Björn Folkeson RISE





TESTING AND CERTIFICATION OF SHUT-OFF VALVES FOR DISTRICT HEATING AND COOLING

For a reliable DHC infrastructure

Björn Folkeson

2018-09-27

RISE Research Institutes of Sweden

Division Built Environment Energy and circular economy





Contents

- RISE in brief
- DHC at RISE
- Certification of DHC valves
- Testing in practice
- Why certify?



RISE in brief

RISE Research Instutes of Sweden

Present in Sweden and beyond

- Independent state owned research institute
- 2 300 employees

Wide scope of business and research areas

- Digitalization, Energy, Life Science, Mobility, Sustainable cities
- Supporting the smallest SME:s and the largest businesses
- 100 testbeds and demonstration facilities

Quality Assurance

- Technical assessments and verification
- Testing and certification
- Standardization



District Heating and Cooling at RISE

Research

- Innovative DHC solutions in cities
 - Demonstrators in EU
- Aging of DH pipes
 - Degradation of polyurethane foam
- Low temperature DH
 - Steel → Plastic

Certification

- DH substations for detached houses
- DH substations for apartment buildings
- DHC pipes and pipe components
- Shut-off valves for DHC

Standardization

- Member of Swedish mirror committee for CEN/TC 107 Prefabricated DHC pipe systems (EN 488)
 - Working groups for pipe systems and PE casings
- DH substations









VALVE TESTING

EN 488:2015



Valve testing

EN 488:2015

Tough real-life conditions

Has to withstand forces from:

- Thermal expansion
- Thermal contraction
- Soil movements

• • • •



Valve testing

EN 488:2015

The purpose is clear:

The valve shall

Withstand harsh underground conditions while maintaining its function

→Be maneuverable and remain tight

Underground conditions simulated in lab



EN 488:2015 testing – overview

- Axial compressive force test
- Axial tensile force test
- Bending test
- Manouverability test
- Tightness test (after the whole test sequence)



Axial tension test

Example: DN800, PN 25

 $F = 3624 \text{ kN} \ (\approx 369 \text{ tonnes})$

Temp = 20 °C

Manouvering during tension

P1 = P2 = 25 Bar

After closing:

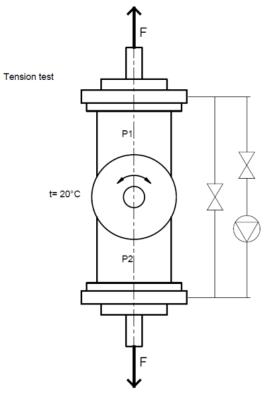
P1 ≈ 0 Bar

P2 = 25 Bar

After opening:

P1 = P2 = 25 Bar







Axial compression test

Example: DN800, PN 25

 $F = 4761 \text{ kN} \ (\approx 485 \text{ tonnes})$

Temp = $90 \, ^{\circ}\text{C}$

Manouvering during compression

P1 = P2 = 25 Bar

After closing:

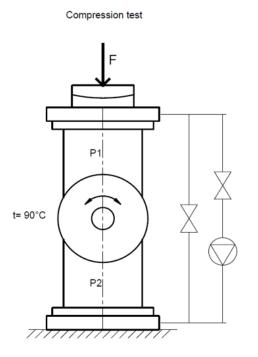
P1 ≈ 0 Bar

P2 = 25 Bar

After opening:

P1 = P2 = 25 Bar







Bending test

Example: DN800, PN 25

M = 476 kNm

Temp = 20 °C

Manouvering during bending

P1 = P2 = 25 Bar

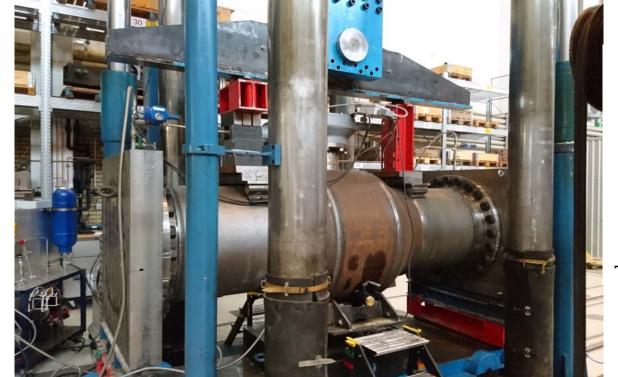
After closing:

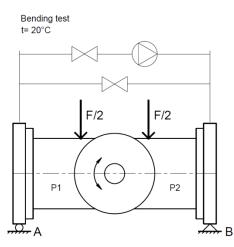
 $P1 \approx 0 \text{ Bar}$

P2 = 25 Bar

After opening:

P1 = P2 = 25 Bar







EN 488:2015 testing – in figures

Example: DN800, PN 25

- In total: 54 opening/closing sequences, min. 30 min between cycles
- Effective testing time: 5 days
- Requirements
 - Max. opening/closing torque
 - Not exceeding manufacturers specification
 - Tightness, shell and stem casing
 - 1,5 x PN, 10 min
 - No visible leakage
 - Tightness, seat
 - 1,1 x PN, 10 min
 - Example: DN 800, 27.5 bar: appr. < 5 ml/10 min



