CARPENTER & PATERSON (ASIA) LTD

WITCH PIPE SUSPENSION EQUIPMENT

CONSTANT EFFORT SUPPORTS

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GENERAL DESCRIPTION

The Constant Effort Support designed and manufactured by Carpenter and Paterson (Asia) Limited ("CPA") incorporates the latest design concepts to produce a Support which provides an essentially constant supporting effort throughout the total travel of the unit. The robust and simple construction of the well-proven CPA design using a bell-crank lever has been enhanced to include universal locking of the load arm.

With a cylindrical spring housing of substantial construction, and several support configurations to suit the position relative to steelwork and available space, the unit can be installed in many arrangements. The spring housing prevents the ingress of foreign bodies such as construction debris, thus reducing the danger of damage or restriction of the unit's function.

SUPPORT CONFIGURATIONS:

Horizontal (e.g. CA50 L)

Vertical (e.g. CA51 T)

Horizontal base mounted (CA53)

Vertical base mounted (CA51 Y)

Tandem (CA52 G)

Horizontal compression seat (CA54)

Vertical inverted base mounted (e.g. CA52 X)

Vertical inverted (e.g. CA52 Y)

MAINTENANCE

Maintenance-free PTFE dry bearings are used on all pivoting points, and are totally enclosed (See Maintenance Instructions).

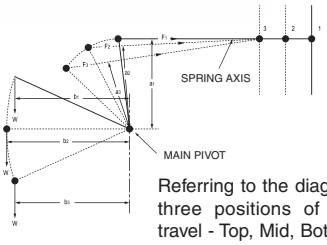
The universal locking mechanism allows the load arm to be locked in any position for the purpose of hydrostatic test, maintenance and decommissioning. The locking is done at the load arm so that excessive loadings are not transferred to the spring tension rod and spring coil. The threaded rods which are used for universal locking, are removed once the Support has been installed and are stowed on the side of the spring housing.

Locked position

Unlocked position

The Constant Effort Support is based on a simple mechanical principle:

In order to produce a constant supporting effort, the load moment about the main pivot must be counterbalanced by an equal spring moment throughout the travel range.



Referring to the diagram, take three positions of the load travel - Top, Mid, Bottom - and equate the moments of these points about the Main Pivot.

$F_1a_1 = Wb_1$
$F_2a_2 = Wb_2$
$F_3a_3 = Wb_3$
$\frac{F_1a_1}{b_1} = \frac{F_2a_2}{b_2} = \frac{F_3a_3}{b_3} = W$

STANDARD DESIGN FEATURES

The standard range of Constant Effort Supports are constructed to accommodate loads between 8kg and 33500kg with a standard range of travels between 40mm and 610mm in 10mm increments.

Constant Effort Supports are manufactured having maximum deviation of +/-5% of the specified load. Universal Locking of the load arm is provided as standard.

Upper and lower travel stops are incorporated in all units to prevent excessive overtravel. All Supports are fitted with a clearly visible grade 316 stainless travel scale and name plate (see images below).

Travel scale

Nameplate

Supports are supplied with hot-dip galvanized finish as standard. Spring coils are supplied plastic-coated as standard. Screw Threads are ISO-metric coarse pitch series (6mm pitch series above size M64).

LOAD ADJUSTMENT

The Supports are delivered preset to the customer's load and travel requirements. It is sometimes necessary to adjust the preset load due to minor variations in actual site conditions. A simple operation of turning the load adjustment screw in the appropriate direction to increase or decrease the load is all that is necessary (see image below). The amount of adjustment is shown on the adjacent scale, which is calibrated in 2% divisions. The maximum adjustment is +/-20% of the operating load.

Load adjusting mechanism →

UNIVERSAL LOCKING / PRESETTING

All Constant Effort Supports are delivered to site locked at the specified loading and in the required travel position to accommodate the specified movements. Supports should be installed, and not unlocked until after completion of pipework insulation work and any acid cleaning or hydrostatic test. The Supports are only to be unlocked when the weight of the pipework matches the operating loading. This will ensure that undesirable pipework deflections do not occur as a result of load imbalance e.g. due to weight of water. The standard Support designs are capable of carrying loadings of twice the operating load when the Supports are locked. The universal locking mechanism enables the Supports to be re-locked in any travel position, and hydrostatic testing can be done with the Supports locked in the new position.

SPECIAL RANGE

Special Constant Effort Supports can be designed for higher loadings or travels than are covered by the standard range.

Supports can be designed for hydrostatic test more than twice the operating load.

Supports can be supplied with special paint finish or manufactured from corrosion-resistant materials.

ORDERING

When ordering, please specify:-

Number required
Figure No. e.g. CA50
Support Size
Mounting Type e.g. Type L
Operating Load
Hydro Test Load (if applicable)
Actual Travel and Direction (up or down)
Total Travel
Drop Rod Size and Thread Form if not standard
Finish if not standard

SELECTION

To select a Constant Effort Support, first calculate the load and travel that the Support is to accommodate, including weight of pipe, insulation, contents and ancillary support hardware.

It is good practice to add overtravel to the vertical design movement of the pipe.

Recommended Overtravel:
For pipe movements up to 125mm: 25mm
For pipe movements > 125mm: 20% of design movement
This should then be rounded up to the next whole 10mm travel increment, giving the total travel and enabling a standard support to be selected.

To determine the correct size of Constant Effort Support, refer to the selection table (pages 4-7), and select a Support size to accommodate the calculated load and the total travel. It should be noted that the travel given in the table is the total travel, this being the maximum vertical travel that the unit will accommodate.

When selecting Vertical Constant Effort Supports (Fig. CA51 only), these should only be selected from the right hand side of the heavy line.

Example:
Actual Load 10 kN
Actual Vertical Movement 90 mm
Total Travel = 90 + 25, rounded up to next 10mm increment
= 120 mm

From kN Selection Table
Locate Column for 120mm Travel, and look down the column until a load is found which is greater than or equal to 10 kN. This reads 10.41 kN.

Then look horizontally along this row to find the Support size in the first column.
In this example, Support is Size 22.

Note: For Base-Mounted Constant Effort Supports, Types CA54 and CA55, the maximum allowable lateral load is limited to 15% of the vertical load.

SPECIFICATION

CPA Constant Effort Supports meet the requirements of the following:-

- European Union Pressure Equipment Directive 97/23/EC
- EN 13480 Part 3 Metallic Industrial Piping
- BS1726-1 Cylindrical Helical Springs made from Round Wire and Bar – Part 1: Compression Springs
- EN 13906 Cylindrical Helical Springs made from round wire and bar – Calculation and Design – Part 1: Compression Springs
- U.S. Manufacturers Standardization Society MSS SP-58
- U.S. Manufacturers Standardization Society MSS SP-69
- The ASME Code for Power Piping ASME B31.1
- The ASME Code for Process Piping ASME B31.3

CONSTANT EFFORT SUPPORTS

CONSTANT EFFORT SUPPORT SELECTION TABLE — LOADS IN KN

Constant Support Size	TOTAL TRAVEL mm																													
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	
Min Load	0.59	0.47	0.39	0.34	0.29	0.26	0.24	0.21	0.20	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.09	0.09	0.09	0.08	0.08	0.08			
1	0.78	0.63	0.52	0.45	0.39	0.35	0.31	0.29	0.26	0.24	0.22	0.21	0.20	0.18	0.17	0.17	0.16	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.11	0.10			
2	0.98	0.78	0.65	0.56	0.49	0.44	0.39	0.36	0.33	0.30	0.28	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.13			
3	1.23	0.98	0.82	0.70	0.61	0.54	0.49	0.45	0.41	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.25	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.18	0.17	0.16			
4	1.57	1.26	1.05	0.90	0.78	0.70	0.63	0.57	0.52	0.48	0.45	0.42	0.39	0.37	0.35	0.33	0.31	0.30	0.29	0.27	0.26	0.25	0.24	0.23	0.22	0.22	0.21			
5	2.01	1.61	1.34	1.15	1.01	0.89	0.80	0.73	0.67	0.62	0.57	0.54	0.50	0.47	0.45	0.42	0.40	0.38	0.37	0.35	0.34	0.32	0.31	0.30	0.29	0.28	0.27			
6	2.55	2.04	1.70	1.46	1.27	1.13	1.02	0.93	0.85	0.78	0.73	0.68	0.64	0.60	0.57	0.54	0.51	0.49	0.46	0.44	0.42	0.41	0.39	0.38	0.36	0.35	0.34			
7	3.24	2.59	2.16	1.85	1.62	1.44	1.29	1.18	1.08	1.00	0.92	0.86	0.81	0.76	0.72	0.68	0.65	0.62	0.59	0.56	0.54	0.52	0.50	0.48	0.46	0.45	0.43	0.42	0.40	
8	4.12	3.30	2.75	2.35	2.06	1.83	1.65	1.50	1.37	1.27	1.18	1.10	1.03	0.97	0.92	0.87	0.82	0.78	0.75	0.72	0.69	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.51	
9	5.25	4.20	3.50	3.00	2.62	2.33	2.10	1.91	1.75	1.61	1.50	1.40	1.31	1.23	1.17	1.10	1.05	1.00	0.95	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.68	0.66	
10	6.67	5.33	4.45	3.81	3.33	2.96	2.67	2.42	2.22	2.05	1.91	1.78	1.67	1.57	1.48	1.40	1.33	1.27	1.21	1.16	1.11	1.07	1.03	0.99	0.95	0.92	0.89	0.86	0.83	
11	8.48	6.79	5.66	4.85	4.24	3.77	3.39	3.08	2.83	2.61	2.42	2.26	2.12	2.00	1.89	1.79	1.70	1.62	1.54	1.48	1.41	1.36	1.31	1.26	1.21	1.17	1.13	1.09	1.06	
12	10.74	8.59	7.16	6.14	5.37	4.77	4.30	3.90	3.58	3.30	3.07	2.86	2.68	2.53	2.39	2.26	2.15	2.05	1.95	1.87	1.79	1.72	1.65	1.59	1.53	1.48	1.43	1.39	1.34	
13			8.07	6.92	6.06	5.38	4.84	4.40	4.04	3.73	3.46	3.23	3.03	2.85	2.69	2.55	2.42	2.31	2.20	2.11	2.02	1.94	1.86	1.79	1.73	1.67	1.61	1.56	1.51	
14			9.09	7.79	6.82	6.06	5.45	4.96	4.54	4.19	3.89	3.63	3.41	3.21	3.03	2.87	2.73	2.60	2.48	2.37	2.27	2.18	2.10	2.02	1.95	1.88	1.82	1.76	1.70	
15			10.20	8.74	7.65	6.80	6.12	5.56	5.10	4.71	4.37	4.08	3.82	3.60	3.40	3.22	3.06	2.91	2.78	2.66	2.55	2.45	2.35	2.27	2.19	2.11	2.04	1.97	1.91	
16			11.31	9.69	8.48	7.54	6.79	6.17	5.66	5.22	4.85	4.52	4.24	3.99	3.77	3.57	3.39	3.23	3.08	2.95	2.83	2.71	2.61	2.51	2.42	2.34	2.26	2.19	2.12	
17			12.45	10.68	9.34	8.30	7.47	6.79	6.23	5.75	5.34	4.98	4.67	4.40	4.15	3.93	3.74	3.56	3.40	3.25	3.11	2.99	2.87	2.77	2.67	2.58	2.49	2.41	2.34	
18			14.15	12.13	10.62	9.44	8.49	7.72	7.08	6.53	6.07	5.66	5.31	5.00	4.72	4.47	4.25	4.04	3.86	3.69	3.54	3.40	3.27	3.15	3.03	2.93	2.83	2.74	2.65	
19			16.08	13.79	12.06	10.72	9.65	8.77	8.04	7.42	6.89	6.43	6.03	5.68	5.36	5.08	4.82	4.60	4.39	4.20	4.02	3.86	3.71	3.57	3.45	3.33	3.22	3.11	3.02	
20			17.52	15.02	13.14	11.68	10.51	9.56	8.76	8.09	7.51	7.01	6.57	6.18	5.84	5.53	5.26	5.01	4.78	4.57	4.38	4.21	4.04	3.89	3.75	3.63	3.50	3.39	3.29	
21			19.06	16.34	14.29	12.71	11.43	10.40	9.53	8.80	8.17	7.62	7.15	6.73	6.35	6.02	5.72	5.45	5.20	4.97	4.76	4.57	4.40	4.24	4.08	3.94	3.81	3.69	3.57	
22			20.82	17.85	15.62	13.88	12.49	11.36	10.41	9.61	8.92	8.33	7.81	7.35	6.94	6.58	6.25	5.95	5.68	5.43	5.21	5.00	4.81	4.63	4.46	4.31	4.16	4.03	3.90	
23			22.69	19.45	17.01	15.12	13.61	12.37	11.34	10.47	9.72	9.07	8.51	8.01	7.56	7.16	6.81	6.48	6.19	5.92	5.67	5.44	5.24	5.04	4.86	4.69	4.54	4.39	4.25	
24			24.68	21.15	18.51	16.45	14.81	13.46	12.34	11.39	10.58	9.87	9.26	8.71	8.23	7.79	7.40	7.05	6.73	6.44	6.17	5.92	5.70	5.48	5.29	5.11	4.94	4.78	4.63	
25			27.13	23.26	20.35	18.09	16.28	14.80	13.57	12.52	11.63	10.85	10.17	9.58	9.04	8.57	8.14	7.75	7.40	7.08	6.78	6.51	6.26	6.03	5.81	5.61	5.43	5.25	5.09	
26			29.94	25.67	22.46	19.96	17.97	16.33	14.97	13.82	12.83	11.98	11.23	10.57	9.98	9.46	8.98	8.56	8.17	7.81	7.49	7.19	6.91	6.65	6.42	6.20	5.99	5.80	5.61	
27				29.22	25.57	22.73	20.46	18.60	17.05	15.74	14.61	13.64	12.79	12.03	11.36	10.77	10.23	9.74	9.30	8.89	8.52	8.18	7.87	7.58	7.31	7.05	6.82	6.60	6.39	
28				33.09	28.95	25.74	23.16	21.06	19.30	17.82	16.55	15.44	14.48	13.63	12.87	12.19	11.58	11.03	10.53	10.07	9.65	9.27	8.91	8.58	8.27	7.99	7.72	7.47	7.24	
29				36.14	31.63	28.11	25.30	23.00	21.08	19.46	18.07	16.87	15.81	14.88	14.06	13.32	12.65	12.05	11.50	11.00	10.54	10.12	9.73	9.37	9.04	8.72	8.43	8.16	7.91	
30				39.39	34.47	30.64	27.58	25.07	22.98	21.21	19.70	18.38	17.24	16.22	15.32	14.51	13.79	13.13	12.53	11.99	11.49	11.03	10.61	10.21	9.85	9.51	9.19	8.90	8.62	
31				42.93	37.56	33.39	30.05	27.32	25.04	23.11	21.46	20.03	18.78	17.68	16.69	15.81	15.02	14.31	13.66	13.06	12.52	12.02	11.56	11.13	10.73	10.36	10.02	9.69	9.39	
32				46.82	40.97	36.42	32.77	29.79	27.31	25.21	23.41	21.85	20.48	19.28	18.21	17.25	16.39	15.61	14.90	14.25	13.66	13.11	12.61	12.14	11.70	11.30	10.92	10.57	10.24	
33				53.60	46.90	41.69	37.52	34.11	31.27	28.86	26.80	25.01	23.45	22.07	20.84	19.75	18.76	17.87	17.05	16.31	15.63	15.01	14.43	13.90	13.40	12.94	12.51	12.10	11.73	
34						46.07	41.46	37.69	34.55	31.89	29.62	27.64	25.91	24.39	23.03	21.82	20.73	19.74	18.85	18.03	17.28	16.59	15.95	15.36	14.81	14.30	13.82	13.38	12.96	
35						50.47	45.42	41.29	37.85	34.94	32.45	30.28	28.39	26.72	25.24	23.91	22.71	21.63	20.65	19.75	18.93	18.17	17.47	16.82	16.22	15.66	15.14	14.65	14.20	
36						57.38	51.64	46.95	43.03	39.72	36.89	34.43	32.28	30.38	28.69	27.18	25.82	24.59	23.47	22.45	21.52	20.66	19.86	19.13	18.44	17.81	17.21	16.66	16.14	
37						65.29	58.76	53.42	48.97	45.20	41.97	39.17	36.73	34.57	32.65	30.93	29.38	27.98	26.71	25.55	24.48	23.50	22.60	21.76	20.99	20.26	19.59	18.96	18.36	
38						71.17	64.06	58.23	53.38	49.27	45.76	42.70	40.04	37.68	35.59	33.71	32.03	30.50	29.12	27.85	26.69	25.62	24.64	23.72	22.88	22.09	21.35	20.66	20.02	
39						77.58	69.82	63.48	58.19	53.71	49.87	46.55	43.64	41.07	38.79	36.75	34.91	33.25	31.74	30.36	29.09	27.93	26.86	25.86	24.94	24.08	23.27	22.52	21.82	
40								69.23	63.47	58.58	54.40	50.77	47.60	44.80	42.31	40.08	38.08	36.27	34.62	33.11	31.73	30.46	29.29	28.21	27.20	26.26	25.39	24.57	23.80	
41								75.39	69.10	63.79	59.23	55.28	51.83	48.78	46.07	43.64	41.46	39.49	37.69	36.05	34.55	33.17	31.89	30.71	29.62	28.59	27.64	26.75	25.91	
42								82.59	75.71	69.88	64.89	60.57	56.78	53.44	50.47	47.82	45.42	43.26	41.29	39.50	37.85	36.34	34.94	33.65	32.45	31.33	30.28	29.31	28.39	
43								93.88	86.05	79.43	73.76	68.84	64.54	60.74	57.37	54.35	51.63	49.17	46.94	44.90	43.03	41.31	39.72	38.25	36.88	35.61	34.42	33.31	32.27	
44								106.82	97.92	90.39	83.93	78.34	73.44	69.12	65.28	61.84	58.75	55.95	53.41	51.09	48.96	47.00	45.19	43.52	41.97	40.52	39.17	37.90	36.72	
45								116.49	106.78	98.56	91.52	85.42	80.08	75.37	71.19	67.44	64.07	61.02	58.24	55.71	53.39	51.25	49.28	47.46	45.76	44.18	42.71	41.33	40.04	
46								126.95	116.37	107.42	99.75	93.10	87.28	82.15	77.58	73.50	69.82	66.50	63.48	60.72	58.19	55.86	53.71	51.72	49.87	48.15	46.55	45.05	43.64	
47								138.45	126.91	117.15	108.78	101.53	95.19	89.59	84.61	80.16	76.15	72.52	69.23	66.22	63.46	60.92	58.58	56.41	54.39	52.52	50.77	49.13	47.59	
48								150.79	138.22	127.59	118.48	110.58	103.67	97.57	92.15	87.30	82.93	78.99	75.40	72.12	69.11	66.35	63.80	61.43	59.24	57.20	55.29	53.51	51.83	
49								162.81	149.24	137.76	127.92	119.39	111.93	105.35	99.49	94.26	89.54	85.28	81.40	77.86	74.62	71.64	68.88	66.33	63.96	61.75	59.70	57.77	55.97	
50								176.66	161.94	149.48	138.81	129.55	121.46	114.31	107.96	102.28	97.16	92.54	88.33	84.49	80.97	77.73	74.74	71.97	69.40	67.01	64.78	62.69	60.73	
51								190.02	174.18	160.78	149.30	139.35	130.64	122.95	116.12	110.01	104.51	99.53	95.01	90.88	87.09	83.61	80.39	77.41	74.65	72.08	69.67	67.43	65.32	
52								205.42	188.30	173.82	161.40	150.64	141.23	132.92	125.54	118.93	112.98	107.60	102.71	98.25	94.15	90.39	86.91	83.69	80.70	77.92	75.32	72.89	70.61	
53								221.86	203.37	187.73	174.32	162.70	152.53	143.56	135.58	128.45	122.02	116.21	110.93	106.11	101.69	97.62	93.86	90.39	87.16	84.15	81.35	78.73	76.27	
54								236.25	216.56	199.90	185.63	173.25	162.42	152.87	144.38	136.78	129.94	123.75	118.13	112.99	108.28	103.95	99.95	96.25	92.81	89.61	86.63	83.83	81.21	
55								253.39	232.27	214.40	199.09	185.82	174.20	163.96	154.85	146.70	139.36	132.73	126.69	121.18	116.14	111.49	107.20	103.23	99.54	96.11	92.91	89.91	87.10	
56								271.77	249.12	229.96	213.53	199.30	186.84	175.85	166.08	157.34	149.47	142.36	135.88	129.98	124.56	119.58	114.98	110.72	106.77	103.08	99.65	96.43	93.42	
57								291.49	267.20	246.64	229.03	213.76	200.40	188.61	178.13	168.76	160.32	152.68	145.74	139.41	133.60	128.26	123.32	118.75	114.51	110.56	106.88	103.43	100.20	
58								312.64	286.58	264.54	245.64	229.27	214.94	202.29	191.06	181.00	171.95	163.76	156.32	149.52	143.29	137.56	132.27	127.37	122.82	118.59	114.63	110.94	107.47	
59												241.02	225.96	212.67	200.85	190.28	180.77	172.16	164.33	157.19	150.64	144.61	139.05	133.90	129.12	124.67	120.51	116.62	112.98	
60												253.39	237.55	223.58	211.16	200.05	190.04	180.99	172.77	165.25	158.37	152.03	146.19	140.77	135.75	131.06	126.70	122.61	118.78	
61												266.39	249.74	235.05	221.99	210.31	199.79	190.28	181.63	173.73	166.49	159.83	153.69	147.99	142.71	137.79	133.19	128.90	124.87	
62												280.05	262.55	247.10	233.38	221.09	210.04	200.04	190.94	182.64	175.03	168.03	161.57	155.58	150.03	144.85	140.03	135.51	131.27	
63												291.48	273.26	257.19	242.90	230.12	218.61	208.20	198.74	190.10	182.17	174.89	168.16	161.93	156.15	150.77	145.74	141.04	136.63	
64												303.39	284.43	267.70	252.83	239.52	227.54	216.71	206.86	197.86	189.62	182.03	175.03	168.55	162.53	156.93	151.70	146.80	142.21	
65												315.77	296.04	278.62	263.15	249.30	236.83	225.55	215.30	205.94	197.36	189.46	182.18	175.43	169.16	163.33	157.89	152.79	148.02	
66												328.67	308.12	290.00	273.89	259.47	246.50	234.76	224.09	214.35	205.42	197.20	189.62	182.59	176.07	170.00	164.33	159.03	154.06	

