

The Safe Purchase and Installation of Machinery, Plant & Equipment

Introduction

In recent years a significant number of new or recently purchased pieces of equipment have been found not to be guarded to the required UK standards or being operated by unsafe methods. The consequences of such purchases have included expensive retrofitting or rectification, delays in commissioning and at worst accidents. This guidance is designed to assist companies in planning and implementing the purchase of new machinery, plant and equipment in a safe manner that will also help to deliver on time start up and cost effective achievement of maximum operational efficiency.

The Guidance

To support the general principles there are a number of checklists designed to assist in the process and while these should provide useful assistance to purchasers they cannot replace the benefits of ensuring competent advice is available for all aspects of a capital purchase. The extent to which all elements of this guidance note is applicable will depend on the nature of the equipment being purchased and it will be a question of informed judgement by the project team which aspects apply.

The Project approach

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 that is essential to its effective completion. An appropriate project team is usually necessary, the composition of which will be determined by the size of the project and the resources that are available.

See: Checklist a model for an appropriate project team – Checklist 1

The phases of a project will include some or all of the following

- Project commencement - the development of a specification and identification of standards to be met
- Pre-purchase inspection and assessment of prospective equipment prior to decision
- Verification of selected supplier
- Pre-purchase installation plan
- Production of Contract
- Placing of order
- Post order project confirmation meeting
- Inspection of equipment prior to arrival and when arrived on site
- Preparation for delivery
- Delivery and provision of manufacturer's information (in English)
- Installation of machinery and pre commissioning checks
- Post installation commissioning, inspection and verification of standards
- Development of risk assessment, safe operating methods, safe systems of work, training plan and instruction plan
- Implementation, followed by validation, of training plan
- Acceptance of equipment by operational department

Some of these phases may effectively run concurrently with each other

Project commencement

Check list for initial machine specification:

- Where and how will it be used?
- What will it be used for?
- Who will use it? (Skilled employees, trainees)?
- What risks to health and safety might result?
- What are the standards required by the company? Are these based on current published UK or international standards, codes of practice and industry guidance?

Notes:

1. *Additional information in respect of standards of guarding is available from guideline publications and web site information produced by the Confederation of Paper Industries.*
2. *There are around 700 harmonised standards 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 equipment manufacturer is familiar, and seeks to comply, with those that apply to the equipment being purchased.*
3. *The Supply of Machinery (Safety) Regulations 1992 (amended 1994 & 2005) govern the responsibilities of the manufacturer and, if applicable, supplier and purchasers are recommended to ensure they are apprised of the regulations.*

Pre-purchase inspection and assessment

Establishing the range of potential equipment that will meet the sales and production specifications and comparing how well different manufacturers control health and safety risks:

1. In the case of “off the shelf” machinery there should be a reasonably simple comparison to be made by reviewing the hazards identified by the manufacturer and the controls they have put in place to remove or reduce the risk.
2. In the case of a “custom built “ or more complex machine the project team should work jointly with potential suppliers to determine the best options available for ensuring machine safety.

See: Checklist of issues to be discussed with supplier (or manufacturer) - Checklist 2

To meet the requirements of The Provision and Use of Work Equipment Regulations 1998 (PUWER) the machinery must:

- Be **suitable** for use and for the purpose and conditions in which it is used.
- Be **maintained** in a safe condition for use so that people’s health and safety is not at risk.
- Be used by people who have received adequate **information, instruction, training and safe systems of work**.
- Be accompanied by suitable **safety measures** e.g.: protective devices, markings, and warnings.

Using the checklist 2 in consultation with potential suppliers or manufacturers, the project team will be able to establish an appropriate specification for all the 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 Regulations will be adhered to. When the order is placed it is essential that it specifies, in writing, that the machine should be safe and that machine instructions will be provided in English. A more detailed PUWER inspection list is provided as appendix I, which may be used at to amplify the checklist, if required.

Verification of the selected supplier or manufacturer

Wherever possible the project team should be provided with the opportunity to see the machine or a very similar one operating by the selected supplier or manufacturer, in order to verify the ability to meet all aspects of the specification, including the health & safety requirements. In some cases due to competitor confidentiality this may not be possible, and in such instances the project team should specify that any order is placed on the basis that the machine can be produced to the agreed safety specification.

Pre-purchase installation plan

This stage will determine where the equipment is to be located within the site, the workflow implications, the impact on the environment and give a measure of the size of this element of the project.

See: Checklist for selection of location for equipment - Checklist 3

Production / Content of Contract

It is anticipated that companies will have standard contractual arrangements so this list is provided as a limited aid memoire:

- Scope of Supply and Performance
- Price – Terms and Conditions of Payments
- Quality Verification – Production Control
- Transport
- Installation
- Plant Safety
- Training
- Start up
- Delivery Test and Acceptance Procedure
- Timetable
- Specifications – Proof of Specifications
- Consequence of Failure
- Warranty (*See checklist 2.1*)
- Spare parts, Service and Software (*See checklist 2.1*)
- Production Guarantee
- Confidentiality
- Liability and Insurances
- Force Majeure
- Language – Translation of Contract Contents
- Place of Jurisdiction, Law and Fulfilment

Place 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 standards required for health & safety of the equipment.

