



***TECHNICAL MANUAL***

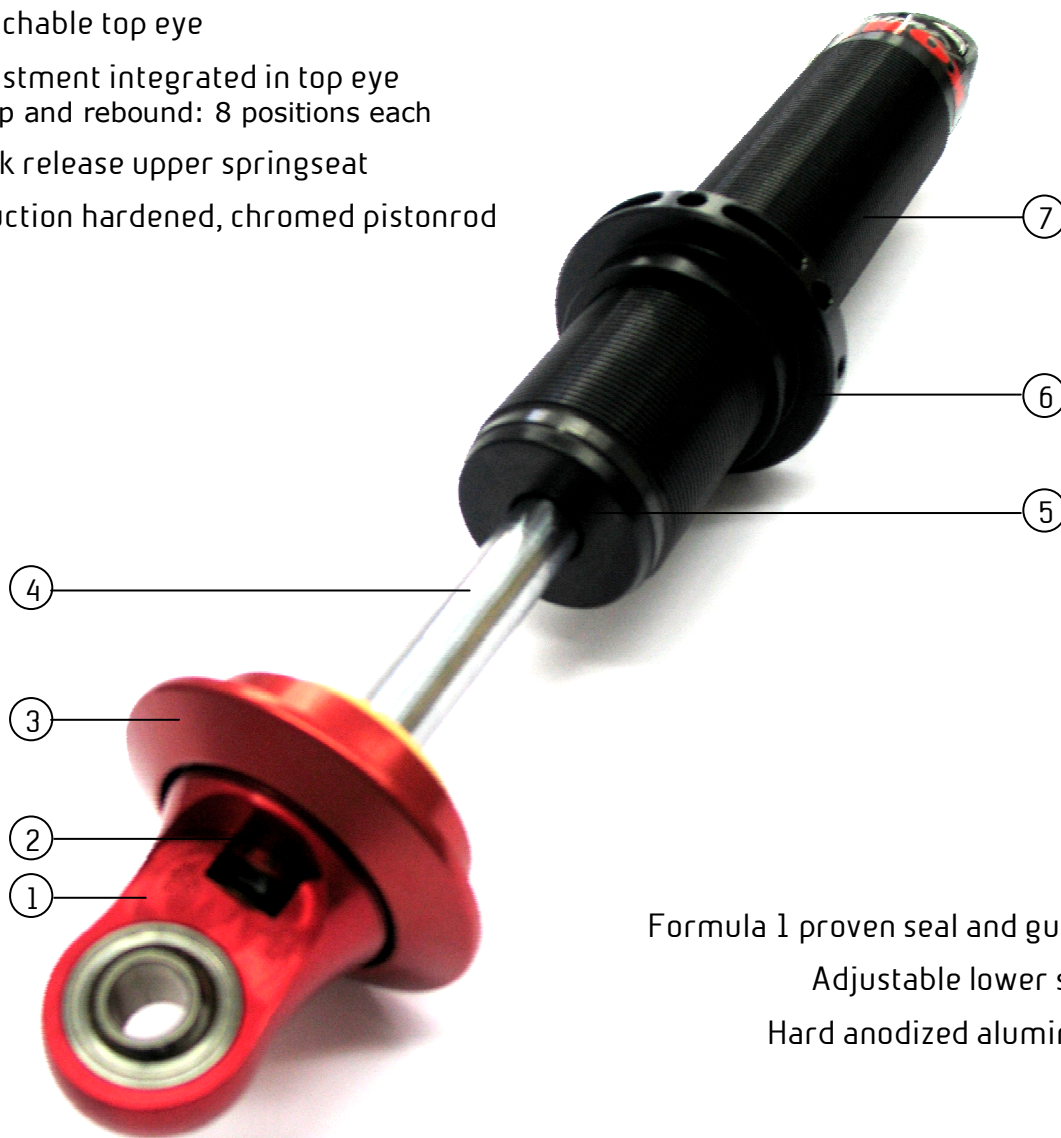
*2612 2-way adjustable race damper*



SERIES  
**2612**

## 2612 Features

- ① Detachable top eye
- ② Adjustment integrated in top eye  
Bump and rebound: 8 positions each
- ③ Quick release upper springseat
- ④ Induction hardened, chromed pistonrod



- Formula 1 proven seal and guide design ⑤
- Adjustable lower springseat ⑥
- Hard anodized aluminium body ⑦

## Other unique features

- Forces in both bump and rebound are generated by the piston area and are not effected by displacement of the piston rod
- Low speed damping in 2 stages (bleed holes and valve loaded ports), no use of needle valves
- Wide adjustment range in equal and repeatable clicks
- Factory assembled and calibrated adjustment cartridges
- Fully independent bump and rebound adjustability
- No need for external reservoir
- Works in any position
- Light weight
- Tailor made and individually tested
- Easily service
- Low friction

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**Revision history**  
Version 1.2: October 2008®

# 1 General information

The 2612 series is based on the proven technology of our 2812 MKII and 2822 MKII series racing dampers. The 2612 series has been developed to meet the highest quality standards. Be sure that you treat this product for what it is: a complex hydraulic device, containing precision parts and built with the most care. Be sure that the damper is not opened by unauthorized mechanics and note that the damper is under high gas pressure.

## 1.1 Damper type

The 2612 series is a mono-tube high pressure gas shock absorber. Specifically designed for competition purposes, it is fully adjustable while fitted on the car. It contains one adjuster in bump (compression) and one in rebound (extension). Its precision adjustment mechanism allows the maximum control possible over the generated damping forces.

## 1.2 Low speed damping

On modern racing cars precise control over the damping forces at low speeds is very important. This in turn means that very small flows of oil have to be controlled. In many racing damper designs, a needle valve is used to try to achieve this. Such a simple mechanism has many drawbacks. For Koni, repeatability, consistency and ease of use are a must for every racing damper. To achieve this, the 2612 series uses superior and advanced adjustment cartridges that control the opening and closing of valve loaded ports. These two cartridges are contained in the main piston, one for bump and one for rebound. They operate totally independent of each other. For both bump and rebound 8 adjustment positions are available, generating a total of 64 predefined damping curves. Distinct stops (clicks) assure that each port can only be either open or close.

Thus total repeatability of performance is engineered into the damper and the need for calibration on a damper dyno is eliminated.

A unique feature is that the low speed damping is created through 2 stages, the first by predefined bleed holes and the other one by ports.

## 1.3 High speed damping

With high piston velocities, such as those correlated with rough sections of pavement, the high speed damping becomes important. The suspension needs to be able to move instead of becoming solid due to too much damping. A main valve enclosed in the piston, controls the high speed damping. It allows the damper to have a blow-off force.

