

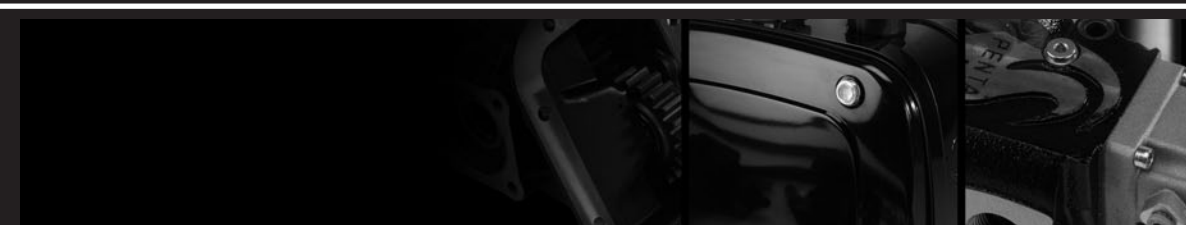


CYLINDERS | **LIGHT DUTY**

Dettagli Tecnici • Technical Data • Détail Techniques • Technischedatum • Detalles Tècnicos

Dettagli Tecnici • Technical Data • Détail Techniques • Technischedatum • Detalles Tècnicos

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TUV SÜD
ZERTIFIKAT ◆ CERTIFICATE ◆ 認 證 證 書 ◆ CERTIFICADO ◆ CERTIFICAT



CERTIFICATO

Nr 50 100 2740 - Rev. 06

Si attesta che / This is to certify that
IL SISTEMA QUALITÀ DI
THE QUALITY SYSTEM OF

H.S. PENTA S.p.A.
SEDE LEGALE E OPERATIVA:
VIA PROVENTA 31
I-48018 FAENZA (RA)

È CONFORME AI REQUISITI DELLA NORMA
HAS BEEN FOUND TO COMPLY WITH THE REQUIREMENTS OF

UNI EN ISO 9001:2008

Questo certificato è valido per il seguente campo di applicazione
This certificate is valid for the following product or service range

Progettazione, fabbricazione ed assistenza di cilindri oleodinamici in particolare telescopici per ribaltabili; progettazione e costruzione dispositivi idraulici per cilindri oleodinamici, in particolare anticaduta e fine corsa (IAF 18)

Design, manufacture and after-sale service of telescopic hydraulic cylinders for tipping gears; design and construction of hydraulic devices for hydraulic cylinders, hose burst valves and end-of-stroke devices (IAF 18)



Per l'Organismo di Certificazione
For the Certification Body
TÜV Italia S.r.l.

Data di emissione / Issue date

2012-05-15

SGQ N° 049A SSI N° 005G PRD N° 081B
SGAN N° 018D ITX N° 001L ISP N° 057E
SCR N° 009F PRS N° 077C LAB N° 007B

Paolo Merenda
Direttore Certificazione

Data di scadenza / Expiry date

2015-04-30

Membro degli Accordi di Mutuo Riconoscimento
EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

Organizzazione certificata per la prima volta in data 2003-05-20

"La validità del presente certificato è subordinata a sorveglianza periodica a 12 mesi e al riesame completo del sistema di gestione aziendale con periodicità triennale"

"The validity of the present certificate depends on the annual surveillance every 12 months and on the complete review of company's management system after three-years"

TÜV Italia S.r.l. • Gruppo TÜV SÜD • Via Carducci 125, Pal. 23 • 20099 Sesto San Giovanni (MI) • Italia • www.tuv.it



Index



LIGHT DUTY

2 L 174

3 L 160

4 L 140

5 L 120

6 L 105

7 L 90

8 L 75

9 Notes

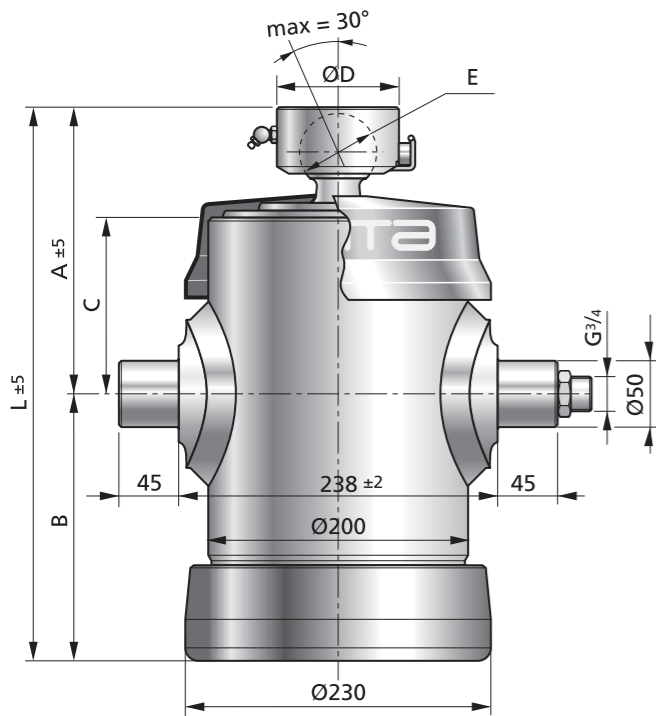
10-11 Selection charts

12 Assembly

Endpaper Warnings - Warranty

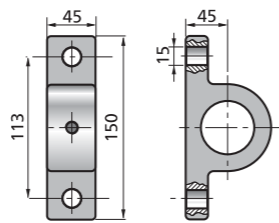
L 174

EFFECTIVE DIAMETER [mm] 174 • 154 • 135 • 120 • 105 • 90 • 75 • 60

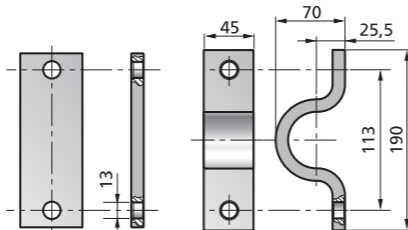


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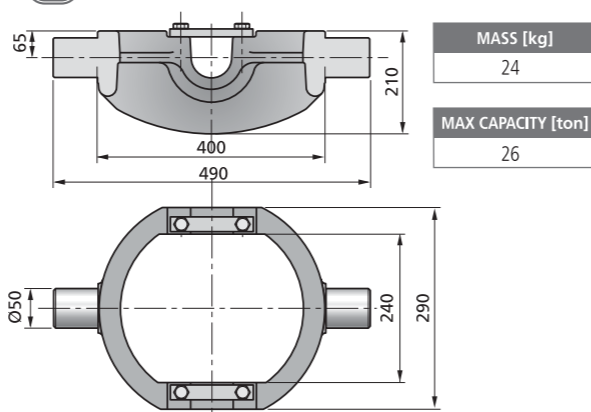
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CRADLE SUPPORT PAIR A60050001

