

**Health & Safety Procedure for the Procurement and Installation of Machinery, Plant and Equipment in the Papermaking, Corrugated and Recovered Paper Industries**

****

**Published September 2019**

**1. Foreword**

This guidance has been prepared by PABIAC in consultation with the Health and Safety Executive.

**2. Introduction**

Every year, the UK Paper-based Industries invests a significant amount of money purchasing and installing machinery, plant and equipment. Unfortunately, and despite machine manufacturers claims to the contrary, some equipment when it arrives in the UK does not meet the required level of safety standards. Consequently, additional costs are incurred by these industries from having to retrofit the necessary legal safeguards.

To ensure that new machinery, plant and equipment complies with the relevant UK legislation – *the Supply of Machinery (Safety) Regulations 2008 (as amended)*, and the appropriate International and National Standards. This PABIAC endorsed industry guidance has been developed to assist all sites in the planning and implementation for purchasing new machinery, plant and equipment.

An essential aspect of any purchase is having in place a concise procurement procedure between the purchaser and the supplier. **Appendix 1** of this guidance has been written to assist each company / site in this process.

Taking into consideration any specific requirements pertaining to each site, PABIAC would encourage all companies / sites to adopt this procedure as a minimum standard when purchasing any machinery, either within or outside of the EU.

**3. Purchasing a New Machine - Key Stages**

There are several key phases which need to be considered when purchasing new

machinery and these can be broken down into step by step stages.

**Key Stage 1 - Project commencement**

3.1 The purchase and installation of machinery, plant and equipment, needs to be

undertaken as a properly planned and controlled project. The project will have constraints of cost and time, which must not be allowed to weaken the safety management control, which is essential for effective completion.

3.2 An appropriate project team needs to be established, typically this will comprise of people from operations, finance, engineering and health and safety. It is good practice to ensure that at least one member of the team is familiar with the relevant ISO / EN Technical Standards for machinery. And, the health and safety manager is involved from the initial proposal and throughout the process.

3.3 With plenty of machines of varying types available on the open market, before you buy, think about:

* what are the requirements of the machine and the business in terms of sales and production specifications;
* what will it be used for;
* where and how will it be used;
* who will use it (skilled employees, trainees etc);
* what risks to health and safety might result from its use; and how well does the machine manufacturer control health and safety risks.

3.4 Answers to the above will help you to determine whether you require a standard

‘off the shelf’ machine, or something more complex which requires the machine to be custom built.

3.5 For an ‘off the shelf’ machine it should be reasonably simple to compare different manufacturers on the hazards identified and controls they have put in place to remove or reduce the risk.

3.6 In the case of a custom built or more complex machinery, the project team

should work jointly with potential manufacturers / suppliers to determine the best options for designing out the causes of injury and ill health.

*(see* ***Checklist 1*** *for additional information on pre-purchase questions)*

***Note:*** *In both cases the machine manufacturer* ***MUST*** *keep information in a technical file of the health and safety hazards likely to be present when the machine is used and explain what they have done and* why.

**Key Stage 2 - Machine specification**

3.7 Following discussions with potential machine manufacturers or suppliers, the project team will be able to commence compiling an appropriate specification for all the health and safety aspects of the machine and its operation, prior to deciding on the machine to be purchased. At this stage it is important to ensure that all the essential health and safety requirements of the *Supply of Machinery (Safety) Regulations 2008 (as amended)* and any harmonised European Standard listed in the *Official Journal of the European Union* relevant to the machine is incorporated into the specification.

***Note:*** *There are approximately 700 harmonised standards many are listed in* ***Appendix 2*** *related to machinery that address issues of guarding, electrical safety, electrosensitive devices, ergonomic design principles, noise and other hazards, including hazards to health. It is important to establish that the machine manufacturer is familiar and seeks to comply with those that apply to the equipment being purchased.*

*The Supply of Machinery (Safety) Regulations 2008 (as amended) govern the responsibilities of the “responsible person” (e.g. manufacturer) and, if applicable, suppliers and users are recommended to ensure they are apprised of the regulations*.

*Industry specific guidance and information is also available from the Confederation of Paper Industries.*

**Pre-purchase checks**

3.8 Before placing the final order, there are several pre-purchase checks to be

undertaken by the project team.

* Arrange for members of the project team to view the machine or a similar

one in order to verify the ability to meet all aspects of the specification, including the health & safety requirements.

* As part of a pre-purchase installation plan**,** decide where the equipment is to be located within the site, the workflow implications, impact on the environment and give a measure of the size of the project.

