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(FACTORY OF CONSTRUCTIONM MACHINERY "BUMAR" LTD)

# CATALOGUE OF HYDRAULIC CYLINDERS

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## CH

### Cylinder type: Double-sided action cylinders with one-sided piston rod.

CH hydraulic cylinders are characterized by a rigid and simple construction. These advantages will lengthen and cause reliable work in heavy conditions – especially in building machines. Piston rod's surface is covered with hard chromium plate. This plate will guarantee resistance to external conditions. It is possible to produce cylinders with a version with damping the terminal movement of the piston rod. It is also possible to manufacture cylinders in versions depending on the location of inlet holes. Drawings below show the standard version. Location of the inlet hole under the piston is defined by the  $\alpha$  angle and the location of inlet above the piston is defined by the  $\beta$  angle. Angles  $\alpha$  and  $\beta$  are executed as a multiple of the angle  $90^\circ$ . For CH1, CH2, CH3, CH4 and CH6 cylinders these angles are defined clockwise when looking at the cylinders from the piston rod side.

### CONTENT OF CATALOGUE

Catalogue includes the following types of cylinders in relation to fastening and feeding:

- CH1 - fastening with an ear with a permanent sliding pillow
- CH2 - fastening with an ear with a ball pillow
- CH3 - fastening with a clamping ring with a pivot
- CH4 - fastening with a clamping ring with holes under a pivot
- CH5 - fastening with sleeves
- CH6 - fastening on lugs
- CH7 - fastening with pivots and fed with a piston rod

### TECHNICAL PARAMETERS

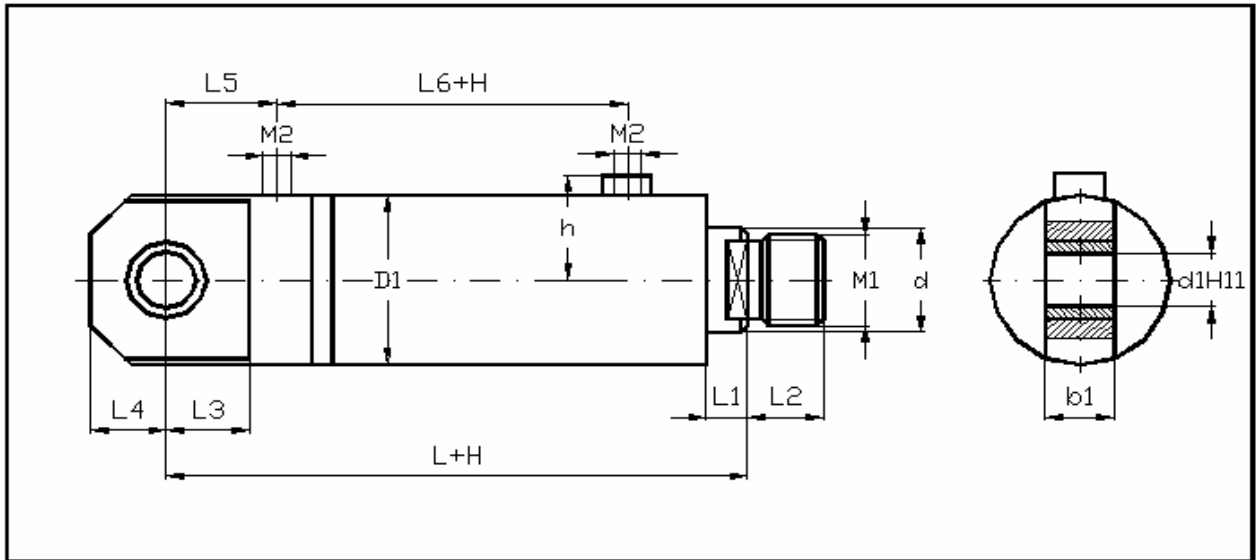
- nominal pressure - 16 MPa
- max. piston move - 0,5 m/s
- range of work temperature - 253 ÷ 353 K
- working fluid viscosity range - 9 ÷ 300 cSt
- working fluid cleanness requirements - 9 Kl. according to NAS 1638

It is possible to manufacture these cylinders with working pressures of 16, 20, 25 MPa.

### STRUCTURE OF DESIGNATION

|  |  |
|--|--|
|  | CH3 - 20 - 140/100 - 1500 - T - $\alpha$ - $\beta$ - f - * |
| Series of types                                  |  |
| Nominal pressures                                |  |
| Piston diameter                                  |  |
| Piston rod diameter                              |  |
| Cylinder stroke                                  |  |
| In case of a version with damping                |  |
| Inlet holes determining by angles                |  |
| Clamping ring length for cylinders CH3, CH4, CH7 |  |

# CH1

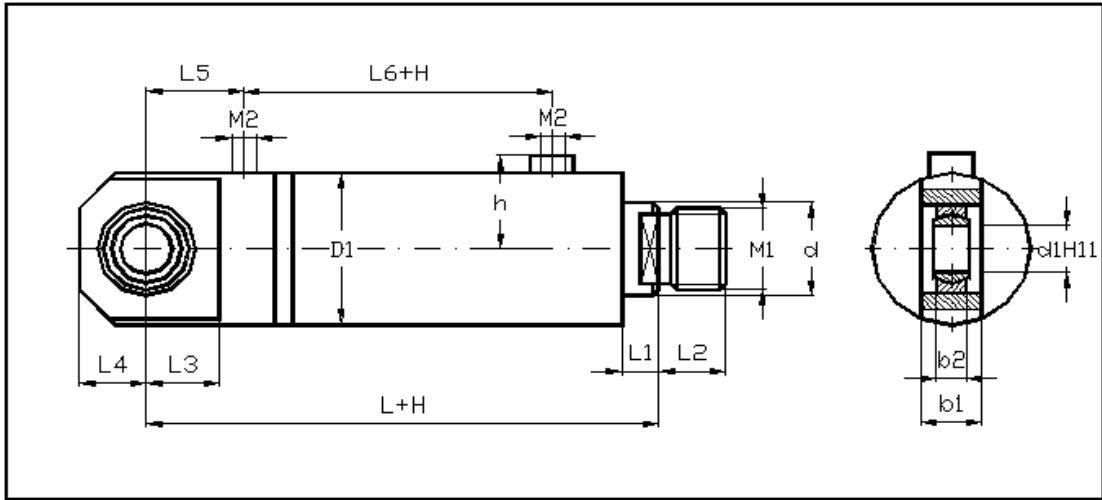


H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder stroke is up to 4000 mm)

$M_2$  – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br>D   | 80    | 100   | 110   | 120   | 125   | 127   | 140   | 160   | 180   | 200*   | 250*   | 280*   | 320*   | 400*   |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Piston rod diameter<br>d | 50    | 63    | 70    | 70    | 80    | 80    | 90    | 100   | 110   | 125    | 160    | 180    | 200    | 250    |
|                          | 56    | 70    | 80    | 80    | 90    | 90    | 100   | 110   | 125   | 140    | 180    | 200    | 220    | 280    |
| L                        | 275   | 322   | 337   | 387   | 385   | 385   | 400   | 420   | 500   | 540    | 630    | 690    | 760    | 880    |
| $L_1$                    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 25    | 25     | 30     | 30     | 35     | 35     |
| $L_2$                    | 50    | 55    | 60    | 60    | 65    | 65    | 70    | 80    | 80    | 100    | 135    | 150    | 170    | 190    |
| $L_3$                    | 53    | 60    | 65    | 65    | 70    | 70    | 75    | 85    | 100   | 110    | 140    | 165    | 200    | 230    |
| $L_4$                    | 55    | 65    | 70    | 70    | 80    | 80    | 85    | 97    | 105   | 120    | 150    | 175    | 210    | 240    |
| $L_5$                    | 79    | 90    | 95    | 95    | 100   | 100   | 105   | 120   | 135   | 145    | 180    | 215    | 255    | 290    |
| $L_6$                    | 94    | 127   | 127   | 167   | 150   | 150   | 150   | 156   | 196   | 206    | 211    | 225    | 240    | 260    |
| $D_1$                    | 100   | 125   | 133   | 146   | 159   | 159   | 168   | 194   | 210   | 240    | 294    | 323    | 390    | 457    |
| $d_1H11$                 | 50    | 60    | 60    | 70    | 70    | 70    | 80    | 80    | 90    | 100    | 110    | 120    | 140    | 160    |
| $b_1$                    | 50    | 60    | 60    | 65    | 65    | 65    | 79    | 70    | 80    | 80     | 100    | 120    | 140    | 160    |
| h                        | 67    | 81,5  | 85,5  | 92    | 98,5  | 98,5  | 103   | 122   | 130   | 145    | 172    | 189    | 225    | 258    |
| $M_1$                    | M45x2 | M52x2 | M58x2 | M58x2 | M64x2 | M64x2 | M68x2 | M80x2 | M80x2 | M100x2 | M130x3 | M140x3 | M160x3 | M180x3 |
| $M_2$                    | 0x1,5 | 27x2  | 27x2  | 27x2  | 27x2  | 27x2  | 27x2  | 33x2  | 33x2  | 33x2   | 33x2   | 42x2   | 48x2   | 48x2   |