Select Figure No. CA51 Constant Effort Supports from the right hand side of the heavy line

CONSTANT EFFORT SUPPORT SELECTION TABLE

LOADS IN KN

Constant Support Size	TOTAL TRAVEL mm																												
	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610
Min Load																													
1																													
2																													
3																													
4																													
5																													
6																													
7	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.32	0.31																			
8	0.50	0.48	0.47	0.46	0.45	0.43	0.42	0.41	0.40	0.39																			
9	0.64	0.62	0.60	0.58	0.57	0.55	0.54	0.52	0.51	0.50																			
10	0.81	0.78	0.76	0.74	0.72	0.70	0.68	0.67	0.65	0.64																			
11	1.03	1.00	0.97	0.94	0.92	0.89	0.87	0.85	0.83	0.81																			
12	1.30	1.26	1.23	1.19	1.16	1.13	1.10	1.07	1.05	1.02																			
13	1.47	1.42	1.38	1.35	1.31	1.27	1.24	1.21	1.18	1.15																			
14	1.65	1.60	1.56	1.51	1.47	1.43	1.40	1.36	1.33	1.30																			
15	1.85	1.80	1.75	1.70	1.65	1.61	1.57	1.53	1.49	1.46																			
16	2.06	2.00	1.94	1.89	1.83	1.79	1.74	1.70	1.66	1.62																			
17	2.26	2.20	2.14	2.08	2.02	1.97	1.92	1.87	1.82	1.78																			
18	2.57	2.50	2.43	2.36	2.30	2.23	2.18	2.12	2.07	2.02																			
19	2.92	2.84	2.76	2.68	2.61	2.54	2.47	2.41	2.35	2.30	2.24	2.19	2.14	2.10	2.05	2.01	1.97	1.93											
20	3.19	3.09	3.00	2.92	2.84	2.77	2.70	2.63	2.56	2.50	2.44	2.39	2.34	2.29	2.24	2.19	2.15	2.10											
21	3.47	3.36	3.27	3.18	3.09	3.01	2.93	2.86	2.79	2.72	2.66	2.60	2.54	2.49	2.43	2.38	2.33	2.29											
22	3.79	3.67	3.57	3.47	3.38	3.29	3.20	3.12	3.05	2.97	2.91	2.84	2.78	2.72	2.66	2.60	2.55	2.50											
23	4.12	4.00	3.89	3.78	3.68	3.58	3.49	3.40	3.32	3.24	3.17	3.09	3.02	2.96	2.90	2.84	2.78	2.72											
24	4.49	4.36	4.23	4.11	4.00	3.90	3.80	3.70	3.61	3.53	3.44	3.37	3.29	3.22	3.15	3.09	3.02	2.96											
25	4.93	4.79	4.65	4.52	4.40	4.28	4.17	4.07	3.97	3.88	3.79	3.70	3.62	3.54	3.46	3.39	3.32	3.26											
26	5.44	5.28	5.13	4.99	4.86	4.73	4.61	4.49	4.38	4.28	4.18	4.08	3.99	3.91	3.82	3.74	3.67	3.59											
27	6.20	6.02	5.84	5.68	5.53	5.38	5.25	5.11	4.99	4.87	4.76	4.65	4.55	4.45	4.35	4.26	4.17	4.09											
28	7.02	6.81	6.62	6.43	6.26	6.10	5.94	5.79	5.65	5.52	5.39	5.26	5.15	5.04	4.93	4.83	4.73	4.63											
29	7.67	7.44	7.23	7.03	6.84	6.66	6.49	6.33	6.17	6.02	5.88	5.75	5.62	5.50	5.38	5.27	5.16	5.06											
30	8.36	8.11	7.88	7.66	7.45	7.26	7.07	6.89	6.73	6.57	6.41	6.27	6.13	5.99	5.87	5.75	5.63	5.52											
31	9.11	8.84	8.59	8.35	8.12	7.91	7.70	7.51	7.33	7.15	6.99	6.83	6.68	6.53	6.39	6.26	6.13	6.01											
32	9.93	9.64	9.36	9.10	8.86	8.62	8.40	8.19	7.99	7.80	7.62	7.45	7.28	7.12	6.97	6.83	6.69	6.55											
33	11.37	11.04	10.72	10.42	10.14	9.87	9.62	9.38	9.15	8.93	8.73	8.53	8.34	8.16	7.98	7.82	7.66	7.50											
34	12.56	12.19	11.85	11.52	11.21	10.91	10.63	10.37	10.11	9.87	9.64	9.42	9.21	9.01	8.82	8.64	8.46	8.29	8.13	7.97	7.82	7.68	7.54	7.40	7.27	7.15	7.03	6.91	6.80
35	13.76	13.36	12.98	12.62	12.28	11.95	11.65	11.36	11.08	10.82	10.56	10.32	10.09	9.87	9.66	9.46	9.27	9.08	8.91	8.74	8.57	8.41	8.26	8.11	7.97	7.83	7.70	7.57	7.45
36	15.65	15.19	14.75	14.34	13.96	13.59	13.24	12.91	12.60	12.30	12.01	11.74	11.48	11.23	10.99	10.76	10.54	10.33	10.13	9.93	9.74	9.56	9.39	9.22	9.06	8.90	8.75	8.61	8.47
37	17.81	17.28	16.79	16.32	15.88	15.46	15.07	14.69	14.33	13.99	13.67	13.35	13.06	12.77	12.50	12.24	11.99	11.75	11.52	11.30	11.09	10.88	10.68	10.49	10.31	10.13	9.96	9.79	9.63
38	19.41	18.84	18.30	17.79	17.31	16.86	16.42	16.01	15.62	15.25	14.90	14.56	14.23	13.93	13.63	13.35	13.07	12.81	12.56	12.32	12.09	11.86	11.65	11.44	11.24	11.04	10.86	10.68	10.50
39	21.16	20.54	19.95	19.40	18.87	18.37	17.90	17.46	17.03	16.62	16.24	15.87	15.52	15.18	14.86	14.55	14.25	13.96	13.69	13.43	13.17	12.93	12.70	12.47	12.25	12.04	11.83	11.64	11.45
40	23.08	22.40	21.76	21.16	20.58	20.04	19.53	19.04	18.58	18.13	17.71	17.31	16.92	16.56	16.20	15.87	15.54	15.23	14.93	14.65	14.37	14.10	13.85	13.60	13.36	13.13	12.91	12.69	12.48
41	25.13	24.39	23.69	23.03	22.41	21.82	21.26	20.73	20.23	19.74	19.28	18.85	18.43	18.03	17.64	17.28	16.92	16.59	16.26	15.95	15.65	15.36	15.08	14.81	14.55	14.30	14.06	13.82	13.59
42	27.53	26.72	25.96	25.24	24.55	23.91	23.29	22.71	22.16	21.63	21.13	20.65	20.19	19.75	19.33	18.93	18.54	18.17	17.81	17.47	17.14	16.82	16.52	16.22	15.94	15.66	15.40	15.14	14.89
43	31.29	30.37	29.50	28.68	27.91	27.17	26.48	25.82	25.19	24.59	24.01	23.47	22.95	22.45	21.97	21.51	21.07	20.65	20.25	19.86	19.48	19.12	18.78	18.44	18.12	17.80	17.50	17.21	16.93
44	35.61	34.56	33.57	32.64	31.76	30.92	30.13	29.38	28.66	27.98	27.33	26.71	26.11	25.54	25.00	24.48	23.98	23.50	23.04	22.60	22.17	21.76	21.36	20.98	20.61	20.26	19.92	19.58	19.26
45	38.83	37.69	36.61	35.59	34.63	33.72	32.85	32.03	31.25	30.51	29.80	29.12	28.47	27.86	27.26	26.69	26.15	25.63	25.12	24.64	24.18	23.73	23.30	22.88	22.48	22.09	21.72	21.36	21.01
46	42.32	41.07	39.90	38.79	37.74	36.75	35.81	34.91	34.06	33.25	32.48	31.74	31.03	30.36	29.71	29.09	28.50	27.93	27.38	26.86	26.35	25.86	25.39	24.94	24.50	24.08	23.67	23.27	22.89
47	46.15	44.79	43.51	42.30	41.16	40.08	39.05	38.07	37.15	36.26	35.42	34.61	33.84	33.11	32.40	31.73	31.08	30.46	29.86	29.29	28.74	28.20	27.69	27.20	26.72	26.26	25.81	25.38	24.97
48	50.26	48.79	47.39	46.07	44.83	43.65	42.53	41.47	40.46	39.49	38.57	37.70	36.86	36.06	35.29	34.56	33.85	33.17	32.52	31.90	31.30	30.72	30.16	29.62	29.10	28.60	28.11	27.64	27.19
49	54.27	52.67	51.17	49.75	48.40	47.13	45.92	44.77	43.68	42.64	41.65	40.70	39.80	38.93	38.10	37.31	36.55	35.82	35.12	34.44	33.79	33.16	32.56	31.98	31.42	30.88	30.35	29.85	29.36
50	58.89	57.16	55.52	53.98	52.52	51.14	49.83	48.58	47.40	46.27	45.19	44.17	43.18	42.25	41.35	40.49	39.66	38.87	38.10	37.37	36.67	35.99	35.33	34.70	34.09	33.50	32.94	32.39	31.86
51	63.34	61.48	59.72	58.06	56.49	55.00	53.59	52.25	50.98	49.77	48.61	47.50	46.45	45.44	44.47	43.55	42.66	41.80	40.98	40.20	39.44	38.71	38.00	37.32	36.67	36.04	35.43	34.84	34.27
52	68.47	66.46	64.56	62.77	61.07	59.46	57.94	56.49	55.11	53.80	52.55	51.36	50.21	49.12	48.08	47.08	46.12	45.19	44.31	43.45	42.63	41.85	41.08	40.35	39.64	38.96	38.30	37.66	37.04
53	73.95	71.78	69.73	67.79	65.96	64.22	62.58	61.01	59.52	58.11	56.76	55.47	54.23	53.05	51.93	50.84	49.81	48.81	47.85	46.93	46.05	45.19	44.37	43.58	42.82	42.08	41.36	40.67	40.01
54	78.75	76.43	74.25	72.19	70.24	68.39	66.63	64.97	63.38	61.88	60.44	59.06	57.75	56.49	55.29	54.14	53.04	51.98	50.96	49.98	49.03	48.13	47.25	46.41	45.59	44.81	44.05	43.31	42.60
55	84.46	81.98	79.64	77.42	75.33	73.35	71.47	69.68	67.98	66.36	64.82	63.35	61.94	60.59	59.30	58.07	56.88	55.74	54.65	53.60	52.59	51.62	50.68	49.77	48.90	48.06	47.24	46.45	45.69
56	90.59	87.93	85.41	83.04	80.80	78.67	76.65	74.74	72.91	71.18	69.52	67.94	66.43	64.99	63.61	62.28	61.01	59.79	58.62	57.49	56.40	55.36	54.35	53.38	52.45	51.54	50.67	49.82	49.01
57	97.16	94.31	91.61	89.07	86.66	84.38	82.21	80.16	78.20	76.34	74.57	72.87	71.25	69.70	68.22	66.80	65.44	64.13	62.87	61.66	60.50	59.38	58.30	57.26	56.25	55.28	54.35	53.44	52.56
58	104.21	101.15	98.26	95.53	92.95	90.50	88.18	85.97	83.88	81.88	79.98	78.16	76.42	74.76	73.17	71.65	70.18	68.78	67.43	66.13	64.89	63.69	62.53	61.41	60.33	59.29	58.29	57.32	56.38
59	109.56	106.33	103.29	100.43	97.71	95.14	92.70	90.38	88.18	86.08	84.08	82.17	80.34	78.59	76.92	75.32	73.78	72.31	70.89	69.53	68.21	66.95	65.73	64.56	63.43	62.33	61.28	60.26	59.27
60	115.18	111.79	108.60	105.58	102.73	100.02	97.46	95.02	92.70	90.50	88.39	86.38	84.46	82.63	80.87	79.18	77.57	76.02	74.53	73.09	71.71	70.39	69.11	67.87	66.68	65.53	64.42	63.35	62.31
61	121.09	117.52	114.17	110.99	108.00	105.15	102.46	99.90	97.46	95.14	92.93	90.81	88.80	86.87	85.02	83.25	81.55	79.92	78.35	76.84	75.39	74.00	72.65	71.35	70.10	68.89	67.73	66.60	65.51
62	127.30	123.55	120.02	116.69	113.53	110.55	107.71	105.02	102.46	100.02	97.69	95.47	93.35	91.32	89.38	87.52	85.73	84.02	82.37	80.78	79.26	77.79	76.38	75.01	73.70	72.43	71.20	70.01	68.87
63	132.49	128.59	124.92	121.45	118.17	115.06	112.11	109.30	106.64	104.10	101.68	99.37	97.16	95.05	93.03	91.09	89.23	87.44	85.73	84.08	82.49	80.97	79.49	78.07	76.71	75.38	74.11	72.87	71.68
64	137.91	133.85	130.02	126.41	123.00	119.76	116.69	113.77	111.00	108.35	105.83	103.43	101.13	98.93	96.83	94.81	92.87	91.02	89.23	87.52	85.87	84.28	82.74	81.27	79.84	78.46	77.13	75.85	74.60
65	143.53	139.31	135.33	131.57	128.02	124.65	121.45	118.42	115.53	112.78	110.15	107.65	105.26	102.97	100.78	98.68	96.67	94.73	92.87	91.09	89.37	87.72	86.12	84.58	83.10	81.67	80.28	78.94	77.65
66	149.39	145.00	140.86	136.94	133.24	129.74	126.41	123.25	120.24	117.38	114.65	112.05	109.56	107.17	104.89	102.71	100.61	98.60	96.67	94.81	93.02	91.30	89.64	88.04	86.49	85.00	83.56	82.17	80.82