## 1.4 Unique features

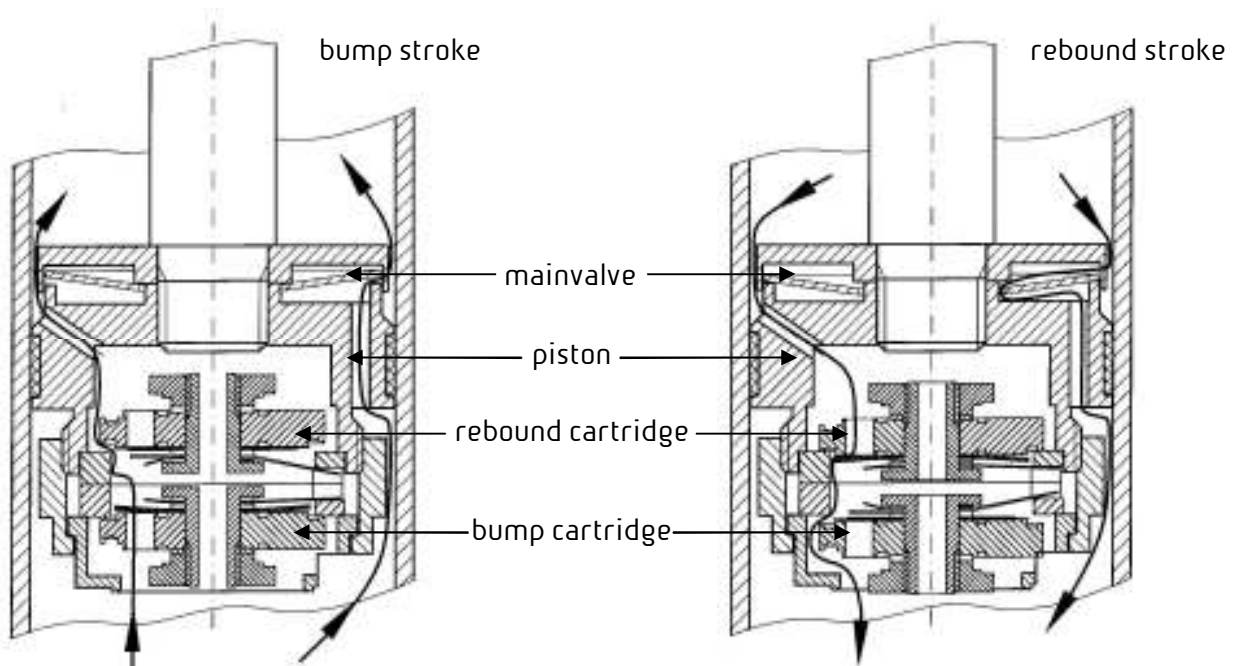
Also unique to both low as well as high speed damping is that the bump and rebound forces are generated by the piston area and not by rod displacement at all. This creates a very precise control over the damping forces and very little phase lag (hysteresis) due to the lower hydraulic pressures. Besides, it makes a separate reservoir to accommodate the bump adjuster superfluous, and installation simple, lightweight and clean.

## 2 Working principals of 2612

When the piston rod is pushed into the body of the damper, it displaces its own volume in oil. To make this possible the lower part of the damper is filled with nitrogen. This nitrogen can be compressed and is separated from the oil by a floating piston. When the piston rod is pushed into the body of the damper its volume will push down the floating piston a little bit and is thereby creating more space in the cylinder to accept the intruding piston rod. While moving the piston through the damper, oil will flow through the separate bump and rebound cartridges. In these cartridges the oil will flow through valve loaded ports. When the oil flows through it creates a pressure drop over the piston, which gives a damping force on the piston rod. The use of separate cartridges is a unique and patented Koni feature. The damper forces are generated by the amount of oil flowing through the piston and not the much smaller amount of oil displaced by the piston rod only. When the oil can not flow away quickly enough through the low speed cartridges the pressure difference over the piston increases that much the mainvalve would be opened. The damping characteristic can be divided in two velocity ranges. The low speed range from 0 up to 0,2 m/s and the high speed range from 0,2 m/s and higher, depending on valving and click setting of the damper.

### 2.1 Low speed damping

The valves in the bump and rebound cartridge control the low speed damping. So when the damper would be compressed, pressure will build up over the piston and the valves in the bump cartridge will open. The same counts when the damper is being extended for the rebound cartridge. The valves are thin steel plates, which will bend due to the oil pressure. The bump and rebound cartridges can be exchanged easily if a different range of bump and / or rebound damping forces is needed.



### 2.2 High speed damping

The main valve controls the pressure when the flow over the piston becomes too high to be handled by the low speed cartridges only. The oil will flow through both the cartridges and the mainvalve to create either a digressive, linear or progressive characteristic. Because the pressure difference between the area under and above the piston, the oil will flow through the mainvalve until the difference is small enough to be handled by the low speed cartridges only. The main valve can be exchanged if a different range of bump and / or rebound high speed damping forces is needed.

### 3 Adjustment mechanism

Rotating the adjustment discs, located in the window of the top eye, adjusts the damping. You only need a steel pin adjustment tool of 1.5 mm (0.06") diameter. The adjusters are marked with letters that are visible on the alloy top eye, with a 'B' for bump and an 'R' for rebound next to the corresponding disc. The bump and rebound discs are also recognizable at their color. The bump-disc is colored black and the rebound-disc is colored red. Rotate the discs according to the markings on the top eye.

The adjusters have 8 distinct stops (clicks), each of which marks an adjustment position. There are a total of 8 adjustment positions from minimum to maximum adjustment. The minimum position is referred to as position 1 and the maximum adjustment position as position 8. The adjusters have a positive stop at the minimum and maximum position.

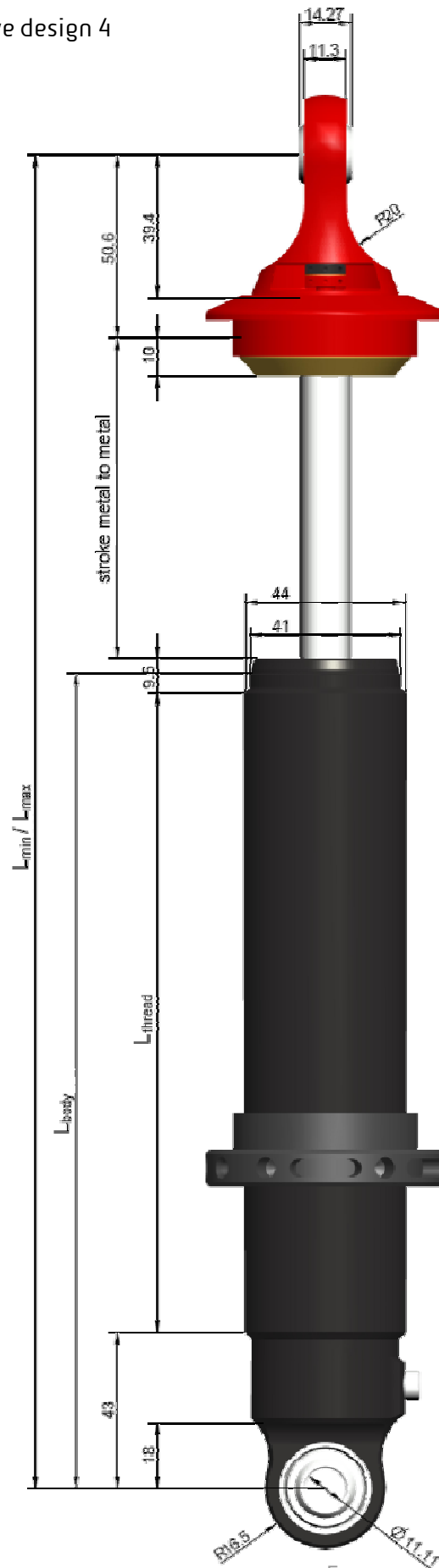
**Never use excessive force while adjusting cause damage may result.**