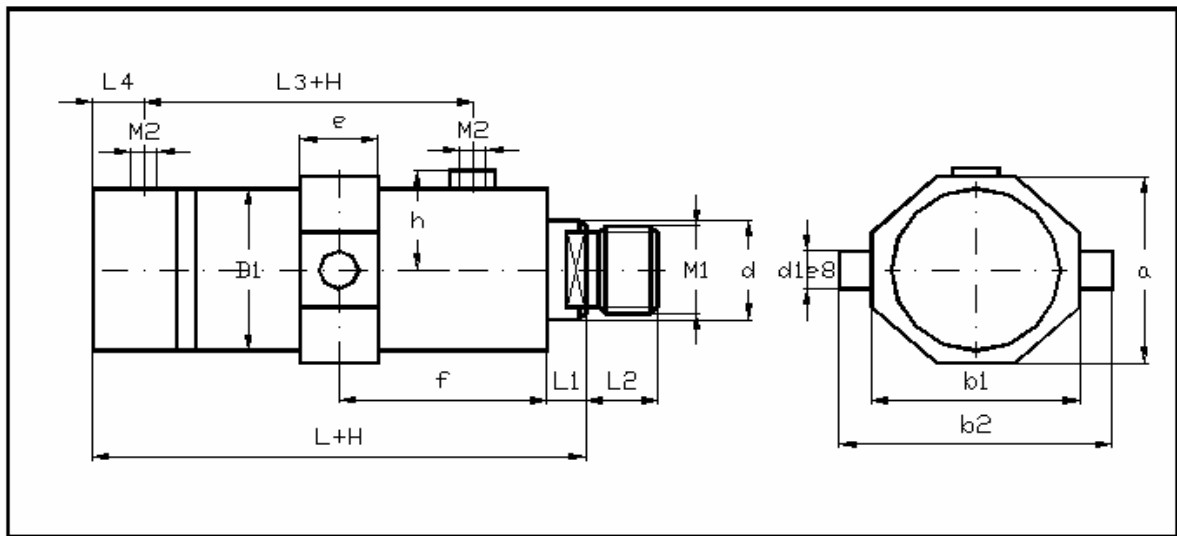
## CH 2



H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder strike is up to 4000 mm)  
M<sub>2</sub> – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br>D   | 80        | 100       | 110       | 120       | 125       | 127       | 140       | 160       | 180       | 200*       | 250*       | 280*       | 320*       | 400*       |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| Piston rod diameter<br>d | 50        | 63        | 70        | 70        | 80        | 80        | 90        | 100       | 110       | 125        | 160        | 180        | 200        | 250        |
|                          | 56        | 70        | 80        | 80        | 90        | 90        | 100       | 110       | 125       | 140        | 180        | 200        | 220        | 280        |
| L                        | 275       | 322       | 337       | 387       | 385       | 385       | 400       | 420       | 500       | 540        | 630        | 690        | 760        | 880        |
| L <sub>1</sub>           | 20        | 20        | 20        | 20        | 20        | 20        | 20        | 20        | 25        | 25         | 30         | 30         | 35         | 35         |
| L <sub>2</sub>           | 50        | 55        | 60        | 60        | 65        | 65        | 70        | 80        | 80        | 100        | 135        | 150        | 170        | 190        |
| L <sub>3</sub>           | 53        | 60        | 65        | 65        | 70        | 70        | 75        | 85        | 100       | 110        | 140        | 165        | 200        | 230        |
| L <sub>4</sub>           | 55        | 65        | 70        | 70        | 80        | 80        | 85        | 97        | 105       | 120        | 150        | 175        | 210        | 240        |
| L <sub>5</sub>           | 79        | 90        | 95        | 95        | 100       | 100       | 105       | 120       | 135       | 145        | 180        | 215        | 255        | 290        |
| L <sub>6</sub>           | 94        | 127       | 127       | 167       | 150       | 150       | 150       | 156       | 196       | 206        | 211        | 225        | 240        | 260        |
| D <sub>1</sub>           | 100       | 125       | 133       | 146       | 159       | 159       | 168       | 194       | 210       | 240        | 294        | 323        | 390        | 457        |
| d <sub>1H11</sub>        | 50        | 60        | 60        | 70        | 70        | 70        | 80        | 80        | 90        | 100        | 110        | 120        | 140        | 160        |
| b <sub>1</sub>           | 50        | 60        | 60        | 65        | 65        | 65        | 79        | 70        | 80        | 80         | 100        | 120        | 140        | 160        |
| b <sub>2</sub>           | 40        | 50        | 50        | 60        | 60        | 60        | 65        | 65        | 60        | 70         | 70         | 85         | 90         | 105        |
| h                        | 67        | 81,5      | 85,5      | 92        | 98,5      | 98,5      | 103       | 122       | 130       | 145        | 172        | 189        | 225        | 258        |
| M <sub>1</sub>           | M45x<br>2 | M52x<br>2 | M58x<br>2 | M58x<br>2 | M64x<br>2 | M64x<br>2 | M68x<br>2 | M80x<br>2 | M80x<br>2 | M100<br>x2 | M130<br>x3 | M140<br>x3 | M160<br>x3 | M180<br>x3 |
| M <sub>2</sub>           | 20x1,5    | M27x2     | M27x2     | M27x2     | M27x2     | M27x2     | M27x2     | M33x2     | M33x2     | M33x2      | M33x2      | M42x2      | M48x2      | M48x2      |

