PNEUMATIC ACTUATORS

Product Index

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Isoclair round cylinders	Ø 8 to 25 mm - ISO 6432/CETOP/AFNOR	C/AS		435	P220-1
	Ø 32 to 63 mm - ISO 6431/CETOP	CIS		438	P225-1
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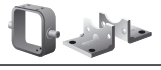
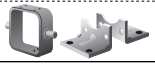
PNEUMATIC ACTUATORS

Selection of equipment

standards	model: single acting: Rod returned at rest	model: single acting: Rod out at rest	model: double acting: Non-cushioned	model: double acting: Elastic cushioning	model: double acting: Adjust. pneumatic cushioning	construction: Cylinder	construction: Tie rods	construction: Profiled barrel	construction: Through-rod	construction: Rotation-proof	Ø (mm) min.	Ø (mm) max.	standard stroke min.	standard stroke max.	detection: Equipped for position detection (1)	type	illustration	série	page
Micro-cylinders																			
	●		●			●					2,5	6	5	25		Micro 10		435	P205-1
Panel cylinders																			
	●		●			●					6	16	5	15		E		429	P210-1
Isoclair round cylinders																			
ISO 6432 CETOP AFNOR NF E 49030	●	●		●	●	●			●		8	25	25	160	●	C-AS C-A		435	P220-1
ISO 6431 CETOP	●			●	●	●					32	63	25	500	●	CIS		438	P225-1
Short-stroke cylinders																			
	●		●					●			8	100	4	100	●	K		441	P215-1
								●	●		8	100	4	130	●	K		441	P215-8
								●		●	20	100	5	100	●	K		441	P215-9
								●			8	100				K	spare parts	441	P215-11
Compact cylinders according to ISO 21287 standard																			
ISO 21287								●								PEC	ISO 21287 standard PEC range	449	P200-8
	●	●	●					●	●		20	100	5	400	●	PEC		449	P226-3
								●		●	20	100	5	400	●	PEC		449	P226-5
								●			20	100			●	PEC	spare parts	449	P226-7
		●						●			20	80	15	40	●	CSC		CSC	P226B-3
ISO 15552	Mountings according to ISO15552 standard							●			20	100						434	P226-8

(1) Magnetic position detectors, see page 5

standards	model: single acting: Rod returned at rest	model: single acting: Rod out at rest	model: double acting: Non-cushioned	model: double acting: Elastic cushioning	model: double acting: Adjust. pneumatic cushioning	construction: Cylinder	construction: Tie rods	construction: Profiled barrel	construction: Through-rod	construction: Rotation-proof	Ø (mm) min.	Ø (mm) max.	standard stroke min.	standard stroke max.	detection: Equipped for position detection (1)	type	illustration	series	page
Cylinders according to ISO 15552 standard																			
ISO15552 AFNOR ISO 15552 DIN ISO 15552							●	●								PES PLS	ISO 15552 standard PES range	450 453	P200-7
							●				32	250	25	1000	●	PES		450	P229-5
								●			32	100	25	1000	●	PLS	new 	452	P229-9
								●			32	100	25	1000	●	PES		453	P229-15
								●			32	100			●	PES	spare parts	453	P229-17
	Options and special versions of ISO 15552 cylinders						●	●			32	200	25	2000	●	PES		450 453	P239-1
							●				32	200	25	600	●	PES		450	P239-3
							●				32	250			●	PES	spare parts	450	P229-7
	Guiding units for ISO 15552 cylinders						●	●			32	100	50	500		U		010	P239-4
																H		881	P239-7
	Rod lock for ISO 15552 cylinders						●	●			32	100	50	600		static		463	P239-11
											40	100	50	600		dynamic		450 453	P239-17
							●				32	80	25	630	●	PES Ω		450	P239-22
								●									according with slow and quick speed	453	P239-23
							●	●			32	80			●	PES Ω	spare parts	450 453	P239-25
	Mountings according to ISO15552 standard						●	●			20	200						434	P229-18
Cylinders according to ISO 6431 standard																			
ISO6431 CETOP							●				-	250	50	1000	●	PIS		436	P243-1
Cylinders																			
CNOMO AFNOR NF E 49001							●				25	200	50	1000	●	PCN		437	P245-1
							●				25	200			●	PCN	spare parts	437	P245-9
Anti-corrosive cylinders																			
ISO 6432 CETOP AFNOR NF E 49030						●					12	25	25	160	●	CIX		435	P252-1
ISO 6431						●					32	80	25	1000	●	CIX	new 	435	P255-1
DIN ISO15552						●					32	125	25	500	●	E-F G-H	new 	S	P257-1

