H&S Machine and Equipment Standard of Requirements for Vendors

This Standard of Requirements is a supplementary document to **TCAPQP-WIN-004**. Both documents should be used in conjunction when purchasing or modifying machinery or equipment within Tiercon Corp and Coplas Inc.

Contents

1.0 PURPOSE

The purpose of this procedure is to outline the standard of requirements for vendors that supply Tiercon Corp.'s & Coplas Inc.'s machine and equipment.

2.0 SCOPE

This procedure applies to all machines and equipment that Tiercon Corp. & Coplas Inc. purchases or modifies.

2.1 References

Pre-start Health and Safety Reviews (OHSA Reg. 851 S.7)
- Exposure Limit (OHSA Reg. 833)
- Designated Substance – Asbestos (OHSA Reg. 278/05)
- Designated Substances (OHSA Reg. 490/09)

Premises (OHSA Reg. 851 S.12-14)
Machine Guarding (OHSA Reg. 851 S.24-44.2)
- Safeguarding of Machinery (CSA Z432-16)

Control of hazardous energy – Lockout and other methods (CSA Z460-13)
Musculoskeletal Disorders Prevention Program Standards (EHSP-201)
Noise (OHSA Reg. 381 S.2)
Industrial Hygiene (OHSA Reg. 851 S.128)
Lighting (OHSA Reg. 851 S.21)
- Emergency lighting equipment (CSA C22.2 No. 141-15)

Cables, Slings, & Rigging (OHSA Reg. 213 S. 168-180)
- Health and safety code for suspended equipment operations (CSA Z91-17)

Industrial robots and robot systems (CSA Z434-14)
Safety standard for lift trucks (CSA B335-15)
Industrial Control Equipment (CSA C22.2 No. 14-18)
Electrical Interface between Injection Moulding Machine and Handling Device/Robot (EUROMAP 67)
The Canadian Standards Association
The Electrical Safety Authority (Electricity Act, 1998)
Regulations (OSHA Standards – 29 CFR)
General Industry Safety and Health Standards (MIOSHA)
Building Code Act (1992)
Fire Protection and Prevention Act (1997)
Conveyor Standards of Requirements (EHSP-204)

3.0 RESPONSIBILITY

Vendors shall: ensure that all standards listed in this procedure are complied with

4.0 PROCEDURE

4.01 Pre-start Health and Safety Reviews (OHSA Reg. 851 S.7)

A pre-start health and safety review is required if, in a factory other than a logging operation,

- Because a new apparatus, structure or protective element is to be constructed, added or installed or a new process is to be used; or
- Because an existing apparatus, structure, protective element or process is to be modified and one of the following steps must be taken to obtain compliance with the applicable provision:
    1. New or modified engineering controls are used
    2. Other new or modified measures are used
    3. A combination of new, existing or modified engineering controls and other new or modified measures is used

A pre-start health and safety review includes the preparation of a written report that is made to the owner, lease or employer and contains,

- Details of the measures to be taken for compliance with the relevant provisions of the Regulations
- If testing is required before the apparatus or structure can be operated or used or before the process can be used, details of measures to protect the health and safety of workers that are to be taken before the testing is carried out; and
- If:
    - Clause 45(b): Material, articles, or things are placed or stored on a structure that is a rack or stacking structure; or
    - Section 51 & 53: the construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist
    - Applies, details of the structural adequacy of the apparatus or structure
- When:
    - Any of the following are used as protective elements in connection with an apparatus:
        1. Safeguarding devices that signal the apparatus to stop, including but not limited to safety light curtains and screens, area scanning safe guarding systems, radio frequency systems and capacitance safeguarding systems, safety mat systems, two-hand control systems, two-hand tripping systems, and single or multiple beam systems
        2. Barrier guards that use interlocking mechanical or electrical safeguarding devices
    - Applies, a pre-start health and safety review is not required if,
        - The protective element was installed at the time the apparatus was manufactured; or
        - The protective element was not installed at the time the apparatus was manufactured

The apparatus was manufactured in accordance with and meets current applicable standards, or it has been modified to meet current applicable standards

The apparatus is installed in accordance with the manufacturer's instructions and current applicable standards

The protective element was manufactured in accordance with and meets current applicable standards, or it has been modified to meet current applicable standards