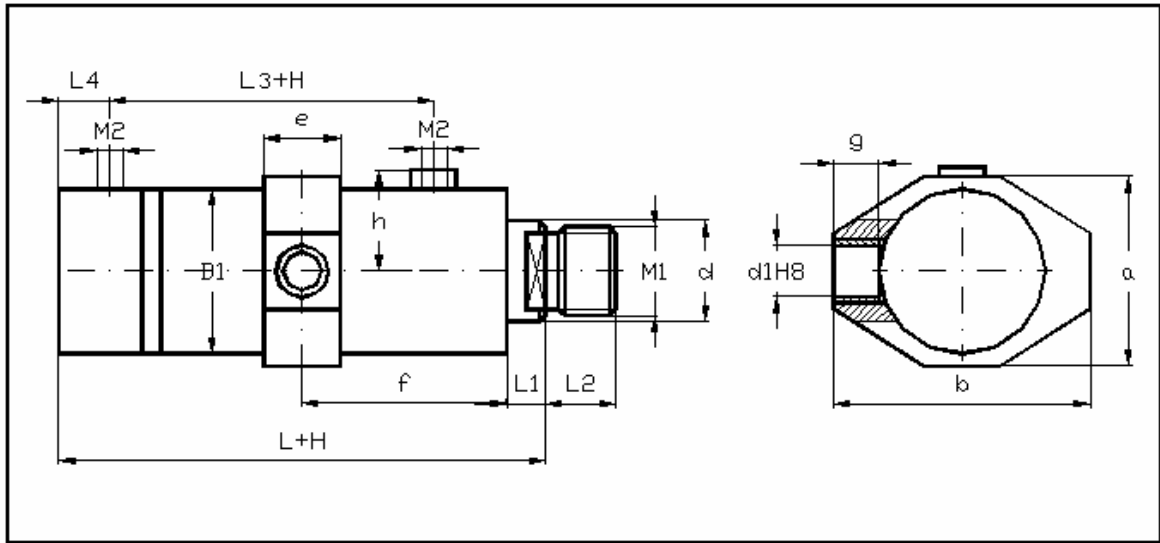
### CH3



H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder strike is up to 4000 mm)  
 M<sub>2</sub> – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br>D   | 80    | 100   | 110   | 120   | 125   | 127   | 140   | 160   | 180   | 200*   | 250*   | 280*   | 320*   | 400*   |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Piston rod diameter<br>d | 50    | 63    | 70    | 70    | 80    | 80    | 90    | 100   | 110   | 125    | 160    | 180    | 200    | 250    |
|                          | 56    | 70    | 80    | 80    | 90    | 90    | 100   | 110   | 125   | 140    | 180    | 200    | 220    | 280    |
| L                        | 230   | 262   | 272   | 322   | 315   | 315   | 325   | 335   | 400   | 430    | 490    | 525    | 560    | 650    |
| L <sub>1</sub>           | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 25    | 25     | 30     | 30     | 35     | 35     |
| L <sub>2</sub>           | 50    | 55    | 60    | 60    | 65    | 65    | 70    | 80    | 80    | 100    | 135    | 150    | 170    | 190    |
| L <sub>3</sub>           | 102   | 127   | 127   | 167   | 150   | 150   | 150   | 156   | 196   | 206    | 211    | 225    | 240    | 260    |
| L <sub>4</sub>           | 26    | 30    | 30    | 30    | 30    | 30    | 30    | 35    | 35    | 35     | 40     | 50     | 55     | 60     |
| D <sub>1</sub>           | 100   | 125   | 133   | 146   | 159   | 159   | 168   | 194   | 210   | 240    | 294    | 323    | 390    | 457    |
| d <sub>1e8</sub>         | 40    | 50    | 60    | 60    | 60    | 60    | 70    | 80    | 90    | 100    | 110    | 140    | 160    | 180    |
| b <sub>1</sub>           | 130   | 160   | 170   | 180   | 200   | 200   | 210   | 250   | 260   | 290    | 360    | 400    | 460    | 540    |
| b <sub>2</sub>           | 180   | 210   | 230   | 240   | 260   | 260   | 290   | 350   | 360   | 410    | 480    | 560    | 660    | 780    |
| a                        | 130   | 160   | 170   | 180   | 200   | 200   | 210   | 250   | 260   | 290    | 360    | 400    | 460    | 540    |
| h                        | 67    | 81,5  | 85,5  | 92    | 98,5  | 98,5  | 103   | 122   | 130   | 145    | 172    | 189    | 225    | 258    |
| e                        | 60    | 70    | 80    | 80    | 80    | 80    | 90    | 100   | 110   | 130    | 140    | 170    | 200    | 220    |
| f <sub>min</sub>         | 145   | 165   | 180   | 190   | 200   | 200   | 215   | 230   | 250   | 280    | 340    | 375    | 400    | 475    |
| M <sub>1</sub>           | M45x2 | M52x2 | M58x2 | M58x2 | M64x2 | M64x2 | M68x2 | M80x2 | M80x2 | M100x2 | M130x3 | M140x3 | M160x3 | M180x3 |

## CH4

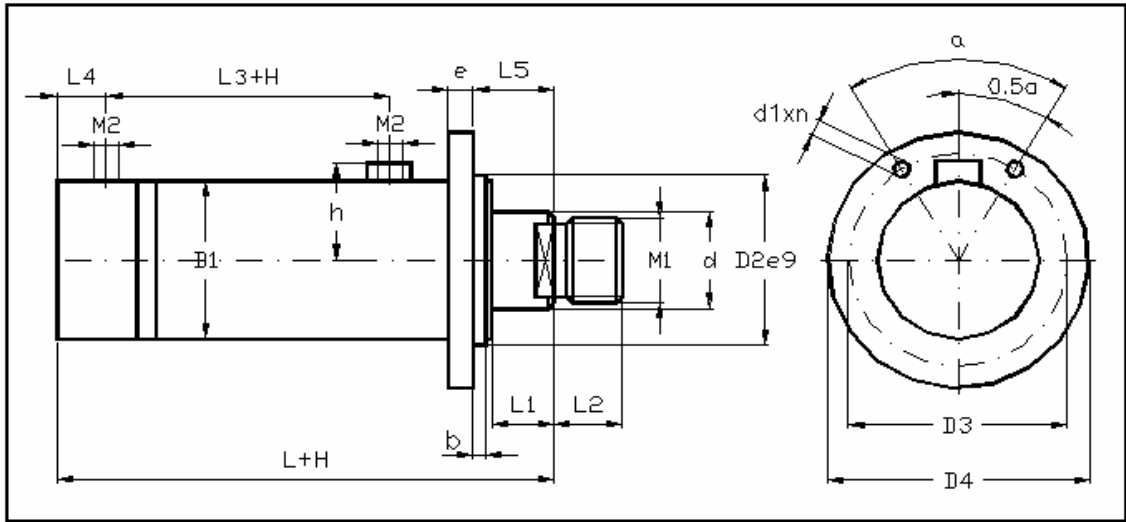


H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder strike is up to 4000mm)

$M_2$  – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br><b>D</b>   | 80    | 100   | 110   | 120   | 125   | 127   | 140   | 160   | 180   | 200*   | 250*   | 280*   | 320*   | 400*   |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Piston rod diameter<br><b>d</b> | 50    | 63    | 70    | 70    | 80    | 80    | 90    | 100   | 110   | 125    | 160    | 180    | 200    | 250    |
|                                 | 56    | 70    | 80    | 80    | 90    | 90    | 100   | 110   | 125   | 140    | 180    | 200    | 220    | 280    |
| <b>L</b>                        | 230   | 262   | 272   | 322   | 315   | 315   | 325   | 335   | 400   | 430    | 490    | 525    | 560    | 650    |
| <b>L<sub>1</sub></b>            | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 25    | 25     | 30     | 30     | 35     | 35     |
| <b>L<sub>2</sub></b>            | 50    | 55    | 60    | 60    | 65    | 65    | 70    | 80    | 80    | 100    | 135    | 150    | 170    | 190    |
| <b>L<sub>3</sub></b>            | 102   | 127   | 127   | 167   | 150   | 150   | 150   | 156   | 196   | 206    | 211    | 225    | 240    | 260    |
| <b>L<sub>4</sub></b>            | 26    | 30    | 30    | 30    | 30    | 30    | 30    | 35    | 35    | 35     | 40     | 50     | 55     | 60     |
| <b>D<sub>1</sub></b>            | 100   | 125   | 133   | 146   | 159   | 159   | 168   | 194   | 210   | 240    | 294    | 323    | 390    | 457    |
| <b>d<sub>1</sub>H8</b>          | 40    | 50    | 60    | 60    | 60    | 60    | 70    | 80    | 90    | 100    | 110    | 140    | 160    | 180    |
| <b>a</b>                        | 130   | 160   | 170   | 180   | 200   | 200   | 210   | 250   | 260   | 290    | 360    | 400    | 460    | 540    |
| <b>b</b>                        | 150   | 175   | 195   | 206   | 220   | 220   | 240   | 280   | 290   | 340    | 400    | 470    | 550    | 660    |
| <b>g</b>                        | 25    | 25    | 30    | 30    | 30    | 30    | 35    | 40    | 40    | 50     | 50     | 70     | 80     | 100    |
| <b>h</b>                        | 67    | 81,5  | 85,5  | 92    | 98,5  | 98,5  | 103   | 122   | 130   | 145    | 172    | 189    | 225    | 258    |
| <b>e</b>                        | 90    | 100   | 105   | 110   | 120   | 120   | 140   | 150   | 160   | 180    | 240    | 250    | 280    | 300    |
| <b>f<sub>min</sub></b>          | 160   | 180   | 195   | 205   | 220   | 220   | 230   | 255   | 275   | 305    | 390    | 415    | 440    | 515    |
| <b>M<sub>1</sub></b>            | M45x2 | M52x2 | M58x2 | M58x2 | M64x2 | M64x2 | M68x2 | M80x2 | M80x2 | M100x2 | M130x3 | M140x3 | M160x3 | M180x3 |

