

# Neles™ capping valve Series PZ

Neles capping valves provide for automatic opening and closing of batch digesters for chip fill. Complete accessories for computer control are furnished in the assembly. Over 2000 units are in use at pulp mills around the world.

## Design features

The unique design features of PZ valves offer benefits in installation, productivity and safety.

A preloading device assists the ball to the seat with the desired pressure for tight sealing. No adjustments are needed.

The preloading device is outside the body to prevent chips and liquor from causing hazards.

### Fits straight onto digester flange

The lower body half can be modified in accordance with the digester flange dimensions and standards.

### High reliability and endurance

PZ capping valves have metal to metal seating and a true Stemball™. In this design the ball and stem are made in a single piece for high reliability and endurance. Thanks to the single seat design, there is a spare seating surface available when the ball is turned 180°. The body joint accommodates a continuous gasket between the flanges.

### No damage caused by occasional overfills

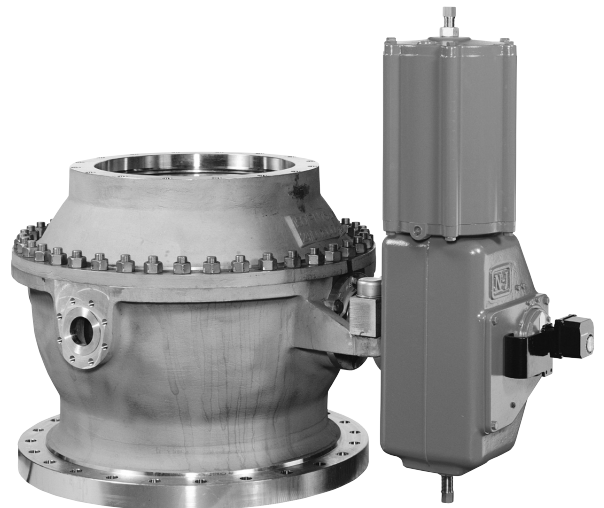
The Stemball® has a rear stem and a support to prevent sideways movement of the ball when closing against chips.

### Added assurance, no supervision

Valves enable secure operation and full automation. To help prevent unintended operation when the digester is pressurized, an assembly of two independent interlocks including sensitive pressure switches is normally supplied.

### Increased productivity

Quick opening and closing make the valve efficient. Chip filling is efficient because the valve has a full bore ball. The ball flow path is provided with a liner insert to allow smooth passage of the chips for fast filling.



### Fast return on investment

An investment in capping valves soon pays off. Low maintenance and long service life can be expected.

Savings are achieved because filling time and labour costs are reduced. If we estimate that the cooking circulation cycle is reduced by 8 minutes and the time between fillings is 5 hours, then the increase in production at the average mill will be 2.5%. The daily increase for a mill producing 130,000 t/a would be 10 tons.

### Nominal sizes and pressure ratings

Neles capping valves are manufactured in PN 16 and ASME class 150 pressure ratings in the following sizes:

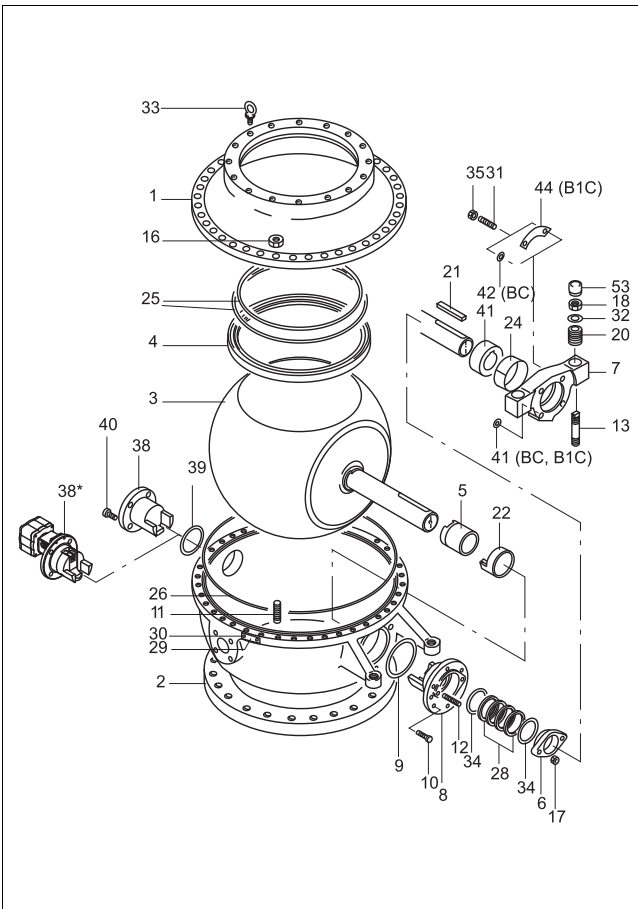
- DN 500 or 20 inch
- DN 600 or 24 inch
- DN 750 or 30 inch

