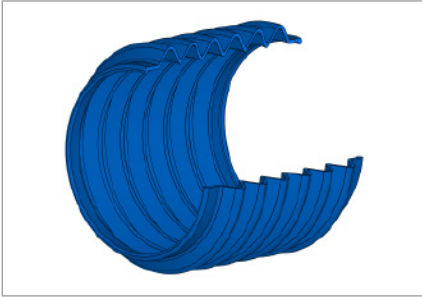


# MULTIPLE CONVOLUTION BELLOWS



## PRODUCT DESCRIPTION

Bellows are protective elements comprising a moving section and two connection pieces for fastening. They protect axially moving rods and parts of machines against soiling, water spray, dust or the effects of the weather. Depending on their design, they can accommodate movements perpendicular to the axis or a combination of movements (e.g. gear levers).

Bellows are able to follow axial movements within their limits  $L_{\min}$  (compressed length) and  $L_{\max}$  (extended length). Special loads (non-axial movements, pressure loads etc.) affect the maximum working stroke and the flexibility → Technical Manual.

## PRODUCT ADVANTAGES

Depending on the application, bellows and connecting areas can have very different geometrical shapes and dimensions. More than 500 different bellows geometries are available to the user quickly and cost-effectively.

## APPLICATION

There are many application cases for bellows, for example, the functional sealing of ball joints, connection of two tube ends, push rods (e.g. in hydraulic and pneumatic applications), axle bearings.

## MATERIAL

Material	Hardness
CR	42/50 Shore A
NBR	approx. 45 Shore A

Other materials on enquiry (after clarification of the material-job specification and the type).

## OPERATING CONDITIONS

Material	Temperature	Dynamic loading	Mineral oil and grease resistance
CR	-40 ... +100 °C	very good	sufficient
NBR	-30 ... +100 °C	sufficient	good

The values listed in the table are recommended values.  
→ Technical Manual.

## FITTING & INSTALLATION

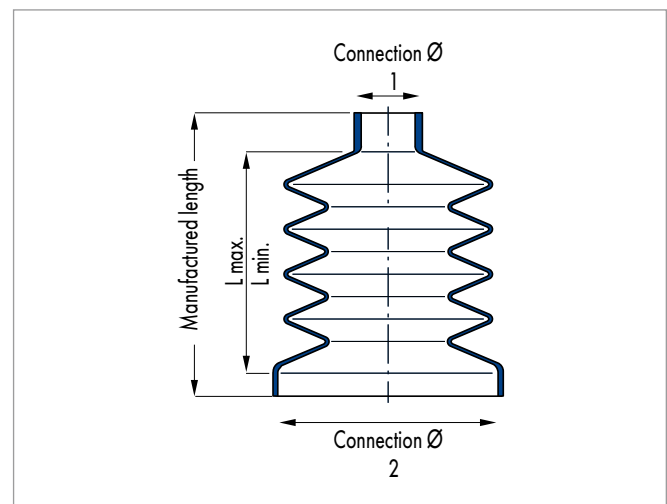
The moving section of the bellows must not come into contact with any sharp edges. It is imperative that continuous chaffing against moving parts of the machine is avoided.

Bellows are not able to absorb major excess pressure or vacuum, as otherwise excessive deformation would occur.

To prevent a pressure build-up inside bellows on axial movements, a sufficient ventilation must be provided.

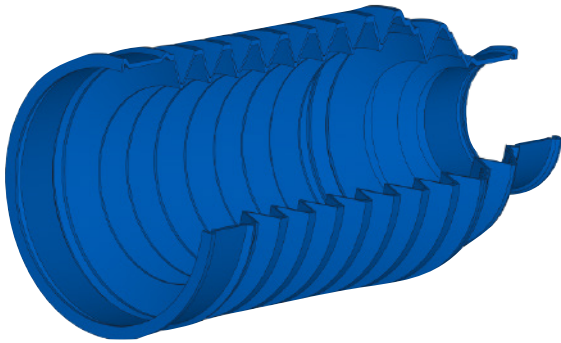
Torsional loading of the bellows should be avoided.

For further information on installation: → Technical Manual.



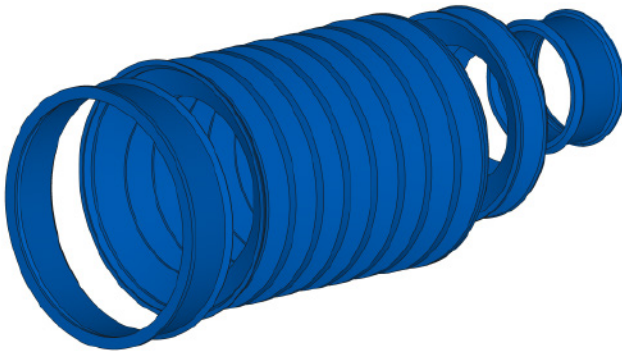
Drawing with dimensions multiple convolution bellows

## MODULAR TPE BELLOWS



### PRODUCT DESCRIPTION

Modular TPE bellows constitute one part of the FST catalog portfolio. These are multi-convolution bellows made of thermoplastic elastomer, which are constructed according to the toolbox principle. The bellows can be varied in the manufacturing length (85 to 200 mm), the outside diameters (in gradations of Ø50, Ø63, Ø80, Ø100 and Ø125) and the connection areas by using different mold inserts and can thus be adapted precisely to the customer's application. Deviating manufacturing lengths and finer gradations of the outside diameters are possible on request.



Example illustration of a modular TPE bellows

### PRODUCT ADVANTAGES

The customer is given the opportunity to create the desired bellows that fit precisely by choosing the right dimensions with our modular tool concept. Connections, convolution area and length are individually selectable, enabling a wide range of applications.

The depth and width of the convolutions and the connection areas are designed by Freudenberg depending on the customer's specifications for the application.

Due to the modular tool concept, different solutions can be realized and allow cost savings for follow-up projects of the customer.

The technical advantages of TPE compared to elastomer bellows lie primarily in its increased service life and ozone resistance.

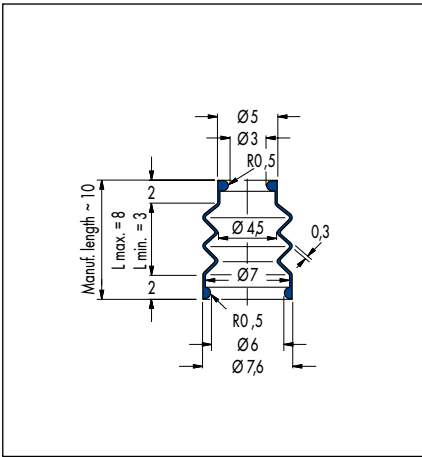
### APPLICATION

- cardan joints
- piston rods
- joy sticks
- connection of pipe ends to compensate for backlash
- overrun brakes of trailers

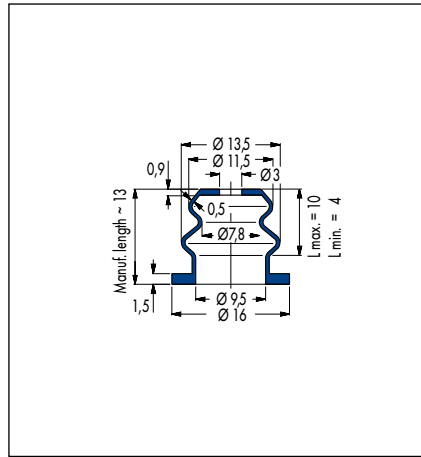
### MATERIAL

Material	Temperature	Ozone resistance	Chemical resistance
Thermoplastic elastomer (TPE)	-40 ... +120 °C	high	as usual for polyolefins/thermo-plastics

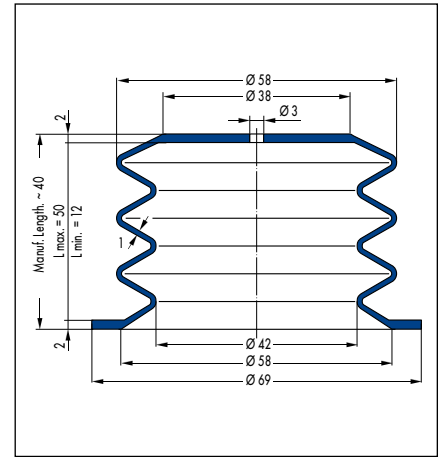
The values listed in the table are approximate values. For more information please refer to the FST technical manual.



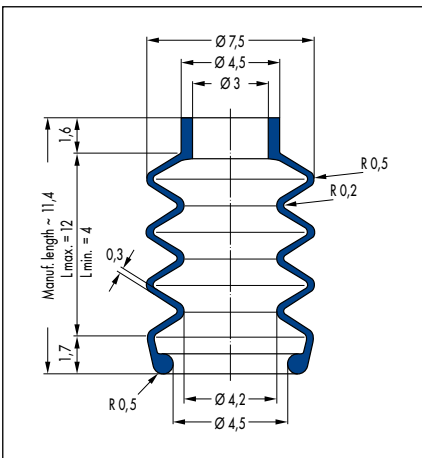
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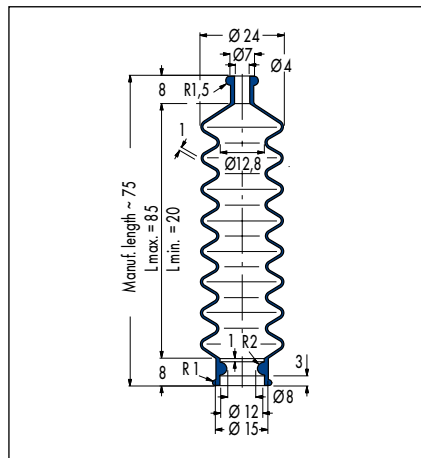
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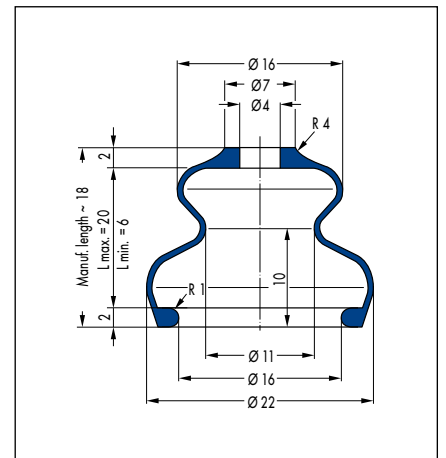
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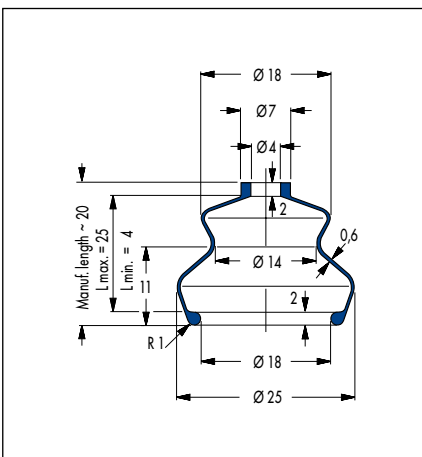
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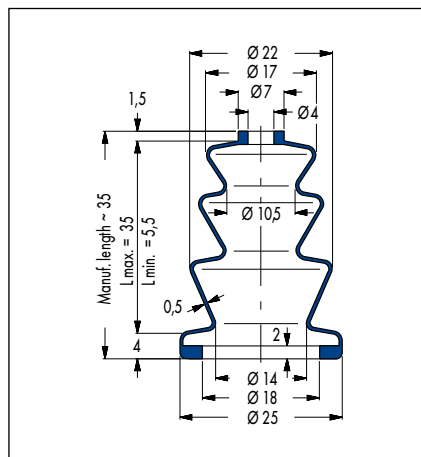
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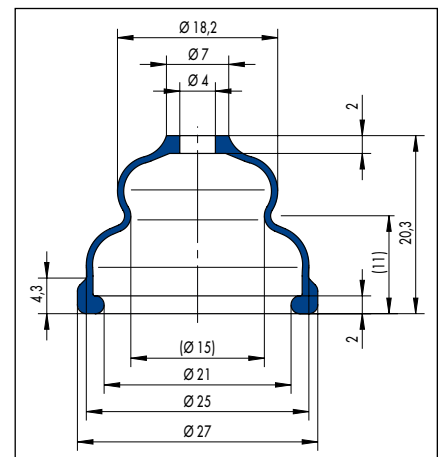
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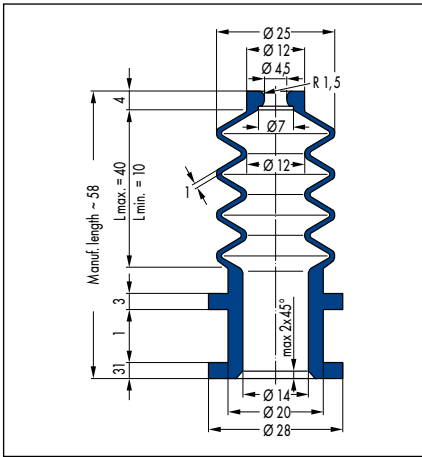
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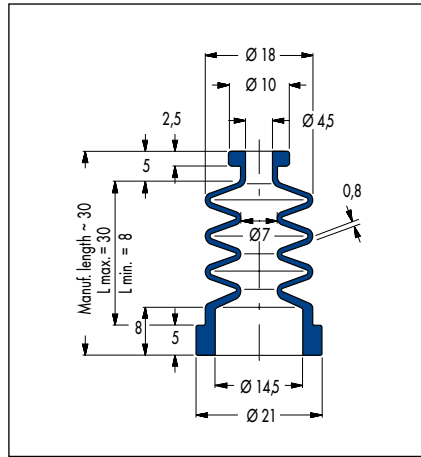
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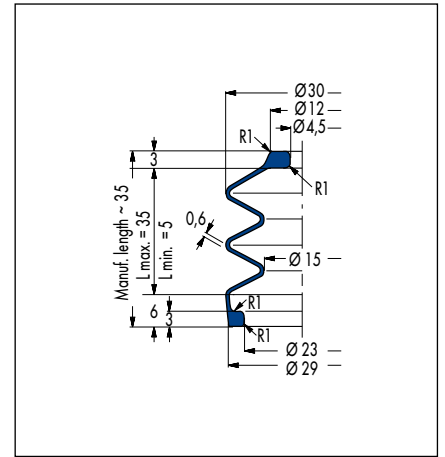
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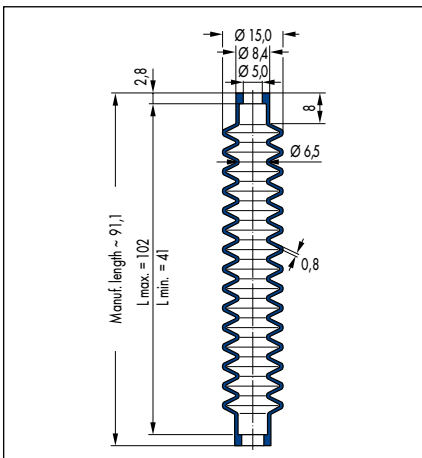
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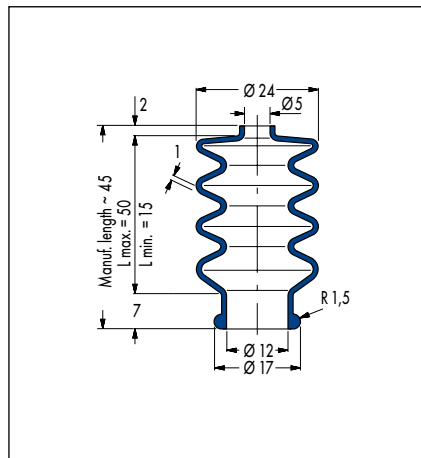
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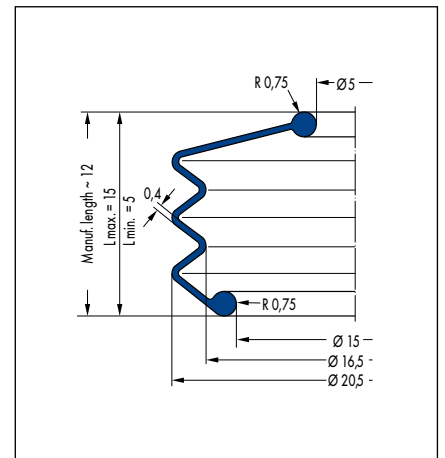
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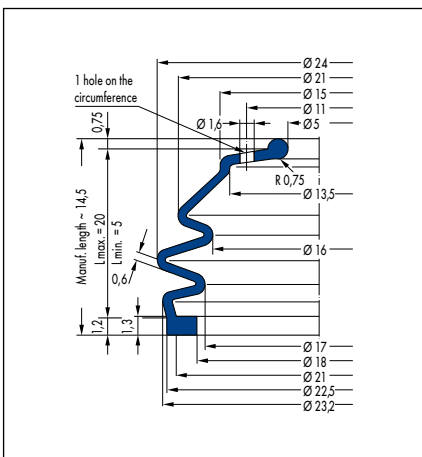
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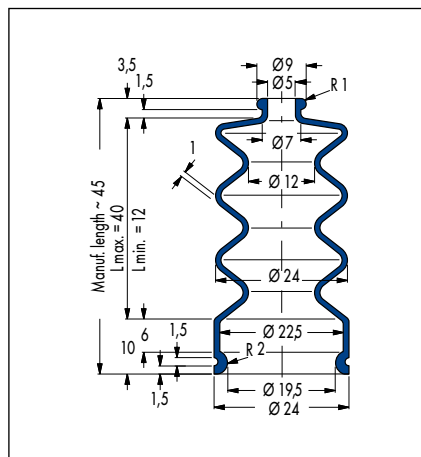
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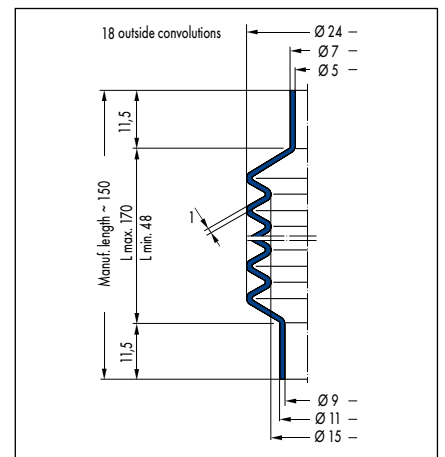
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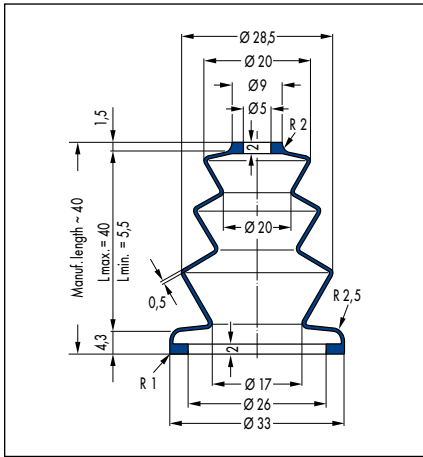
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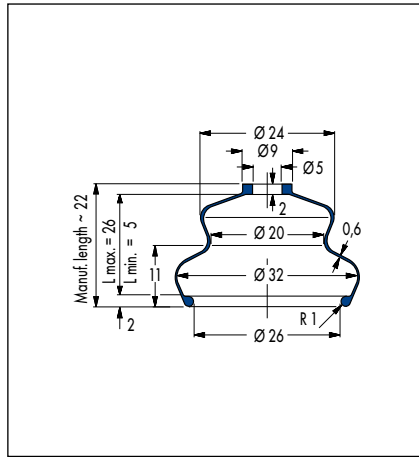
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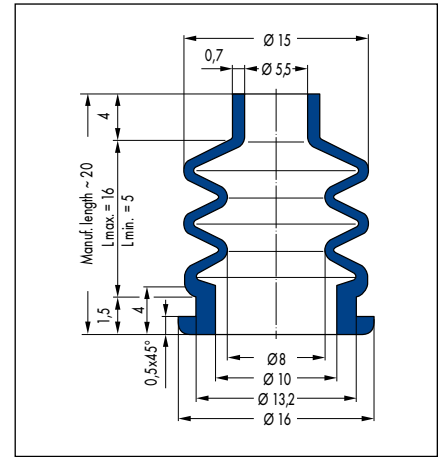
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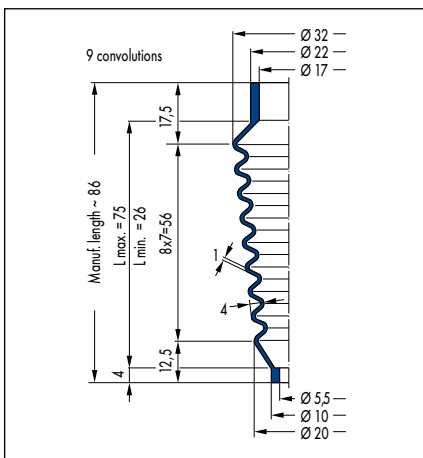
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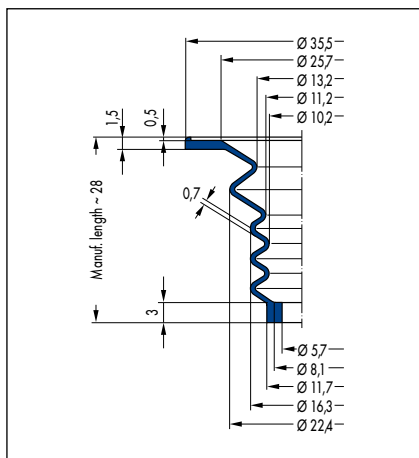
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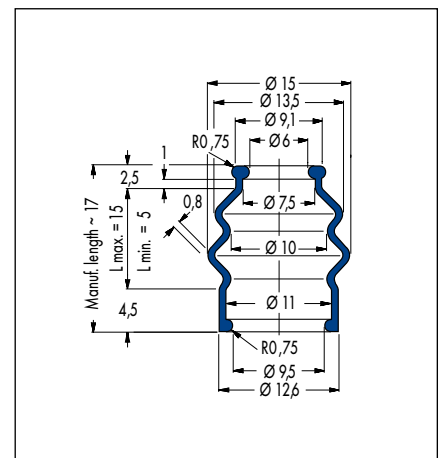
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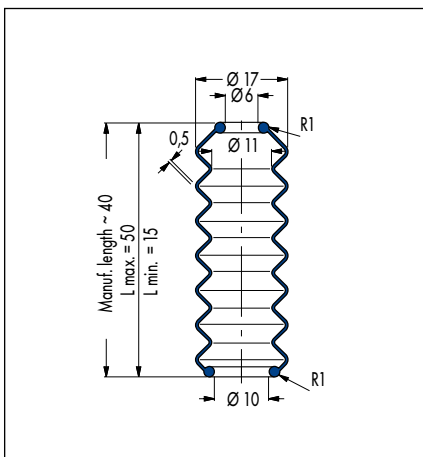
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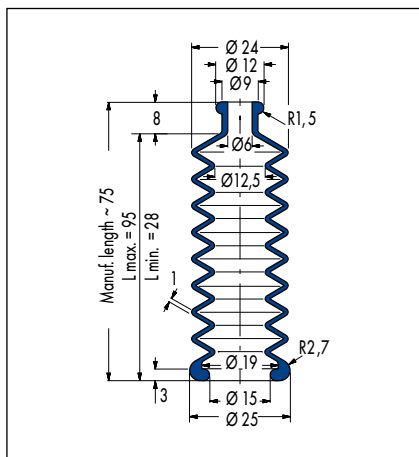
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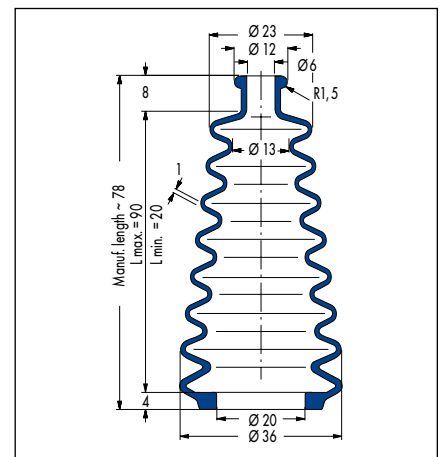
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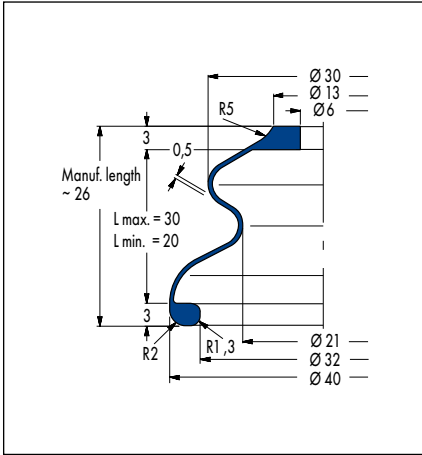
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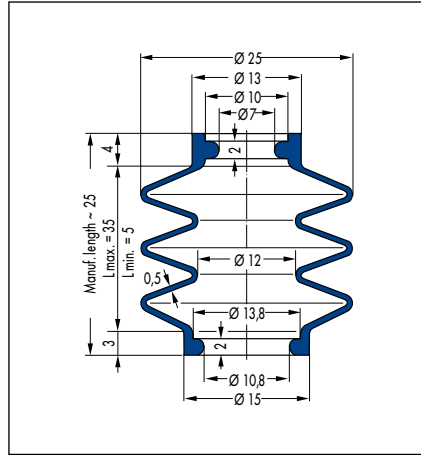
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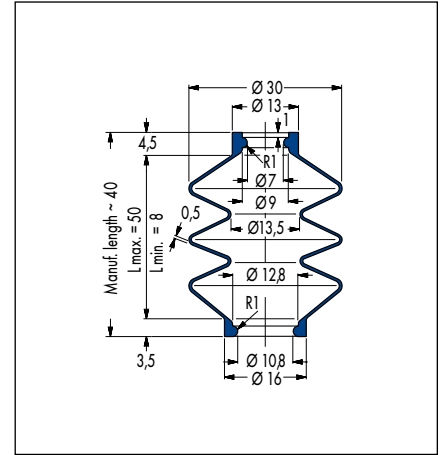
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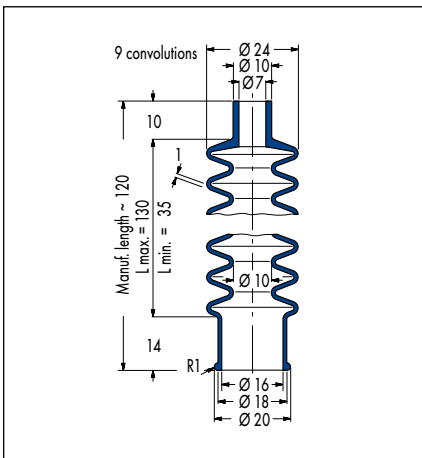
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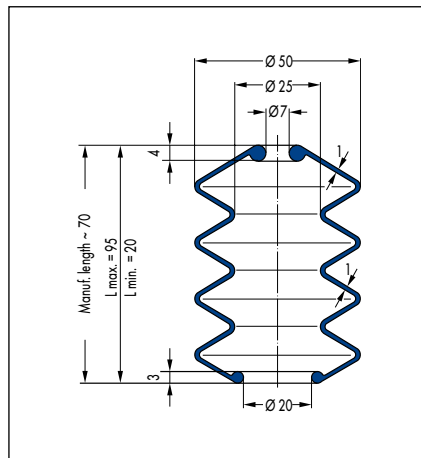
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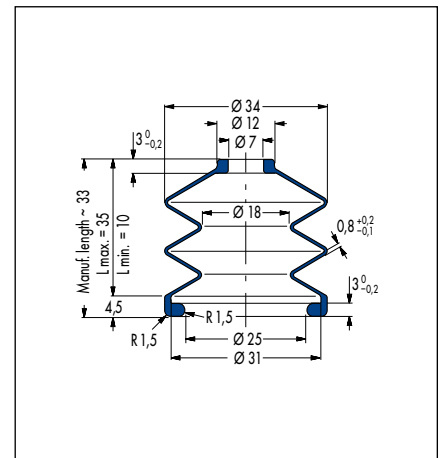
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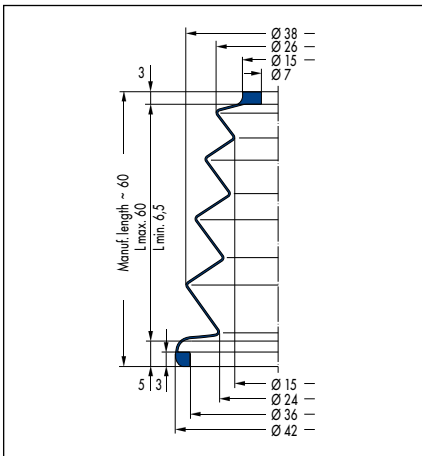
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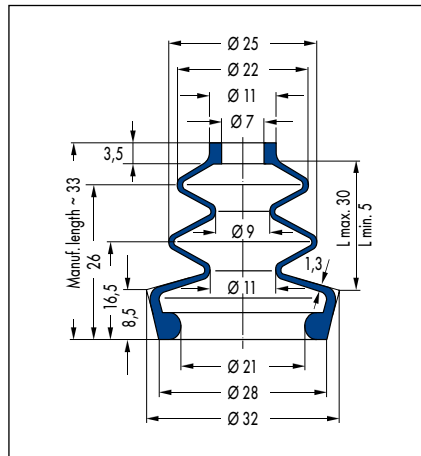
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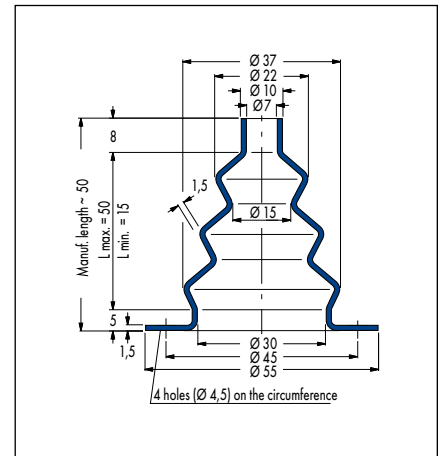
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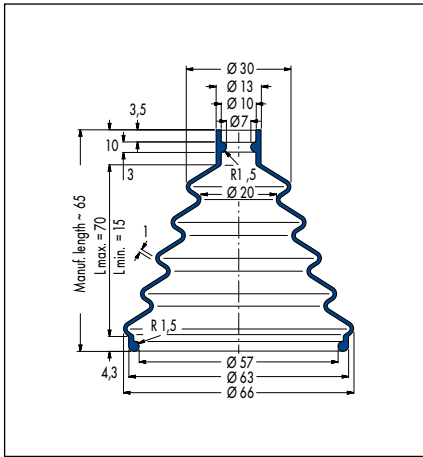
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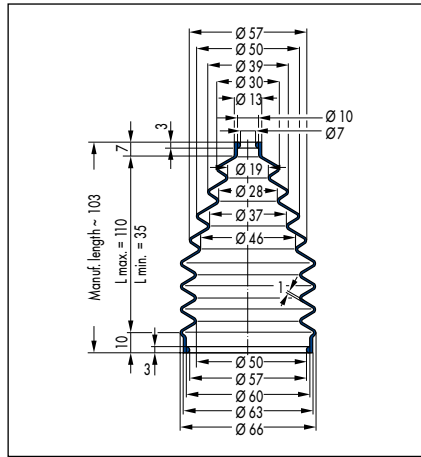
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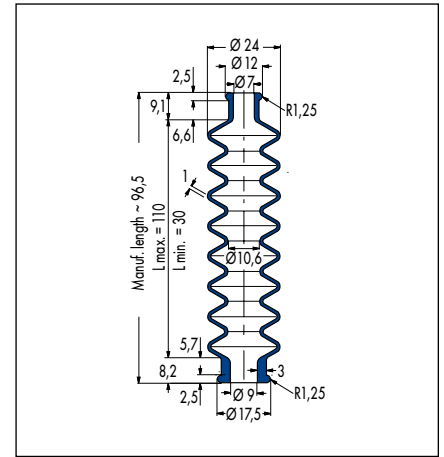
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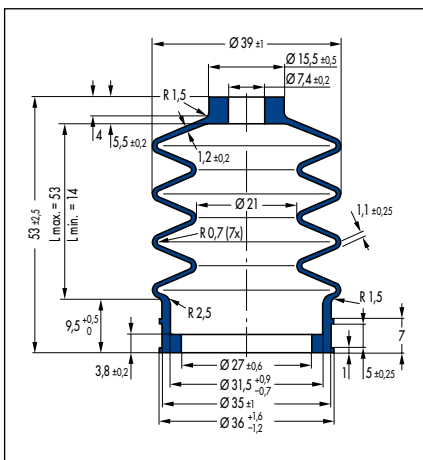
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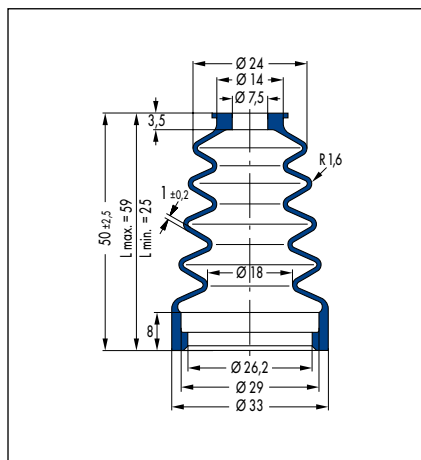
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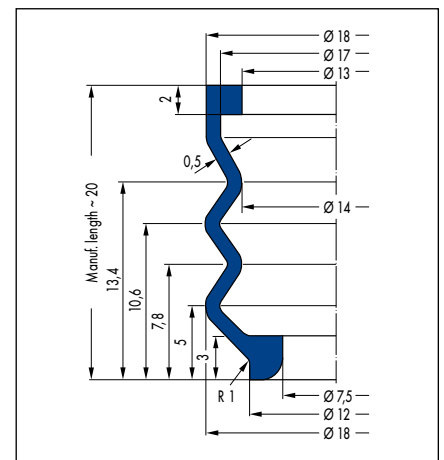
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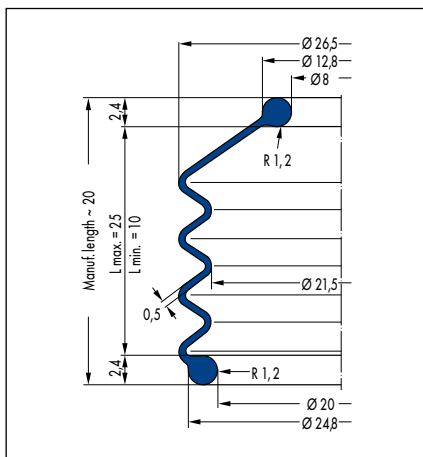
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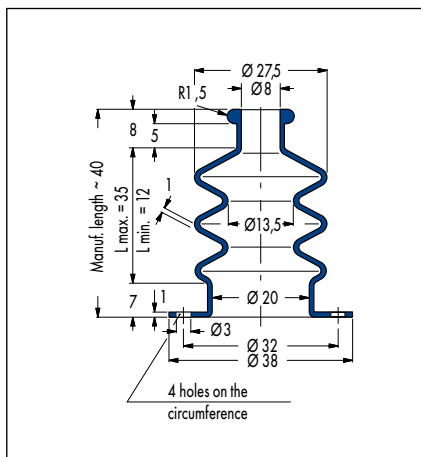
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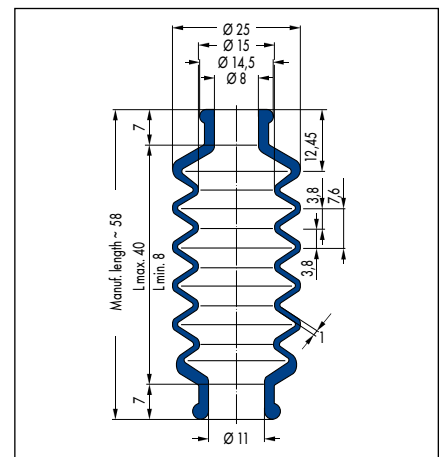
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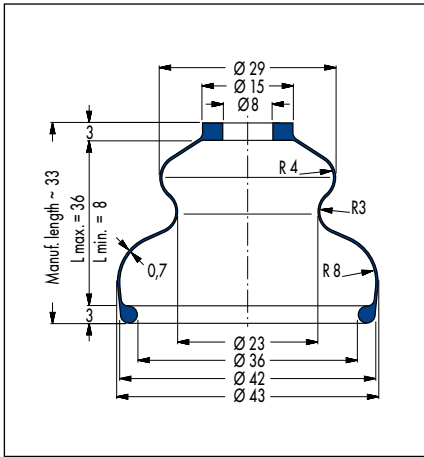
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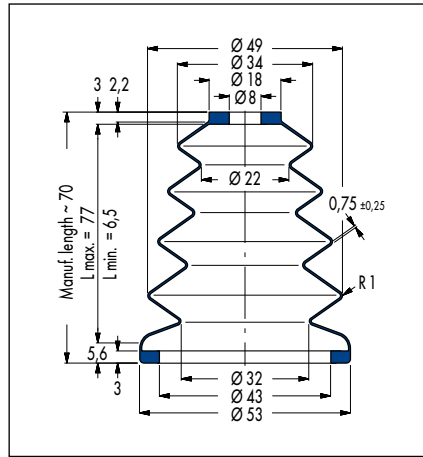
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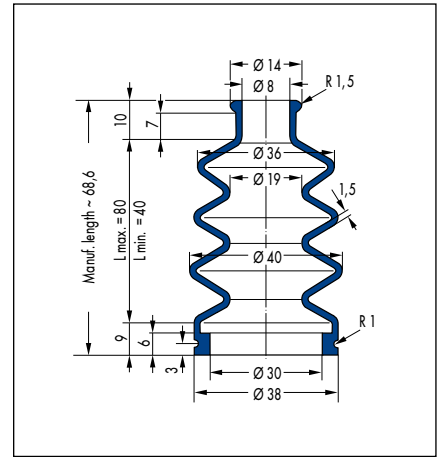
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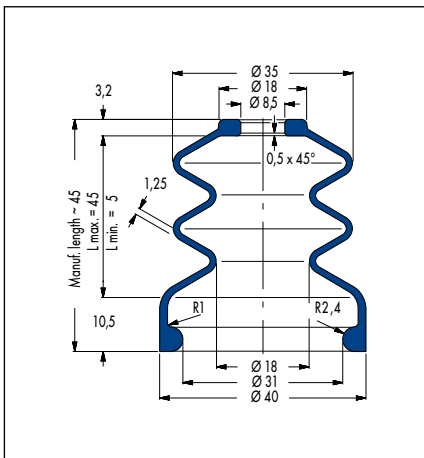
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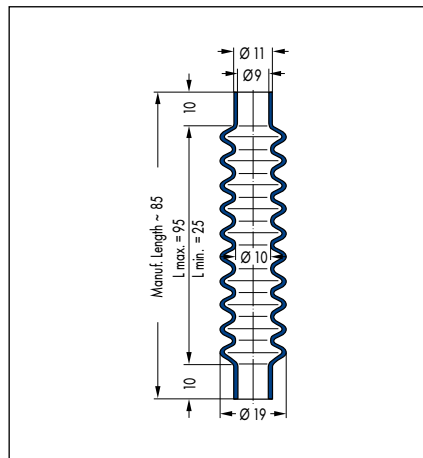
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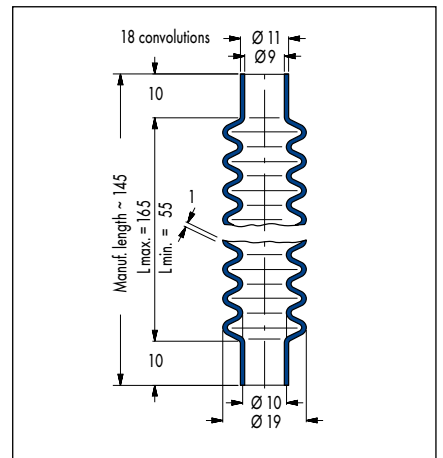
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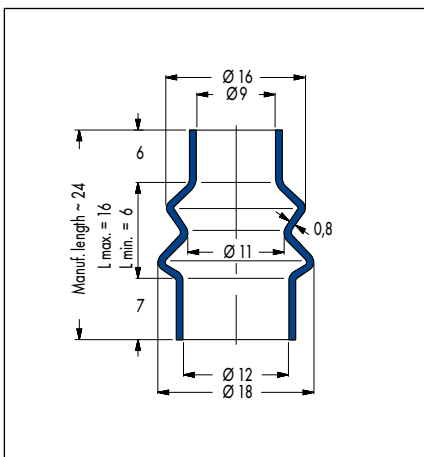
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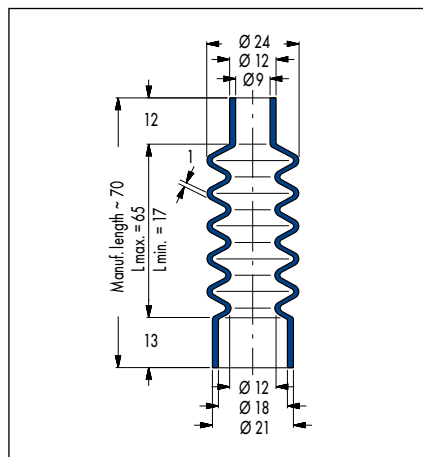
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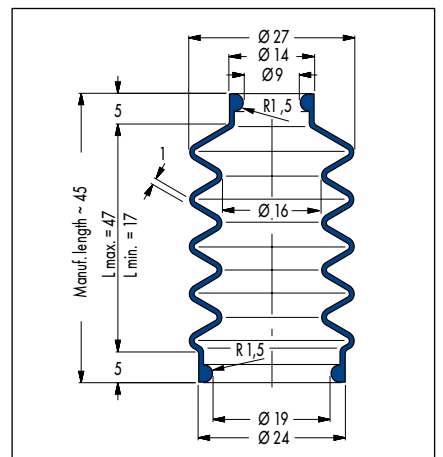
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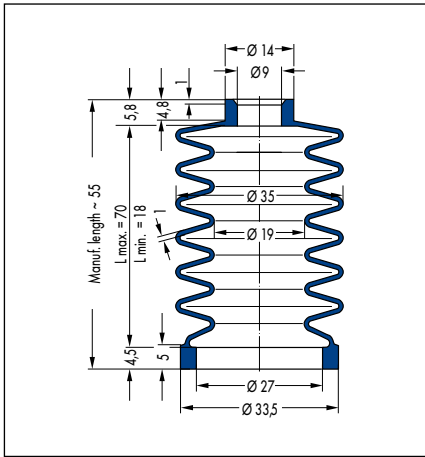


