BVT
SWEDEN
VALVE SOLUTIONS

BVT-TB

Steam conditioning valve

B-001

BVT-TB
Steam conditioning valve

BVT SWEDEN
VALVE SOLUTIONS

About us

BVT Sweden was started with the ambition of becoming world leading in critical applications in process steam and thermal power plant turbine bypass. Based in Säffle, BVT Sweden employs experts with over 30 years experience in turbine bypass, steam conditioning, temperature control, design and manufacturing processes. We design turbine bypass valves, select actuation to fit our customer's requirements. Our products are optimized on a per-order basis, and we have the experience necessary to design special solutions. These products cover steam conditioning valves, pressure reduction valves, stop valves, desuperheaters and spray water control valves.

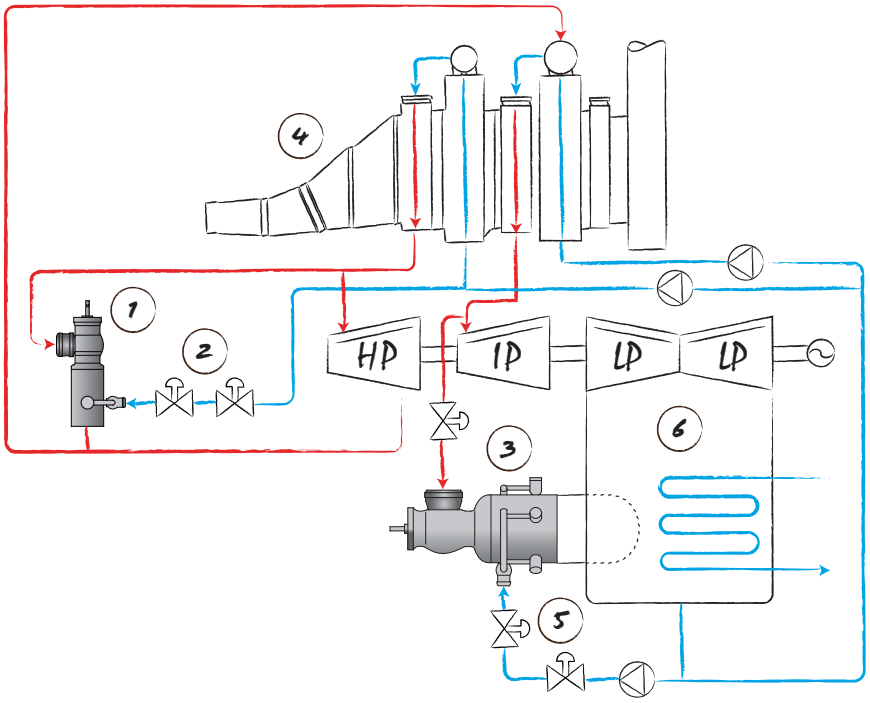
The turbine bypass system

The turbine bypass system consists of both pressure reduction and steam desuperheating. Turbine bypass valves are installed in parallel with the turbine's pressure stages and provide a secondary conduit for the superheated steam. The valves may be used for controlling the downstream pressure and temperature during turbine operation or during a turbine trip.

Bypass to condenser

The illustration on the right shows an example of a steam turbine with three pressure stages (**HP**, **IP** and **LP**) connected to a HRSG (**4**). The HP steam conditioning valve (**1**) is connected in parallel with the high pressure stage of the turbine, and is fed water from a spray water control valve (**2**). A second steam conditioning valve (**3**) is connected to a downstream dump tube, which dumps steam to the condenser (**6**). Condensate is pumped from the condenser and passed to the HRSG and to the spray water control valves.