CONSTANT EFFORT SUPPORTS

CONSTANT EFFORT SUPPORT SELECTION TABLE — LOADS IN KG

Constant Support Size	TOTAL TRAVEL mm																													
	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	
Min Load	60	48	40	34	30	27	24	22	20	18	17	16	15	14	13	13	12	11	11	10	10	10	9	9	9	8	8			
1	80	64	53	46	40	36	32	29	27	25	23	21	20	19	18	17	16	15	15	14	13	13	12	12	11	11	11			
2	100	80	67	57	50	44	40	36	33	31	29	27	25	24	22	21	20	19	18	17	17	16	15	15	14	14	13			
3	125	100	83	71	63	56	50	45	42	38	36	33	31	29	28	26	25	24	23	22	21	20	19	19	18	17	17			
4	160	128	107	91	80	71	64	58	53	49	46	43	40	38	36	34	32	30	29	28	27	26	25	24	23	22	21			
5	205	164	137	117	103	91	82	75	68	63	59	55	51	48	46	43	41	39	37	36	34	33	32	30	29	28	27			
6	260	208	173	149	130	116	104	95	87	80	74	69	65	61	58	55	52	50	47	45	43	42	40	39	37	36	35			
7	330	264	220	189	165	147	132	120	110	102	94	88	83	78	73	69	66	63	60	57	55	53	51	49	47	46	44	43	41	
8	420	336	280	240	210	187	168	153	140	129	120	112	105	99	93	88	84	80	76	73	70	67	65	62	60	58	56	54	53	
9	535	428	357	306	268	238	214	195	178	165	153	143	134	126	119	113	107	102	97	93	89	86	82	79	76	74	71	69	67	
10	680	544	453	389	340	302	272	247	227	209	194	181	170	160	151	143	136	130	124	118	113	109	105	101	97	94	91	88	85	
11	865	692	577	494	433	384	346	315	288	266	247	231	216	204	192	182	173	165	157	150	144	138	133	128	124	119	115	112	108	
12	1095	876	730	626	548	487	438	398	365	337	313	292	274	258	243	231	219	209	199	190	183	175	168	162	156	151	146	141	137	
13			823	706	618	549	494	449	412	380	353	329	309	291	274	260	247	235	225	215	206	198	190	183	176	170	165	159	154	
14			927	794	695	618	556	505	463	428	397	371	348	327	309	293	278	265	253	242	232	222	214	206	199	192	185	179	174	
15			1040	891	780	693	624	567	520	480	446	416	390	367	347	328	312	297	284	271	260	250	240	231	223	215	208	201	195	
16			1153	989	865	769	692	629	577	532	494	461	433	407	384	364	346	330	315	301	288	277	266	256	247	239	231	223	216	
17			1270	1089	953	847	762	693	635	586	544	508	476	448	423	401	381	363	346	331	318	305	293	282	272	263	254	246	238	
18			1443	1237	1083	962	866	787	722	666	619	577	541	509	481	456	433	412	394	377	361	346	333	321	309	299	289	279	271	
19			1640	1406	1230	1093	984	895	820	757	703	656	615	579	547	518	492	469	447	428	410	394	378	364	351	339	328	317	308	
20			1787	1531	1340	1191	1072	975	893	825	766	715	670	631	596	564	536	510	487	466	447	429	412	397	383	370	357	346	335	
21			1943	1666	1458	1296	1166	1060	972	897	833	777	729	686	648	614	583	555	530	507	486	466	448	432	416	402	389	376	364	
22			2123	1820	1593	1416	1274	1158	1062	980	910	849	796	749	708	671	637	607	579	554	531	510	490	472	455	439	425	411	398	
23			2313	1983	1735	1542	1388	1262	1157	1068	991	925	868	816	771	731	694	661	631	603	578	555	534	514	496	479	463	448	434	
24			2517	2157	1888	1678	1510	1373	1258	1162	1079	1007	944	888	839	795	755	719	686	657	629	604	581	559	539	521	503	487	472	
25			2767	2371	2075	1844	1660	1509	1383	1277	1186	1107	1038	976	922	874	830	790	755	722	692	664	638	615	593	572	553	535	519	
26			3053	2617	2290	2036	1832	1665	1527	1409	1309	1221	1145	1078	1018	964	916	872	833	797	763	733	705	679	654	632	611	591	573	
27				2980	2608	2318	2086	1896	1738	1605	1490	1391	1304	1227	1159	1098	1043	993	948	907	869	834	802	773	745	719	695	673	652	
28				3374	2953	2624	2362	2147	1968	1817	1687	1575	1476	1389	1312	1243	1181	1125	1074	1027	984	945	908	875	844	814	787	762	738	
29				3686	3225	2867	2580	2345	2150	1985	1843	1720	1613	1518	1433	1358	1290	1229	1173	1122	1075	1032	992	956	921	890	860	832	806	
30				4017	3515	3124	2812	2556	2343	2163	2009	1875	1758	1654	1562	1480	1406	1339	1278	1223	1172	1125	1082	1041	1004	970	937	907	879	
31				4377	3830	3404	3064	2785	2553	2357	2189	2043	1915	1802	1702	1613	1532	1459	1393	1332	1277	1226	1178	1135	1094	1057	1021	988	958	
32				4774	4178	3713	3342	3038	2785	2571	2387	2228	2089	1966	1857	1759	1671	1591	1519	1453	1393	1337	1285	1238	1194	1152	1114	1078	1044	
33				5466	4783	4251	3826	3478	3188	2943	2733	2551	2391	2251	2126	2014	1913	1822	1739	1663	1594	1530	1472	1417	1366	1319	1275	1234	1196	
34						4698	4228	3844	3523	3252	3020	2819	2643	2487	2349	2225	2114	2013	1922	1838	1762	1691	1626	1566	1510	1458	1409	1364	1321	
35						5147	4632	4211	3860	3563	3309	3088	2895	2725	2573	2438	2316	2206	2105	2014	1930	1853	1782	1716	1654	1597	1544	1494	1448	
36						5851	5266	4787	4388	4051	3761	3511	3291	3098	2926	2772	2633	2508	2394	2290	2194	2106	2025	1950	1881	1816	1755	1699	1646	
37						6658	5992	5447	4993	4609	4280	3995	3745	3525	3329	3154	2996	2853	2724	2605	2497	2397	2305	2219	2140	2066	1997	1933	1873	
38						7258	6532	5938	5443	5025	4666	4355	4083	3842	3629	3438	3266	3110	2969	2840	2722	2613	2512	2419	2333	2252	2177	2107	2041	
39						7911	7120	6473	5933	5477	5086	4747	4450	4188	3956	3747	3560	3390	3236	3096	2967	2848	2738	2637	2543	2455	2373	2297	2225	
40								7060	6472	5974	5547	5177	4854	4568	4314	4087	3883	3698	3530	3377	3236	3106	2987	2876	2774	2678	2589	2505	2427	
41								7687	7047	6505	6040	5637	5285	4974	4698	4451	4228	4027	3844	3677	3523	3382	3252	3132	3020	2916	2819	2728	2643	
42								8422	7720	7126	6617	6176	5790	5449	5147	4876	4632	4411	4211	4028	3860	3706	3563	3431	3309	3194	3088	2988	2895	
43								9573	8775	8100	7521	7020	6581	6194	5850	5542	5265	5014	4786	4578	4388	4212	4050	3900	3761	3631	3510	3397	3291	
44								10893	9985	9217	8559	7988	7489	7048	6657	6306	5991	5706	5446	5210	4993	4793	4608	4438	4279	4132	3994	3865	3744	
45								11878	10888	10051	9333	8711	8166	7686	7259	6877	6533	6222	5939	5681	5444	5226	5025	4839	4666	4506	4355	4215	4083	
46								12945	11867	10954	10171	9493	8900	8376	7911	7495	7120	6781	6473	6191	5933	5696	5477	5274	5086	4910	4747	4594	4450	
47								14118	12942	11946	11093	10353	9706	9135	8628	8174	7765	7395	7059	6752	6471	6212	5973	5752	5546	5355	5177	5010	4853	
48								15376	14095	13011	12081	11276	10571	9949	9397	8902	8457	8054	7688	7354	7048	6766	6505	6264	6041	5832	5638	5456	5286	
49								16602	15218	14048	13044	12175	11414	10742	10146	9612	9131	8696	8301	7940	7609	7305	7024	6764	6522	6297	6087	5891	5707	
50								18015	16513	15243	14154	13211	12385	11656	11009	10429	9908	9436	9007	8616	8257	7926	7622	7339	7077	6833	6605	6392	6193	
51								19376	17762	16395	15224	14209	13321	12538	11841	11218	10657	10150	9688	9267	8881	8526	8198	7894	7612	7350	7105	6875	6661	
52								20947	19202	17725	16459	15361	14401	13554	12801	12127	11521	10972	10474	10018	9601	9217	8862	8534	8229	7946	7681	7433	7201	
53								22624	20738	19143	17776	16591	15554	14639	13826	13098	12443	11850	11312	10820	10369	9954	9572	9217	8888	8581	8295	8028	7777	
54								24091	22083	20385	18929	17667	16563	15588	14722	13947	13250	12619	12045	11522	11042	10600	10192	9815	9464	9138	8833	8548	8281	
55								25838	23685	21863	20301	18948	17764	16719	15790	14959	14211	13534	12919	12357	11843	11369	10932	10527	10151	9801	9474	9168	8882	
56								27713	25403	23449	21774	20323	19053	17932	16936	16044	15242	14516	13856	13254	12702	12194	11725	11290	10887	10512	10161	9834	9526	
57								29724	27247	25151	23354	21797	20435	19233	18164	17208	16348	15570	14862	14216	13623	13078	12575	12110	11677	11274	10899	10547	10218	
58								31880	29223	26975	25049	23379	21918	20628	19482	18457	17534	16699	15940	15247	14612	14027	13488	12988	12524	12092	11689	11312	10959	
59												24577	23041	21686	20481	19403	18433	17555	16757	16029	15361	14746	14179	13654	13166	12712	12289	11892	11521	
60												25839	24224	22799	21532	20399	19379	18456	17617	16851	16149	15503	14907	14355	13842	13365	12919	12503	12112	
61												27164	25466	23968	22637	21445	20373	19403	18521	17716	16978	16298	15672	15091	14552	14050	13582	13144	12733	
62												28557	26773	25198	23798	22545	21418	20398	19471	18624	17848	17134	16475	15865	15299	14771	14279	13818	13386	
63												29723	27865	26226	24769	23465	22292	21230	20265	19384	18577	17834	17148	16513	15923	15374	14861	14382	13933	
64												30937	29004	27298	25781	24424	23203	22098	21094	20177	19336	18562	17848	17187	16574	16002	15469	14970	14502	
65												32200	30188	28412	26833	25421	24150	23000	21955	21000	20125	19320	18577	17889	17250	16655	16100	15581	15094	
66												33515	31420	29572	27929	26459	25136	23939	22851	21857	20947	20109	19335	18619	17954	17335	16757	16217	15710	

Select Figure No. CA51 Constant Effort Supports from the right hand side of the heavy line

CONSTANT EFFORT SUPPORT SELECTION TABLE

LOADS IN KG

Constant Support Size	TOTAL TRAVEL mm																													
	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610
Min Load																													
1																													
2																													
3																													
4																													
5																													
6																													
7	40	39	38	37	36	35	34	33	32	31																			
8	51	49	48	47	45	44	43	42	41	40																			
9	65	63	61	59	58	56	55	54	52	51																			
10	82	80	78	76	74	72	70	68	66	65																			
11	105	102	99	96	94	91	89	87	84	82																			
12	133	129	125	122	118	115	112	110	107	104																			
13	150	145	141	137	134	130	127	124	120	118																			
14	168	164	159	154	150	146	143	139	136	132																			
15	189	184	178	173	169	164	160	156	152	149																			
16	210	204	198	192	187	182	177	173	169	165																			
17	231	224	218	212	206	201	195	191	186	181																			
18	262	255	247	241	234	228	222	217	211	206																			
19	298	289	281	273	266	259	252	246	240	234	229	224	219	214	209	205	201	197											
20	325	315	306	298	290	282	275	268	261	255	249	244	238	233	228	223	219	214											
21	353	343	333	324	315	307	299	292	284	278	271	265	259	253	248	243	238	233											
22	386	375	364	354	344	335	327	319	311	303	296	290	283	277	271	265	260	255											
23	421	408	397	386	375	365	356	347	339	330	323	315	308	302	295	289	283	278											
24	458	444	431	419	408	397	387	378	368	360	351	343	336	328	321	315	308	302											
25	503	488	474	461	449	437	426	415	405	395	386	377	369	361	353	346	339	332											
26	555	539	523	509	495	482	470	458	447	436	426	416	407	398	390	382	374	366											
27	632	614	596	579	564	549	535	522	509	497	485	474	464	453	444	435	426	417											
28	716	695	675	656	638	622	606	591	576	562	549	537	525	513	503	492	482	472											
29	782	759	737	717	697	679	662	645	629	614	600	586	573	561	549	538	527	516											
30	852	827	803	781	760	740	721	703	686	670	654	639	625	611	598	586	574	562											
31	928	901	875	851	828	806	786	766	747	730	713	696	681	666	652	638	625	613											
32	1013	983	955	928	903	879	857	836	815	796	777	760	743	727	711	696	682	668											
33	1159	1125	1093	1063	1034	1007	981	957	933	911	890	870	850	832	814	797	781	765											
34	1281	1244	1208	1174	1143	1113	1084	1057	1031	1007	983	961	940	919	900	881	863	846	829	813	798	783	769	755	742	729	717	705	693
35	1404	1362	1323	1287	1252	1219	1188	1158	1130	1103	1077	1053	1029	1007	986	965	945	926	908	891	874	858	842	827	813	799	785	772	759
36	1596	1549	1505	1463	1423	1386	1350	1317	1284	1254	1225	1197	1170	1145	1120	1097	1075	1053	1033	1013	994	975	957	940	924	908	893	878	863
37	1816	1762	1712	1664	1619	1577	1536	1498	1461	1427	1393	1362	1332	1303	1275	1248	1223	1198	1175	1152	1131	1110	1089	1070	1051	1033	1016	999	982
38	1979	1921	1866	1814	1765	1719	1675	1633	1593	1555	1519	1485	1452	1420	1390	1361	1333	1306	1281	1256	1232	1210	1188	1166	1146	1126	1107	1089	1071
39	2158	2094	2034	1978	1924	1874	1826	1780	1737	1695	1656	1618	1582	1548	1515	1483	1453	1424	1396	1369	1343	1319	1295	1271	1249	1228	1207	1187	1167
40	2353	2284	2219	2157	2099	2044	1991	1942	1894	1849	1806	1765	1726	1688	1652	1618	1585	1553	1523	1493	1465	1438	1412	1387	1362	1339	1316	1294	1273
41	2562	2487	2416	2349	2285	2225	2168	2114	2062	2013	1967	1922	1879	1838	1799	1762	1726	1691	1658	1626	1595	1566	1537	1510	1484	1458	1433	1409	1386
42	2807	2725	2647	2573	2504	2438	2375	2316	2260	2206	2154	2105	2059	2014	1971	1930	1891	1853	1816	1782	1748	1716	1684	1654	1625	1597	1570	1544	1519
43	3191	3097	3009	2925	2846	2771	2700	2633	2568	2507	2449	2393	2340	2289	2240	2194	2149	2106	2065	2025	1987	1950	1915	1880	1847	1816	1785	1755	1726
44	3631	3524	3423	3328	3238	3153	3072	2996	2922	2853	2787	2723	2663	2605	2549	2496	2445	2396	2349	2304	2261	2219	2179	2140	2102	2066	2031	1997	1964
45	3959	3843	3733	3629	3531	3438	3350	3267	3187	3111	3039	2970	2904	2840	2780	2722	2667	2613	2562	2513	2465	2420	2376	2333	2292	2253	2215	2178	2142
46	4315	4188	4069	3956	3849	3747	3651	3560	3473	3390	3312	3236	3164	3096	3030	2967	2906	2848	2792	2738	2687	2637	2589	2543	2498	2455	2414	2373	2334
47	4706	4568	4437	4314	4197	4087	3982	3883	3788	3698	3612	3530	3451	3376	3304	3235	3169	3106	3045	2987	2930	2876	2824	2773	2725	2678	2632	2588	2546
48	5125	4975	4833	4698	4571	4451	4337	4229	4125	4027	3933	3844	3759	3677	3599	3524	3452	3383	3316	3253	3191	3132	3075	3020	2967	2916	2867	2819	2773
49	5534	5371	5218	5073	4936	4806	4683	4566	4454	4348	4247	4150	4058	3970	3886	3805	3727	3652	3581	3512	3446	3382	3320	3261	3204	3149	3095	3044	2994
50	6005	5828	5662	5504	5356	5215	5081	4954	4833	4718	4608	4504	4404	4308	4216	4128	4044	3963	3885	3811	3739	3670	3603	3539	3476	3417	3359	3303	3249
51	6459	6269	6090	5921	5761	5609	5465	5329	5199	5075	4957	4844	4736	4633	4535	4440	4350	4263	4179	4099	4022	3947	3875	3806	3739	3675	3613	3552	3494
52	6982	6777	6583	6401	6228	6064	5908	5761	5620	5486	5359	5237	5120	5009	4903	4800	4702	4608	4518	4431	4348	4267	4189	4115	4042	3973	3905	3840	3777
53	7541	7319	7110	6913	6726	6549	6381	6222	6070	5925	5787	5656	5530	5410	5295	5185	5079	4977	4880	4786	4695	4609	4525	4444	4366	4291	4218	4148	4080
54	8030	7794	7571	7361	7162	6974	6795	6625	6463	6310	6163	6023	5889	5761	5638	5521	5408	5300	5196	5096	5000	4907	4818	4732	4649	4569	4492	4417	4344
55	8613	8359	8121	7895	7682	7479	7288	7106	6932	6767	6610	6460	6316	6179	6047	5921	5800	5684	5573	5466	5363	5263	5168	5075	4986	4900	4817	4737	4659
56	9238	8966	8710	8468	8239	8022	7816	7621	7435	7258	7089	6928	6774	6627	6486	6351	6221	6097	5977	5862	5752	5645	5543	5444	5348	5256	5167	5081	4997
57	9908	9616	9342	9082	8837	8604	8384	8174	7975	7785	7604	7431	7266	7108	6957	6812	6673	6539	6411	6288	6169	6055	5945	5839	5736	5637	5542	5449	5360
58	10627	10314	10019	9741	9478	9228	8992	8767	8553	8350	8155	7970	7793	7623	7461	7306	7157	7014	6876	6744	6617	6494	6376	6262	6152	6046	5944	5845	5749
59	11172	10843	10533	10241	9964	9702	9453	9217	8992	8778	8573	8379	8192	8014	7844	7680	7524	7373	7229	7090	6956	6827	6703	6583	6468	6356	6248	6144	6044
60	11745	11399	11074	10766	10475	10199	9938	9690	9453	9228	9013	8809	8613	8426	8246	8075	7910	7752	7600	7453	7313	7177	7047	6921	6800	6682	6569	6460	6354
61	12347	11984	11642	11318	11012	10723	10448	10187	9938	9701	9476	9260	9055	8858	8669	8489	8316	8149	7989	7836	7688	7546	7408	7276	7148	7025	6906	6791	6680
62	12981	12599	12239	11899	11577	11273	10984	10709	10448	10199	9962	9735	9519	9312	9114	8924	8742	8567	8399	8238	8082	7933	7788	7649	7515	7386	7260	7139	7022
63	13510	13113	12738	12384	12050	11733	11432	11146	10874	10615	10368	10133	9908	9692	9486	9288	9099	8917	8742	8574	8412	8256	8106	7961	7822	7687	7557	7431	7309
64	14062	13649	13259	12891	12542	12212	11899	11602	11319	11049	10792	10547	10312	10088	9874	9668	9471	9281	9099	8924	8756	8594	8437	8287	8141	8001	7865	7734	7608
65	14636	14206	13800	13417	13054	12711	12385	12075	11780	11500	11233	10977	10733	10500	10277	10063	9857	9660	9471	9288	9113	8944	8782	8625	8474	8328	8186	8050	7918
66	15234	14786	14363	13964	13587	13229	12890	12568	12261	11970	11691	11425	11172	10929	10696	10473	10260	10054	9857	9668	9485	9310	9140	8977	8820	8668	8521	8379	8241