## 4 Dimensional drawings

### 4.1 2612

dimensions with topeye design 4



## 5 Coding system 2612

|   |   |   |   |   |   |   |   |  |   |   |   |
|---|---|---|---|---|---|---|---|--|---|---|---|
| 2 | 6 | 1 | 2 | D | L | L | L |  | V | V | V |
|---|---|---|---|---|---|---|---|--|---|---|---|

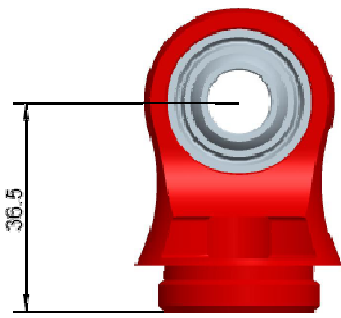
- D** = Design code  
*See design code details*
- L** = Length code  
*See length code details*
- V** = Valving code  
*See valving code details*

### 5.1 Design code details

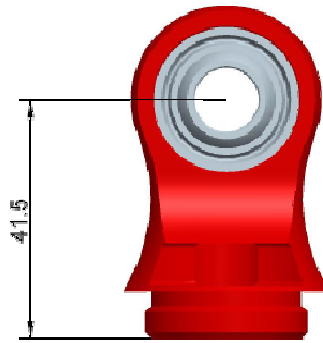
| Design code | Topeye   | Topeye bearing | Adjustment window | Upper spring seat | Lower spring seat |
|-------------|----------|----------------|-------------------|-------------------|-------------------|
| <b>A</b>    | Design 1 | ID 7/16"       | 0°                | 2"                | 2"                |
| <b>B</b>    | Design 2 | ID 7/16"       | 0°                | 2"                | 2"                |
| <b>C</b>    | Design 3 | ID 7/16"       | 0°                | 2"                | 2"                |
| <b>G</b>    | Design 1 | ID 7/16"       | 0°                | 1.88"             | 1.88"             |
| <b>H</b>    | Design 2 | ID 7/16"       | 0°                | 1.88"             | 1.88"             |
| <b>I</b>    | Design 3 | ID 7/16"       | 0°                | 1.88"             | 1.88"             |
| <b>N</b>    | -        | -              | -                 | -                 | -                 |
| <b>O</b>    | Design 5 | ID 1/2"        | 0°                | 1.88"             | 1.88"             |
| <b>P</b>    | -        | -              | -                 | -                 | 2"                |
| <b>R</b>    | -        | -              | -                 | 2"                | 2"                |
| <b>S</b>    | Design 4 | ID 7/16"       | 90°               | 1.88"             | 1.88"             |
| <b>T</b>    | -        | -              | -                 | -                 | 1.88"             |
| <b>U</b>    | -        | -              | -                 | 1.88"             | 1.88"             |
| <b>V</b>    | Design 4 | ID 7/16"       | 90°               | 2"                | 2"                |
| <b>W</b>    | Design 5 | ID 1/2"        | 0°                | 2"                | 2"                |
| <b>Y</b>    | Design 6 | ID 1/2"        | 90°               | 2"                | 2"                |
| <b>Z</b>    | Design 6 | ID 1/2"        | 90°               | 1.88"             | 1.88"             |



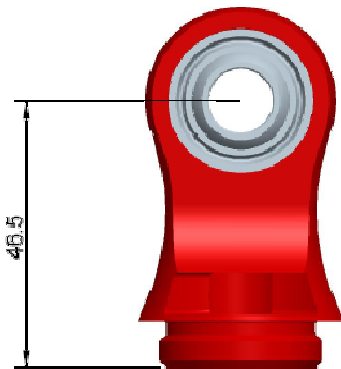
### 5.1.1 Top eye designs



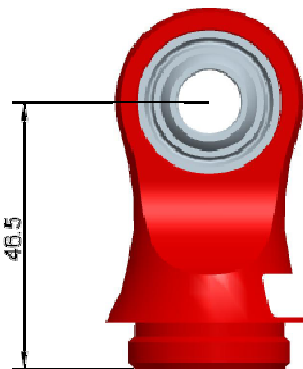
Topeye design 1



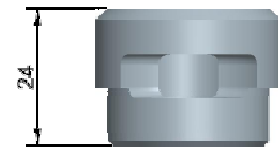
Topeye design 2



Topeye design 3



Topeye design 4



Steel top for welding purposes  
*part no. 71-51-01-085-0*  
(must be ordered separately)

### 5.1.2 Design code part numbers

|             |   |                |
|-------------|---|----------------|
| Top eye     | design 1  | 71 52 07 081 0 |
|             | design 2  | 71 52 07 082 0 |
|             | design 3  | 71 52 07 087 0 |
|             | design 4  | 71 52 07 084 0 |
|             | design 5  | 71 52 07 046 0 |
|             | design 6  | 71 52 07 047 0 |
| Bearing     | 1/2" (use with top eye design 5 and 6)                | 1425 50 00 29  |
|             | 7/16" (use with top eye design 1, 2, 3, 4 and bottom) | 1425 50 00 14  |
| Spring seat | Upper 1.88"   | 71 29 01 080 0 |
|             | Upper 2"  | 71 29 01 060 0 |
|             | Lower 1.88"   | 71 29 11 124 0 |
|             | Lower 2"  | 71 29 11 123 0 |
| Bump rubber | OD 46.5 mm (use with 2" upper spring seat)            | 71 34 80 000 0 |
|             | OD 43.5 mm (use with 1.88" upper spring seat)         | 71 34 95 000 0 |