1. HP STEAM CONDITIONING VALVE
2. HP WATER CONTROL / STOP VALVE
3. IP STEAM CONDITIONING VALVE
4. HRSG
5. IP WATER CONTROL VALVE
6. WATER COOLED CONDENSER

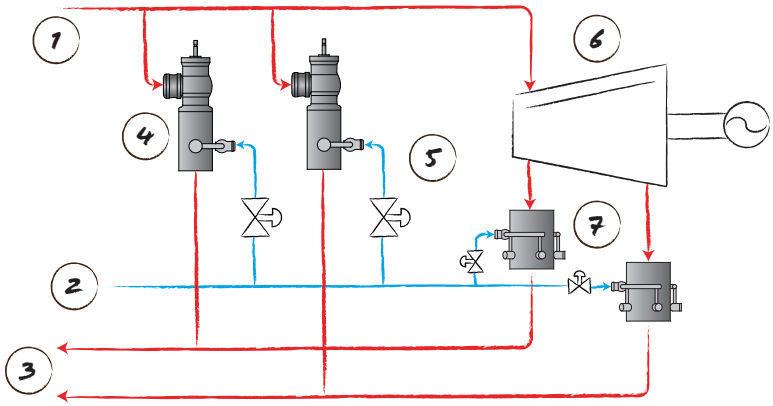


BVT-TB TURBINE BYPASS VALVES WITH HRSG AND CONDENSER

Bypass to process

In this example, two BVT-TB valves (**4**) are installed in parallel to a turbine (**6**) and two BVT-DLP desuperheaters (**7**). Steam is desuperheated by both valves and desuperheaters and output to process. Water is controlled by external spray water control valves (**5**).

1. INPUT SUPERHEATED STEAM
2. SPRAY WATER / CONDENSATE
3. OUTPUT PROCESS STEAM
4. BVT-TB STEAM CONDITIONING VALVE
5. WATER CONTROL / STOP VALVE
6. STEAM TURBINE
7. BVT-DLP MULTI NOZZLE DESUPERHEATER



BVT-TB AND BVT-DLP IN BYPASS TO PROCESS APPLICATION

BVT-TB

Steam conditioning valve

BVT-TB turbine bypass valve

The BVT-TB is an angle-style steam conditioning valve, used for both process and turbine bypass applications. It is designed to reduce temperature and pressure of steam to match downstream requirements. Pressure is controlled using a proven trim technology which reveals a series of perforations in the valve cage as the plug moves. Steam is then passed to the outlet through a series of pressure reduction stages, selected specifically for the operating conditions on a case-by-case basis in order to reduce noise. Valve Plug design is optimized for low actuating forces, allowing for smaller and pneumatic actuators. Control of temperature takes place in the outlet, where a number of spring-loaded spray water atomizing nozzles are installed perpendicular to the steam flow. The selection, placement and design of these are chosen to match the desuperheating requirements of the system as well as reducing risk of free water being injected into the downstream piping.

Specifications

Valve sizes
Up to 500 mm seat diameter

Pressure class
Up to ANSI 4500 (higher rating on request)

Design temperature
620 ºC as standard (650 ºC on request)

Leakage class
ANSI Class III, IV, V, MSS SP 61

Rangeability
Up to 25:1 for the complete valve

Regulatory requirements
ASME, PED, IBR, CRN, ISO 9001/14001

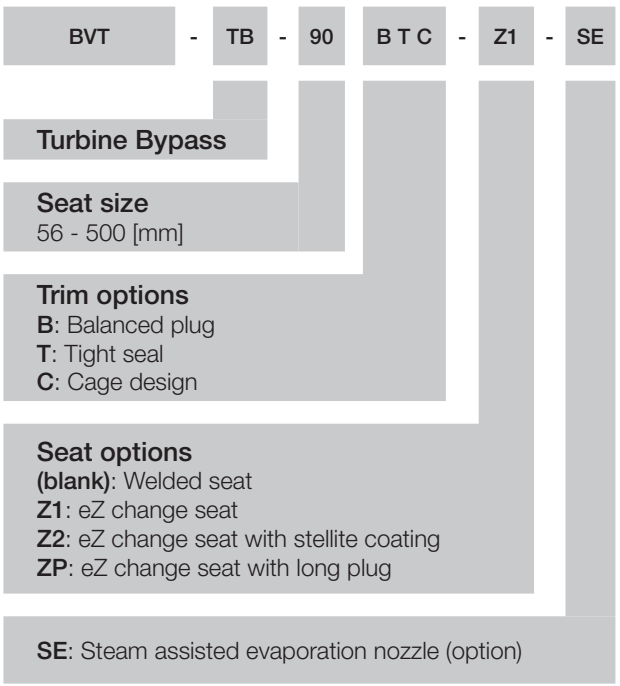
Materials
Forged material adapted to connecting pipe material