The lower flange of the valve is custom-made to match the digester neck at the mill.

### Operation

The capping valve is normally operated with a Neles pneumatic actuator. If required, a hydraulic or electric actuator can be used instead. A variety of limit switches can also be supplied.

## Assembly drawing



## Parts list

| ITEM | QTY  | PART DESCRIPTION     | MATERIAL                    |
|------|------|----------------------|-----------------------------|
| 001  | 1    | BODY UPPER PART      | ASTM A351 gr. CF8M          |
| 002  | 1    | BODY LOWER PART      | ASTM A351 gr. CF8M          |
| 003  | 1    | BALL                 | ASTM A351 gr. CF8M + HCr    |
| 004  | 1    | BALL SEAT            | AISI 316 + ALLOY 50 Nb      |
| 005  | 1    | BEARING BUSHING      | AISI 316 + HCr+PTFE         |
| 006  | 1    | GLAND                | ASTM A351 gr. CF8M          |
| 007  | 1    | CONSOLE              | EN 10025-S355J2G3 + ENP     |
| 008  | 1    | BONNET               | ASTM A351 gr. CF8M          |
| 009  | 1    | SPIRAL GASKET        | AISI 316 + PTFE             |
| 010  | 6    | HEXAGON SCREW        | ISO 3506 A4-80              |
| 011  | (40) | STUD                 | ASTM A193 gr. B8M           |
| 012  | 2    | STUD                 | ASTM A193 gr. B8M           |
| 013  | 2    | STUD                 | AISI 316                    |
| 016  | (40) | HEXAGON NUT HEAVY    | ASTM A194 gr. 8M            |
| 017  | 2    | HEXAGON NUT          | ISO 3506 A4-70/80           |
| 018  | 2    | HEXAGON NUT HEAVY    | ISO 3506 A4-70/80           |
| 020  | (24) | DISC SPRING          | EN 10083-1.8159             |
| 021  | 1    | KEY                  | UNS S31803                  |
| 022  | 1    | BEARING BUSHING      | UNS S21800                  |
| 024  | 1    | BEARING STRIP        | PTFE + C25                  |
| 025  | 2    | SEALING CORD         | PTFE                        |
| 026  | 1    | SEAL STRIP           | PTFE                        |
| 028  | 4    | PACKING RING         | PTFE                        |
| 029  | 1    | IDENTIFICATION PLATE | AISI 304                    |
| 031  | (8)  | STUD                 | TYPE AISI 329               |
| 032  | 2    | ADJUSTING PLATE KIT  | AISI 316                    |
| 033  | 4    | LIFTING EYE BOLT     | ASTM A576 gr. 1015          |
| 034  | 2    | SUPPORT RING         | PTFE + C25                  |
| 035  | (8)  | HEXAGON NUT          | CARBON STEEL + ZINC + PASS. |
| 038  | 1    | SUPPORTER            | ASTM A351 gr. CF8M          |
| 038* | 1    | REAR TILTING DEVICE  | ASTM A351 gr. CF8M          |
| 039  | 1    | SPIRAL GASKET        | AISI 316 + PTFE             |
| 040  | 4    | HEXAGON SCREW        | ISO 3506 A4-80              |
| 041  | 1    | BEARING RING         | TYPE AISI 329               |
| 042  | (6)  | WASHER               | CARBON STEEL + ZINC + PASS. |
| 044  | 1    | RETAINER PLATE       | AISI 316                    |
| 053  | 2    | PROTECTION COVER     | AISI 304                    |