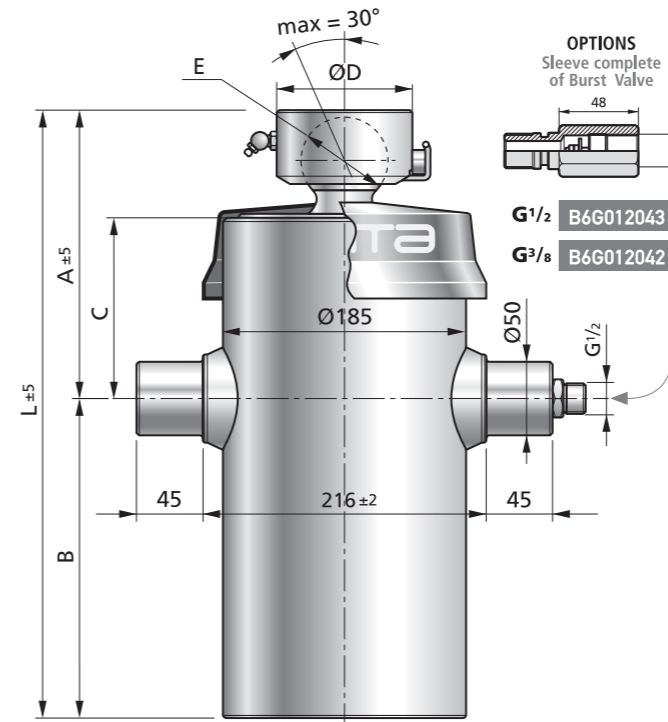


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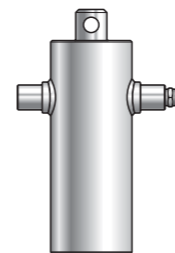


L 160

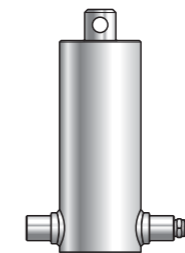
EFFECTIVE DIAMETER [mm] 160 • 140 • 120 • 105 • 90 • 75 • 60



OPTION with ROD EYE - PIN

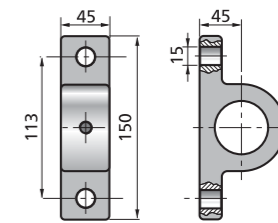


OPTION with ROD EYE - LOWER PIN

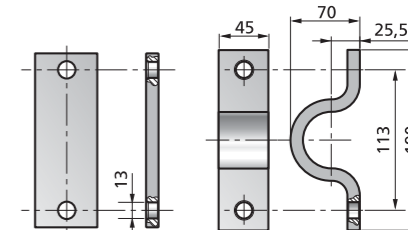


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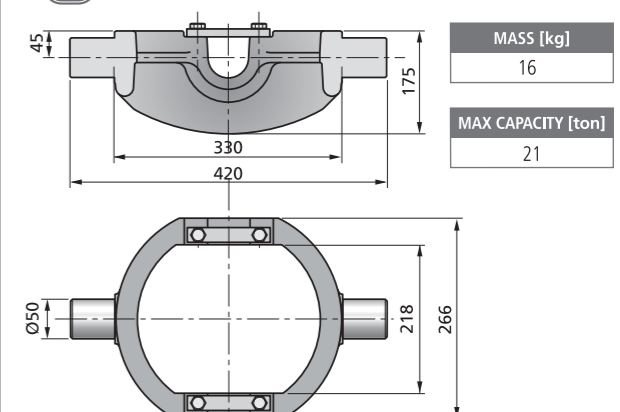
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CRADLE SUPPORT PAIR A60050001



CRADLE A50300001



L 174 TECHNICAL DATA

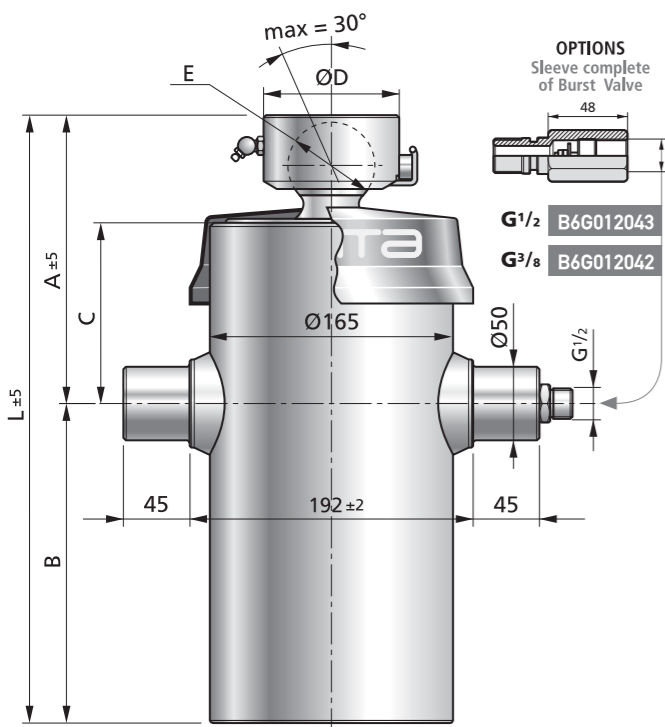
| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|------------------|---------------|--------------|-------------------|-----------|----------------------|-----------------------------|------------------------|-----|-----|-----|-----|----|----|
| BL300 1796 174 8 | 3103001748001 | 8 | 1796 | 78 | 20,1 | 180 | 14-24 | 417 | 216 | 201 | 133 | 92 | 58 |
| BL300 1569 174 7 | 3103001747001 | 7 | 1569 | 81 | 19,5 | 180 | 17-28 | 417 | 216 | 201 | 133 | 92 | 58 |
| BL300 1345 174 6 | 3103001746001 | 6 | 1345 | 74 | 18,5 | 180 | 18-30 | 417 | 216 | 201 | 133 | 92 | 58 |

L 160 TECHNICAL DATA

| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|------------------|---------------|--------------|-------------------|-----------|----------------------|-----------------------------|------------------------|-----|-----|-----|-----|----|----|
| BL400 2271 160 7 | 3104001607001 | 7 | 2271 | 76 | 22,6 | 180 | 12-21 | 517 | 246 | 271 | 174 | 92 | 58 |
| BL400 1950 160 6 | 3104001606001 | 6 | 1950 | 77 | 21,7 | 180 | 15-25 | 517 | 246 | 271 | 174 | 92 | 58 |
| BL400 1631 160 5 | 3104001605001 | 5 | 1631 | 68 | 20,2 | 180 | 17-29 | 517 | 246 | 271 | 174 | 92 | 58 |
| BL400 1315 160 4 | 3104001604001 | 4 | 1315 | 65 | 18,2 | 180 | 17-29 | 517 | 246 | 271 | 174 | 92 | 58 |
| BL300 1613 160 7 | 3103001607001 | 7 | 1613 | 61 | 16,1 | 180 | 12-21 | 423 | 219 | 204 | 147 | 92 | 58 |
| BL300 1386 160 6 | 3103001606001 | 6 | 1386 | 61 | 15,4 | 180 | 15-25 | 423 | 219 | 204 | 147 | 92 | 58 |
| BL300 1161 160 5 | 3103001605001 | 5 | 1161 | 55 | 14,4 | 180 | 17-29 | 423 | 219 | 204 | 147 | 92 | 58 |