### 5.1.3 Special designs

2612 001 950  
2612 004 VVV  
2612 005 VVV

Dallara F305, F306 and F307 front / rear  
Lola F3/06 front  
Lola F3/06 rear

without topeye  
including topeye  
including topeye

## 5.2 Length code details

| Length code | Topeye design 1       |                       | Topeye design 2       |                       | Topeye design 3       |                       | Stroke [mm] | L <sub>body</sub> [mm] |
|-------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------|------------------------|
|             | L <sub>max</sub> [mm] | L <sub>min</sub> [mm] | L <sub>max</sub> [mm] | L <sub>min</sub> [mm] | L <sub>max</sub> [mm] | L <sub>min</sub> [mm] |             |                        |
| 224         | 224                   | 195                   | 229                   | 200                   | 234                   | 200                   | 29          | 149                    |
| 229         | 229                   | 200                   | 234                   | 200                   | 239                   | 205                   | 29          | 154                    |
| 234         | 234                   | 200                   | 239                   | 205                   | 244                   | 205                   | 34          | 154                    |
| 239         | 239                   | 205                   | 244                   | 205                   | 249                   | 210                   | 34          | 159                    |
| 244         | 244                   | 205                   | 249                   | 210                   | 254                   | 210                   | 39          | 159                    |
| 249         | 249                   | 210                   | 254                   | 210                   | 259                   | 215                   | 39          | 164                    |
| 254         | 254                   | 210                   | 259                   | 215                   | 264                   | 215                   | 44          | 164                    |
| 259         | 259                   | 215                   | 264                   | 215                   | 269                   | 220                   | 44          | 169                    |
| 264         | 264                   | 215                   | 269                   | 220                   | 274                   | 220                   | 49          | 169                    |
| 269         | 269                   | 220                   | 274                   | 220                   | 279                   | 225                   | 49          | 174                    |
| 274         | 274                   | 220                   | 279                   | 225                   | 284                   | 225                   | 54          | 174                    |
| 279         | 279                   | 225                   | 284                   | 225                   | 289                   | 230                   | 54          | 179                    |
| 284         | 284                   | 225                   | 289                   | 230                   | 294                   | 230                   | 59          | 179                    |
| 289         | 289                   | 230                   | 294                   | 230                   | 299                   | 235                   | 59          | 184                    |
| 294         | 294                   | 230                   | 299                   | 235                   | 304                   | 235                   | 64          | 184                    |
| 299         | 299                   | 235                   | 304                   | 235                   | 309                   | 240                   | 64          | 189                    |
| 304         | 304                   | 235                   | 309                   | 240                   | 314                   | 240                   | 69          | 189                    |
| 309         | 309                   | 240                   | 314                   | 240                   | 319                   | 245                   | 69          | 194                    |
| 314         | 314                   | 240                   | 319                   | 245                   | 324                   | 245                   | 74          | 194                    |
| 319         | 319                   | 245                   | 324                   | 245                   | 329                   | 250                   | 74          | 199                    |
| 324         | 324                   | 245                   | 329                   | 250                   | 334                   | 250                   | 79          | 199                    |
| 329         | 329                   | 250                   | 334                   | 250                   | 339                   | 255                   | 79          | 204                    |
| 334         | 334                   | 250                   | 339                   | 255                   | 344                   | 255                   | 84          | 204                    |
| 339         | 339                   | 255                   | 344                   | 255                   | 349                   | 260                   | 84          | 209                    |
| 344         | 344                   | 255                   | 349                   | 260                   | 354                   | 260                   | 89          | 209                    |
| 349         | 349                   | 260                   | 354                   | 260                   | 359                   | 265                   | 89          | 214                    |
| 354         | 354                   | 260                   | 359                   | 265                   | 364                   | 265                   | 94          | 214                    |
| 359         | 359                   | 265                   | 364                   | 265                   | 369                   | 270                   | 94          | 219                    |
| 364         | 364                   | 265                   | 369                   | 270                   | 374                   | 270                   | 99          | 219                    |
| 369         | 369                   | 270                   | 374                   | 270                   | 379                   | 275                   | 99          | 224                    |
| 374         | 374                   | 270                   | 379                   | 275                   | 384                   | 275                   | 104         | 224                    |

## 5.3 Valving code details

### 5.3.1 Standard cartridge combinations

| Bump valve code | Bump cartridge |
|-----------------|----------------|
| 3               | 71 60 21 030 9 |
| 5               | 71 60 21 050 9 |
| 7               | 71 60 21 070 9 |

| Rebound valve code | Rebound cartridge |
|--------------------|-------------------|
| 3                  | 71 60 22 003 9    |
| 5                  | 71 60 22 005 9    |
| 7                  | 71 60 22 007 9    |

| Possible standard valvings |     |     |
|----------------------------|-----|-----|
| 633                        | 635 |     |
| 653                        | 655 | 657 |
|                            | 675 | 677 |

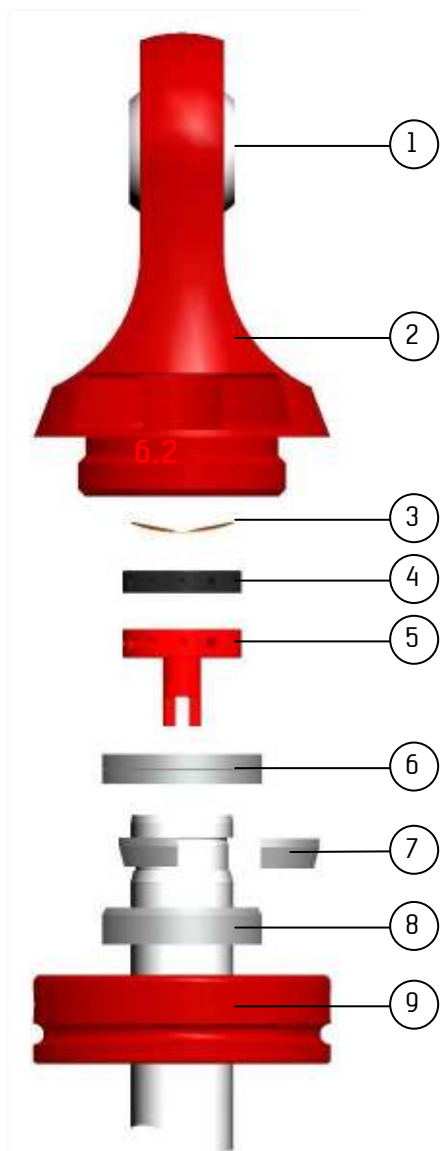
For more detailed information and forces, please request the valving list.

### 5.3.2 Special valvings

KONI has developed a lot of specific characteristics for its customers over the past years, if you need anything different from above mentioned standard cartridge combinations, please request our valvinglist or contact KONI to discuss your requests. We would be pleased to help you with your specific application.

