



# Chlorine Service Control Valves

Euro Chlor Zero Environmental Leakage vs. Valve Performance



**CloroSur**

**2022**

COSTA DO SAUÍPE



# Chlorine Service Control Valves

## Euro Chlor Zero Environmental Leakage vs. Valve Performance

### Contents:

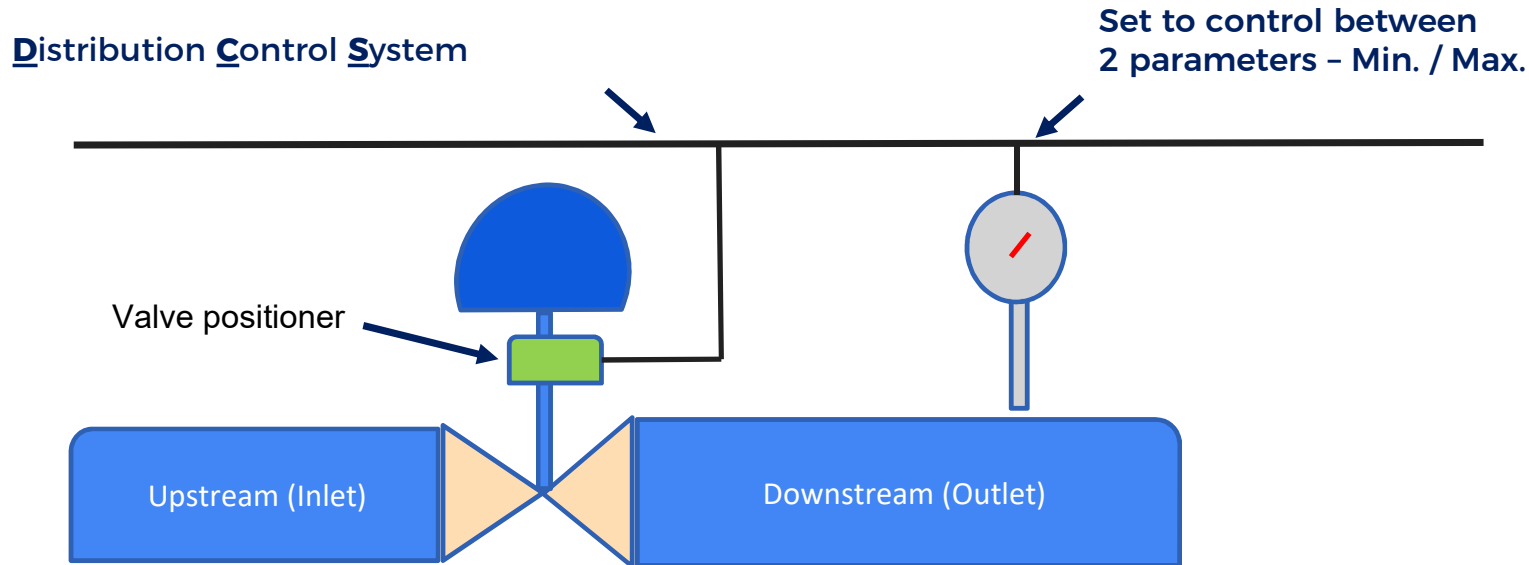
1. Control Valves for Chlorine Service
2. Euro Chlor GEST 17/492 Zero Environmental Leakage Criteria
3. Steps to undergo for Euro Chlor Approval
4. Conclusions





**FUNCTION**

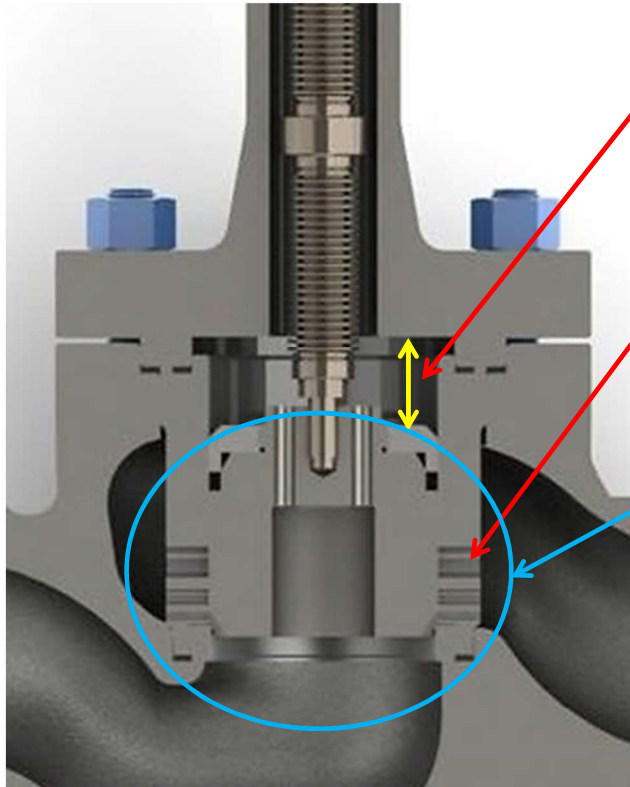
**Varies the flow in response to input signal**



