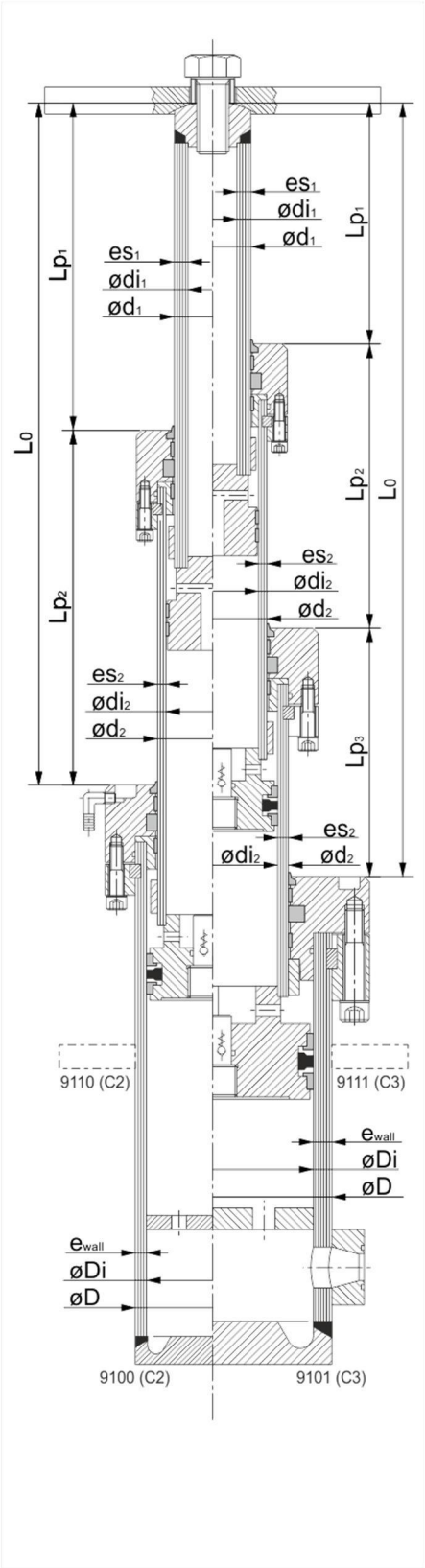


LEGEND :

$ød_n$ = ram outside diameter [mm]

$ødi_n$ = ram inner diameter [mm]

es_n = ram wall thickness [mm]

A_n = cross-sectional area of the material of the ram

$$= \frac{\pi \cdot d^2}{400} \text{ [cm}^2\text{]}$$

B_n = cross-sectional area of the material of the ram (internal)

$$= \frac{\pi \cdot d^2}{400} \text{ [cm}^2\text{]}$$

F_n = cross sectional area

$$= \frac{\pi \cdot (d^2 - di^2)}{400} \text{ [cm}^2\text{]}$$

J_n = moment of inertia (second moment of area of the ram)

$$= \frac{\pi \cdot (d^4 - di^4)}{640\,000} \text{ [cm}^4\text{]}$$

i_n = radyus of gyration of the ram

$$= \sqrt{\frac{J}{F}} \text{ [cm]}$$

q_n = ram weight per meter [kg/m]

$p0_n$ = weight of the stage with travel = 0 [kg]

øD = cylinder outside diameter [mm]

øDi = cylinder inner diameter [mm]

e_{wall} = cylinder wall thickness [mm]

Q_c = circulating fluid per meter of travel [dm^3/m]

Q_r = fluid for filling a meter of the jack travel [dm^3/m]

Lp_n = ram total stroke

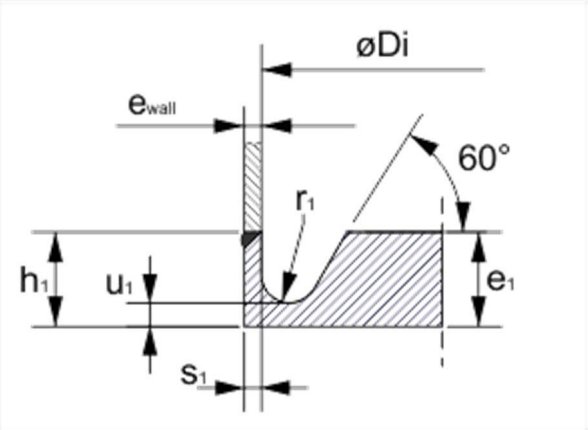
L_0 = maximum lenght of rams subject to buckling (buckling length)

t = synchronization coefficient

Jacks Telescopics 2 Stages			Jack					
			T42 C2	T50 C2	T63 C2	T70 C2	T85 C2	T100 C2
Stage 1	$ød_1$	[mm]	42	50	63	70	85	100
	$ødi_1$	[mm]		0		45	55	80
	es_1	[mm]	21	25	31,5	12,50	15,00	10,00
	A_1	[cm²]	13,85	19,63	31,17	38,48	56,75	78,54
	F_1	[cm²]				22,58	32,99	28,27
	J_1	[cm⁴]	15,27	30,68	77,33	97,73	211,32	289,81
	i_1	[cm]	1,05	1,25	1,58	2,08	2,53	3,20
	$p0_1$	[daN]	2,30	3,50	7,00	7,50	10,50	12,00
	q_1	[daN/m]	10,65	12,50	15,75	17,36	25,37	21,74
Stage 2	$ød_2$	[mm]	60	70	85	100	120	140
	$ødi_2$	[mm]	50	60	73	85	100	120
	es_2	[mm]	5	5	6	7,5	10	10
	A_2	[cm²]	28,27	37,48	56,75	78,54	113,10	153,94
	B_2	[cm²]	19,63	28,27	41,85	56,75	78,54	113,10
	F_2	[cm²]	8,64	10,21	14,89	21,79	34,56	40,84
	J_2	[cm⁴]	32,94	54,24	116,84	234,63	527,00	867,86
	i_2	[cm]	1,95	2,30	2,80	3,28	3,91	4,61
	$p0_2$	[daN]	7,20	7,50	11,0	15,00	23,50	31,50
	q_2	[daN/m]	8,40	10,35	15,14	21,75	33,48	41,36
Cylinder	øD	[mm]	85	100	120	140	170	200
	øDi	[mm]	73	85	105	120	147	170
	e_{wall}	[mm]	6	7,50	7,50	10	11,5	15
	B_c	[cm²]	41,85	56,75	86,59	113,10	169,72	226,98
Jack	Qr	[l/m]	1,10	1,40	2,10	2,20	4,00	5,60
	Qc	[l/m]	2,20	2,90	4,40	6,00	8,50	11,80
	t	-	1,980	1,930	1,958	1,898	1,998	1,930