( ) Quantities are related to valve size above numbers are for DN 600/24"

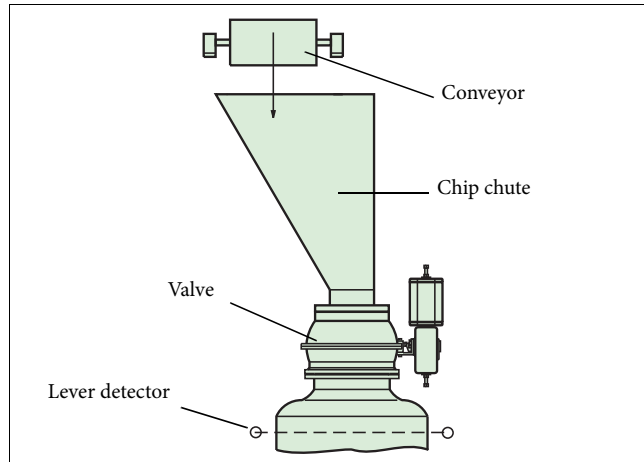
## Technical specifications

|  |  |
|--|--|
| Product type   | Full-bore ball valve<br>Ball and stem integrally cast<br>Split-body design<br>Single metal-seat design<br>Customer-fit lower flange                            |
| Pressure ratings   | PN 16 and ANSI 150 for the body  |
| Size range   | DN 500, 600 (750) / 20", 24" (30")   |
| Indication of the nominal size for the lower flange given in the second part of the size code, for example, 500/600. |  |
| Temperature range  | ... +200 °C / 390 °F   |
| Design standards   | Valve body: ANSI B 16.34<br>Body joint: ASME VIII<br>Valve flanges: Upper flange acc. to dimensional drawings, page 3<br>Lower flange as ordered by customer   |
| Standard materials   | Body halves: ASTM A 351 gr. CF8M<br>Ball: ASTM A 351 gr. CF8M + hard-chrome<br>Bearings: Hard-chromed PTFE + UNS S21800<br>Seat: AISI 316 + Cobalt based alloy |

|                            |  |
|----------------------------|--|
| Standard delivery includes | Factory-adjusted preloading device.<br>Linear insert in the flow opening of the ball.  |
| Options                    | Piston-type actuator (pneumatic).<br>Pressure switches for safety interlocks.<br>Water flushing for ball surface, see application report 2611/01/05EN.<br>Rear tilting device.   |
| Certification              | EN 10204 3.1 material certificates for body halves, ball and bonnet.<br>Tightness test certificate.  |
| Valve testing              | Each valve is tested for body and seat tightness.<br>The test pressure for the body is 30 bar (1.5 x PN).<br>The seat tightness testing is carried out with both air and water.<br>Test pressures are:<br>with air 0.7 and 5.6 bar / 10 and 82 psi<br>with inhibited water 6 and 20.6 bar. / 87 and 299 psi. |

### Chip feeding arrangement

The figure depicts the chip flow from a belt conveyor. A 15 degree angle prior to the valve achieves the best filling behaviour in cases where excessive air has to escape through the valve (upwards).



There must be efficient air removal when steam is used for packing the chips. Steam packing increases chip filling by 20-40% for each charge. Air evacuation requires screens inside the digester and a blower (fan) specially designed for this purpose.

### Interlocking

The primary devices of the system are two separate pressure switches. Their preset pressure can be low. Operation of the solenoid valves is virtually impossible when the digester is under pressure. The function of the packing steam valve can also be tied to this interlocking system.

