BROCHURE

Pressure relief
A proven approach
Pressure relief

Pressure relief systems are a vital layer of protection for your processes. To provide this protection, systems need to be well designed which is much more than sizing a relief valve.

ABB has the capability and experience to assist you wherever you are in your pressure relief life cycle and whatever the size of the project.

With our extensive industrial experience and understanding of the codes we can help you to:

- Demonstrate compliance to regulators
- Define and shape pressure relief studies
- Design new relief systems
- Review existing relief systems
- Reduce costs of modifications
- Review third party design
- Provide guidance and training

ABB understands the pressure operators are under to ensure that their plant is safe, satisfies regulatory requirements and the expense that can be incurred through plant modifications. ABB has developed a suite of methodologies that are proven to be safe on thousands of relief streams throughout the world.

The public and employees must be protected from the hazards of high or low pressures and the potential loss of containment of hazardous material. Therefore, correctly designed and installed relief systems are critical to plant safety.

The loss of production and damage from the failure of pressure systems erode business performance.

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“That disc always fails when we start up.”

“That safety valve never seems to reset after it’s blown!”

Above are comments you can sometimes hear on plants. Relief devices should be considered as the last line of defense, not as a means of controlling the process. So they should be called upon to operate as little as possible.
Capabilities

ABB’s complete range of pressure relief services are shown in the flowchart below.

Design
ABB has the knowledge and experience to size and design pressure relief systems using industry codes such as API or British European Standards. Pressure relief systems requires input from mechanical, piping, C&I and process engineers for a successful design. ABB has experienced engineers in all of these disciplines.

Retrospective reviews
Undertaking retrospective reviews of relief devices is different to designing them. However, many companies approach the workflow in the same manner which can increase the duration and cost of a project. With a retrospective study the question that needs answering is: “Is the installed device sufficiently sized?” rather than the design question: “What size should the relief device be?” Using the ABB methodology which starts with the installed device saves time and costs in data gathering and calculating relief rates.
Prioritisation
Operators review their relief stream design periodically for a variety of reasons. There can be hundreds of relief devices on an operating plant, which can be daunting to program and fund a review project. ABB has a prioritisation methodology to rank the criticality of relief devices from a safety, environmental and business aspects. From this programs and costs can be developed in line with available resources.

Assurance
The design of the pressure relief systems for major modifications and greenfield new builds is normally undertaken by the EPC contractors. ABB has a methodology to work with the operator to review the relief stream design and identify mistakes which can be corrected before construction. This has the potential to save operators significant costs from post construction modifications or incidents.

Risk ranking
The results from a pressure relief study can generate a large and costly schedule of modifications. ABB can assist in reviewing the findings from a study, risk rank the gap between the installed system and the codes and identify short, medium and long term mitigation measures. This helps the operator identify the critical ‘must do’ findings from a study and allows the site to plan and resource the corrective actions that need to be done. Sometimes gaps can be resolved without costly modification to the relief system such as re-rating pressure equipment or changing trip settings.

Discharge and disposal
On P&IDs relief systems are routed “To a safe location”. This needs to be carefully considered especially when the material being relieved is toxic, flammable, hazardous etc. ABB uses a variety of calculation methods and software modelling tools depending on the case to assist clients with this important but often forgotten aspect of pressure relief design.

Vent and flare systems
Pressure drops and pipework relief capacities are important aspects of a relief system’s design. Understanding the possible flowrates, compositions and pressures in vent and flare systems is especially important to ensure relief devices are correctly specified and will perform as expected. ABB has a suite of tools and methodologies to review the design of vent and flare systems.

Complex pressure relief
Some pressure relief scenarios are complex due to issues such as high temperatures and pressures, phase changes and chemical reactions etc. ABB has experience in determining the relief rates for these more complex cases including:
- Exothermic and runway reaction using DIERS methodology
- Multicomponent fire cases
- Gas filled vessels
- Dynamic simulation of relief scenarios

Piping design
- Reaction forces
- Pipe stressing

Discharge and disposal
- Consequence modelling dispersion and radiation

Operational support and troubleshooting
- Relief stream inspection
- Legislation support PER, PSSR

Gap risk assessment and prioritisation

Design verification

- Pressure relief training
- Pressure relief design guides
- Competence support
Pressure relief software

ABB licenses its PEL (Process Engineers’ Library) software to clients. This software can be used extensively in pressure relief studies.

- **CAPRE**: determination of relief rates and device sizing
- **ADRIAN**: upstream and downstream pressure drops and system capacity for compressible flow
- **FLONET**: upstream and downstream pressure drops and system capacity for incompressible flow
- **PIPER**: upstream and downstream pressure drops and system capacity for 2 phase flow
- **PROVUE DB**: datasheets and document control
- **PHYSPACK**: physical properties for relief scenarios and sizing
Pressure relief services

ABB’s pressure relief services include:
- Pressure relief system auditing
- Pressure relief identification and calculation
- Process and mechanical design
- Vent collection system modelling and design
- DIERS methodology for two phase flow relief
- Pressure relief training (IChemE approved)
- Pressure relief design guides
- Instrument protective systems to IEC 61508, IEC 61511 and SIL determination
- Discharge and disposal systems
- Flare and vent system design
- Low pressure storage tank assessments
- Legislation support e.g. PED, PSSR
- Installation and in-service inspection

Other ABB capabilities include:
- Inspection
- Integrity management
- Operations improvement
- Process safety
- Project services
- Site and asset regeneration
- Technical engineering
- Technical software
- Technical training and competency