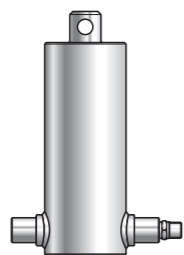
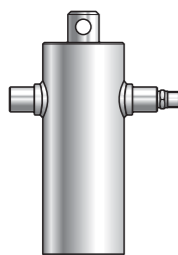
L 140

EFFECTIVE DIAMETER [mm] 140 • 120 • 105 • 90 • 75 • 60



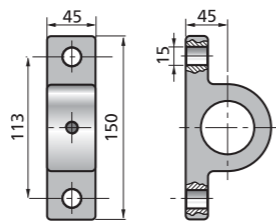
OPTION with ROD EYE - PIN

OPTION with ROD EYE - LOWER PIN

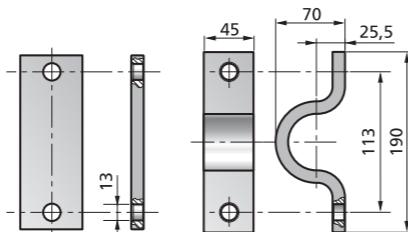


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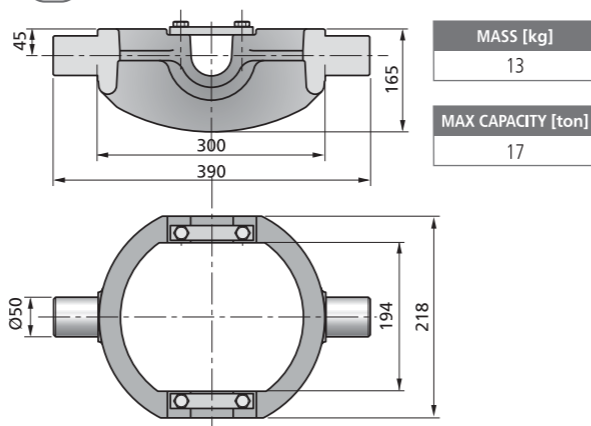
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CRADLE SUPPORT PAIR A60050001

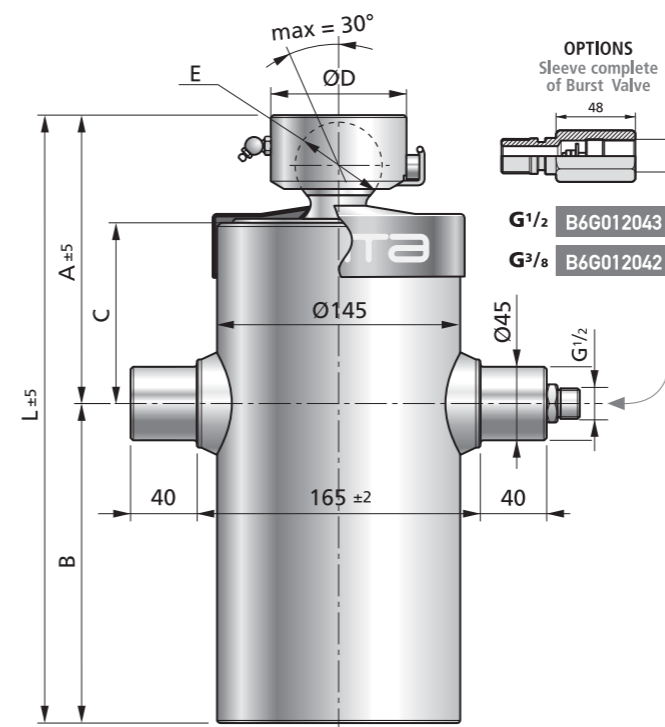


CRADLE A50400001



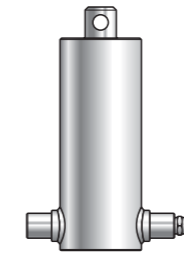
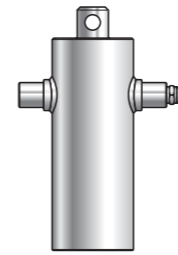
L 120

EFFECTIVE DIAMETER [mm] 120 • 105 • 90 • 75 • 60 • 45



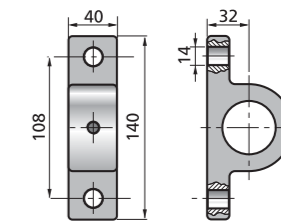
OPTION with ROD EYE - PIN

OPTION with ROD EYE - LOWER PIN

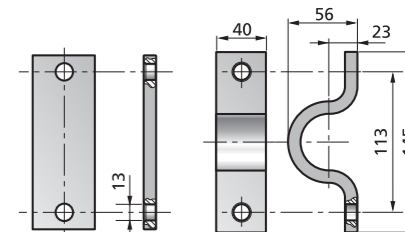


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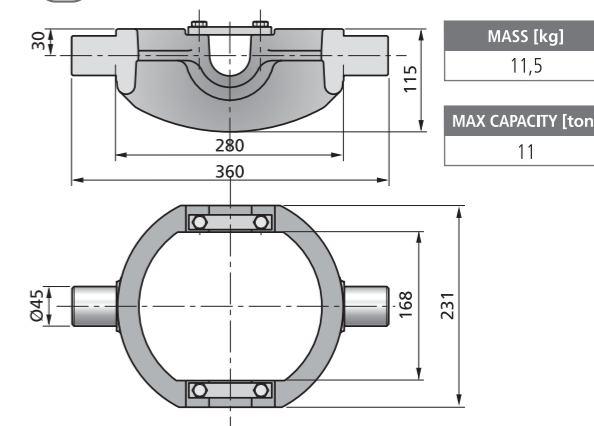
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CRADLE SUPPORT PAIR A60045001