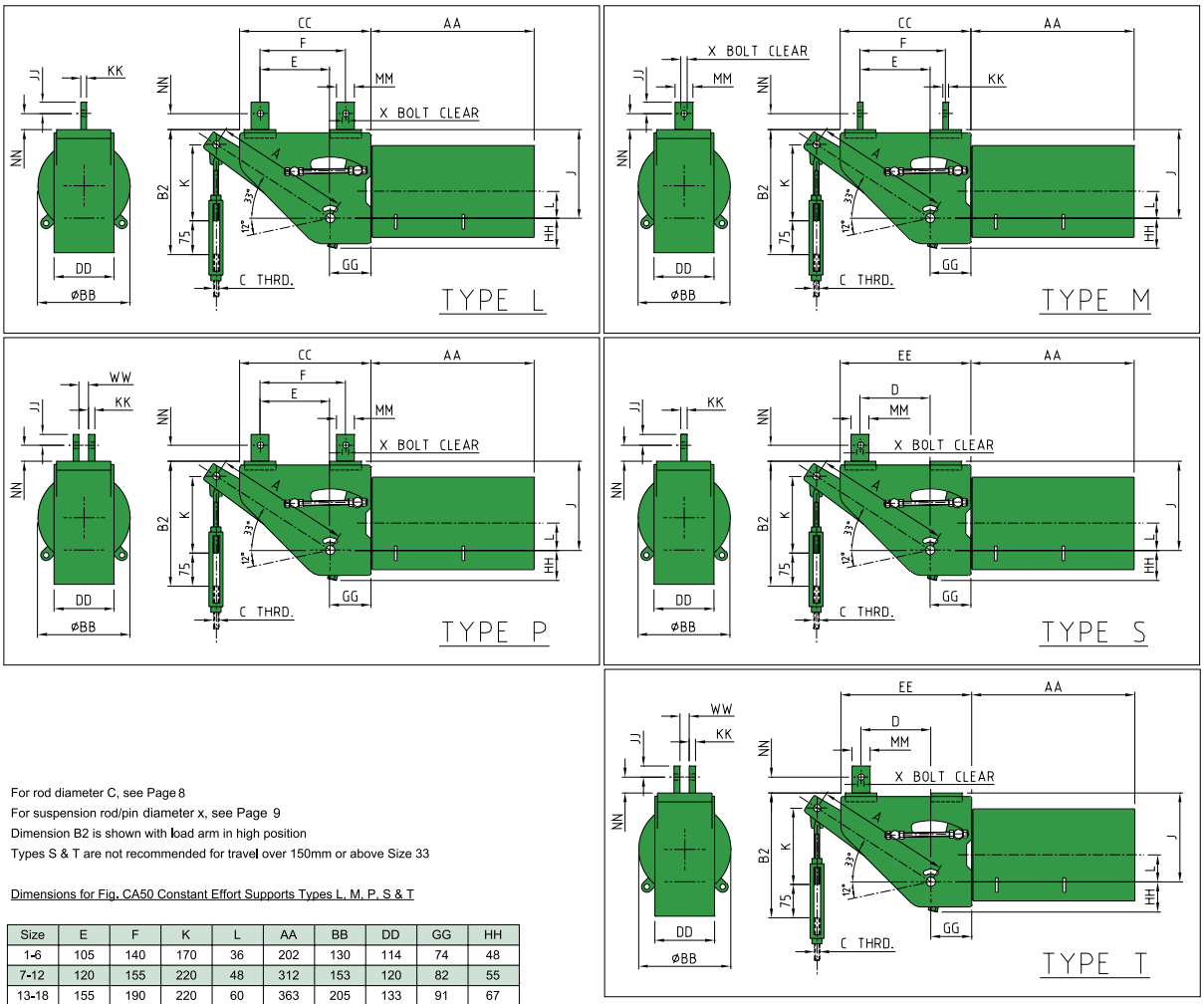
HANGER ROD SIZES (THREAD SIZE C)

| Spring Size | TRAVEL | | |

TOP SUSPENSION SIZES (DIAMETER X) BOLT OR ROD

| Spring Size | TRAVEL | | |

CONSTANT EFFORT SUPPORTS FIG. CA50 TYPES L, M, P, S & T



For rod diameter C, see Page 8
For suspension rod/pin diameter x, see Page 9
Dimension B2 is shown with load arm in high position
Types S & T are not recommended for travel over 150mm or above Size 33

Dimensions for Fig. CA50 Constant Effort Supports Types L, M, P, S & T

Size	E	F	K	L	AA	BB	DD	GG	HH
1-6	105	140	170	36	202	130	114	74	48
7-12	120	155	220	48	312	153	120	82	55
13-18	155	190	220	60	363	205	133	91	67
19-26	190	240	260	72	465	248	149	118	69
27-33	235	300	260	89	639	291	181	148	94
34-39	290	365	300	108	760	357	226	168	113
40-47	355	455	340	155	1025	462	281	218	136
48-58	340	480	400	200	1127	573	335	283	183
59-66	380	560	400	300	1639	573	391	322	207

Dimensions of Suspension Lugs

Dia X	12	16	20	24	30	36	42	48	56	64	72	80	90
JJ	25	25	30	40	45	60	70	80	90	100	110	130	140
KK	6	6	10	10	12	15	15	20	20	20	25	25	30
MM	40	50	50	70	80	100	120	130	150	170	180	220	220
NN	35	40	45	55	60	75	90	100	105	115	125	145	160
WW	30	30	35	40	50	65	70	75	85	90	100	110	120

Dimensions J, CC & EE

Size	Travel 40-140			Travel 150-220			Travel 230-300			Travel 310-360			Travel 370-420			Travel 430-500			Travel 510-610		
	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE
1-6	140	198	234	191	198	234	249	198	-	-	-	-	-	-	-	-	-	-	-	-	-
7-12	170	231	262	193	231	272	250	231	-	294	231	-	337	231	-	-	-	-	-	-	-
13-18	198	291	291	198	291	291	254	282	-	297	282	-	341	282	-	-	-	-	-	-	-
19-26	245	347	347	245	347	347	263	347	-	301	347	-	345	347	-	403	347	-	-	-	-
27-33	307	436	436	307	436	436	307	436	-	307	436	-	348	436	-	405	436	-	-	-	-
34-39	360	520	-	360	520	-	360	520	-	360	520	-	360	520	-	414	520	-	494	520	-
40-47	465	630	-	465	630	-	465	630	-	465	630	-	465	630	-	465	630	-	510	630	-
48-58	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-
59-66	-	-	-	755	820	-	755	820	-	755	820	-	755	820	-	755	820	-	755	820	-

Weights kg

Size	Approx Weight
1-4	13
5-6	13
7-9	20
10-12	22
13-16	36
17-18	40
19-22	64
23-26	71

Size	Approx Weight
27-28	124
29-31	135
32-33	149
34-35	230
36-37	250
38-39	270
40-42	440
43-44	490

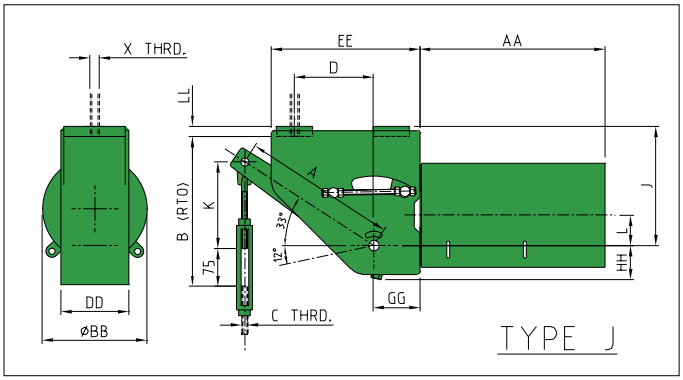
Size	Approx Weight
45-47	550
48-49	720
50-52	800
53-55	850
56-58	1120
59-62	1690
63-66	1790

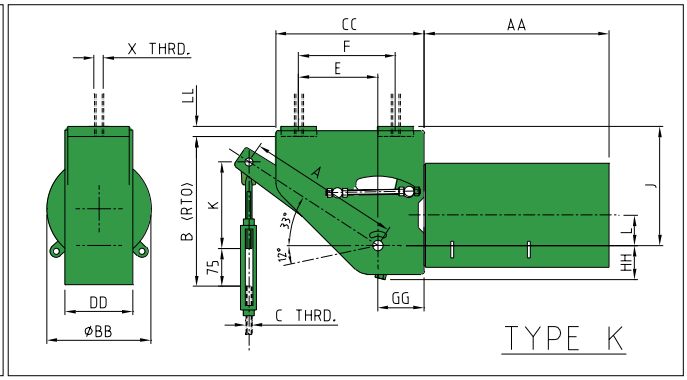
CONSTANT EFFORT SUPPORTS FIG. CA50 TYPES L, M, P, S & T

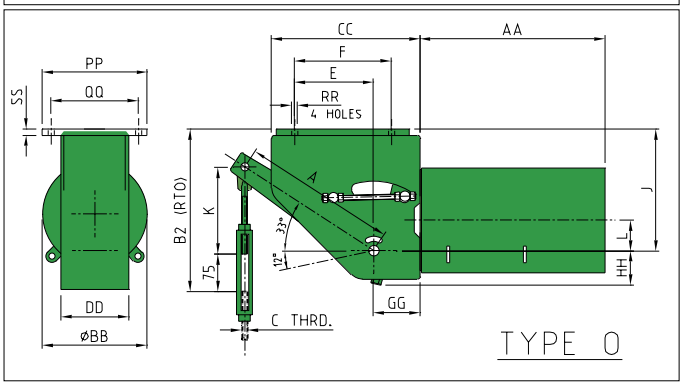
CA50 Type L

Size	=>	1-6			7-12			13-18			19-26			27-33			34-39		40-47		48-58		59-66	
Travel	A	B2	LL	D	B2	LL	D	B2	LL	D	B2	LL	D	B2	LL	D	B2	LL	B2	LL	B2	LL	B2	LL
40	54	356	15	44	436	20																		
50	67	349	15	55	429	20																		
60	80	341	15	65	421	20	68	449	20	68	536	30	68											
70	94	334	15	75	414	20	79	442	20	79	529	30	79	591	40	77								
80	107	327	15	85	407	20	90	435	20	90	522	30	90	584	40	88								
90	120	320	15	95	400	20	101	428	20	101	515	30	101	577	40	99	670	40						
100	133	313	15	104	393	20	112	421	20	112	508	30	111	570	40	109	663	40						
110	147	305	15	113	385	20	123	413	20	123	500	30	122	562	40	120	655	40	800	50	1005	80		
120	160	298	15	122	378	20	133	406	20	133	493	30	133	555	40	130	648	40	793	50	998	80		
130	173	291	15	131	371	20	144	399	20	144	486	30	143	548	40	141	641	40	786	50	991	80		
140	187	283	15	140	363	20	154	391	20	154	478	30	154	540	40	151	633	40	778	50	983	80		
150	200	327	15	149	379	20	164	384	20	165	471	30	164	533	30	161	626	40	771	50	976	80	1121	80
160	213	320	15		372	20		377	20		464	30		526	30		619	40	764	50	969	80	1114	80
170	226	313	15		365	20		370	20		457	30		519	30		612	40	757	50	962	80	1107	80
180	240	305	15		357	20		362	20		449	30		511	30		604	40	749	50	954	80	1099	80
190	253	298	15		350	20		355	20		442	30		504	30		597	40	742	50	947	80	1092	80
200	266	291	15		343	20		348	20		435	30		497	30		590	40	735	50	940	80	1085	80
210	280	284	15		336	20		341	20		428	30		490	30		583	40	728	50	933	80	1078	80
220	293	276	15		328	20		333	20		420	30		482	30		575	40	720	50	925	80	1070	80
230	306	327	15		378	20		382	20		431	20		475	30		568	40	713	40	918	60	1063	80
240	319	320	15		371	20		375	20		424	20		468	30		561	40	706	40	911	60	1056	80
250	333	313	15		364	20		368	20		417	20		461	30		554	40	699	40	904	60	1049	80
260	346	306	15		357	20		361	20		410	20		454	30		547	40	692	40	897	60	1042	80
270	359	298	15		349	20		353	20		402	20		446	30		539	40	684	40	889	60	1034	80
280	373	291	15		342	20		346	20		395	20		439	30		532	40	677	40	882	60	1027	80
290	386	284	15		335	20		339	20		388	20		432	30		525	40	670	40	875	60	1020	80
300	399	277	15		328	20		332	20		381	20		425	30		518	40	663	40	868	60	1013	80
310	412				365	20		368	20		412	20		418	30		511	40	656	40	861	50	1006	80
320	426				357	20		360	20		404	20		410	30		503	40	648	40	853	50	998	80
330	439				350	20		353	20		397	20		403	30		496	40	641	40	846	50	991	80
340	452				343	20		346	20		390	20		396	30		489	40	634	40	839	50	984	80
350	466				335	20		338	20		382	20		388	30		481	40	626	40	831	50	976	80
360	479				328	20		331	20		375	20		381	30		474	40	619	40	824	50	969	80
370	492				364	20		368	20		412	20		415	30		467	40	612	40	817	50	962	60
380	505				357	20		361	20		405	20		408	30		460	40	605	40	810	50	955	60
390	519				349	20		353	20		397	20		400	30		452	40	597	40	802	50	947	60
400	532				342	20		346	20		390	20		393	30		445	40	590	40	795	50	940	60
410	545				335	20		339	20		383	20		386	30		438	40	583	40	788	50	933	60
420	559				328	20		332	20		376	20		379	30		431	40	576	40	781	50	926	60
430	572										426	20		428	30		477	40	568	40	773	50	918	60
440	585										419	20		421	30		470	40	561	40	766	50	911	60
450	598										412	20		414	30		463	40	554	40	759	50	904	60
460	612										405	20		407	30		456	40	547	40	752	50	897	60
470	625										398	20		400	30		449	40	540	40	745	50	890	60
480	638										391	20		393	30		442	40	533	40	738	50	883	60
490	652										383	20		385	30		434	40	525	40	730	50	875	60
500	665										376	20		378	30		427	40	518	40	723	50	868	60
510	678																500	40	556	40	716	50	861	60
520	691																493	40	549	40	709	50	854	60
530	705																485	40	541	40	701	50	846	60
540	718																478	40	534	40	694	50	839	60
550	731																471	40	527	40	687	50	832	60
560	745																463	40	519	40	679	50	824	60
570	758																456	40	512	40	672	50	817	60
580	771																449	40	505	40	665	50	810	60
590	785																441	40	497	40	657	50	802	60
600	798																434	40	490	40	650	50	795	60
610	811																427	40	483	40	643	50	788	60

CONSTANT EFFORT SUPPORTS FIG. CA50 TYPES J, K & O







For rod diameter C, see Page 8
For suspension rod/pin diameter x, see Page 9
Rod Take Out (B, B2) is shown with load arm in high position
Type J is not recommended for travel over 150mm or above Size 33

Dimensions for Fig. CA50 Constant Effort Supports Types J, K & O

Size	E	F	K	L	AA	BB	DD	GG	HH	PP	QQ	RR	SS
1-6	105	140	170	36	202	130	114	74	48	215	165	14	6
7-12	120	155	220	48	312	153	120	82	55	230	180	18	6
13-18	155	190	220	60	363	205	133	91	67	255	205	22	8
19-26	190	240	260	72	465	248	149	118	69	270	220	22	8
27-33	235	300	260	89	639	291	181	148	94	320	265	22	10
34-39	290	365	300	108	760	357	226	168	113	425	335	27	10
40-47	355	455	340	155	1025	462	281	218	136	480	395	33	15
48-58	340	480	400	200	1127	573	335	283	183	745	520	45	20
59-66	380	560	400	300	1639	573	391	322	207	802	632	51	25

Dimensions J, CC & EE

Size	Travel 40-140			Travel 150-220			Travel 230-300			Travel 310-360			Travel 370-420			Travel 430-500			Travel 510-610		
	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE	J	CC	EE
1-6	140	198	234	191	198	234	249	198	-	-	-	-	-	-	-	-	-	-	-	-	-
7-12	170	231	262	193	231	272	250	231	-	294	231	-	337	231	-	-	-	-	-	-	-
13-18	198	291	291	198	291	291	254	282	-	297	282	-	341	282	-	-	-	-	-	-	-
19-26	245	347	347	245	347	347	263	347	-	301	347	-	345	347	-	403	347	-	-	-	-
27-33	307	436	436	307	436	436	307	436	-	307	436	-	348	436	-	405	436	-	-	-	-
34-39	360	520	-	360	520	-	360	520	-	360	520	-	360	520	-	414	520	-	494	520	-
40-47	465	630	-	465	630	-	465	630	-	465	630	-	465	630	-	465	630	-	510	630	-
48-58	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-	610	721	-
59-66	-	-	-	755	820	-	755	820	-	755	820	-	755	820	-	755	820	-	755	820	-

Weights kg

Size	Approx Weight
1-4	13
5-6	13
7-9	20
10-12	22
13-16	36
17-18	40
19-22	64
23-26	71

Size	Approx Weight
27-28	124
29-31	135
32-33	149
34-35	230
36-37	250
38-39	270
40-42	440
43-44	490

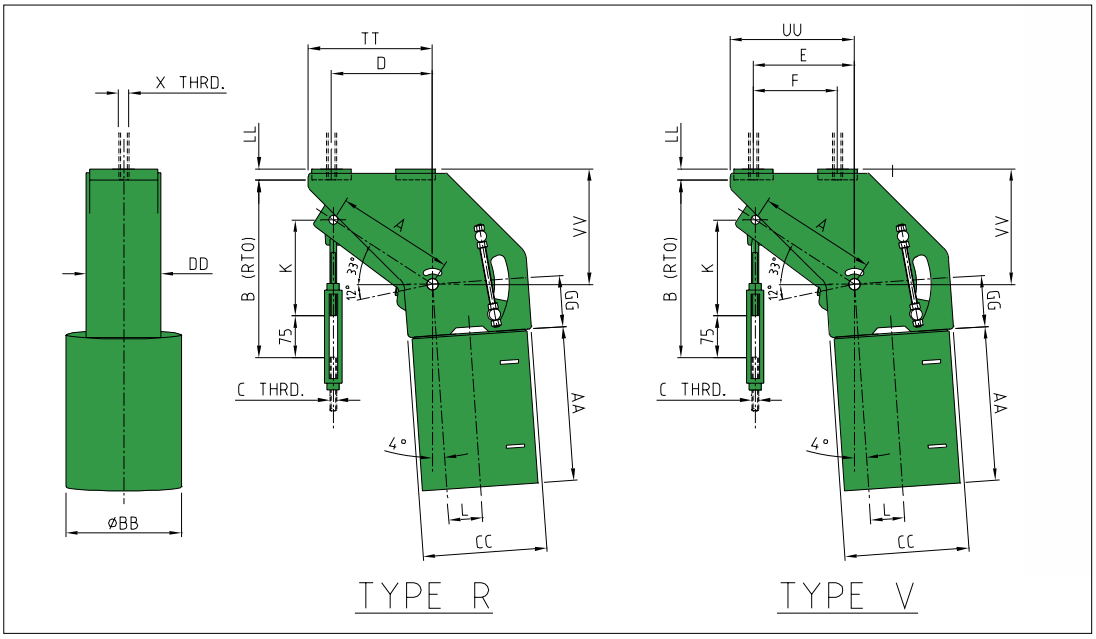
Size	Approx Weight
45-47	550
48-49	720
50-52	800
53-55	850
56-58	1120
59-62	1690
63-66	1790

