

EXPERT OPINION
EN 17975 STANDARD AND HOT LO-TO-TO APPROACH

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EN 17975 STANDARD AND HOT LO-TO-TO APPROACH: ENSURING MAINTENANCE SAFETY WITHOUT COMPROMISING PERFORMANCE



Uncontrolled energy and fluids during maintenance operations pose a serious threat to safety, causing serious accidents every year.

We asked our expert Jean-Pierre Avellaneda, CEN convenor of the EN 17975 committee and active member of several other committees, for his opinion.

In this expert opinion, he shares his knowledge on the implementation of European standard EN 17975 and discusses the HOT LoTo approach, which combines risk control and performance.



The rationale behind a European standard for maintenance safety

Every week, serious accidents occur during maintenance operations. It is against this backdrop that a European standard, EN 17975 (due to be published in summer 2025), is expected to enhance safety in maintenance.

The purpose of maintenance is to "maintain or restore to working order" an installation or machine. This concept covers a wide range of activities:

- routine maintenance (cleaning, adjustment, lubrication, etc.)
- emergency repairs, corrective maintenance
- preventive maintenance, inspections
- improvement maintenance, modifications, new work, etc.

These operations are actually carried out and managed by multiple players, beyond the technical services alone:

- General services (maintenance, facility management)
- Methods, new work, design office (projects) External
- companies, project management (construction sites)
- Operator, production teams (self-maintenance)

All these players are overexposed to risks during maintenance operations.

A joint analysis by Carsat, INRS and AFIM on accidents during maintenance operations showed that **accidents occurred more than three times higher than average and the mortality rate was up to eight times higher.**

Interacting with a machine during maintenance exposes you to hazards related to energy and fluids.

The future CEN standard provides guidelines and recommendations for controlling risks related to energy and fluids during maintenance operations.



Safety during maintenance operations: a complex issue

Over 50% of accidents during maintenance operations are caused by poorly controlled energy and fluids (electrical, hydraulic, pneumatic, mechanical, steam, chemicals, etc.).

Three main types of causes must be addressed in order to make progress:

- Human (skills, behaviour and management).
- Organisational (roles & responsibilities, procedures, processes).
- Technical (documentation, compliance).

Beyond the simple concepts of Lo-To (Lock-Out, Tag-Out) or Lo-To-To (Lock-Out, Tag-Out, TryOut), it is essential to integrate these three types of risk through a comprehensive approach. This is what we call the "HOT Lo-To-To" approach at Apave. It is also essential not to consider only the assignment to a workstation, but to **look at the tasks and activities carried out with, in and around the machines** and installations **at any given time**.

There are often two types of accidents that are difficult to eliminate in industrial environments:

- high-frequency, moderate-severity accidents, such as falls on the same level, which often need to be addressed through actions targeting management, culture and safety behaviour;
- high-severity, low-frequency accidents related to insufficient energy control during maintenance and servicing operations.

From a regulatory point of view, only the NF C18-510 standard on electricity and the Labour Code were available to maintenance professionals before the publication of the NF X60-400 standard, which was replaced by the European standard EN 17975.

The **Machinery Directive**, meanwhile, guarantees safe operation and routine maintenance, but **only touches on the subject of exceptional maintenance in passing** and in very general terms. Furthermore, the compliance established by the supplier is often no longer valid because the installation has been modified over time, its use has changed, the work organisation is different (e.g. introduction of self-maintenance), etc.

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How can maintenance operations be made safe?

When considering the safety of a maintenance operation, it is important to take into account all the energy sources and fluids involved, not just electricity.

When implementing the approach, all direct and indirect occupational risks related to energy and fluids must be taken into account. This input data is used to define the most effective safety measures.

It is good practice to draw up a checklist that serves as a starting point for systematic risk analysis prior to each maintenance situation.