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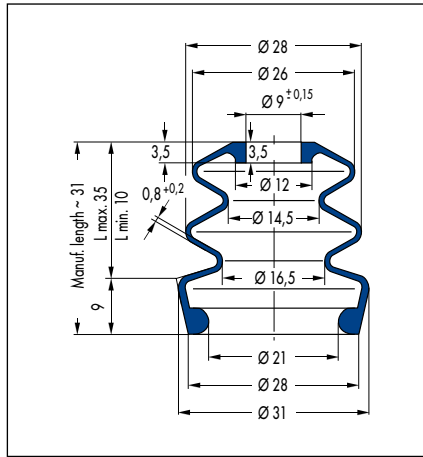


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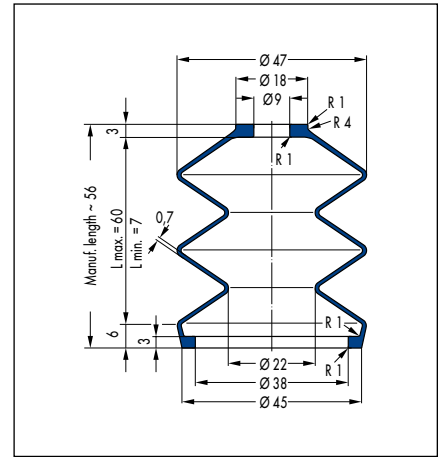




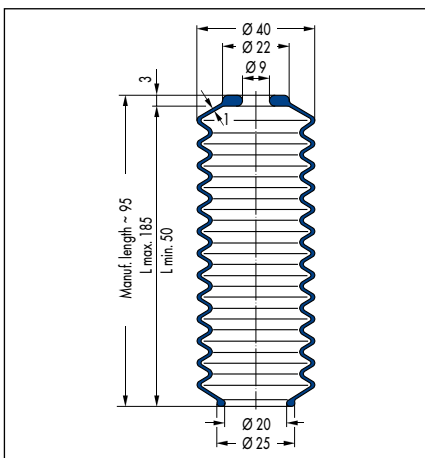
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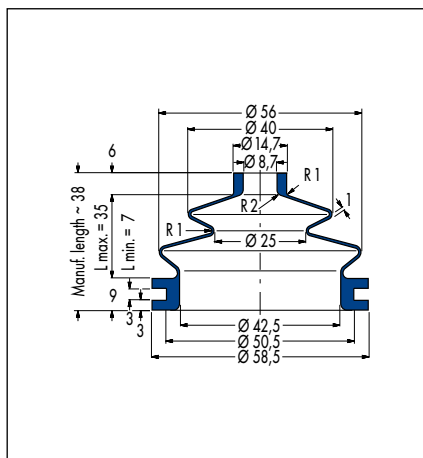
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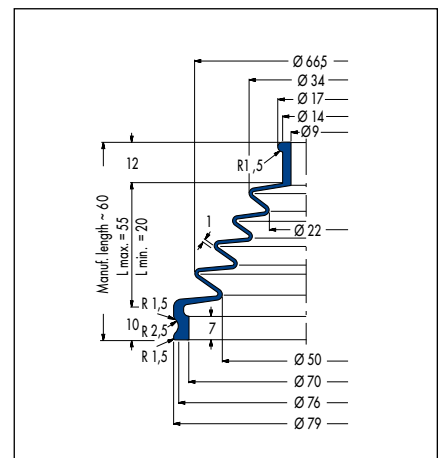
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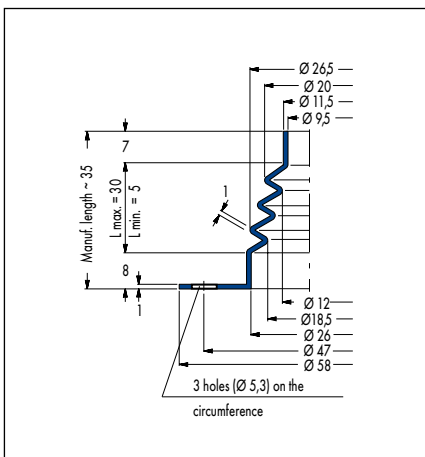
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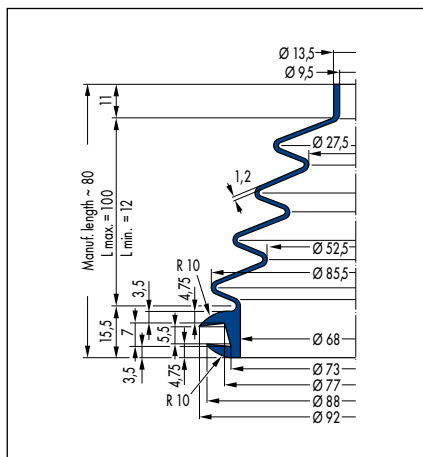
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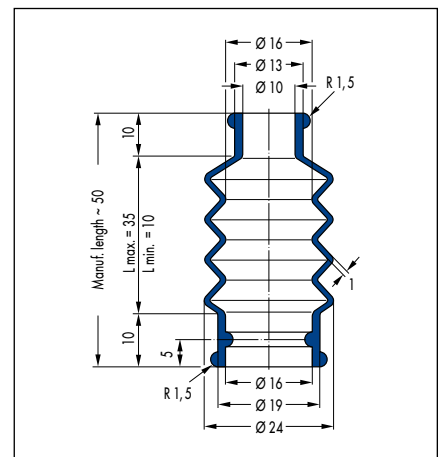
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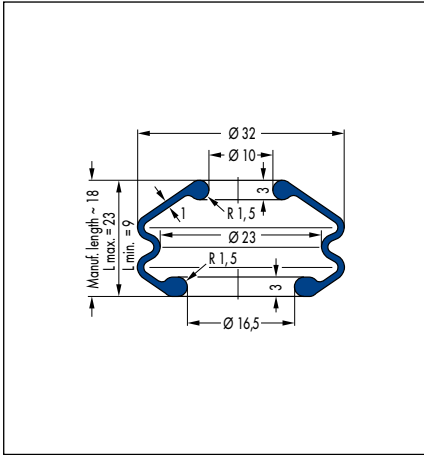
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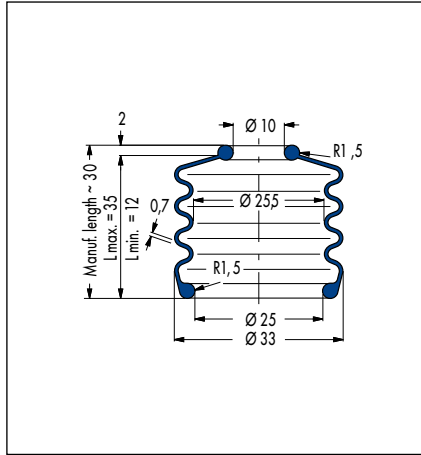
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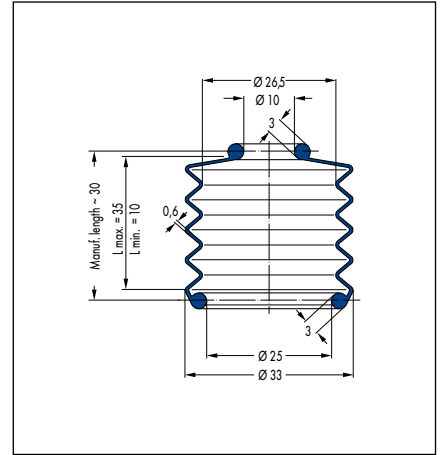
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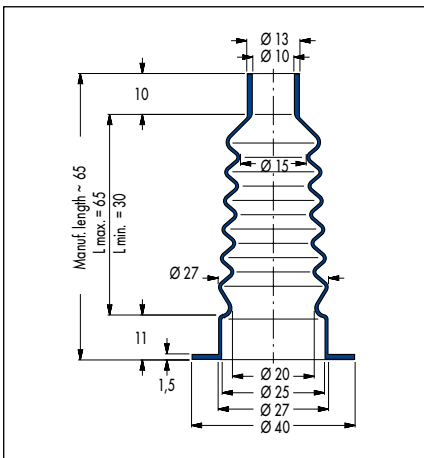
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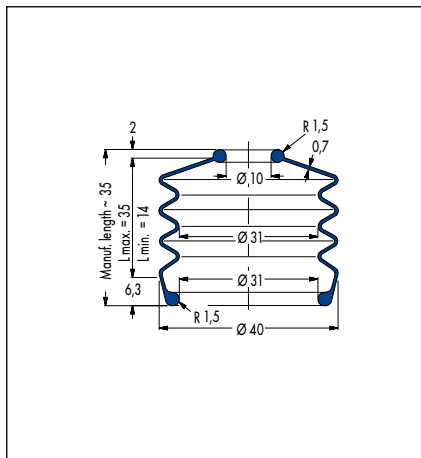
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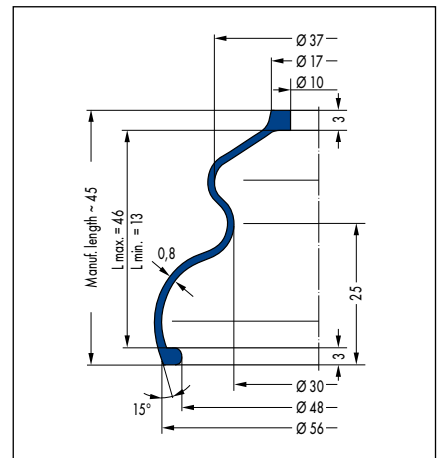
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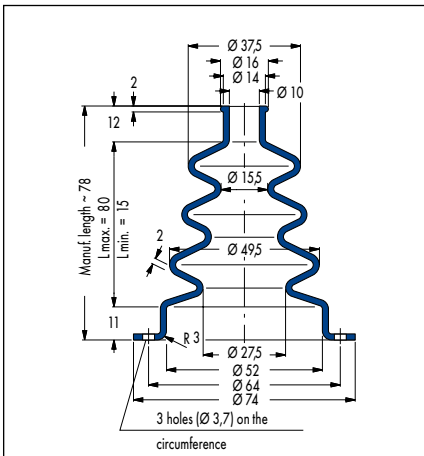
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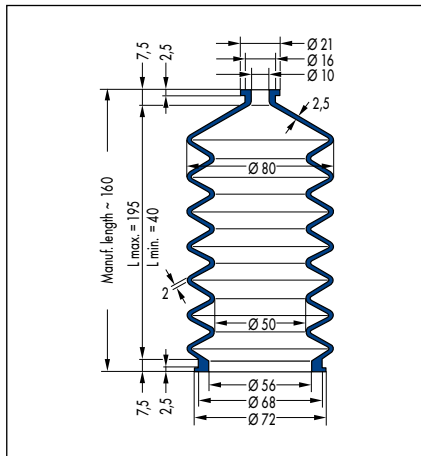
V6-00555, Article No. 438572



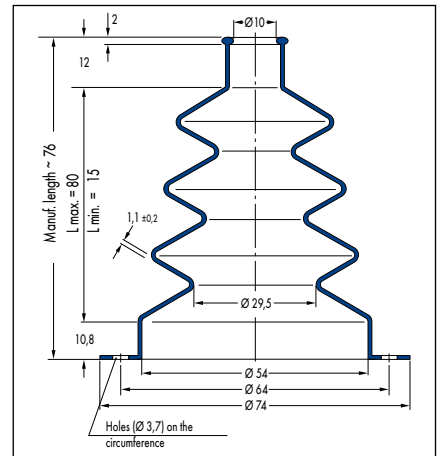
V6-00945, Article No. 413



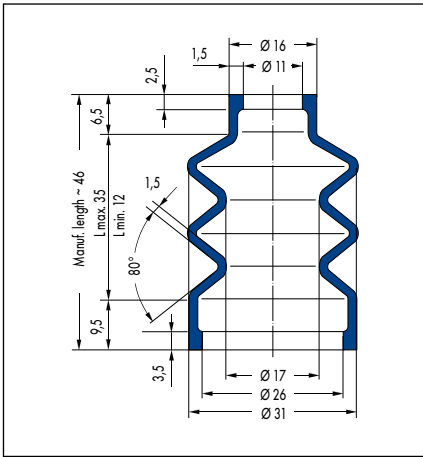
V6-01348, Article No. 429741 (50 CR 879)/  
430248 (42 CR 764)



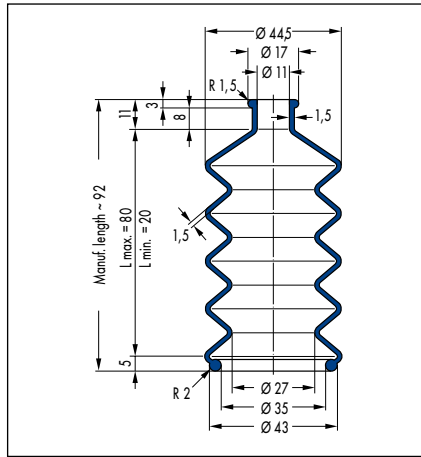
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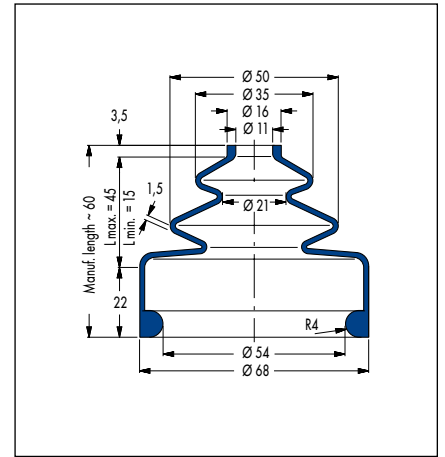
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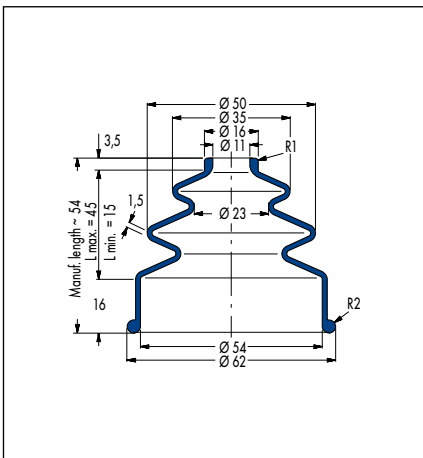
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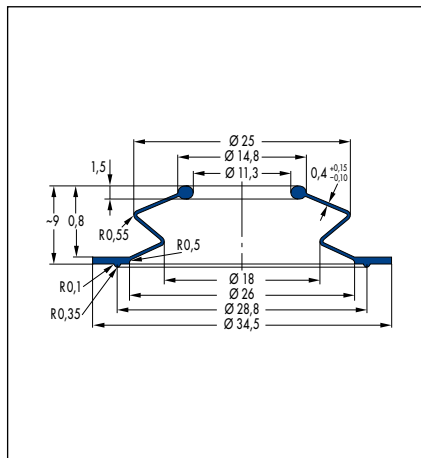
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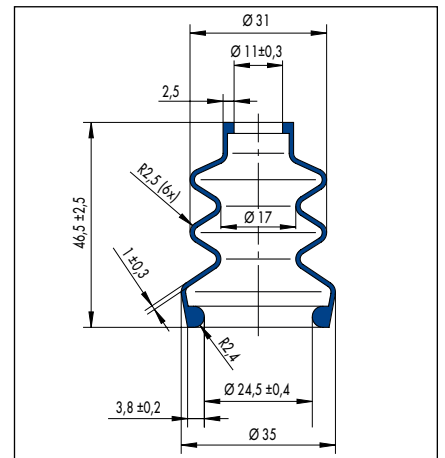
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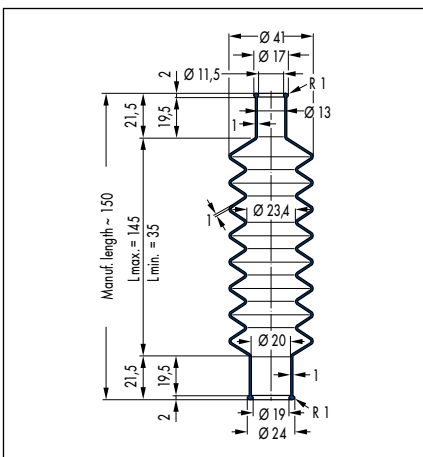
V6-00320, Article No. 440257



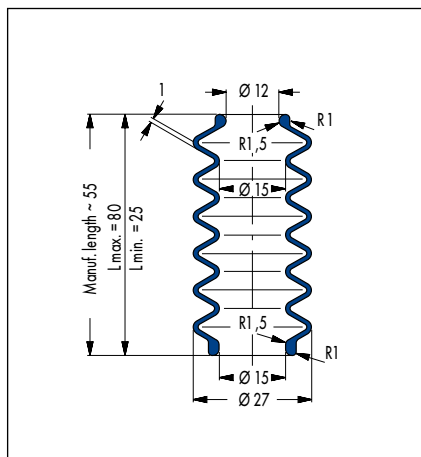
V6-20123, Article No. 49365014



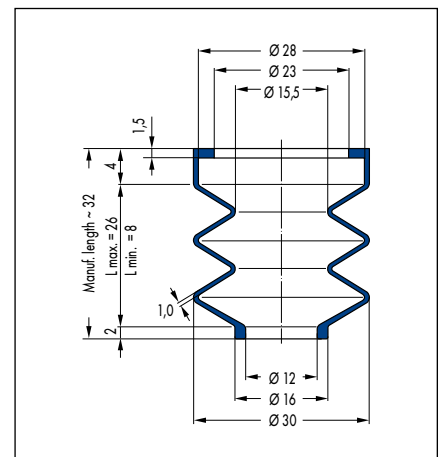
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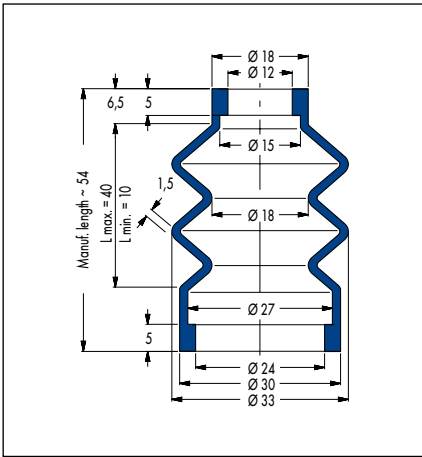
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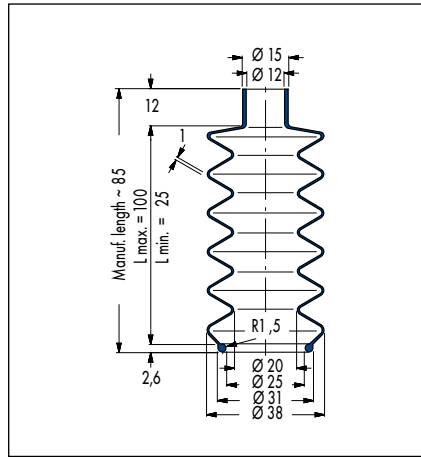
V6-00158, Article No. 430845