CRADLE A5L080001



L 140 TECHNICAL DATA

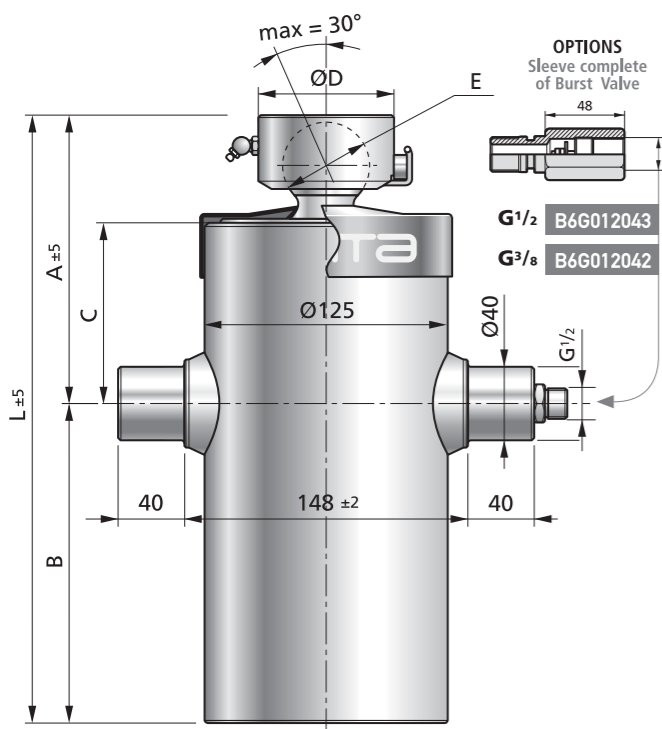
| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|------------------|---------------|--------------|-------------------|-----------|----------------------|-----------------------------|------------------------|-----|-----|-----|-----|----|----|
| BL400 1947 140 6 | 3104001406001 | 6 | 1947 | 61 | 16 | 180 | 11-18 | 510 | 234 | 276 | 162 | 92 | 58 |
| BL400 1625 140 5 | 3104001405001 | 5 | 1625 | 63 | 15,1 | 180 | 13-22 | 510 | 234 | 276 | 162 | 92 | 58 |
| BL400 1307 140 4 | 3104001404001 | 4 | 1307 | 53 | 13,7 | 180 | 15-25 | 510 | 234 | 276 | 162 | 92 | 58 |
| BL300 1383 140 6 | 3103001406001 | 6 | 1383 | 49 | 11,4 | 180 | 11-18 | 416 | 242 | 174 | 170 | 92 | 58 |
| BL300 1155 140 5 | 3103001405001 | 5 | 1155 | 50 | 10,8 | 180 | 13-22 | 416 | 242 | 174 | 170 | 92 | 58 |
| BL300 930 140 4 | 3103001404001 | 4 | 930 | 43 | 9,8 | 180 | 15-25 | 416 | 242 | 174 | 170 | 92 | 58 |
| BL270 1197 140 6 | 3102701406001 | 6 | 1197 | 45 | 9,9 | 180 | 11-18 | 385 | 204 | 181 | 132 | 92 | 58 |
| BL270 1000 140 5 | 3102701405001 | 5 | 1000 | 46 | 9,3 | 180 | 13-22 | 385 | 204 | 181 | 132 | 92 | 58 |
| BL270 806 140 4 | 3102701404001 | 4 | 806 | 40 | 8,5 | 180 | 15-25 | 385 | 204 | 181 | 132 | 92 | 58 |

L 120 TECHNICAL DATA

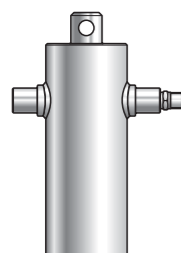
| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|------------------|---------------|--------------|-------------------|-----------|----------------------|-----------------------------|------------------------|-----|-----|-----|-----|----|----|
| BL445 2250 120 6 | 3104451206001 | 6 | 2250 | 50 | 13,2 | 200 | 7-14 | 541 | 143 | 398 | 88 | 74 | 43 |
| BL445 1875 120 5 | 3104451205001 | 5 | 1875 | 55 | 12,6 | 200 | 9-17 | 558 | 160 | 398 | 88 | 92 | 58 |
| BL445 1501 120 4 | 3104451204001 | 4 | 1501 | 55 | 11,6 | 200 | 11-21 | 558 | 160 | 398 | 88 | 92 | 58 |
| BL410 2057 120 6 | 3104101206001 | 6 | 2057 | 47 | 12,1 | 200 | 7-14 | 508 | 215 | 293 | 160 | 74 | 43 |
| BL410 1710 120 5 | 3104101205001 | 5 | 1710 | 50 | 11,5 | 200 | 9-17 | 525 | 232 | 293 | 160 | 92 | 58 |
| BL410 1369 120 4 | 3104101204001 | 4 | 1369 | 51 | 10,6 | 200 | 11-21 | 525 | 232 | 293 | 160 | 92 | 58 |
| BL370 896 120 3 | 3103701203001 | 3 | 896 | 38 | 7,9 | 200 | 13-24 | 480 | 197 | 283 | 125 | 92 | 58 |
| BL360 1727 120 6 | 3103601206001 | 6 | 1727 | 42 | 10,2 | 200 | 7-14 | 453 | 180 | 273 | 125 | 74 | 43 |
| BL360 1435 120 5 | 3103601205001 | 5 | 1435 | 44 | 9,7 | 200 | 9-17 | 470 | 197 | 273 | 125 | 92 | 58 |
| BL360 1145 120 4 | 3103601204001 | 4 | 1145 | 46 | 8,8 | 200 | 11-21 | 470 | 197 | 273 | 125 | 92 | 58 |
| BL305 1415 120 6 | 3103051206001 | 6 | 1415 | 36 | 8,3 | 200 | 7-14 | 401 | 180 | 221 | 125 | 74 | 43 |
| BL305 1175 120 5 | 3103051205001 | 5 | 1175 | 39 | 7,9 | 200 | 9-17 | 418 | 197 | 221 | 125 | 92 | 58 |
| BL275 1241 120 6 | 3102751206001 | 6 | 1241 | 37 | 7,3 | 200 | 7-14 | 372 | 180 | 192 | 125 | 74 | 43 |
| BL275 1030 120 5 | 3102751205001 | 5 | 1030 | 35 | 7 | 200 | 9-17 | 389 | 197 | 192 | 125 | 92 | 58 |

L 105

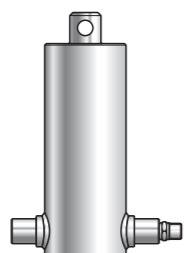
EFFECTIVE DIAMETER [mm] 105 • 90 • 75 • 60 • 45 • 30