Actuation
Pneumatic, hydraulic or electrical

Options
- **Quick change type seat**
- **Erosion resistant trim with long cage**
- **Expanded outlet**
- **Live load gland seal packings**

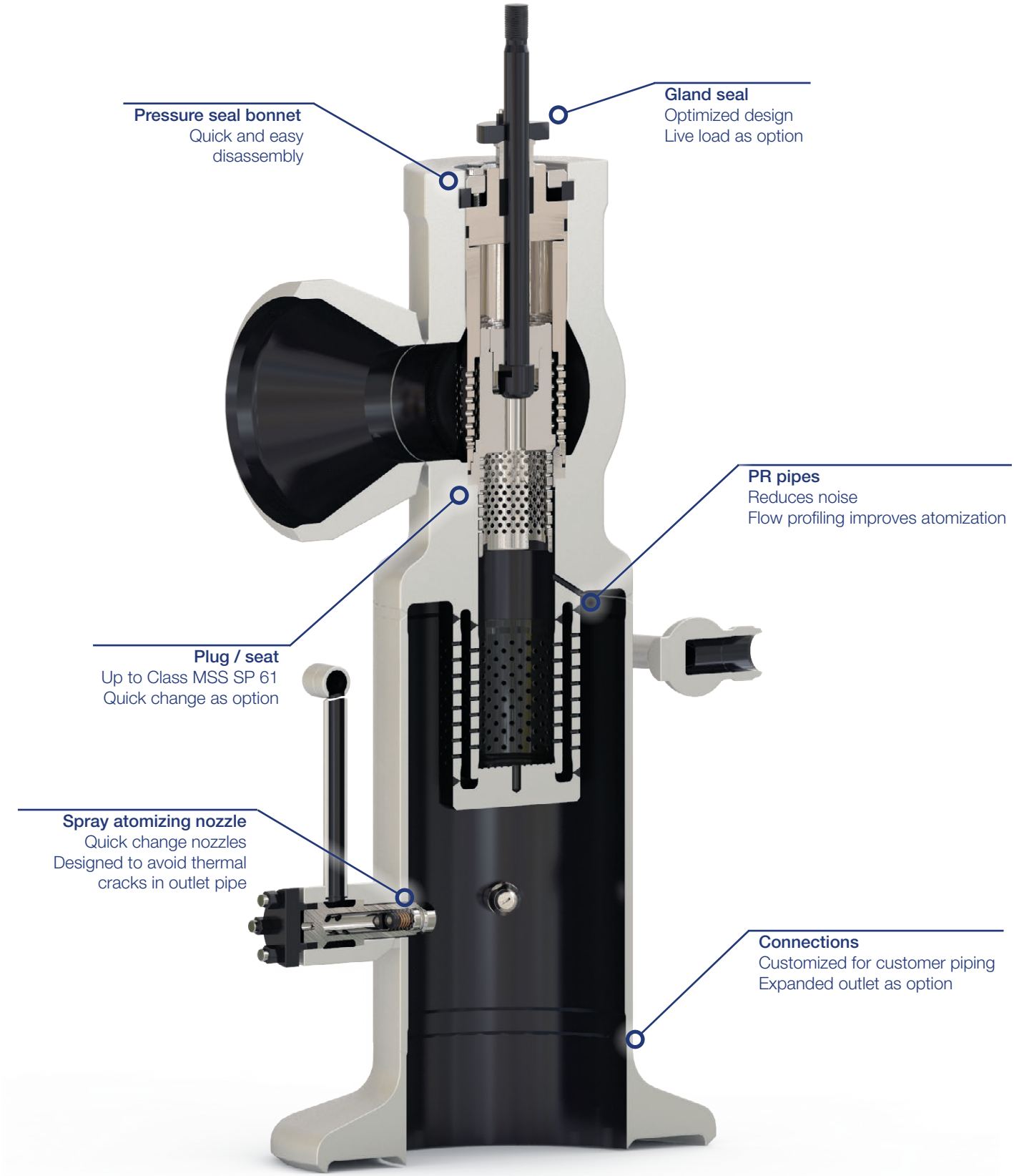
Key features

- ✓ Fully customizable inlet, outlet connections
- ✓ Complies with the following standards: ASME, EN, PED
- ✓ Forged valve body with uniform thickness and trim design optimized to withstand thermal cycling
- ✓ High shut-off class
- ✓ Great rangeability
- ✓ Pressure reduction stages and spray nozzle arrangements optimized for operating conditions, and for reduced noise. The pressure reduction pipes also create a flow profile that improves atomization.
- ✓ Balanced plug design requires smaller actuating forces, and so allows for smaller and pneumatic actuators
- ✓ Pressure seal bonnet for simpler and quicker maintenance. No special tools necessary
- ✓ Compatible with pneumatic, hydraulic and electrical actuation
- ✓ Easily exchangeable seat as option for further reduced maintenance downtime
- ✓ Optional expanded outlet design optimized in order to improve secondary atomization through an increased steam velocity over the nozzles. The outlet design also improves the tertiary atomization, and increases rangeability.
- ✓ Optimized packing design
- ✓ Long cage design reduces wear on trim internals caused by wet steam or particles by moving the critical pressure drop