CONSTANT EFFORT SUPPORTS FIG. CA50 TYPES J, K & O

CA50 Type K

Size	=>	1-6				7-12				13-18				19-26				27-33				34-39			40-47			48-58			59-66		
Travel	A	B	B2	LL	D	B	B2	LL	D	B	B2	LL	D	B	B2	LL	D	B	B2	LL	D	B	B2	LL	B	B2	LL	B	B2	LL	B	B2	LL
40	54	341	356	15	44	416	436	20																									
50	67	334	349	15	55	409	429	20																									
60	80	326	341	15	65	401	421	20	68	429	449	20	68	506	536	30	68																
70	94	319	334	15	75	394	414	20	79	422	442	20	79	499	529	30	79	551	591	40	77												
80	107	312	327	15	85	387	407	20	90	415	435	20	90	492	522	30	90	544	584	40	88												
90	120	305	320	15	95	380	400	20	101	408	428	20	101	485	515	30	101	537	577	40	99	630	670	40									
100	133	298	313	15	104	373	393	20	112	401	421	20	112	478	508	30	111	530	570	40	109	623	663	40									
110	147	290	305	15	113	365	385	20	123	393	413	20	123	470	500	30	122	522	562	40	120	615	655	40	750	800	50	925	1005	80			
120	160	283	298	15	122	358	378	20	133	386	406	20	133	463	493	30	133	515	555	40	130	608	648	40	743	793	50	918	998	80			
130	173	276	291	15	131	351	371	20	144	379	399	20	144	456	486	30	143	508	548	40	141	601	641	40	736	786	50	911	991	80			
140	187	268	283	15	140	343	363	20	154	371	391	20	154	448	478	30	154	500	540	40	151	593	633	40	728	778	50	903	983	80			
150	200	312	327	15	149	359	379	20	164	364	384	20	165	441	471	30	164	503	533	30	161	586	626	40	721	771	50	896	976	80	1096	1176	80
160	213	305	320	15		352	372	20		357	377	20		434	464	30		496	526	30		579	619	40	714	764	50	889	969	80	1089	1169	80
170	226	298	313	15		345	365	20		350	370	20		427	457	30		489	519	30		572	612	40	707	757	50	882	962	80	1082	1162	80
180	240	290	305	15		337	357	20		342	362	20		419	449	30		481	511	30		564	604	40	699	749	50	874	954	80	1074	1154	80
190	253	283	298	15		330	350	20		335	355	20		412	442	30		474	504	30		557	597	40	692	742	50	867	947	80	1067	1147	80
200	266	276	291	15		323	343	20		328	348	20		405	435	30		467	497	30		550	590	40	685	735	50	860	940	80	1060	1140	80
210	280	269	284	15		316	336	20		321	341	20		398	428	30		460	490	30		543	583	40	678	728	50	853	933	80	1053	1133	80
220	293	261	276	15		308	328	20		313	333	20		390	420	30		452	482	30		535	575	40	670	720	50	845	925	80	1045	1125	80
230	306	312	327	15		358	378	20		362	382	20		411	431	20		445	475	30		528	568	40	673	713	40	858	918	60	1038	1118	80
240	319	305	320	15		351	371	20		355	375	20		404	424	20		438	468	30		521	561	40	666	706	40	851	911	60	1031	1111	80
250	333	298	313	15		344	364	20		348	368	20		397	417	20		431	461	30		514	554	40	659	699	40	844	904	60	1024	1104	80
260	346	291	306	15		337	357	20		341	361	20		390	410	20		424	454	30		507	547	40	652	692	40	837	897	60	1017	1097	80
270	359	283	298	15		329	349	20		333	353	20		382	402	20		416	446	30		499	539	40	644	684	40	829	889	60	1009	1089	80
280	373	276	291	15		322	342	20		326	346	20		375	395	20		409	439	30		492	532	40	637	677	40	822	882	60	1002	1082	80
290	386	269	284	15		315	335	20		319	339	20		368	388	20		402	432	30		485	525	40	630	670	40	815	875	60	995	1075	80
300	399	262	277	15		308	328	20		312	332	20		361	381	20		395	425	30		478	518	40	623	663	40	808	868	60	988	1068	80
310	412					345	365	20		348	368	20		392	412	20		388	418	30		471	511	40	616	656	40	811	861	50	981	1061	80
320	426					337	357	20		340	360	20		384	404	20		380	410	30		463	503	40	608	648	40	803	853	50	973	1053	80
330	439					330	350	20		333	353	20		377	397	20		373	403	30		456	496	40	601	641	40	796	846	50	966	1046	80
340	452					323	343	20		326	346	20		370	390	20		366	396	30		449	489	40	594	634	40	789	839	50	959	1039	80
350	466					315	335	20		318	338	20		362	382	20		358	388	30		441	481	40	586	626	40	781	831	50	951	1031	80
360	479					308	328	20		311	331	20		355	375	20		351	381	30		434	474	40	579	619	40	774	824	50	944	1024	80
370	492					344	364	20		348	368	20		392	412	20		385	415	30		427	467	40	572	612	40	767	817	50	957	1017	60
380	505					337	357	20		341	361	20		385	405	20		378	408	30		420	460	40	565	605	40	760	810	50	950	1010	60
390	519					329	349	20		333	353	20		377	397	20		370	400	30		412	452	40	557	597	40	752	802	50	942	1002	60
400	532					322	342	20		326	346	20		370	390	20		363	393	30		405	445	40	550	590	40	745	795	50	935	995	60
410	545					315	335	20		319	339	20		363	383	20		356	386	30		398	438	40	543	583	40	738	788	50	928	988	60
420	559					308	328	20		312	332	20		356	376	20		349	379	30		391	431	40	536	576	40	731	781	50	921	981	60
430	572													406	426	20		398	428	30		437	477	40	528	568	40	723	773	50	913	973	60
440	585													399	419	20		391	421	30		430	470	40	521	561	40	716	766	50	906	966	60
450	598													392	412	20		384	414	30		423	463	40	514	554	40	709	759	50	899	959	60
460	612													385	405	20		377	407	30		416	456	40	507	547	40	702	752	50	892	952	60
470	625													378	398	20		370	400	30		409	449	40	500	540	40	695	745	50	885	945	60
480	638													371	391	20		363	393	30		402	442	40	493	533	40	688	738	50	878	938	60
490	652													363	383	20		355	385	30		394	434	40	485	525	40	680	730	50	870	930	60
500	665													356	376	20		348	378	30		387	427	40	478	518	40	673	723	50	863	923	60
510	678																					460	500	40	516	556	40	666	716	50	856	916	60
520	691																					453	493	40	509	549	40	659	709	50	849	909	60
530	705																					445	485	40	501	541	40	651	701	50	841	901	60
540	718																					438	478	40	494	534	40	644	694	50	834	894	60
550	731																					431	471	40	487	527	40	637	687	50	827	887	60
560	745																					423	463	40	479	519	40	629	679	50	819	879	60
570	758																					416	456	40	472	512	40	622	672	50	812	872	60
580	771																					409	449	40	465	505	40	615	665	50	805	865	60
590	785																					401	441	40	457	497	40	607	657	50	797	857	60
600	798																					394	434	40	450	490	40	600	650	50	790	850	60
610	811																					387	427	40	443		40	593	643	50	783	843	60

CONSTANT EFFORT SUPPORTS FIG. CA51 TYPES R, V & Y



CA51 Type R

For rod diameter C, see Page 8
For suspension rod/pin diameter x, see Page 9
Rod Take Out (B, B2) is shown with load arm in high position
Type R is not recommended for travel over 150mm or above Size 33

Dimensions for Fig. CA51 Constant Effort Supports Types R, V & Y

Size	E	F	K	L	AA	BB	CC	DD	GG	Q	R	S	X	Y	RR	SS	XX	YY
1-6	150	130	170	36	202	130	160	114	74	120	200	240	170	210	14	6	279	102
7-12	155	125	220	48	312	153	196	120	82	155	280	330	200	250	18	6	390	119
13-18	225	195	220	60	363	205	220	133	91	195	370	420	250	300	22	8	457	121
19-26	260	220	260	72	465	248	264	149	118	235	415	480	300	365	22	8	585	152
27-33	285	240	260	89	639	291	320	181	148	290	545	620	350	425	22	10	789	171
34-39	400	355	300	108	760	357	380	226	168	355	580	680	400	500	27	10	927	221
40-47	430	370	340	155	1025	462	500	281	218	475	810	910	560	660	33	15	1244	293
48-58	460	365	400	200	1127	573	600	335	295	590	960	1090	560	690	45	20	1426	348
59-66	430	500	400	300	1639	573	749	391	322	-	-	-	-	-	-	-	-	-

Yoke Table (see Page 19)

Size	Yoke Arrangement is used on these Travels	Width W
1-6	50	82
7-12	60	88
13-18	not used	-
19-26	not used	-
27-33	100	137
34-39	120 to 130	174
40-47	160 to 170	213
48-58	160 to 220	272
59-66	190 to 230	357

Dimensions TT, UU & VV

Size	Travel 50-140			Travel 150-220			Travel 230-300			Travel 310-360			Travel 370-420			Travel 430-500			Travel 510-610		
	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV
1-6	165	165	148	225	165	191	-	165	249	-	-	-	-	-	-	-	-	-	-	-	-
7-12	174	174	158	258	174	215	-	174	250	-	174	294	-	174	337	-	-	-	-	-	-
13-18	267	267	228	267	267	228	-	250	254	-	250	297	-	250	341	-	-	-	-	-	-
19-26	290	290	233	290	290	233	345	290	283	-	290	301	-	290	345	-	290	403	-	-	-
27-33	319	319	250	319	319	250	361	319	307	361	319	307	-	319	348	-	319	405	-	-	-
34-39	440	440	325	440	440	325	440	440	325	440	440	375	500	440	415	590	440	470	-	440	494
40-47	-	492	430	-	492	430	-	492	430	-	492	430	-	492	430	-	492	430	-	492	510
48-58	-	545	471	-	545	471	-	545	471	-	545	471	-	545	471	-	545	490	-	545	556
59-66	-	-	-	-	515	544	-	515	544	-	515	544	-	515	544	-	515	544	-	515	544

Weights, Types R, U & V kg

Size	Approx Weight
1-4	14
5-6	14
7-9	21
10-12	23
13-16	38
17-18	42
19-22	69
23-26	76

Size	Approx Weight
27-28	124
29-31	135
32-33	150
34-35	240
36-37	250
38-39	280
40-42	460
43-44	510

Size	Approx Weight
45-47	570
48-49	730
50-52	810
53-55	860
56-58	1130
59-62	1690
63-66	1790

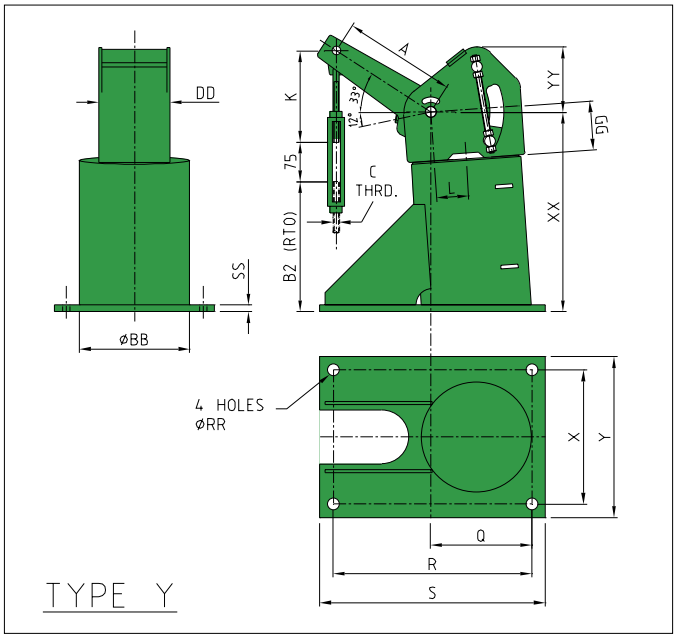
Weights, Type Y kg

Size	Approx Weight
1-4	12
5-6	13
7-9	21
10-12	23
13-16	37
17-18	41
19-22	64
23-26	71

Size	Approx Weight
27-28	119
29-31	131
32-33	145
34-35	230
36-37	250
38-39	270
40-42	460
43-44	510

Size	Approx Weight
45-47	570
48-49	720
50-52	800
53-55	850
56-58	1120

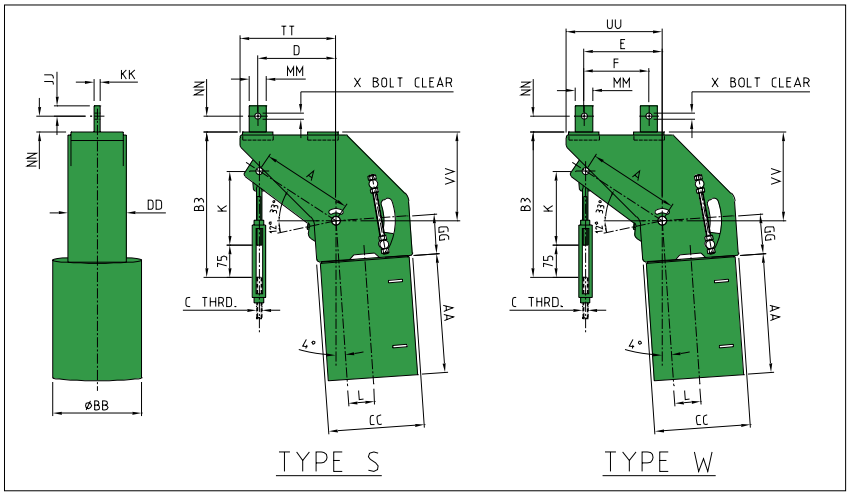
CONSTANT EFFORT SUPPORTS FIG. CA51 TYPES R, V & Y

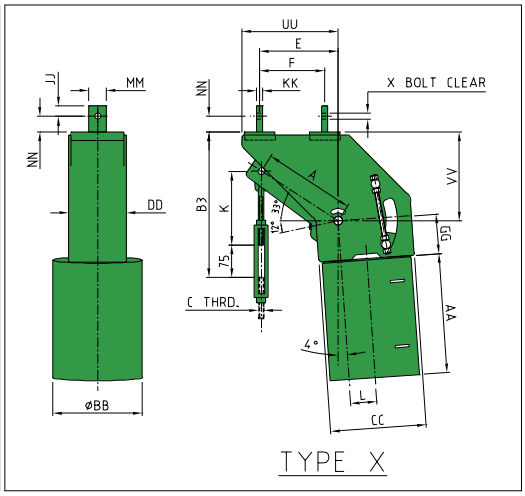


CA51 Type Y

Size	=>	1-6				7-12				13-18				19-26				27-33				34-39			40-47			48-58			59-66	
Travel	A	B	LL	D	B2	B	LL	D	B2	B	LL	D	B2	B	LL	D	B2	B	LL	D	B2	B	LL	B2	B	LL	B2	B	LL	B2	B	LL
50	67	342	15	57	70																											
60	80	334	15	68	78	389	20	70	139																							
70	94	327	15	78	85	382	20	82	146																							
80	107	320	15	88	92	375	20	93	153	445	20	93	220																			
90	120	313	15	98	99	368	20	104	160	438	20	104	227	473	30	105	315															
100	133	306	15	108	106	361	20	115	167	431	20	115	234	466	30	116	322	473	40	115	526											
110	147	298	15	117	114	353	20	126	175	423	20	127	242	458	30	127	330	465	40	127	534											
120	160	291	15	127	121	346	20	137	182	416	20	137	249	451	30	138	337	458	40	138	541	573	40	639								
130	173	284	15	136	128	339	20	147	189	409	20	148	256	444	30	149	344	451	40	149	548	566	40	646								
140	187	276	15	145	136	331	20	158	197	401	20	159	264	436	30	160	352	443	40	160	556	558	40	654								
150	200	312	15	153	143	381	20	168	204	394	20	170	271	429	30	170	359	446	30	170	563	551	40	661								
160	213	305	15		150	374	20		211	387	20		278	422	30		366	439	30		570	544	40	668	679	50	945	750	80	1067		
170	226	298	15		157	367	20		218	380	20		285	415	30		373	432	30		577	537	40	675	672	50	952	743	80	1074		
180	240	290	15		165	359	20		226	372	20		293	407	30		381	424	30		585	529	40	683	664	50	960	735	80	1082		
190	253	283	15		172	352	20		233	365	20		300	400	30		388	417	30		592	522	40	690	657	50	967	728	80	1089	801	80
200	266	276	15		179	345	20		240	358	20		307	393	30		395	410	30		599	515	40	697	650	50	974	721	80	1096	794	80
210	280	269	15		186	338	20		247	351	20		314	386	30		402	403	30		606	508	40	704	643	50	981	714	80	1103	787	80
220	293	261	15		194	330	20		255	343	20		322	378	30		410	395	30		614	500	40	712	635	50	989	706	80	1111	779	80
230	306	312	15		201	358	20		262	362	20		329	431	20		417	445	30		621	493	40	719	638	40	996	719	60	1118	772	80
240	319	305	15		208	351	20		269	355	20		336	424	20		424	438	30		628	486	40	726	631	40	1003	712	60	1125	765	80
250	333	298	15		215	344	20		276	348	20		343	417	20		431	431	30		635	479	40	733	624	40	1010	705	60	1132	758	80
260	346	291	15		222	337	20		283	341	20		350	410	20		438	424	30		642	472	40	740	617	40	1017	698	60	1139	751	80
270	359	283	15		230	329	20		291	333	20		358	402	20		446	416	30		650	464	40	748	609	40	1025	690	60	1147	743	80
280	373	276	15		237	322	20		298	326	20		365	395	20		453	409	30		657	457	40	755	602	40	1032	683	60	1154	736	80
290	386	269	15		244	315	20		305	319	20		372	388	20		460	402	30		664	450	40	762	595	40	1039	676	60	1161	729	80
300	399	262	15		251	308	20		312	312	20		379	381	20		467	395	30		671	443	40	769	588	40	1046	669	60	1168	722	80
310	412					345	20		319	348	20		386	392	20		474	388	30		678	486	40	776	581	40	1053	672	50	1175	715	80
320	426					337	20		327	340	20		394	384	20		482	380	30		686	478	40	784	573	40	1061	664	50	1183	707	80
330	439					330	20		334	333	20		401	377	20		489	373	30		693	471	40	791	566	40	1068	657	50	1190	700	80
340	452					323	20		341	326	20		408	370	20		496	366	30		700	464	40	798	559	40	1075	650	50	1197	693	80
350	466					315	20		349	318	20		416	362	20		504	358	30		708	456	40	806	551	40	1083	642	50	1205	685	80
360	479					308	20		356	311	20		423	355	20		511	351	30		715	449	40	813	544	40	1090	635	50	1212	678	80
370	492					344	20		363	348	20		430	392	20		518	385	30		722	482	40	820	537	40	1097	628	50	1219	691	60
380	505					337	20		370	341	20		437	385	20		525	378	30		729	475	40	827	530	40	1104	621	50	1226	684	60
390	519					329	20		378	333	20		445	377	20		533	370	30		737	467	40	835	522	40	1112	613	50	1234	676	60
400	532					322	20		385	326	20		452	370	20		540	363	30		744	460	40	842	515	40	1119	606	50	1241	669	60
410	545					315	20		392	319	20		459	363	20		547	356	30		751	453	40	849	508	40	1126	599	50	1248	662	60
420	559					308	20		399	312	20		466	356	20		554	349	30		758	446	40	856	501	40	1133	592	50	1255	655	60
430	572												474	406	20		562	398	30		766	493	40	864	493	40	1141	603	50	1263	647	60
440	585												481	399	20		569	391	30		773	486	40	871	486	40	1148	596	50	1270	640	60
450	598												488	392	20		576	384	30		780	479	40	878	479	40	1155	589	50	1277	633	60
460	612												495	385	20		583	377	30		787	472	40	885	472	40	1162	582	50	1284	626	60
470	625												502	378	20		590	370	30		794	465	40	892	465	40	1169	575	50	1291	619	60
480	638												509	371	20		597	363	30		801	458	40	899	458	40	1176	568	50	1298	612	60
490	652												517	363	20		605	355	30		809	450	40	907	450	40	1184	560	50	1306	604	60
500	665												524	356	20		612	348	30		816	443	40	914	443	40	1191	553	50	1313	597	60
510	678																					460	40	921	516	40	1198	612	50	1320	590	60
520	691																					453	40	928	509	40	1205	605	50	1327	583	60
530	705																					445	40	936	501	40	1213	597	50	1335	575	60
540	718																					438	40	943	494	40	1220	590	50	1342	568	60
550	731																					431	40	950	487	40	1227	583	50	1349	561	60
560	745																					423	40	958	479	40	1235	575	50	1357	553	60
570	758																					416	40	965	472	40	1242	568	50	1364	546	60
580	771																					409	40	972	465	40	1249	561	50	1371	539	60
590	785																					401	40	980	457	40	1257	553	50	1379	531	60
600	798																					394	40	987	450	40	1264	546	50	1386	524	60
610	811																					387	40	994	443	40	1271	539	50	1393	517	60