 **Placing the order and signing a contract**

3.9 When you are satisfied that all pre-purchase checks have been signed off, a contract should be drawn up between the site and the manufacturer / supplier to place the order. It is important to ensure that the order accurately reflects the specification for the equipment, in every aspect. The competent person(s) within the project team should take all reasonable measures to satisfy themselves that the specification clearly establishes the procedures and technical standards required by the manufacturer to ensure that the machine is safe.

3.10 One of the most important aspect of buying any machine, is to ensure that the ‘end user’ is clear on their requirements, standards and expectations from any manufacturer / supplier. Failure to stipulate these from the start could lead to expensive retrofitting of safe guards and controls.

*(see* ***Appendix 1*** *procurement policy and health and safety requirements)*

3.11 To ensure the manufacturer / supplier fulfils their legal and contractual obligations, the contract should stipulate a clause whereby the site / company will retain a % of the purchase price in case of performance or safety non-compliance.

3.12 When the order is placed it is essential that it specifies in writing that the machine should be safe, and that the machine instructions will be provided in English.

3.13 Additional information for inclusion in the contract should cover, but not exclusively, warranty requirements, service and spare parts, training, software requirements etc.

*(see* ***Checklist 2*** *for additional information on pre-purchase warranty etc. questions)*

**Post order project confirmation meeting**

3.14 It is common practice to hold a meeting at this stage, which confirms all aspects of the order, specifications, installation plan and the standards which apply. This meeting is an ideal opportunity to include anyone who may not have been involved in the initial stages of the project to get involved, for example machine operatives, safety / employee representatives etc.

3.15 Properly conducted, this meeting can ensure that the equipment specified will be fit for purpose and remove the need for subsequent amendments or retrofits that can add significant cost to the project. At this meeting the company representative should make the manufacturer / supplier aware of the company’s contractor management rules and procedures.

**Key Stage 3 - Pre-delivery checks**

3.16 To ensure that all machinery has been constructed to specification and has not been damaged in transit. Arrangements should be put in place for inspection of the equipment at the manufacturing site prior to shipping, and at the receiving site upon delivery.

**Key Stage 4 - Machine delivery**

3.17 It is essential to check that the machine has a **CE** marking attached and that a **Declaration of Conformity** is provided.

***Note:*** *It is important to understand that the* ***CE marking is only a claim by the manufacturer that the machine meets legal requirements and it is the purchaser’s responsibility to make sure that the machine is in fact safe to use.***

*(See* ***Checklist 3*** *for what should be checked on receipt and installation of the machine / equipment)*

3.18The company’s designated person or project manager will be responsible for

ensuring that the installation is undertaken to the agreed and approved plan. Pre-commissioning checks should then be carried out to confirm that the machine or equipment as installed is safe for use.

**Key Stage 5 - Post installation**

3.19 Risk assessments must be undertaken. These assessments can only be effectively achieved with the full participation of the machine operators and maintenance staff who can bring practical expertise to the process. This task is best performed during trial running and before the installation / commissioning engineers hand the machine over to production.

3.20 If at this stage the machine is not considered safe, the manufacturer / supplier must be required to make it safe before final commissioning and handover to production.

*(see* ***Checklist 4*** *for additional information**on post installation risk assessments)*

3.21Once the machine is formally handed over to production, the task of the project team will have been completed, and the final post commissioning check is to ensure that:

* the relevant risk assessments have been completed for operational and maintenance tasks and are readily available to the operators and maintenance personnel;
* safe systems of work have been developed as identified by the risk assessments. These should include both normal production tasks as well as all foreseeable intervention tasks such as setting, quality checking, cleaning, making adjustments, and running maintenance;
* where appropriate safe operating and maintenance procedures and job aids have been recorded in writing and are made available to operators and maintenance staff for reference, close to the machine or equipment;
* operators have been trained in the above tasks as appropriate and are formally signed off as competent to operate the machine safely;
* maintenance staff have been trained, in accordance with safe maintenance procedures and are formally signed off as competent to maintain the machine safely.

3.22 Following completion, it is good practice to hold a post project meeting to review this procedure in relation to any future machinery purchase projects. Additionally, particularly for more complex machines or high hazard machines and equipment, it is good practice to carry out a further post start-up check i.e. audit the machine after it has been in use for a short time, speak to operators and maintenance staff to gather their experiences.

**4. Purchasing of second-hand machinery**

4.1 In some cases, second-hand machinery will not have **CE** marking, but it is still the duty of the supplier to make sure that it is safe and has instructions for safe use.

It is the duty of the purchaser to make sure that second-hand machinery is:

* safe when put into use;
* suitable for the selected work; and
* maintained in a safe condition

4.2 If a second-hand machine has been totally refurbished (e.g. adding Computer Numerical Control, together with other work) it may have **CE** marking. This is because the way it operates is different after the refurbishment and as a result it has been treated as if it was a new machine.