- ✓ Spring loaded nozzles designed to avoid thermal cracks in outlet pipe, and are quickly and easily replaced



BVT-TB PRODUCT CODE

Overview



BVT-TB HP BYPASS VALVE

BVT-TB

Steam conditioning valve

Water valves

BVT provides a multitude of spray water control valves, selected and designed to match operating conditions and customer requirements. The trims are chosen to prevent cavitation and flashing and prevent aerated liquids from corroding or eroding valve parts. They are equipped with quick exchange trims for more convenient inspection replacement. Among the options of trim designs are contour plugs, multi-step plugs, multi-cage and labyrinth disc stacks.

Trim types

PT (Plug throttling)
Cv Range: 1.4 ~ 9930
Rangeability: 25 to 1
Leakage class: IV / V

HSC (Micro High Step Cascade)
Cv Range: 0.24 ~ 406
Rangeability: 100 to 1
Leakage class: V

HEST (Single seat, drilled cage)
Cv Range: 38 ~ 8900
Rangeability: Varies
Leakage class: IV / V

LEFT: ANGLE-STYLE VALVE BODY
RIGHT: GLOBE STYLE VALVE BODY

Pneumatic actuation

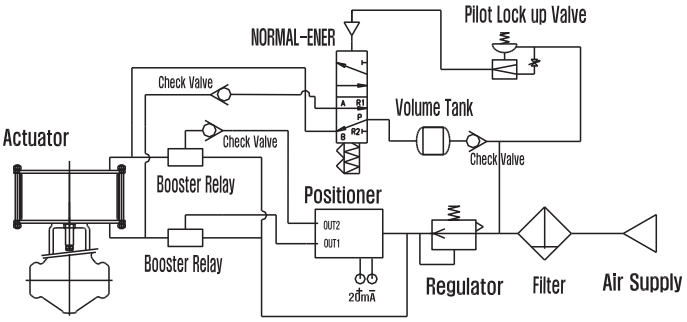
BVT valves can be equipped with pneumatic piston actuators. The cylinders are chosen to overcome the forces created by steam flow, and the accessories are chosen to handle the required stroke speeds and functionality.