## CH5

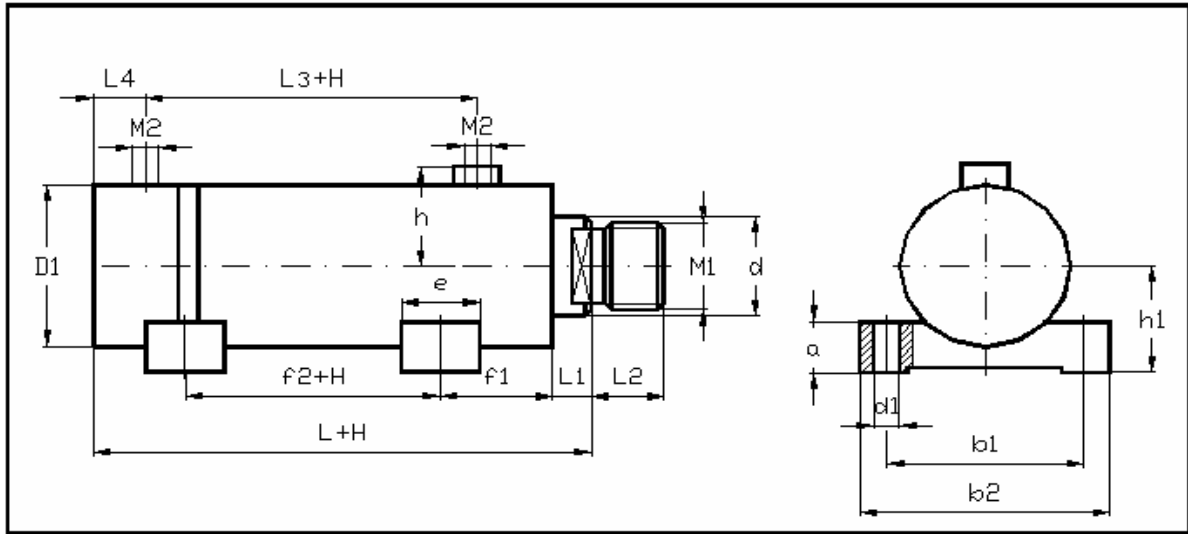


H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder strike is up to 4000 mm)

M<sub>2</sub> – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br>D   | 80    | 100   | 110   | 120   | 125   | 127   | 140   | 160   | 180   | 200*   | 250*   | 280*   | 320*   | 400*   |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Piston rod diameter<br>d | 50    | 63    | 70    | 70    | 80    | 80    | 90    | 100   | 110   | 125    | 160    | 180    | 200    | 250    |
|                          | 56    | 70    | 80    | 80    | 90    | 90    | 100   | 110   | 125   | 140    | 180    | 200    | 220    | 280    |
| <b>L</b>                 | 230   | 262   | 272   | 322   | 315   | 315   | 325   | 335   | 400   | 430    | 490    | 525    | 560    | 650    |
| L <sub>1</sub>           | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 25    | 25     | 30     | 30     | 35     | 35     |
| L <sub>2</sub>           | 50    | 55    | 60    | 60    | 65    | 65    | 70    | 80    | 80    | 100    | 135    | 150    | 170    | 190    |
| L <sub>3</sub>           | 102   | 127   | 127   | 167   | 150   | 150   | 150   | 156   | 196   | 206    | 211    | 225    | 240    | 260    |
| L <sub>4</sub>           | 26    | 30    | 30    | 30    | 30    | 30    | 30    | 35    | 35    | 35     | 40     | 50     | 55     | 60     |
| L <sub>5</sub>           | 35    | 35    | 35    | 35    | 35    | 35    | 40    | 40    | 45    | 45     | 50     | 55     | 60     | 60     |
| D <sub>1</sub>           | 100   | 125   | 133   | 146   | 159   | 159   | 168   | 194   | 210   | 240    | 294    | 323    | 390    | 457    |
| D <sub>2e9</sub>         | 115   | 142   | 150   | 165   | 165   | 165   | 185   | 210   | 230   | 255    | 324    | 345    | 410    | 480    |
| D <sub>3</sub>           | 155   | 190   | 200   | 220   | 220   | 220   | 240   | 275   | 295   | 330    | 410    | 450    | 520    | 660    |
| D <sub>4</sub>           | 188   | 223   | 240   | 262   | 262   | 262   | 288   | 328   | 348   | 388    | 480    | 530    | 610    | 750    |
| d <sub>1</sub>           | 20    | 22    | 22    | 26    | 26    | 26    | 30    | 33    | 33    | 36     | 42     | 45     | 45     | 51     |
| b                        | 5     | 5     | 5     | 5     | 5     | 5     | 8     | 8     | 8     | 8      | 8      | 10     | 10     | 10     |
| e                        | 34    | 36    | 36    | 38    | 38    | 38    | 42    | 46    | 50    | 55     | 70     | 80     | 90     | 105    |
| h                        | 67    | 81,5  | 85,5  | 92    | 98,5  | 98,5  | 103   | 122   | 130   | 145    | 172    | 189    | 225    | 258    |
| □                        | 60    | 60    | 60    | 60    | 45    | 45    | 45    | 45    | 30    | 30     | 30     | 30     | 22,5   | 22,5   |
| n                        | 6     | 6     | 6     | 6     | 8     | 8     | 8     | 8     | 12    | 12     | 12     | 12     | 16     | 16     |
| M <sub>1</sub>           | M45x2 | M52x2 | M58x2 | M58x2 | M64x2 | M64x2 | M68x2 | M80x2 | M80x2 | M100x2 | M130x3 | M140x3 | M160x3 | M180x3 |

# C H 6



H – cylinder stroke (up to 9000 mm, for diameters marked “\*” cylinder stroke is up to 4000mm)

$M_2$  – thread seat according to PN-ISO 6149-1

| Cylinder diameter<br><b>D</b>   | 80    | 100   | 110   | 120   | 125   | 127   | 140   | 160   | 180   | 200*   | 250*   | 280*   | 320*   | 400*   |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Piston rod diameter<br><b>d</b> | 50    | 63    | 70    | 70    | 80    | 80    | 90    | 100   | 110   | 125    | 160    | 180    | 200    | 250    |
|                                 | 56    | 70    | 80    | 80    | 90    | 90    | 100   | 110   | 125   | 140    | 180    | 200    | 220    | 280    |
| <b>L</b>                        | 230   | 262   | 272   | 322   | 315   | 315   | 325   | 335   | 400   | 430    | 490    | 525    | 560    | 650    |
| $L_1$                           | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 20    | 25    | 25     | 30     | 30     | 35     | 35     |
| $L_2$                           | 50    | 55    | 60    | 60    | 65    | 65    | 70    | 80    | 80    | 100    | 135    | 150    | 170    | 190    |
| $L_3$                           | 102   | 127   | 127   | 167   | 150   | 150   | 150   | 156   | 196   | 206    | 211    | 225    | 240    | 260    |
| $L_4$                           | 26    | 30    | 30    | 30    | 30    | 30    | 30    | 35    | 35    | 35     | 40     | 50     | 55     | 60     |
| $D_1$                           | 100   | 125   | 133   | 146   | 159   | 159   | 168   | 194   | 210   | 240    | 294    | 323    | 390    | 457    |
| $b_1$                           | 140   | 180   | 200   | 210   | 220   | 220   | 240   | 280   | 320   | 360    | 420    | 480    | 540    | 610    |
| $b_2$                           | 190   | 250   | 270   | 290   | 300   | 300   | 320   | 380   | 430   | 480    | 560    | 640    | 720    | 810    |
| $h$                             | 67    | 81,5  | 85,5  | 92    | 98,5  | 98,5  | 103   | 122   | 130   | 145    | 172    | 189    | 225    | 258    |
| $h_1$                           | 70    | 80    | 90    | 100   | 110   | 110   | 115   | 130   | 140   | 160    | 190    | 210    | 255    | 300    |
| $d_1$                           | 25    | 31    | 37    | 40    | 40    | 40    | 43    | 50    | 58    | 60     | 78     | 87     | 98     | 119    |
| $a$                             | 35    | 45    | 50    | 55    | 60    | 60    | 65    | 70    | 75    | 80     | 90     | 100    | 120    | 140    |
| $e$                             | 50    | 60    | 70    | 75    | 80    | 80    | 90    | 100   | 110   | 120    | 140    | 160    | 180    | 200    |
| $f_1$                           | 65    | 70    | 70    | 80    | 80    | 80    | 80    | 80    | 90    | 100    | 110    | 120    | 150    | 170    |
| $f_2$                           | 60    | 70    | 80    | 100   | 100   | 100   | 120   | 140   | 160   | 160    | 180    | 200    | 200    | 200    |
| $M_1$                           | M45x2 | M52x2 | M58x2 | M58x2 | M64x2 | M64x2 | M68x2 | M80x2 | M80x2 | M100x2 | M130x3 | M140x3 | M160x3 | M180x3 |



