

## TYPE TESTING OF BALL VALVES

**Requested by** **Koka Oy**  
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**Order ref.** 11.4.2018, Timo Kariluoma

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**Assignment** **Type testing of ball valves**

**Sample details** The customer delivered 5 different types of "Greenline" full bore ball valves on 22.5.2018. Samples are described in the Appendix 1.

| Samples                                                                          | LVI      | Marked at Eurofins |
|----------------------------------------------------------------------------------|----------|--------------------|
| Greenline DN15 inner threads ½" T-lever                                          | 3713 009 | 18.078.1-5         |
| Greenline DN15 inner and outer threads ½" T-lever                                | 3713 037 | 18.080.1-5         |
| Greenline DN20 inner threads ½" T-lever                                          | 3713 010 | 18.079.1-5         |
| Greenline DN20 inner and outer threads ½" T-lever                                | 3713 038 | 18.081.1-5         |
| Greenline DN15 water meter valve inner thread ½" and inner thread nut ¾" T-lever | 3825 530 | 18.082.1-5         |

**Methods**

SFS-EN 1213. Building valves. Copper alloy stopvalves for potable water supply in buildings. Tests and requirements. 1999.

NKB 4. Product rules for sanitary taps for hot and cold water supply systems. 1986.

ISO 6957. Copper alloys - Ammonia test for stress corrosion resistance. 1988.

ISO 6509. Corrosion of metals and alloys - Determination of dezincification resistance of brass. 1981.

SFS-EN 1267. Industrial valves – Test of flow resistance using water as test fluid. 2012.

**Results**

Test results are presented in the Appendix 2.

The lever of cracked at 15 Nm. Spindle remained unbroken and the valve was still working and tight.

Other tested characteristic fulfils requirements of standards.

**Espoo, 31.8.2018**



*Ville Matveinen*

*Expert*



*Christer Björklund*

*Laboratory Technician*

**Appendices**

1 Sample description

2 Test results

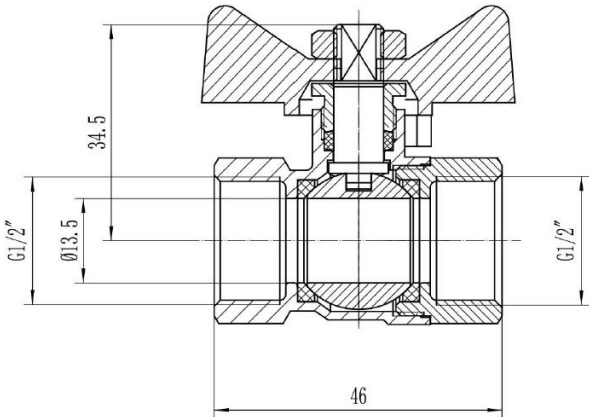
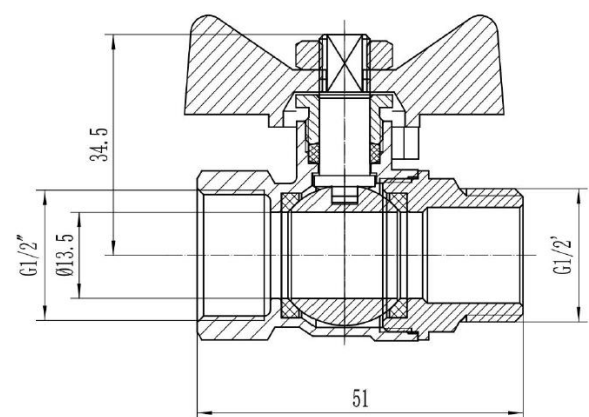
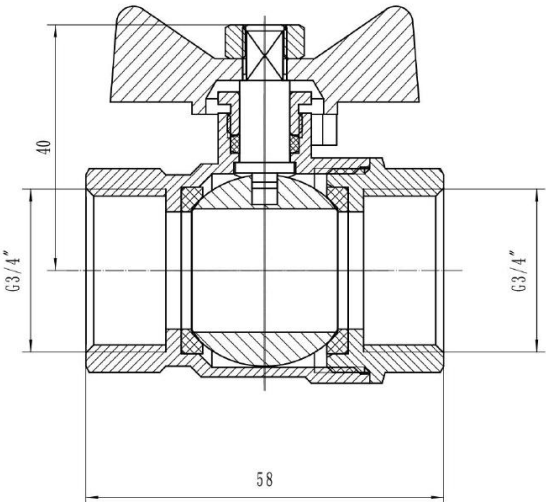
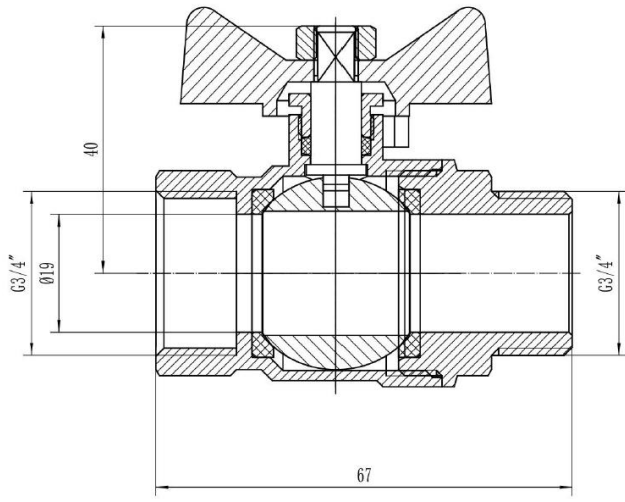
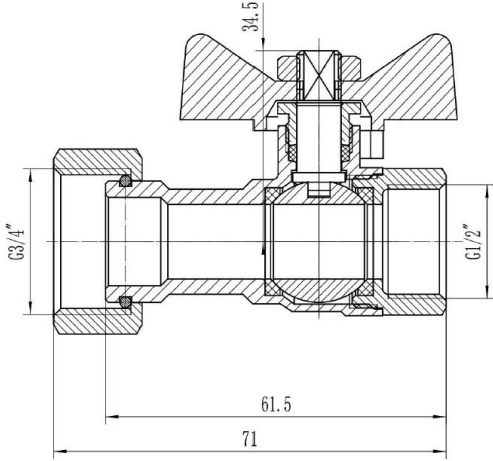
**Distribution**