(1) Magnetic position detectors, see page 5

standards	model: double acting: Non-cushioned	model: double acting: Elastic cushioning	model: double acting: Adjust. pneumatic cushioning	model: guide: Without	model: guide: Ball bearings	model: guide: Plain bearings	model: guide: Cross rollers	model: construction: Round cylinder	model: construction: Profiled barrel	model: construction: Rotation-proof	model: construction: Rodless	model: construction: Rotatable	Ø (mm) min.	Ø (mm) max.	standard stroke min.	standard stroke max.	detection: Equipped for position detection	type	illustration	series	page
Rodless cylinders																					
		●	●	●		●	●				●		6	80			●		selection chart		P259-1
Rodless cylinders with magnetic couplings																					
				●							●		6	40	50	2000	●	STN		445	P260-3
						●					●		6	40	50	1500	●	STG		445	P260-9
Rodless band cylinders																					
				●							●		16	80	5	6000	●	STBN		448	P267-4
						●					●		25	63	100	3800	●	STB		446	P265-2
						●					●		16	80	5	5500	●	STB		448	P267-9
							●				●		25	50	5	3750	●	STBB		448	P267-19
																		STBN-STB-STBB	Position detectors for cylinder series 448	881	P267-31
Actuators with linear guides																					
					●	●			●				16	63	10	100	●	CGT		CGT	P272-2
					●	●			●				16	32	10	160	●	P2L-P2B		447	P275-4
Rotatable cylinders (90°-180°)																					
												●	12	20	-	-	● (1)	R (2 positions)		429	P285-1
												●	16	22	-	-	● (1)	RS (2, 3 and 4 positions)		429	P285-3

(1) Magnetic position detectors, see page 5

model: Reed-switch type - 2 wires	model: Magneto-resistive - 3 wires (MR)	model: Magneto-inductive	adaptation on cylinder type: Isoclair cylinders, types C/AS, CC/AS, CIS, CIB	adaptation on cylinder type: Profiled barrel with T slots, type PES, series 453	adaptation on cylinder type: Tie rods, type PES, series 450, type PCN	adaptation on cylinder type: Profiled barrel - dovetail grooves, short-stroke types K, KN, compact type PEC, ISO 15552, type PES, series 453, with linear guides, types P2L, P2B	illustration	series	page
Position detectors - for T-slot grooves									
						...		REED	P291-1
						...		PNP NPN	P291-3
			or			integrated	mounting kits	N199	P291-5
Position detectors - type BIM									
								881	P297-1

B

DEFINITION OF THE DIAMETER OF A CYLINDER

• THE DYNAMIC EFFORT DEVELOPED BY A CYLINDER

F = Pressure x piston area x efficiency

The efficiency of a cylinder depends on the diameter of the cylinder, on the pressure and on its mechanical construction. The **graph and chart page 6** show the dynamic effort developed by a cylinder at the piston rod, at various supply pressures.

• LOAD FACTOR

This is the relationship expressed as a percentage between the actual load being moved by the cylinder and the dynamic effort available at the end of the piston rod.

$$\text{Load factor (in \%)} = \frac{\text{Actual load}}{\text{Dynamic effort}} \times 100$$

For an optimum installation of a cylinder, we recommend a cylinder with a load factor **inferior to or equal to 75%**.

EXAMPLE: calculate a cylinder to lift a load of 130 daN with a pressure of 7 bar (gauge pressure).

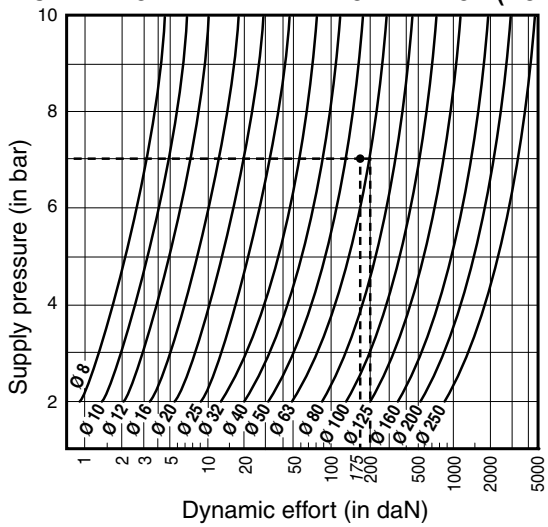
$$\text{Theoretical dynamic effort} = \frac{\text{actual load}}{\text{load factor}} = \frac{130}{0{,}75} = 175 \text{ daN}$$

The graph below shows the cross over point between the dynamic effort and the supply pressure. The cylinder diameter required will be that where the curve passes this point or the cylinder giving a force immediately above that required.