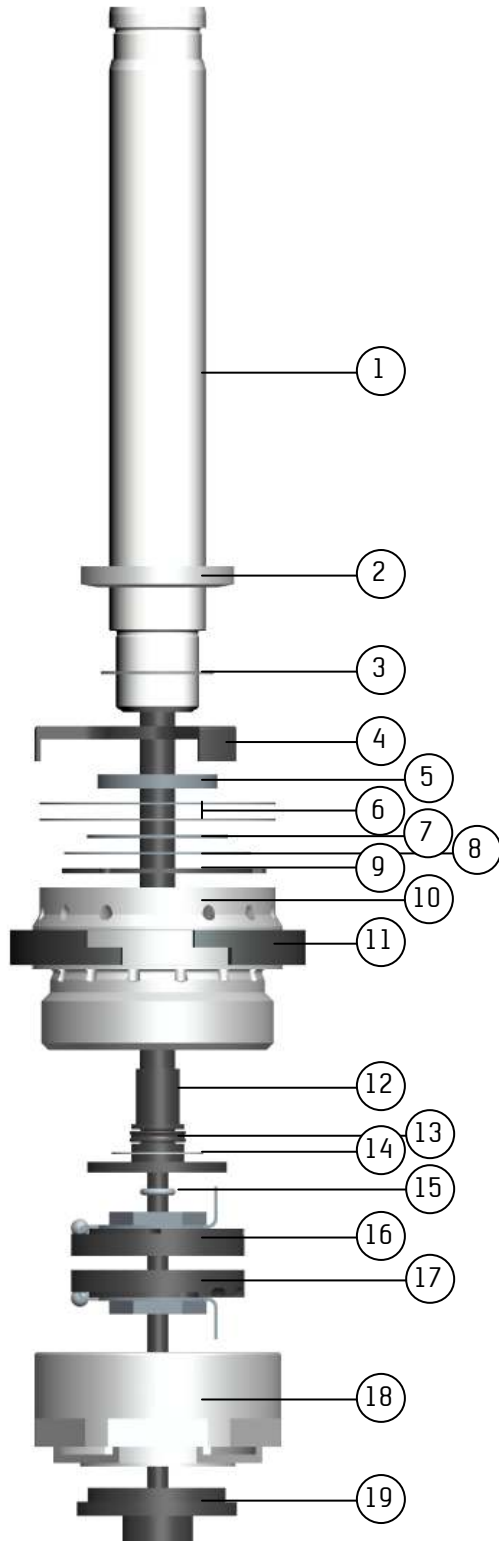
## 6 Parts lists 2612

### 6.1 Parts list top eye assembly



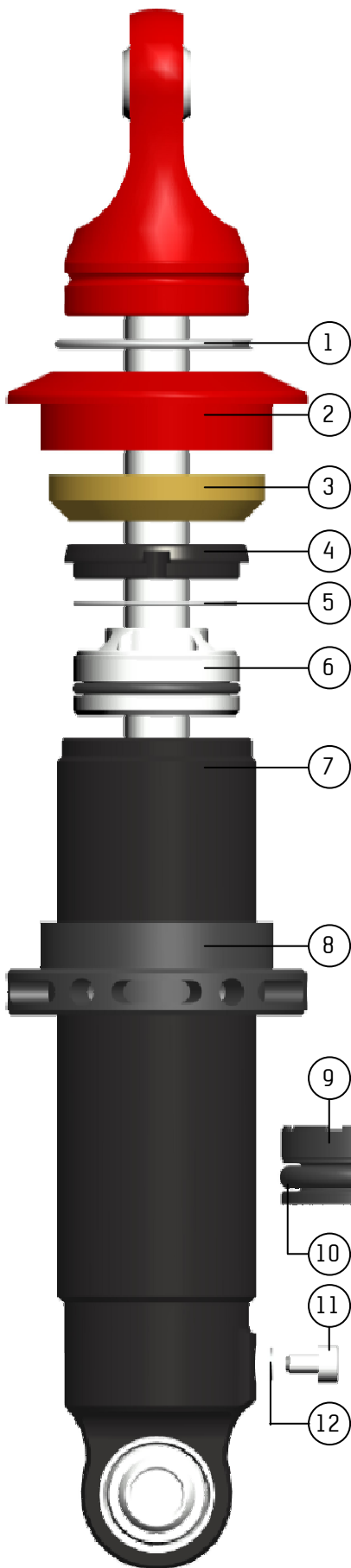
|   |                         |                       |
|---|-------------------------|-----------------------|
| 1 | Bearing                 | See page 7            |
| 2 | Topeye                  | See page 7            |
| 3 | Anti-rattle spring      | 71 05 51 018 0        |
| 4 | Bump adjustment disc    | 71 09 00 148 0        |
| 5 | Rebound adjustment disc | 71 09 00 149 0        |
| 6 | Thrust washer           | 3.0 mm 71 10 07 270 0 |
|   |                         | 3.5 mm 71 10 07 343 0 |
| 7 | Collets (2 per unit)    | 71 10 07 271 0        |
| 8 | Wedge collar            | 71 10 07 272 0        |
| 9 | Lock nut                | 71 51 05 029 0        |

## Parts list rod assembly



|    |   |                |
|----|---|----------------|
| 1  | Piston rod<br>(*** = refer to rebuild data for required length) | 2826 01 *** 16 |
| 2  | Rebound-spacer  | 71 36 01 144 0 |
| 3  | Washer  | 71 05 01 219 0 |
| 4  | Abutment disc   | 71 10 07 422 0 |
| 5  | Rebound valve seat  |                |
|    | 17 x 12.1 x 2   | 71 05 04 039 0 |
| 6  | Main valve  |                |
|    | 33.4 x 0.2  | 71 05 01 267 0 |
|    | 33.4 x 0.3  | 71 05 01 264 0 |
|    | 33.4 x 0.4  | 71 05 01 265 0 |
|    | 33.4 x 0.5  | 71 05 01 266 0 |
| 7  | Inner preload washer  |                |
|    | 0.5   | 71 05 04 047 0 |
|    | 0.7   | 71 05 04 041 0 |
| 8  | Preload disc  |                |
|    | 26.5 x 0.3  | 71 05 11 004 0 |
|    | 26.5 x 0.4  | 71 05 11 002 0 |
|    | 26.5 x 0.5  | 71 05 11 003 0 |
| 9  | Outer preload washer  | 71 05 04 068 0 |
| 10 | Piston  | 71 12 00 134 0 |
| 11 | Piston seal   | 71 12 02 059 0 |
| 12 | Rebound adjuster tube<br>(*** = piston rod length -1 mm)        | 71 41 22 *** 0 |
| 13 | Tube quad-ring  | 1604 73 00 08  |
| 14 | Thrust washer   | 71 05 05 019 0 |
| 15 | Rod quad-ring   | 1604 73 00 06  |
| 16 | Rebound cartridge<br>(*** = refer to valvinglist)               | 71 60 22 *** 0 |
| 17 | Bump cartridge<br>(*** = refer to valvinglist)                  | 71 60 21 *** 0 |
| 18 | Piston locking nut  | 71 25 00 163 0 |
| 19 | Bump adjuster rod<br>(*** = piston rod length +44 mm)           | 71 41 16 *** 0 |