# CHT

## CONTENT OF CATALOGUE

CHT1 – one-sided action

CHT2 – double-sided action

CHT3 – double-sided action with uniform piston rod feed

## TECHNICAL PARAMETERS

|  |                               |
|--|-------------------------------|
| - nominal pressure                     |                               |
| for CHT1 type cylinders                | - 4 MPa                       |
| for CHT2 type cylinders                |                               |
| - under a piston (move out)            | - 16 MPa                      |
| - over a piston (move in)              | - 12 MPa                      |
| for CHT3 type cylinders                |                               |
| - under a piston (move out)            | - 25 MPa                      |
| - over a piston (move in)              | - 30 MPa                      |
| - max. piston move                     | - 0,5 m/s                     |
| - working temperature range            | - 253 ÷ 353 K                 |
| - working fluid viscosity range        | - 9 ÷ 300 cSt                 |
| - working fluid cleanness requirements | - 9 Kl. according to NAS 1638 |

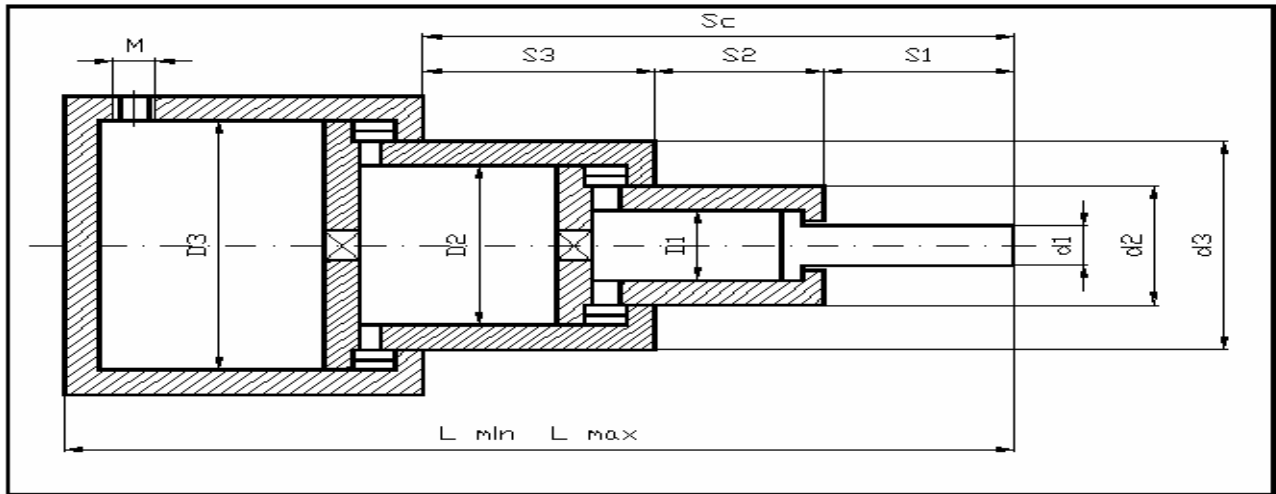
## STRUCTURE OF DESIGNATION

CHT2 – 16/12 – 2 – 180/140 – 160/120 – 5715/5715 – 11430

|                                |             |
|--------------------------------|-------------|
| Series of types                | CHT2        |
| Pressure                       | 16/12       |
| Move out/Move in               | – 2         |
| Number of stages               | – 180/140   |
| Inner cylinder diameter        | – 160/120   |
| Outer piston rod diameter      | – 5715/5715 |
| Piston's stroke for each stage | – 11430     |
| Entire stroke                  |             |

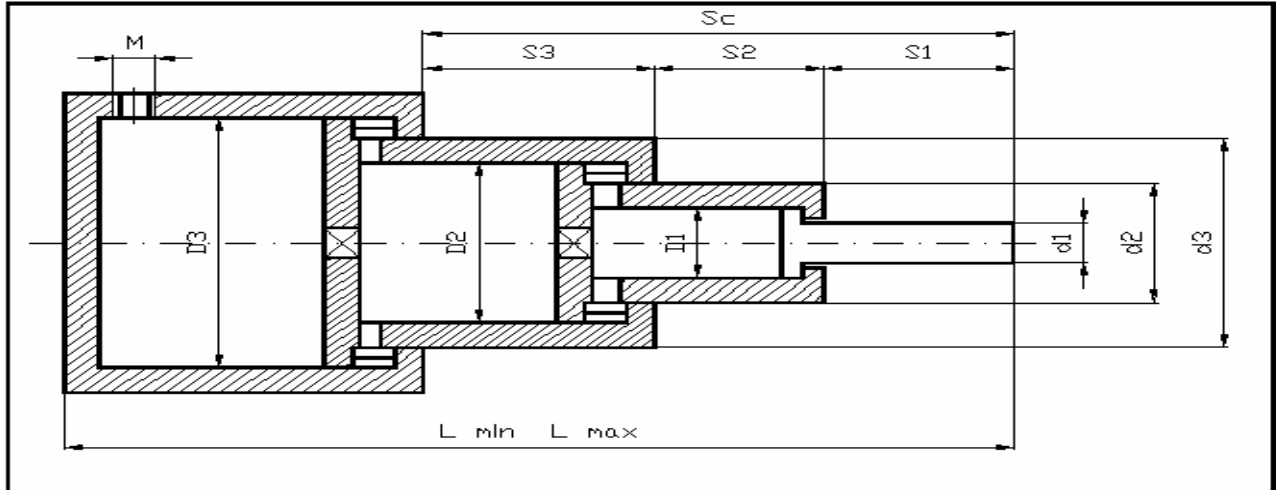
It is possible to manufacture telescopic cylinders with other working strokes and pressures.

# ONE-SIDED ACTION C H T 1



| Inner cylinder sleeve diameter of each stage |       |       | Outer piston rod diameter of each stage |       |       | Strokes each stage |       |       | Entire stroke (all stages) | M     |       |
|--|-------|-------|---|-------|-------|--------------------|-------|-------|----------------------------|-------|-------|
|  |       |       |   |       |       |                    |       |       |                            |       |       |
| $D_1$  | $D_2$ | $D_3$ | $d_1$                                   | $d_2$ | $d_3$ | $S_1$              | $S_2$ | $S_3$ | $S_c$                      |       |       |
| 85   | 120   | 185   | 70                                      | 100   | 140   | 2177               | 2408  | 2365  | 6950                       | 3135  | M48x2 |
|  |       |       |   |       |       |                    |       |       |                            | 10085 |       |
|  |       |       |   |       |       | 3150               | 3480  | 3420  | 10050                      | 4191  |       |
|  |       |       |   |       |       |                    |       |       |                            | 14241 |       |
|  |       |       |   |       |       | 3346               | 3726  | 3845  | 10750                      | 4431  |       |
|  |       |       |   | 15181 |       |                    |       |       |                            |       |       |
|  |       |       |   |       | 3540  | 3915               | 3845  | 11300 | 4615                       |       |       |
|  |       |       |   |       |       |                    |       |       | 15915                      |       |       |
| 85   | 120   | 185   | 70                                      | 100   | 140   | 2490               | 2930  | 3030  | 8450                       | 5494  |       |
|  |       |       |   |       |       |                    |       |       |                            | 13944 |       |
|  |       |       |   |       |       | 4070               | 4505  | 4425  | 13000                      | 5195  |       |
|  |       |       |   |       |       |                    |       |       |                            | 18195 |       |
| 85   | 120   |       | 70                                      | 100   |       | 3940               | 4360  |       | 8300                       | 4930  |       |
|  |       |       |   |       |       |                    |       |       |                            | 13230 |       |
| 85   | 120   |       | 70                                      | 100   |       | 2890               | 2770  |       | 5660                       | 3615  |       |
|  |       |       |   |       |       |                    |       |       |                            | 9275  |       |
|  |       |       |   |       |       | 3116               | 3494  |       | 6610                       | 4116  |       |
|  |       |       |   |       |       |                    |       |       |                            | 10725 |       |
|  |       |       |   |       |       | 4140               | 4140  |       | 8280                       | 4796  |       |

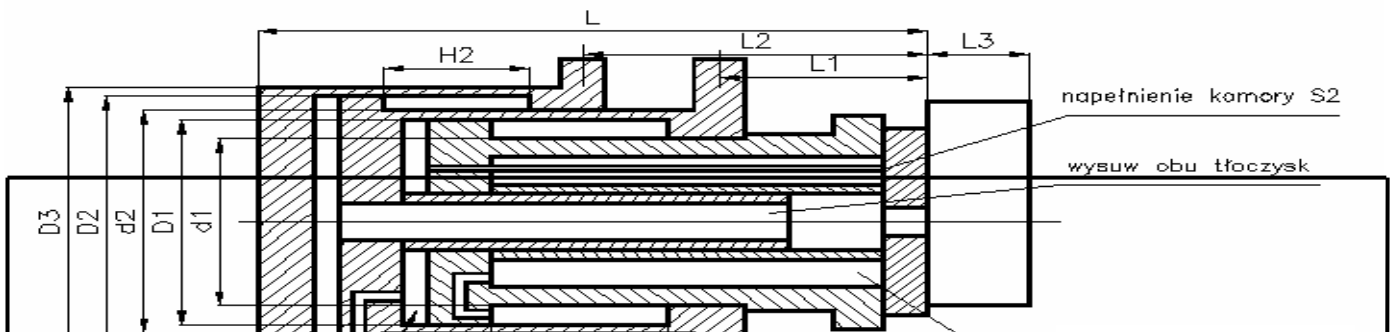
# DOUBLE-SIDED ACTION C H T 2



Feed – by piston rod with returnable steering valves.