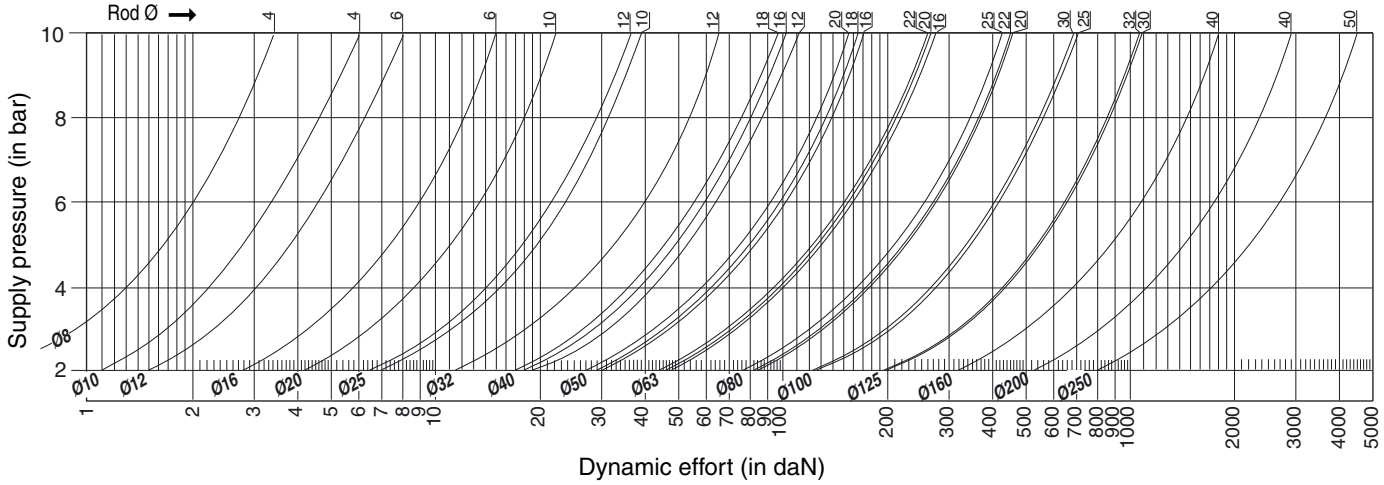
In the example above: 175 daN is between Ø 50 and Ø 63. The cylinder recommended is the Ø 63 mm wich will develop a force of 200 daN at 7 bar and the actual load factor is :

$$\frac{130 \text{ daN}}{200 \text{ daN}} \times 100 = 65 \text{ \%}$$

EFFORTS DEVELOPED AT THE END OF THE ROD (ROD OUT)



EFFORTS DEVELOPED AT THE END OF THE ROD (ROD RETURNED)



EFFORTS DEVELOPED BY A CYLINDER (in daN)