### 6.3 Parts list body & guide assembly



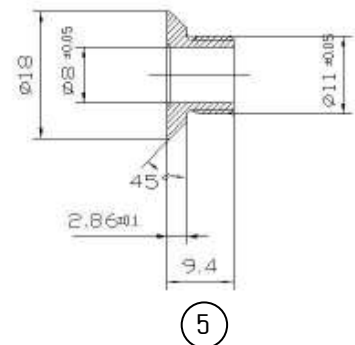
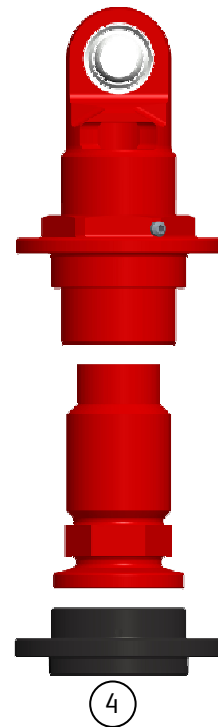
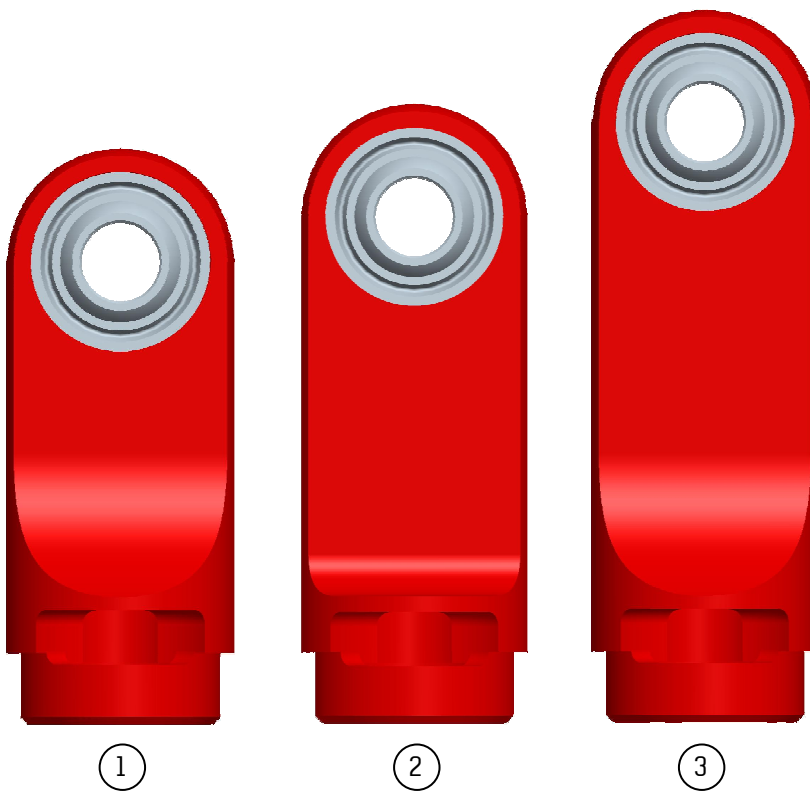
|    |  |                |
|----|--|----------------|
| 1  | Spring seat circlip                              | 1038 22 00 40  |
| 2  | Upper spring seat                                | See page 7     |
| 3  | Bump rubber                                      | See page 7     |
| 4  | Bump cap   | 71 25 02 058 0 |
| 5  | Guide circlip                                    | 15 33 09 025 0 |
| 6  | Guide assembly                                   | 71 22 20 384 9 |
|    | Guide O-ring (30 x 2.5)                          | 1601 73 13 85  |
| 7  | Cylinder full thread (incl. 7/16" bearing)       | 2612 52 07 02  |
|    | Cylinder without threading (incl. 5/16" bearing) | 2612 52 07 01  |
| 8  | Lower spring seat                                | See page 7     |
|    | Lower spring seat locking bolt (M5)              | 71 07 06 012 0 |
| 9  | Floating piston                                  | 71 12 11 059 0 |
| 10 | Floating piston O-ring                           | 1601 73 12 29  |
| 11 | Gas filling bolt (hexagonal socket screw)        | 1035 62 06 20  |
| 12 | Dowty seal                                       | 1611 04 50 70  |

## 6.4 Parts list accessories

|   |  |                |
|---|--|----------------|
| 1 | Topeye + 28.5 mm (incl. 7/16" bearing)   | 2812 52 07 26  |
| 2 | Topeye + 35.0 mm (incl. 7/16" bearing)   | 2812 52 07 28  |
| 3 | Topeye + 48.5 mm (incl. 7/16" bearing)   | 2812 52 07 27  |
| 4 | Topeye F3 Style (incl. 5/16" bearing)    | 2812 52 07 68  |
|   | Lock nut                                 | 71 52 07 069 0 |
|   | Upper spring seat (for 36 mm ID springs) | 71 29 01 074 0 |
|   | Upper spring seat locking bolt (M4)      | 71 07 06 013 0 |
|   | Lower spring seat (for 36 mm ID springs) | 71 25 02 055 0 |

**Always use top eyes as short as possible**

|   |                       |                |
|---|-----------------------|----------------|
| 5 | Adapter bush (ø 8 mm) | 71 52 11 026 0 |
|---|-----------------------|----------------|





## 7 Service manual

### 7.1 Introduction

Revalving a 2612 type damper is a relatively straightforward process, but should never be taken lightly. It is a very delicate hydraulic-mechanical piece of equipment with a vital control function and should always be treated as such. Keep the following points in mind before you start dismantling the damper.

- This damper is charged with high-pressure nitrogen gas. Please take appropriate precautions when handling or opening.
- Shock absorbers and dirt do not get along at all. Dirt in this case is anything that is not meant to be inside the housing; sand, metal bits, fluff from cleaning rags, remains of O-rings etc. So make sure the work environment, tools and all damper components are as clean as possible.
- Both dimensions and form of all parts are machined to tight tolerances, and should therefore be handled with care. Scratches or deformation of critical parts could cause loss of damping performance.
- Always use aluminium clamping plates when putting the damper or its components in a vice.
- When the damper is taken apart, make sure the O-rings are replaced and lubricated before putting the damper back together.