VALVE CERTIFICATION EHP 003 + EN 488:2015

Certification of DHC valves - EHP 003

- Based on testing according to EN 488:2015
- Launched in April 2016
- Coordinated by Euroheat & Power
- One of several EHP certification programs
 - 2007: EHP 001, Pre-insulated straight pipes
 - 2016: EHP 003, Steel valves
 - 2017: EHP 004, Eco-efficient substations



GUIDELINES: EHP/003 CERTIFICATE: XX/YY

CERTIFICATION Guidelines EHP/003/April 2016

Approved by the Euroheat & Power Certification Board

EUROHEAT & POWER CERTIFICATION
GUIDELINES FOR THE QUALITY
ASSESSMENT OF DISTRICT HEATING
STEEL VALVES

EHP/003/April 2016



Certification of DHC valves - EHP 003 - overview

EHP...

...approves test institutes

...approves certification bodies

...lists valid certificates



To verify a certificate

Check the valve label

Check the EHP website





Certification of DHC valves - EHP 003 - overview

Testing (EN 488) construction type Certificate valid for DN range Certificate Valid for 6 years Manufacturing inspection inspections



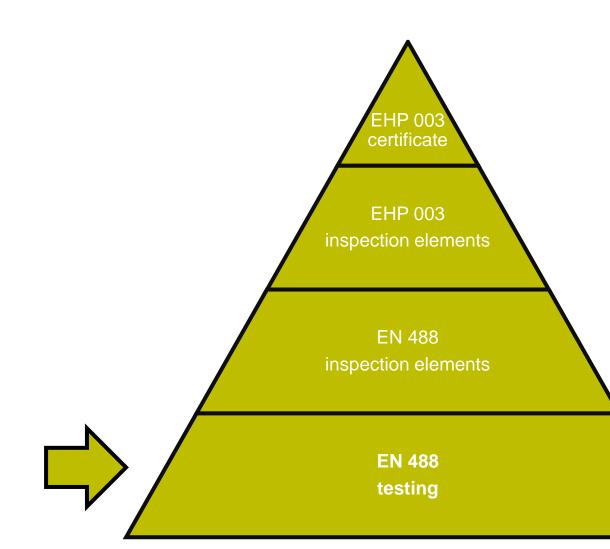


Why not just EN 488 testing?

The test report says the valve was OK, but...

- Is it still OK, 4-5 years later?
 - Left to the manufacturer to answer
- No control of the manufacturer's QMS
 - Risk for quality reduction
- Risk for changes in product
 - Are you even getting the same valve?

Testing ≠ **certification!**

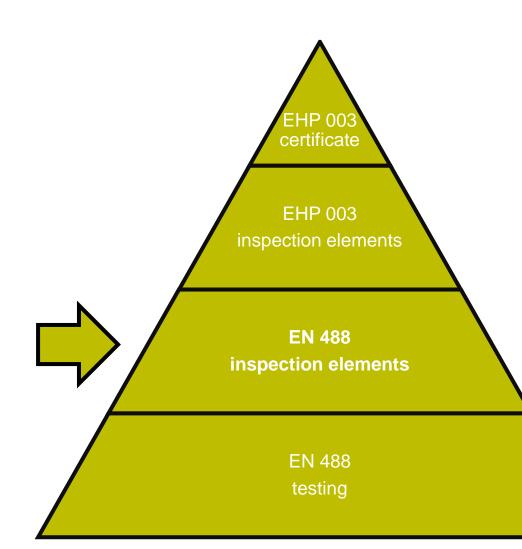


Why not just EN 488 certificate?

You have received an EN 488 certificate, but...

- Is inspection included?
 - Yearly?
 - What is covered by the inspections?
- Who performed the tests?
 - Approved for testing?
 - Quality of the test results?

Many question marks!



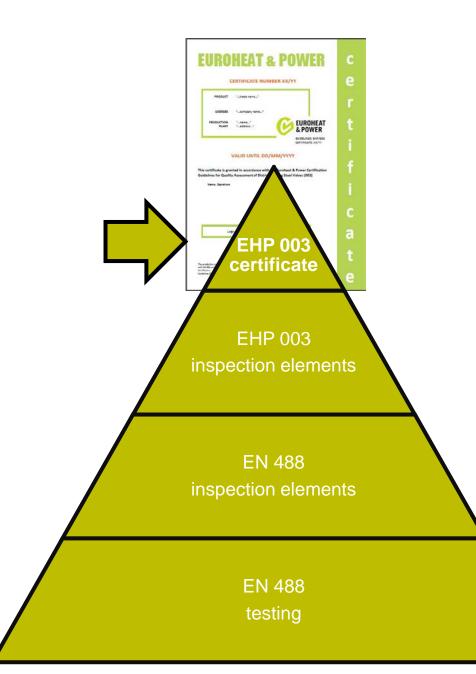
Why EHP 003 certification?

EN 488 included!

"The production complies with the EN 488:2015 and EHP Certification Guidelines [003]."