Cylinder Ø (mm)	Rod Ø (mm)	Cylinder types: Isoclair C-CC-CIS	Isoclair CIX	PEC	PES	PCN	PIS	Piston cross-section area (cm²) ●	Piston cross-section area (cm²) O	Dynamic effort developed (in daN) at various supply pressures (in bar): 2 ●	2 O	4 ●	4 O	6 ●	6 O	8 ●	8 O	10 ●	10 O
8	4	x						0,5	0,4	1,0	0,5	1,5	1,5	2,5	2,0	3,5	2,5	4,5	3,5
10	4	x						0,8	0,6	1,5	1,0	2,5	2,5	4,0	3,5	5,5	4,5	7,5	6,0
12	6	x	x					1,1	0,8	2,0	1,5	4,0	3,0	6,0	4,5	8,5	6,0	10,5	8,0
16	6	x	x					2,0	1,7	3,5	3,0	7,5	6,0	10,0	9,0	15,0	12,0	19,0	15,0
20	10	x	x	x				3,1	2,3	5,5	4,0	12,0	9,0	16,0	13,5	23,0	18,0	30,0	22,0
25	10	x	x	x				4,9	4,1	8,5	7,0	18,0	15,0	27,0	24,0	38,0	31,0	48,0	39,0
	12					x			3,8		6,5		14,0		22,0		29,0		36,0
32	12	x	x	x	x	x		8,0	6,9	13,0	11,5	30,0	25,0	46,0	40,0	62,0	52,0	77,0	66,0
40	12			x				12,6	11,5	21,0	19,0	46,0	42,0	70,0	64,0	95,0	87,0	122,0	111,5
	16		x		x				10,6		18,0		39,0		59,0		80,0		102,5
	18	x				x			10,0		17,0		36,5		56,0		75,5		97,0
50	16			x				19,6	17,6	33,0	30,0	70,0	64,0	110,0	100,5	150,0	134,0	190,0	170,5
	18	x				x			17,0		29,0		62,0		97,0		130,0		165,0
	20		x		x				16,5		27,0		58,0		92,0		124,0		155,0
63	16			x				31,2	29,1	53,0	47,5	110,0	101,5	170,0	159,5	230,0	218,5	290,0	273,5
	20		x		x				28,1		46,0		98,0		154,0		211,0		264,0
	22	x				x			27,4		44,0		97,0		150,0		200,0		260,0
80	20			x				50,3	47,2	88,0	82,0	185,0	172,5	285,0	266,0	385,0	365,5	480,0	457,0
	22					x			46,5		81,0		170,0		262,0		360,0		450,0
	25		x		x				45,4		77,0		163,0		255,0		341,0		427,0
100	25			x	x			78,5	73,6	135,0	126,5	290,0	272,0	440,0	412,5	600,0	562,5	750,0	703,0
	30					x			71,5		123,0		264,0		401,0		546,5		683,0
125	30					x		123,0	115,7	210,0	198,0	460,0	433,0	700,0	658,5	925,0	870,0	1150,0	1082,0
	32				x				115,0		196,5		430,0		654,5		865,0		1075,0
160	40				x	x		201,0	188,0	350,0	320,0	750,0	700,0	1150,0	1100,0	1550,0	1500,0	1900,0	1800,0
200	40				x	x		314,0	302,0	550,0	530,0	1150,0	1100,0	1800,0	1700,0	2400,0	2300,0	3000,0	2900,0
250	50						x	491,0	471,0	825,0	800,0	1800,0	1700,0	2800,0	2750,0	3700,0	3600,0	4800,0	4500,0

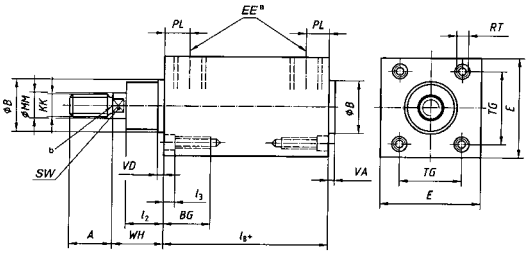
● Efforts developed with rod out (bottom side) O Efforts developed with rod returned (rod side)

Note : Cylinders with double crossbar develop identical efforts in both working directions. Their values are the ones defined here-above for efforts developed with rod **returned**.

STANDARDS OF CYLINDERS Ø 32 to 320 mm	INTERCHANGEABILITY within the standard	INTERCHANGEABILITY between standards

ISO 15552 cylinders (year: 2004)

This new international standard **cancels and replaces** ISO 6431. It defines the outer dimensions of a **bare** cylinder and equipped with its mountings.



NUMATICS cylinder, type PES, complies with the international standards

Full interchangeability between the manufacturers is achieved at every level:
- bare cylinder,
- each mounting,
- complete unit.

AFNOR NF ISO 15552 (june 2004) - DIN ISO 15552

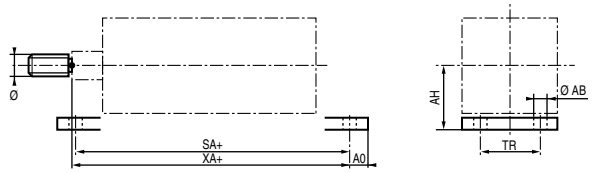
These standards fully include the international standard ISO 15552.L'AFNOR NF ISO 15552 is completed with a definition of the rod diameters MM and cancels and replaces standard NFE 49003 parts 1 to 3.

Numatics cylinder, type ***PES***, complies with the international standards

For full interchangeability with ISO 15552, ISO 6431 cylinder must be equipped with its mountings,and reciprocally.

ISO 6431 cylinders (year: 1983)

This international standard defined a cylinder unit equipped with its mountings without specifying the bare cylinder alone. It is cancelled and replaced by above standard ISO 15552.



Numatics cylinder, type ***PES***, complies with the international standards

Interchangeability between manufacturers is achieved by replacing both the cylinder **and** its mountings.