OPTION with ROD EYE - PIN

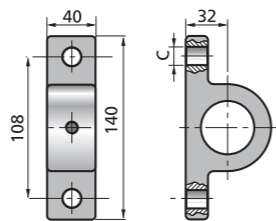


OPTION with ROD EYE - LOWER PIN

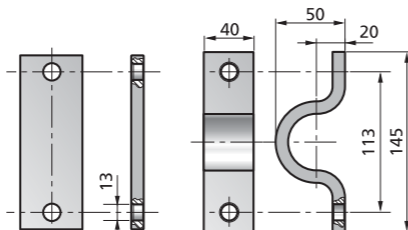


ACCESSORIES

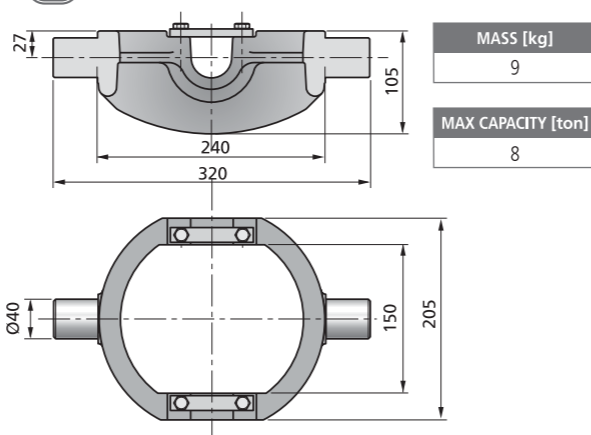
CYLINDER SUPPORT PAIR A70040001



CRADLE SUPPORT PAIR A60040001

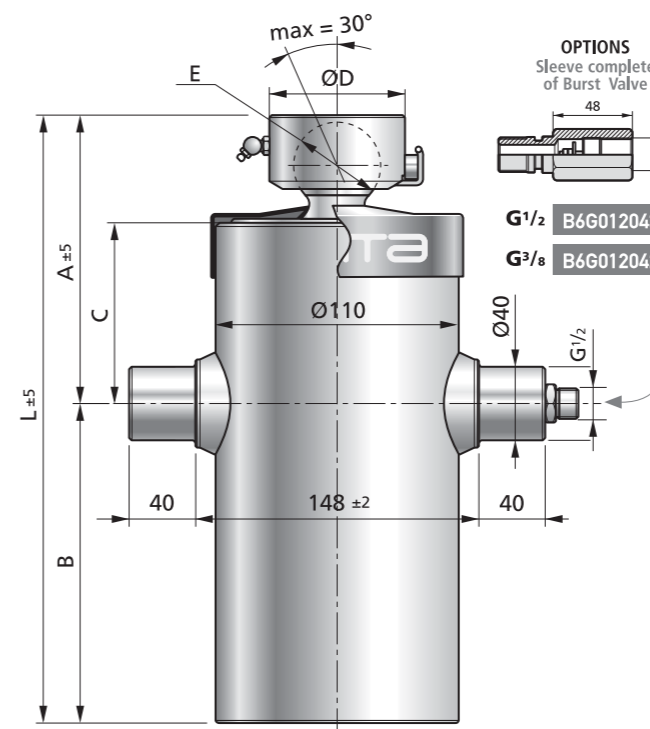


CRADLE A5L060001

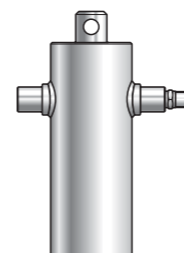


L 90

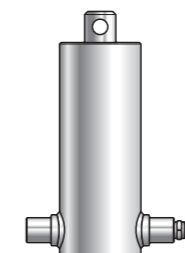
EFFECTIVE DIAMETER [mm] 90 • 75 • 60 • 45 • 30



OPTION with ROD EYE - PIN

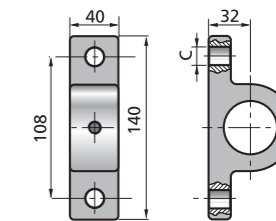


OPTION with ROD EYE - LOWER PIN

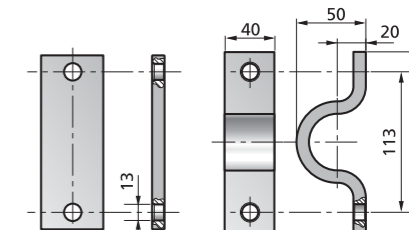


ACCESSORIES

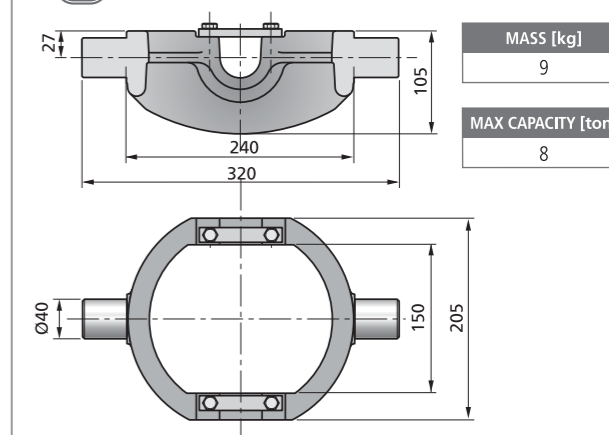
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CRADLE SUPPORT PAIR A60040001