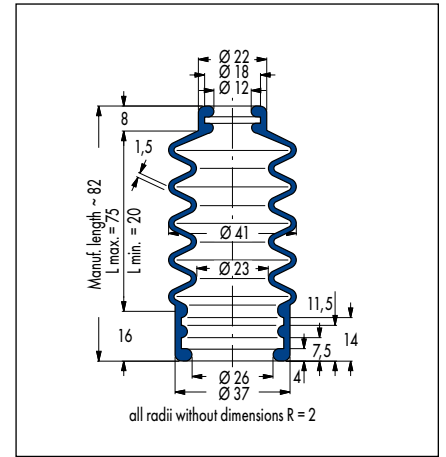
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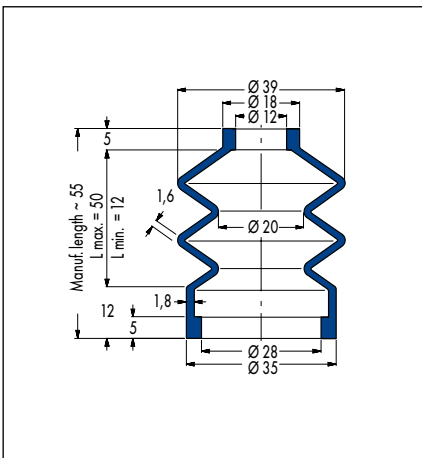
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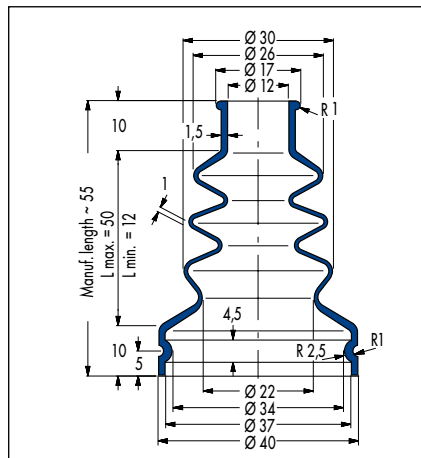
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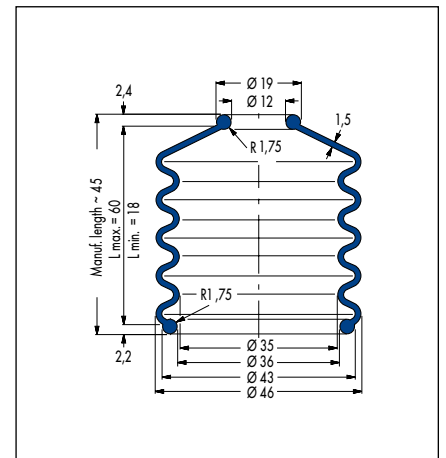
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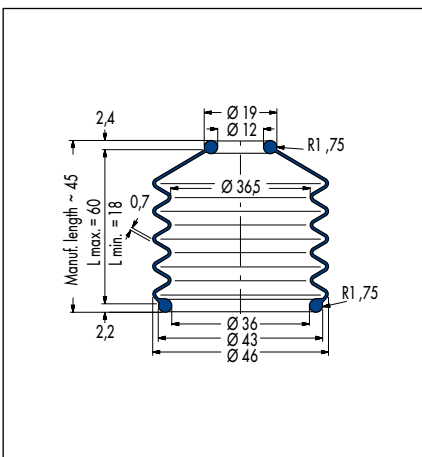
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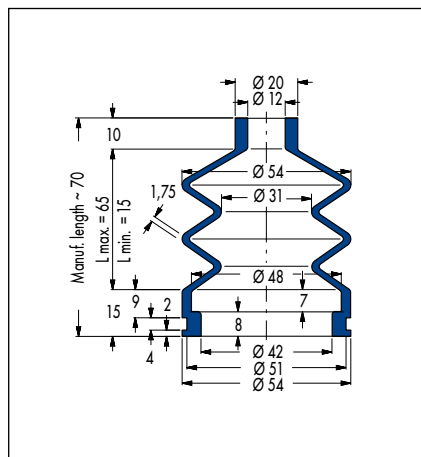
V6-00716, Article No. 427272



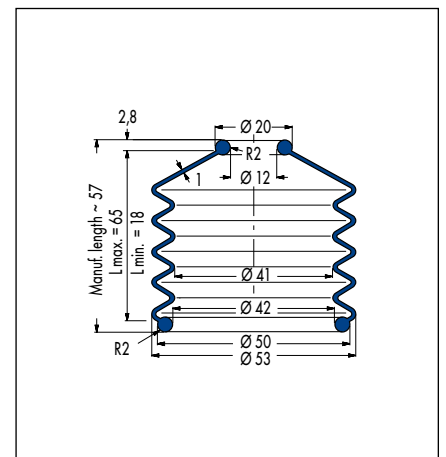
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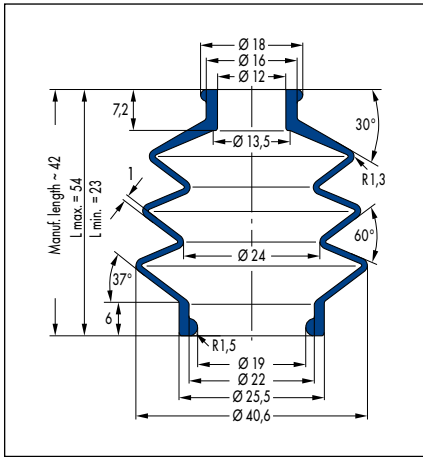
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81222 (42 CR 764)



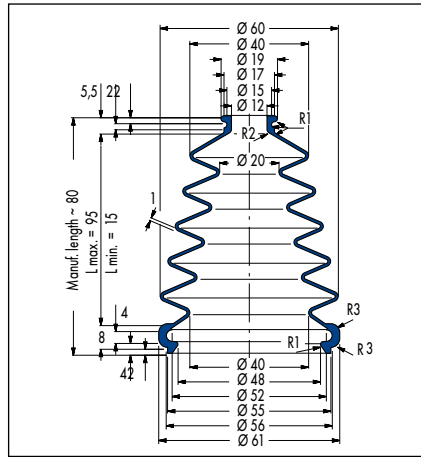
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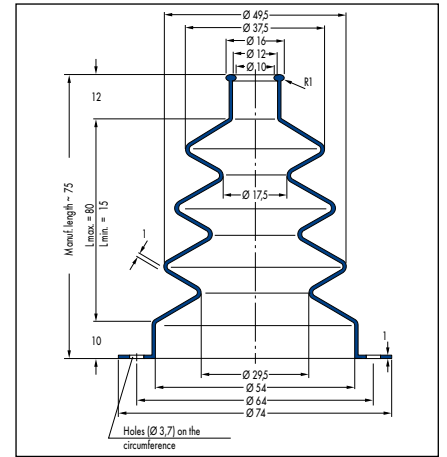
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438542 (NBR)



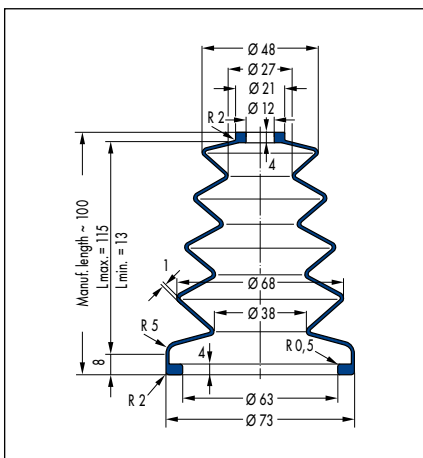
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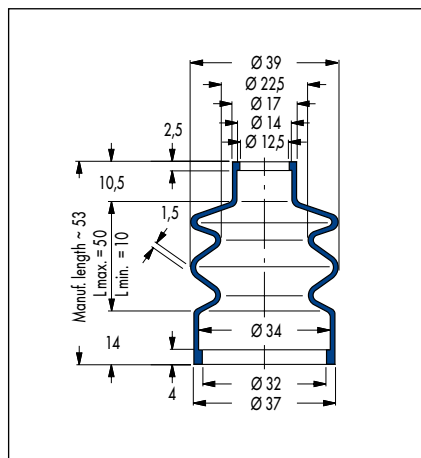
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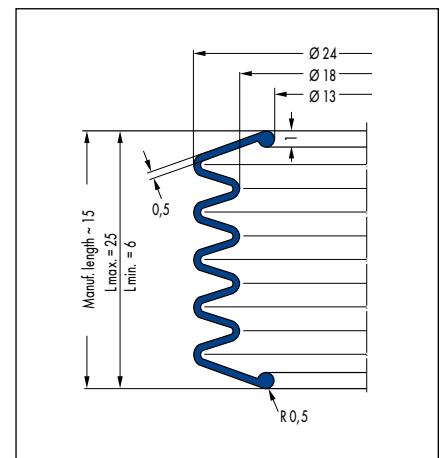
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508013 (NBR)



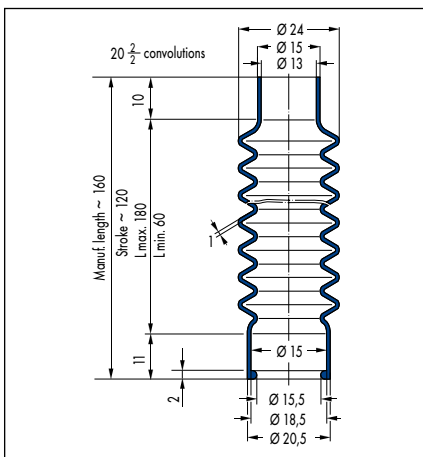
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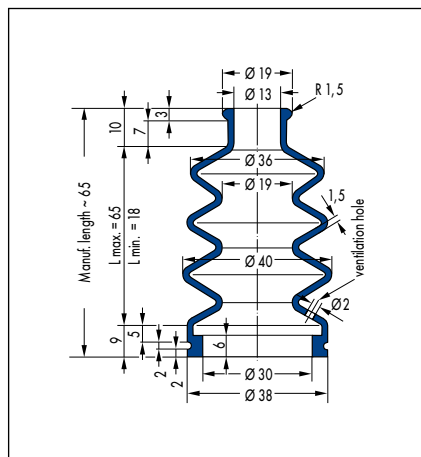
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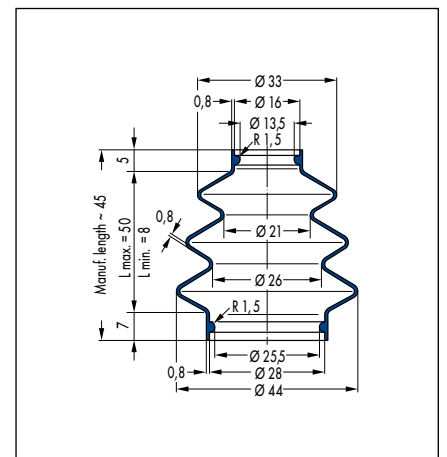
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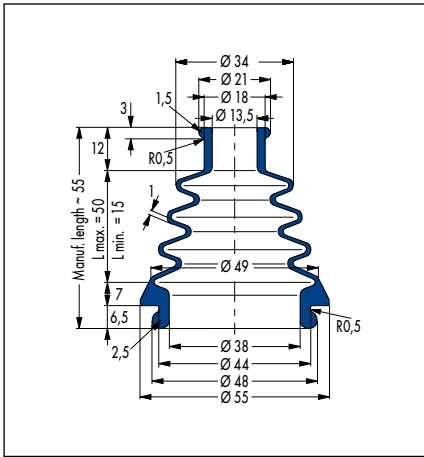
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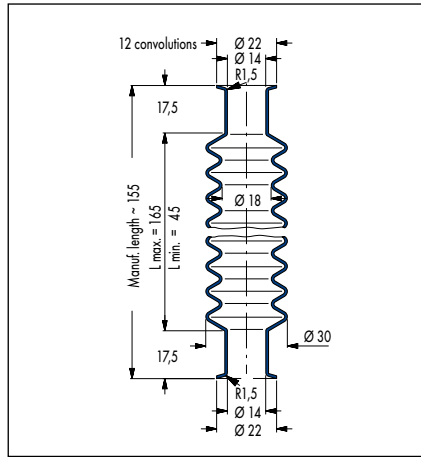
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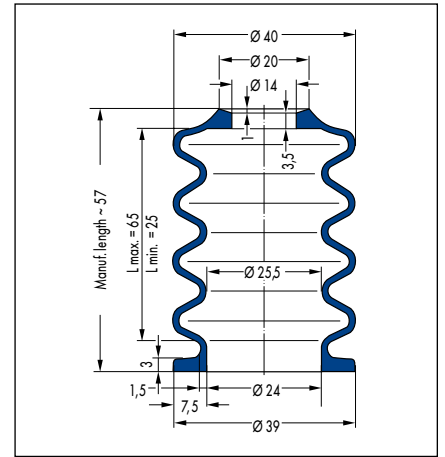
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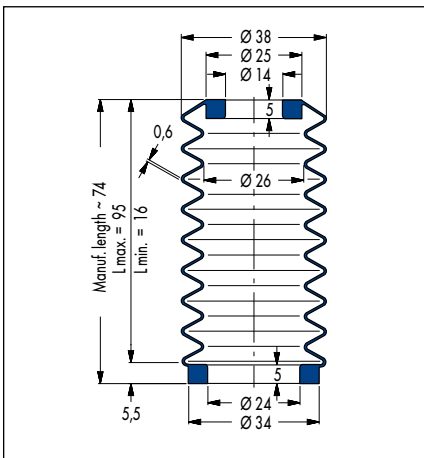
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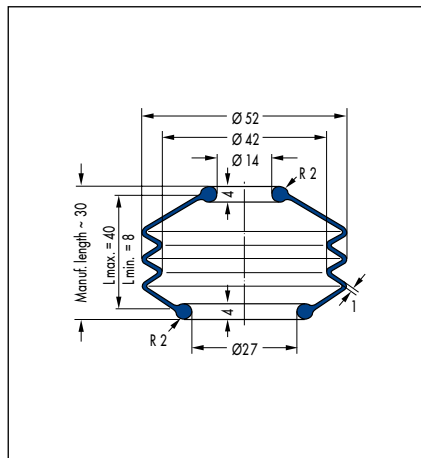
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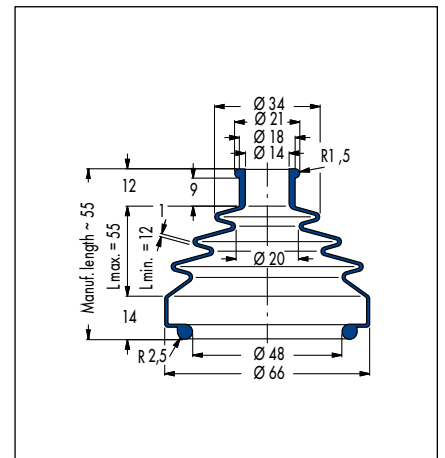
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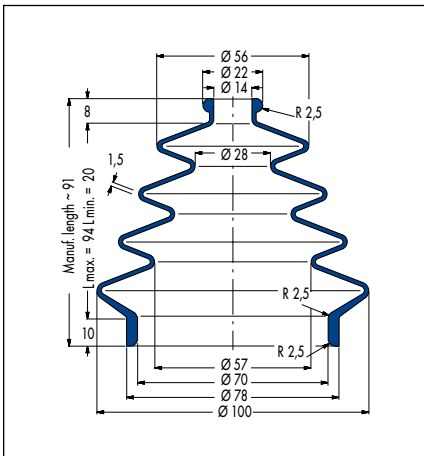
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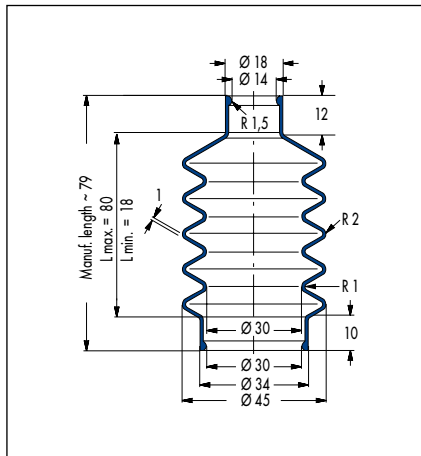
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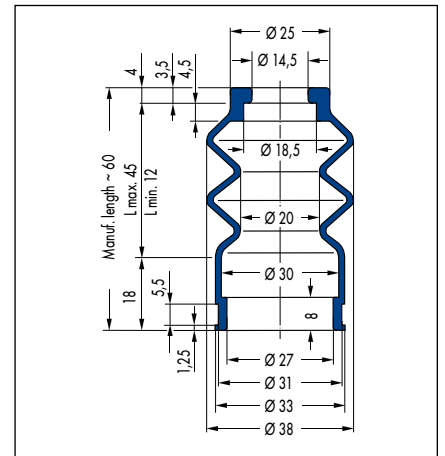
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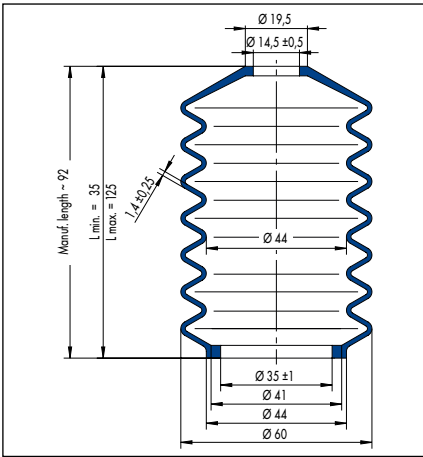
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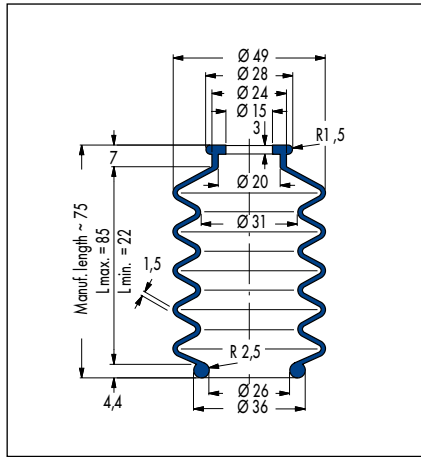
V6-00988, Article No. 385391



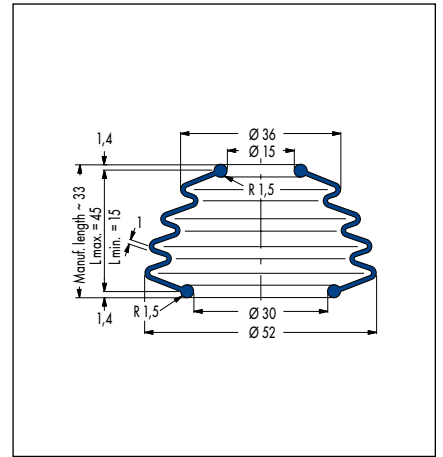
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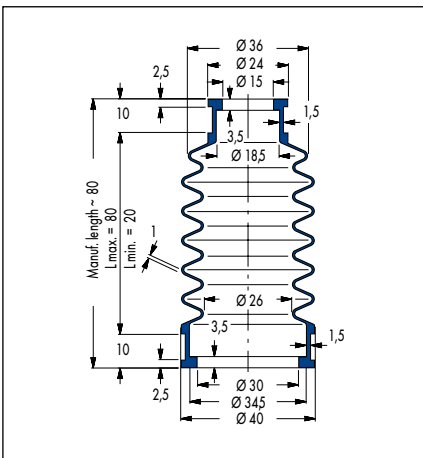
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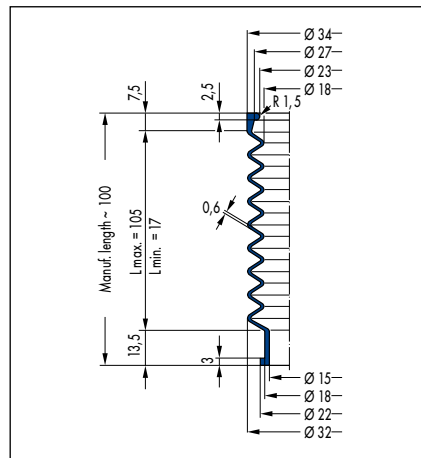
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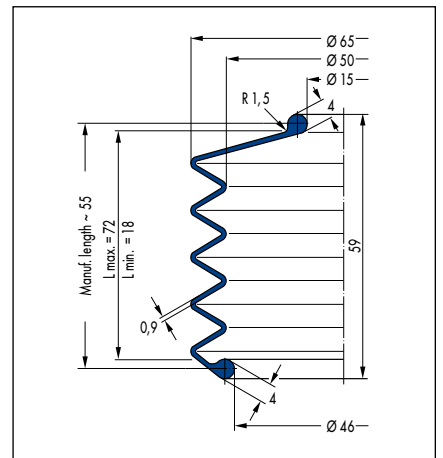
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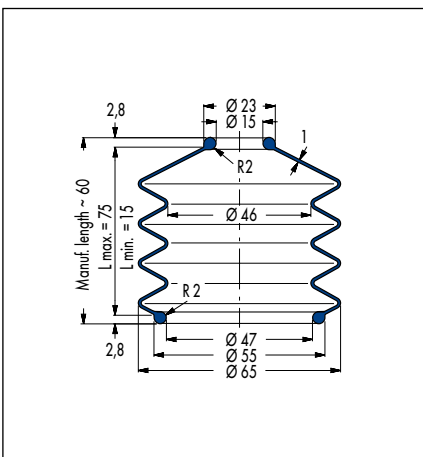
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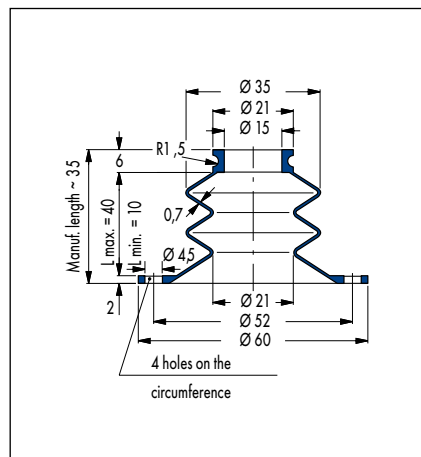
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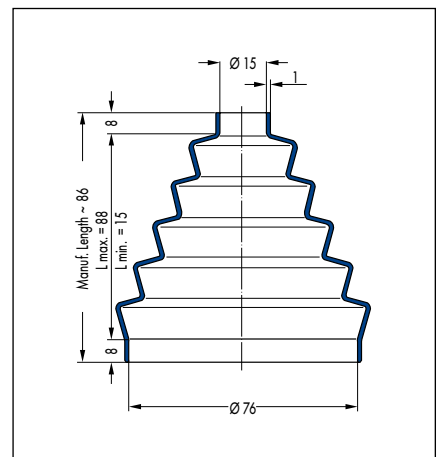
V6-01538, Article No. 434075



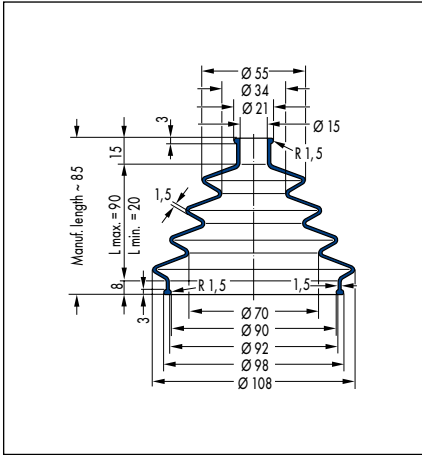
V6-00582, Article No. 49312586 (CR)



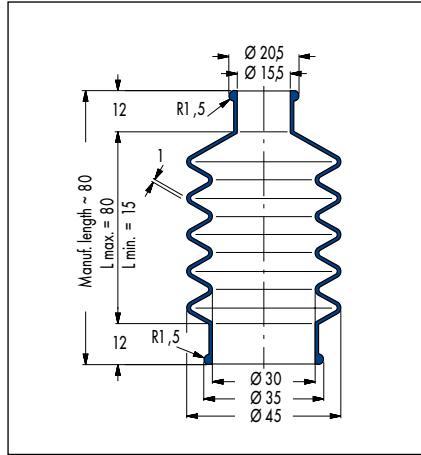
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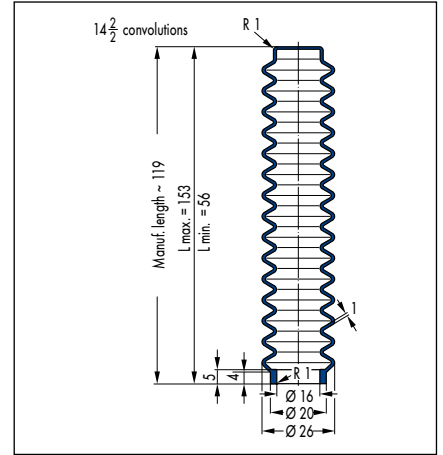
V6-00116, Article No. 439182 (42 CR 764)/  
439181 (50 CR 879)



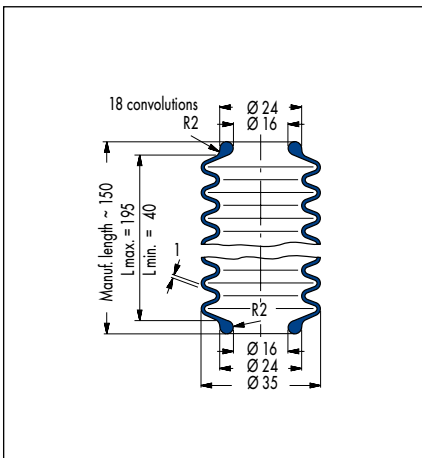
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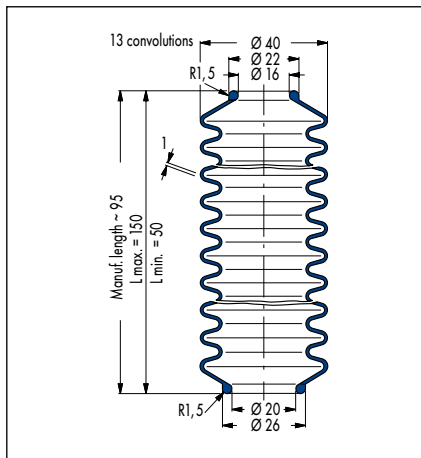
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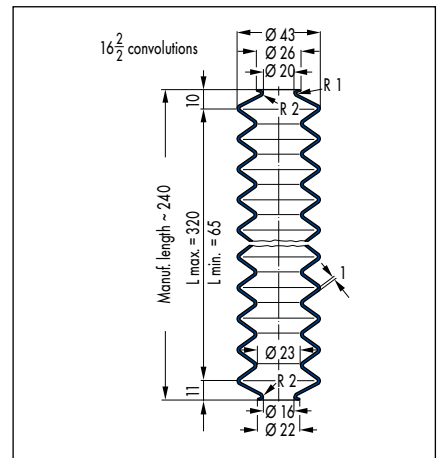
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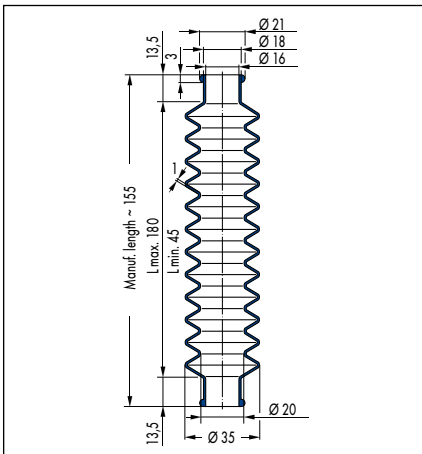
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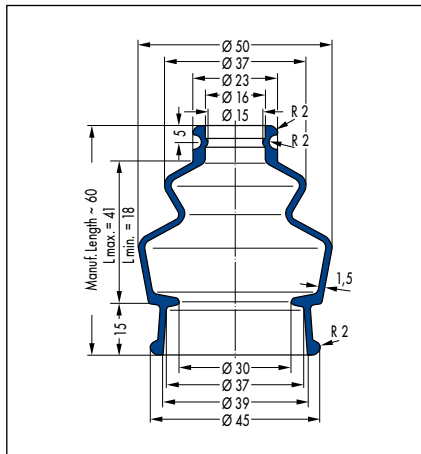
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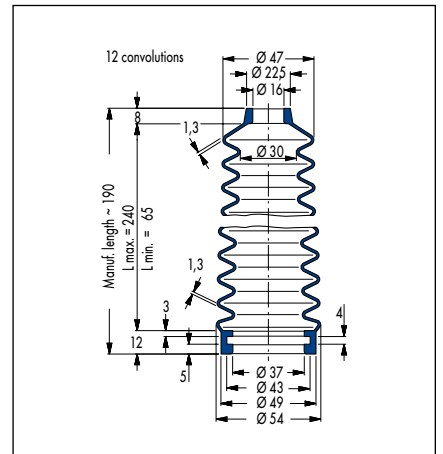
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V6-00639, Article No. 400785



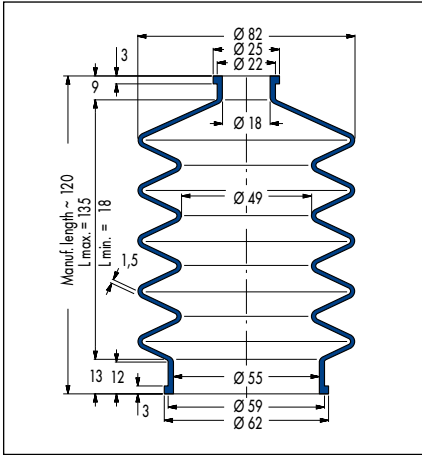
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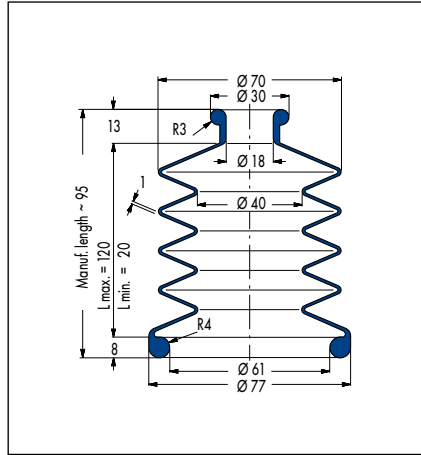
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428851 (NBR)