### Determining port size for batch digester capping valves

The required port size for a Neles capping valve is determined by the digester volume and the desired filling time. The port area required for a ball capping valve using conveyor belt chip transport can be closely estimated when the required chip volume, filling time, and conveyor speed are known.

The following tables assist in selecting a capping valve.

| Target filling time                                       | Fill rate  | Valve size |
|---|--|------------|
| Digester volume 120 m <sup>3</sup> / 4200 ft <sup>3</sup> |  |            |
| 25 minutes  | 4.8 m <sup>3</sup> /min / 169 ft <sup>3</sup> /min | DN 500/20" |
| Digester volume 160 m <sup>3</sup> / 5600 ft <sup>3</sup> |  |            |
| 30 minutes  | 5.3 m <sup>3</sup> /min / 187 ft <sup>3</sup> /min | DN 600/24" |
| 35 minutes  | 4 m <sup>3</sup> /min / 141 ft <sup>3</sup> /min   | DN 500/20" |
| Digester volume 200 m <sup>3</sup> / 7000 ft <sup>3</sup> |  |            |
| 30 minutes  | 6.7 m <sup>3</sup> /min / 236 ft <sup>3</sup> /min | DN 600/24" |
| 40 minutes  | 5 m <sup>3</sup> /min / 176 ft <sup>3</sup> /min   | DN 600/24" |

This table is conservative and valid for digesters where excessive air moves upwards through the valve.

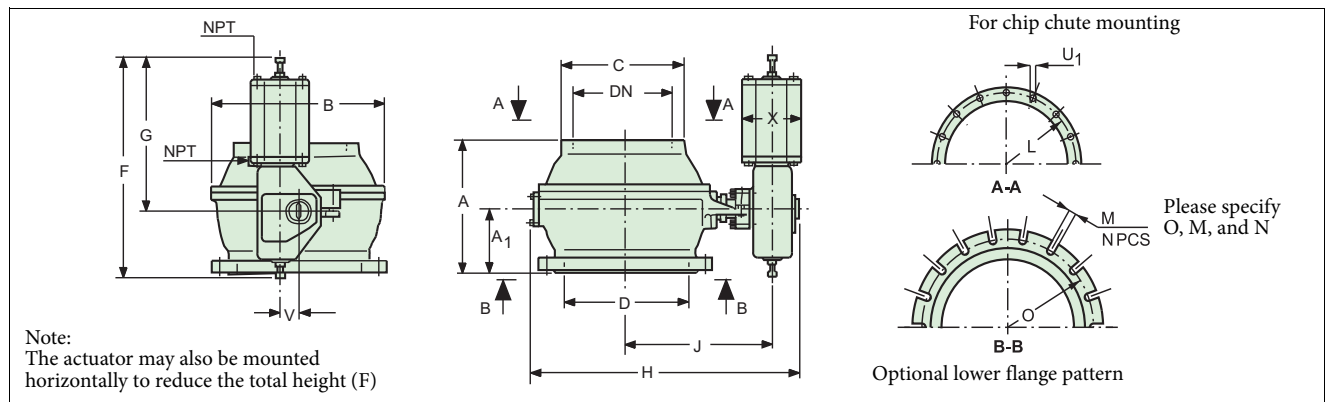
A modern digester is equipped with a screw-type conveyor feed.

High capacities of up to 16.7 m<sup>3</sup>/min / 600 ft<sup>3</sup>/min can be achieved. If the air evacuation is engineered correctly the filling time can be reduced considerably. Typically the following filling time has been achieved:

Digester volume 200 m<sup>3</sup> / 7000 ft<sup>3</sup>:  
 - valve size: 500/20"  
 - filling time: 20 min

In case the filling and chip packing cycle includes a periodical "vacuum pressure" inside the digester, a Rear Tilting Device (L option) is recommended to improve valve tightness and cycle life. "