The protective element is installed in accordance with the manufacturer's instructions, and current applicable standards, if any

When material, articles or things are placed or stored on a structure that is a rack or stacking structure, a pre-start health and safety review is not required if the rack or stacking structure is designed and tested for use in accordance with current applicable standards

When a process involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety, a pre-start health and safety review is not required if the process is conducted inside a spray booth that is manufactured and installed in accordance with current applicable standards

When the construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist, a pre-start health and safety review is not required

- In the case of a lifting device or travelling crane,, if it is in or on a supporting structure originally designed for it and its capacity does not exceed the capacity provided for in that original design;
- In the case of an automobile hoist, if it is certified that it meets current applicable standards

If no pre-start health and safety review is required, an exemption letter is to be provided to Tiercon Corp. & Coplas Inc.

A pre-start health and safety review required, shall be conducted by a professional engineer

- A professional engineer who has been deemed competent by Tiercon Corp. & Coplas Inc.
    - CCS Engineering Inc. by Jim Anderson www.ccseng.ca
    - Industrial Risk Management Ltd. by Richard Bohlken www.indrm.ca
    - S.A.F.E. Engineering Inc. https://www.safeengineering.ca/
    - Specific to robotics: JVK Industrial Automation Inc. (516)651-3371

A pre-start health and safety review required under a process uses or produces a substance that may result in the exposure of a worker in excess of any exposure limit set out in Regulation 833, Regulation 278/05, or Regulation 490/09; shall be conducted by a professional engineer or by a person who is an expert or professional knowledge or qualifications appropriate to assess any potential or actual hazards

The person conducting a pre-start health and safety review shall,

- Date and sign the written report
- If the person is a professional engineer, affix his or her seal to the report; and
- If the person is not a professional engineer, include in the report details of his or her special, expert or professional knowledge or qualifications

List of Items that are applicable:

1. Flammable liquids are located or dispensed in a building, room or area

2. Any of the following are used as protective elements in connection with an apparatus:
    a. Safeguarding devices that signal the apparatus to stop, including but not limited to safety light curtains and screens, area scanning safeguarding systems, radio frequency systems and capacitance safeguarding systems, safety mat systems, two-hand control systems, two-hand tripping systems and single or multiple beam systems
    b. Barrier guards that use interlocking mechanical or electrical safeguarding devices
3. Material, articles or things are placed or stored on a structure that is a rack or stacking structure
4. A process involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health or safety
5. The use of a dust collector involves a risk of ignition or explosion that creates a condition of imminent hazard to a person's health and safety
6. A factory produces aluminum or steel or is a foundry that melts material or handles molten material
7. The construction, addition, installation or modification relates to a lifting device, travelling crane or automobile hoist
8. A process uses or produces a substance that may result in the exposure of a worker in excess of any exposure limit set out in Regulation 833 of the Revised Regulations of Ontario, 1990 (Control of Exposure to Biological or Chemical Agents), Ontario Regulation 278/05 (Designated Substance-Asbestos on Construction Projects and in Buildings and Repair Operations) or Ontario Regulation 490/09 (Designated Substances) all made under the Act

4.02 Premises (OHSA Reg. 851 S.12-14)

Clearances between a moving part of any machine or any material carried by the moving part of the machine and any other machines, structure or thing shall be adequate to ensure that the safety of any worker in the area is not endangered

There shall be a guardrail, around a machine, electrical installation, place or thing that is likely to endanger the safety of any worker

A guardrail shall,

- Have a top rail located not less than 91 and not more than 107 cm above the surface to be guarded
- Have a mid-rail
- If tools or other objects may fall on a worker, have a toe board that extends from the surface to be guarded to a height of at least 125mm; and
- Be free of splinters and protruding nails

A guardrail shall be constructed to meet the structural requirements for guards as set out in the Building Code

4.03 Machine Guarding (OHSA Reg. 851 S.24-44.2)

Where a machine or prime mover or transmission equipment has an exposed moving part that may endanger the safety of any worker, the machine or prime mover or transmission equipment

shall be equipped with and guarded by a guard or other device that prevents access to the moving part

An in-running nip hazard or any part of a machine, device or thing that may endanger the safety of any worker shall be equipped with and guarded by a guard or other device that prevents access to the punch point