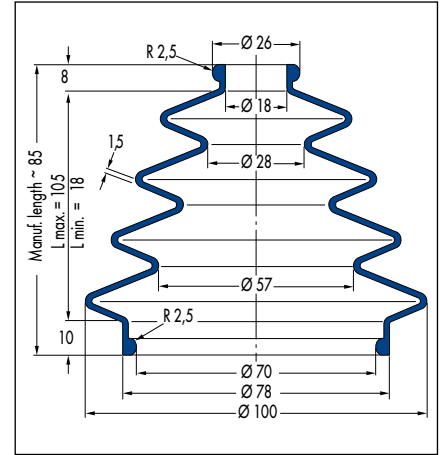




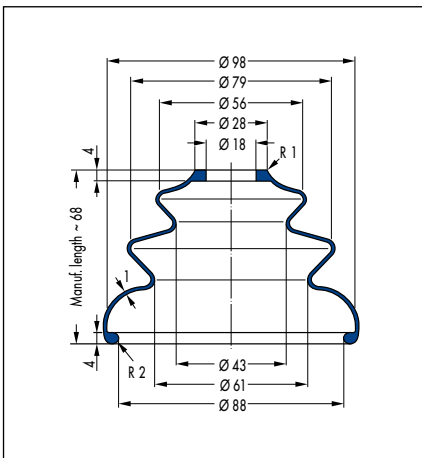
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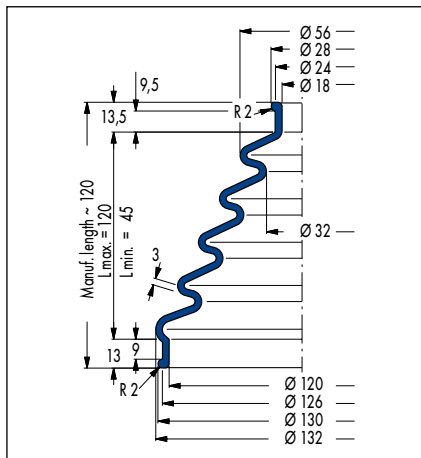
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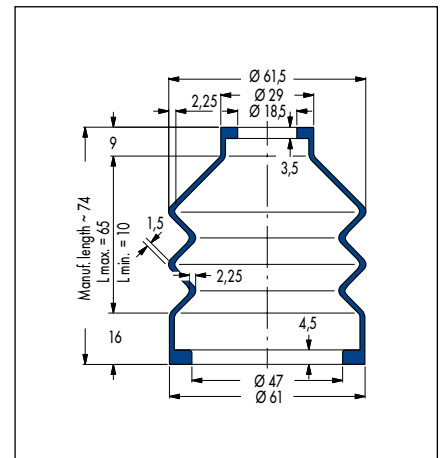
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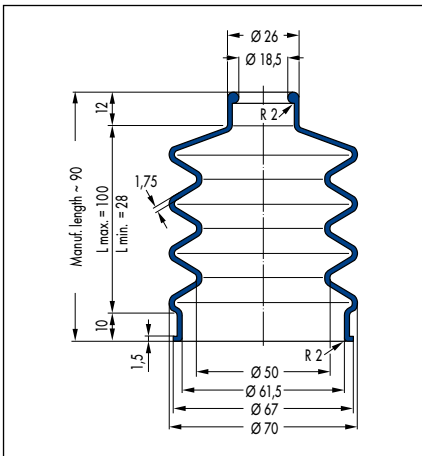
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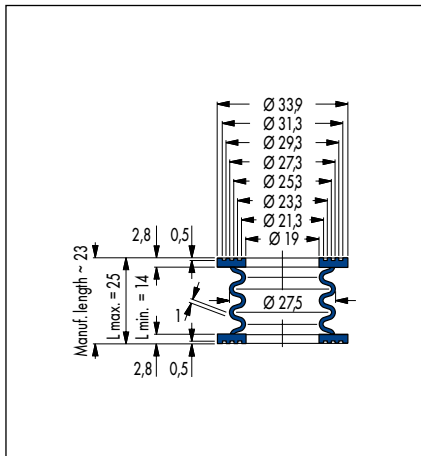
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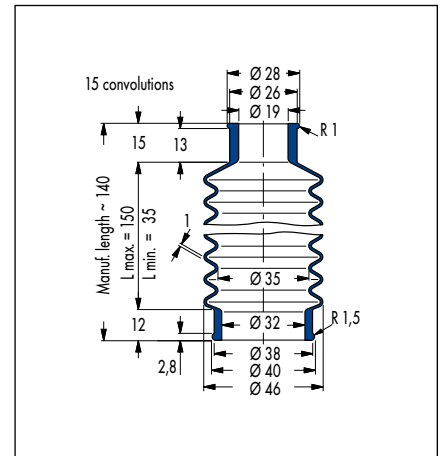
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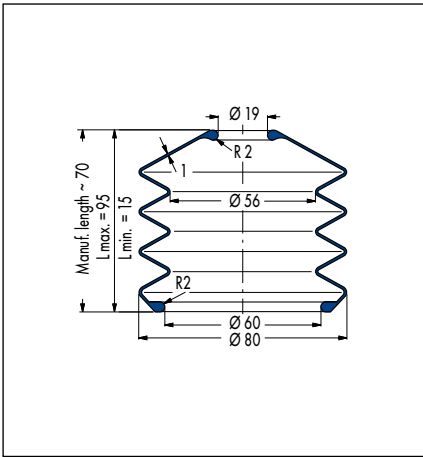
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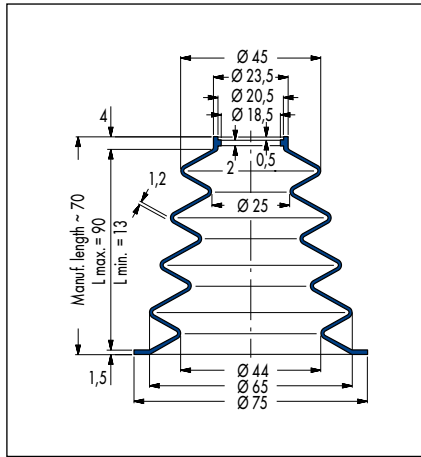
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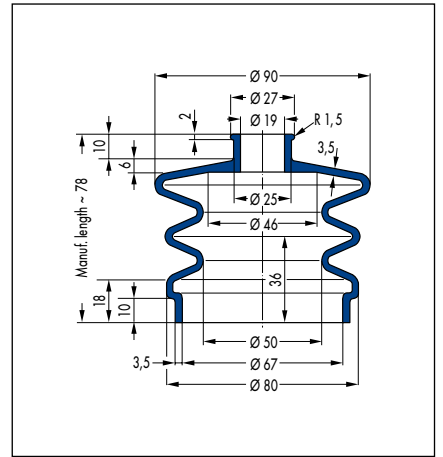
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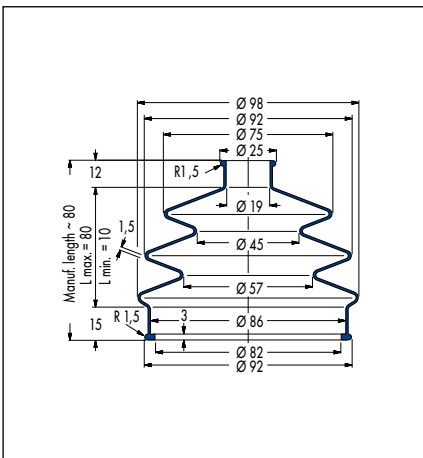
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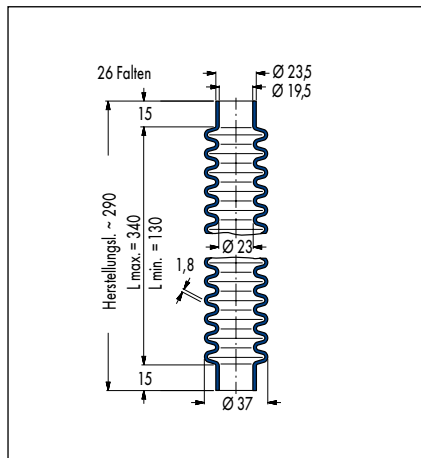
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427271 (45 NBR 670)



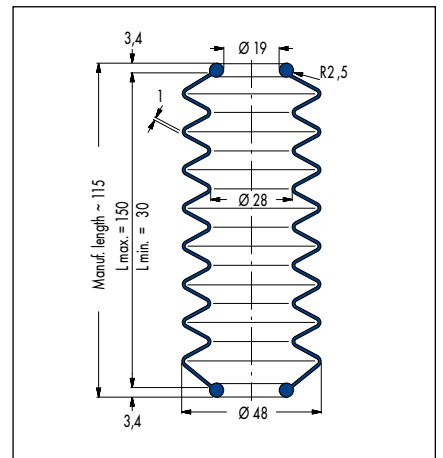
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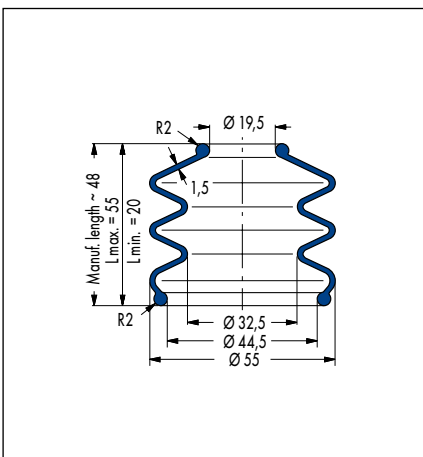
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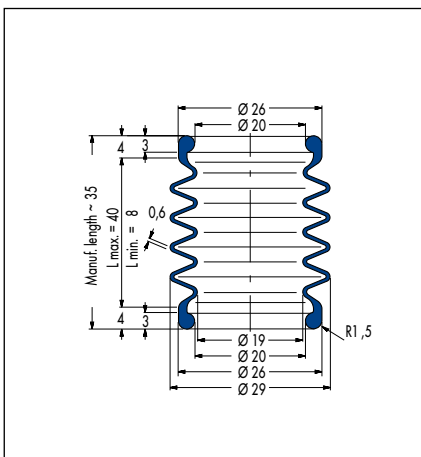
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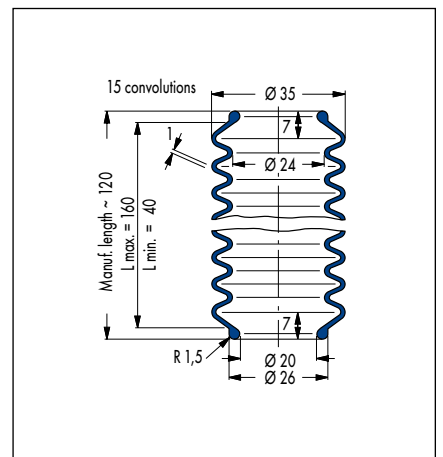
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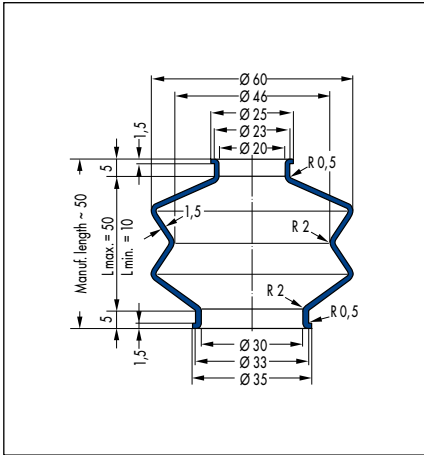
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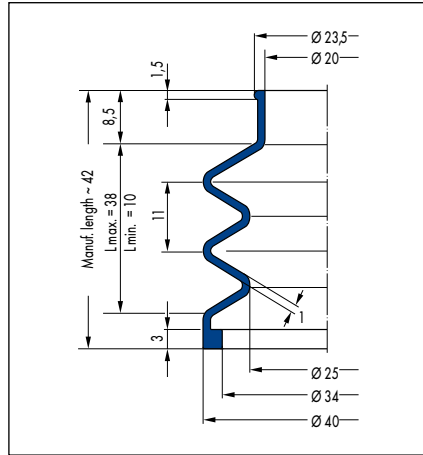
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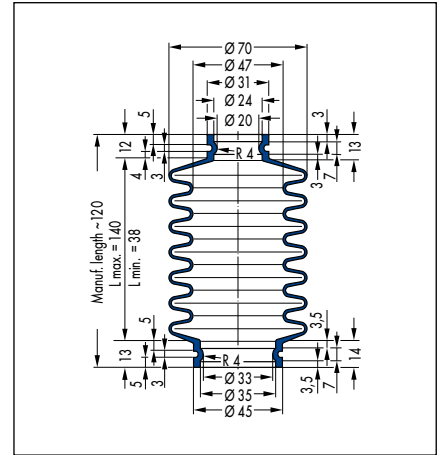
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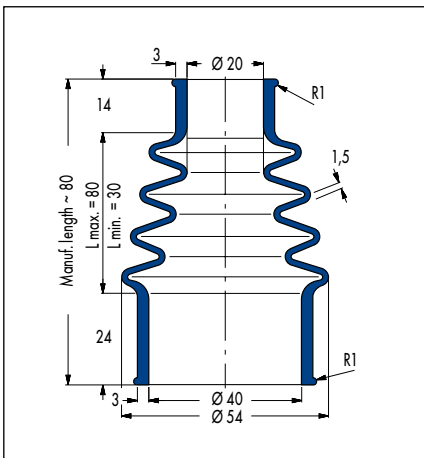
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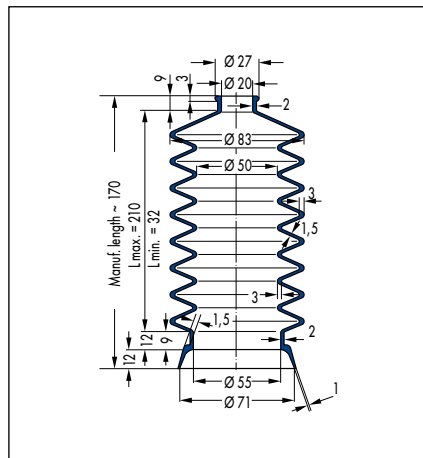
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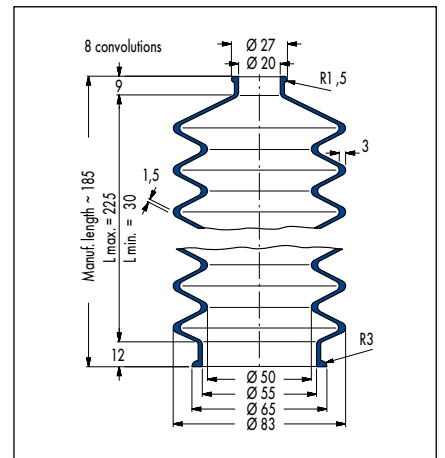
V6-00218, Article No. 430858



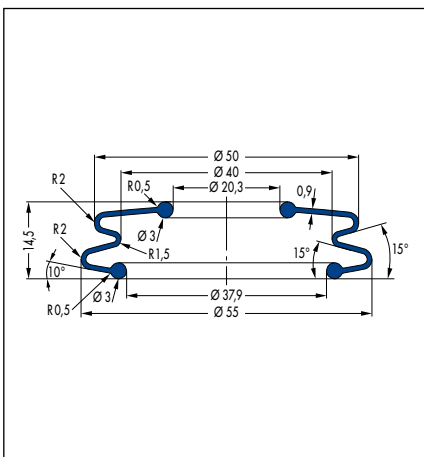
V6-01544, Article No. 301805



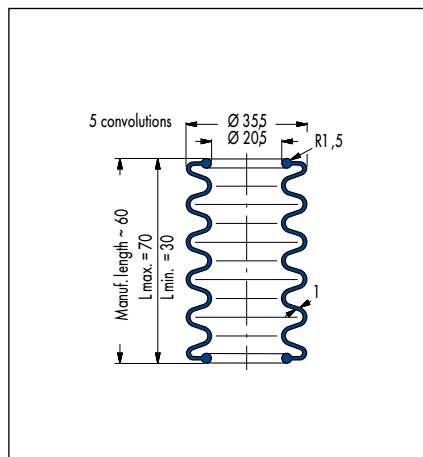
V6-00434, Article No. 438213



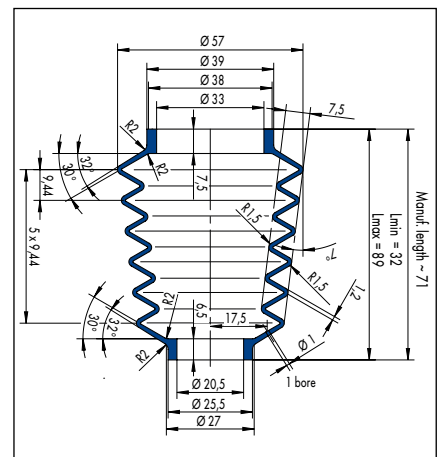
V6-00861, Article No. 429667 (42 CR 764)/  
429668 (50 CR 879)



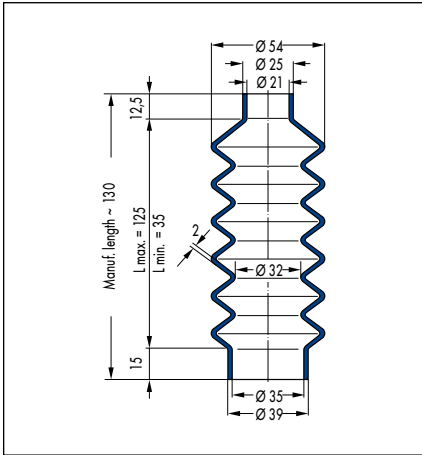
V6-20105, Article No. 49332672



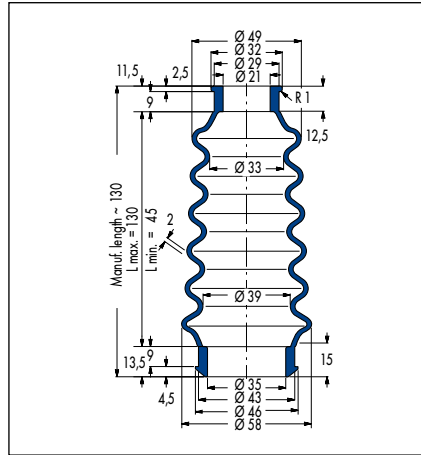
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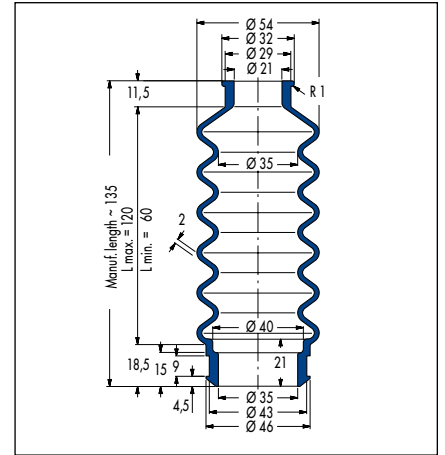
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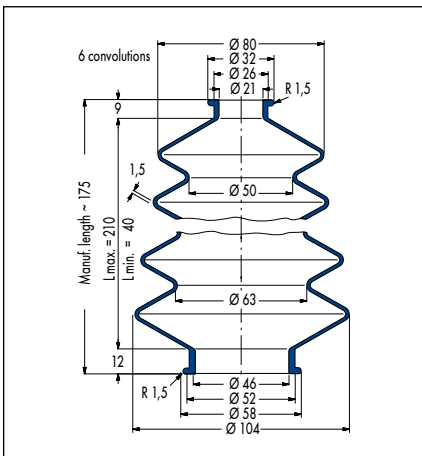
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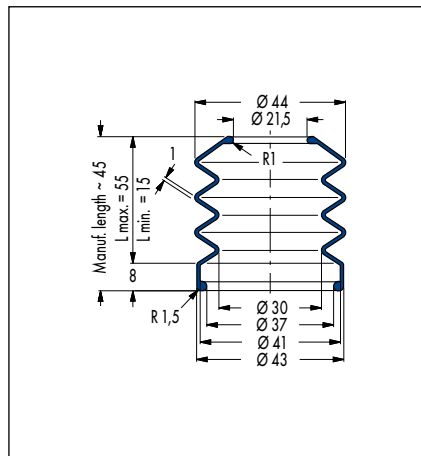
V6-00195, Article No. 436916



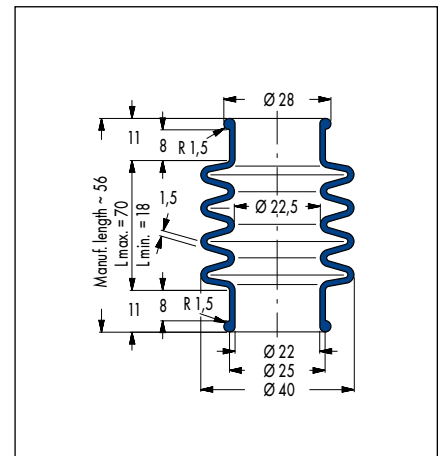
V6-00305, Article No. 426323



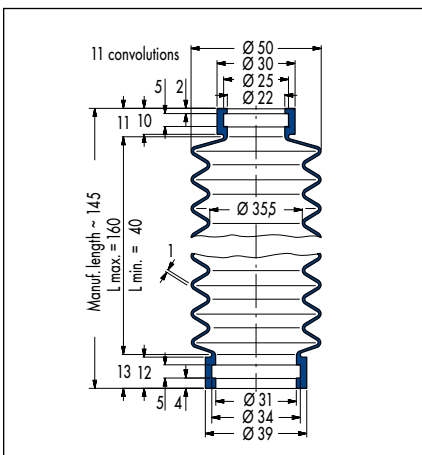
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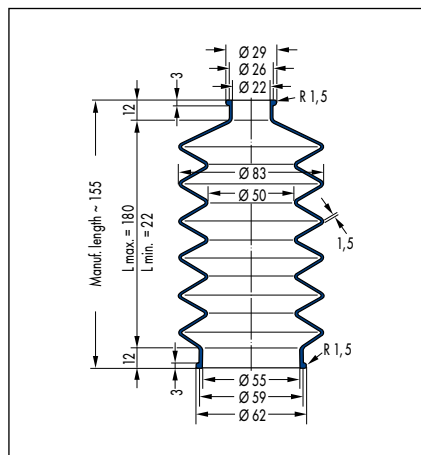
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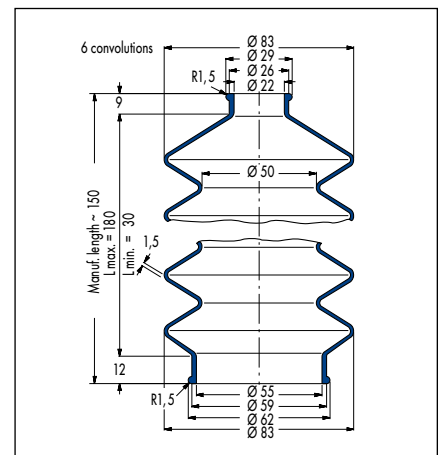
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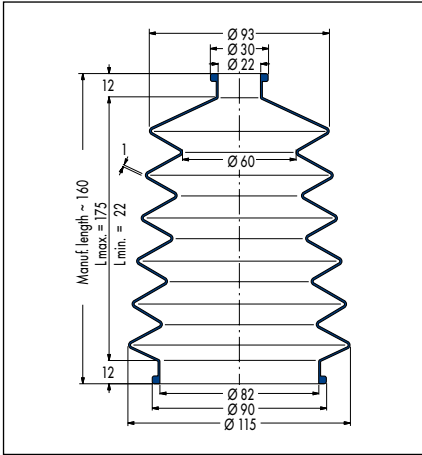
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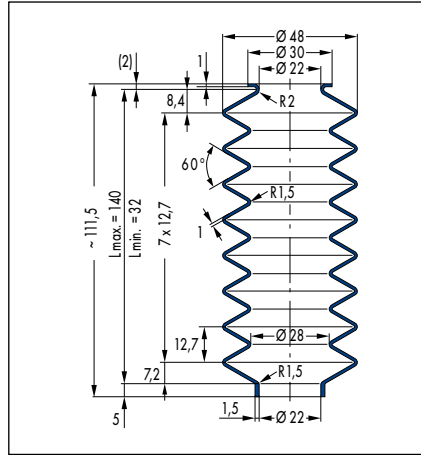
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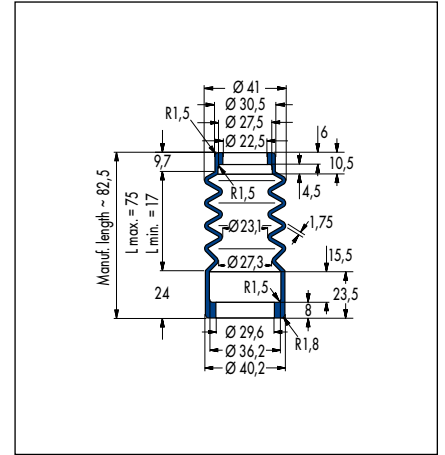
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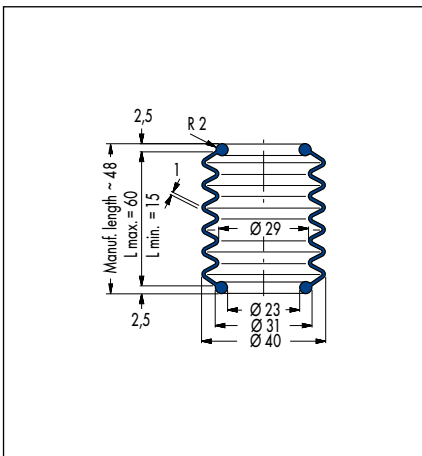
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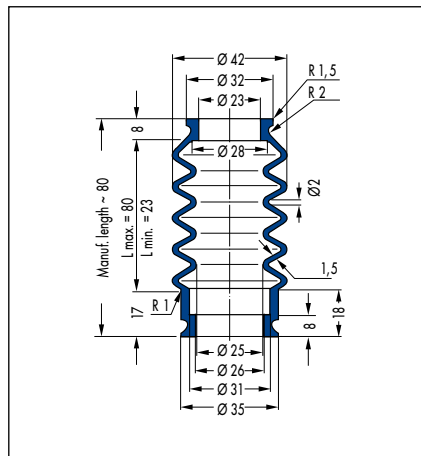
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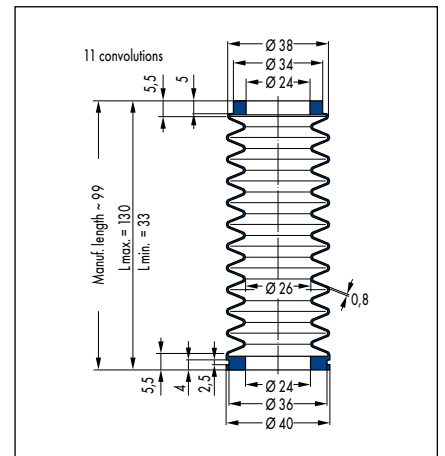
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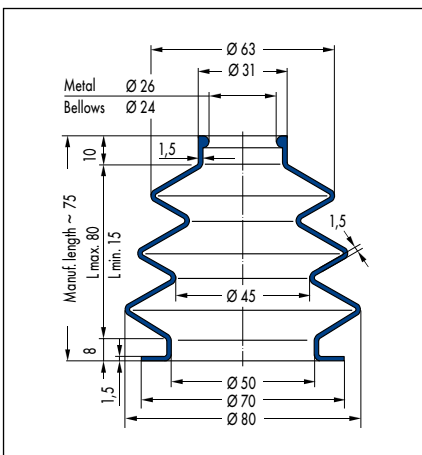
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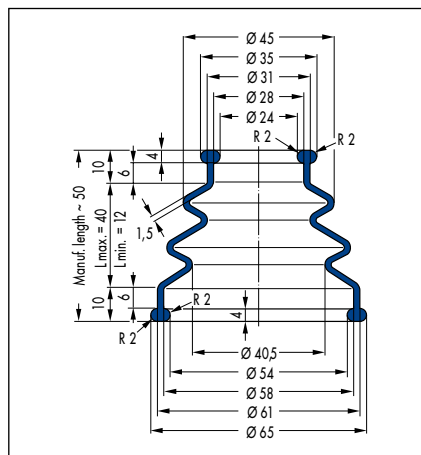
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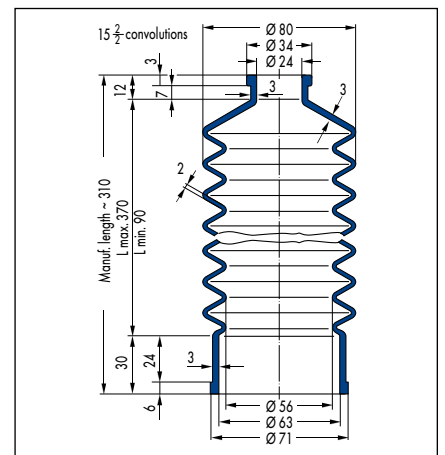
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V6-00826, Article No. 456489

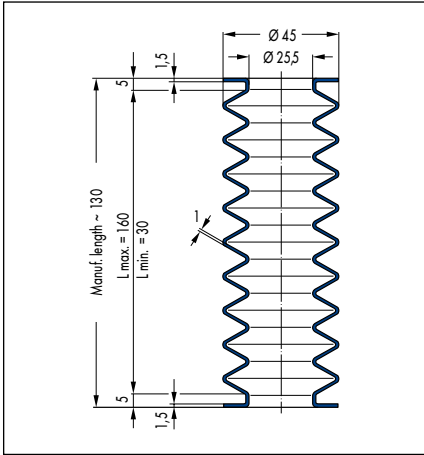


V6-00851, Article No. 457841

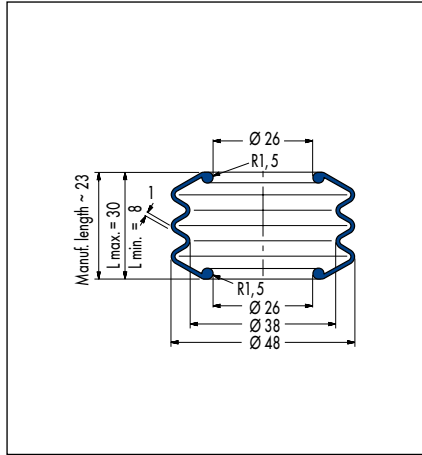


V6-00738, Article No. 60037192

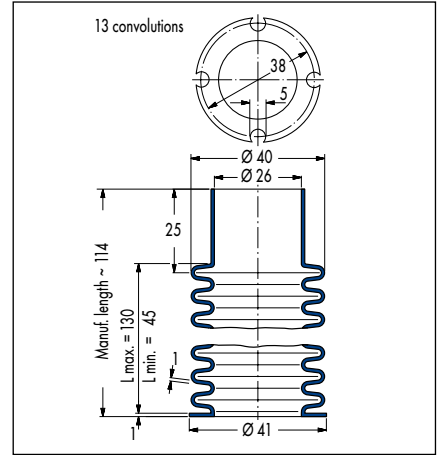




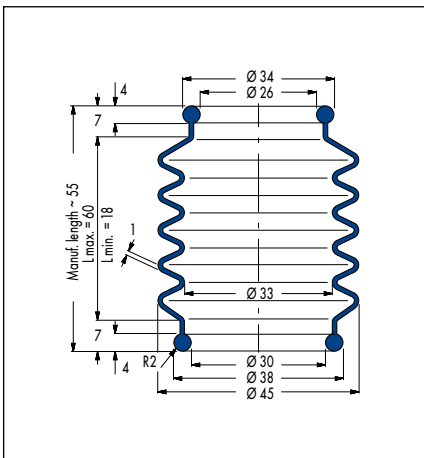
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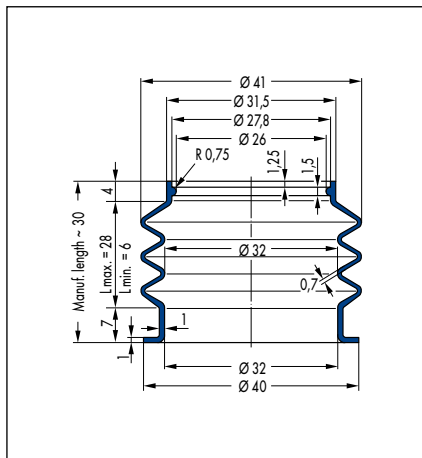
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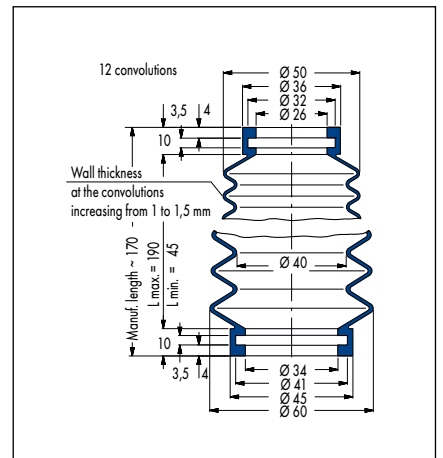
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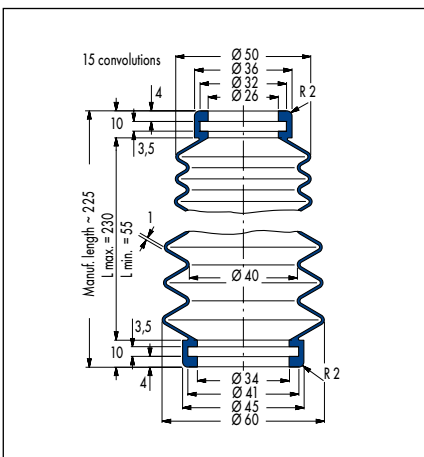
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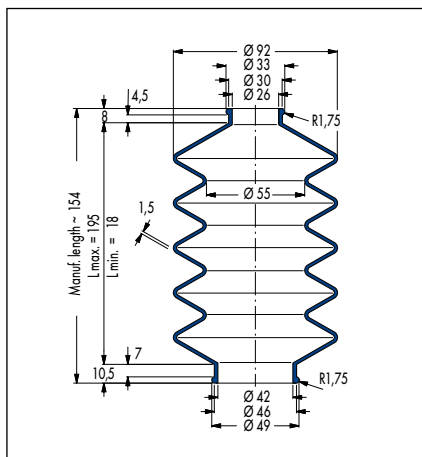
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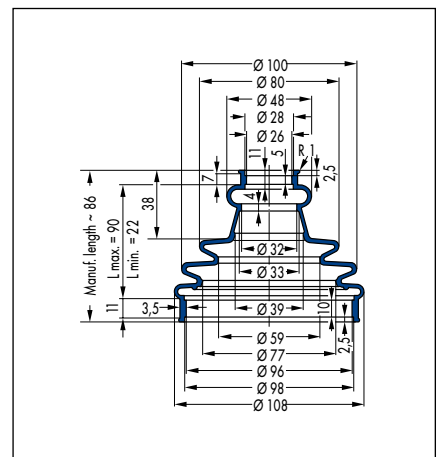
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V6-00401, Article No. 440291