Can be controlling:

Pressure - PCV; Temperature - TCV; Flow - FCV; Level - LCV





Plug moves = Flow varies

More holes = More flow

Each application requires a bespoke trim design

- Noise Reduction
- Prevent Cavitation
- Prevent Vibration
- Flashing



Actuated On/Off Valve

**Can we use an actuated On/Off valve for a Control Valve application?**



Control Valve

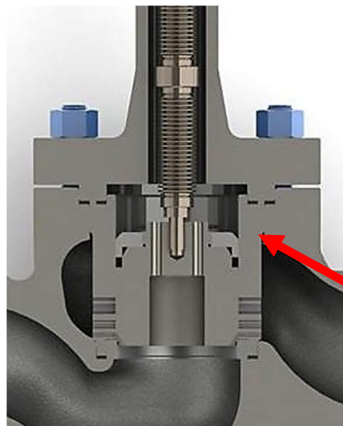


## Differences between On/Off Valve Bodies and Control Valve Bodies

limits the use of modified On/Off Valve in some Process Control Valve applications

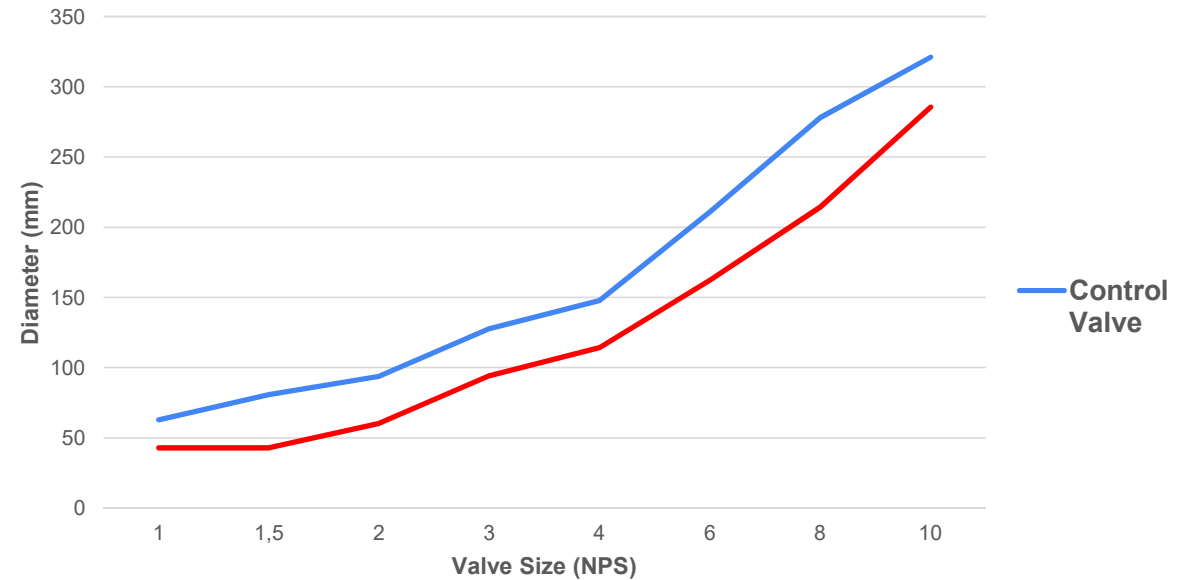
Body Design needs to accommodate:

- Low noise trim
- Anti Cavitation Trim
- Flashing



Internal Diameter

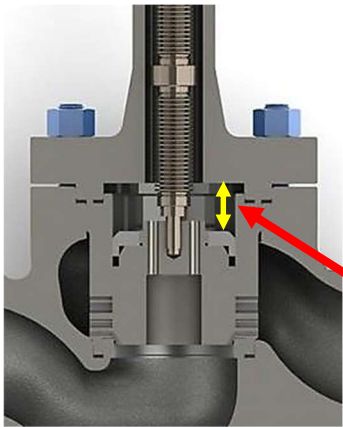
Body Internal Diameter Comparison





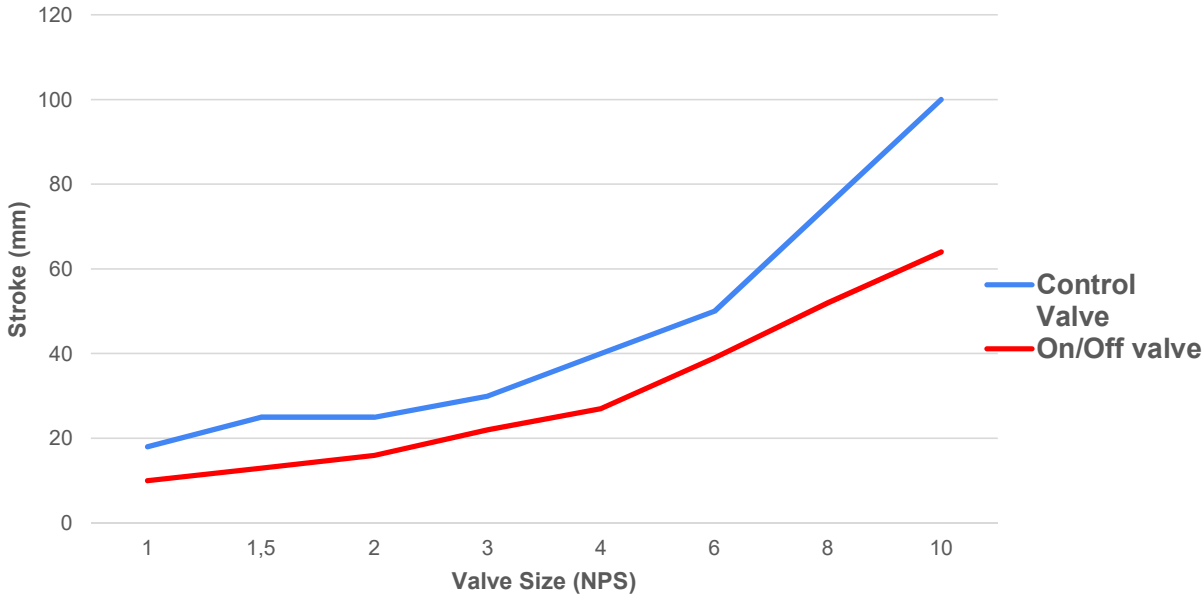
**Body Design needs to allow:**

- **Greater valve stroke**



**Valve Stroke**

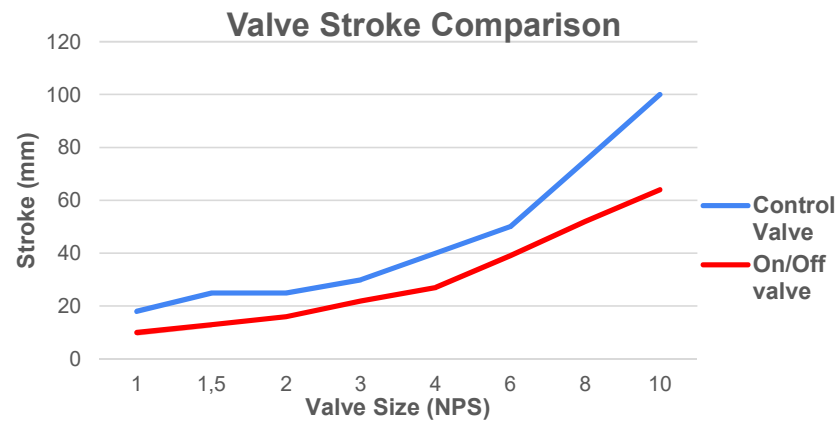
**Valve Stroke Comparison**





## Bellows Design

- Control valve Bellows design 100,000 cycles, On/Off valve design 10,000 cycles.
- Stroke length of Control Valves are up to **+45%** compared with On/Off valves.
- **Bellows length significantly greater**







## Trim Design

**Contoured plug & sleeve**  
for normal low pressure drop conditions



**Plug & single stage sleeve**  
for anti-cavitation and noise reduction



**Spline plugs**  
For low flow applications



**Multi-stage sleeves**  
for high noise reduction and anti-cavitation





**Euro Chlor = European Federation of Chlorine Producers**

Encourages, promotes and supports best practices in:

- Safety – Health - Environment protection
- 60 Euro Chlor member’s manufacturing locations, in 19 countries
- 110 worldwide partners