### Dimensions



| VALVE  |     |               | Dimensions in mm |     |      |     |     |     |       |      |      |     |     |      | Pneumatic actuator type | kg** |
|--------|-----|---------------|------------------|-----|------|-----|-----|-----|-------|------|------|-----|-----|------|-------------------------|------|
| TYPE   | DN  | Lower flange* | A                | A1  | B    | C   | L   | U1  |       | F    | G    | X   | V   | J    |                         |      |
|        |     | D             |                  |     |      |     |     | M   | Depth |      |      |     |     |      |                         |      |
| PZ 500 | 500 | 490 ≤ D ≤ 520 | 730              | 400 | 920  | 625 | 590 | M20 | 38    | 1330 | 910  | 395 | 153 | 840  | B1C 32/95               | 1250 |
|        |     | 640 ≤ D ≤ 680 | 630              | 300 |      |     |     |     |       |      |      |     |     |      |                         |      |
| PZ 600 | 600 | 580 ≤ D ≤ 590 | 870              | 480 | 1070 | 740 | 700 | M20 | 42    | 1330 | 910  | 395 | 153 | 970  | B1C 32/105              | 1750 |
|        |     | 720 ≤ D ≤ 740 | 770              | 380 |      |     |     |     |       |      |      |     |     |      |                         |      |
| PZ 750 | 750 | 730 ≤ D ≤ 740 | 1080             | 600 | 1330 | 910 | 860 | M24 | 42    | 1660 | 1150 | 505 | 194 | 1200 | B1C 40/120              | 2600 |
|        |     | 880 ≤ D ≤ 890 | 930              | 450 |      |     |     |     |       |      |      |     |     |      |                         |      |

| VALVE |      |                   | Dimensions in inch |       |       |       |       |     |       |       |       |       |      |       | Pneumatic actuator type | lbs** |
|-------|------|-------------------|--------------------|-------|-------|-------|-------|-----|-------|-------|-------|-------|------|-------|-------------------------|-------|
| TYPE  | SIZE | Lower flange*     | A                  | A1    | B     | C     | L     | U1  |       | F     | G     | X     | V    | J     |                         |       |
|       |      | SIZE              |                    |       |       |       |       | UNC | Depth |       |       |       |      |       |                         |       |
| PZ 20 | 20   | 19.29 ≤ D ≤ 20.47 | 28.74              | 15.75 | 36.22 | 24.61 | 23.23 | 3/4 | 1.50  | 52.36 | 35.83 | 15.55 | 6.02 | 33.07 | B1C 32/95               | 2750  |
|       |      | 25.19 ≤ D ≤ 26.77 | 24.80              | 11.81 |       |       |       |     |       |       |       |       |      |       |                         |       |
| PZ 24 | 24   | 22.83 ≤ D ≤ 23.23 | 34.25              | 18.90 | 42.13 | 29.13 | 27.56 | 7/8 | 1.65  | 52.36 | 35.83 | 15.55 | 6.02 | 38.19 | B1C 32/105              | 3850  |
|       |      | 28.34 ≤ D ≤ 29.13 | 30.31              | 14.96 |       |       |       |     |       |       |       |       |      |       |                         |       |
| PZ 30 | 30   | 28.74 ≤ D ≤ 29.13 | 42.52              | 23.62 | 52.36 | 35.83 | 33.86 | 1   | 1.65  | 65.35 | 45.28 | 19.88 | 7.64 | 47.24 | B1C 40/120              | 5720  |
|       |      | 34.64 ≤ D ≤ 35.04 | 36.61              | 17.72 |       |       |       |     |       |       |       |       |      |       |                         |       |

\*) The lower flange is made to correspond to the digester flange. The valve height A varies with the lower flange diameter.

\*\*) Weights are only approximative due different lower flange sizes.