Fastening – clamping ring with pivot  
piston rod end with bolt

| Inner cylinder sleeve diameter of each stage |       | Outer piston rod diameter of each stage |       | Strokes of each stage |       | Entire stroke (all stages) | $L_{min}$ |
|--|-------|---|-------|-----------------------|-------|----------------------------|-----------|
| $D_1$  | $D_2$ | $D_1$                                   | $d_2$ | $S_1$                 | $S_2$ | $S_C$                      | $L_{max}$ |
| 127  | 160   | 115                                     | 145   | 5715                  | 5715  | 11430                      | 6809      |
|  |       |   |       |                       |       |                            | 18239     |
| 140  | 180   | 120                                     | 160   | 5715                  | 5715  | 11430                      | 6809      |
|  |       |   |       |                       |       |                            | 18239     |
| 140  | 180   | 120                                     | 160   | 7520                  | 7520  | 15040                      | 8755      |
|  |       |   |       |                       |       |                            | 23795     |
| 140  | 180   | 120                                     | 160   | 8020                  | 8020  | 16040                      | 9255      |
|  |       |   |       |                       |       |                            | 25205     |



H – Cylinder stroke (  $H_1 + H_2$  )

M – Thread seat according to DIN 3852

| Cylinder diameter<br>$D_1 / D_2$ | <b>110 / 165,3</b> |  |
|----------------------------------|--------------------|--|
| $D_3$                            | 183                |  |
| $d_1$                            | 95                 |  |
| $d_2$                            | 127                |  |
| $L_1$                            | 199                |  |
| $L_2$                            | 376                |  |
| $L_3$                            | 71                 |  |
| L                                | 7686               |  |
| H                                | 14123              |  |
| $H_1$                            | 7123               |  |
| $H_2$                            | 7000               |  |

# WITH TWO-SIDED PISTON ROD CHDT

## CONTENT OF CATALOGUE

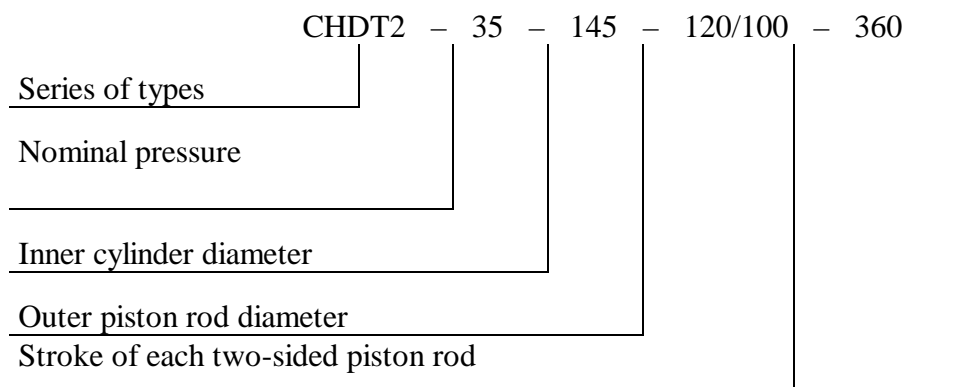
Catalogue includes types of following types of cylinders with double-sided piston rods.

CHDT1 - fastening on lugs

## TECHNICAL PARAMETERS

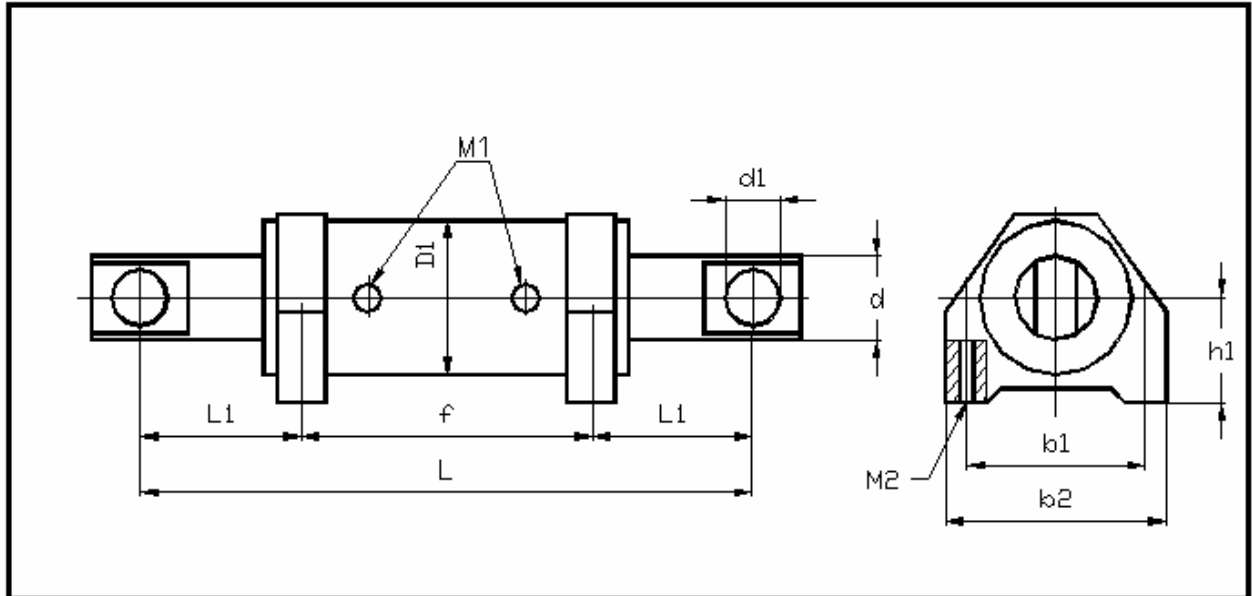
- |  |                               |
|--|-------------------------------|
| - nominal pressure                     |                               |
| for CHDT1 type cylinders               | - 20 MPa                      |
| - max. piston move                     | - 0,5 m/s                     |
| - work range temperature               | - 253 ÷ 353 K                 |
| - working fluid viscosity range        | - 9 ÷ 300 cSt                 |
| - working fluid cleanness requirements | - 9 Kl. according to NAS 1638 |

## STRUCTURE OF DESIGNATION



There's possibility to manufacture telescopic cylinders with other working strokes and pressures.