Customer, electronically approved

## KOKA BALL VALVE SAMPLES



Picture 1. DN15 inner threads  $\frac{1}{2}$ " T-lever, DN15 inner and outer threads  $\frac{1}{2}$ " T-lever, DN20 inner threads  $\frac{1}{2}$ " T-lever, DN20 inner and outer threads  $\frac{3}{4}$ " T-lever, water meter valve inner thread  $\frac{3}{4}$ " and inner thread nut  $\frac{3}{4}$ " T-lever

|                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Greenline DN15 inner threads ½" T-lever</p>                                                                                            | <p>Greenline DN15 inner and outer threads ½" T-lever</p>  |
| <p>Greenline DN20 inner threads ¾" T-lever</p>                                                                                                      | <p>Greenline DN20 inner and outer threads ¾" T-lever</p>     |
| <p>Greenline water meter valve inner thread ½" and inner thread nut ¾" T-lever</p>  |                                                                                                                                                                                                                                                          |

## TEST RESULTS

**Samples:** Ball valves  
**Manufacturer:** Koka Oy  
**Date of testing:** 22.5.2018-20.8.2018

### 1. CONSTRUCTION

#### 1.1. Dimensions and designation

Full bore ball valves. Dimensions according to drawings. See Appendix 1.

| Sample     | Bore of ball, mm | Thread length, mm        |
|------------|------------------|--------------------------|
| 18.078.5   | 13,20            | 11,44 ja 11,36           |
| 18.079.2   | 19,10            | 12,86 ja 12,92           |
| 18.080.3   | 13,13            | 11,30 ja 9,10            |
| 18.081.1   | 19,10            | 12,78 ja 11,78           |
| 18.082.1-5 | 13,18            | 11,45 ja 9,81 (3/4" nut) |

#### 1.2. Marking

DN size, thread size in inches (1/2"), nominal pressure PN and CR (corrode resistance).

#### 1.3. Finishing

No remark.

### 2. MATERIAL

#### 2.1. Material composition

| Eurofins Expert Services Ltd analyses (optical emission spectrometer): 170-171/18 |               |      |      |      |       |      |      |       |      |       |      |
|-----------------------------------------------------------------------------------|---------------|------|------|------|-------|------|------|-------|------|-------|------|
| Analysed on 21.6.2018                                                             |               |      |      |      |       |      |      |       |      |       |      |
| Koka Oy                                                                           | Composition % |      |      |      |       |      |      |       |      |       |      |
|                                                                                   | Sn            | Pb   | Zn   | Ni   | P     | Fe   | Si   | Mn    | As   | Al    | Cu   |
| Koka DN20, ball                                                                   | 0,77          | 2,90 | 36,7 | 0,31 | 0,006 | 0,97 | 0,04 | 0,04  | 0,01 | 0,27  | 57,9 |
| Koka DN20, body                                                                   | 0,10          | 2,20 | 35,0 | 0,05 | 0,006 | 0,11 | 0,05 | <0,01 | 0,07 | <0,01 | 62,4 |

Result: body of the valve corresponds to brass material CW602N. The ball is made of another brass material.