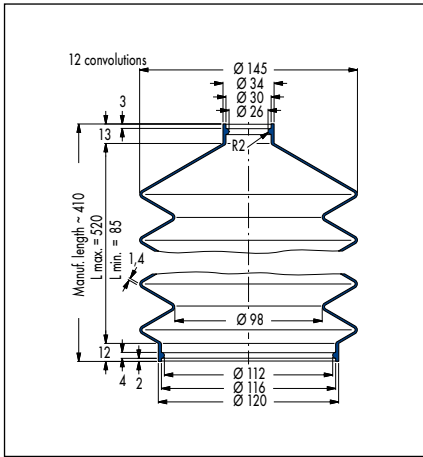


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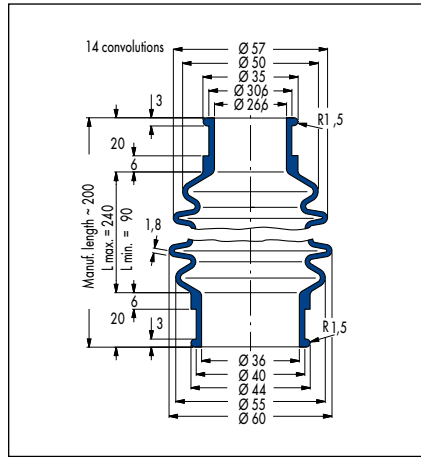


V6-01755, Article No. 451384

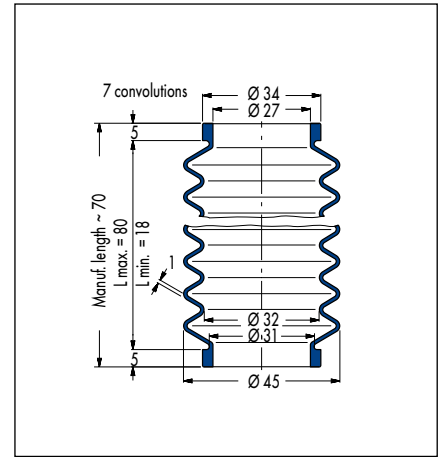




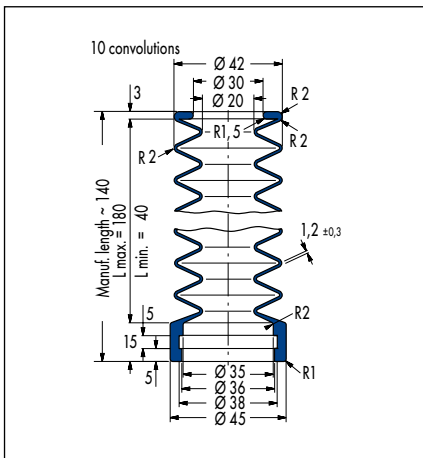
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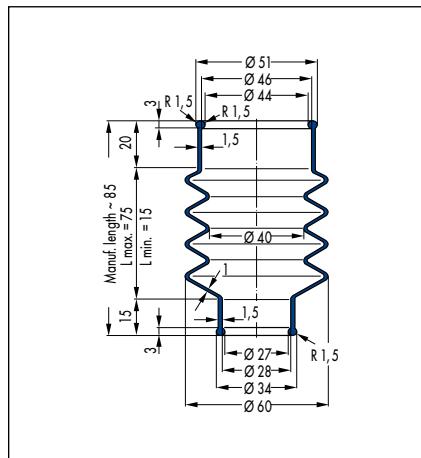
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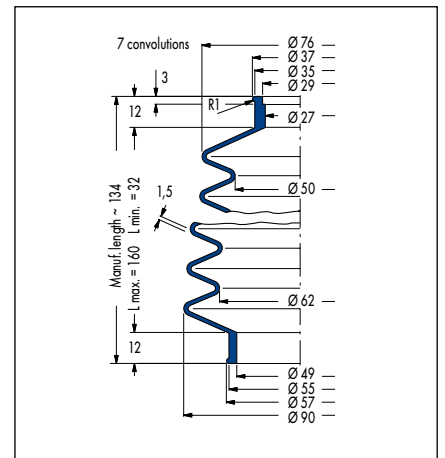
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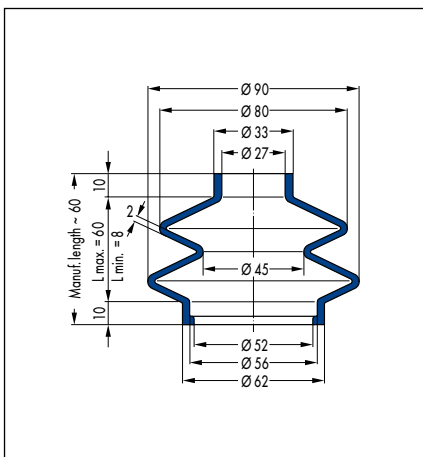
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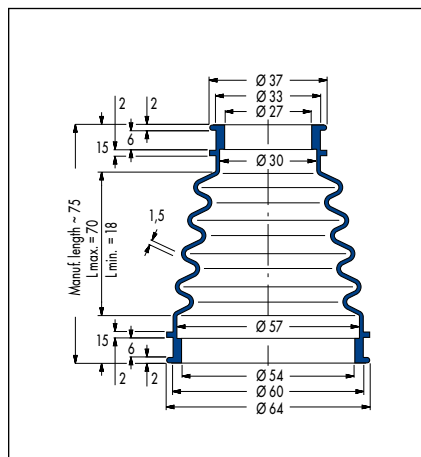
V6-00363, Article No. 432594 (CR)/  
60034466 (NBR)



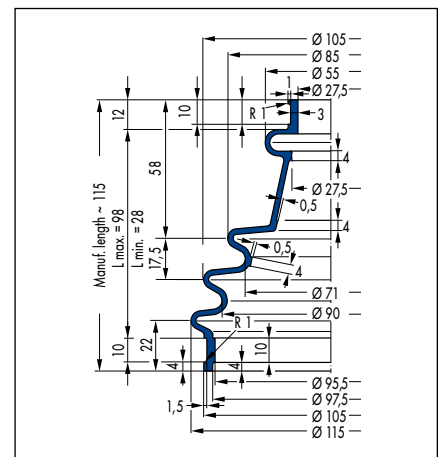
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430857 (CR)



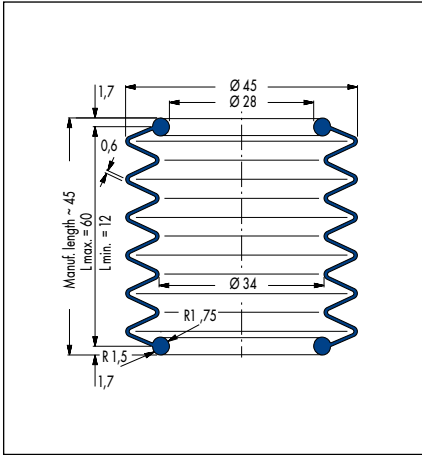
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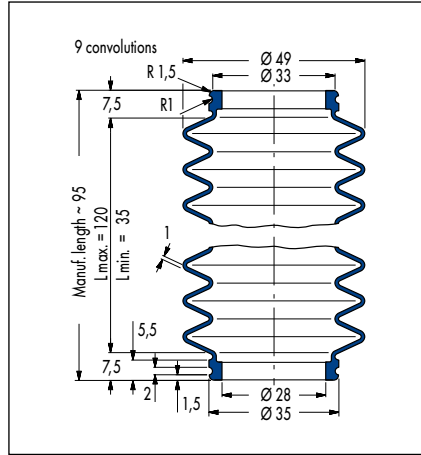
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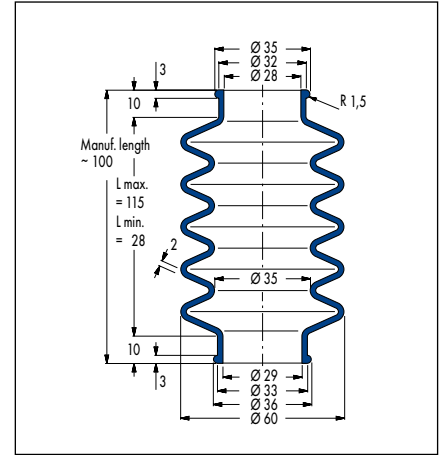
V6-01723, Article No. 438571



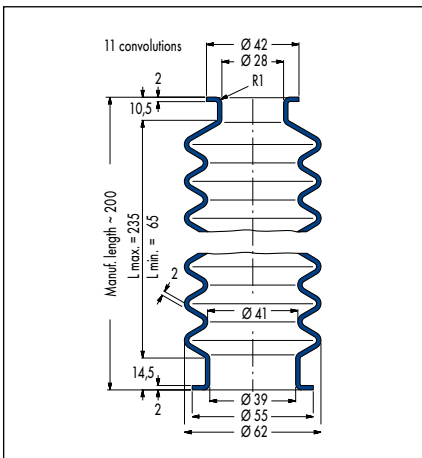
V6-00640, Article No. 427268



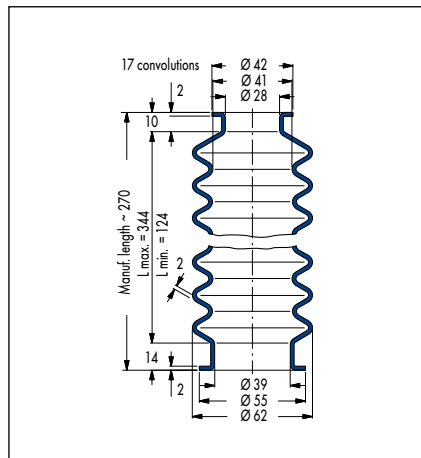
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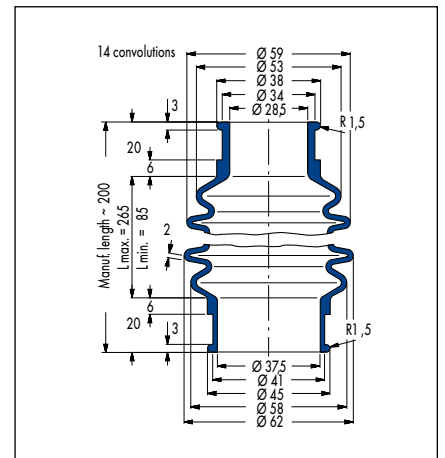
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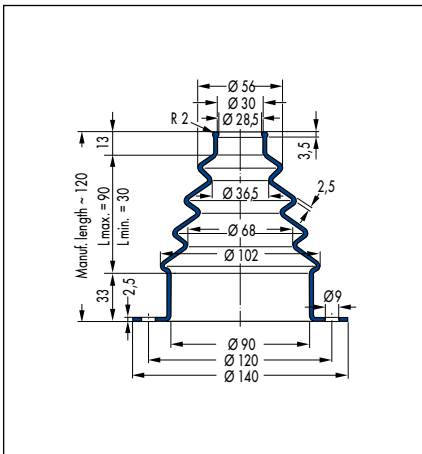
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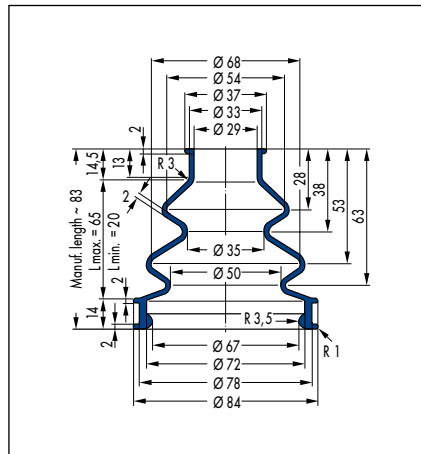
V6-00201, Article No. 49312542



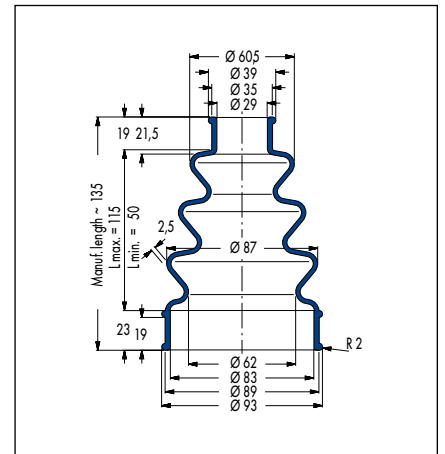
V6-00325, Article No. 426794



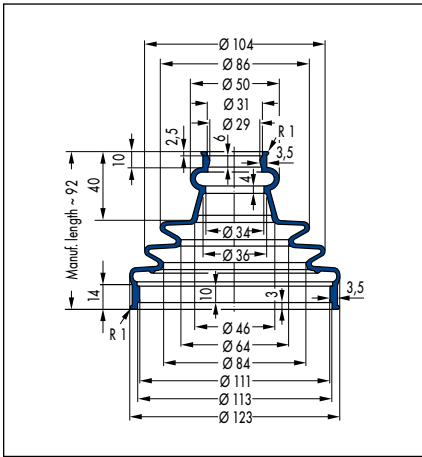
V6-00475, Article No. 400708



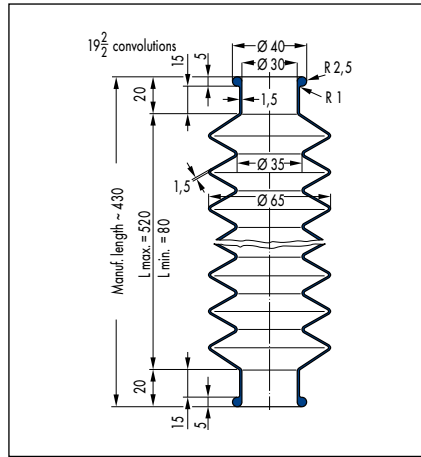
V6-01023, Article No. 454488



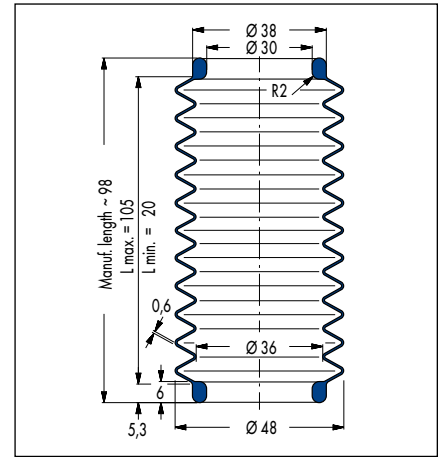
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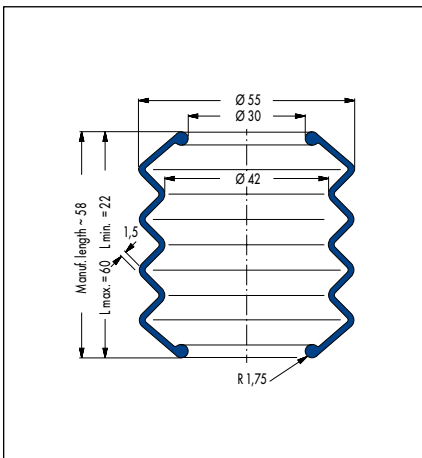
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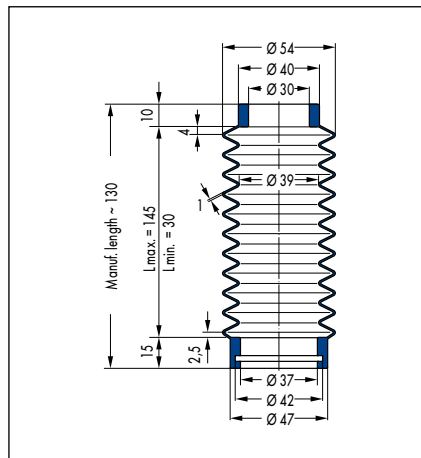
V6-00589, Article No. 15267



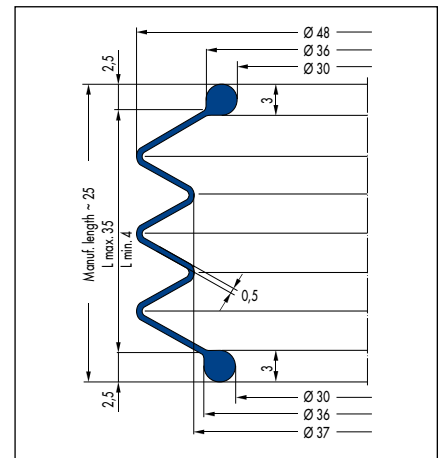
V6-00904, Article No. 375419



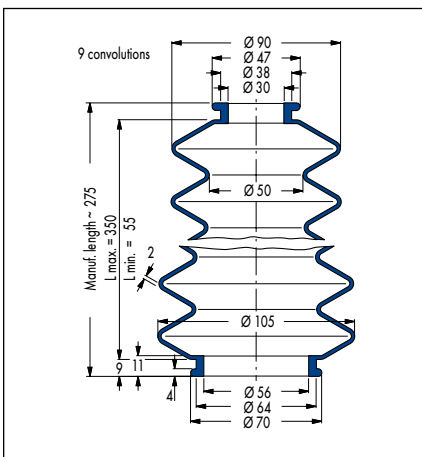
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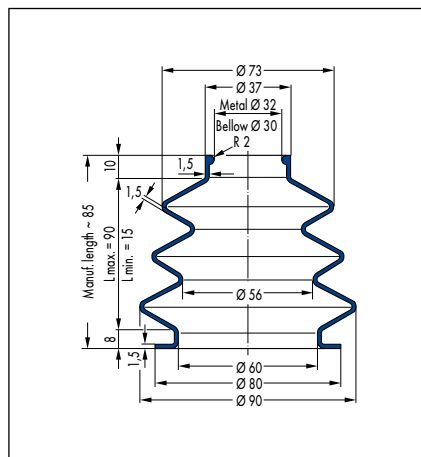
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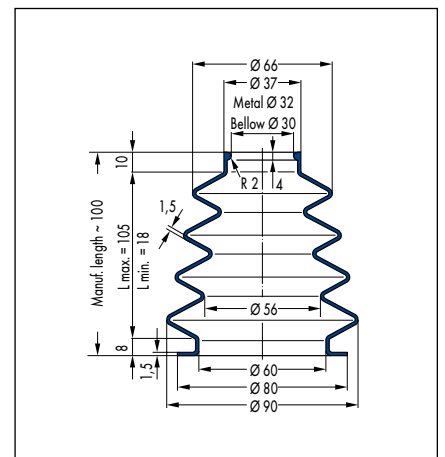
V6-00720, Article No. 400804



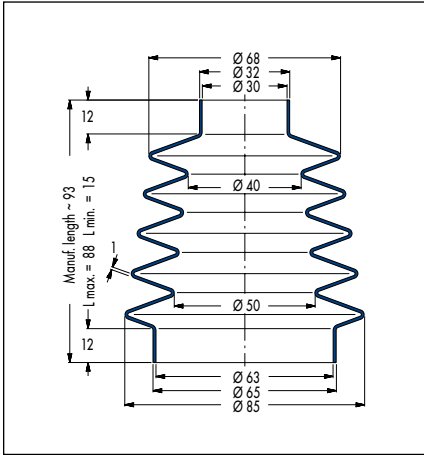
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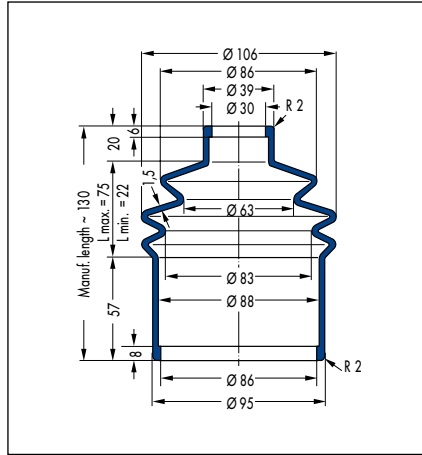
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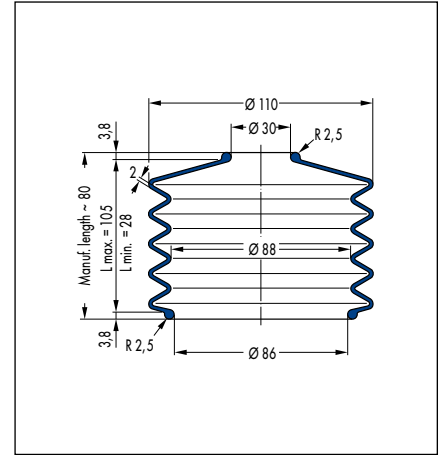
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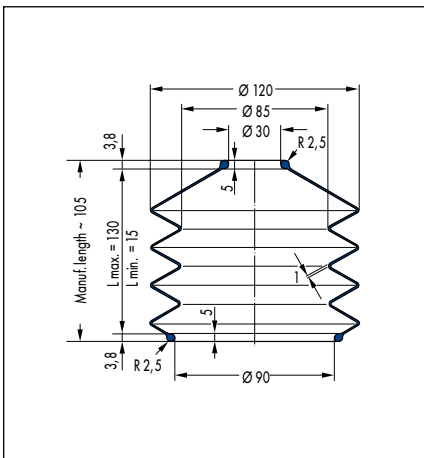
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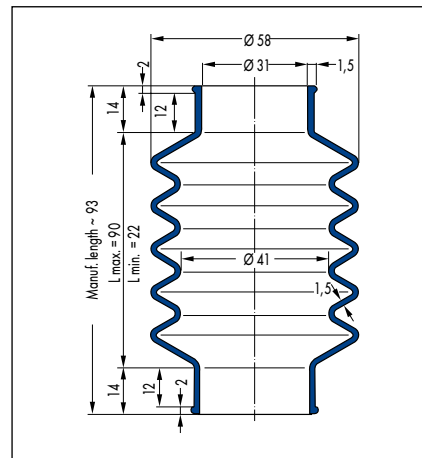
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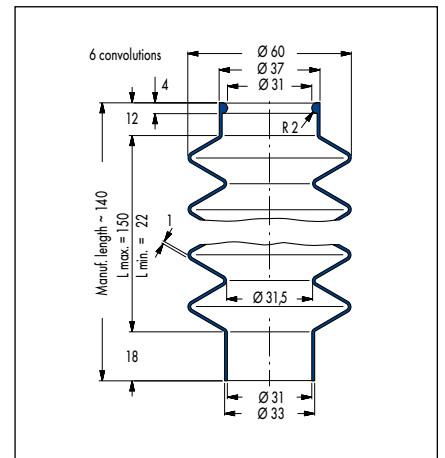
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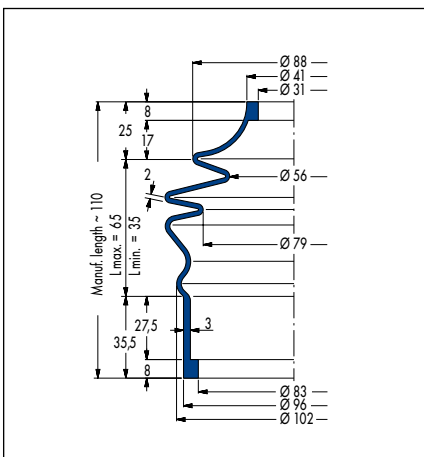
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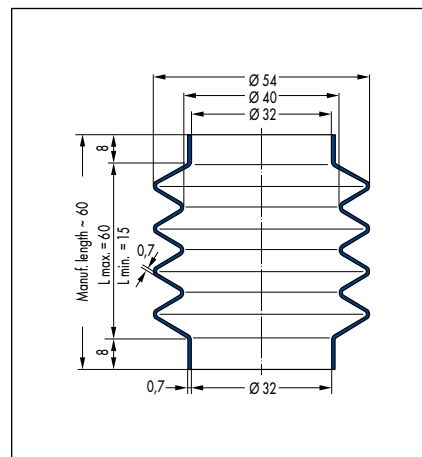
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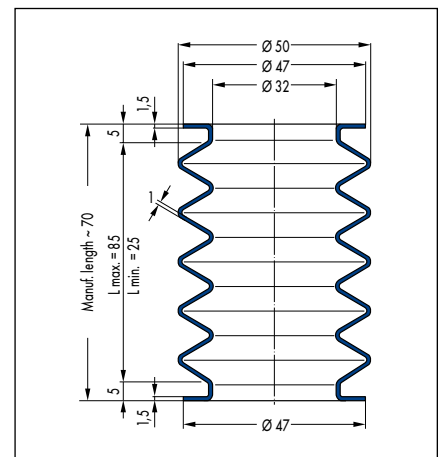
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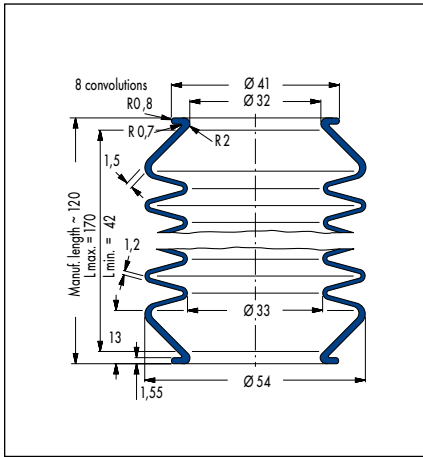
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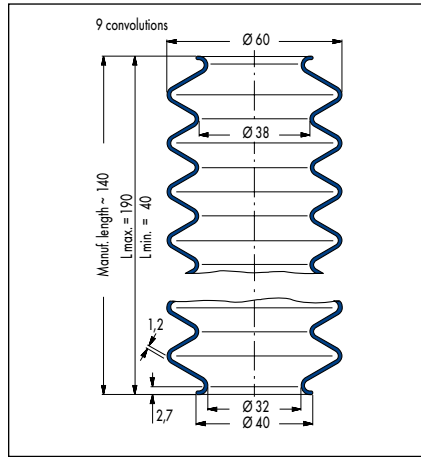
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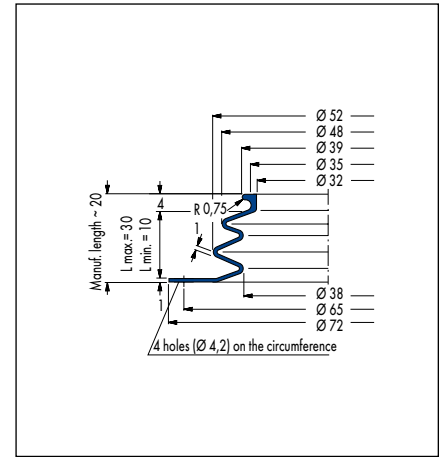
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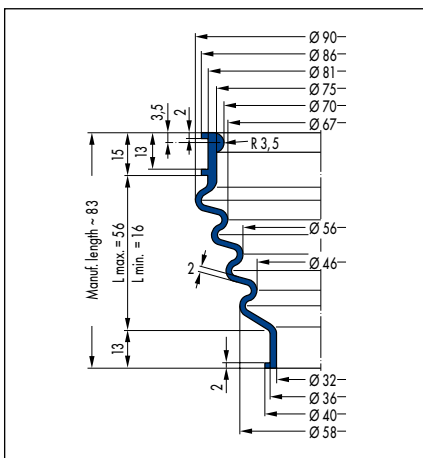
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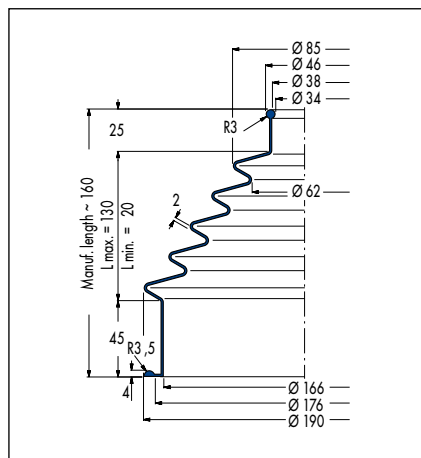
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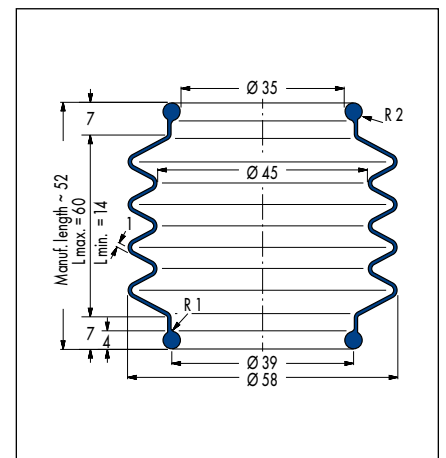
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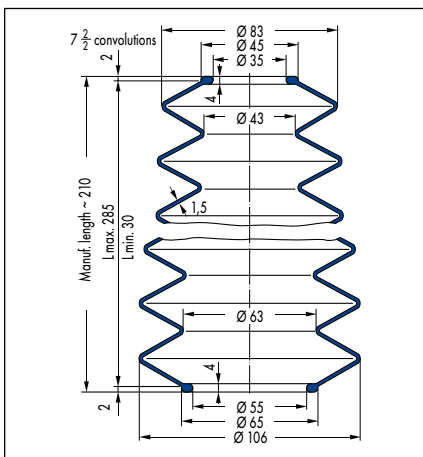
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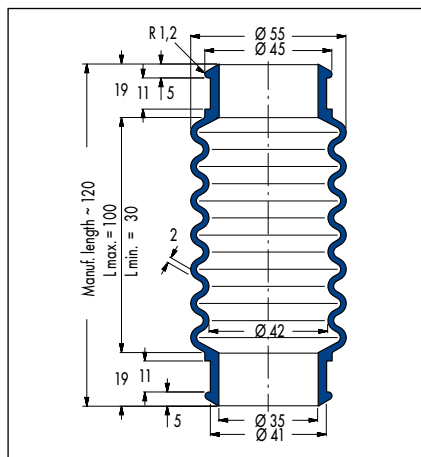
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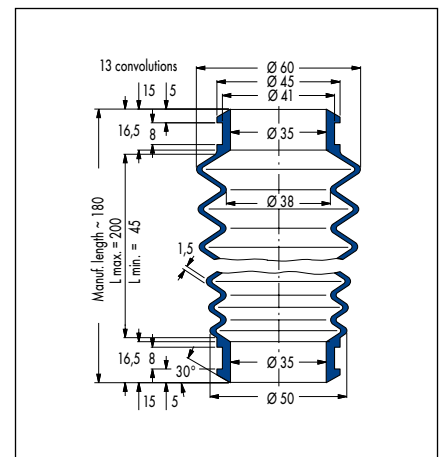
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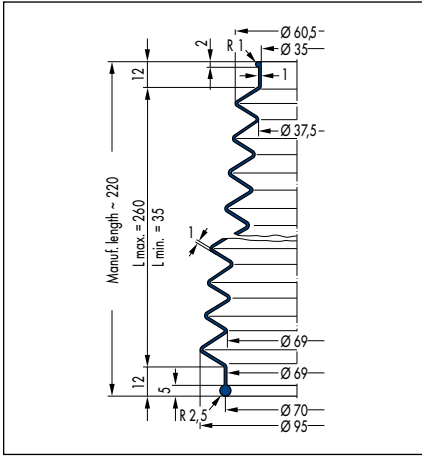
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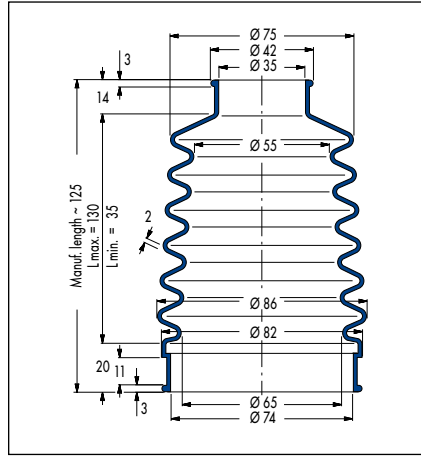
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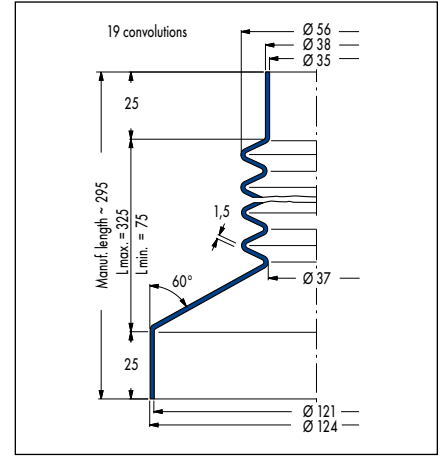
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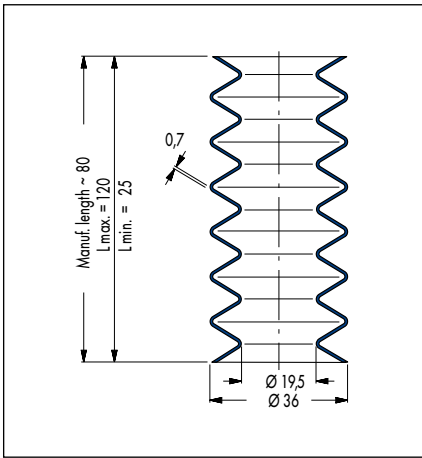
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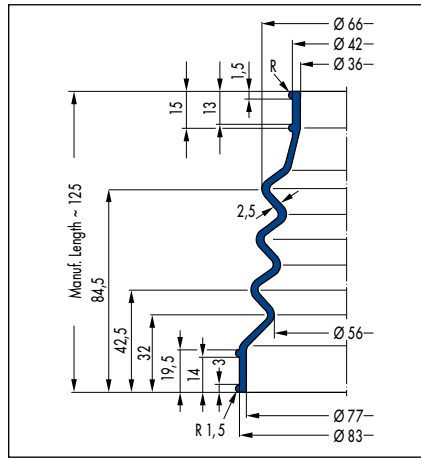
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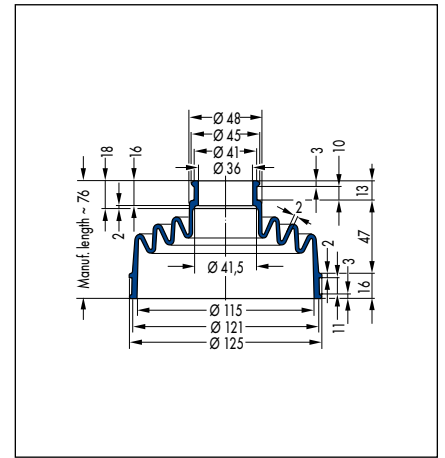
V6-00117, Article No. 29288