CRADLE A5L060001



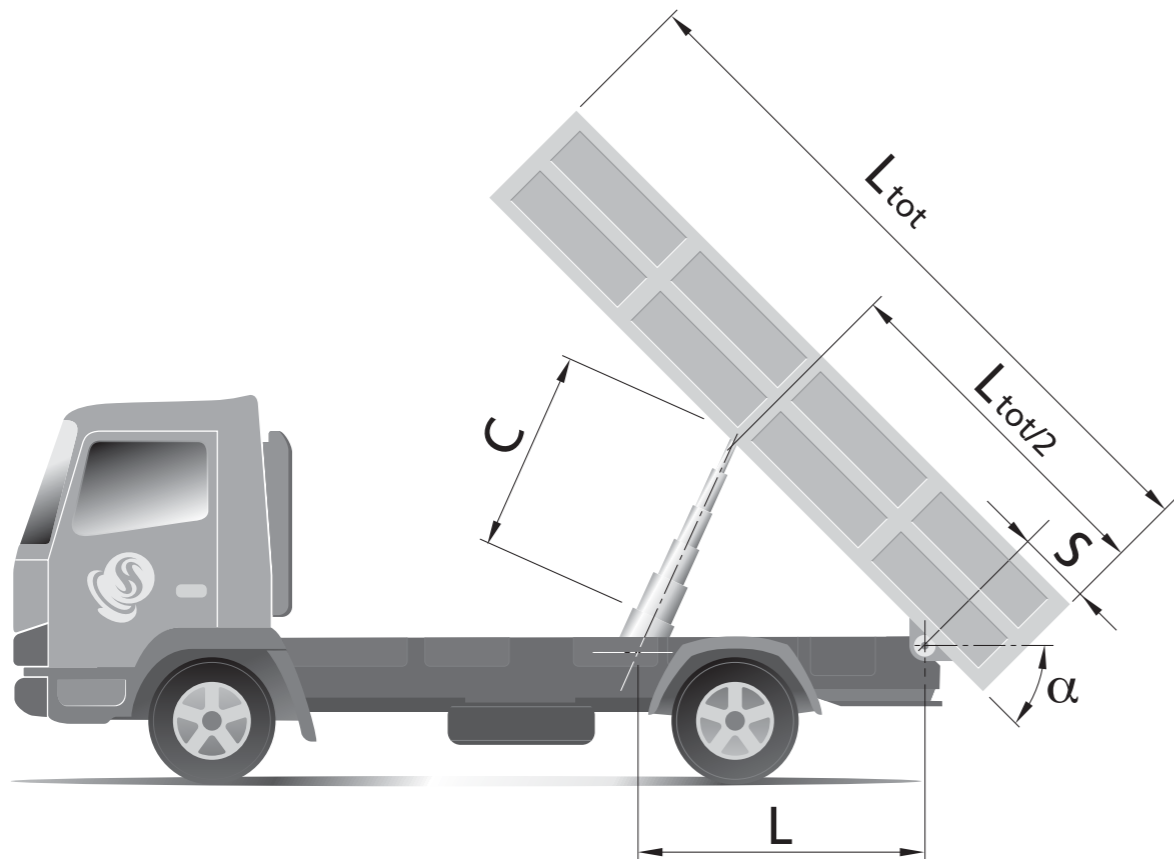
L 105 TECHNICAL DATA

| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm ³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|------------------|---------------|--------------|-------------------|-----------|-----------------------------------|-----------------------------|------------------------|-----|-----|-----|----|----|----|
| BL445 1872 105 5 | 3104451055001 | 5 | 1872 | 38 | 8,9 | 200 | 6-12 | 532 | 140 | 392 | 85 | 74 | 43 |
| BL445 1492 105 4 | 3104451054001 | 4 | 1492 | 40 | 8,3 | 200 | 8-15 | 549 | 157 | 392 | 85 | 92 | 58 |
| BL360 1432 105 5 | 3103601055001 | 5 | 1432 | 30 | 6,8 | 200 | 6-12 | 444 | 150 | 294 | 95 | 74 | 43 |
| BL360 1140 105 4 | 3103601054001 | 4 | 1140 | 33 | 6,4 | 200 | 8-15 | 461 | 167 | 294 | 95 | 92 | 58 |
| BL360 855 105 3 | 3103601053010 | 3 | 855 | 35 | 5,6 | 200 | 10-18 | 461 | 167 | 294 | 95 | 92 | 58 |
| BL320 1237 105 5 | 3103201055001 | 5 | 1237 | 28 | 5,9 | 200 | 6-12 | 405 | 150 | 255 | 95 | 74 | 43 |
| BL320 984 105 4 | 3103201054001 | 4 | 984 | 27 | 5,5 | 200 | 8-15 | 405 | 150 | 255 | 95 | 74 | 43 |
| BL320 984 105 4 | 3103201054003 | 4 | 984 | 29 | 5,4 | 200 | 8-15 | 422 | 167 | 255 | 95 | 92 | 58 |
| BL275 1027 105 5 | 3102751055001 | 5 | 1027 | 24 | 4,9 | 200 | 6-12 | 363 | 150 | 213 | 95 | 74 | 43 |
| BL275 816 105 4 | 3102751054001 | 4 | 816 | 22 | 4,6 | 200 | 8-15 | 363 | 150 | 213 | 95 | 74 | 43 |
| BL265 1182 105 6 | 3102651056001 | 6 | 1172 | 22 | 4,7 | 200 | 5-9 | 351 | 151 | 200 | 95 | 74 | 43 |
| BL235 1003 105 6 | 3102351056001 | 6 | 1004 | 21 | 4,1 | 200 | 5-9 | 323 | 151 | 172 | 95 | 74 | 43 |

L 90 TECHNICAL DATA

| MODEL | CODE | EXTENSION N. | POWER STROKE [mm] | MASS [kg] | WORKING VOLUME [dm ³] | MAX. WORKING PRESSURE [bar] | TIPPING CAPACITY [ton] | L | A | B | C | D | E |
|-----------------|---------------|--------------|-------------------|-----------|-----------------------------------|-----------------------------|------------------------|-----|-----|-----|-----|----|----|
| BL475 1211 90 3 | 3104750903001 | 3 | 1199 | 35 | 5,4 | 220 | 5-14 | 578 | 180 | 398 | 108 | 92 | 58 |
| BL360 1140 90 4 | 3103600904001 | 4 | 1140 | 25 | 4,3 | 220 | 5-11 | 445 | 156 | 289 | 100 | 74 | 43 |
| BL360 866 90 3 | 3103600903001 | 3 | 848 | 26 | 3,8 | 220 | 5-14 | 445 | 156 | 289 | 100 | 74 | 43 |
| BL320 1256 90 5 | 3103200905001 | 5 | 1256 | 25 | 4 | 220 | 4-8 | 405 | 155 | 250 | 100 | 74 | 43 |
| BL320 984 90 4 | 3103200904001 | 4 | 984 | 23 | 3,7 | 220 | 5-11 | 405 | 155 | 250 | 100 | 74 | 43 |
| BL275 816 90 4 | 3102750904001 | 4 | 816 | 20 | 3,1 | 220 | 5-11 | 363 | 155 | 208 | 100 | 74 | 43 |
| BL245 676 90 4 | 3102450904001 | 4 | 676 | 19 | 2,5 | 220 | 5-11 | 328 | 152 | 176 | 97 | 74 | 43 |

Selection charts



STROKE

| L [mm] | BODY TILTING α [°] | | | | | |
|-----------|-----------------------|------|------|------|------|------|
| | 40 | 45 | 48 | 50 | 55 | 60 |
| 500 | 342 | 383 | 407 | 423 | 462 | 500 |
| 750 | 513 | 574 | 610 | 634 | 693 | 750 |
| 1000 | 684 | 765 | 813 | 845 | 923 | 1000 |
| 1100 | 752 | 842 | 895 | 930 | 1016 | 1100 |
| 1200 | 821 | 918 | 976 | 1014 | 1108 | 1200 |
| 1300 | 889 | 995 | 1058 | 1099 | 1201 | 1300 |
| 1400 | 958 | 1072 | 1139 | 1183 | 1293 | 1400 |
| 1500 | 1026 | 1148 | 1220 | 1268 | 1385 | 1500 |
| 1600 | 1094 | 1225 | 1302 | 1352 | 1478 | 1600 |
| 1700 | 1163 | 1301 | 1383 | 1437 | 1570 | 1700 |
| 1800 | 1231 | 1378 | 1464 | 1521 | 1662 | 1800 |
| 1900 | 1300 | 1454 | 1546 | 1606 | 1755 | 1900 |
| 2000 | 1368 | 1531 | 1627 | 1690 | 1847 | 2000 |
| 2150 | 1471 | 1646 | 1749 | 1817 | 1986 | 2150 |
| 2300 | 1573 | 1760 | 1871 | 1944 | 2124 | 2300 |
| 2450 | 1676 | 1875 | 1993 | 2071 | 2263 | 2450 |
| 2600 | 1779 | 1990 | 2115 | 2198 | 2401 | 2600 |
| 2750 | 1881 | 2105 | 2237 | 2324 | 2540 | 2750 |
| 3000 | 2052 | 2296 | 2440 | 2536 | 2770 | 3000 |
| 3200 | 2189 | 2449 | 2603 | 2705 | 2955 | 3200 |

C POWER STROKE
[mm]

$$C_{(mm)} = 2L_{(mm)} \sin\left(\frac{\alpha_{(rad)}}{2}\right) \Rightarrow$$

$$\Rightarrow C_{(mm)} \cong \frac{3,1416}{180} \cdot \alpha_{(°)} \cdot L_{(mm)} \cdot \left(1 - \frac{9,8696}{777600} \alpha_{(°)}^2\right)$$

• The stroke is identified by crossing the pivot length (L) with the requested tipping angle (°).