## WITH TWO-SIDED PISTON ROD CHDT 1



H – cylinder stroke

M<sub>1</sub> – thread seat according to DIN 3852

|                                  |            |            |            |            |
|----------------------------------|------------|------------|------------|------------|
| <b>Cylinder diameter<br/>D</b>   | <b>140</b> | <b>175</b> | <b>175</b> | <b>200</b> |
| <b>Piston rod diameter<br/>d</b> | <b>100</b> | <b>125</b> | <b>125</b> | <b>140</b> |
| <b>H</b>                         | 2x210      | 2x175      | 2x195      | 2x195      |
| <b>L</b>                         | 1440       | 1725       | 1725       | 1727       |
| <b>L<sub>1</sub></b>             | 379        | 442,5      | 442,5      | 442,5      |
| <b>D<sub>1</sub></b>             | 160        | 200        | 200        | 245        |
| <b>D<sub>1</sub></b>             | 40         | 60         | 60         | 70         |
| <b>B<sub>1</sub></b>             | 210        | 280        | 280        | 280        |
| <b>B<sub>2</sub></b>             | 260        | 340        | 340        | 340        |
| <b>F</b>                         | 682        | 840        | 840        | 840        |
| <b>H<sub>1</sub></b>             | 93         | 105        | 105        | 105        |
|                                  |            |            |            |            |

# 15. PLUNGER HYDRAULIC CYLINDERS CHN

## CONTENT OF CATALOGUE

CHN – plunger hydraulic cylinders with one-sided action

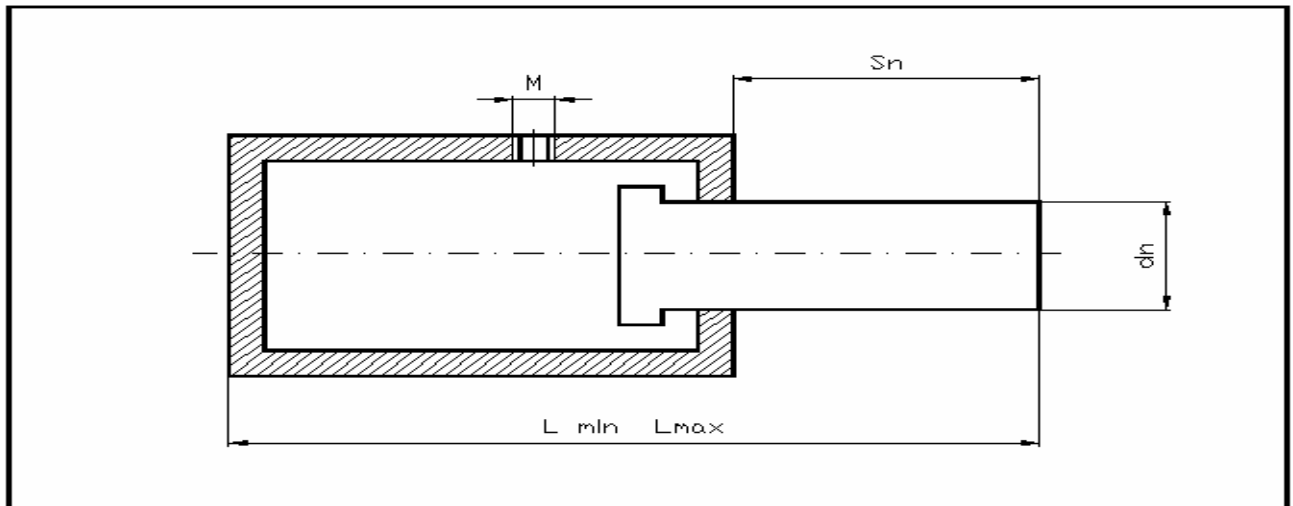
## TECHNICAL PARAMETERS

- nominal pressure - 4 MPa
- max. piston move - 0,5 m/s
- work range temperature - 253 ÷ 353 K
- working fluid viscosity range - 9 ÷ 300 cSt
- working fluid cleanness requirements - 9 Kl. according to NAS 1638

## STRUCTURE OF DESIGNATION

|                  |     |   |   |   |    |   |      |
|------------------|-----|---|---|---|----|---|------|
|                  | CHN | - | 4 | - | 70 | - | 3545 |
| Series of types  |     |   |   |   |    |   |      |
| Nominal pressure |     |   |   |   |    |   |      |
| Plunger diameter |     |   |   |   |    |   |      |
| Stroke           |     |   |   |   |    |   |      |

It is possible to manufacture telescopic cylinders with other working strokes and pressures.



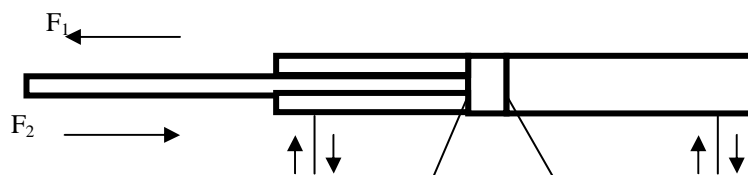
M – thread seat according to PN-ISO 6149-1

| Plunger diameter<br>$d_n$ | Stroke<br>$S_n$ | $L_{min}$ | M       |
|---------------------------|-----------------|-----------|---------|
|                           |                 | $L_{max}$ |         |
| <b>50</b>                 | 2650            | 3055      | M22x1,5 |
|                           |                 | 5705      |         |
|                           | 3850            | 4154      |         |
|                           | 3895            | 8004      |         |
|                           |                 | 4199      |         |
| <b>70</b>                 | 3545            | 8094      | M42x2   |
|                           |                 | 3811      |         |
| <b>100</b>                | 3665            | 7356      | M48x2   |
|                           |                 | 3920      |         |
|                           | 3730            | 7585      |         |
|                           |                 | 3985      |         |
|                           | 3755            | 7715      |         |
|                           |                 | 4010      |         |
|                           | 4190            | 7765      |         |
|                           |                 | 4445      |         |
|                           | 4230            | 8635      |         |
|                           |                 | 4485      |         |
|                           | 5545            | 8715      |         |
|                           |                 | 5800      |         |
|                           | 6955            | 11345     |         |
| 7210                      |                 |           |         |
| 7030                      | 14165           |           |         |
|                           | 7285            |           |         |
| 519                       | 14315           | 5814      |         |
|                           | 11004           |           |         |