The usual constraints and causes of failure to control these risks in maintenance are:

- lack of information (e.g. obsolete plans), standards and procedures,
- the failures in communication (e.g. : between teams production and maintenance teams, when handing over duties between teams, etc.).
- dilapidated facilities,
- accessibility issues,
- design and compliance issues (and uncontrolled modifications),
- unreliable safety devices and locking mechanisms,
- lack of maintenance (e.g. no preventive maintenance plan for equipment or safety devices),
- preconceived ideas (pressing an emergency stop button does not necessarily ensure the safety of the operator if energy flows are not taken into account).

Safety is not solely dependent on technical considerations. Organisational and human factors play an important role.



How can the urgency of intervention be reconciled with safety?

In maintenance, a quick solution must be found to avoid blocking production for too long. **In urgent repairs, 80% of the safety of maintenance operations often depends on the operator's actions.**

These maintenance operations are particularly accident-prone. Sometimes chronically understaffed due to market shortages, maintenance workers are often overworked and have to work long hours and overtime. The daily pressure of dealing with safety issues is a difficult equation to solve.

Even in the ideal company, maintenance workers often put pressure on themselves because their job is to help others. Unfortunately, accidents where witnesses say that the victim behaved recklessly "to be helpful" are common.

Everyone's **behaviour** is the result of the individual, but also of the corporate culture, management practices and organisation. There are **two types of "risky" behavioural profiles: the novice** (high frequency of accidents, low severity) **and the expert** who has become accustomed to risk, suffers few accidents but with high severity. We should take

inspiration from firefighters, who train and have systematic protocols for dealing with risk so as not to give in to pressure and make mistakes, and introduce a systematic "stop" to take a step back and analyse the risk before each intervention.

It is also essential **to establish a general procedure for securing energy and fluids**, to set requirements and define rules. This must be coordinated with other company processes

and rules, and cover multiple scenarios (external companies, team changes, etc.).

Production, as a partner of maintenance, must be involved in the process, as must management and senior management. Long-term involvement of senior management is essential for success.

For scheduled interventions (typically preventive maintenance), preparation can optimise both machine downtime and safety. Apave's approach emphasises the importance of returning to **good maintenance practices** (ratio of maintenance performed/planned, methods, reliability, maintainability, etc.) **to improve both safety and performance.**

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What changes does the CEN standard propose?

The standardisation committee has built on the implementation of NF X60-400 and the combined experience of manufacturers, Apave and INRS. It has taken into account technical, organisational and human risk factors. **The standard** is not based solely on French experience, but **draws inspiration from international approaches such as Lock Out Tag Out (Lo-To) and Lock Out – Tag Out – Try Out (Lo-To-To), as well as best practice guides from around the world.**

The standard proposes a number of operational measures, including the identification of energy sources, the selection of safety procedures, the principle of risk analysis, the location of locking devices and the implementation of "padlocking". These are supplemented by requirements in terms of skills, training and qualifications. It provides specific advice on piping and mechanics, includes a flowchart and sample reference sheets for identifying hazardous energy sources on equipment, etc.

Risk analysis is essential for safety.

This analysis requires several skills and is therefore often carried out by several people (production, maintenance, service provider):

- Knowledge of the energy and fluids associated with the equipment and its environment
- Knowledge of the energy and fluids associated with the operation and process
- Knowledge of the energy and fluids involved in the intervention (e.g. welding)

It is recommended that authorisations and qualifications be established within the company, along with a training and assessment system. The person with an overview of all energy sources is generally the one who is competent to carry out the risk analysis; they are not necessarily an expert in all energy sources.

Five safety procedures are described in the standard:

- reinforced insulation
- simple insulation enhanced with compensatory measures
- neutralisation by a control system
- management of machine safety during operation (e.g. during the test or diagnostic phase)
- lockout and tagging

The CEN standard is voluntary.

It explains the **links between energy and fluids and other business processes**, such as maintenance, operations, safety, and design.

It also sheds light on the **issue of the "grey area"**, which is mainly the organisational uncertainty surrounding maintenance operations carried out by production.