CONSTANT EFFORT SUPPORTS FIG. CA51 TYPES S, T, U, W, X & Z





For rod diameter C, see Page 8
For suspension rod/pin diameter X, see Page 9
Dimension B3 is shown with load arm in high position

Dimensions for Fig. CA51 Constant Effort Supports Types S, T, U, W, X & Z

Size	E	F	K	L	AA	BB	CC	DD	GG	PP	QQ	RR	SS
1-6	150	130	170	36	202	130	160	114	74	215	165	14	6
7-12	155	125	220	48	312	153	196	120	82	230	180	18	6
13-18	225	195	220	60	363	205	220	133	91	255	205	22	8
19-26	260	220	260	72	465	248	264	149	118	270	220	22	8
27-33	285	240	260	89	639	291	320	181	148	320	265	22	10
34-39	400	355	300	108	760	357	380	226	168	425	335	27	10
40-47	430	370	340	155	1025	462	500	281	218	480	395	33	15
48-58	460	365	400	200	1127	573	600	335	295	745	520	45	20
59-66	430	500	400	300	1639	573	749	391	322	802	632	51	25

Maximum Recommended Travels for Types S & T

Size	Max. Travel
1-6	190
7-12	190
13-18	210
19-26	290
27-33	300
34-39	500
40-47	Not recommended
48-58	Not recommended
59-66	Not recommended

Dimensions of Suspension Lugs

Dia X	12	16	20	24	30	36	42	48	56	64	72	80	90
JJ	25	25	30	40	45	60	70	80	90	100	110	130	140
KK	6	6	10	10	12	15	15	20	20	20	25	25	30
MM	40	50	50	70	80	100	120	130	150	170	180	220	220
NN	35	40	45	55	60	75	90	100	105	115	125	145	160
WW	30	30	35	40	50	65	70	75	85	90	100	110	120

Dimensions TT, UU & VV

Size	Travel 50-140			Travel 150-220			Travel 230-300			Travel 310-360			Travel 370-420			Travel 430-500			Travel 510-610		
	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV	TT	UU	VV
1-6	165	165	148	225	165	191	-	165	249	-	-	-	-	-	-	-	-	-	-	-	-
7-12	174	174	158	258	174	215	-	174	250	-	174	294	-	174	337	-	-	-	-	-	-
13-18	267	267	228	267	267	228	-	250	254	-	250	297	-	250	341	-	-	-	-	-	-
19-26	290	290	233	290	290	233	345	290	283	-	290	301	-	290	345	-	290	403	-	-	-
27-33	319	319	250	319	319	250	361	319	307	361	319	307	-	319	348	-	319	405	-	-	-
34-39	440	440	325	440	440	325	440	440	325	440	440	375	500	440	415	590	440	470	-	440	494
40-47	-	492	430	-	492	430	-	492	430	-	492	430	-	492	430	-	492	430	-	492	510
48-58	-	545	471	-	545	471	-	545	471	-	545	471	-	545	471	-	545	490	-	545	556
59-66	-	-	-	-	515	544	-	515	544	-	515	544	-	515	544	-	515	544	-	515	544

Weights kg

Size	Approx Weight
1-4	14
5-6	14
7-9	21
10-12	23
13-16	38
17-18	42
19-22	69
23-26	76

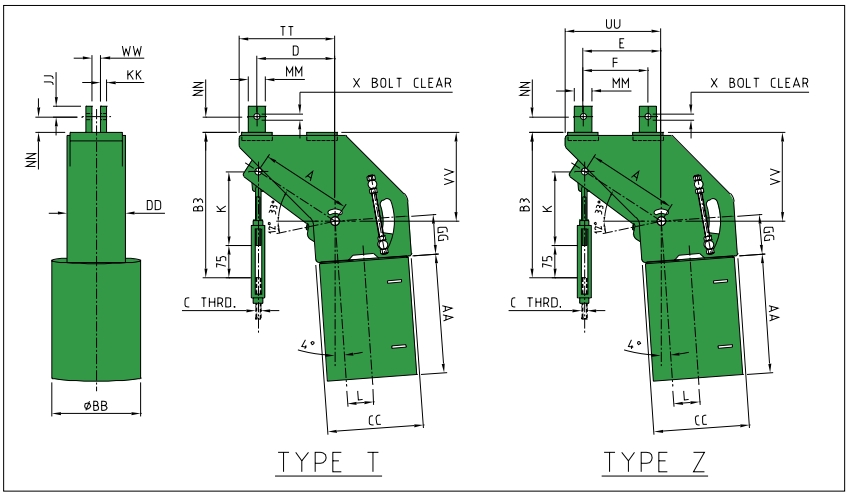
Size	Approx Weight
27-28	124
29-31	135
32-33	150
34-35	240
36-37	250
38-39	280
40-42	460
43-44	510

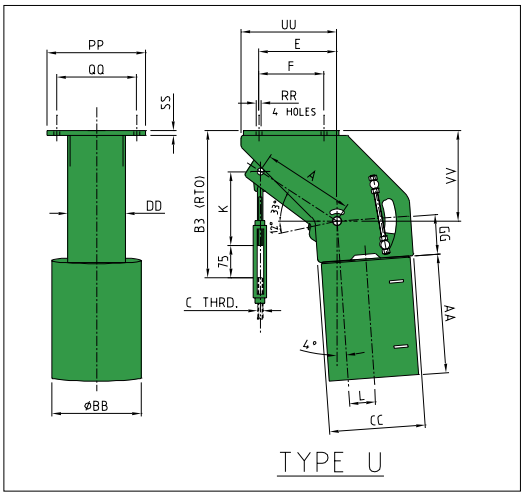
Size	Approx Weight
45-47	570
48-49	730
50-52	810
53-55	860
56-58	1130
59-62	1690
63-66	1790

Yoke Table

Size	Yoke Arrangement is used on these Travels	Width W
1-6	50	82
7-12	60	88
13-18	not used	-
19-26	not used	-
27-33	100	137
34-39	120 to 130	174
40-47	160 to 170	213
48-58	160 to 220	272
59-66	190 to 230	357

CONSTANT EFFORT SUPPORTS FIG. CA51 TYPES S, T, U, W, X & Z

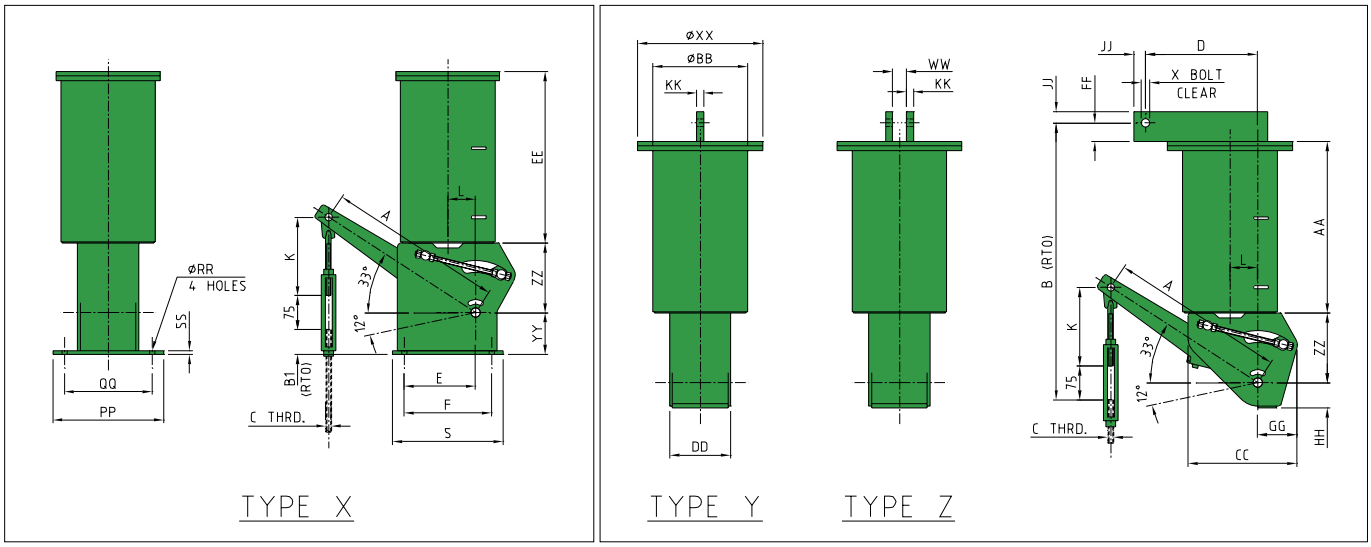




Size	=>	1-6		7-12		13-18		19-26		27-33		34-39		40-47	48-58	59-66
Travel	A	B3	D	B3	D	B3	D	B3	D	B3	D	B3	D	B3	B3	B3
50	67	357	57													
60	80	349	68	409	70											
70	94	342	78	402	82											
80	107	335	88	395	93	465	93									
90	120	328	98	388	104	458	104	503	105							
100	133	321	108	381	115	451	115	496	116	513	115					
110	147	313	117	373	126	443	127	488	127	505	127					
120	160	306	127	366	137	436	137	481	138	498	138	613	137			
130	173	299	136	359	147	429	148	474	149	491	149	606	148			
140	187	291	145	351	158	421	159	466	160	483	160	598	159			
150	200	327	153	401	168	414	170	459	170	476	170	591	169			
160	213	320	162	394	179	407	180	452	181	469	181	584	180	729	830	
170	226	313	170	387	189	400	191	445	192	462	192	577	191	722	823	
180	240	305	179	379	199	392	201	437	202	454	202	569	201	714	815	
190	253	298	187	372	210	385	211	430	213	447	213	562	212	707	808	881
200	266	291		365		378	222	423	223	440	224	555	222	700	801	874
210	280	284		358		371	232	416	234	433	234	548	232	693	794	867
220	293	276		350		363		408	244	425	244	540	243	685	786	859
230	306	327		378		382		451	254	475	255	533	253	678	779	852
240	319	320		371		375		444	264	468	265	526	263	671	772	845
250	333	313		364		368		437	274	461	275	519	273	664	765	838
260	346	306		357		361		430	284	454	285	512	283	657	758	831
270	359	298		349		353		422	294	446	295	504	293	649	750	823
280	373	291		342		346		415	304	439	305	497	303	642	743	816
290	386	284		335		339		408	314	432	315	490	313	635	736	809
300	399	277		328		332		401		425	325	483	323	628	729	802
310	412			365		368		412		418		526	332	621	722	795
320	426			357		360		404		410		518	342	613	714	787
330	439			350		353		397		403		511	351	606	707	780
340	452			343		346		390		396		504	361	599	700	773
350	466			335		338		382		388		496	370	591	692	765
360	479			328		331		375		381		489	380	584	685	758
370	492			364		368		412		415		522	389	577	678	751
380	505			357		361		405		408		515	399	570	671	744
390	519			349		353		397		400		507	408	562	663	736
400	532			342		346		390		393		500	417	555	656	729
410	545			335		339		383		386		493	426	548	649	722
420	559			328		332		376		379		486	435	541	642	715
430	572							426		428		533	444	533	653	707
440	585							419		421		526	453	526	646	700
450	598							412		414		519	462	519	639	693
460	612							405		407		512	471	512	632	686
470	625							398		400		505	480	505	625	679
480	638							391		393		498	488	498	618	672
490	652							383		385		490	497	490	610	664
500	665							376		378		483	506	483	603	657
510	678											500		556	662	650
520	691											493		549	655	643
530	705											485		541	647	635
540	718											478		534	640	628
550	731											471		527	633	621
560	745											463		519	625	613
570	758											456		512	618	606
580	771											449		505	611	599
590	785											441		497	603	591
600	798											434		490	596	584
610	811											427		483	589	577

CA51Type S

CONSTANT EFFORT SUPPORTS FIG. CA52 TYPES X, Y & Z



For rod diameter C, see Page 8
For suspension rod/pin diameter X, see Page 9
Rod Take Out (B, B1) is shown with load arm in high position

Dimensions for Fig. CA52 Constant Effort Supports Types X, Y & Z

Size	E	F	S	K	L	AA	CC	BB	XX	DD	EE	FF	GG	HH	KK	PP	QQ	RR	SS	ZZ
1-6	105	140	180	170	36	208	174	130	185	114	208	40	74	33	10	215	165	14	6	110
7-12	120	155	205	220	48	320	201	153	208	120	318	45	77	37	12	230	180	18	6	124
13-18	155	190	240	220	60	373	237	205	271	133	369	50	86	55	12	255	205	22	8	152
19-26	190	240	305	260	72	477	269	248	336	149	471	65	100	61	20	270	220	22	8	188
27-33	235	300	375	260	89	654	324	291	379	181	645	75	116	75	25	320	265	22	10	228
34-39	290	365	465	300	108	779	378	357	445	226	765	90	126	96	25	425	335	27	10	258
40-47	355	455	610	340	155	1045	526	462	572	281	1031	105	174	106	30	480	395	33	15	338
48-58	340	480	610	400	200	1168	670	573	703	335	1138	145	232	138	40	745	520	45	20	433
59-66	505	685	835	400	300	1689	815	573	729	391	1649	160	245	165	40	855	685	51	25	494

Dimensions of Suspension Plates

Dia X	12	16	20	24	30	36	42	48	56	64	72	80	90
JJ	25	25	30	40	45	60	70	80	90	100	110	130	140
WW	30	30	35	40	50	65	70	75	85	90	100	110	120

Dimension YY

Size	Travel 40-140	Travel 150-220	Travel 230-300	Travel 310-360	Travel 370-420	Travel 430-500	Travel 510-610
	YY	YY	YY	YY	YY	YY	YY
1-6	65	82	104	-	-	-	-
7-12	84	84	106	123	139	-	-
13-18	90	90	110	127	143	-	-
19-26	119	119	119	132	148	171	-
27-33	134	134	134	134	149	172	-
34-39	157	157	157	157	157	179	210
40-47	194	194	194	194	194	194	225
48-58	235	235	235	235	235	235	235
59-66	-	300	300	300	300	300	300

Yoke Table

Size	Yoke Arrangement is used on these Travels	Width W
1-6	40 to 110	93
7-12	40 to 130	98
13-18	60 to 150	110
19-26	70 to 180	123
27-33	80 to 220	153
34-39	100 to 260	190
40-47	120 to 350	231
48-58	150 to 440	288
59-66	180 to 570	382

Maximum Recommended Travels for Types Y & Z

Size	Max Recommended Travel
1-6	250
7-12	300
13-18	360
19-26	420
27-33	420
34-39	500

Weights, Type X kg

Size	Approx Weight
1-4	13
5-6	14
7-9	20
10-12	22
13-16	36
17-18	40
19-22	63
23-26	70

Size	Approx Weight
27-28	115
29-31	126
32-33	140
34-35	220
36-37	240
38-39	260
40-42	420
43-44	470

Size	Approx Weight
45-47	530
48-49	690
50-52	770
53-55	830
56-58	1100
59-62	1630
63-66	1730

Weights, Type Y & Z kg

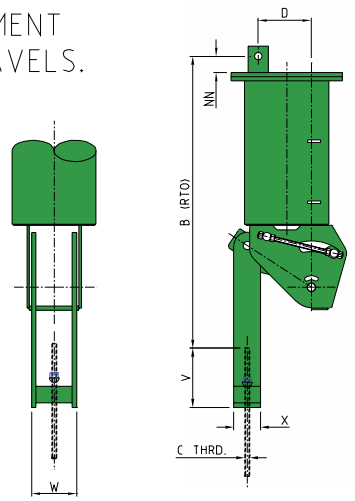
Size	Approx Weight
1-4	12
5-6	12
7-9	19
10-12	21
13-16	36
17-18	39
19-22	64
23-26	71

Size	Approx Weight
27-28	113
29-31	124
32-33	138
34-35	220
36-37	240
38-39	260
40-42	420
43-44	470

Size	Approx Weight
45-47	530
48-49	700
50-52	780
53-55	830
56-58	1100
59-62	1620
63-66	1720

CONSTANT EFFORT SUPPORTS FIG. CA52 TYPES X, Y & Z

YOKE ARRANGEMENT
FOR SHORT TRAVELS.
SEE TABLE.