➤ **Euro Chlor Approves and Certifies:**

**Valves & Manufacturers for Liquid and Gas Chlorine Service**

➤ **GEST 17/492 Edition 2:**

**Specifies the Requirements and the Approval Procedure**



## Zero Emissions requirements:



### Body Casting

- Thicker Casting = **Longer Life**
- Radiographic Test to cover 100% of casting volume = **Longer Life**

### Bellows

- Hastelloy C276 = **Zero Emissions**
- Guaranteed min. 100,000 Cycle Life = **Zero Emissions**
- Open Design = **Longer Life**

**Trim Parts** = Replaceable

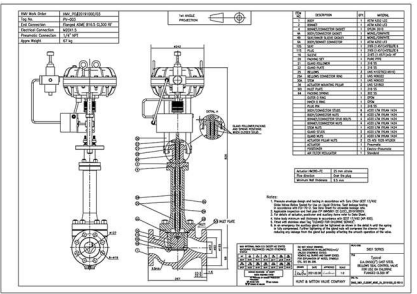
# Steps to undergo for Euro Chlor Approval

A Global Business

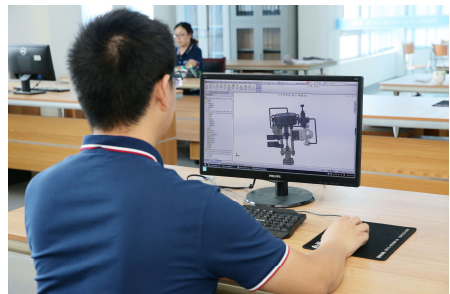


The Euro Chlor Procedure for Approval requires that:

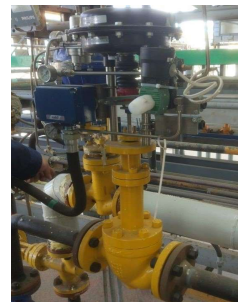
## Design



## Q.A. & Manufacture



## In-service Performance



are assessed by **an external Independent Inspection Body**



## Steps to undergo

### Step 1. Manufacturer's Application to Euro Chlor:

- List of nominated valves
- List of plants where nominated valves are installed
- Large scale sectional drawings with complete Bill of Materials
- Report demonstrating the compliance with the Euro Chlor requirements
- Proposal for an Independent Inspection Body to carry out assessment

### Step 2. Euro Chlor application approval:

- Acceptance of the application
- Acceptance of the Independent Inspection Body



NPS 1 to NPS 6  
PN 16/25/40  
Class 150 & 300



## Steps to undergo contd.

### Step 3. Assessment by Independent Inspection Body

- Verification of Design against the Euro Chlor GEST 17/492 requirements:
  - Design personnel professional qualification
  - Design standards, principles and rules
  - General Assembly drawings
  - Valve component drawings / final machining drawings
  - Design calculations
  - Materials selection and restrictions
  - Verification of Particular Material Appraisals (PMA's)
  - Materials procurement procedures / Approved material suppliers
  - Bellows Cycle Life tests and test reports
  - Welding procedures and operators professional qualifications
  - NDE procedures and personnel qualifications - laboratory accreditations where applicable
  - Cleaning procedure for Chlorine Service
  - Test procedures
  - Drying procedure for Chlorine Service
  - Valve Certification System
  - Archiving system for Radiographic films and Reports, and other requested Quality Documents and Certificates, for min. 10 years



## Steps to undergo contd.

- Verification of the Quality Assurance System:
  - Quality Assurance and Control personnel qualification
  - Quality Assurance Manual
  - Review of Detailed Procedures as required by ISO 9001 and by the European Pressure Equipment Directive (PED 2014/68/EU)
  
- Verification of Manufacturing Process:
  - Process Management System
  - Evaluation of available manufacturing and testing equipment
  - Factory Audit, mainly focused on:
    - Assessment of approved suppliers for materials/components/services - onsite assessment of selected ones.
    - Inspection of incoming materials - visual, dimensional, and NDE where applicable
    - Check of materials and components storage system and inventory management system
    - Inspection of components in various manufacturing process stages
    - Testing of sample valves picked from regular production
    - Verification of specific for Chlorine Service processes - Cleaning, Drying, Packaging



## Steps to undergo contd.

- Detailed Assessment Report is issued by the Independent Inspection Body



No. of Pages 18

No. of Appendixes 73







## Steps to undergo contd.

### Step 4. Review of Assessment Report

- Euro Chlor Equipment Working Group reviews the Independent Inspection Body Assessment Report
- Equipment Working Group asks supplementary questions. Accepts report