## How to order

|    |    |    |          |    |    |    |   |             |   |     |   |     |
|----|----|----|----------|----|----|----|---|-------------|---|-----|---|-----|
| PZ | K  | S  | *600/800 | A  | R  | V  | - | B1CU 32/105 | - | QX  | - | ACC |
| 1. | 2. | 3. | 4. & 5.  | 6. | 7. | 8. | - | 9.          | - | 10. | - | 11. |

NOTE \*Size marking, either in inches or in millimeters, defines also the upper end connection threads; unified threads when size expressed in inches and metric threads when size expressed in millimeters.

| 1. | PRODUCT SERIES / CONSTRUCTION / PRESSURE RATING   |
|----|---|
| PZ | Ball valve, lower body half with flange to be specified in order. Upper body half with 16 pcs tapped holes with metric threads or unified threads starting from center line. Body pressure rating PN 16 / ASME class 150. |

| 2. | CONNECTIONS / SPECIAL CONSTRUCTION  |
|----|---|
| K  | 2 pcs PN16 / DN 80 connections in lower body half.  |
| C  | 2 pcs ASME class 150 / NPS 3" connections in lower body half.   |
| N  | Lower body half without connections.  |
| Y  | Special connections, special location e.g. in upper body half or special quantity or some other speciality. |

| 3. | END-TO-END LENGTH   |   |  |
|----|---|---|--|
|    | DN 500 / 20"  | DN 600 / 24"  | DN 750 / 30"   |
| L  | 730 mm / 28.74", when flow port of lower body half is<br>490 mm ≤ D ≤ 520 mm / 19.25" ≤ D ≤ 20.47". | 870 mm / 34.25", when flow port of lower body half is<br>580 mm ≤ D ≤ 590 mm / 22.83" ≤ D ≤ 23.23". | 1080 mm / 42.52", when flow port of lower body half is<br>730 mm ≤ D ≤ 740 mm / 28.74" ≤ D ≤ 29.13". |
| S  | 630 mm / 24.80", when flow port of lower body half is<br>640 mm ≤ D ≤ 680 mm / 25.19" ≤ D ≤ 26.77". | 770 mm / 30.31", when flow port of lower body half is<br>720 mm ≤ D ≤ 740 mm / 28.38" ≤ D ≤ 29.13". | 930 mm / 36.61", when flow port of lower body half is<br>880 mm ≤ D ≤ 890 mm / 34.64" ≤ D ≤ 35.04".  |
| Y  | Special, to be specified in order.  | Special, to be specified in order.  | Special, to be specified in order.   |

| 4.  | SIZE |  |
|-----|------|--|
| mm  | in   |  |
| 500 | 20   |  |
| 600 | 24   |  |
| 750 | 30   |  |

| 5. | NOMINAL SIZE OF LOWER BODY HALF (mm or in)  |
|----|---|
|    | To be specified in order. Nominal size of lower body half shall be given in the same units as the valve size, see 4. sign separated with slash. |

| 6. | BODY  | BALL               | BALL SEAT                         | BEARINGS                        |
|----|-------|--------------------|-----------------------------------|---------------------------------|
| A  | CF8M  | CF8M + Hard chrome | 316 SS + Cobalt based hard facing | Coated hard chrome + UNS S21800 |
| C  | CG8 M | CG8M + CA-chrome   | 317 SS + Cobalt based hard facing | PTFE/ 254 SMO                   |

| 7. | BALL SEAT TYPE                           |
|----|--|
| R  | Scraping, locked, seat seals in grooves. |

| 8. | OPTIONS  |
|----|--|
| -  | Standard, without sign.                                      |
| V  | Water flushing for ball, see application report 2611/01/05EN |
| L  | Rear tilting device  |
| Y  | Special option, to be specified in order.                    |

| 9.       | ACTUATOR SERIES  |
|----------|--|
| B1CU 32  | Pneumatic actuator, double-acting, mounting face acc. to ISO 5211.   |
| B1CPU 32 | Pneumatic actuator, double-acting, mounting face acc. to ISO 5211 with Jammer locking device, see application report 2611/01/03. |

| 10.         | LIMIT SWITCH SERIES   |
|-------------|-----------------------|
| QX4VK05 HDM | Microswitches, 4 pcs. |

| 11.    | SAFETY LOCKING   |
|--------|--|
| ACC    | Interlocking system, see application report 2611/01/02 |
| Jammer | Jammer system, see application report 2611/01/03       |

Subject to change without prior notice.

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