**5. Relocation of machinery between sites (internally)**

5.1 When relocating machinery between sites, a similar criteria to purchasing second-hand machinery will apply.

5.2 Prior to being dismantled, the site receiving the machine should liaise with the site supplying the machine to ensure that it functions correctly, is undamaged and is mechanically and electrically sound.

5.3 The site supplying the machine should provide all relevant documentation e.g.

* operational risk assessments;
* operational safe systems of work;
* technical manuals;
* electrical diagrams;
* ‘Declaration of Conformity’ (where applicable).

5.4 Upon arrival at the receiving site, the machine **must not** be operated until it has been checked for operational safety by a mechanical / electrical engineer, the plant handover checklist has been completed, and operators and maintenance personnel have received appropriate training.

5.5 Risk assessments and safe systems of work should be reviewed to ensure they reflect any changes made to the machine and account for the new location.

**6. Further information**

**Checklists:**

* **Checklist 1** - Pre-purchase questions for potential manufacturers

or suppliers.

* **Checklist 2** - Pre-purchase questions for warranty, spare parts, service and software changes.
* **Checklist 3** - Receipt and installation of machine.
* **Checklist 4** - Post installation risk assessment guidance.

**Appendices:**

* **Appendix 1 -** Procurement policy and health and safety requirements.
* **Appendix 2 -** Harmonised Standards

**Checklist 1**

**Pre-purchase questions for potential manufacturers or suppliers**

Explain to the manufacturer / supplier what the machine will be used for and who will be using it and then address the following:

* what health and safety risks arise from using the machine;
* are there any dangerous parts and will guards be provided;
* will it need emergency stop controls and how will it be isolated;
* how do the controls and control system work;
* is there a setting status, such as crawl or inch and if yes, does it reduce risks by conforming to the relevant standards and procedures;
* are controls and information displays well designed and suitably located;
* will the machine produce dust or fumes? If these are likely to be above the exposure limits, can an existing system be adapted to cope with the new machine, or will a new system have to be purchased;
* has the machinery been designed to minimise the noise and vibration levels produced when operating under production conditions, processing materials;
* what is the anticipated noise (db)/vibration level;
* are there any extremely hot or very cold parts of the machine and can they be insulated or protected;
* are there any lasers or thickness gauges, and can any exposure to radiation be eliminated? If not, what precautions are there to stop any exposure to radiation;
* what has been done to eliminate the risk of electric shock, particularly during maintenance work when covers or control panel doors may be open;
* are there risks from other sources of energy such as hydraulic or pneumatic, steam, air etc;
* is there clear information about installation, maintenance and breakdown procedures
* will the supplier notify (insert company name) of any problems that arise with similar machines that have been purchased by other users, now and in the future;
* what service or back-up helpline facilities are offered to customers who have purchased a machine;
* what steps have been taken in the design, including ergonomic factors, to ensure that the operator(s) can safely interface with the machine. This could include operator comfort, manual handling & fatigue issues;
* is a suitable operator’s training manual provided in English;
* are competent trainers (fluent in English) provided.

***Note:*** *It is assumed that if the company has a requirement for training in languages other than English, suitable arrangements already exist for effective translation and instruction.*

**Checklist 2**

**Pre-purchase questions for warranty, spare parts, service and software changes**

Warranty requirements

* start date and period of warranty;
* definition of supplied items included;
* defined wear parts excluded providing defined lifetime reached;
* labour included in warranty and for how long;
* shipping and handling costs under warranty;
* non-wear parts replaced to have a separate warranty period or a fixed price for spare and warranty parts.

Spare parts, service and software requirements

* supplier guarantee of availability of spare parts and accessories for specified number of years;
* guarantee of availability of expert advice for the period as defined above;
* service personnel supplied must speak the local language;
* any manufacturer / supplier personnel working at the site will comply with all local health & safety requirements;
* software changes or updates must receive site authorisation before implementation.

**Checklist 3**

**Receipt and installation of machine**

Upon receipt of the machine the following should be checked, and any omissions rectified.

* a technical file for the machinery is available and, if applicable, the machinery has been type-examined by a notified body. This applies to machinery or safety components not manufactured in conformity with transposed harmonised safety standards;
* the manufacturer / supplier has issued a ‘Declaration of Conformity’ for the machine and a CE mark is attached or has been issued with a declaration of incorporation;
* the manufacturer / supplier has provided instructions (in English) explaining how to assemble, install, commission, make adjustment and maintain the machine;
* the manufacturer / supplier has explained what the machine is designed to be used for and what it cannot be used for (except in the case of ‘off the shelf machinery’);
* information has been provided about any residual risks from the machine and the precautions needed to deal with them. These may include electrical, hydraulic, pneumatic, stored energy, thermal, radiation or health hazards;
* data regarding noise and vibration levels under operating conditions, have been supplied and explained;
* any warning signs are visible and easy to understand;
* ensure that any early concerns about the safety of the machine or health concerns are reported to the supplier.