### 7.2 Rebuild data

| Length code | Pistonrod length [mm] | Rebound adjuster tube length [mm] | Bump adjuster rod length [mm] | Floating piston height [mm] |
|-------------|-----------------------|-----------------------------------|-------------------------------|-----------------------------|
| 224         | 76                    | 75                                | 120                           | 71                          |
| 229         | 76                    | 75                                | 120                           | 71                          |
| 234         | 81                    | 80                                | 125                           | 75                          |
| 239         | 81                    | 80                                | 125                           | 75                          |
| 244         | 86                    | 85                                | 130                           | 79                          |
| 249         | 86                    | 85                                | 130                           | 79                          |
| 254         | 91                    | 90                                | 135                           | 84                          |
| 259         | 91                    | 90                                | 135                           | 84                          |
| 264         | 96                    | 95                                | 140                           | 88                          |
| 269         | 96                    | 95                                | 140                           | 88                          |
| 274         | 101                   | 100                               | 145                           | 92                          |
| 279         | 101                   | 100                               | 145                           | 92                          |
| 284         | 106                   | 105                               | 150                           | 97                          |
| 289         | 106                   | 105                               | 150                           | 97                          |
| 294         | 111                   | 110                               | 155                           | 101                         |
| 299         | 111                   | 110                               | 155                           | 101                         |
| 304         | 116                   | 115                               | 160                           | 105                         |
| 309         | 116                   | 115                               | 160                           | 105                         |
| 314         | 121                   | 120                               | 165                           | 109                         |
| 319         | 121                   | 120                               | 165                           | 109                         |
| 324         | 126                   | 125                               | 170                           | 114                         |
| 329         | 126                   | 125                               | 170                           | 114                         |
| 334         | 131                   | 130                               | 175                           | 118                         |
| 339         | 131                   | 130                               | 175                           | 118                         |
| 344         | 136                   | 135                               | 180                           | 122                         |
| 349         | 136                   | 135                               | 180                           | 122                         |
| 354         | 141                   | 140                               | 185                           | 126                         |
| 359         | 141                   | 140                               | 185                           | 126                         |
| 364         | 146                   | 145                               | 190                           | 131                         |
| 369         | 146                   | 145                               | 190                           | 131                         |
| 374         | 151                   | 150                               | 195                           | 135                         |

## 7.3 Dismantling

Clean the exterior thoroughly. Set both adjustments to minimum position.

### 7.3.1 Top eye

Make sure all the tension is off the main spring by lowering the spring seat on the body. The circlip on the top attachment can now be removed. Take off the upper spring seat and the spring itself.

Carefully put the top mount in a vice. Use a Pin-spanner (size 40/42, order n° 1880-22-16-00) to slacken the circular lock nut.

**Do not remove the top mount yet.**

Take the damper out off the vice. Hold the lock nut in one hand, the top mount pointing upwards. With the other hand remove the top mount. Keep all parts, especially the adjuster parts in order. Notice the thickness of the thrust washer (n° 4, page 11), it's 3.0 or 3.5 mm. It is used to keep the overall length within a  $\pm 0.5$ -mm tolerance. Remove the wedge collar and collets (if needed tap on the wedge collar with a soft-faced hammer)

### 7.3.2 Shock absorber unit

Slowly release the gas pressure by turning the hexagon socket bolt beside the bottom eye; use a 2.5-mm Allen key.

Remove the bump cap with a dull screwdriver and a hammer. Put the damper with the bottom eye upright in a vice. Push the guide down a little. If this proves hard to do, check all nitrogen has been removed. Gently tap down the guide with a large drift and a soft faced hammer till you are able to pry out the guide circlip. Gently tap the complete piston assembly out of the body till the guides O-ring becomes visible, after this you could push the guide and piston assembly out of the cylinder.

### 7.3.3 Piston assembly

Pull the bump adjuster rod out of the rod assembly and inspect to see if it is free from burrs.

Use tool n° 1880-22-05-00 to clamp the piston. Loosen the piston lock nut with a hexagon nut 32 mm.

Remove piston nut, bump and rebound low speed cartridges and rebound adjuster tube. Notice the small quad-ring in the bottom of the tube.

If the main valve needs changing, the piston can now be removed. Use tool n° 1880-22-06-00 to loosen the piston. Use tool n° 1880-22-02-00 to clamp the rod in a vice. Make sure to tighten it correctly so the rod won't damage.

Before removing the guide check the piston side of the piston rod for irregularity. This could cause damage for the guide bush and other internal parts of the guide.

## 7.4 Assembly

Inspect all parts, seals and O-rings for damage. Replace as needed.

### 7.4.1 Piston assembly

If the guide has been removed, grease the seal before assembling. Use tool n° *1880-22-08-00* to make sure the guide seal would not be damaged. Before installing the piston, the following parts must be installed over the piston (refer to parts list rod assembly)

- Outer preload washer
- Preload disc
- Inner preload washer
- Main valve(s)
- Rebound valve seat
- Abutment disc
- Rebound disc

Tighten the piston with a torque of 30 lbs.-ft or 40 Nm with the piston tool n° *1880-22-06-00*. Lubricate the rebound adjuster tube and quad-ring before sliding it into the piston rod.

Install respectively rebound and bump low speed cartridge. Ensure a proper engagement of the rebound cartridge with the adjuster tube.

Lubricate the end of the bump adjuster rod and slide it through the cartridges until it fits onto the bump cartridge.

Use tool n° *1880-22-05-00* to clamp the piston.

Fit the piston lock nut and tighten it with a torque of 22 lbs.-ft or 30 Nm. Use a hexagon nut 32 mm.

### 7.4.2 Shock absorber unit

Check the floating piston height according to build sheet. The height “H” is measured from the top of the cylinder to the bottom of the floating piston. Make sure this is done correctly. For exact placement of the floating piston use our tool *1884-00-06-00*.

Fill the body with oil up to the circlip groove. Make sure the gas filling bolt is not tightened. Gently push the rod assembly into the housing till the guide is under the circlip grooves position. Be sure not moving the piston rod when the guide is fitted, cause this would change your floating piston height. Fit the circlip and check that it fits snugly into its groove. Tighten the gas filling bolt.

### 7.4.3 Top eye

Install the bump cap, bump stop and / or travel limiter. Install the top eye components in reverse order of disassembly and torque the top eye locknut with 55 lbs -ft or 75 Nm. Use Pin-spanner (size 40/42, order n° *1880-22-16-00*) to tighten. For tightening the locknut you could use our topeye mould (n° *1880-22-01-00*) to save the topeye.

## 7.5 Gas filling

General notice: Replace dowty-seal of the gas filling bolt every time and pressurise the damper with nitrogen only!

Place the damper into gas filling tool n° 1880-00-10-50. Make sure the hexagon key engages with the gas filling bolt and tighten it.

Adjust the filling pressure according to the data on this page. Pressurise the tool and slowly undo the gas filling bolt for a full turn. The piston rod should be pressed fully outwards.

Leave the pressure on for 10 or more seconds and close the filling bolt.

Release the pressure from the gas filling tool and remove the damper. Make sure that the bolt is tightened; check this with a 2.5 mm Allen key, if you aren't sure about it.

To check if the floating piston isn't too high, push the bump adjuster at the top of the damper inside. Little resistance must be appreciable.

Finally check carefully for leaks, especially at the dowty-seal of the gas filling bolt, as leakages here tend to be very small and hard to spot.

**Important:** The gas pressure is important for a proper function of the damper. Some race engineers try to lower the gas pressure without always realising the risk involved. If the gas pressure is too low, air will be drawn into the damper. This will have a negative effect on its performance. To calculate the minimum required gas pressure, the highest bump damper force ever occurring is taken.