A machine shall be shielded or guarded so that the product, material being processed or waste stock will not endanger the safety of any worker

An emergency stop control on a power-driven machine shall, be conspicuously identified; and be located within easy reach of the operator

An operating control that acts as a guard for a machine not otherwise guarded shall, be in a location where the safety of the operator is not endangered by moving machinery; be arranged so that it cannot be operated accidentally and not be made ineffective by a tie-down device or other means

A grinding wheel shall be,

- Marked with the maximum speed at which it may be used;
- Checked for defects before mounting;
- Mounted in accordance with the manufacturer's specifications;
- Operated at a speed which does not exceed the manufacturer's recommendations;
- Provided with protective hoods that enclose the wheel as closely as the work will permit;

A work rest for a grinding wheel shall,

- Have a maximum clearance of 3mm from the grinding wheel;
- Be in a position above the centre line of the grinding wheel; and
- Not be adjusted while the grinding wheel is in motion

A centrifugal extractor, separator or dryer shall have an interlocking device that will prevent,

- Any lid or covering guard from being opened or removal while the rotating drum or basket is in motion; and
- The starting of the drum or basket while the lid or covering guard is open or removed

A tumbling will or tumbling dryer shall have a locking device which prevents any movement of the mill or dryer that may endanger any worker during loading or unloading

Portions of conveyors or other moving machinery that are not visible from the control station, and where starting up may endanger any worker, shall be equipped with automatic start-up warning devices

Guards shall be provided beneath conveyors that pass over any worker; or from which falling material, including broken conveyor parts, may be a hazard to any worker

Overhead protection shall be provided where falling material may endanger any worker

An explosive actuated fastening tool shall,

- Have a firing mechanism that will prevent the tool from being fired
  - While being loaded
  - During preparation for firing, or
  - If dropped

- Be capable of being operated only when the muzzle end is held against a working surface with a force of at least 22 N greater than the weight of the tool
- If required to be dismantled into separate parts for loading, be capable of being operated only when the separate parts are firmly locked together
- Be capable of being fired only after two separate and distinct actions have been carried out by the operator, with the firing movement separate from the operation of bringing the tool into the firing position
- Be used only when equipped with a protective guard or shield
    - Suitable for the particular fastening operation being performed,
    - Mounted at right angles to the barrel,
    - At least 75mm in diameter, and
    - Placed in a central position on the muzzle end of the tool except where the fastener is intended to be driven into a surface at a point within 38mm of another surface that is at any angle to the surface into which the fastener is intended to be driven;
- Be capable of being operated when the guard prescribed is placed in the central position only when the bearing surface of the guard is tilted not more than 8 degrees from the working surface
- Whether loaded or unloaded, not to be pointed directly at any person
- Be used only,
    - The tool is clean
    - All moving parts operate freely
    - The barrel is free from any obstruction
    - The tool is adequately equipped for the intended use, and
    - It is not defective
    - With an explosive load of a strength adequate to perform the intended work without excessive force, and
    - To drive a stud or other fastener suitable for insertion in the tool; and
    - Not to be used in an atmosphere containing flammable vapours, gasses or dust

Do not apply to an explosive activated fastening tool if the velocity of the stud or other fastener does not exceed 9m/s measured at a distance of 2m from the muzzle end of the tool when propelled by the maximum commercially available explosive load that the tool is chambered to accept

An explosive load for an explosive actuated fastening tool shall,

- Be so marked or labelled that the operator can readily identify its strength
- Not be stored in a container where an explosive load of a different strength is stored

A hand-held nailing gun or similar tool shall be capable of being operated only when in contact with the work surface

A chain saw shall,

- Have,
    - A chain that minimizes the possibility of a kickback, and
    - A device which will effectively stop the chain in the event of a kickback
- Be in safe operating condition
- Have the chain stopped when not actually cutting

Electrical equipment, insulating materials and conductors shall be,

- Suitable for their use; and
- Certified by
  - The Canadian Standards Association, and
  - The Electrical Safety Authority, as defined in the Electricity Act, 1998

Tools and other equipment that are capable of conducting electricity and endangering the safety of any worker shall not be used in such proximity to any live electrical installation or equipment that they might make electrical contact with the live conductor