For the installation of the machine the following procedures and processes should be in place.

* a communication and project liaison structure should be established and clearly understood by all parties. This is particularly important in projects where contractors and sub-contractors are involved;
* the project supervisor will be responsible for monitoring that all safety controls established as part of the project are being adhered to;
* it is strongly recommended that whilst any machinery is in the process of being moved, one or more competent persons are designated as banksmen to ensure that there are no internal traffic collisions, and that all pedestrians are kept clear from the machinery being moved;
* suitable briefings on the progress of the project and its impact on affected employees should be held at appropriate intervals during the project;
* the project supervisor should report any deviation from the agreed safety controls to the designated senior manager, who will be responsible for ensuring corrective action;
* following installation, a complete check of all machine guards and safety devices must be undertaken to ensure that it meets the required procedure. These checks must be recorded before the machine is formally handed over to production management.

**Checklist 4**

**Post installation risk assessment**

* do any parts look dangerous, e.g. exposed gear wheels, cutters, in-running nips;
* are there guards and are they in place;
* can the machine be operated with the guards removed;
* are the controls properly explained and suitably laid out;
* do the machine operators understand the controls;
* can dust or fumes escape from the machine;
* is it excessively noisy;
* is there excessive vibration;
* are any exposed parts likely to be extremely hot or cold;
* is there access to any exposed live electrical parts;
* are there any special features, e.g. slow running speed for use when setting, inspection etc;
* is there clear information about maintenance and breakdown procedures;
* have inspection schedules been developed that include both shift/daily/weekly checks as appropriate, and less frequent but more detailed maintenance checks to look for less obvious damage, wear, deterioration in performance etc;
* do you think the machine is safe.

**Appendix 1**

**Procurement policy and health and safety requirements**

1. The equipment will be supplied, where relevant, in conformity with:

1.1 The Machinery Directive 2006/42/EC.

1.2 The Low Voltage Directive 2014/35/EU.

1.3 The Electromagnetic Compatibility Directive 2014/30/EU.

1.4. The Pressure Equipment Directive 2014/68/EU

1.5. The Simple Pressure Vessels Directive 2014/29/EU

1.6 The ATEX Directive 2014/34/EU

1.7 The Radio Equipment Directive 2014/53/EU

1.8 UK law.

2. The equipment will display the CE mark. The **SUPPLIER** will provide the extracts from the Technical File covering the details of electrical, pneumatic and hydraulic drawings, safe design, construction and operation of the equipment in compliance with the European and International norms relevant at the time of construction.

3. The equipment will be supplied and installed to conform to the Use of Work Equipment Directive 2009/104/EC of the European Parliament and of the Council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

These requirements also apply to interchangeable equipment, safety components placed independently on the market, lifting accessories, chains, ropes and webbing, removable transmission devices and partly completed machinery.

The EC declaration of conformity must contain the following particulars:

* business name and full address of the manufacturer and, where

appropriate, his authorised representative;

* name and address of the person authorised to compile the technical file, who must be established in the Community;
* description and identification of the machinery, including generic denomination, function, model, type, serial number and commercial name;
* a sentence expressly declaring that the machinery fulfils all the relevant directives and the provisions of those directives. These references must be those of the text published in the *Official Journal of the European Union*;
* the name, address and identification number of the notified body which carried out the EC type examination and the number of the EC type-examination certificate;
* the name, address and identification number of the notified body which approved the full quality assurance system;
* a reference to the harmonised standards used;
* the reference to other technical standards and specifications used;
* the place and date of the declaration;
* the identity and signature of the person empowered to draw up the declaration on behalf of the manufacturer or their authorised representative.

4. **UK based suppliers only**. The **SUPPLIER** recognises Section 6 of the Health and Safety at Work etc Act 1974. The HSAWA remains in force and provides the powers which enforcement authorities may use to ensure that machinery is safe to use at work, and is without risk to health and that there is nothing about its erection or installation which gives rise to risks to health or safety.

**Note:** *Section 6 will not apply to equipment supplied under e.g. The Supply of Machinery (Safety) Regulations 2008 (as amended), it might apply to second-hand machinery which has already been placed on the EU market (whether or not CE marked); powers to ensure the equipment is safe to use are found in the Provision and Use of Work Equipment Regulations 1998 (PUWER)*

5. A formal interim risk assessment will take place involving (insert company name) and the **SUPPLIER** at the suppliers work at a suitable and agreed time during the construction of the equipment.