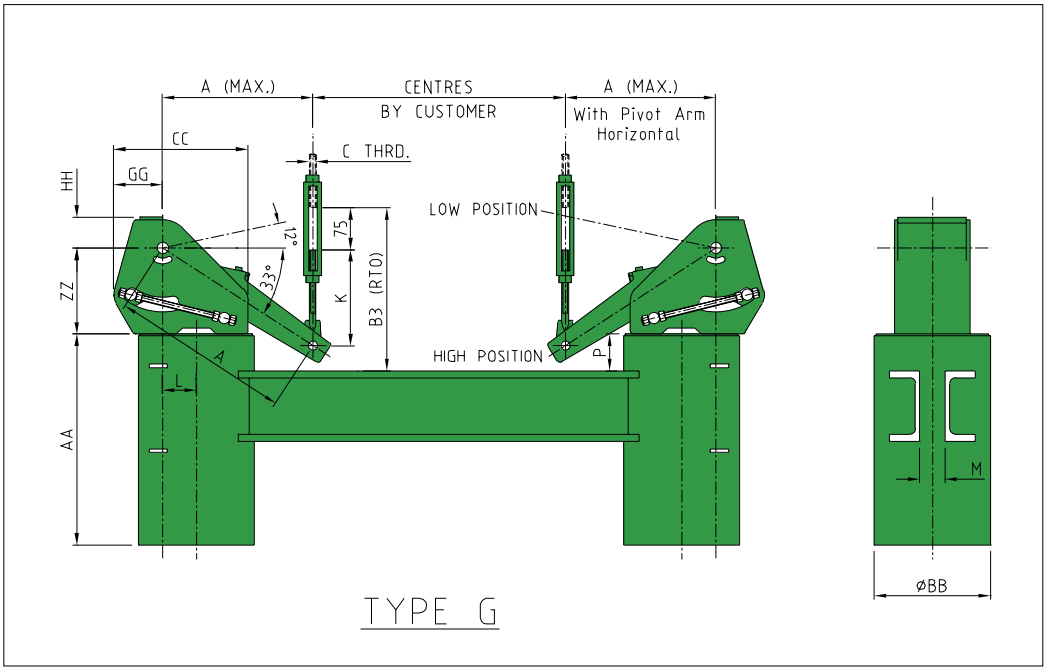


CA52 Type X

CA52 Type Y

Size	=>	1-6			7-12			13-18			19-26			27-33			34-39			40-47			48-58			59-66		
Travel	A	B	D	B1	B	D	B1	B	D	B1	B	D	B1	B	D	B1	B	D	B1	B	D	B1	B	D	B1	B	D	B1
40	54	574	48	-106	755	49	-182																					
50	67	567	60	-99	748	61	-175																					
60	80	559	71	-91	740	73	-167	826	73	-161																		
70	94	552	82	-84	733	84	-160	819	85	-154	1014	85	-165															
80	107	545	93	-77	726	96	-153	812	97	-147	1007	97	-158	1234	97	-143												
90	120	538	103	-70	719	107	-146	805	108	-140	1000	109	-151	1227	109	-136												
100	133	531	114	-63	712	119	-139	798	120	-133	993	120	-144	1220	121	-129	1430	121	-146									
110	147	523	124	-55	704	130	-131	790	131	-125	985	132	-136	1212	133	-121	1422	133	-138									
120	160	516	134	-48	697	141	-124	783	142	-118	978	143	-129	1205	144	-114	1415	145	-131	1816	147	-134						
130	173	509	144	-41	690	152	-117	776	154	-111	971	155	-122	1198	156	-107	1408	156	-124	1809	158	-127						
140	187	501	153	-33	682	163	-109	768	165	-103	963	166	-114	1190	167	-99	1400	168	-116	1801	170	-119						
150	200	494	163	-26	675	174	-102	761	176	-96	956	177	-107	1183	178	-92	1393	179	-109	1794	181	-112	2112	183	-131			
160	213	487	172	-19	668	185	-95	754	187	-89	949	188	-100	1176	190	-85	1386	190	-102	1787	193	-105	2105	195	-124			
170	226	480	181	-12	661	196	-88	747	198	-82	942	199	-93	1169	201	-78	1379	202	-95	1780	204	-98	2098	207	-117			
180	240	472	190	-4	653	207	-80	739	208	-74	934	210	-85	1161	212	-70	1371	213	-87	1772	216	-90	2090	218	-109	2564	223	-44
190	253	465	198	3	646	217	-73	732	219	-67	927	221	-78	1154	223	-63	1364	224	-80	1765	227	-83	2083	230	-102	2557	234	-37
200	266	458	207	10	639	228	-66	725	230	-60	920	232	-71	1147	234	-56	1357	235	-73	1758	238	-76	2076	241	-95	2550	246	-30
210	280	451	215	17	632	238	-59	718	240	-53	913	243	-64	1140	245	-49	1350	246	-66	1751	249	-69	2069	252	-88	2543	258	-23
220	293	443	224	25	624	248	-51	710	251	-45	905	253	-56	1132	256	-41	1342	257	-58	1743	261	-61	2061	264	-80	2535	269	-15
230	306	436	232	32	617	258	-22	703	261	-18	898	264	-49	1125	267	-34	1335	268	-51	1736	272	-54	2054	275	-73	2528	281	-8
240	319	429	240	39	610	268	-15	696	271	-11	891	274	-42	1118	277	-27	1328	278	-44	1729	282	-47	2047	286	-66	2521	292	-1
250	333	422	247	46	603	278	-8	689	281	-4	884	285	-35	1111	288	-20	1321	289	-37	1722	293	-40	2040	297	-59	2514	303	6
260	346	415		53	596	288	-1	682	292	3	877	295	-28	1104	298	-13	1314	299	-30	1715	304	-33	2033	308	-52	2507	314	13
270	359	407		61	588	298	7	674	302	11	869	306	-20	1096	309	-5	1306	310	-22	1707	315	-25	2025	319	-44	2499	326	21
280	373	400		68	581	308	14	667	312	18	862	316	-13	1089	319	2	1299	320	-15	1700	326	-18	2018	330	-37	2492	337	28
290	386	393		75	574	318	21	660	321	25	855	326	-6	1082	330	9	1292	331	-8	1693	336	-11	2011	341	-30	2485	348	35
300	399	386		82	567	327	28	653	331	32	848	336	1	1075	340	16	1285	341	-1	1686	347	-4	2004	352	-23	2478	359	42
310	412				560		52	646	341	56	841	346	21	1068	350	23	1278	351	6	1679	357	3	1997	362	-16	2471	370	49
320	426				552		60	638	351	64	833	356	29	1060	360	31	1270	362	14	1671	368	11	1989	373	-8	2463	381	57
330	439				545		67	631	360	71	826	366	36	1053	371	38	1263	372	21	1664	378	18	1982	384	-1	2456	391	64
340	452				538		74	624	370	78	819	376	43	1046	381	45	1256	382	28	1657	389	25	1975	394	6	2449	402	71
350	466				530		82	616	379	86	811	385	51	1038	391	53	1248	392	36	1649	399	33	1967	405	14	2441	413	79
360	479				523		89	609	388	93	804	395	58	1031	400	60	1241	402	43	1642	409	40	1960	415	21	2434	423	86
370	492				516		112	602		116	797	405	81	1024	410	82	1234	412	50	1635	419	47	1953	426	28	2427	434	93
380	505				509		119	595		123	790	414	88	1017	420	89	1227	421	57	1628	429	54	1946	436	35	2420	444	100
390	519				501		127	587		131	782	424	96	1009	430	97	1219	431	65	1620	439	62	1938	446	43	2412	455	108
400	532				494		134	580		138	775	433	103	1002	440	104	1212	441	72	1613	449	69	1931	456	50	2405	465	115
410	545				487		141	573		145	768	443	110	995	449	111	1205	450	79	1606	459	76	1924	467	57	2398	476	122
420	559				480		148	566		152	761	452	117	988	459	118	1198	460	86	1599	469	83	1917	477	64	2391	486	129
430	572										753		148	980		149	1190	469	116	1591	479	91	1909	487	72	2383	496	137
440	585										746		155	973		156	1183	479	123	1584	489	98	1902	497	79	2376	506	144
450	598										739		162	966		163	1176	488	130	1577	498	105	1895	507	86	2369	516	151
460	612										732		169	959		170	1169	498	137	1570	508	112	1888	517	93	2362	526	158
470	625										725		176	952		177	1162	507	144	1563	518	119	1881	527	100	2355	536	165
480	638										718		183	945		184	1155	516	151	1556	527	126	1874	537	107	2348	546	172
490	652										710		191	937		192	1147	525	159	1548	537	134	1866	546	115	2340	556	180
500	665										703		198	930		199	1140	534	166	1541	546	141	1859	556	122	2333	566	187
510	678																1133		204	1534	556	179	1852	566	129	2326	576	194
520	691																1126		211	1527	565	186	1845	575	136	2319	586	201
530	705																1118		219	1519	574	194	1837	585	144	2311	595	209
540	718																1111		226	1512	584	201	1830	594	151	2304	605	216
550	731																1104		233	1505	593	208	1823	604	158	2297	615	223
560	745																1096		241	1497	602	216	1815	613	166	2289	624	231
570	758																1089		248	1490	611	223	1808	623	173	2282	634	238
580	771																1082		255	1483	620	230	1801	632	180	2275	643	245
590	785																1074		263	1475	629	238	1793	641	188	2267	652	253
600	798																1067		270	1468	638	245	1786	651	195	2260	662	260
610	811																1060		277	1461	647	252	1779	660	202	2253	671	267

CONSTANT EFFORT SUPPORTS FIG. CA52 TYPE G



For rod diameter C, see Page 8

Rod Take Out (B3) is shown with load arm in high position

Dimensions for Fig. CA52 Constant Effort Supports Type G

Size	K	L	M	AA	CC	BB	DD	GG	HH	ZZ
1-6	170	36	18	202	174	130	114	74	33	110
7-12	220	48	30	312	201	153	120	77	37	124
13-18	220	60	30	363	237	205	133	86	55	152
19-26	260	72	42	465	269	248	149	100	61	188
27-33	260	89	50	639	324	291	181	116	75	228
34-39	300	108	55	759	378	357	226	126	96	258
40-47	340	155	65	1025	526	462	281	174	106	338
48-58	400	200	65	1128	670	573	335	232	138	433
59-66	400	300	70	1639	815	573	391	245	165	494

Maximum Recommended Travels for Type G

Size	Max Travel
1-6	250
7-12	300
13-18	360
19-26	420
27-33	420
34-39	500

Dimension P

Size	Travel 40-140	Travel 150-220	Travel 230-300	Travel 310-360	Travel 370-420	Travel 430-500	Travel 510-610
	P	P	P	P	P	P	P
1-6	40	85	105	-	-	-	-
7-12	40	70	130	-	-	-	-
13-18	40	50	105	150	-	-	-
19-26	40	40	80	115	160	-	-
27-33	40	40	40	80	120	180	-
34-39	40	40	40	60	100	160	-
40-47	70	70	70	70	70	95	175
48-58	70	70	70	70	70	70	125
59-66	-	70	70	70	70	70	70

Weights (excluding beam), Type G kg

Size	Approx Weight
1-4	20
5-6	21
7-9	31
10-12	35
13-16	59
17-18	66
19-22	105
23-26	119

Size	Approx Weight
27-28	196
29-31	220
32-33	250
34-35	380
36-37	410
38-39	450
40-42	730
43-44	830

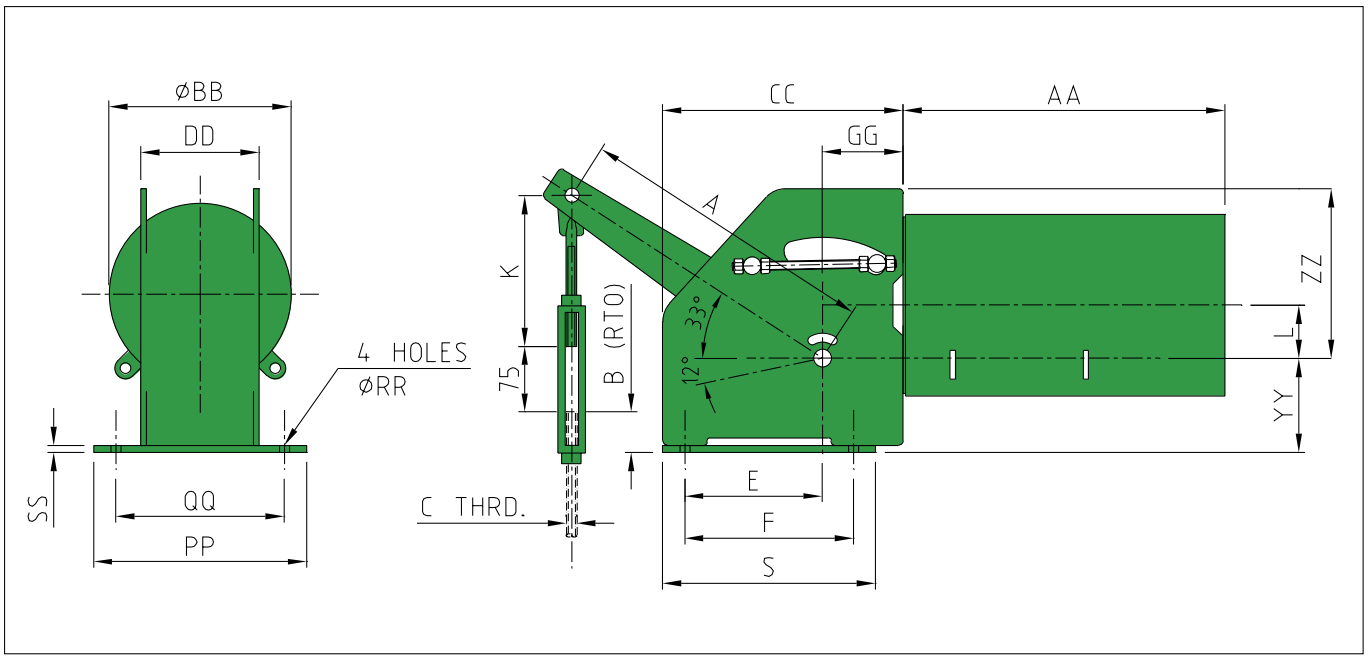
Size	Approx Weight
45-47	950
48-49	1140
50-52	1310
53-55	1410
56-58	1950
59-62	2870
63-66	3070

CONSTANT EFFORT SUPPORTS FIG. CA52 TYPE G

CA52 Type G

Size	=>	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-58	59-66
Travel	A	B3	B3	B3	B3	B3	B3	B3	B3	B3
40	54	366	430							
50	67	359	423							
60	80	351	415	443						
70	94	344	408	436	512					
80	107	337	401	429	505	545				
90	120	330	394	422	498	538				
100	133	323	387	415	491	531	601			
110	147	315	379	407	483	523	593			
120	160	308	372	400	476	516	586	736		
130	173	301	365	393	469	509	579	729		
140	187	293	357	385	461	501	571	721		
150	200	331	380	388	454	494	564	714	869	
160	213	324	373	381	447	487	557	707	862	
170	226	317	366	374	440	480	550	700	855	
180	240	309	358	366	432	472	542	692	847	927
190	253	302	351	359	425	465	535	685	840	920
200	266	295	344	352	418	458	528	678	833	913
210	280	288	337	345	411	451	521	671	826	906
220	293	280	329	337	403	443	513	663	818	898
230	306	293	382	385	436	436	506	656	811	891
240	319	286	375	378	429	429	499	649	804	884
250	333	279	368	371	422	422	492	642	797	877
260	346		361	364	415	415	485	635	790	870
270	359		353	356	407	407	477	627	782	862
280	373		346	349	400	400	470	620	775	855
290	386		339	342	393	393	463	613	768	848
300	399		332	335	386	386	456	606	761	841
310	412			373	414	419	469	599	754	834
320	426			365	406	411	461	591	746	826
330	439			358	399	404	454	584	739	819
340	452			351	392	397	447	577	732	812
350	466			343	384	389	439	569	724	804
360	479			336	377	382	432	562	717	797
370	492				415	415	465	555	710	790
380	505				408	408	458	548	703	783
390	519				400	400	450	540	695	775
400	532				393	393	443	533	688	768
410	545				386	386	436	526	681	761
420	559				379	379	429	519	674	754
430	572						481	536	666	746
440	585						474	529	659	739
450	598						467	522	652	732
460	612						460	515	645	725
470	625						453	508	638	718
480	638						446	501	631	711
490	652						438	493	623	703
500	665						431	486	616	696
510	678							559	664	689
520	691							552	657	682
530	705							544	649	674
540	718							537	642	667
550	731							530	635	660
560	745							522	627	652
570	758							515	620	645
580	771							508	613	638
590	785							500	605	630
600	798							493	598	623
610	811							486	591	616

CONSTANT EFFORT SUPPORTS FIG. CA53



For rod diameter C, see Page 8

Rod Take Out (B) is shown with load arm in high position

Dimensions for Fig. CA53 Constant Effort Supports

Size	E	F	S	K	L	AA	BB	CC	DD	GG	PP	QQ	RR	SS	ZZ
1-6	105	140	180	170	36	202	130	199	114	74	215	165	14	6	124
7-12	120	155	205	220	48	312	153	227	120	82	230	180	18	6	149
13-18	155	190	240	220	60	363	205	271	133	91	255	205	22	8	191
19-26	190	240	305	260	72	465	248	341	149	118	270	220	22	8	229
27-33	235	300	375	260	89	639	291	421	181	148	320	265	22	10	284
34-39	290	365	465	300	108	760	357	508	226	168	425	335	27	10	352
40-47	355	455	610	340	155	1025	462	651	281	218	480	395	33	15	432
48-58	340	480	610	400	200	1127	573	688	335	283	745	520	45	20	520
59-66	380	560	710	400	300	1639	573	777	391	322	855	685	51	25	660

Dimension YY

Size	Travel 40-140	Travel 150-220	Travel 230-300	Travel 310-360	Travel 370-420	Travel 430-500	Travel 510-610
	YY	YY	YY	YY	YY	YY	YY
1-6	62	82	104	-	-	-	-
7-12	73	84	106	123	139	-	-
13-18	89	89	110	127	143	-	-
19-26	104	104	119	132	148	171	-
27-33	134	134	134	134	149	172	-
34-39	157	157	157	157	157	179	210
40-47	194	194	194	194	194	194	225
48-58	211	211	211	211	211	211	235
59-66	-	240	240	240	240	240	254