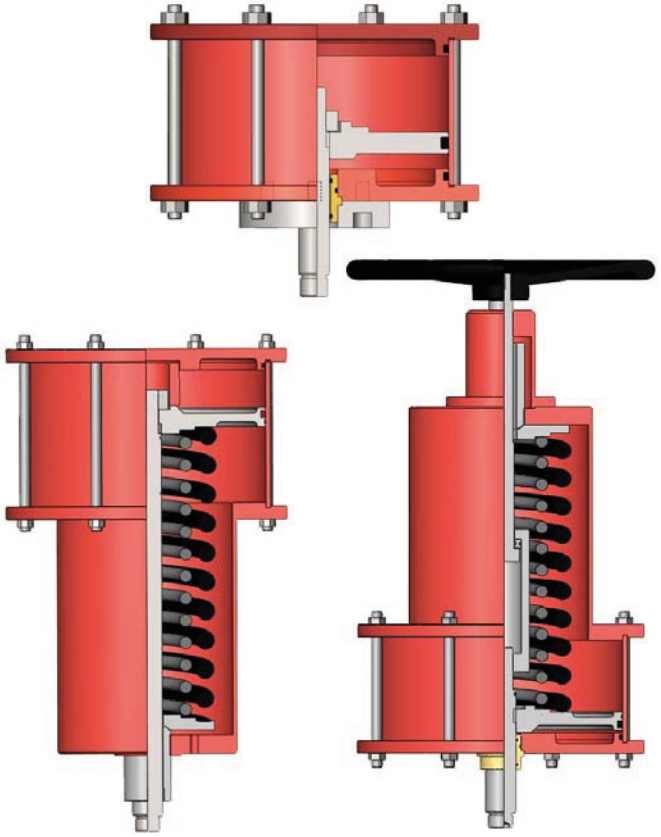
Features and options

Cylinder types
- **Double Acting, Single Acting**
- **Spring Open, Spring Close**
- **Top mounted hand wheel, side mounted hand wheel**

Air supply
4 - 10 bar

Accessories and options
- **Air filter regulator as standard**
- **3-way valves (quick open/close)**
- **Limit switches (open/close position)**
- **Position transmitters, air locks, boosters as option**