Cord-connected electrical equipment and tools shall have a casing that is adequately grounded

- Does not apply to cord-connected electrical equipment or tools that are adequately double-insulated and whose insulated casing shows no evidence of cracks or defects
- Does not apply to a portable electrical generator in which the electrical equipment or tools are not exposed to an external electric power source if the casing of portable electrical equipment or tools connected to the generator is bonded to a non-current-carrying part of the generator

When used outdoors or in wet locations, portable electrical tools shall be protected by a ground fault circuit interrupter installed at the receptacle or on the circuit at the panel

4.04 Lockout

All equipment/machines with the use of any energy source shall have the ability to be locked out

Lock out controls/disconnects shall be located in an easily accessible location on or within the equipment/machine

Information on all lockout of energy sources shall be provided

4.05 Ergonomics

The equipment/machine shall not require a lift, lower, carry, push, or pull greater than 11lbs for the operator to operate

The equipment/machine should allow an operator to work at a close to neutral posture

- Shall not require an operator to work with:
  - Neck flexion >20 degrees
  - Neck extension
  - Neck lateral bend
  - Shoulder flexion >45 degrees
  - Shoulder extension>20 degrees
  - Ulnar and radial deviation of the wrist
  - Back extension
  - Back flexion >60 degrees
  - Back lateral bend
  - Back rotation
- Height is adjustable (including elevated fixtures on the work surface)

- Shelving be located and tilted according to the frequency of use and item (items used/retained at a high frequency shall be located closer to the user)

The equipment/machine shall not require difficult and forceful gripping with the hand greater than 200N

Shall allow cycles to run at the maximum 2 times per minute

Ideally, a user should not require more than 4 steps to operate the equipment/machine within one cycle time. If more than 4 steps are required, force, posture and total cycle time shall be (re)evaluated to reduce the potential harm /risk level

Tools with vibration shall be minimized with anti-vibration properties

Size of work station is sufficient for the task performed

Shall allow the minimum of 2000 lux light levels or the requested amount of light levels

Workstation allows for a spacious and easy travel means of egress

If any of the listed ergonomic requirements cannot be met, different versions of the design shall be provided along with the specific requirement(s) that it has violated, the result of the violation (i.e. risk involved), and a cost benefit analysis differentiating the difference between designs

4.06 Programmable Logic Controller

The programmable logic controller (PLC) will be sold and owned by Tiercon Corp. & Coplas Inc. including any information pertinent to the PLC (e.g. codes, work instructions, etc.)

4.07 Noise (OHSA Reg. 381 S.2)

The equipment shall not have a sound level greater than an equivalent sound exposure level of 85dB

4.08 Industrial Hygiene (OHSA Reg. 851 S.128)

The discharge of air from any exhaust system shall be in such a manner so as to prevent the return of contaminants to any workplace

4.09 Lighting (OHSA Reg. 851 S.21)

Where natural lighting is inadequate to ensure the safety of any worker, artificial lighting shall be provided and shadows and glare shall be reduced to a minimum

4.10 Cables, Slings, & Rigging (OHSA Reg. 213 S. 168-180)

A cable used by a crane or similar hoisting device

- Shall be steel wire rope of the type, size, grade, and construction recommended by the manufacturer of the crane or similar hoisting device
- Shall be compatible with the sheaves and the drum of the crane or similar hoisting device

- Shall be lubricated to prevent corrosion and wear
- Shall not be spliced; and
- Shall have its end connections securely fastened and shall be kept with at least three full turns on the drum

No cable used by a crane or similar hoisting device

- Shall contain six randomly-distributed wires that are broken in one rope lay or three or more wires that are broken in one strand in a rope lay;
- Shall be similar than its normal rope diameter by more than,
  - 1mm for a diameter up to and including 19mm
  - 2mm for a diameter greater than 19mm up to and including 29mm, and
  - 3mm for a diameter greater than 29mm
- Shall be worn by more than one-third of the original diameter of its outside individual wires;
- Shall show evidence of kinking, bird-caging, corrosion or other damage resulting in distortion of the rope structure; or
- Shall show evidence of possible rope failure including rope damage caused by contact with electricity

