 seam and bring the mine in line with the legal requirements.

ACCIDENT SEVERITY	**HEALTH**				
INJURY	IRRITANT	**1**	**2**	**4**	**7**
DISABLING	TEMPORARY	**3**	**5**	**8**	**11**
PERMANENT	PERMANENT	**6**	**9**	**12**	**14**
FATALITIES	DEATH	**10**	**13**	**15**	**16**
		ONCE A YEAR	**ONCE A QUARTER**	**ONCE A MONTH**	**ONCE A DAY**

ITEM NO	**TASK/ EQUIPMENT**	**HAZARD**	**HAZARD EVENT**	**EXISTING CONTROLS**	**RESIDUAL RISK RATING**	**SHORTCOMINGS IN EXISTING CONTROLS**	**RECOMMENDATIONS**	**APPROVAL HEALTH &**

									SAFETY
		What will injure		**What you have in place to prevent the event**	HEALTH	SAFETY			
1	**Patrolling Conveyor**	**Moving parts on conveyor.** No guards or guards not in place.	**Injuries** Fatalities/ amputations/ lacerations.	**Regulation 20.5** All exposed machinery which, when in motion, may be dangerous to any person, shall be securely fenced off. Effective guards shall be provided to such parts as may be a source of danger to any person. **Engineering Procedure** Standard for the installation, operation, repair, maintenance and patrolling of belt conveyor systems		**10**	There are no guards along the sides of the cross conveyor and also at the top section of the sub incline.	Effective guards to be fitted on both sides of the conveyor to prevent people walking under or into moving conveyor. All other guards that are not already fitted to be fitted with immediate effect.	
2	**Electric Motors**	**Electricity**	**Electrocution** Fatalities. Electrical burns. Electrical shock.	**Mine Health and Safety Act and Regulations. 21.7.1** Any accessible metallic portion of electric apparatus which may accidentally become live, shall be connected to earth by a conductor of adequate cross sectional area.		**10**	Some motors are not earthed.	Adhere to Regulation 21.7.1	

ITEM NO	TASK/ EQUIPMENT	HAZARD	HAZARD EVENT	EXISTING CONTROLS	RESIDUAL RISK RATING		SHORTCOMINGS IN EXISTING CONTROLS	RECOMMENDATIONS	APPROVAL HEALTH & SAFETY
		What will injure		**What you have in place to prevent the event**	HEALTH	SAFETY			
3	**Conveyor**	**Fire**	**Damage to property.**	**Regulation 11.4.2**			None, however there are some fire extinguishers	Adhere to regulations.	

		Noxious fumes - CO	Conveyor/coal fires – inhalation of noxious fumes	Suitable and adequate means for extinguishing fires shall be available at conveyor drives and also along the conveyor.		**10**	missing and not in place. Water hydrants not available in places.		
4	**Transfer Points**	**Dust**	**Inhalation of fine dust**	**Regulation 10.1.1** No person permitted to work in dust visible by sight. **Regulation 10.2.1** When coal is moved, screened or by any process which may produce dust, dust allaying measures must be in place.	**6**		There are no water sprays fitted at transfer points. Some persons do not wear the protective equipment.	Adhere to Regulation MS15. Fit and use water sprays at all transfer points.	
5	**Conveyor Drive**	**No hand rail on chute side of top platform** (Slip and fall)	**Fractures and/or contusions**	**Mine Health & Safety Act & Regulations** **Regulation 20.8** Every precaution shall be taken in connection with the use of machinery to ensure that the safety of every person employed on or about such machinery is not endangered.		**10**	There are no hand rails to prevent persons falling into the transfer chute.	Hand rails to be fitted.	
6	**Pulleys and Nip Points**	**Conveyor Pulleys**	**Fatalities, Abrasions.** **Amputations.**	**Regulation 20.5** All moving machinery when exposed to be effectively guarded. **Engineering Standard** Standard for the installation, repair, patrolling and maintenance of conveyor systems.		**20**	Not all the nip points have nip guards fitted.	Fit nip guards to all places requiring them.	
7	**Transfer Chutes**	**Flying objects/ coal**	**Eye injury.** **Abrasions.** **Lacerations.**	**Mining Standard MS15** Personal protective equipment – eye protection to be worn.		**6**			
8	**Patrolling Conveyor**	**Noise**	**Loss of hearing ability.**	**Mining Standard MS15** Personal protection equipment – hearing protection to be worn.	**6**		None.	PPE to be worn at all times.	

15. Ergonomics

15.1 Fixed Conveyors

- Upwards

Any pulley or idler, which is 2.5 meters or more in height and therefore beyond an upward reach, may be regarded as being positionally safe and need not be guarded. The possible reduction of this safe clearance by a build-up of spillage or discharge of material shall, however, be borne in mind.

- Over

Head and tail pulleys must be guarded on at least the two (2) sides and the top unless the guards or fences on the sides are extended to a height that makes it impossible to reach over and contact the nip guard. If safeguards only are attached with a very small clearance between the edge of the belt and the side guard, this may perhaps be regarded as adequate to prevent reach over the guard to the nip point but will not necessarily prevent tools or clothing from being caught in the nip point. If a top guard is attached, it is high enough above the belt to ensure that the loads on the belt will not damage it.

- Into

The distance that the guard or fence is placed from the side of the belt determines the distance that these extend away from the nip point along the length of the belt. An acceptable distance is at least 0,85 meters away from the nip point, preferably from the position of the nip guard.

- Around

This is like 'into so far as the conveyor pulley guard is concerned but may also be applied to determine the length of the top section of the guard. The same minimum distance of 0.85 metres applies.