- We're also certain that...
 - ...the test institute is approved
 - ...the certification body is approved
 - ...the certificate is valid while listed on website
 - ...manufacturing inspection is performed yearly
 - ...the certification program is maintained by the coordinator

The product fulfils the EN 488 and EHP 003 requirements for the lifetime of the certificate!



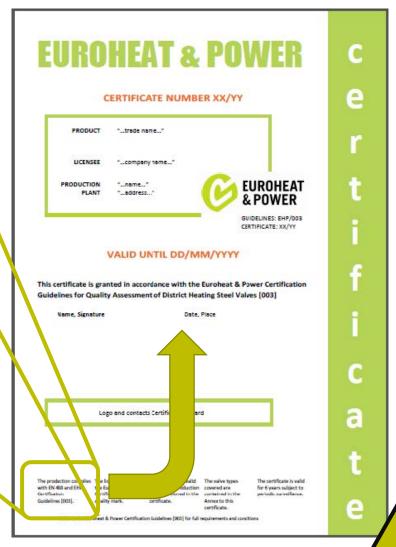
Why EHP 003 certification?

EN 488 included!

"The production complies with the EN 488:2015 and EHP Certification Guidelines [003]."

Pending certificate layout change

→ EN 488 info to center



certificate **EHP 003** inspection elements EN 488 inspection elements

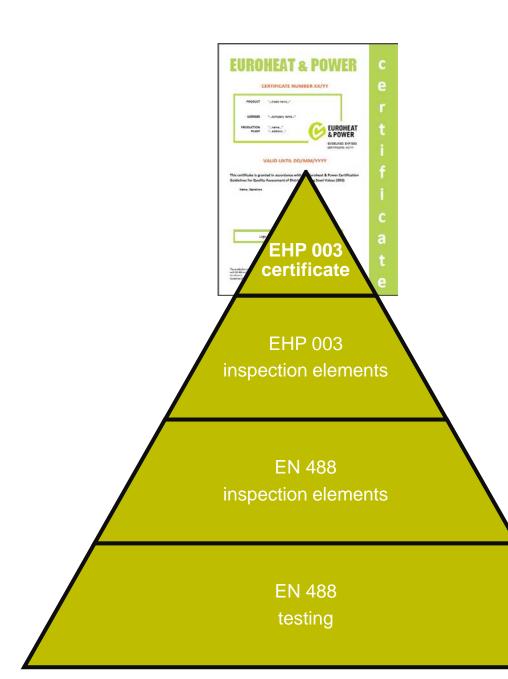
EN 488

testing

Why EHP 003 certification?

The benefit?

- For the manufacturer:
 - Ensures the quality of the product
- For the purchaser:
 - Ensures all necessary requirements are fulfilled
- For the network owner:
 - Ensures reliability and long term cost efficiency



Valid EHP 003 certificates

Certificate	Licensee		Product	Production plant	Issuing certification body
EHP003 01/01	Vexve Oy	▼ VEXVE OY	Vexve and Naval Steel ball valves, for preinsulated district heating and cooling valve assemblies. DN 10 - 800	Vexve Oy Pajakatu 11, Sastamala, and Riihenkalliontie 10, Laitila Finland	RISE Research Institutes of Sweden
EHP003 01/02	Kompotek AB	KOMPOTEK	2510-HW full bore and reduced bore steel ball valves, for preinsulated district heat valve assemblies. DN 80 - 1000	Shanghai Pudong Hanwei Valve Co Ltd. 245 Hangyin Road 201202 Shanghai, China	RISE Research Institutes of Sweden
EHP003 08/01	BROEN OIL & GAS Sp. z o.o.	BROEN VALVE TECHNOLOGIES	Trunnion mounted full port and reduced port ball valves, DN 150 – DN 1000	BROEN OIL & GAS Sp. z o.o. UI. Wojska Polskiego 4 64-610 Rogoźno Poland	IMA Materialforschung und Anwendungstechnik GmbH
EHP003 08/02	BROEN S.A.	BROEN VALVE TECHNOLOGIES	Floating ball valves with full port and reduced port, DN 25 $-$ DN 500	BROEN S.A. Pieszycka 10 58-200 Dzierżoniów Poland	IMA Materialforschung und Anwendungstechnik GmbH
EHP003 09/01	TEMPER LLC	-6-TEMPER	Temper steel ball valves, for pre-insulated district heating and cooling valve assemblies. DN 10 - 300 mm.	TEMPER LLC Schersa str. 93A, Kurgan 940007 Russia	Technická inšpekcia, a.s.



SUMMARY

Summary

- EHP 003-certification
 - Third-party quality assurance of the valve
 - Facilitates for manufacturer, purchaser and network owner
- EHP 003 certification includes all aspects of EN 488:2015 (and more)
- RISE is your *one stop shop*: testing, certification and manufacturing inspection
 - EHP 001 (Piping systems)
 - EHP 003 (DH valves)
 - EHP 004 (DH substations)
 - Also counseling, technical assessments, research





Thank you for your attention.

 $\underline{Bjorn.Folkeson@ri.se}$

+46 10 516 54 46

RISE Research Institutes of Sweden

Division Built Environment

Energy and circular economy