## 2.2. Dissolution of heavy metals (NKB4)

Report no. S-03405-18

Test date: 5.-29.7.2018

| Test water volume<br>0.020 liters | 9 <sup>th</sup> test water |           | 10 <sup>th</sup> test water |           | Limit<br>µg/sample |
|-----------------------------------|----------------------------|-----------|-----------------------------|-----------|--------------------|
|                                   | µg/l                       | µg/sample | µg/l                        | µg/sample |                    |
| Cadmium (Cd)                      | 0.5                        | < 0.1     | 0.5                         | < 0.1     | 2 *                |
| Lead (Pb)                         | 84                         | 1.7       | 83                          | 1.7       | 15 **              |

\* Maximum Cd amount dissolved in 9<sup>th</sup> or 10<sup>th</sup> test water.

\*\* Maximum average Pb amount dissolved in 9<sup>th</sup> and 10<sup>th</sup> test water.

## 2.3. Dezincification resistance (DZR) test (ISO 6509)

| Samples: ball valve 1 ½" |                | Result dezincification |                 | Requirement                               |
|--------------------------|----------------|------------------------|-----------------|-------------------------------------------|
|                          |                | Average value<br>(µm)  | Max. value (µm) |                                           |
| ball valve<br>body       | body: sample 1 | 18                     | 38,6            | mean value ≤ 200 nm<br>max value ≤ 400 nm |
|                          | body: sample 1 | 9                      | 26,5            |                                           |

## 2.4. Stress corrosion (ISO 6957)

Test method: ISO 6957 Medium of corrosion: ammonium chloride, pH = 10,5

Pickling liquid: 5% H<sub>2</sub>SO<sub>4</sub>

| Samples: DN15 water meter valve | Result    | Requirement                                       |
|---------------------------------|-----------|---------------------------------------------------|
| tightened nut                   | no cracks | Max. depth of cracks<br>1/3 of the wall thickness |

## 3. TIGHTNESS AND PRESSURE RESISTANCE OF BALL VALVES

### 3.1. Tightness, cold and hot water valves

Valves are tested first closed and then open at water pressures of 1600 kPa and 20 kPa, water temperatures 93 ±2 °C and 5-25 °C, test period 15 min.

| Sample (size) | Number of samples | Result | Requirement       |
|---------------|-------------------|--------|-------------------|
| 18.078.1      | 1                 | tight  | SFS-EN 1213:7.3.1 |
| 18.079.2      | 1                 | tight  |                   |
| 18.080.2      | 1                 | tight  |                   |
| 18.081.5      | 1                 | tight  |                   |
| 18.082.5      | 1                 | tight  |                   |

### 3.2. Pressure resistance

Valves open and outlet closed at the pressure of 2,5 MPa (25 bar), cold water (5 - 25 °C), test period 10 min.

| Sample (size) | Number of samples | Result                   | Requirement       |
|---------------|-------------------|--------------------------|-------------------|
| 18.078.1      | 1                 | no permanent deformation | SFS-EN 1213:7.3.2 |
| 18.079.2      | 1                 | no permanent deformation |                   |
| 18.080.2      | 1                 | no permanent deformation |                   |
| 18.081.5      | 1                 | no permanent deformation |                   |
| 18.082.5      | 1                 | no permanent deformation |                   |

## 4. ENDURANCE

Test parameters: Water; temperature  $93 \pm 2$  °C, pressure 200-400 kPa, flow 0,1 dm<sup>3</sup>/s. Torque  $\approx 2,5$  Nm

| Sample (size)                            | Number of cycles | Test dates      | Result           | Requirement      |
|------------------------------------------|------------------|-----------------|------------------|------------------|
| 18.079.3 - DN20 inner threads ½" T-lever | 10 000           | 20.6.-22.6.2018 | Tight, no damage | Tight, no damage |

## 5. MECHANICAL STRENGTH

### 5.1. Bending test

Bending moment of the valve with metallic tubes for 10 minutes. Samples: threaded ends, 1 sample /dimension

| Sample (size) | Number of samples | Bending moment Nm | Result    | Requirement                    |
|---------------|-------------------|-------------------|-----------|--------------------------------|
| 18.078.2 DN15 | 1                 | 75                | no damage | No deformation or other damage |
| 18.079.1 DN20 | 1                 | 95                | no damage |                                |
| 18.080.5 DN15 | 1                 | 75                | no damage |                                |
| 18.081.2 DN20 | 1                 | 95                | no damage |                                |
| 18.082.4 DN15 | 1                 | 75                | no damage |                                |