THRUST

| EXTENSION Ø [mm] | PRESSIONE PRESSURE [bar] | | | | | | | | | THRUST [kN] |
|---------------------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|----------------|
| | 50 | 75 | 100 | 125 | 150 | 175 | 200 | 220 | 240 | |
| 30 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 | 17 | |
| 45 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 35 | 38 | |
| 60 | 14 | 21 | 28 | 35 | 42 | 49 | 57 | 62 | 68 | |
| 75 | 22 | 33 | 44 | 55 | 66 | 77 | 88 | 97 | 106 | |
| 90 | 32 | 48 | 64 | 80 | 95 | 111 | 127 | 140 | 153 | |
| 105 | 43 | 65 | 87 | 108 | 130 | 152 | 173 | 190 | 208 | |
| 120 | 57 | 85 | 113 | 141 | 170 | 198 | 226 | 249 | 271 | |
| 135 | 72 | 107 | 143 | 179 | 215 | 250 | 286 | 315 | 343 | |
| 140 | 77 | 115 | 154 | 192 | 231 | 269 | 308 | 338 | 369 | |
| 154 | 15 | 140 | 186 | 233 | 279 | 326 | 372 | 410 | 447 | |
| 160 | 100 | 151 | 201 | 251 | 301 | 352 | 402 | 442 | 482 | |
| 174 | 119 | 178 | 238 | 297 | 356 | 416 | 475 | 523 | 570 | |

$$S_{(kN)} = \frac{\pi}{4} d_{(mm)}^2 \frac{p_{(bar)}}{10000} \Rightarrow$$

$$\Rightarrow S_{(kN)} \cong \frac{0,785}{10000} d_{(mm)}^2 p_{(bar)}$$

• The thrust is a force generated by oil under pressure, which lifts the stage of the cylinder. "D" is the diameter of the stage.

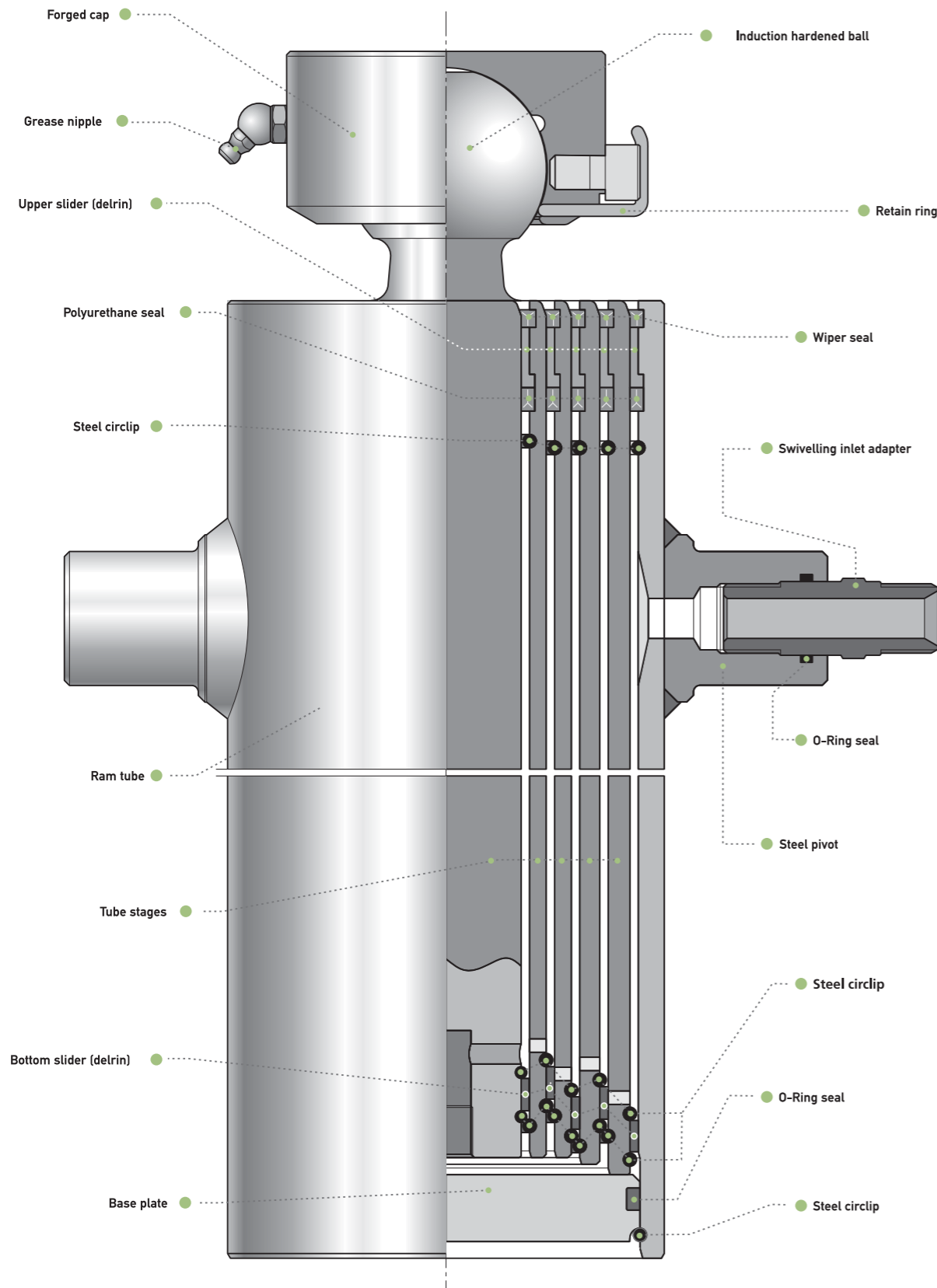
QUICK REFERENCE SELECTION CHART

| TYPE | TOTAL MASS [ton] | | | | | | | |
|------|---------------------|-------|-------|-------|-------|------|-----|-----|
| | 25÷30 | 20÷25 | 15÷20 | 13÷15 | 11÷13 | 9÷11 | 7÷9 | 4÷7 |
| L174 | 6 | 7 | 8 | | | | | |
| L160 | 5 | 6 | 7 | | | | | |
| L140 | | 4 | 5 | 6 | | | | |
| L120 | | | 3 | 4 | 5 | 6 | | |
| L105 | | | | | 3 | 4 | 5 | 6 |
| L90 | | | | | | 3 | 4 | 5 |
| L75 | | | | | | | 2 | 3 |



• Depending on the total tipping weight, the chart identifies the most suitable model and number of stages available.