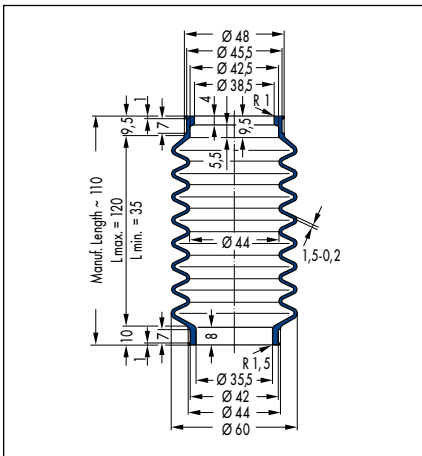
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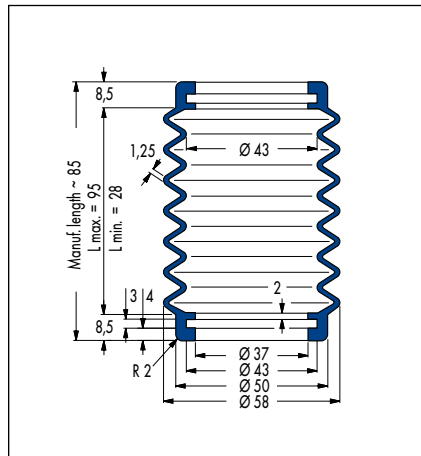
V6-01449, Article No. 152544



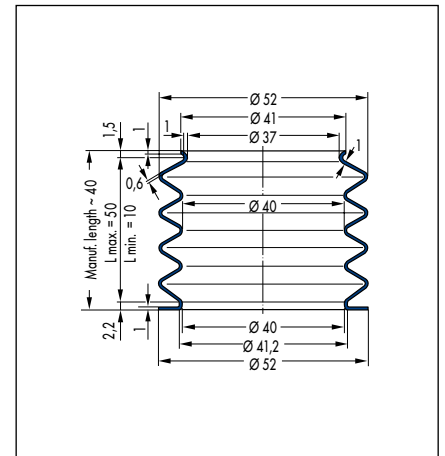
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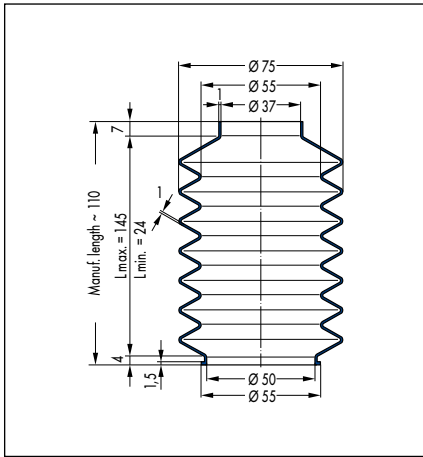
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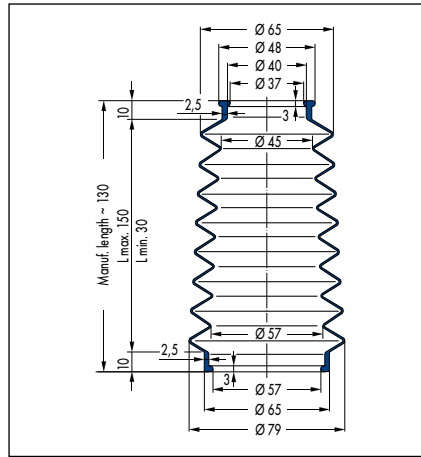
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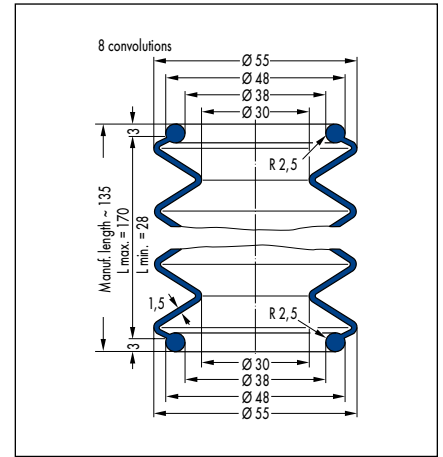
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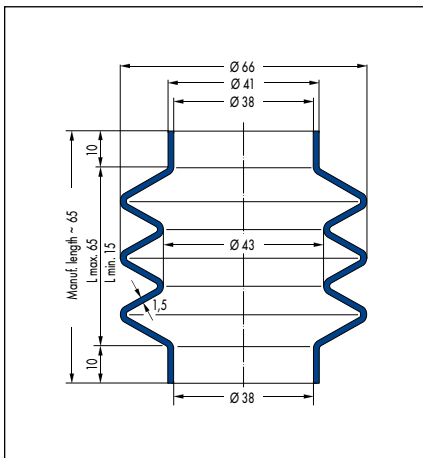
V6-00790, Article No. 29965



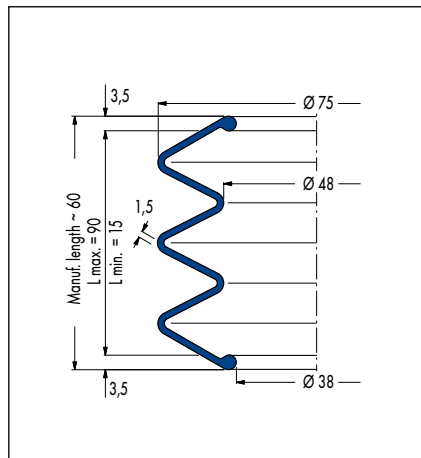
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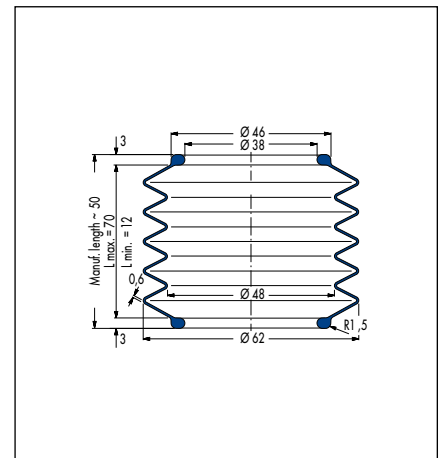
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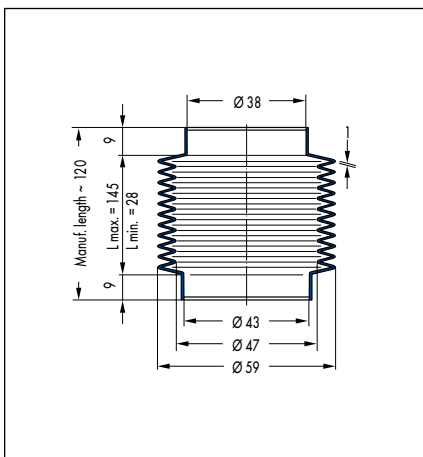
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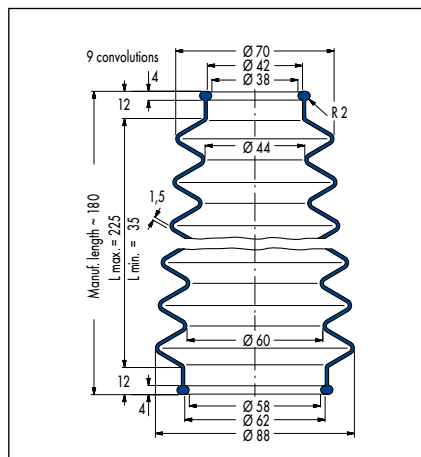
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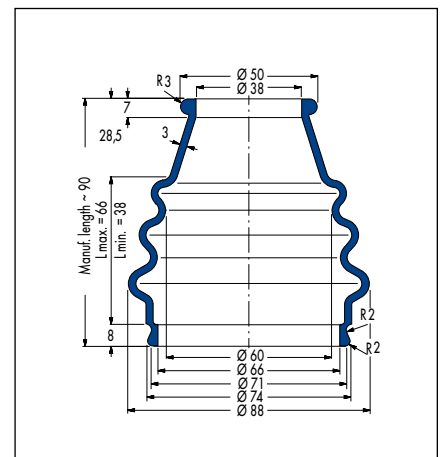
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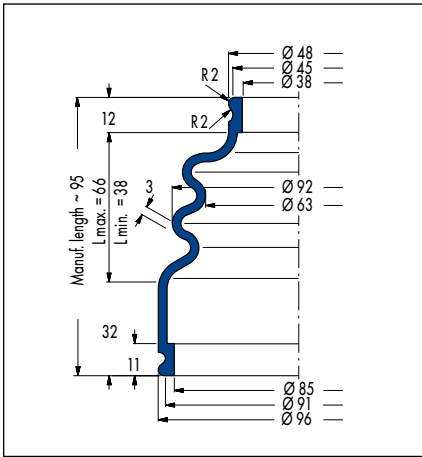
V6-00230, Article No. 439434



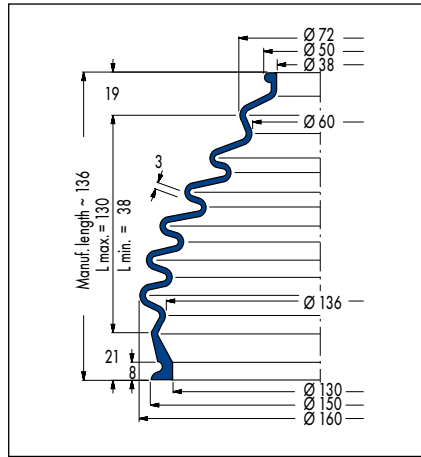
V6-00619, Article No. 431955 (CR)/  
431957 (NBR)



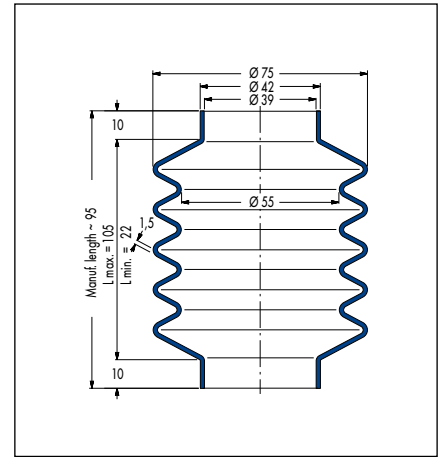
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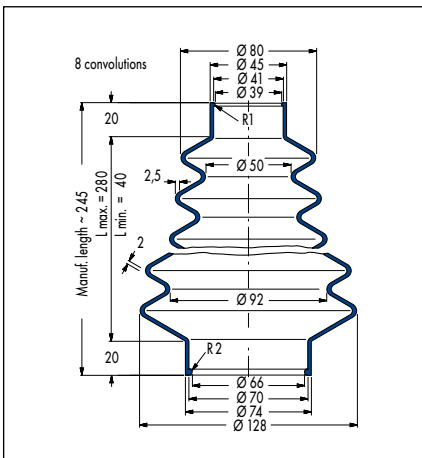
V6-00191, Article No. 428311



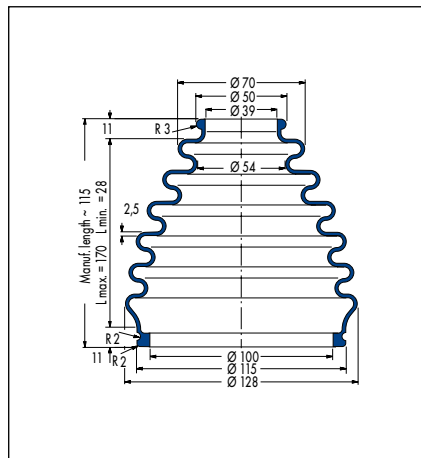
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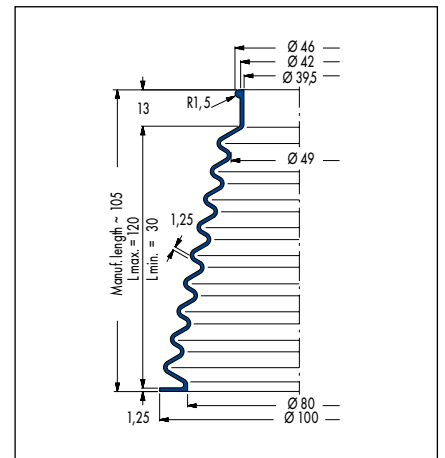
V6-00321, Article No. 429648



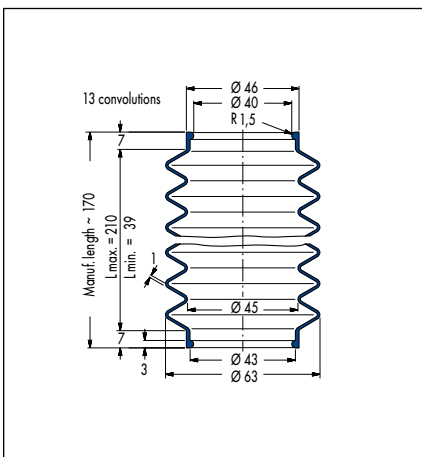
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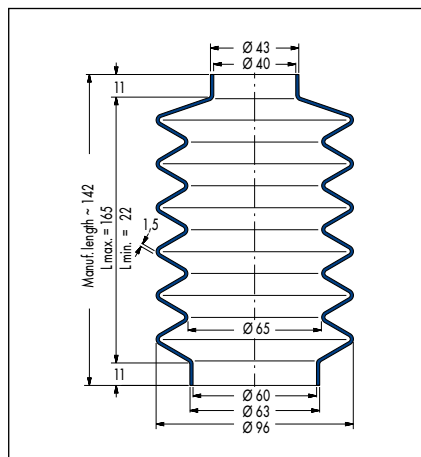
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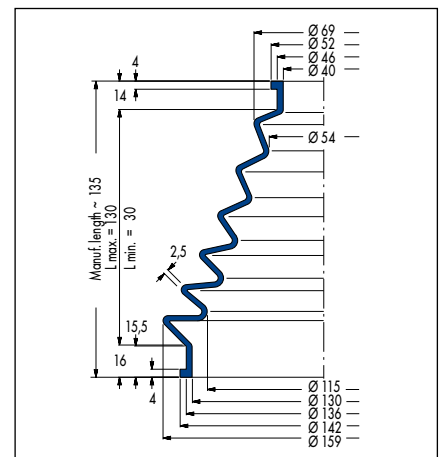
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V6-00801, Article No. 438557 (50 CR 879)/  
440760 (42 CR 764)

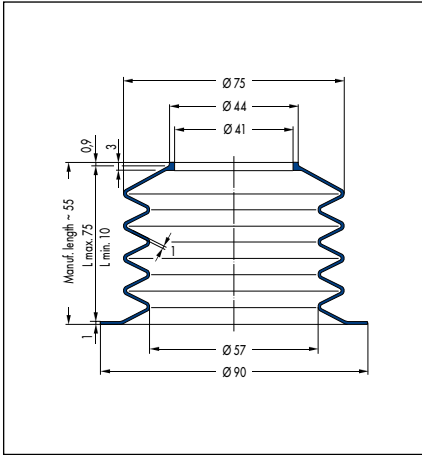


V6-00072, Article No. 434088

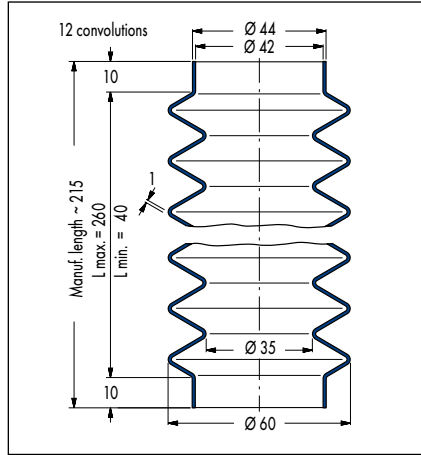


V6-00092, Article No. 434425

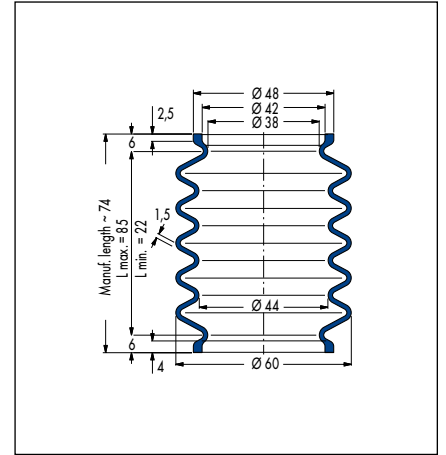




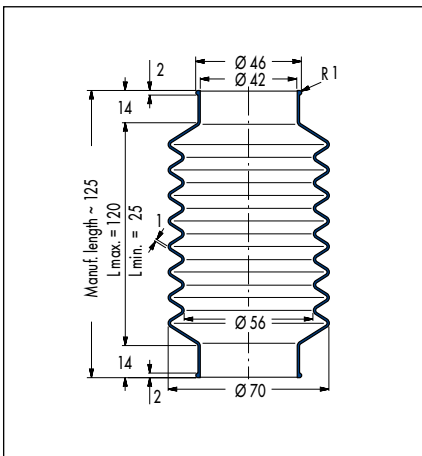
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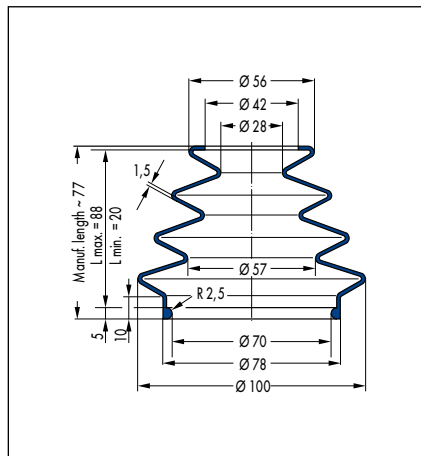
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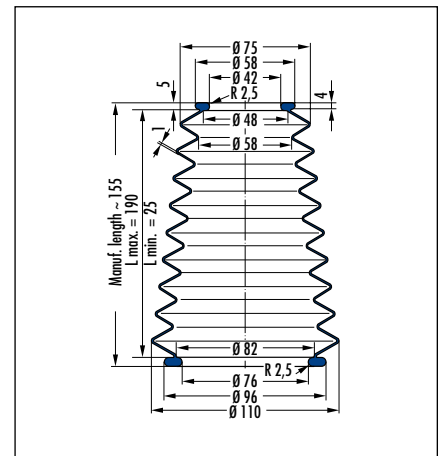
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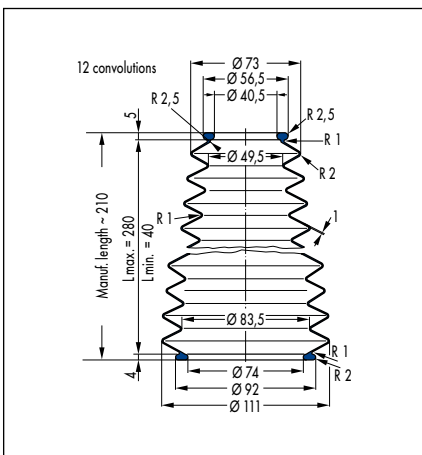
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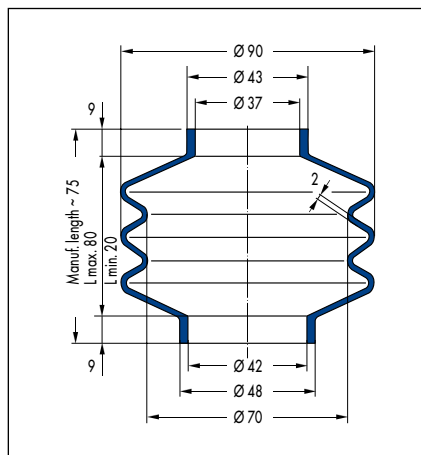
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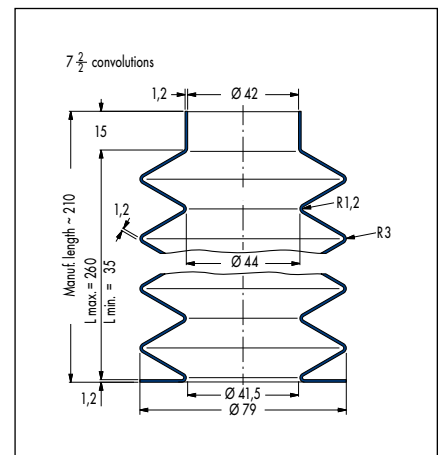
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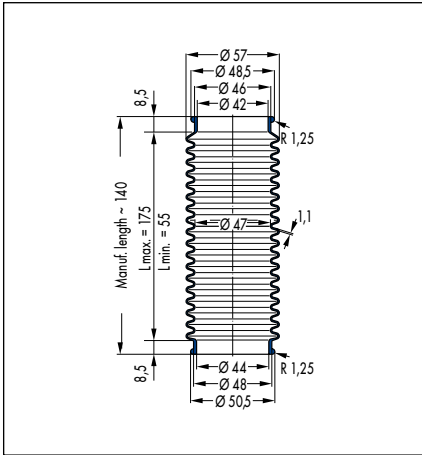
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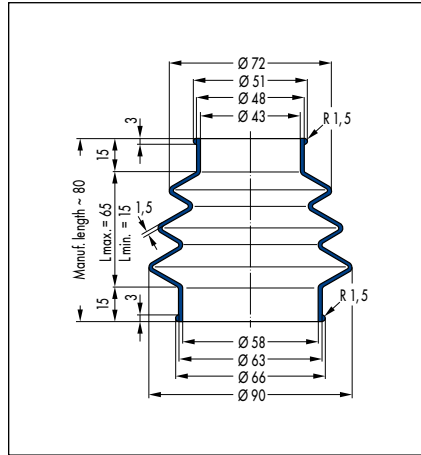
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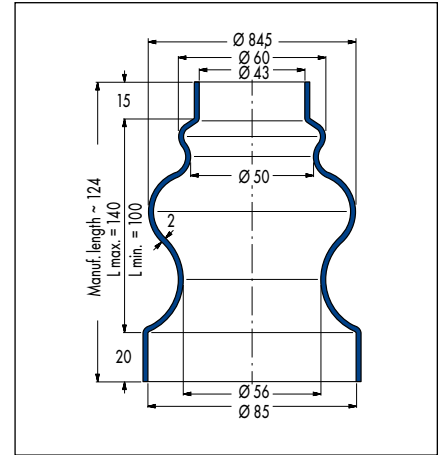
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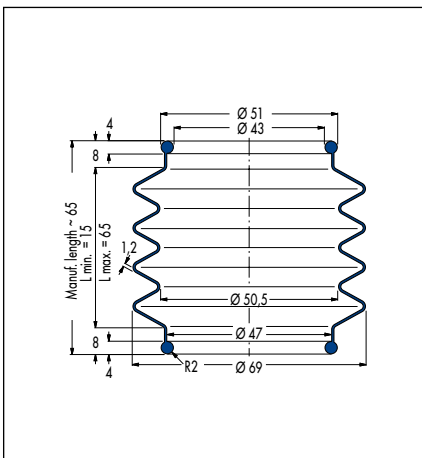
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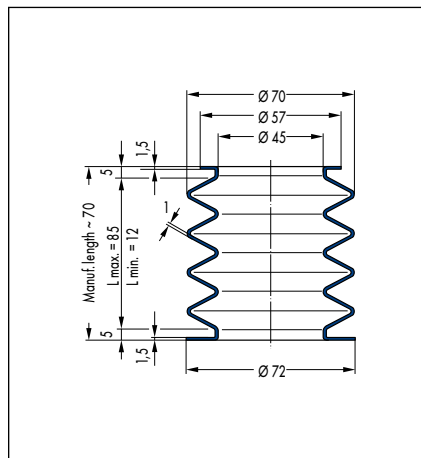
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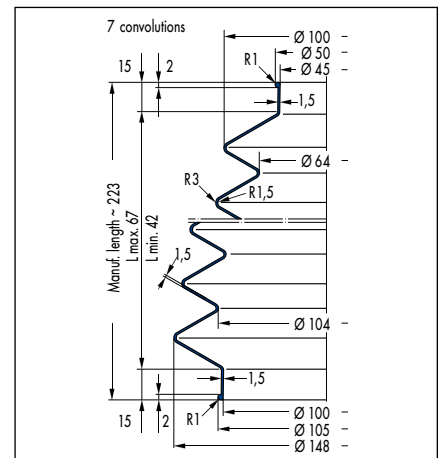
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60032051 (45 NBR 670)



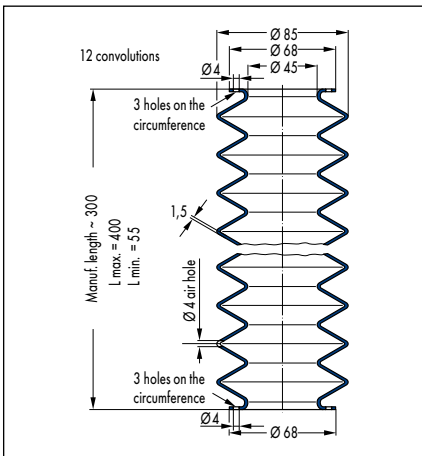
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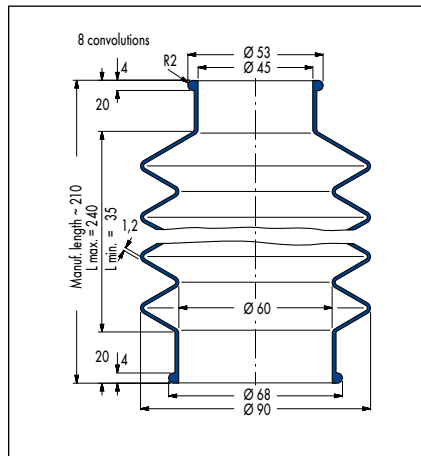
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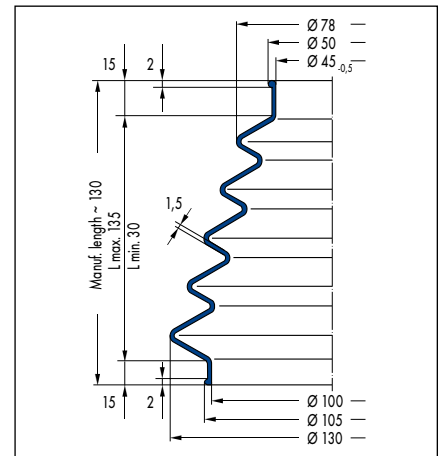
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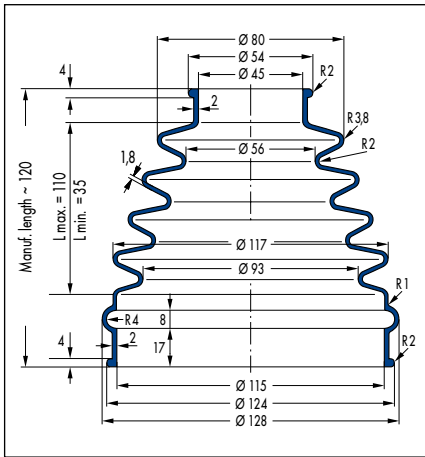
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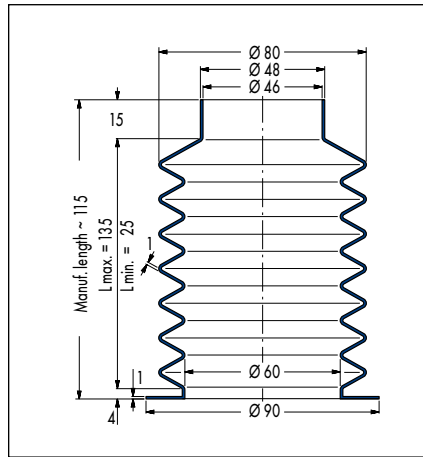
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439499 (50 CR 879)



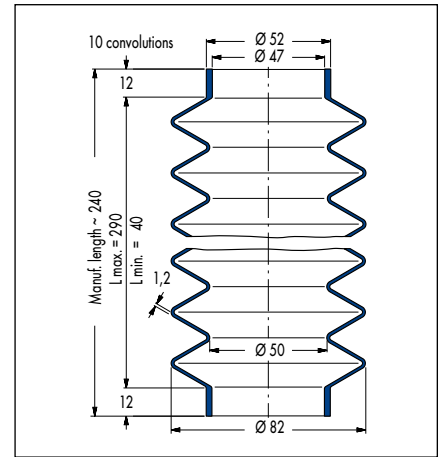
V6-01047, Article No. 454226



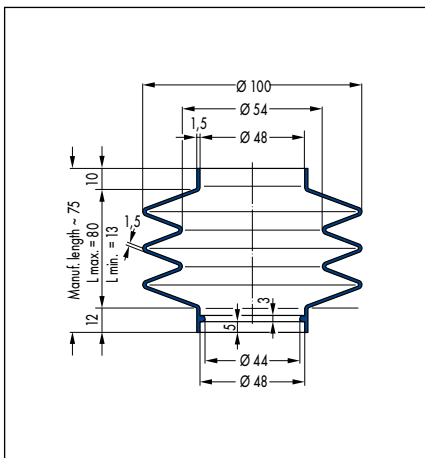
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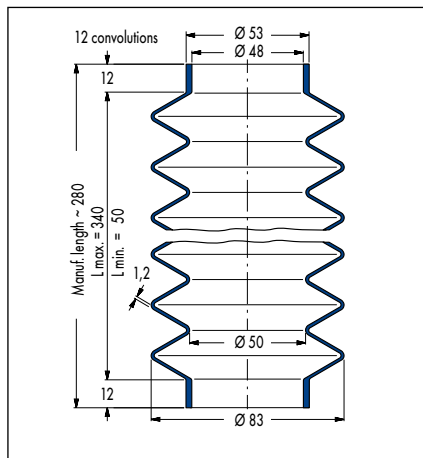
V6-00466, Article No. 430847