6. The **SUPPLIER** will carry out any further safety/guarding requirements, prior to delivery, that are deemed necessary following this risk assessment. A post installation risk assessment will take place involving (insert company name) and the **SUPPLIER** after installation at (insert company name) premises and prior to commissioning.

7. Any changes to the electrical, equipment safety and general guarding of the equipment fitted by the **SUPPLIER** shall be recorded on the assessment and responsibility assigned.

8. The **SUPPLIER** is responsible for guarding his own equipment and not that supplied by others. In the event where additional safety features are requested, which go beyond appropriate norms within the *Official Journal of the European Union* or the International Standards Organisation, these shall be in addition to this appendix.

9. The **SUPPLIER** will provide the required mechanical and electrical design information to enable safe integration of emergency stop functions of the equipment. This is to allow a combined complex line to be emergency stopped safely without creating additional hazards. This will enable complete safe functional operational control, during all phases of intended use of the combined complex line.

10. The **SUPPLIER** and (insert company name) will agree the position of all process control panels and facilities, and the position of all emergency stop buttons and facilities during the design stage of the equipment and definitely before the construction of the equipment. Any alterations required by the (insert company name) will be discussed and agreed between the (insert company name) and the **SUPPLIER.**

11. A safety functionality audit will be carried out before start-up of the machinery at a time and date to be advised at installation.

12. All employees and / or sub-contractors of the **SUPPLIER** are required to wear work clothing which is to be acceptable to (insert company name) and must work in a manner which complies with the rules of (insert company name). A full induction will take place prior to work commencing at any (insert company name) premises. Any of the **SUPPLIERS** personnel and / or sub-contractors who do not conform will not be allowed to start or continue at (insert company name) premises.

13. The **SUPPLIER** will provide the information as requested by the site’s Management of Contractors processes which is agreed by (insert company name) before work commences. Work can only commence when this agreement has been reached and recorded in writing between (insert company name) and the **SUPPLIER**. The **SUPPLIER** agrees that at least one of its own installation personnel and / or contractors will be fully conversant in the site’s local language. (insert company name) and will provide the individual plant specific, safety rules & regulations that apply (Control of Contractors) before the delivery of the equipment.

**Technical standards**

14. All printing and paper converting machines must meet the requirements of the current version of safety requirements for the design and construction of printing and paper converting machines BS EN 1010 parts 1-4 24-28.

15. All packaging machines must meet the requirements of the current version of BS EN 415 parts 1-10, 46-53.

16. All papermaking and finishing machines must meet the requirements of the current version of safety requirements for the design and construction of papermaking and finishing machines EN 1034 parts 1-27 30-45.

**Guarding**

17. All guards must meet the requirements of the current versions of EN ISO 14120 19 and EN ISO 13857 12.

18. **Fixed Guards** - fixings must remain attached to the guards or the machinery when the guards are removed and require a tool to remove them. Where possible guards must be incapable of remaining in place without their fixings as required within the Machinery Directive.

19. **Interlocked Guards** - All interlocks must meet the requirements of the current version of EN ISO 14119 18. The customer requires that all movable interlocking guarding shall be fitted with:

* guard locking, which is powered to lock, and a non-contact switch. Both devices must be ‘Dual Channel’ (Category 3) and must meet the requirements of the current version of EN 13849 8 PLd, or
* trapped key, or a combination of all / any of the above.

20. The guard locking device must ensure that the hazardous machine functions covered by the guard, cannot operate until the guard is closed and locked.

21. (insert company name) require that the fasteners for the interlocks and actuators meets the requirements of the current version of EN ISO 14119 18 but are not Allen type bolts, cross type heads, slot types heads or hexagonal heads.

22. The guard must remain closed and locked until the risk of injury from the hazardous machine functions has passed.

23. When the guard is closed and locked, the hazardous machine functions ‘covered’ by the guard can operate, but the closure and locking of the guard must not by themselves initiate their operation without a manual safety related control system reset, and a manual motion control button activation taking place.

24. Each complex assembly can be split into multiple control zones. Each control zone will have independent functional operation. Before entering a control zone, all hazardous movement must have ceased.

Once the appropriate task within the control zone has been completed, the control zone must:

* be clear from persons;
* reset of the safety related control functions for the activated zone must not be accessible from inside the control zone;
* be reactivated.

All guards that may need to be opened must be monitored by a safety relay / configurable relay or safety PLC.

25. To achieve the (insert company name) standard, for PLd a non-contact switch and a power locked device must be linked together and monitored.

26. Safety related parts of the control system - Emergency stops, interlocked guards and other safety circuits must conform with the current version of EN 13849 -1 8. The minimum requirement is a dual channel, single fault tolerant system which is self- monitoring and conforms to PLd using the current version of EN 13849-1 8.