Post order project confirmation meeting (“kick off”)

It is common practice to hold a meeting at this stage, which confirms all aspects of the order and the specifications and or standards that apply. This meeting is an ideal opportunity to involve those who may have not yet played a part in the purchasing process (due to constraints such as travel costs) and are identified as those who should be included in the project team (*checklist 1*). 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.

Inspection prior to and at delivery

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

Preparation for the delivery of the machine

At this stage it is possible to do a theoretical (desk top) risk assessment in preparation for the practical assessment that will be required when the machine is delivered. This assessment will be used to verify machine positioning, provision of services and other operating arrangements as they relate to a safe operation.

Good practice at this stage is to involve employee representatives, if they have not been involved in machine selection. Safety Representatives, in particular, need to be fully aware of the safety arrangements involved in the initial selection of the machine and it will be helpful if they are able to view the machine, or a similar one, prior to the risk assessment process with which they should be involved.

The initial assessment should identify any specific characteristics that may be required by potential machine operators, so that these can be built into the person specification for operator recruitment.

Suitable operators need to be selected prior to machine installation and an appropriate training plan prepared. If it is possible to arrange training at another location, where a similar machine is already operating this can be very helpful. (Note: this is in addition, to any in-house training, and is not a substitute for any specific training on the newly acquired machine) It will be necessary to verify that the training location selected has suitable safety training elements within their training programme. The selected operators need to be in a position to be involved with the machine from the commencement of its installation, as working with the installation engineers will enhance their understanding of the mechanics of the machine and the safety features incorporated.

When the machine is delivered

It is essential to check that the machine has a **CE** marking attached and that a **Certificate of Conformity** is provided. 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 for receipt and installation of machine –Checklist 4

Installing the machine and pre commissioning checks

The company's designated person or project supervisor will be responsible for ensuring 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.

See: Checklist for receipt and installation of machine –Checklist 4

Post installation

A risk assessment has to be undertaken. This assessment can only be effectively achieved with the full participation of machine operators and maintenance staff, who can bring practical expertise to the process. This task will best be performed during trial running and before the installation/commissioning engineers hand the machine over to production.

See: Checklist for post installation risk assessment - Checklist 5

A more detailed assessment checklist designed on the regulations contained within PUWER is attached as appendix 1

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

Training and instruction

The safe operating methods, measures to prevent injury and safe systems of work will be developed from the risk assessment and information provided by the manufacturer.

The training programme will need to be developed from information provided by the manufacturer either by a job instructor or in writing, or a combination of both. The agreed programme to be used will need to be developed by a competent instructor who has had the opportunity to observe during installation and, if at all possible, to see a similar machine in operation. Necessary steps in this process will include:

- Job Description (for each position associated with the equipment)
- Task analysis (including health & safety and contribution to maintenance, cleaning etc.)
- Fault identification, analysis and rectification (including all identified hazards)
- Instruction plan

The training programme will be comprised of, at least, the following elements:

- Establishment of minimum training standard
- Delivery of the training in a systematic manner balancing theory and practical skills
- Provision of written safe working procedures and job aids, where required, that will be retained at or close to the point of use.
- Recording of training and validation of competence, including knowledge and skills, through testing and observation to confirm the required standard has been achieved.

Good practice, particularly for complex machines and process lines in particular, is to arrange for the machinery manufacturer to provide operators with initial familiarisation training at the manufacturers premises or training centre before the machine or equipment is delivered to site. If the machine manufacturer does not provide this service an alternative maybe to arrange the

training at a site that already operates a similar machine. This option might have to be undertaken in another country if there are issues of competitive and confidential information.

When the machine is commissioned to run

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

- Relevant risk assessments have been completed for operational and maintenance tasks and are readily available to the operators.
- Any necessary safe systems of work have been developed, as identified by the risk assessment. 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.
- The operators have been trained in the above tasks as appropriate and formally signed off as competent to operate the machine safely.
- Machine inspection and maintenance schedules, including maintenance and inspection schedules for machine controls, safety devices and emergency stop systems, have been established and an effective recording procedure is in place.
- Maintenance staff have been trained, in accordance with safe maintenance procedures and formally signed off as competent to maintain the machine safely.

Good practice will be to hold a post project review to recommend any amendment to this procedure that would enhance 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 little while

Notes regarding the purchase of second-hand machinery

In most 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 – in particular to establish that no original guarding has been removed or altered, unless it has been replaced with guarding that meets the standards and guidance in force at the time of purchase
- Suitable for the work it is to do
- Maintained in a safe condition
- That all the requirements of PUWER are adhered to.

If a second-hand machine has been totally refurbished (e.g. adding CNC 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.

The check lists provided for selection of machine, preparation for delivery, when delivered, when installed and when commissioned are all appropriate to the purchase of second-hand machinery, except for the issues relating to the design of new machinery. They can be used, with appropriate amendment, by a project team purchasing second-hand machines.

Sources of information

INDG271 HSE guide to **Buying new machinery**, which defines machinery as “a piece of equipment which has moving parts and, usually, some kind of drive unit.” This would include forklift trucks, lifting equipment, baling machine, drills etc. but not steam boilers, tanks and pressure vessels.

INDG380 HSE / RUBIAC **Tread Safely** – The sections dealing with new machines, machinery accident prevention and training.

PABIAC publication "Guide to managing H&S in paper mills" part 1 - Application of PUWER to the paper and board Industry - contains (at pages 12, 13 & 14) useful summaries of the duties on employers when providing new work equipment and second-hand work equipment".

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