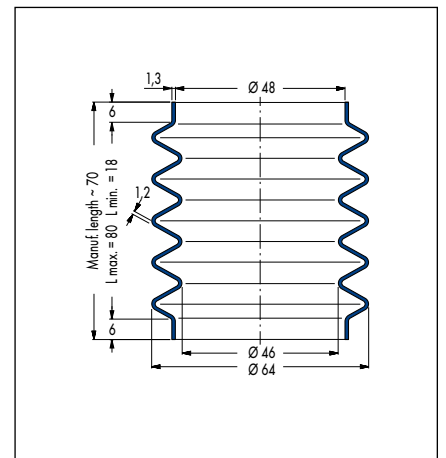
V6-01022, Article No. 49344567 (CR)/  
49344592 (NBR)



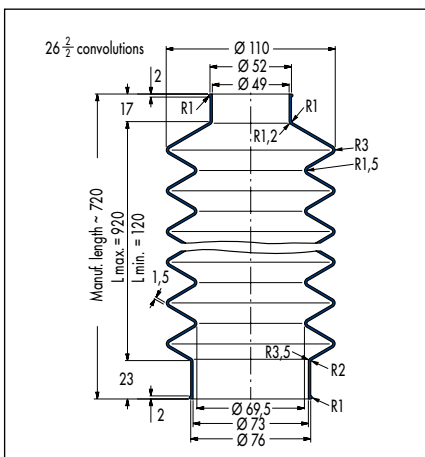
V6-01136, Article No. 425266



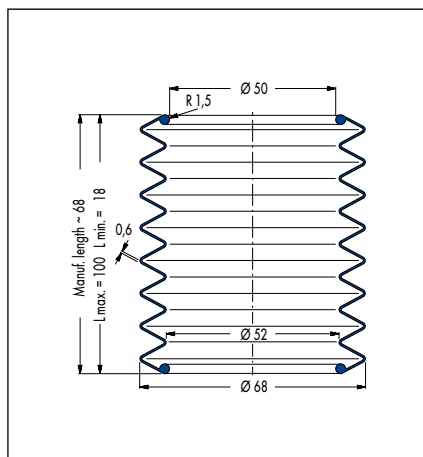
V6-01165, Article No. 454248



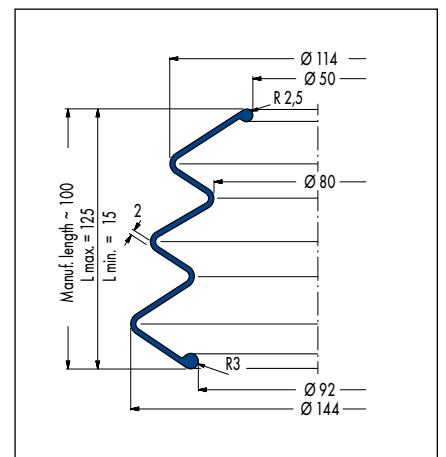
V6-00541, Article No. 25105



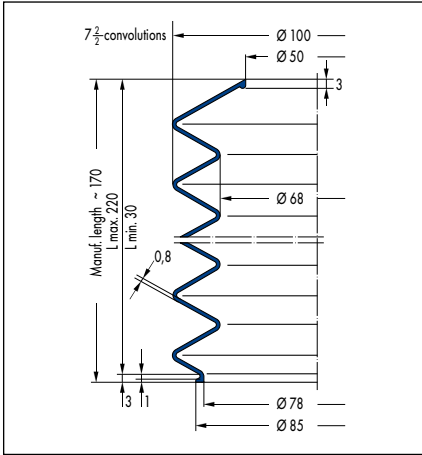
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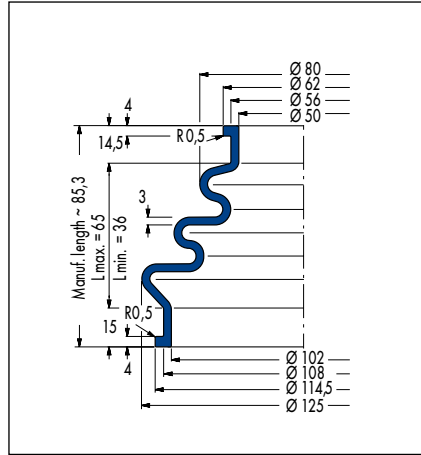
V6-00742, Article No. 426388



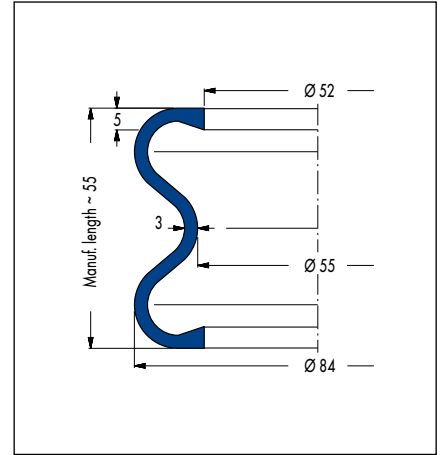
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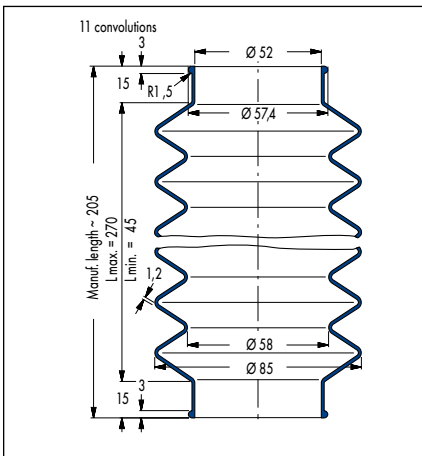
V6-01029, Article No. 20231



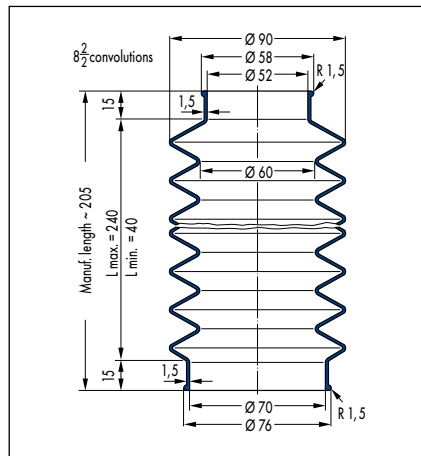
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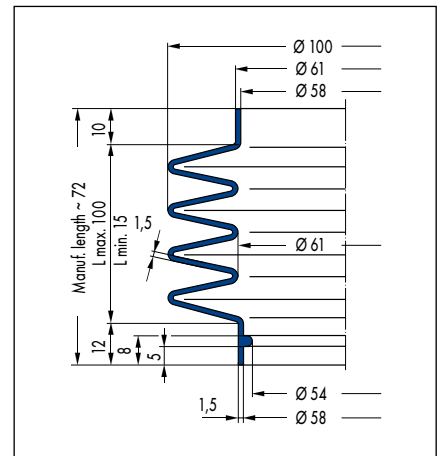
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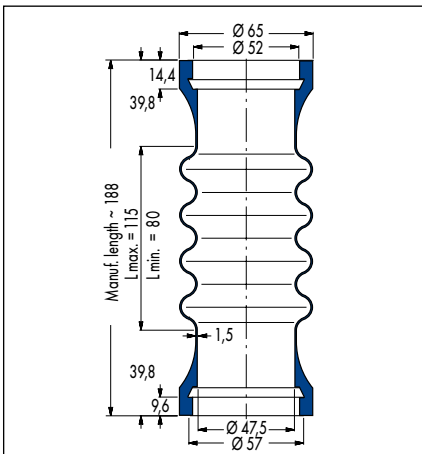
V6-00987, Article No. 49312666 (42 CR 764)/  
49312659 (50 CR 879)



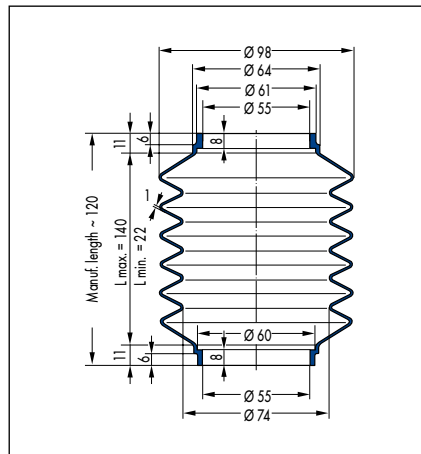
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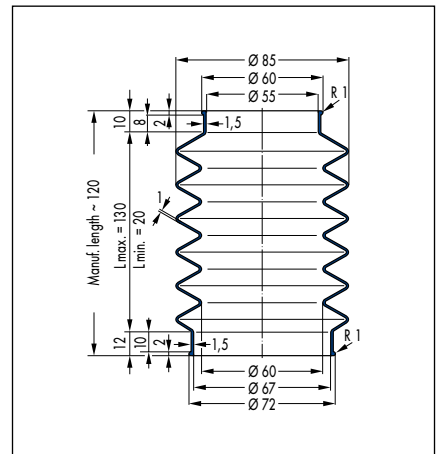
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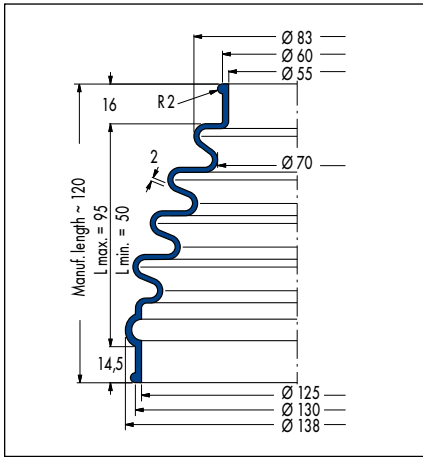
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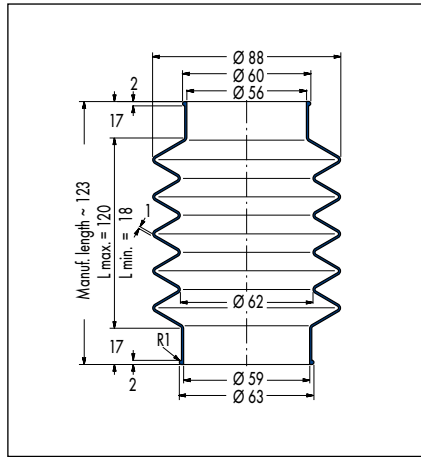
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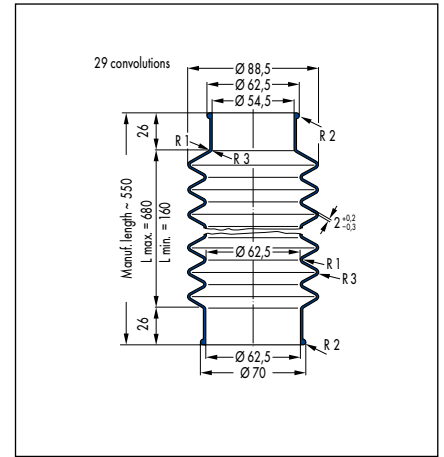
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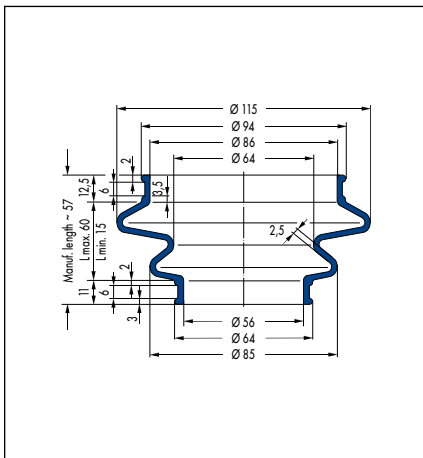
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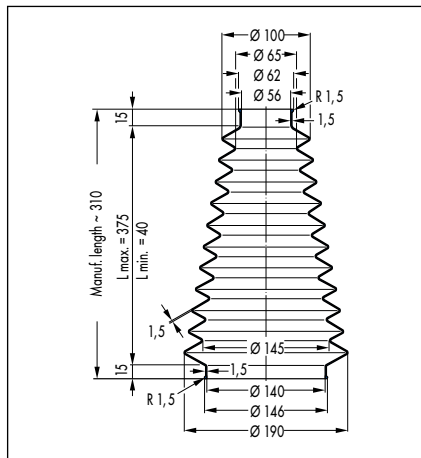
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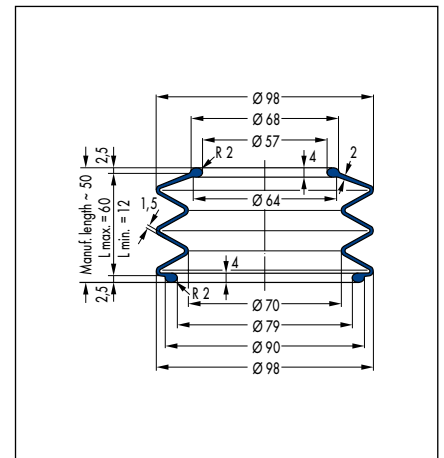
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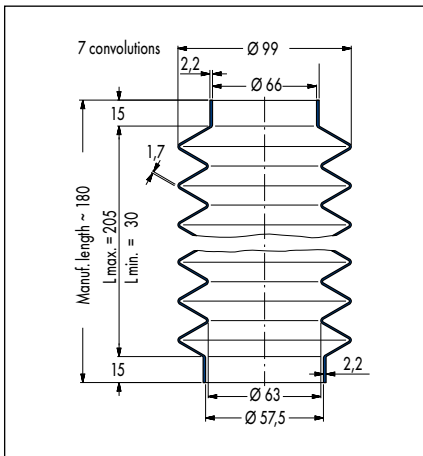
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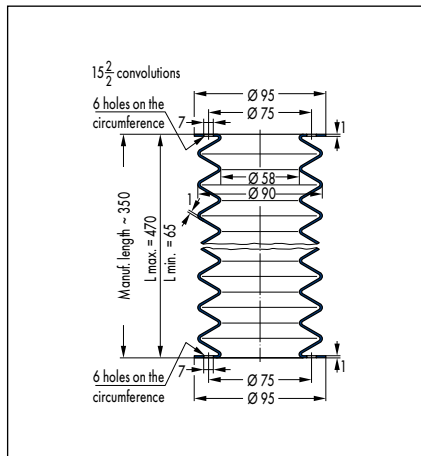
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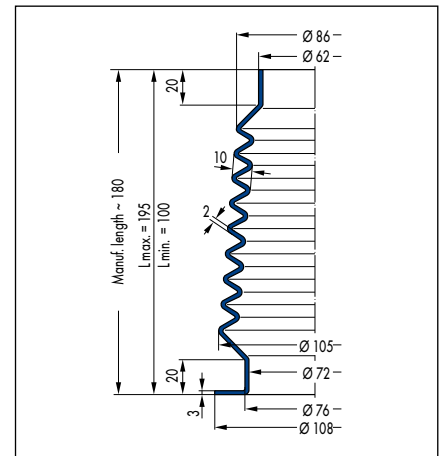
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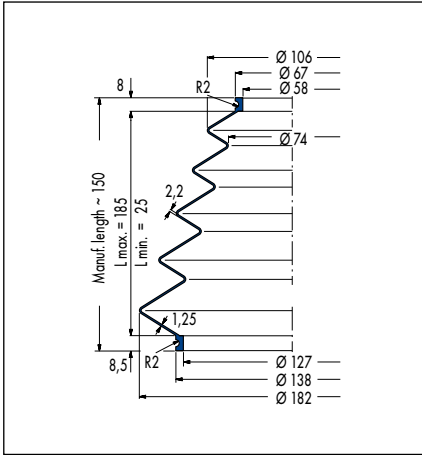
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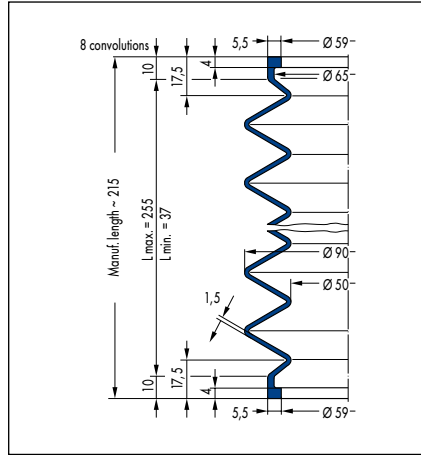
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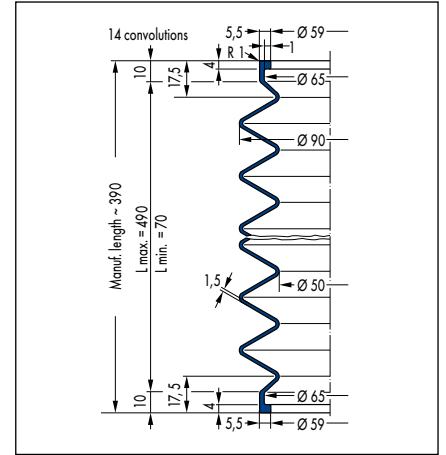
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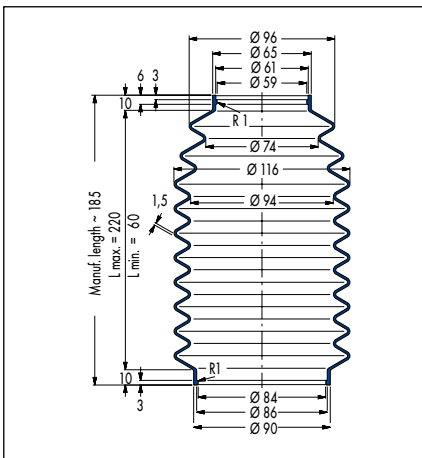
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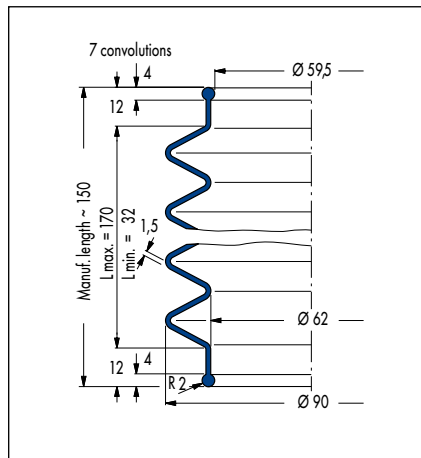
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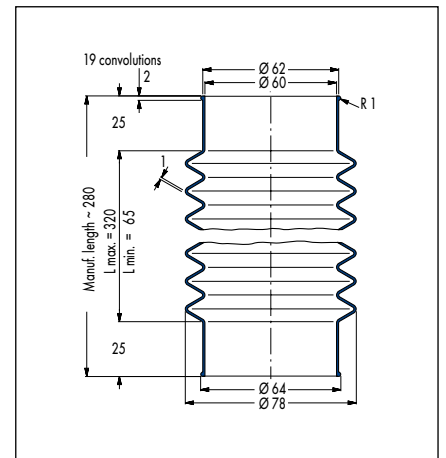
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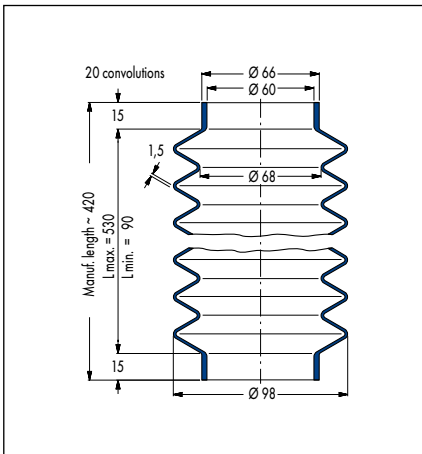
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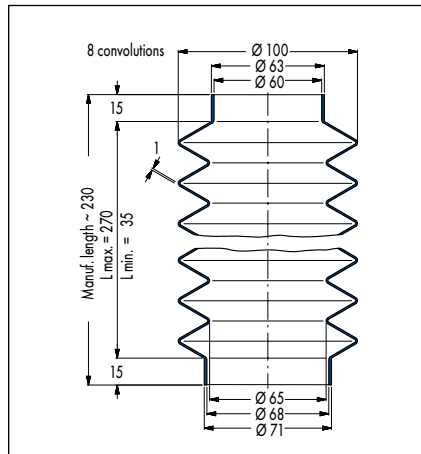
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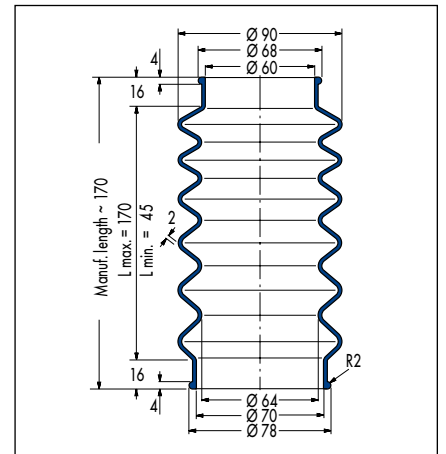
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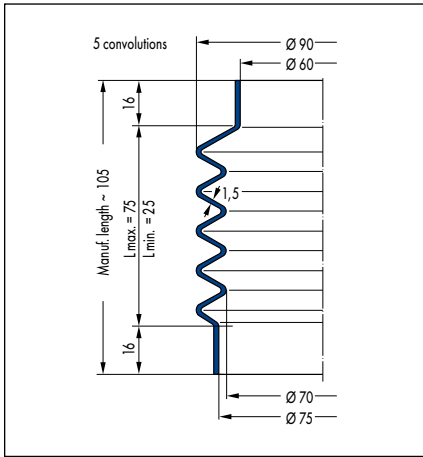
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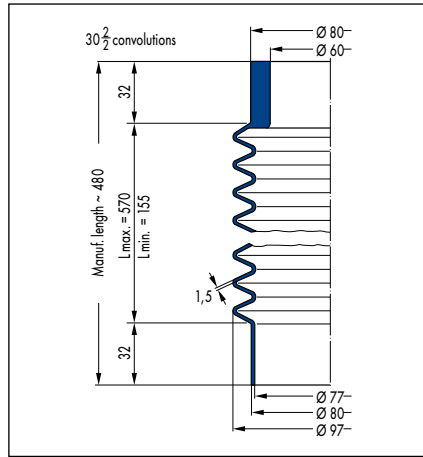
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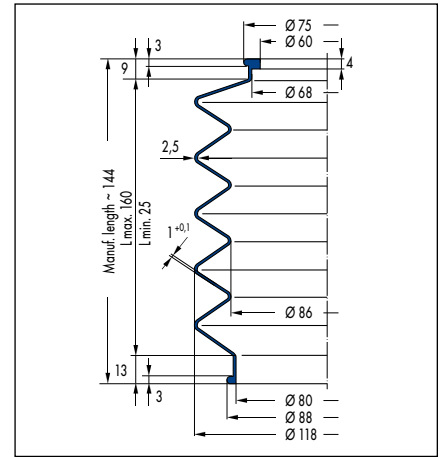
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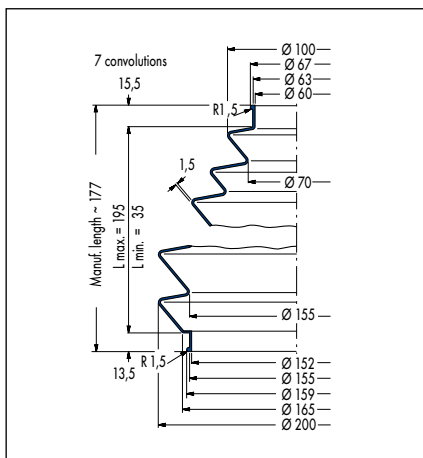
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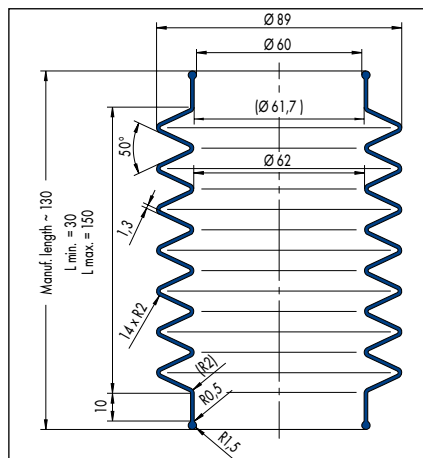
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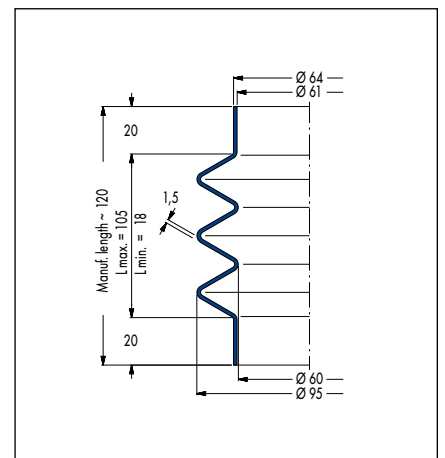
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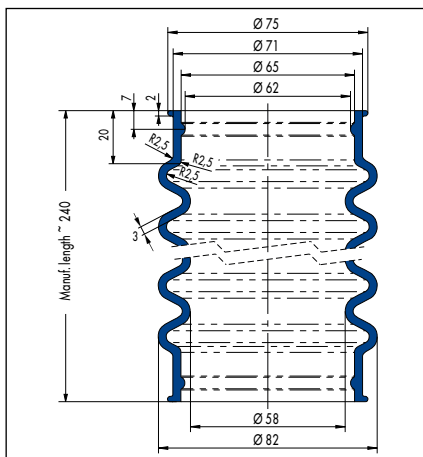
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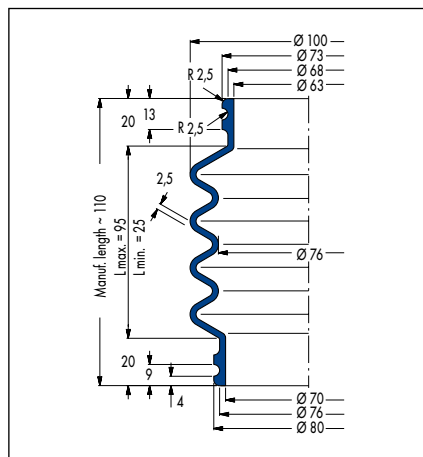
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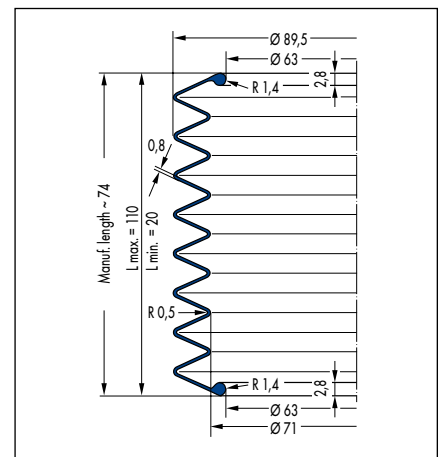
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434092 (CR)



V6-20082, Article No. 49469781



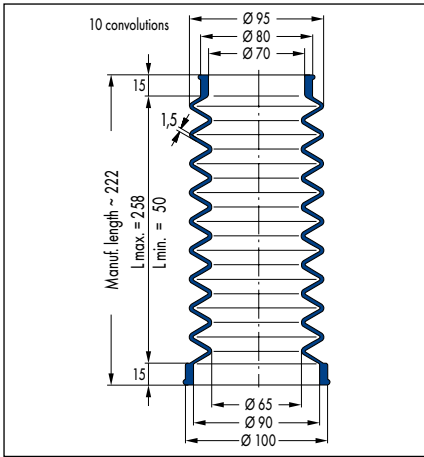
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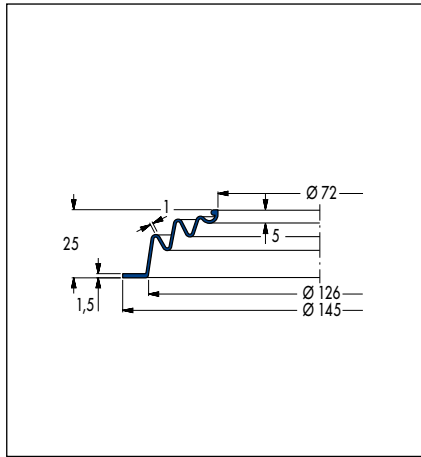
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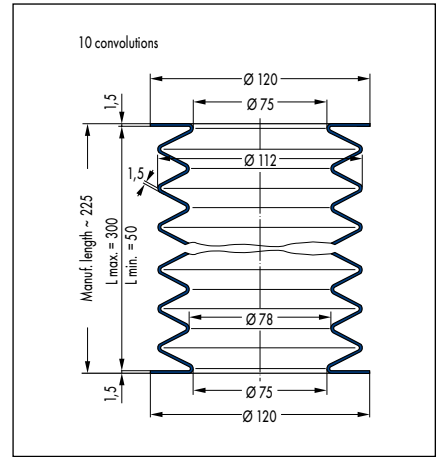




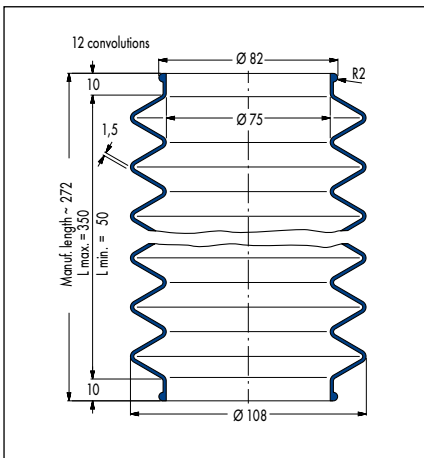
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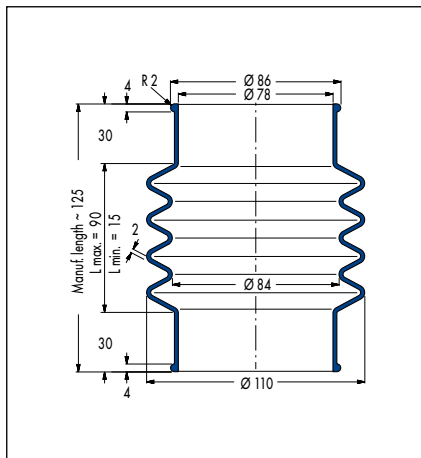
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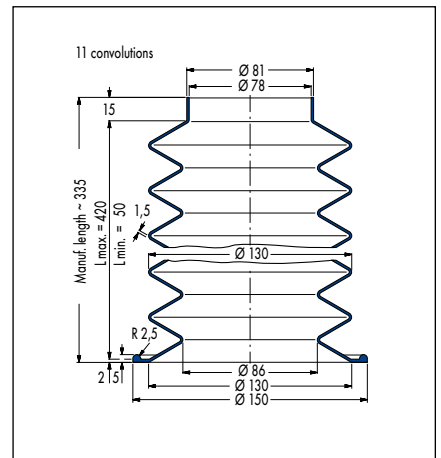
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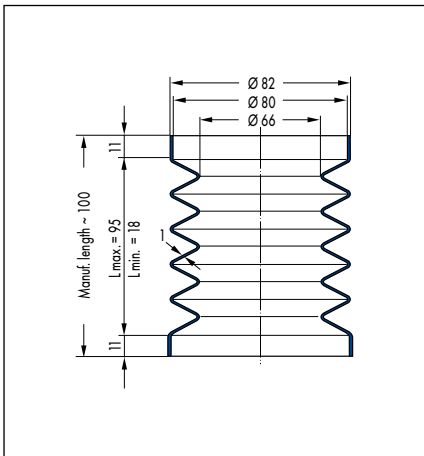
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440342 (NBR)