Jacks Telescopics 3 Stages			Jack					
			T42 C2	T50 C2	T63 C2	T70 C2	T85 C2	T100 C2
Stage 1	$\varnothing d_1$	[mm]	42	50	63	70	85	100
	$\varnothing di_1$	[mm]		0		45	55	80
	es_1	[mm]	21	25	31,5	12,5	15	10
	A_1	[cm²]	13,85	19,63	31,17	38,48	56,75	78,54
	F_1	[cm²]				22,58	32,99	28,27
	J_1	[cm⁴]	15,27	30,68	77,33	97,73	211,32	289,81
	i_1	[cm]	1,05	1,25	1,58	2,08	2,53	3,20
	$p0_1$	[daN]	3,10	5,00	9,50	9,00	14,50	15,00
	q_1	[daN/m]	10,65	12,50	15,75	17,36	25,37	21,74
Stage 2	$\varnothing d_2$	[mm]	60	70	85	100	120	140
	$\varnothing di_2$	[mm]	50	60	73	85	100	120
	es_2	[mm]	5	5	6	7,5	10	10
	A_2	[cm²]	28,27	37,48	56,75	78,54	113,10	153,94
	B_2	[cm²]	19,63	28,27	41,85	56,75	78,54	113,10
	F_2	[cm²]	8,64	10,21	14,89	21,79	34,56	40,84
	J_2	[cm⁴]	32,94	54,24	116,84	234,63	527,00	867,86
	i_2	[cm]	1,95	2,30	2,80	3,28	3,91	4,61
	$p0_2$	[daN]	7,90	8,50	12,00	17,00	27,50	36,50
	q_2	[daN/m]	8,40	10,35	15,14	21,75	33,48	41,36
Stage 3	$\varnothing d_3$	[mm]	85	100	120	140	170	200
	$\varnothing di_3$	[mm]	73	85	105	120	147	170
	es_3	[mm]	6	7,5	7,5	10	11,5	15
	A_3	[cm²]	56,75	78,54	113,10	153,94	226,98	314,16
	B_3	[cm²]	41,85	56,75	86,59	113,10	169,72	226,98
	F_3	[cm²]	14,89	21,79	26,51	40,84	57,26	87,18
	J_3	[cm⁴]	116,84	234,63	421,22	867,86	1807,70	3754,15
	i_3	[cm]	2,80	3,28	3,99	4,61	5,62	6,56
	$p0_3$	[daN]	9,10	15,00	17,5	37,00	55,50	83,00
	q_3	[daN/m]	15,14	21,75	28,00	41,36	58,97	87,02
Cylinder	$\varnothing D$	[mm]	130	150	180	216	254	298
	$\varnothing Di$	[mm]	115	130	160	185	225	260
	e_{wall}	[mm]	7,5	10	10	17	14	19
	B_c	[cm²]	103,87	132,73	201,06	268,80	397,61	530,93
Jack	Qr	[l/m]	2,60	2,80	4,30	5,70	8,30	11,4
	Qc	[l/m]	2,93	4,70	6,70	9,20	13,20	18,70
	t	-	2,868	2,843	2,942	2,882	2,992	2,843

EN 81-50 § 5.13.1.2.2



$$e_{wall} \geq \frac{2{,}3 \cdot 1{,}7 \cdot p_{stat} \cdot \text{øDi}}{20 \cdot R_{p0,2}} + 1$$

$$e_1 \geq 0{,}4 \cdot \text{øDi} \sqrt{\frac{2{,}3 \cdot 1{,}7 \cdot p_{stat}}{10 \cdot R_{p0,2}}} + 1$$

$$u_1 \geq 1{,}3 \cdot \left(\frac{\text{øDi}}{2} - r_1\right) \cdot \frac{2{,}3 \cdot 1{,}7 \cdot p_{stat}}{10 \cdot R_{p0,2}}$$

$r_1 \geq 0{,}2 \cdot e_1$ e $r_1 \geq 5$ mm

$u_1 \leq 1{,}5 \cdot s_1$

$h_1 \geq u_1 + r_1$

$R_{p0,2} = 355$ N/mm^2

Ram C2	øD	øDi	$e_{wall} = s_1$	r_1	$h_1 = e_1$	u_1
	[mm]					
T42	85	73	6	6	20	7
T50	100	85	7,5			
T63	120	105				10
T70	140	120	10		25	
T85	170	147	11,5	7		12
T100	200	170	15	10	30	14

Ram C3	øD	øDi	$e_{wall} = s_1$	r_1	$h_1 = e_1$	u_1
	[mm]					
T42	130	115	7,5	6	25	10
T50	150	130	10		30	15
T63	180	160			35	
T70	219	185	17	10	40	20
T85	254	225	14,5		45	21
T100	298	260	19		55	28

For values not included in this table, ask to GMV