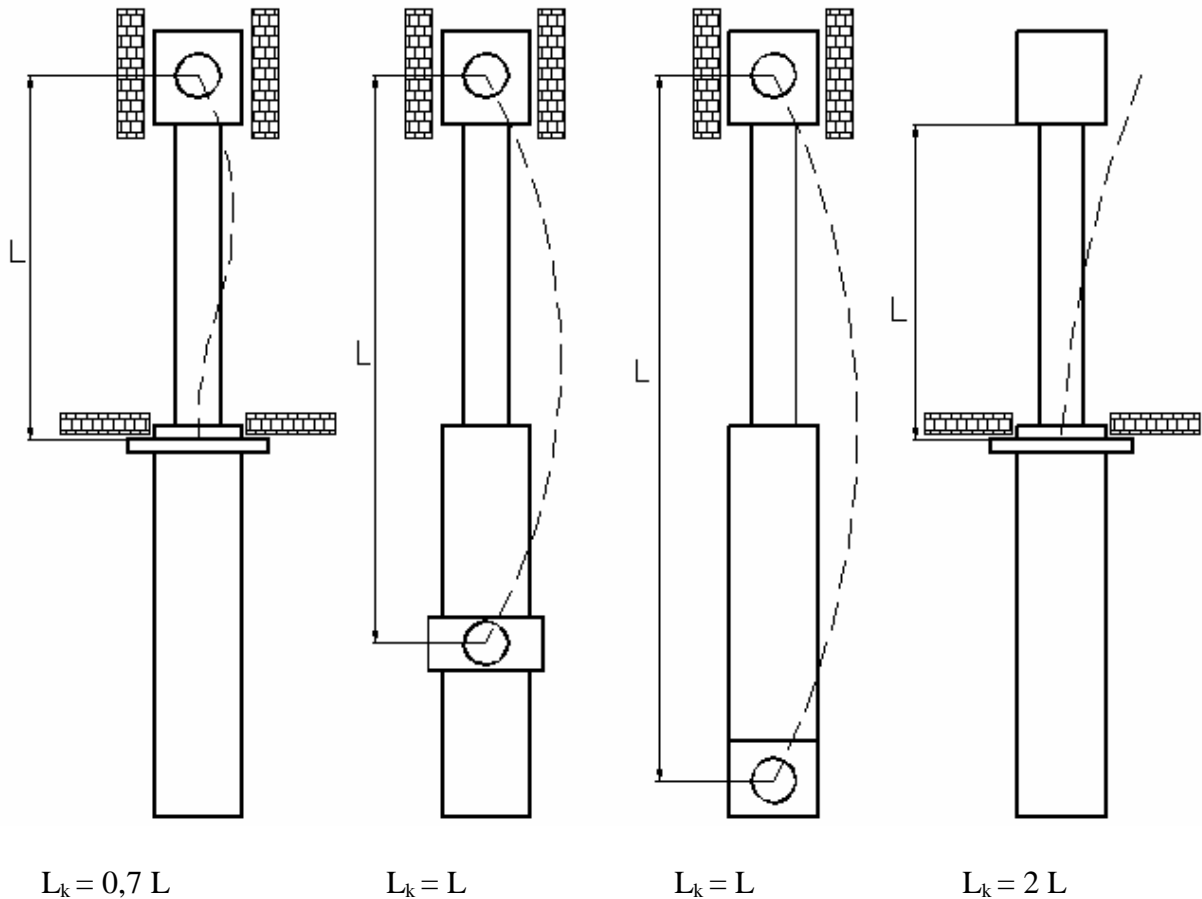
# CYLINDERS

## 17. VALUE OF FORCES DEPENDENT ON THE DIAMETER AND PRESSURE OF CYLINDER

| Cylinder diameter<br>D | Pushing surface<br>$S_1$ | Piston rod diameter<br>d | Pulling surface<br>$S_2$ | Pushing force<br>$F_1$ |        |        | Pulling force<br>$F_2$ |        |        |
|------------------------|--------------------------|--------------------------|--------------------------|------------------------|--------|--------|------------------------|--------|--------|
|                        |                          |                          |                          | 16 MPa                 | 20 MPa | 25 MPa | 16 MPa                 | 20 MPa | 25 MPa |
| Mm                     | mm <sup>2</sup>          | mm                       | mm <sup>2</sup>          | kN                     | KN     | kN     | kN                     | kN     | kN     |
| 80                     | 5027                     | 50                       | 3063                     | 80                     | 101    | 126    | 49                     | 61     | 77     |
|                        |                          | 56                       | 2564                     |                        |        |        | 41                     | 51     | 64     |
| 100                    | 7854                     | 63                       | 4737                     | 126                    | 157    | 196    | 76                     | 95     | 118    |
|                        |                          | 70                       | 4006                     |                        |        |        | 64                     | 80     | 100    |
| 110                    | 9503                     | 70                       | 5655                     | 152                    | 190    | 238    | 90                     | 113    | 141    |
|                        |                          | 80                       | 4477                     |                        |        |        | 72                     | 90     | 112    |
| 120                    | 11310                    | 70                       | 7464                     | 181                    | 226    | 283    | 119                    | 149    | 187    |
|                        |                          | 80                       | 6283                     |                        |        |        | 101                    | 126    | 157    |
| 125                    | 12272                    | 80                       | 7245                     | 196                    | 245    | 307    | 116                    | 145    | 181    |
|                        |                          | 90                       | 5910                     |                        |        |        | 95                     | 118    | 148    |
| 127                    | 12668                    | 80                       | 7641                     | 203                    | 253    | 317    | 122                    | 153    | 191    |
|                        |                          | 90                       | 6306                     |                        |        |        | 101                    | 126    | 158    |
| 140                    | 15394                    | 90                       | 9032                     | 246                    | 308    | 358    | 145                    | 181    | 226    |
|                        |                          | 100                      | 7540                     |                        |        |        | 121                    | 151    | 188    |
| 160                    | 20106                    | 100                      | 12252                    | 322                    | 402    | 503    | 196                    | 245    | 306    |
|                        |                          | 110                      | 10603                    |                        |        |        | 170                    | 212    | 265    |
| 180                    | 25447                    | 110                      | 15944                    | 407                    | 509    | 636    | 255                    | 319    | 399    |
|                        |                          | 125                      | 13175                    |                        |        |        | 211                    | 264    | 329    |
| 200                    | 31416                    | 125                      | 19144                    | 503                    | 628    | 785    | 306                    | 383    | 479    |
|                        |                          | 140                      | 16022                    |                        |        |        | 256                    | 320    | 401    |
| 250                    | 49087                    | 160                      | 28981                    | 785                    | 982    | 1227   | 464                    | 580    | 725    |
|                        |                          | 180                      | 23640                    |                        |        |        | 378                    | 473    | 591    |
| 280                    | 61575                    | 180                      | 36128                    | 985                    | 1232   | 1539   | 578                    | 723    | 903    |
|                        |                          | 200                      | 30159                    |                        |        |        | 483                    | 603    | 754    |
| 320                    | 80425                    | 200                      | 49009                    | 1287                   | 1608   | 2011   | 784                    | 980    | 1225   |
|                        |                          | 220                      | 42412                    |                        |        |        | 679                    | 848    | 1060   |
| 400                    | 125664                   | 250                      | 76576                    | 2011                   | 2513   | 3142   | 1225                   | 1532   | 1914   |
|                        |                          | 280                      | 64088                    |                        |        |        | 1025                   | 1292   | 1602   |



## 18. IMPACT OF FASTENING ON THE BULGING LENGTH



### Selection of a cylinder depending on charge

Diameter 1 on the preceding page presents  $L_k$  - the free length of cylinder as a function of pressure for specific cylinders. The free length is calculated according to the Euler formula:

$$F = \frac{\pi^2 \times E \times J}{S \times L_k^2}$$

F = bulging force

E = module of elasticity - assumed  $2,1 \times 10^5 \text{ N/mm}^2$  for steel

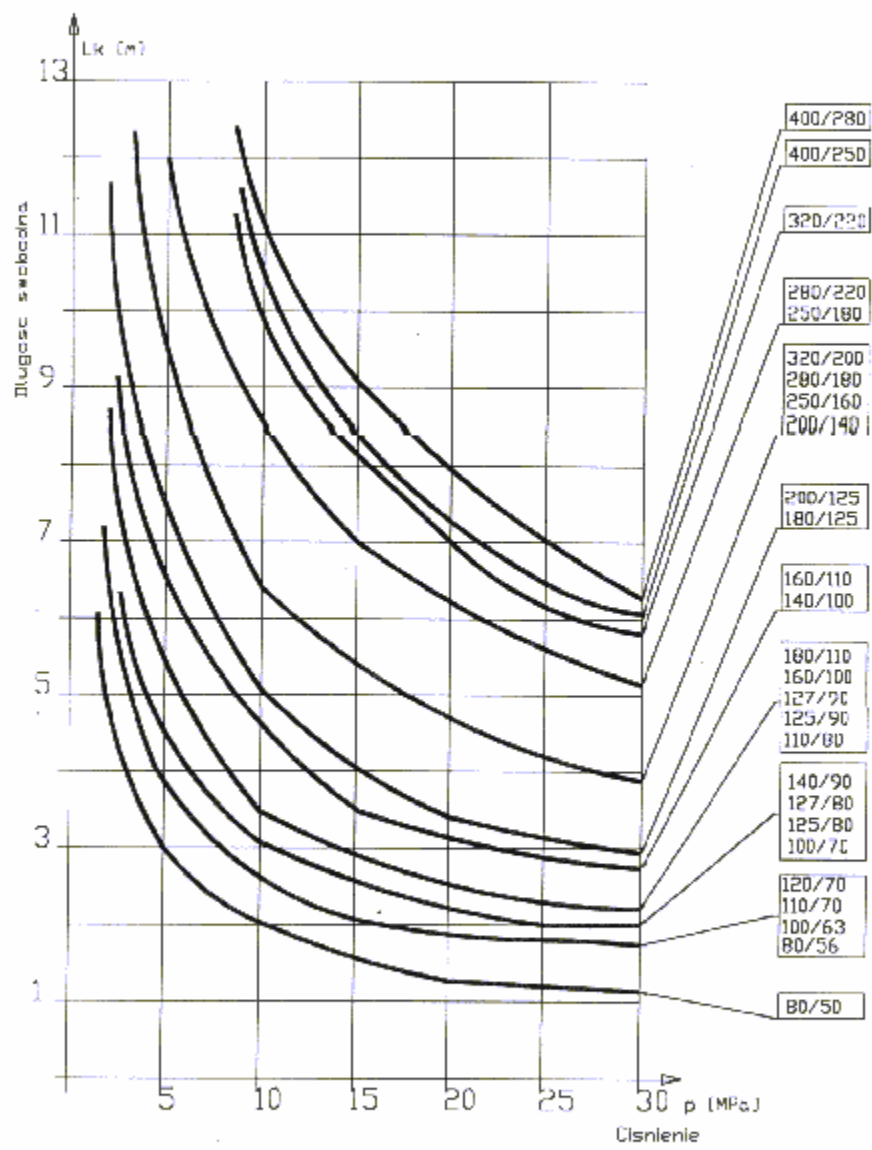
J = axial moment of inertia at section -  $0,491 d^4 \text{ (mm}^4\text{)}$

S = coefficient of security - assumption of 3 for steel

$L_k$  = free length

D = diameter of piston rod.

## 19. FREE LENGTH OF CYLINDER AS A FUNCTION OF PRESSURE



Rys. Nr 1