27. The **SUPPLIER** must demonstrate PL calculation for all the safety related control system. Physical tests will also be carried out to validate correct operation of the safety systems in conjunction with the **SUPPLIER**, after installation and before ‘start-up’ of the equipment.

28. Positioning of safeguards, with respect to approach speeds of the human body, Electrical Sensory Protective Devices (ESPD) must meet the requirements of the current version of EN ISO 13855 21. The (insert company name) standard specification requires the height of the lowest beam to be a maximum 200 mm from the “plane” to prevent full body access under the detection zone.

29. Lock-out key switches – All key switches that are intended to place the machine into an Intermittent Energy State (IES) shall have a unique identity, and clarification is to be requested from the customer to ensure there are no other keys of that type on site.

30. Electrical panels and panel wiring must meet the requirements of the current version of EN 60204-1 7

1. reset of the safety related control functions for the activated zone must not be accessible from inside the control zone;
2. the safety related control voltage (inputs) should be no greater than 24V DC;
3. the control circuit voltage should be no greater than 24V DC for input signals and output signals for devices such as control relay and indication lamp. Some device such as large contactors and solenoids may require 110V AC. Safety related functions should ideally be supplied via the internal test pulses generated by the safety controller;
4. the architecture of motor control circuits must be compliant to the PLr (Performance Level required) of the function. If the electrical control panel supplies a machine or motor via direct online contactor or a drive that does not have a safety rating; if safe to do so, the main electrical supply must be removed using a dual contactor assembly once the emergency stop system has been operated;
5. the main power supply within the machine can be split, so that motors which are controlled by inverter drives with on-board safety do not have to have dual contactors fitted. However other motors that are controlled via a direct online contactor should be on a supply which has one set of dual contactors to remove the power, this will remove the need for individual dual contactors for all other motors. When the emergency stop is operated all forms of energy i.e. motion must be removed therefore all fans must stop*.*
6. It is acceptable for the main power to remain on the machine in order to bring the main drive to a safe stop condition. Once this has been confirmed via a zero speed signal or drive indication, the power must be removed.

**Hold-to-run device**

31. Hold-to-run control device - A control device where the actuator is pressed and pressure on the actuator is manually maintained to start the process, and when released the machine operation is stopped. The machine speed shall not exceed the appropriate EN standard for the specific machine.

32. Jog / Inch – Machine will run for a pre-determined time, then stop or until a pre-determined displacement (limited inch) has been reached. The machine speed or displacement shall not exceed the appropriate EN standard for the specific machine.

**Indicator lights and signals**

33. All indicator lights and buttons must meet the requirements of the current version of *Safety of machinery - Electrical Equipment of Machines - Part 1: General requirements EN 60204-1 7.* (insert company name) require for the purpose of standardisation that all buttons shall be coloured as follows:

**GREEN** - Shall be used for START buttons or ON indication functions. It shall also be used for auto / manual selection. It shall be illuminated when auto is selected.

**RED** - Shall be used for emergency stop and other stop functions.

Emergency stop buttons will be of the mushroom type 40mm with a twist release. The wording emergency stop button with a yellow background is optional.

The emergency mushroom head must not be key release. Normal stop button will be flush and fast stop button will be protruding.

**BLUE** - Shall be used for all safety related reset functions or reset indication.

Local resets that are illuminated:

* Blue light flashing - means a safety function has been operated.
* Blue light off - means the system has been reset and safety is active.
* Master machine reset for the safety related control system, blue light flashing means - a safety function has been operated.
* Blue light solid on - means the whole system is ready for full system reset.
* Pressing the solid blue button will reset the complex machine line and allow the start-up process.
* Blue light off - means the system has been reset and safety is active.

**YELLOW** -Shall be used for **ABNORMAL** conditions such as movement stops or movement error indication. Movement stop will be a mushroom 40mm twist release button.

**BLACK** -Shall be used for push button actuators that initiate operation while they are actuated and cease the operation when they are released (for example hold-to-run).

**WHITE** - Shall be used for control power ON and manual control ON indication. The button shall be illuminated.

* It shall also be used for guard entry.
* Under normal condition for operation purposes, the white button will not be illuminated.
* To gain access into a safe zone, a request to open is required. This is achieved by pressing the white button. The process will be as follows:
1. The white light will flash until the machine has come to a safe condition.
2. Once the white light is solid, the gate will be released.
3. To exit the safe area, close the gate and press the solid white light, this will tell the safety system the gate can be locked, and production speed can be resumed.

34. All functions must be labelled to indicate what they control.

35. All visual status indictors must comply with the current version of EN 60204-1 7 10.3.2:

* Red for Emergency
* Yellow for Abnormal
* Blue for Mandatory
* Green for Normal
* White for Neutral

36. Safety signs must meet the requirements of the current version of ISO 7010 60. Signs dedicated to specific machine functions not listed in ISO 7010 60 must meet the relevant requirements of the current version of ISO 3864-1 61 and 3 63.