### Step 5. Review of Field Test Reports

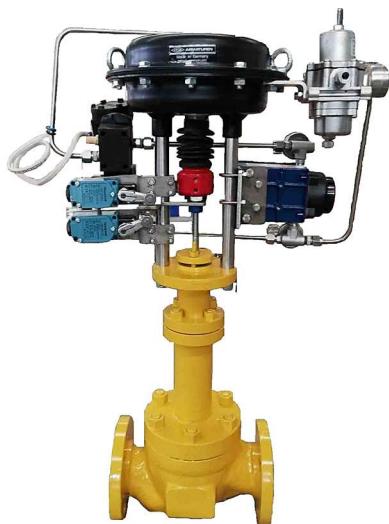
- Euro Chlor reviews Field Test Reports for similar valves as those assessed, received from:
  - minimum 2 World Chlorine Council member companies for
  - at least 3 valves per company to cover
  - minimum 2 years of Field Test for each valve

### Step 6. Issue of the Euro Chlor Certificate of Approval





## Control Valves Certified as Approved by Euro Chlor to GEST 17/492



22/06

APPROVAL CERTIFICATE

The Working Group Production, Storage and Transport Safety (GEST) of Euro Chlor, after examination of the documents listed in Appendix 1, declared that the valves manufactured by:

HUNT & MITTON VALVE COMPANY/Valve Industrial Park, Economic Development Zone, Dafeng District, Yancheng City, Jiangsu Province 224100, China

As described hereafter:

- Are in accordance with the specification GEST 17/492 version 2
- And are approved for use with dry gaseous chlorine for PN16 and ANSI 150 and for liquid and gaseous chlorine for PN40 and ANSI 300.

This Approval Certificate is given for the flanged bellow sealed globe valves models:

- Bellows Seal Globe Control Valves Series 5801
- Manufactured with dimension DN25 mm to DN150 mm/1 inch to 6 inches,
- According to PN16, PN40, ANSI 150 Lbs an ANSI class 300Lbs,
- And in accordance with the documents listed in Appendix 1, an original of which being filed by Euro Chlor.

Euro Chlor keeps the right to cancel this approval certificate in case of infringement of the prescription of the GEST specification 17/492.

Hunt & Mitton  
Valve Company



Mr Martin Greenhalgh  
President

Location:  
United Kingdom

Date: 17/03/2022

Euro Chlor



Ms Martleen Pauweis  
Euro Chlor Manager

Location:  
Brussels/Belgium

Date: 17/03/2022

Working Group Production,  
Storage and Transport  
Safety (GEST)



Ms Claudia Paarmann  
GEST Chairman

Location:  
Stade/Germany

Date: 17/03/2022



CloroSur



- 1. Control valve bodies have larger inside diameters and longer strokes than ON/OFF valve bodies to ensure good control performance across a wide range of applications including**
  - Anti Cavitation
  - Low noise
  - Flashing
- 2. Euro Chlor GEST 17/492 requirements have been successfully applied to a control valve body**
- 3. The Euro Chlor certification process requires the manufacturer to submit their designs, Q. A. Systems and Manufacturing processes to a comprehensive assessment by an Independent Inspection Body.**
- 4. Euro Chlor requires a satisfactory report from the Independent Inspection Body and 2 years satisfactory operating experience before the Approval Certificate is issued.**

**GEST 17/492 = Performance + Zero Emissions**

## Control Valve trim after 6 Years of Service



### Application Details

Valve serial No = SN5440-01

Fluid = Chlorine Gas

Temperature = 90 C

Inlet Pressure = 12.5 barg

Outlet Pressure = 1.5 barg

Flowrate = 2600 kg/hr

Valve Details = Control Valve Size = DN100 class 300

Body material = A216 WCC

Trim Type = 2 stage noise attenuation - Balanced plug

Bellows material = 2 ply Hastelloy C276

Plug material = 316 with stellite HF

Seat Material = 316 / Stellite HF

Stem material = Hastelloy C22

Service Life = Installed Date = May 2016

Removal Date = June 2022

6 Years in Service 24 hours per day, 7 days per week.





## Is it Difficult to become a Euro Chlor Approved Manufacturer?

Ludovic Kiss - Technical Director



After

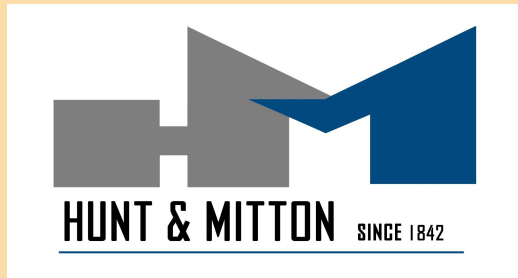


Before



Thank you for your attention today

I am happy to answer any questions you may have



**Come and see us at EBP Solutions Booth.**