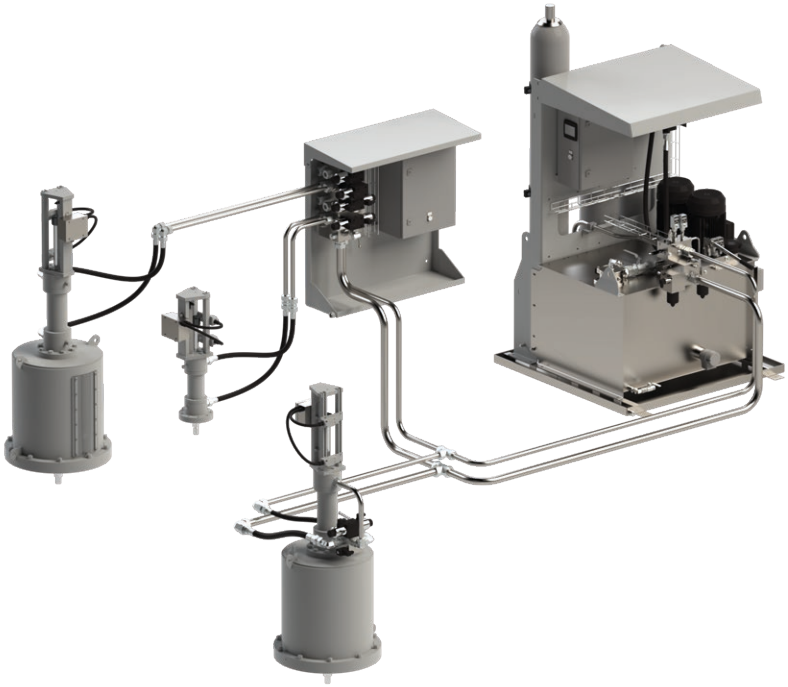


TOP: DIFFERENT CYLINDER SOLUTIONS AVAILABLE
LEFT: PNEUMATIC SCHEMATIC OF MODULATING ACTUATOR WITH AIR LOCK AND BOOSTERS

Hydraulics

As an alternative to pneumatic actuation, BVT can also provide our valves with electro-hydraulic actuators. To power and control these actuators, BVT also supply Hydraulic Control Panel (HCP) and Hydraulic Power Generator (HPG). Pump control in the HPG is by default handled by the Intelligent Power Manager (IPM). The IPM monitors oil level, temperature and pressures and warns the DCS of any issues. Positioning is by default is handled by the Intelligent Actuator Control (IAC), which can control two modulating and two on/off actuators.

Commissioning tools and hydraulic pipes, fittings and hoses are also available.



HPG, HCP AND THREE HYDRAULIC CYLINDERS

Features

Hydraulic Linear Actuator
- **C4 RAL7003 painting as standard, C5M as option**
- **Double rod seals & metal scrapers**
- **Precise movement and positioning**
- **No programming of transmitter required**
- **2x Limit switches DPDT**
- **Spring and cylinder mounted valve block (HCB) as option**

Hydraulic Control Panel
- **Dual gain proportional valve for quick open/close**
- **Roof and floor stand as option**
- **Local accumulator as option**
- **Intelligent Actuator Control positioner as standard**

Hydraulic Power Generator
- **Intelligent Power Manager pump controller as standard**
- **Dual pumps, accumulators, spill tray**
- **Analog pressure, temperature and level transmitters as standard**

Intelligent Actuator Control
- **2x modulating + 2x on/off control**
- **Smooth movement and accurate positioning**
- **One-click calibration of transmitters**
- **IP66, -20º to +55ºC ambient temperature**
- **PC based service tool for setup**
- **S shaped ramps for smooth movement**

Intelligent Power Manager
- **HMI display as standard**
- **IP66, -20º to +55ºC ambient temperature**
- **Automated pipe flushing function**
- **Local / remote control**
- **Redundancy as option**
- **Different bus protocols as option**

Certificates

Certificate No. / Zertifikat Nr.: 50329/1

Lloyd's Register

CERTIFICATE
in accordance with the requirements of the Pressure Equipment Directive 2014/68/EU

ZERTIFIKAT
in Übereinstimmung mit den Anforderungen der Druckgeräterichtlinie 2014/68/EU

This is to certify that the quality assurance system of
Hiermit wird bescheinigt, dass das Qualitätssicherungssystem des Unternehmens

BVT Sweden AB
SE-653 46 Karlstad
Sweden / Schweden

has been assessed by LR Deutschland GmbH in accordance with the requirements of Annex III
durch die LR Deutschland GmbH entsprechend den Forderungen des Anhangs III

Module H

to the Pressure Equipment Directive 2014/68/EU and
conforms to the requirements for the products shown below:
der Druckgeräterichtlinie 2014/68/EU geprüft und bewertet wurde und für die folgenden Produkte die Anforderungen erfüllt:

Valves and accessories for power and process applications,
for details see Annex 1 to this certificate.
Ventile und Ausrüstungsteile für Anwendungen in der Wärme- und Verfahrenstechnik,
Einzelheiten siehe Anhang 1 dieses Zertifikates.