**Pneumatic and hydraulic systems**

37. All pneumatic systems must meet the requirement of the current version of EN ISO 4414 2.

38. All hydraulic systems must meet the requirement of the current version of EN ISO 4413 3.

39. Electrical safety is defined in EN 60204-1 7 and the safety related control system in line with EN ISO 13849-1 8, where this captures hydraulic and pneumatic safety functions also.

40. When the emergency stop system has operated, the pneumatics must be discharged if safe to do so or locked to prevent any movement. This discharge can be immediate or delayed until a zero speed signal is received. The locked system must prevent any equipment held in the up position from creeping down due to a loss of pressure.

41. All steam supply and return systems must fully comply with the requirements of the European Pressure Equipment Directive 2014/68/EU. (insert company name) requires that all supply and return systems are installed with double isolation valves (double isolated).

**Access ladders and stairs**

42.All access ladders / stairs / working platforms must conform to the current versions of EN ISO 14122 parts 1-4 13-16.

**Robotics**

43. All robots and robotic devices must comply with the current version of EN ISO 10218. (insert company name) requires that all emergency and protective stop functions must have a manual reset only.

44. There are 2 parts to this standard. EN ISO 10218-1 55 is aimed at the manufacturers of the robots, where part EN ISO 10218-2 56 is aimed at the system integrators and end users of the equipment. If multiple robots are used, guidance can be found in EN ISO 11161 23 for integrated manufacturing systems. Any collaborative applications should follow ISO TS 15066 64.

**Horizontal / Vertical baling presses and compactors**

45. All machines for compacting waste materials or recyclable fractions must comply with the current versions of EN 16252 57 and EN 16500 58 and 16486 59.

**Lasers**

46. All lasers must comply with the current version of EN 60825 24.

**Transfer Cars**

47. All transfers cars must comply with EN 619 17.

48. (insert company name) require that all transfer cars and shuttle systems are fitted with Electro Sensory Protection Device (scanners) to prevent contact with pedestrians.

49. A mechanical actuation device is only acceptable at speeds below 0.3 metres per second.

**Acceptance of this procedure**

I hereby sign to say that I have read, understood and agree to comply with the procurement and installation of machinery, plant and equipment procedure at all times.

|  |  |  |  |
| --- | --- | --- | --- |
| **Date:** | **Name** |  **Position** | **Signature:** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Appendix 2**

**EN Harmonised Standards.**

1. EN 349:1993+A1:2008 Safety of machinery - Minimum gaps to avoid crushing of parts of the human body.
2. EN ISO 4414: 2010 Pneumatic fluid power - General rules and safety requirements for systems and their components.
3. EN ISO 4413: 2010 Hydraulic fluid power - General rules and safety requirements for systems and their components.
4. EN 1037: 1995 +A1:2008 Safety of machinery - Prevention of unexpected start-up
5. EN ISO 12100: 2010 Safety of machinery - Basic concepts, general principles for design - Risk assessment and risk reduction.
6. EN ISO 13732-1: 2008 Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces.
7. EN 60204-1: 2018 Safety of machinery - Electrical equipment of machines - Part 1: General requirements.
8. EN ISO 13849-1: 2015 Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
9. EN ISO 13849-2: 2012 Safety of machinery - Safety-related parts of control systems - Part 2: Validation
10. EN 62061:2005 Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems.
11. EN ISO 13850: 2015 Safety of machinery. Emergency stop. Principles for design
12. EN ISO 13857: 2008 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
13. EN ISO 14122-1: 2016 Safety of machinery - Permanent means of access to machinery - Part 1: Choice of fixed means of access between two levels
14. EN ISO 14122-2: 2016 Safety of machinery - Permanent means of access to machinery - Part 2: Working platforms and walkways
15. EN ISO 14122-3: 2016 Safety of machinery - Permanent means of access to machinery - Part 3: Stairs, stepladders and guard-rails.
16. EN ISO 14122-4: 2016 Safety of machinery - Permanent means of access to machinery - Part 4: Fixed ladders
17. EN 619: 2002 +A1:2010 Continuous handling equipment and systems (Conveyors) - Safety and EMC requirements.
18. EN ISO 14119: 2013 Safety of machinery - Interlocking devices associated with guards - Principles for design and selection.
19. EN ISO 14120: 2015 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards.
20. EN ISO 11202: 2010 Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a workstation and at other specified positions applying approximate environmental corrections
21. EN ISO 13855: 2010 Safety of machinery - Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855: 2010).
22. EN 574: 1996 +A1:2008 Safety of machinery - Two-hand control devices - Functional aspects - Principles for design
23. EN ISO 11161:2007 Safety of machinery — Integrated manufacturing systems — Basic requirements
24. EN 60825-1:2014 Safety of laser products. Equipment classification and requirements