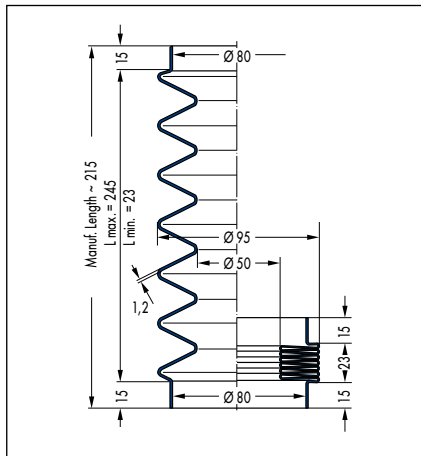
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438946 (42 CR 764)



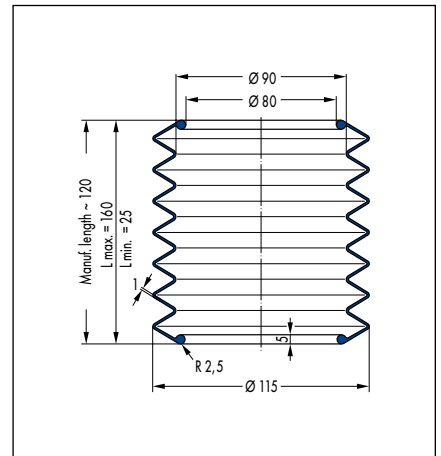
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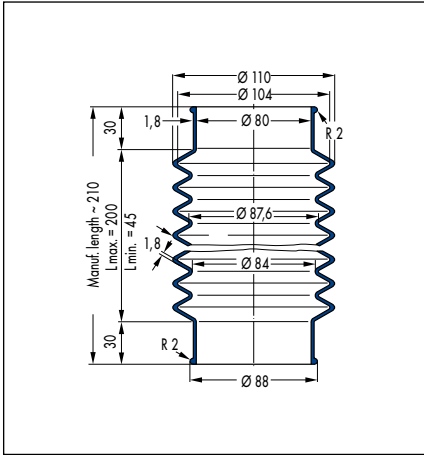
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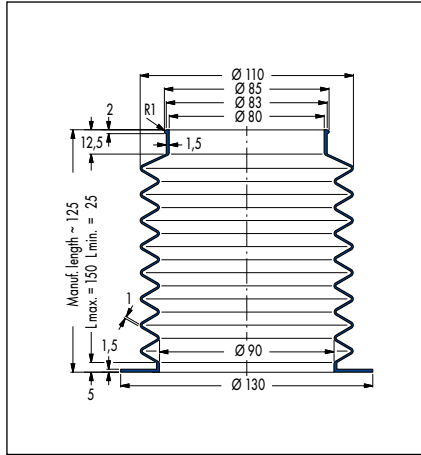
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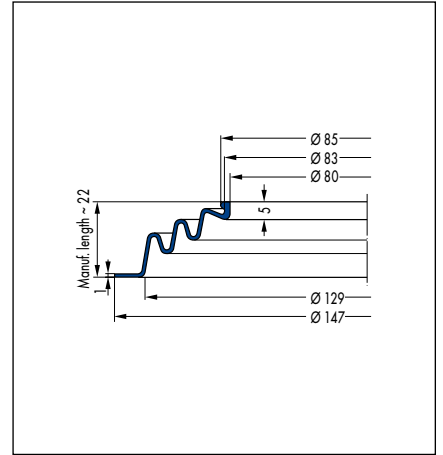
V6-01079, Article No. 454232



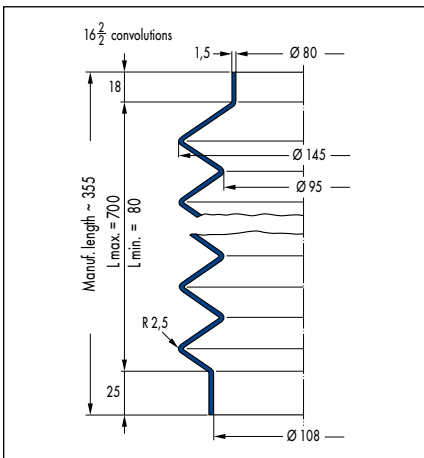
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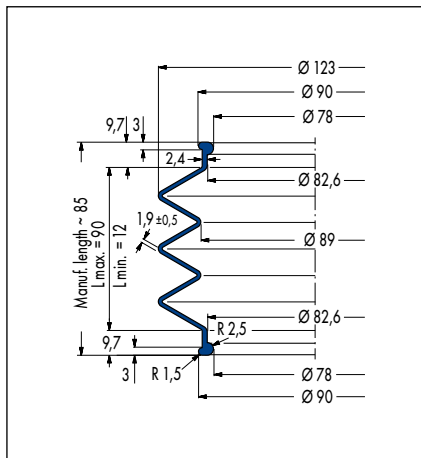
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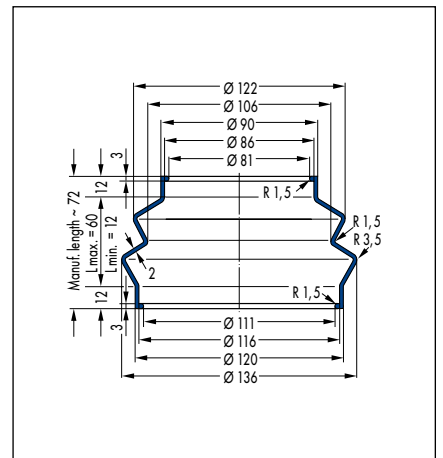
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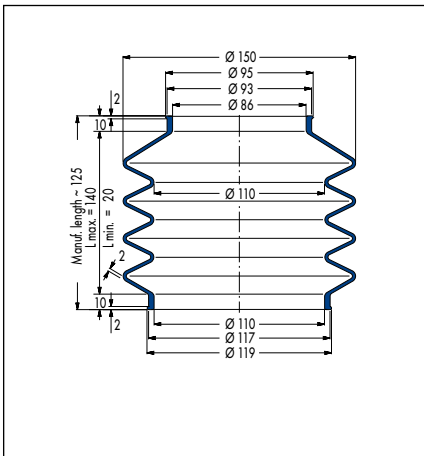
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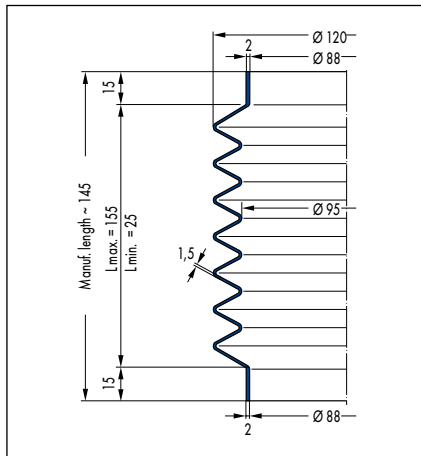
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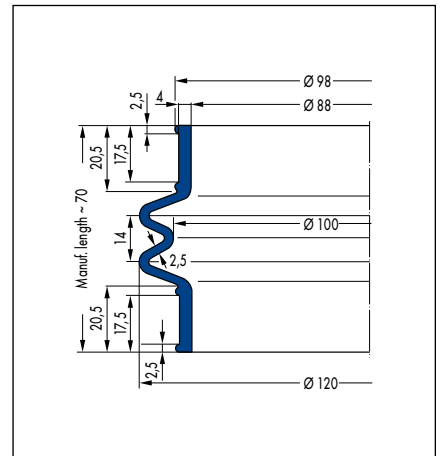
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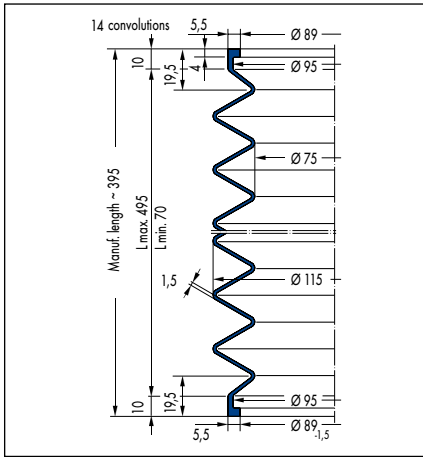
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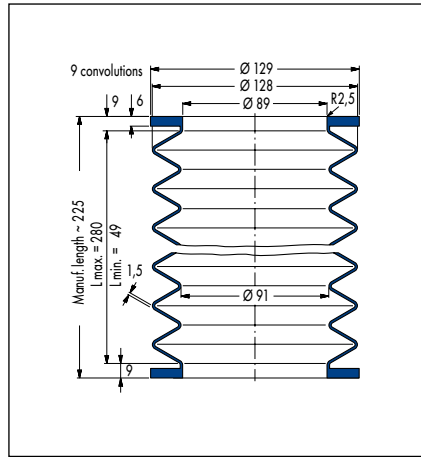
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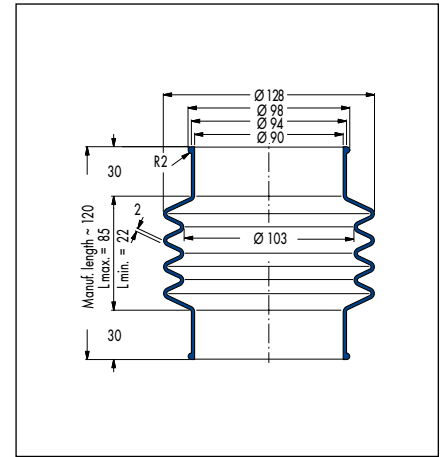
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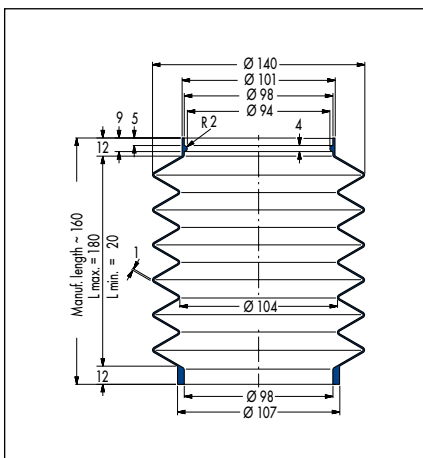
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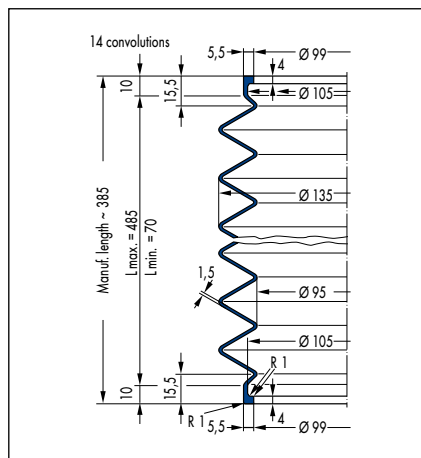
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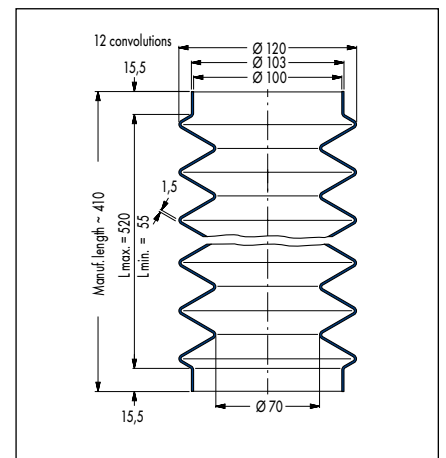
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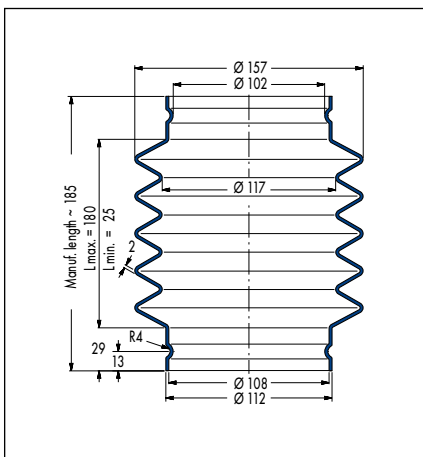
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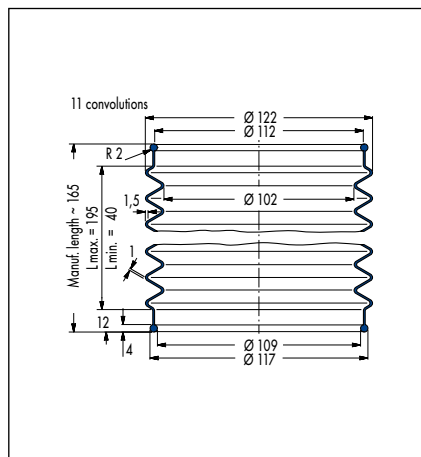
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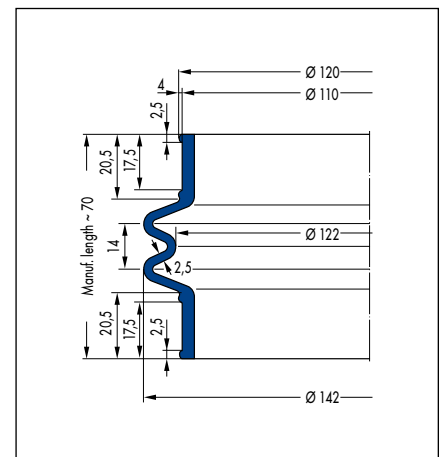
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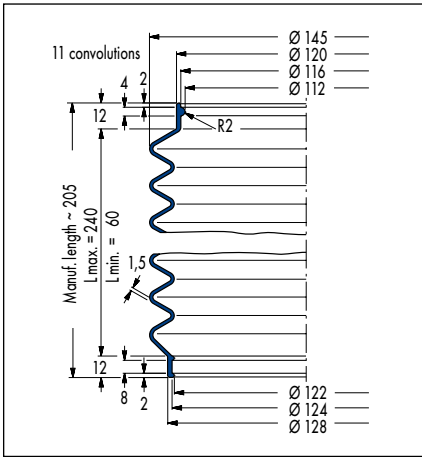
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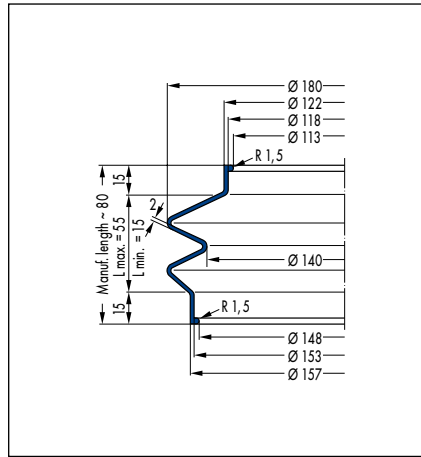
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49040057 (NBR)



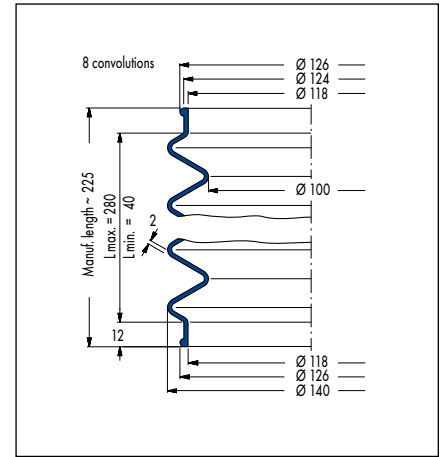
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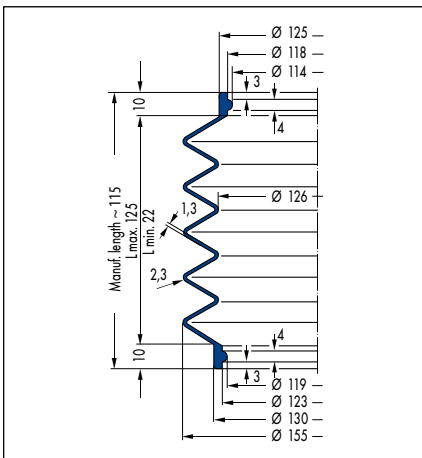
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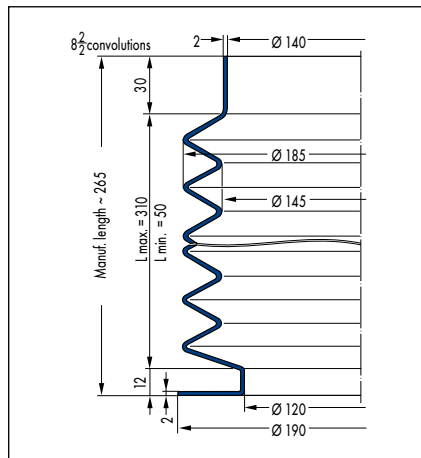
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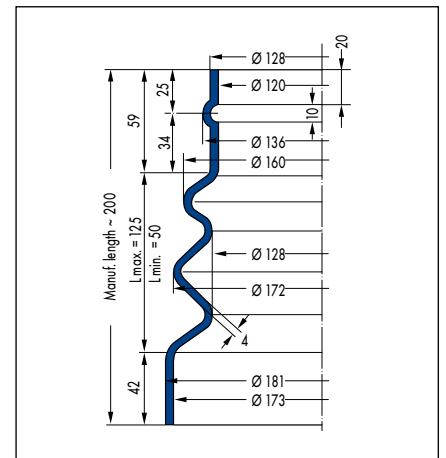
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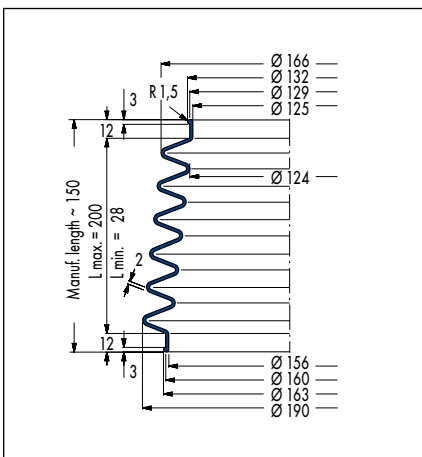
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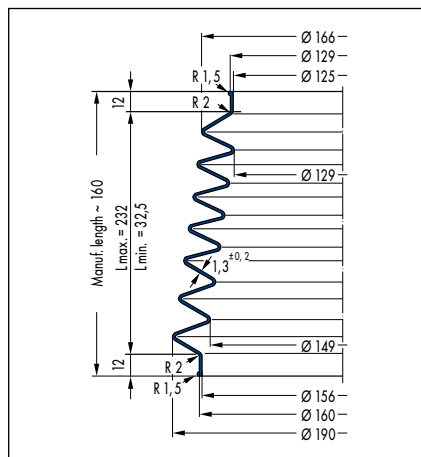
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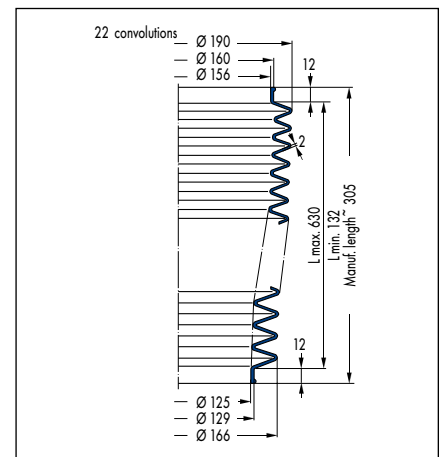
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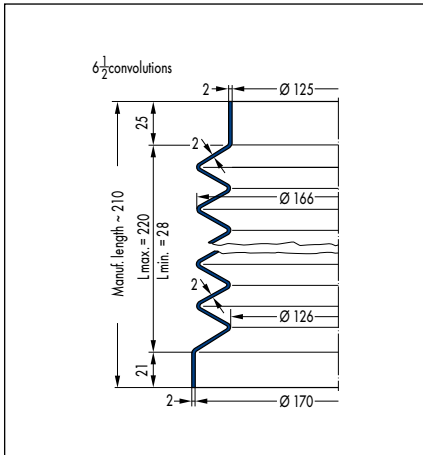
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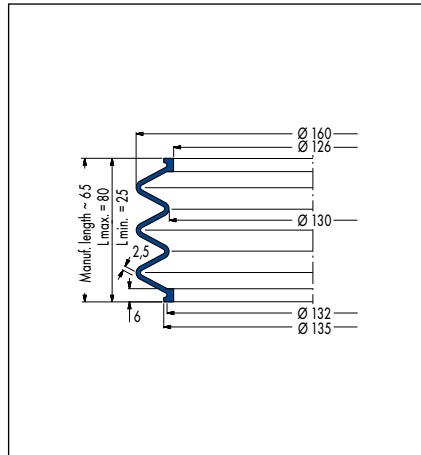
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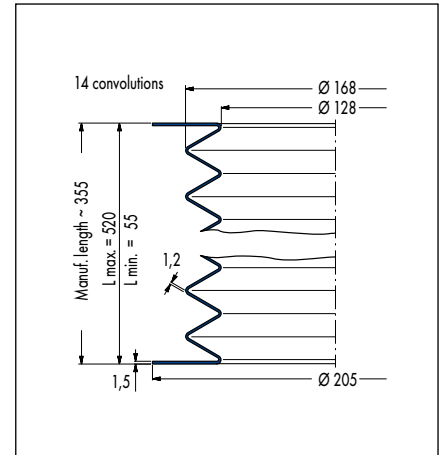
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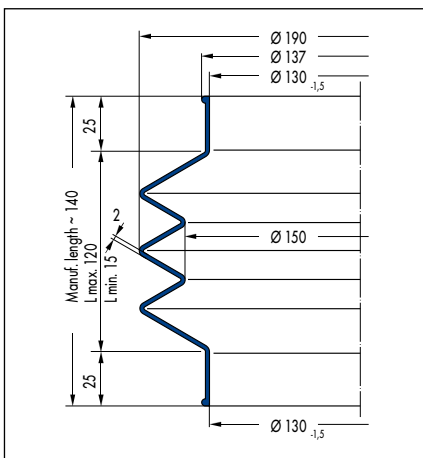
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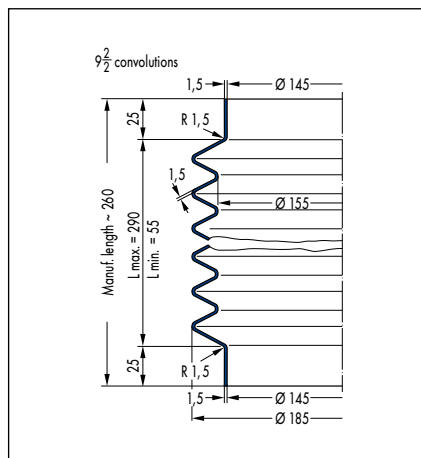
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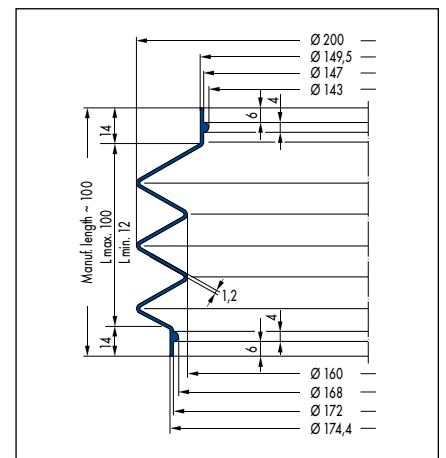
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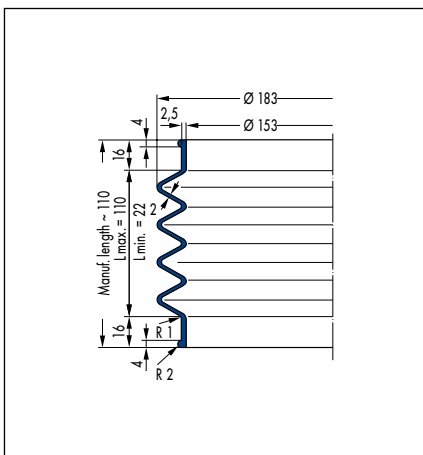
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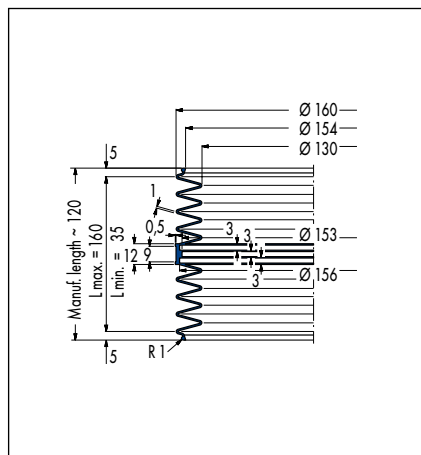
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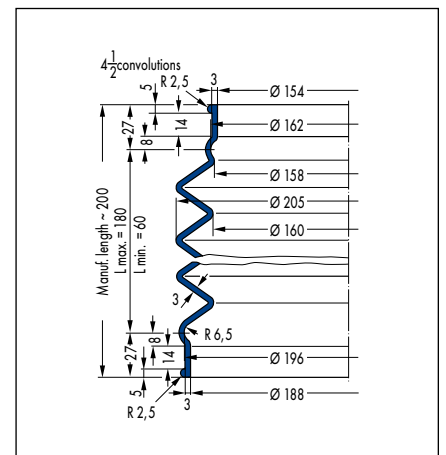
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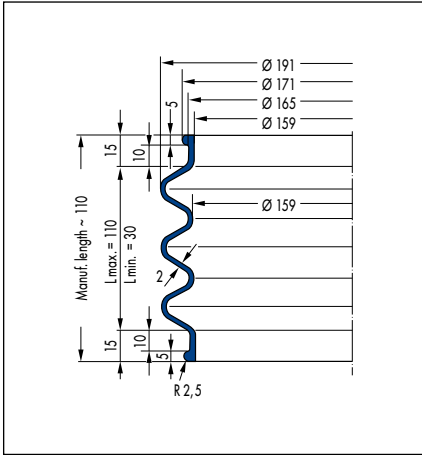
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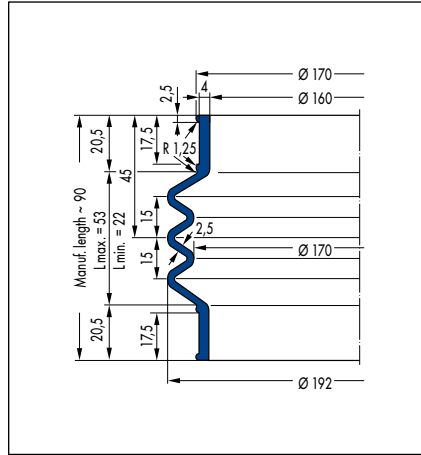
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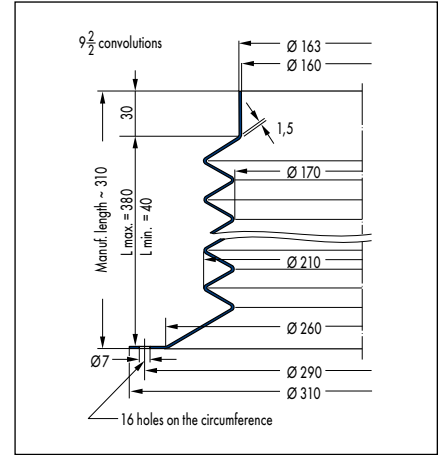
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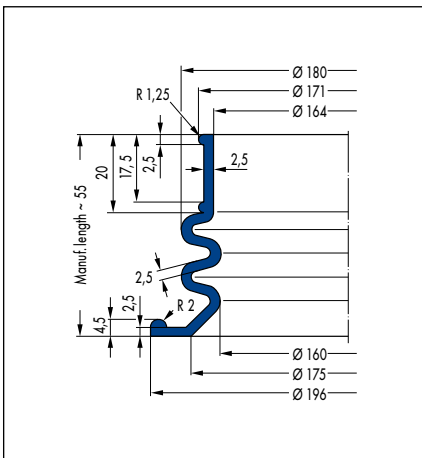
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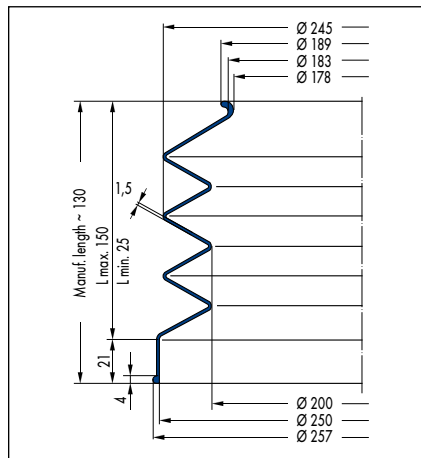
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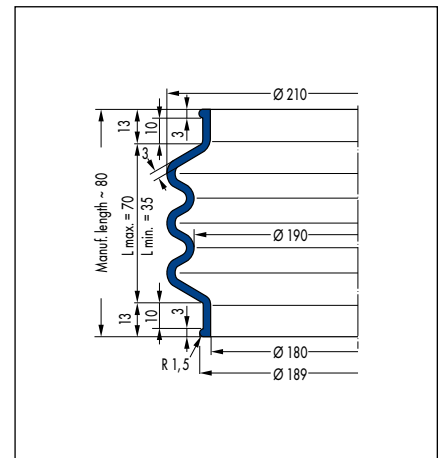
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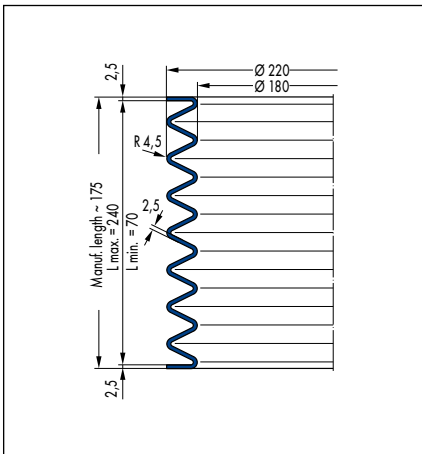
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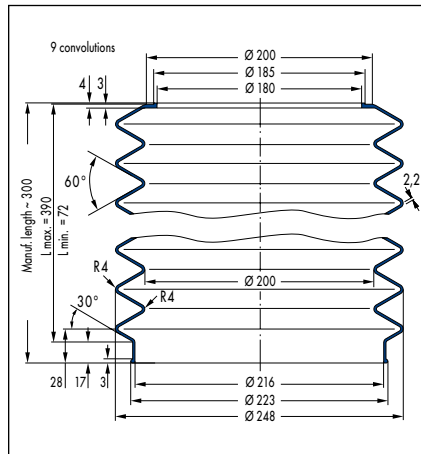
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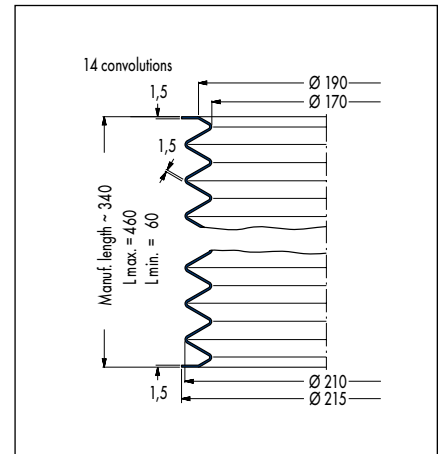
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60028128 (50 CR 879)



V6-00345, Article No. 325185 (CR)/  
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V6-01474, Article No. 49365010



V6-00767, Article No. 36413