- Through

The protection afforded against injury by reaching through the guard is determined by the shape and size of openings in the material used for the construction of the guard or fence.

- Square Openings:

It may be assumed that there is no reach through an opening of 10 x 10 mm or less, as it is too small for fingers. If the opening is such that it will admit one (1), two (2), or three (3) fingers, the reach is restricted by the roots of the fingers, a distance normally not exceeding 100mm.

When the opening is sufficient to admit the whole arm and a small portion of the shoulder, the reasonable safe distance is based on the distance from fingertips to the armpit, which is assumed to be 0,85 meters. Screening materials with openings over 80 x 80 mm shall not be used in the construction of guards or fences. Preference shall be given to materials with an opening not exceeding 25 x 25 mm.

- Elongation Opening (opening with parallel sides):

6mm wide is no consequence. The guard or fence so constructed may virtually be regarded as a sheet, and a working clearance of approximately 25 mm is all that is required.

Openings greater than 6 mm but less than 13 mm will admit part of a finger and require at least 50 mm clearance from the danger points. Openings over 13 mm but not greater than 80 mm are subject to the following formula:

X = 10Y where:

X = reasonable safe distance from danger points in mm;

Y = width of opening in mm;

Note: The tail pulley guard shall be closed at the rear.

15.2 Ergonomics - Work Station Conveyors

This type of conveyor installation although it does not have the high capacity nor speeds associated to conventional conveyor access is key due to the limitation of the factory floor. Their footprint is confined to a very limited area with multiple transfer stations. Accessibility is key in all aspects to allow safe passage around the elevated sections as the conveyors negotiate different routes to the final station.

All those areas must be guarded from the roof and side walls preventing contact with the conveyors in motion.

16. Training

All maintenance and operations must prescribe safe working procedures and policies that must be adhered to. Operating staff must be regularly reminded of the necessity to adhere to these safe working procedures.

All new staff, whether temporary or permanent, must be formally instructed in the safe work procedures for a particular task, and records of training must be maintained.

Regular training of the force workforce is a priority.

17. Maintenance

19.1 Safety Requirements for Maintenance

On a moving conveyor belt, the belt, pulleys, and idlers are all in motion, and each idler, chute skirt, belt cleaner, or pulley has a potential nip point. The prohibition of work on moving machinery relates to tasks such as belt cleaning, training of the belt, greasing of pulley bearings, housekeeping, and removal of spillages at localised points. Where build-up of carry back material occurs on the face of pulleys

and idler shells, the removal of this build-up is only permitted when the conveyor system has been stopped and a Lock-Out is issued. In instances whereby work is being undertaken on LIVE Plant whilst in operation, such as belt training or the adjustment of material stream deflectors, be this must be performed by Competent Teams under the direct supervision of the Responsible Person (RP). This would be guided by an approved Risk Assessment and Safe Working Procedures to the tasks being performed. Operating staff should be part of the task and be able to activate a pull-key pull key or an emergency stop button that must be readily accessible.

Preventive Maintenance of Conveyor Belts requires:

- Cleaning and greasing of rolling elements (pulleys).
- Adjustment of the conveyor belt.
- Replacement of damaged elements.
- Checking hydraulic or oil leaks, condition of electrical connections, clearances…
- Nip Guard measurement and adjustment.
- Checking security and protection systems.
- Conditioning monitoring history and planned intervention.

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Perform the following maintenance checks daily, during normal operation: Visually inspect for debris stuck in the conveyor mechanism. Check for unusual noise during normal conveyor operation. Visually inspect for cuts or bruises on a conveyor belt. Take note of any belt slippage or material spillage, Inspect the surface for deformation, cracks, scratches, or grooves. Inspect the belt edge for shavings, blue dust, or cracks. Inspect the surface and edge for belt discoloration.

If wear patterns are identified, they must be reported immediately to the relevant department.

19.2 Routine Conveyor Maintenance

- Do a routine cleaning at the start and end of the day to ensure that there are no components that will interfere with the function of the conveyor belt.
- Physically inspect conveyor drive components and any debris that may be stuck in the conveyor mechanism.
- Inspect the entire surface of the conveyor belt for any wear that may cause issues.
- Check for damaged or broken parts.
- Check rollers for any structural damage, debris build-up, motor, etc.
- Check for misalignment of conveyor belts.
- Check the conveyor belt and joints to make sure that there is no unusual peeling or damage.
- Check machine guard placement (for belts, pulleys, sprockets, and other pinch points).
- Check emergency stops to make sure that it is functioning properly.

18. References

18.1 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

Normative

[1] ISO 9001 Quality Management Systems.

[2] South Africa – SANS 971.

[3] DIN 15220 Belt Conveyors: Examples for the protection of nip points by guards.

[4] AS 1755 – 2000 Conveyors – Safety requirements.

Informative

[1] SANS 094: 1982, Bolted Friction-Grip Joints.

[3] SANS 1168, 1313, 1173, Conveyor Equipment.

[4] ISO 5048, Conveyor Design.

[7] SANS 053: 1972, Viscosity Classification of Industrial Lubricating Oils.

[9]

18.2 Related/Supporting Documents

[1] CMA MS01 – October 2013: Conveyor Manufacturers Association of SA Ltd. – Guideline SAFETY AROUND BELT CONVEYORS.

[2] SANS 1168, 1313 and 1173 – Conveyor Equipment

[3] SANS 10114-1

[4] SANS 10400 – section: 4.31. 2) for all buildings that exceed thirty (30) m in height (approx. 10 floors), or contain any floor exceeding five thousand (5,000) m2, to be equipped with a fire detection system

18.3 Applicable Standards:

[16] South Africa – SANS 971.

25 Annexures – Figures