Weights kg

Size	Approx Weight
1-4	12
5-6	13
7-9	19
10-12	21
13-16	35
17-18	39
19-22	62
23-26	69

Size	Approx Weight
27-28	116
29-31	127
32-33	141
34-35	220
36-37	240
38-39	260
40-42	430
43-44	480

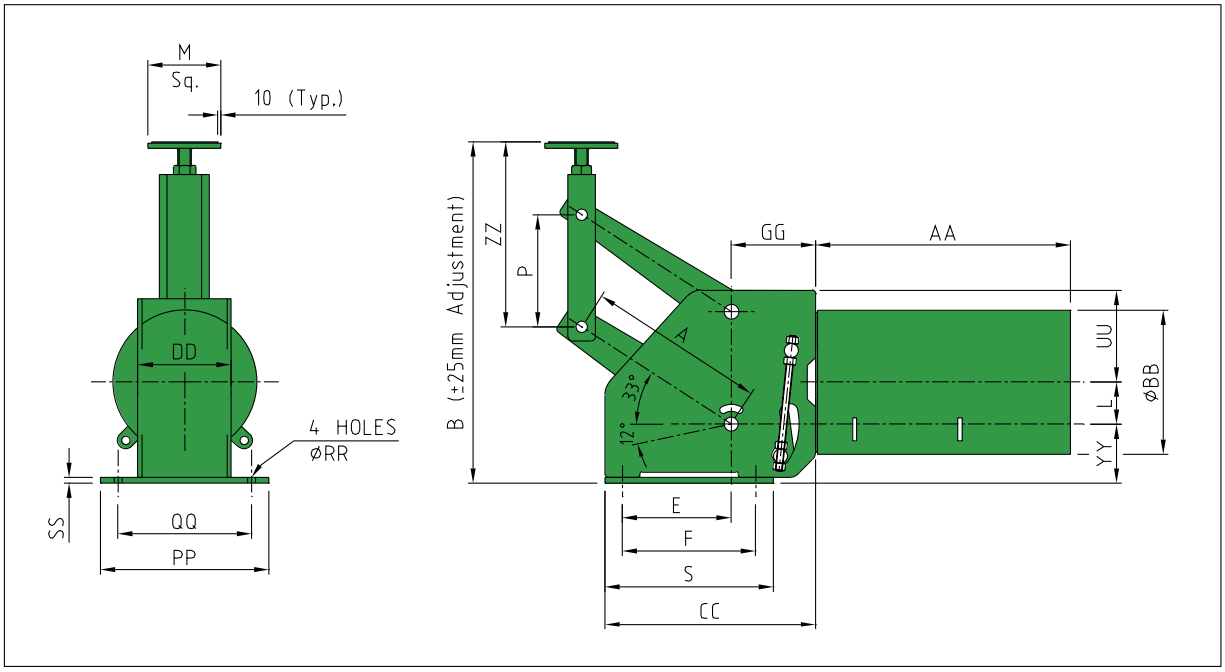
Size	Approx Weight
45-47	540
48-49	680
50-52	760
53-55	810
56-58	1080
59-62	1650
63-66	1750

CONSTANT EFFORT SUPPORTS FIG. CA53

CA53

Size	=>	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-58	59-66
Travel	A	B	B	B	B	B	B	B	B	B
40	54	-154	-193							
50	67	-147	-186							
60	80	-139	-178	-162	-187					
70	94	-132	-171	-155	-180	-150				
80	107	-125	-164	-148	-173	-143				
90	120	-118	-157	-141	-166	-136	-153			
100	133	-111	-150	-134	-159	-129	-146			
110	147	-103	-142	-126	-151	-121	-138	-141	-184	
120	160	-96	-135	-119	-144	-114	-131	-134	-177	
130	173	-89	-128	-112	-137	-107	-124	-127	-170	
140	187	-81	-120	-104	-129	-99	-116	-119	-162	
150	200	-54	-102	-97	-122	-92	-109	-112	-155	-126
160	213	-47	-95	-90	-115	-85	-102	-105	-148	-119
170	226	-40	-88	-83	-108	-78	-95	-98	-141	-112
180	240	-32	-80	-75	-100	-70	-87	-90	-133	-104
190	253	-25	-73	-68	-93	-63	-80	-83	-126	-97
200	266	-18	-66	-61	-86	-56	-73	-76	-119	-90
210	280	-11	-59	-54	-79	-49	-66	-69	-112	-83
220	293	-3	-51	-46	-71	-41	-58	-61	-104	-75
230	306	26	-22	-18	-49	-34	-51	-54	-97	-68
240	319	33	-15	-11	-42	-27	-44	-47	-90	-61
250	333	40	-8	-4	-35	-20	-37	-40	-83	-54
260	346	47	-1	3	-28	-13	-30	-33	-76	-47
270	359	55	7	11	-20	-5	-22	-25	-68	-39
280	373	62	14	18	-13	2	-15	-18	-61	-32
290	386	69	21	25	-6	9	-8	-11	-54	-25
300	399	76	28	32	1	16	-1	-4	-47	-18
310	412		52	56	21	23	6	3	-40	-11
320	426		60	64	29	31	14	11	-32	-3
330	439		67	71	36	38	21	18	-25	4
340	452		74	78	43	45	28	25	-18	11
350	466		82	86	51	53	36	33	-10	19
360	479		89	93	58	60	43	40	-3	26
370	492		112	116	81	82	50	47	4	33
380	505		119	123	88	89	57	54	11	40
390	519		127	131	96	97	65	62	19	48
400	532		134	138	103	104	72	69	26	55
410	545		141	145	110	111	79	76	33	62
420	559		148	152	117	118	86	83	40	69
430	572				148	149	116	91	48	77
440	585				155	156	123	98	55	84
450	598				162	163	130	105	62	91
460	612				169	170	137	112	69	98
470	625				176	177	144	119	76	105
480	638				183	184	151	126	83	112
490	652				191	192	159	134	91	120
500	665				198	199	166	141	98	127
510	678						204	179	129	148
520	691						211	186	136	155
530	705						219	194	144	163
540	718						226	201	151	170
550	731						233	208	158	177
560	745						241	216	166	185
570	758						248	223	173	192
580	771						255	230	180	199
590	785						263	238	188	207
600	798						270	245	195	214
610	811						277	252	202	221

CONSTANT EFFORT SUPPORTS FIG. CA54



Height B is shown with load arm in high position

Dimensions for Fig. CA54 Constant Effort Supports

Size	E	F	S	L	P	AA	BB	CC	DD	GG	PP	QQ	RR	SS	UU
1-6	105	140	180	36	108	202	130	214	114	89	215	165	14	6	88
7-12	120	155	205	48	131	312	153	240	120	95	230	180	18	6	101
13-18	155	190	240	60	160	363	205	300	133	120	255	205	22	8	131
19-26	190	240	305	72	190	465	248	353	149	130	270	220	22	8	157
27-33	235	300	375	89	241	639	291	443	181	170	320	265	22	10	195
34-39	290	365	465	108	292	760	357	540	226	200	425	335	27	10	244
40-47	355	455	610	155	382	1025	462	713	281	280	480	395	33	15	292
48-58	340	480	610	200	460	1127	573	765	335	360	745	520	45	20	330
59-66	380	560	710	300	626	1639	573	835	391	380	855	685	51	25	436

Dimensions M, YY & ZZ

Size	Travel 40-140			Travel 150-220			Travel 230-300			Travel 310-360			Travel 370-420			Travel 430-500			Travel 510-610		
	M	YY	ZZ	M	YY	ZZ	M	YY	ZZ	M	YY	ZZ	M	YY	ZZ	M	YY	ZZ	M	YY	ZZ
1-6	80	82	265	80	82	265	80	104	265	-	-			-			-			-	
7-12	100	73	313	80	84	307	80	106	307	80	123	307	80	139	307		-			-	
13-18	120	89	353	100	89	350	100	110	350	80	127	344	80	143	344		-			-	
19-26	160	104	408	100	104	395	100	119	395	100	132	395	100	148	395	100	171	395		-	
27-33	160	134	464	120	134	454	120	134	454	100	134	451	100	149	451	100	172	451		-	
34-39	200	157	540	160	157	530	160	157	530	120	157	520	120	157	520	120	179	520	120	210	520
40-47	260	194	679	260	194	679	200	194	660	160	194	650	160	194	650	160	194	650	160	225	650
48-58	360	241	812	310	241	801	260	241	789	260	241	789	200	241	770	200	241	770	200	241	770
59-66	-	-	-	360	280	1043	310	280	1032	260	280	1020	260	280	1020	260	280	1020	260	280	1020

Weights kg

Size	Approx Weight
1-4	14
5-6	15
7-9	22
10-12	24
13-16	42
17-18	45
19-22	70
23-26	77

Size	Approx Weight
27-28	129
29-31	141
32-33	155
34-35	250
36-37	260
38-39	280
40-42	460
43-44	510

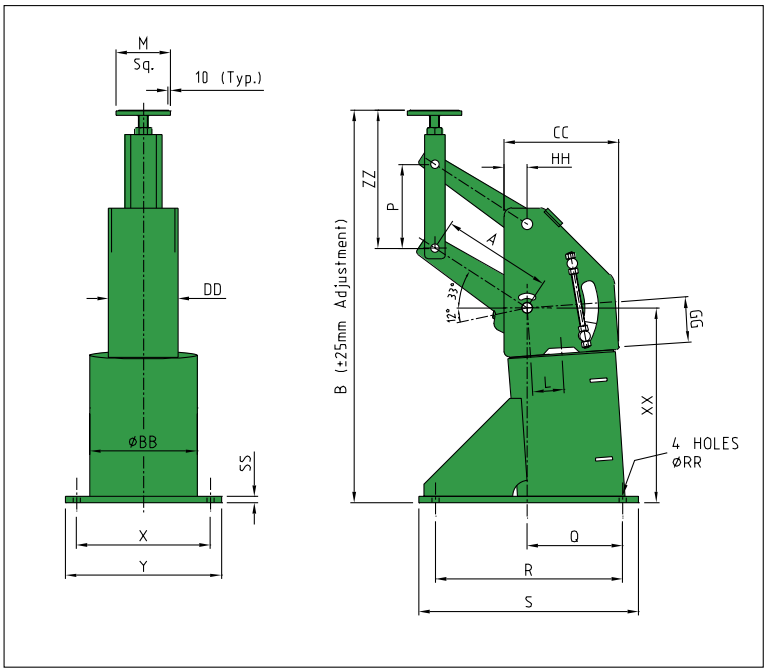
Size	Approx Weight
45-47	580
48-49	750
50-52	830
53-55	890
56-58	1160
59-62	1820
63-66	1920

CONSTANT EFFORT SUPPORTS FIG. CA54

CA54

Size	=>	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-58	59-66
Travel	A	B	B	B	B	B	B	B	B	B
40	54	376	415							
50	67	383	422							
60	80	391	430	486	556					
70	94	398	437	493	563	649				
80	107	405	444	500	570	656				
90	120	412	451	507	577	663	762			
100	133	419	458	514	584	670	769			
110	147	427	466	522	592	678	777	953	1133	
120	160	434	473	529	599	685	784	960	1140	
130	173	441	480	536	606	692	791	967	1147	
140	187	449	488	544	614	700	799	975	1155	
150	200	456	500	548	608	697	796	982	1151	1483
160	213	463	507	555	615	704	803	989	1158	1490
170	226	470	514	562	622	711	810	996	1165	1497
180	240	478	522	570	630	719	818	1004	1173	1505
190	253	485	529	577	637	726	825	1011	1180	1512
200	266	492	536	584	644	733	832	1018	1187	1519
210	280	499	543	591	651	740	839	1025	1194	1526
220	293	507	551	599	659	748	847	1033	1202	1534
230	306	536	580	627	681	755	854	1021	1197	1530
240	319	543	587	634	688	762	861	1028	1204	1537
250	333	550	594	641	695	769	868	1035	1211	1544
260	346	557	601	648	702	776	875	1042	1218	1551
270	359	565	609	656	710	784	883	1050	1226	1559
280	373	572	616	663	717	791	890	1057	1233	1566
290	386	579	623	670	724	798	897	1064	1240	1573
300	399	586	630	677	731	805	904	1071	1247	1580
310	412		654	695	751	809	901	1068	1254	1575
320	426		662	703	759	817	909	1076	1262	1583
330	439		669	710	766	824	916	1083	1269	1590
340	452		676	717	773	831	923	1090	1276	1597
350	466		684	725	781	839	931	1098	1284	1605
360	479		691	732	788	846	938	1105	1291	1612
370	492		714	755	811	868	945	1112	1279	1619
380	505		721	762	818	875	952	1119	1286	1626
390	519		729	770	826	883	960	1127	1294	1634
400	532		736	777	833	890	967	1134	1301	1641
410	545		743	784	840	897	974	1141	1308	1648
420	559		750	791	847	904	981	1148	1315	1655
430	572				878	935	1011	1156	1323	1663
440	585				885	942	1018	1163	1330	1670
450	598				892	949	1025	1170	1337	1677
460	612				899	956	1032	1177	1344	1684
470	625				906	963	1039	1184	1351	1691
480	638				913	970	1046	1191	1358	1698
490	652				921	978	1054	1199	1366	1706
500	665				928	985	1061	1206	1373	1713
510	678						1099	1244	1380	1720
520	691						1106	1251	1387	1727
530	705						1114	1259	1395	1735
540	718						1121	1266	1402	1742
550	731						1128	1273	1409	1749
560	745						1136	1281	1417	1757
570	758						1143	1288	1424	1764
580	771						1150	1295	1431	1771
590	785						1158	1303	1439	1779
600	798						1165	1310	1446	1786
610	811						1172	1317	1453	1793

CONSTANT EFFORT SUPPORTS FIG. CA55



Height B is shown with load arm in high position

Dimensions for Fig. CA55 Constant Effort Supports

Size	Q	R	S	X	Y	RR	SS	L	P	BB	CC	DD	GG	HH	XX
1-6	120	200	240	170	210	14	6	36	102	130	159	114	74	39	279
7-12	155	280	330	200	250	18	6	48	121	153	195	120	82	45	390
13-18	195	370	420	250	300	22	8	60	160	205	219	133	91	44	457
19-26	235	415	480	300	365	22	8	72	190	248	263	149	118	52	585
27-33	290	545	620	350	425	22	10	89	241	291	319	181	148	61	789
34-39	355	580	680	400	500	27	10	108	292	357	379	226	168	70	927
40-47	475	810	910	560	660	33	15	155	389	462	498	281	218	80	1244
48-58	590	960	1090	560	690	45	20	200	500	573	643	335	295	125	1426

Dimensions M & ZZ

Size	Travel 40-140		Travel 150-220		Travel 230-300		Travel 310-360		Travel 370-420		Travel 430-500		Travel 510-610	
	M	ZZ	M	ZZ	M	ZZ	M	ZZ	M	ZZ	M	ZZ	M	ZZ
1-6	80	259	80	259	80	259	-							
7-12	100	303	80	297	80	297	80	297	80	297				
13-18	120	353	100	350	100	350	80	344	80	344				
19-26	160	408	100	395	100	395	100	395	100	395	100	395		
27-33	160	464	120	454	120	454	100	451	100	451	100	451		
34-39	200	540	160	530	160	530	120	520	120	520	120	520	120	520
40-47	260	686	260	686	200	667	160	657	160	657	160	657	160	657
48-58	360	852	310	841	260	829	260	829	200	810	200	810	200	810

Weights kg

Size	Approx Weight
1-4	14
5-6	15
7-9	23
10-12	26
13-16	44
17-18	48
19-22	74
23-26	81

Size	Approx Weight
27-28	136
29-31	147
32-33	161
34-35	260
36-37	280
38-39	300
40-42	500
43-44	550

Size	Approx Weight
45-47	610
48-49	800
50-52	880
53-55	930
56-58	1200

CONSTANT EFFORT SUPPORTS FIG. CA55

CA55

Size	=>	1-6	7-12	13-18	19-26	27-33	34-39	40-47	48-58
Travel	A	B	B	B	B	B	B	B	B
40	54	567	722						
50	67	574	729						
60	80	582	737	854	1037				
70	94	589	744	861	1044	1304			
80	107	596	751	868	1051	1311			
90	120	603	758	875	1058	1318	1532		
100	133	610	765	882	1065	1325	1539		
110	147	618	773	890	1073	1333	1547	2010	2358
120	160	625	780	897	1080	1340	1554	2017	2365
130	173	632	787	904	1087	1347	1561	2024	2372
140	187	640	795	912	1095	1355	1569	2032	2380
150	200	647	796	916	1089	1352	1566	2039	2376
160	213	654	803	923	1096	1359	1573	2046	2383
170	226	661	810	930	1103	1366	1580	2053	2390
180	240	669	818	938	1111	1374	1588	2061	2398
190	253	676	825	945	1118	1381	1595	2068	2405
200	266	683	832	952	1125	1388	1602	2075	2412
210	280	690	839	959	1132	1395	1609	2082	2419
220	293	698	847	967	1140	1403	1617	2090	2427
230	306	705	854	974	1147	1410	1624	2078	2422
240	319	712	861	981	1154	1417	1631	2085	2429
250	333	719	868	988	1161	1424	1638	2092	2436
260	346	726	875	995	1168	1431	1645	2099	2443
270	359	734	883	1003	1176	1439	1653	2107	2451
280	373	741	890	1010	1183	1446	1660	2114	2458
290	386	748	897	1017	1190	1453	1667	2121	2465
300	399	755	904	1024	1197	1460	1674	2128	2472
310	412		911	1025	1204	1464	1671	2125	2479
320	426		919	1033	1212	1472	1679	2133	2487
330	439		926	1040	1219	1479	1686	2140	2494
340	452		933	1047	1226	1486	1693	2147	2501
350	466		941	1055	1234	1494	1701	2155	2509
360	479		948	1062	1241	1501	1708	2162	2516
370	492		955	1069	1248	1508	1715	2169	2504
380	505		962	1076	1255	1515	1722	2176	2511
390	519		970	1084	1263	1523	1730	2184	2519
400	532		977	1091	1270	1530	1737	2191	2526
410	545		984	1098	1277	1537	1744	2198	2533
420	559		991	1105	1284	1544	1751	2205	2540
430	572				1292	1552	1759	2213	2548
440	585				1299	1559	1766	2220	2555
450	598				1306	1566	1773	2227	2562
460	612				1313	1573	1780	2234	2569
470	625				1320	1580	1787	2241	2576
480	638				1327	1587	1794	2248	2583
490	652				1335	1595	1802	2256	2591
500	665				1342	1602	1809	2263	2598
510	678						1816	2270	2605
520	691						1823	2277	2612
530	705						1831	2285	2620
540	718						1838	2292	2627
550	731						1845	2299	2634
560	745						1853	2307	2642
570	758						1860	2314	2649
580	771						1867	2321	2656
590	785						1875	2329	2664
600	798						1882	2336	2671
610	811						1889	2343	2678

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