AFNOR NFE 49003 - VDMA 24562 cylinders (year: 1992)

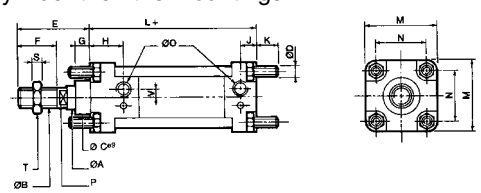
These standards first define the outer dimensions of a **bare** cylinder and then its mountings; the cylinder with its mountings installed then corresponds to a **cylinder unit according to above standard ISO 6431**

Full interchangeability between the manufacturers is achieved at every level:
- bare cylinder,
- each mounting,
- complete unit.

A cylinder to AFNOR NFE 49003 - either bare or equipped with its mountings - is interchangeable with a cylinder to AFNOR NF ISO 15552 and vice versa.

CNOMO 06.07.02/AFNOR NFE 49001 cylinders (year: 1968)

The French standards define first all the external dimensions of a **bare** cylinder then the mountings



Numatics cylinder, type ***PCN series 437***,complies with the French standards

Full interchangeability between the manufacturers is achieved at every level:
- bare cylinder,
- each mounting,
- complete unit.

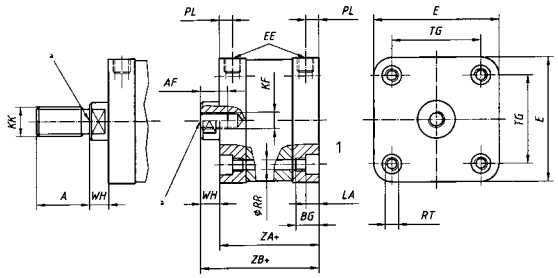
No interchangeability can be achieved between CNOMO/NFE 49001 cylinder (bare or equipped) and AFNOR NFE 49003 cylinder or ISO 6431 cylinder, and reciprocally.

Note : ISO 6432 and AFNOR NFE 49030 standards apply only to mini-cylinders Ø 8 to 25 mm.

STANDARDS OF CYLINDERS	INTERCHANGEABILITY within the standard	INTERCHANGEABILITY between standards

ISO 21287 Ø 20 to 100 mm

This new international standard defines the outer dimensions of a compact **bare** cylinder and equipped with its mountings. The center-to-center mounting distances of dia. 32 to 100 mm cylinders are identical to those of standard ISO 15552.



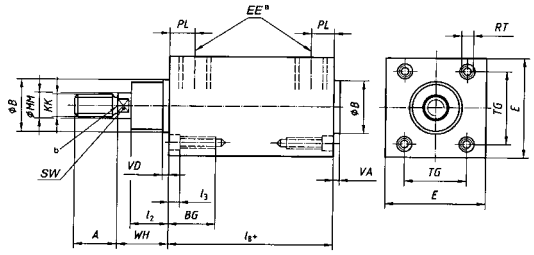
*Numatics cylinder, type **PEC**, complies with the international standards*

Full interchangeability between the manufacturers is achieved at every level:
- bare cylinder,
- each mounting,
- complete unit.

Dia. 32 to 100 mm cylinders can be equipped with all mountings to ISO 15552.

ISO 15552 Ø 32 to 320 mm

This new international standard **cancels and replaces** ISO 6431. It defines the outer dimensions of a **bare** cylinder and equipped with its mountings.



*Numatics cylinder, type **PES**, complies with the international standards*

Full interchangeability between the manufacturers is achieved at every level:
- bare cylinder,
- each mounting,
- complete unit.

AFNOR NF ISO 15552 - DIN ISO 15552

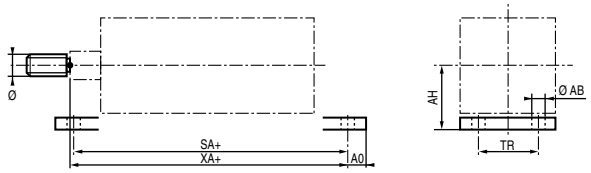
These standards fully include the international standard ISO 15552.L'AFNOR NF ISO 15552 is completed with a definition of the rod diameters MM and cancels and replaces standard NFE 49003 parts 1 to 3.

Numatics cylinder, type ***PES***, complies with the international standards

For full interchangeability with ISO 15552, ISO 6431 cylinder must be equipped with its mountings,and reciprocally.

ISO 6431 (de 1983)

This international standard defined a cylinder unit equipped with its mountings without specifying the bare cylinder alone. It is cancelled and replaced by above standard ISO 15552.



*Numatics cylinder, type **PES**, complies with the international standards*

Interchangeability between manufacturers is achieved by replacing both the cylinder **and** its mountings.