Assembly



Warnings

This catalogue lists the whole range of H.S. PENTA under-body hoists for tippers, standard type. Telescopic cylinders are commonly installed on dumping vehicles and are devices which are intended to provide only a lifting force. The machinery into which the cylinders are incorporated must comply with the requirements of the in force directives and norms. The cylinders is not a structural member, and is not designed, nor intended to provide stability to the dumping vehicle.

Fitment suggestions and operating conditions. The normal application of multi-stage cylinder is to lift up tipping bodies, loaded with different materials, and consequently discharge this material whilst the cylinder is extended all along its stroke. The body weight plus the payload are the total lifting weight that must be raised by the cylinder. This value, calculated at the working pressure, is a rough indication of the tipping power of the cylinder. The cylinders have been sized for loads along the longitudinal axis (e.g. no side load is admitted).

A few hints for correct fitment of the cylinder:

- 1) Protect the top of the cylinder from welding spatter, or other foreign particles;
- 2) Always fit a relief valve in the hydraulic pressure line. The relief valve must be set at a pressure lower than the max admitted for the cylinder (see specification for each cylinder);
- 3) Fit a filter in the hydraulic line, flush the oil tank and pipes, use good quality hydraulic oil;
- 4) The tipper body should not rest on the cylinder. The cylinder should be extended at least 20 mm (when the tipper body is fully loaded).

Further information please see "Hydraulic cylinder for tipping equipment user & maintenance manual – General safety regulations".

Guarantee

1. Guarantee conditions

1.1 H.S.PENTA S.P.A. (hereinafter referred to as the "Company") guarantees the satisfactory operation of its hydraulic components, hydraulic cylinders, and respective accessories (hereinafter jointly referred to as the "Products") and the absence of flaws and defects in the same within the limits specified in these General Guarantee Conditions.

1.2 This guarantee of satisfactory operation has a validity of two (2) years from the date of sale of the Products.

1.3 The Company guarantees the conformity of the Products exclusively to Italian and European Community standards.

2. Guarantee coverage

2.1 Without prejudice to the content of the following Article 2.2 regarding hidden defects, the Products will be considered as having been accepted by the purchaser whenever within 5 days from delivery such latter has not provided the Company with written notice of the presence of flaws and/or defects.

2.2 Upon pain of relinquishing rights to coverage under the guarantee, the purchaser must provide the Company with written notice of the defect in conformity and/or flaw in the Product or part of the same, specifying the nature of the same in detail within 8 days of the date in which the purchaser has observed such defect in conformity and/or flaw.

2.3 The defective Products reported in such notice as per the sense and effect of Article 2.2 above must be conserved by the purchaser for the purpose of examination by the Company.

Following written request from the Company, the purchaser must send the defective Product(s) carriage paid to the latter or the party indicated by the same; whenever after the Company's examination, the Product is declared defective and as such is covered by these General Guarantee Conditions, the Company will reimburse the purchaser for the costs of shipping, while remaining expressly specified that such shipping costs must be within the average reference costs.

The purchaser relinquishes the right to coverage under guarantee whenever he does not permit every reasonable inspection of the Product requested by the Company or whenever after receiving written request from the Company for the return of the Product he fails to do so within 30 days of receiving such request.

2.4 Following transmission of due notice by the purchaser performed as per the sense and effect of previous Article 2.2, after ascertaining the existence of the defect or flaw, the Company can take any of the following courses of action at its own discretion:

- (a) provide the purchaser with Products in replacement of those defective free-of-charge;
- (b) repair the Products directly or through third parties at its own expense; or
- (c) reimburse the price paid by the purchaser for the Products ascertained defective.

It is hereby agreed that any Products supplied in replacement of those proven defective must be shipped "ex-works" and that the defective Products returned to the Company will remain the property of such latter.

2.5 With the exception of those mentioned in Article 2.4 above, the costs and expenses incurred by the replacement or repair of the defective Products must be borne by the purchaser.

For mere purposes of example without excluding others, the purchaser must bear the costs for:

- (a) consumptions caused by the removal of the defective Products from the machinery in which they were installed and the subsequent re-installation of the same;
- (b) the transport of materials and/or equipment;

(c) lubricants and/or expendable materials necessary for the replacement or repair of the defective Products;

(d) the re-painting of the Products;

(e) the transfer expenses of the Company's personnel during checking for flaws and defects reported by the purchaser.

2.6 Nothing will be due to the purchaser by way of compensation for the time that the machinery in which the defective Products are installed remain out of operation for the repair or replacement of the same, and the Company must be considered expressly released from liability for any direct or indirect damage, cost or expense derived by such machinery inactivity.

2.7 For the parts of the Product replaced or repaired, the guarantee will be automatically extended for a new 2-year period from the date of such replacement or repair.

2.8 Except in case of fraudulent intention or serious neglect, the Company will not be liable in any way for any direct or indirect damage, cost, loss, or expense to persons and/or property derived from the operation and use of the Products and/or the interruption of activity of the machinery in which the Products are installed, given that the guarantee specified in Article 2 is the only remedy in the purchaser's favour.

3. Guarantee exclusions

3.1 The Company will not provide guarantee coverage for defects in conformity and/or flaws in the Product or any of its parts for any of the following cases:

- (a) reasons due or linked to normal wear;
- (b) the failure of the purchaser to correctly perform the procedures for the installation, use (or equivalent), and maintenance of the Products specified in the Use and Maintenance manual provided by the Company together with the Products;
- (c) the incorrect use and/or operation of the Products or accident caused by the negligence, inexperience, or imprudence of the purchaser;
- (d) the inadequate maintenance of the Products by the purchaser or modifications, repair and/or replacement made by the same without the Company's written consent;
- (e) shock or impact against the vehicle or machinery in which the Products are installed; and
- (f) causes other than defects in fabrication and/or engineering, working, and/or materials.

3.2 Guarantee coverage will also be excluded whenever:

- (a) the Company is not placed in the conditions to promptly perform the necessary repair or replacement of defective Products;
- (b) the Products are modified by the purchaser;
- (c) the Products are used after the discovery of a flaw or defect;
- (d) Repairs that are not authorized by the Company are made;
- (e) the flaw or defect regards paint coatings and/or is represented by the corrosion of parts of the Product coated or not coated.

4. Applicable Law - Controversy

4.1 These General Guarantee Conditions are regulated by Italian Law with the express exclusion of the application of the United Nations Convention on international movable property sales contracts.

4.2 Any controversy derived from these General Guarantee Conditions, including those regarding their validity, interpretation, execution and resolution that cannot be settled out of court will be subjected to the exclusive decision of the Court of Ravenna, Italy.

"General guarantee conditions" 19/11/2008