Approval is subject to continued maintenance of the quality assurance system
in accordance with the requirements of the above-mentioned directive.
Die Zulassung gilt unter der Voraussetzung, dass das Qualitätssicherungssystem fortlaufend aufrechterhalten wird und
die Forderungen oben genannter Richtlinie erfüllt.

Authorisation is hereby given to use the below-mentioned Notified Body Identification Number
of LR Deutschland GmbH in accordance with the requirements of the specified directive
in relation to the products as named above:
Hiermit wird die Genehmigung erteilt, folgende Kennnummer der LR Deutschland GmbH als Notifizierte Stelle
in Übereinstimmung mit der angegebenen Richtlinie in Bezug auf die oben genannten Produkte zu verwenden:

CE 0525

Certificate expiry date / Zertifikatsgültigkeit bis: **31.01.2022**

Hamburg, 01.11.2019
Place and Date
Ort und Datum

K. Wolf
Name, Signature, Certifier
Name, Unterschrift, Zertifizierer

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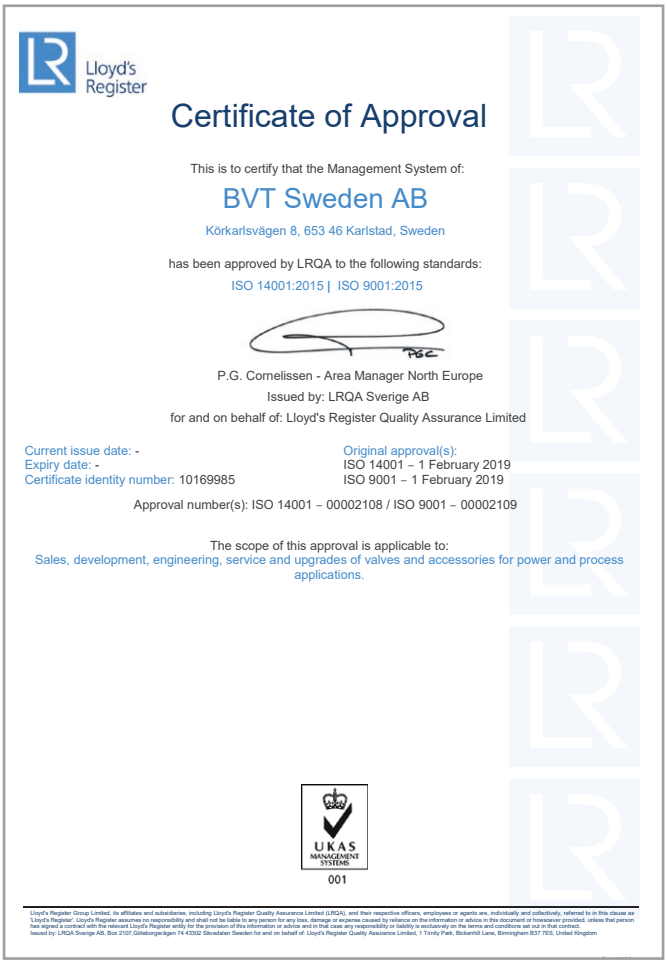
MODULE H



Lloyd's Register

Certificate of Approval

This is to certify that the Management System of:

BVT Sweden AB

Körkarlsvägen 8, 653 46 Karlstad, Sweden

has been approved by LRQA to the following standards:

ISO 14001:2015 | ISO 9001:2015

P.G. Cornelissen - Area Manager North Europe
Issued by: LRQA Sverige AB
for and on behalf of: Lloyd's Register Quality Assurance Limited

Current issue date: -
Expiry date: -
Certificate identity number: 10169985

Original approval(s):
ISO 14001 – 1 February 2019
ISO 9001 – 1 February 2019

Approval number(s): ISO 14001 – 00002108 / ISO 9001 – 00002109

The scope of this approval is applicable to:
Sales, development, engineering, service and upgrades of valves and accessories for power and process applications.

UKAS MANAGEMENT SYSTEMS
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ISO 14001 AND ISO 9001