**EN Harmonised C Standards**

1. EN 1010-1:2004+A1:2010 Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 1: Common requirements
2. EN 1010-2:2006+A1:2010 Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 2: Printing and varnishing machines including pre-press machinery
3. EN 1010-3:2002+A1:2009 Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 3: Cutting machines
4. EN 1010-4:2004+A1:2009 Safety of machinery — Safety requirements for the design and construction of printing and paper converting machines — Part 4: Book-binding, paper converting and finishing machines
5. EN 1034-1:2000+A1:2010 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 1: Common requirements
6. EN 1034-2:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 2: Barking drums
7. EN 1034-3:2011 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 3: Rereelers and winders
8. EN 1034-4:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 4: Pulpers and their loading facilities
9. EN 1034-5:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 5: Sheeters
10. EN 1034-6:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 6: Calender
11. EN 1034-7:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 7: Chests
12. EN 1034-8:2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 8: Refining plants
13. EN 1034-13:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 13: Machines for de- wiring bales and units
14. EN 1034-14:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 14: Reel splitter
15. EN 1034-16:2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 16: Paper and board making machines
16. EN 1034-17:2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 17: Tissue making machines
17. EN 1034-21:2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 21: Coating machines
18. EN 1034-22:2005+A1:2009 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 22: Wood Grinders
19. EN 1034-26: 2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 26: Roll packaging machines
20. EN 1034-27: 2012 Safety of machinery — Safety requirements for the design and construction of paper making and finishing machines — Part 27: Roll handling systems
21. EN 415-1:2014 Safety of packaging machines — Part 1: Terminology and classification of packaging machines and associated equipment
22. EN 415-3:1999+A1:2009 Safety of packaging machines — Part 3: Form, fill and seal machines
23. EN 415-5:2006+A1:2009 Safety of packaging machines — Part 5: Wrapping machines
24. EN 415-6:2013Safety of packaging machines — Part 6: Pallet wrapping machines
25. EN 415-7:2006+A1:2008 Safety of packaging machines — Part 7: Group and secondary packaging machines
26. EN 415-8:2008 Safety of packaging machines — Part 8: Strapping machines
27. EN 415-9:2009 Safety of packaging machines — Part 9: Noise measurement methods for packaging machines, packaging lines and associated equipment, grade of accuracy 2 and 3
28. EN 415-10:2014 Safety of packaging machines — Part 10: General Requirements
29. EN 13023:2003+A1: 2010 Noise measurement methods for printing, paper converting, paper making machines and auxiliary equipment — Accuracy grades 2 and 3
30. EN ISO 10218-1:2011 Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots
31. EN ISO 10218-2:2011 Robots and robotic devices — Safety requirements for industrial robots — Part 2: Robot systems and integration.
32. EN 16252:2012 Machines for compacting waste materials or recyclable fractions — Horizontal baling presses — Safety requirements
33. EN 16500:2014 Machines for compacting waste materials or recyclable fractions — Vertical baling presses — Safety requirements
34. EN 16486:2014 Machines for compacting waste materials or recyclable fractions — Compactors — Safety requirements

**ISO Standards**

1. ISO 7010:2011 Graphical symbols -- Safety colours and safety signs -- registered safety signs
2. ISO 3864-1:2011 Graphical symbols -- Safety colours and safety signs -- part 1: design principles for safety signs and safety markings
3. ISO 3864-2:2016 Graphical symbols -- Safety colours and safety signs -- part 2: design principles for product safety labels
4. ISO 3864-3:2012 Graphical symbols -- Safety colours and safety signs -- part 3: design principles for graphical symbols for use in safety signs
5. ISO/TS 15066:2016 Robots and robotic devices -- Collaborative robots

**ISO standards (In preparation but not released)**

1. ISO 12643-1: 2009 Graphic technology -- Safety requirements for graphic technology equipment and systems -- Part 1: General requirements.
2. ISO 12643-2:2010 Graphic technology -- Safety requirements for graphic technology equipment and systems -- Part 2: Prepress and press equipment and systems
3. ISO 12643-3:2010 Graphic technology -- Safety requirements for graphic technology equipment and systems -- Part 3: Binding and finishing equipment and systems
4. ISO 12643-4:2010 Graphic technology -- Safety requirements for graphic technology equipment and systems -- Part 4: Converting equipment and systems
5. ISO 12643-5: 2010 Graphic technology -- Safety requirements for graphic technology equipment and systems -- Part 5: Stand-alone platen presses

****

