

## INTERNSHIP: TESTING OF RELIEF VALVE (HBO)

### **Zeton company profile**

As the world's leading designer and builder of innovative lab scale systems, pilot plants, demonstration plants, and small modular commercial plants, Zeton helps its customers to bring their new technology and processes to market, faster, with less risk, and lower cost. The plants are modular/skid mounted so that installation and commission at the client's site takes minimum effort. Zeton projects include conceptual design, basic and detail engineering, manufacturing, factory testing, transport, re-assembly and testing at the client's site.

With operations in Burlington, Canada and Enschede, The Netherlands, Zeton has successfully completed over 800 projects in 35 countries across six continents. The location in Enschede has over 170 employees and serves mainly Europe, Africa and the Middle East.

Zeton has three product groups: Zeton Lab and Pilot Systems, Zeton Pharma, and Zeton Demo and Production Plants.



Zeton plants are (mostly) first of a kind and based on challenging client requirement. To fulfil these requirements, Zeton engineers need to make an optimum (process) design, use specific pilot plant solutions and come up with solutions for new challenges. Furthermore, the engineers need to have expert knowledge to find and select suitable equipment, valves and instruments.

Websites: [Zeton | The World Leader in Pilot Plant Design and Fabrication](#) | [Werken bij Zeton | REALIZE THE FUTURE](#)

### **Duration**

The duration of the internship is foreseen to be in the range of 6 months.

### **Education**

Studies related to Chemical Engineering / Mechanical Engineering

### **Background related to the assignment**

To protect a pressure systems against overpressure scenarios (e.g. accidental closing of downstream valves, failure of pressure regulator etc.) a spring-loaded pressure relief valve is commonly applied.

The API 520/521 (and EN-ISO-4126) standards give guidelines how to size in the inlet and outlet line of a relief valve. The standards (API & EN-ISO) state that the sizing of the lines shall be done based on the rated capacity of the device (the maximum capacity of the device). The standards mention that this requirement is to avoid chattering of the valve. As many of the Zeton plants are relatively small, even the small relief valves are significantly oversized. Therefore, Zeton deviates from the standards and sizes the lines based on the required capacity (based on the relief case). Zeton assumes that for small systems chattering is not a risk. However, this assumption requires validation and justification by additional research and tests.

## Assignment

The internship assignment comprises the following work:

- A literature research on the conditions that can lead to chattering and cause problems for different type of relief valves.
- Contact and interview relief valve (design) experts (e.g. fabricators of relief valves).
- Make a test setup to verify the performance (if chattering occurs) of a relief valve (or relief valves). The following relief cases can be tested:
  - setup with a pump (positive displacement) and a relief valve in de downstream line,
  - setup with a relief valve in the line downstream a gas dosing system,
  - setup with a gas dosing system to a vessel and a relief valve on the vessel.
- Report the findings.