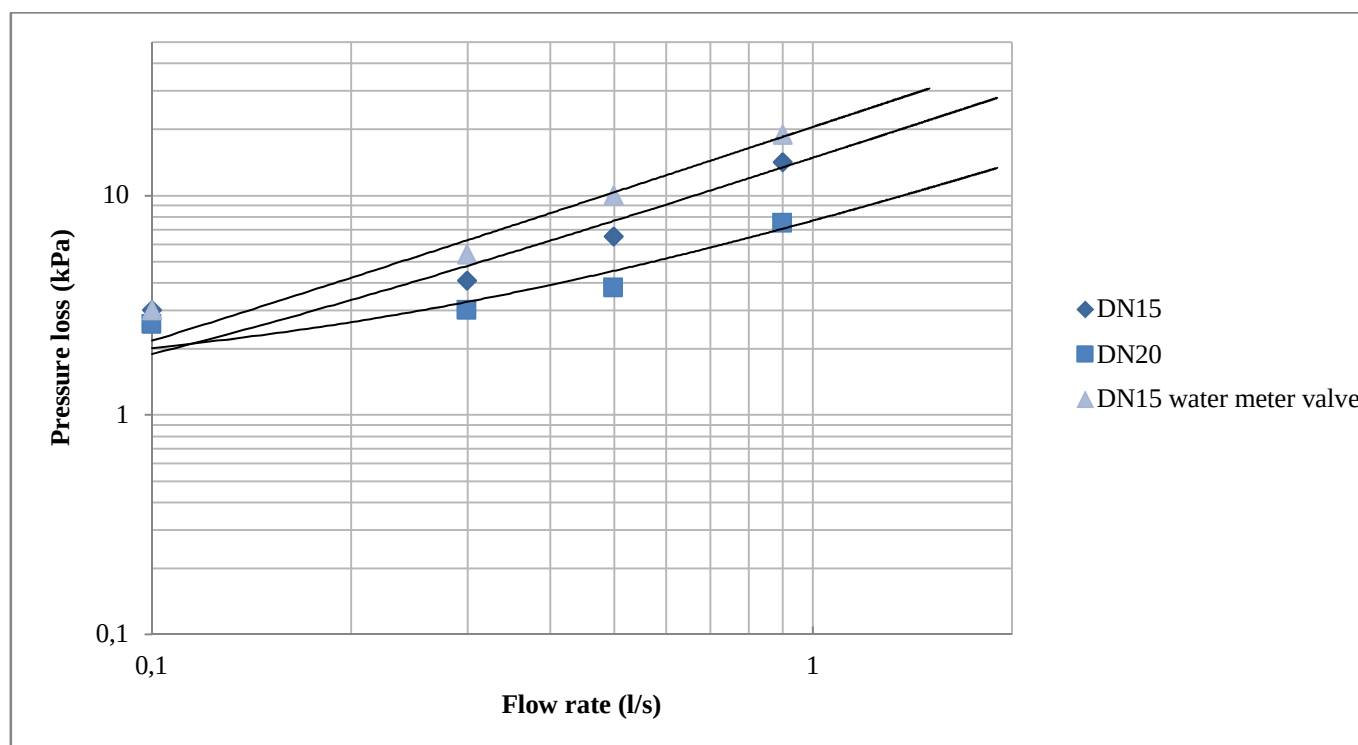
## 5.2. Torque test of the operating device

Ball of the valve is locked in open position. Test torque is applied to the handle to open direction for 5 minutes.

| Sample (size)   | Number of samples | Torque Nm | Result                                                                                      | Requirement                                    |
|-----------------|-------------------|-----------|---------------------------------------------------------------------------------------------|------------------------------------------------|
| 18.078.5 DN15   | 1                 | 10        | no damage                                                                                   | No deformation or other damage, tight 1600 kPa |
| 18.081.1-3 DN20 | 1                 | 15        | Lever/handle got broken at 15 Nm (tested 3 times) <sup>1)</sup><br>Spindle remains unbroken |                                                |

1) Broken lever/handle do not prevent opening and closing the valve as spindle remains unbroken

## 6. FLOW RESISTANCE (SFS-EN 1267)



## 7. ACOUSTICS

Full bore ball valve. No disturbing noise was observed.