Recurring operations can be handled by standard procedures. For non-recurring operations, the standard provides generic procedures in an appendix that outline safety milestones, supported by operational aids (up-to-date plans, Lo-To sheets listing the energies present and the associated lockout devices, visual management, lockout officers, etc.).



Why is change management the key to success?

The HOT Lo-To-To approach improves the efficiency and safety of maintenance operations through a **combination of human, organisational and technical levers**.

There is no magic solution. The subject is complex and each company has a different context, culture, facilities, processes and maturity. **It is essential to start with a comprehensive HOT Lo-To-To diagnosis to identify the right priorities and tailor the approach to the company.**

Our diagnostic methodology also includes preparation for change to facilitate the implementation of recommendations and highly operational support.

- **Technique:** compliance / safety / maintainability / documentability diagnostics, operating modes, Lo-To sheet, visual management of energy shut-off points, etc. The implementation of these measures by equipment also helps to change behaviour.
- **Organisational:** traceability document templates, a general procedure for securing energy and fluids, assistance with specifications, guidelines for listing energy and fluids and thresholds to consider.

The major factor that complements technology and organisation remains to be addressed: **the human factor**. To do this, we offer a comprehensive catalogue of training courses (for maintenance staff, operators, reception staff for external companies, management committees, safety officers, etc.) as well as a project approach supported by change management, management initiatives and safety culture and behaviour initiatives.

Safety is priceless, but it comes at a cost! Balancing the cost of safety measures against the gains in safety is a delicate issue. Implementing the comprehensive HOT Lo-To-To approach minimises the long-term impact on performance, such as the overall equipment effectiveness (OEE), and can even generate performance gains by returning to good maintenance practices. **After measurement and analysis, the findings are striking: in the medium term, good maintenance increases safety and also improves OEE.**

By working better, we gain on both fronts, whereas before we sometimes compromised on safety in order to respond quickly. Optimising the safety system (using reference sheets that map energy sources, pre-prepared operating procedures, etc.) will minimise the extra time needed for interventions. The best way to avoid putting yourself in danger when repairing equipment is to prevent breakdowns by ensuring the reliability of installations and their maintainability through design or improvements.

Conversely, the approach will lose its effectiveness or even fail over time without:

a comprehensive approach tailored to the context

being managed as a project with a change management component

long-term thinking

taking human and organisational factors into account integration

into safety management coordination with business processes



In conclusion, can you say what the HOT Lo-To-To approach based on EN 17975 improves?

Let's take the example of an initiative carried out at an agri-food company: The agri-food sector is complicated because it requires a lot of maintenance, with very short deadlines due to the processing of perishable goods. Margins are low and production rates are high, with very high installation commitment rates.

Maintenance teams work on a wide range of energy sources, not only electrical, but also mechanical, fluid, temperature, pressure, chemical risks (e.g. decontamination), etc.

New installations coexist with older ones that were not designed for safe maintenance. **The high accident rate led this player to implement the Apave HOT Lo-To-To approach** as part of a health, safety and maintenance security policy, while taking into account the impact on performance.

The impact was measured factually (TRS and residual risk indicators) and demonstrated that the approach made it possible to combine the two components of risk and performance. The introduction of reference sheets and valve identification, combined with work on recurring operations with standard operating procedures, has accelerated safety and made interventions and risk analysis more reliable.

However, the approach is fragile, and **company management must remain consistent in prioritising safety.**

#IN SUMMARY

Risk analysis is a prerequisite for securing maintenance activities. Rather than focusing on individual workstations, it is necessary to analyse the activity as a whole, involving senior management.

The EN 17975 standard and the Apave HOT Lo-To-To approach offer operational processes that reconcile maintenance actions and company performance.

Demonstrating the costs of implementation makes it possible to identify resources for improvement and gains on all fronts, and **to address the human factor through effective change management in project mode.**

A collateral effect of this implementation is the detection of weak signals of deviations in the company's processes.

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