Apply pressure on for at least 10 seconds to make sure the nitrogen chamber is filled

### 7.5.1 Minimum Gas Pressure Calculation.

The minimum filling of the gas in the damper is simply calculated by dividing the maximum bump force by the piston area / rod area.

**General notice:** Make sure that the outcome of the calculation is multiplied with a factor of 1.1. This is for safety because the gas pressure differs when the temperature changes.

$$p_{\min} = \frac{F_{\max \text{ in}}}{A_{\text{piston}} - A_{\text{rod}}} * (\text{safety factor of}) 10\% (1.1)$$

With:

|                       |   |  |
|-----------------------|---|--|
| $A_{\text{piston}}$   | : | Piston area [m <sup>2</sup> ]                              |
| $A_{\text{rod}}$      | : | Rod area [m <sup>2</sup> ]                                 |
| $P_{\min}$            | : | Minimal pressure below floating piston [N/m <sup>2</sup> ] |
| $F_{\max \text{ in}}$ | : | Maximal damper force Inward [N]                            |

The piston area minus the rod area of the 2612 damper is  $0.869 * 10^{-3} \text{ m}^2$ . The maximal bump force could be known from gathered data. Multiply the outcome with a factor of 1.1 and the minimum pressure is there.

## 8 Testing

Make sure everything is tightened at the specific torque and both adjusters are in beginning position. Do this by turning them counter clockwise.

Never use excessive force while the adjustments are done as damage may result.

Before testing take the necessary precautions involving safety for your self and the surrounding people.

Put on safety glasses, right clothing and safety shoes.

After all precautions are made testing can be started.

Test the dampers in both minimum and maximum position.

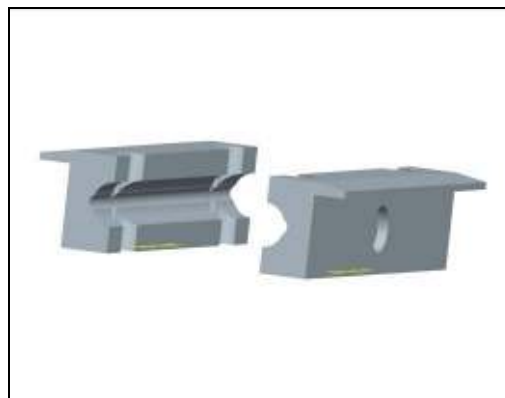
The forces the different valvings should produce can be found in the valving list.

## 9 Tools, torques and pressures

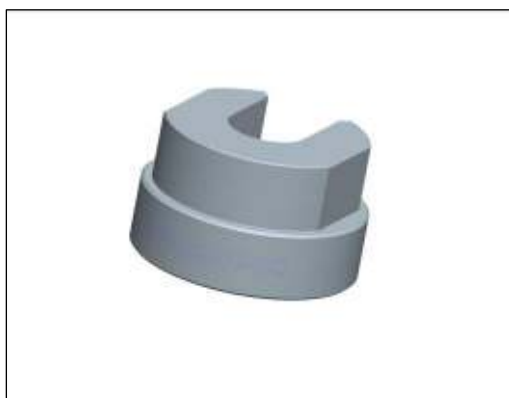
|                             |                                      |                             |
|-----------------------------|--------------------------------------|-----------------------------|
| <b>Tightening torques</b>   | Piston to piston rod                 | 30 lbs.-ft or 40 Nm         |
|                             | Piston nut to piston                 | 22 lbs.-ft or 30 Nm         |
|                             | Top eye lock nut to top eye          | 55 lbs.-ft or 75 Nm         |
| <b>Tools</b>                | Torque wrench with fitting for tools | 1851 16 55 71               |
|                             | Circlip top eye lock nut tool        | 1880 22 16 00               |
|                             | Guide fitting tool                   | 1880 22 08 00               |
|                             | Piston rod clamping tool             | 1880 22 02 00 (order 2 pc.) |
|                             | Piston fitting tool                  | 1880 22 06 00               |
|                             | Piston clamp (36 mm)                 | 1880 22 05 00               |
|                             | Floating piston height setting tool  | 1884 00 06 00               |
| <b>Gas filling pressure</b> | Bump forces up to 2000 N             | 15 bar                      |
|                             | Bump forces as from 2000 N           | 20 bar                      |
| <b>Gas filling tool</b>     | For standard or F3 type bottom       | 1880 00 10 50               |
| <b>Oil type</b>             | Fuchs 5045 (1L)                      | 1006 01 01 18               |



Tool number: 1880-22-01-00  
Tool name: Top eye tool



Tool number: 1880-22-02-00  
Tool name: Rod clamp(s)



Tool number: 1880-22-03-00  
Tool name: Mounting tool 2822



Tool number: 1880-22-04-00  
Tool name: Piston clamp 2812



Tool number: 1880-22-05-00  
Tool name: Piston clamp 2612 & 2822



Tool number: 1880-22-06-00  
Tool name: Piston tool



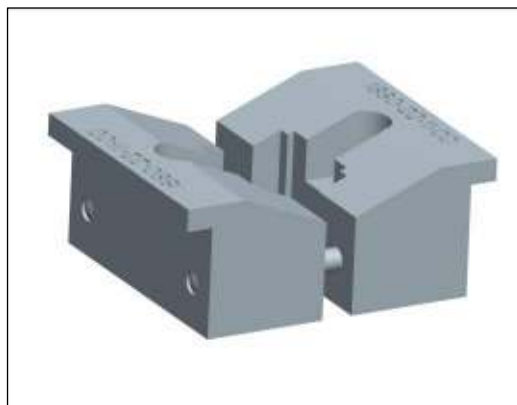
Tool number: 1880-22-07-00  
Tool name: Inserting tool 2822



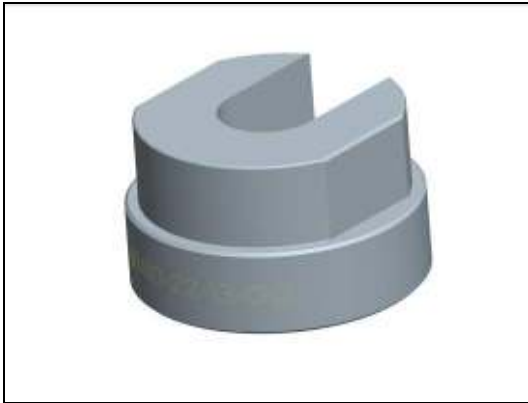
Tool number: 1880-22-08-00  
Tool name: Guide fit tool



Tool number: 1880-22-09-00  
Tool name: Inserting tool GP2 Front



Tool number: 1880-22-11-00  
Tool name: Clamp tool GP2 Front



Tool number: 1880-22-13-00  
Tool name: Mounting tool GP2 Front



## 10 Distribution Race Dampers

The KONI Race dampers, with their specific technology, are represented and put to market by specially KONI trained and officially appointed distributors in the following countries world-wide.

|                  |  |
|------------------|--|
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