No cable that is static or is used for pendants

- Shall contain three or more broken wires in one lay or in a section between end connectors; or
- Shall have more than one broken wire at an end connector

Rotation-resistant wire rope shall not be used for a cable for boom hoist reeving and pendants

Rotation-resistant wire rope shall not be used where an inner wire or strand for a cable is damaged or broken

A cable used by a crane or similar hoisting device shall be capable of supporting at least,

- Three and one-half times the maximum load to which it is likely to be subjected if it is used on a device other than a tower crane and its wind on a drum or passes over a sheave;
- Five times the maximum load to which it is likely to be subjected if it is used on a tower crane and it winds on a drum or passes over a sheave
- Three times the maximum load to which it is likely to be subjected if it is a pendant or is not subject to winding or bending; and
- Ten times the maximum load to which it is likely to be subjected if the crane or similar hoisting device is used for supporting persons

All cable used by a crane or similar hoisting device shall be visually inspected by a competent worker at least once a week when the crane or similar hoisting device is being used

The worker performing an inspection shall record the condition of the rope or cable inspected in the log book for the crane or similar hoisting device

A cable used by a crane or similar hoisting device shall be securely attached,

- By binding and fastening the cable around an oval thimble in a way that is strong enough to prevent the cable thimble from separating; or

- By fastening the cable within either a tapered socket by means of virgin zinc or a wedge-type socket fitted with a wire rope clip at the dead end to prevent the accidental release or loosening of the wedge

The dead end cable of a wedge socket assembly on a hoisting line shall extend between 100mm and 300mm out of the socket

A container, sling or similar device for rigging or hoisting an object, including its fittings and attachments

- Shall be suitable for its intended use;
- Shall be suitable for and capable of supporting the object being rigged or hoisted;
- Shall be so arranged as to prevent the object or any part of the object from slipping or falling;
- Shall be capable of supporting at least five times the maximum load to which it may be subjected; and
- Shall be capable of supporting at least ten times the load to which it may be subjected if it is to be used to support a person

A sling or similar device made of web-type fabric or nylon shall be labelled to indicate its load rating capacity

No sling or similar device for rigging or hoisting made of web-type fabric or nylon shall be used if it may be cut

Every hoisting hook shall be equipped with a safety catch

No safety catch is required on a hoisting hook used in placing structural members if the method of placing protects workers to the same standard as a safety catch does

A hoisting hook shall have its load rating legibly cast or stamped on it in a location where the person using the hook can readily see it

A hoisting hook shall not be used if it is cracked, has a throat opening that is greater than as manufactured or is twisted from the plan of the unbent hook

A hook block shall have its load rating and weight legibly cast or stamped on it in a conspicuous location

An overhauling weight used on the cable of a crane or similar hoisting device

- Shall be prevented from sliding up or down the cable; and
- Shall be securely attached to the load hook and the cable

No overhauling weight used on the cable of a crane or similar hoisting device shall be split

Only an alloy steel chain or a chain manufactured for the purpose shall be used for hoisting

No alloy steel chain shall be annealed or welded

A chain used for hoisting shall,

- Be labelled to indicate its load rating capacity
- Be repaired and reconditioned in accordance with the specifications of its manufacturer
- After being repaired or reconditioned, be proof tested in accordance with the specifications of its manufacturer; and

- Be visually inspected by a competent worker as frequently as recommended by its manufacturer and, in any case, at least once a week when the chain is in service

A friction-type clamp used in hoisting materials shall be constructed so that an accidental slackening of the hoisting cable does not release the clamp

If a worker may be endangered by the rotation or uncontrolled motion of a load being hoisted by a crane or similar hoisting device, one or more guide ropes or tag lines shall be used to prevent the rotation or uncontrolled motion

No guide rope or tag line shall be removed from a load until the load is landed and there is no danger of it tipping, collapsing, or rolling

Piles and sheet-piling shall be adequately supported to prevent their uncontrolled movement while they are being hoisted, placed, removed, or withdrawn

No worker shall be in an area where piles and sheet-piling are being hoisted, placed, removed or withdrawn unless the worker is directly engaged in the operation

5.0 REVISION HISTORY

Revision	Prepared By	Approved By	Date	Changes
0	V.YUAN	A. TASSONE	13-02-2020	Initial creation