



Application

Metalastik® Chevron Springs are operating world wide in a diversity of service applications including LRV, Metro, Freight wagons, High Speed Passenger Coaches and Locomotives. Axlebox load capacities range from 16 kN to 120 kN and vertical deflections from 12 mm to 100 mm.

Features

Chevron Springs provide three modes of flexibility for axlebox primary suspensions.

Suspension properties are achieved by fitting the

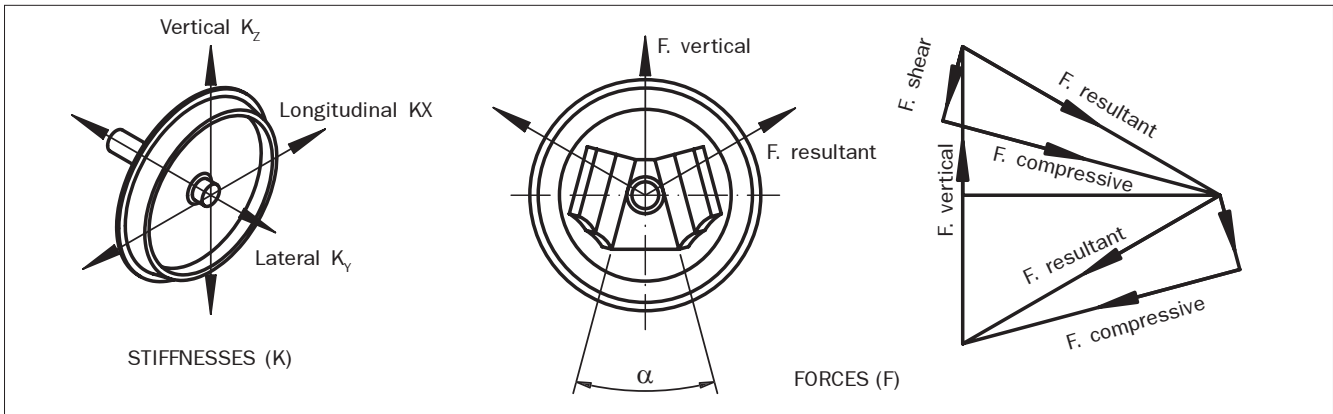
springs in a 'vee' configuration enabling shear and compression compliance within the rubber elements. Improved ride characteristics are provided with the advantages of simplicity, long service life and low maintenance costs.

Abutting end plates can be produced in light alloy to match with similar material interfaces at the axlebox or vehicle frame.

At the design stage the included angle of the chevron metal plate can be varied between 90 deg. and 140 deg.. To provide specific optimised stiffness characteristics requested bogie designers.

Metalstik® type Chevron Springs

Spring characteristics



The three modes of flexibility for axlebox suspension are shown here. Springs are fitted inclined at an angle to the vertical axis, loading the rubber layers in shear and compression.

Values quoted for lateral and longitudinal stiffness may vary with vertical deflection. The longitudinal stiffness value applies when the elastic centre of the two Chevron

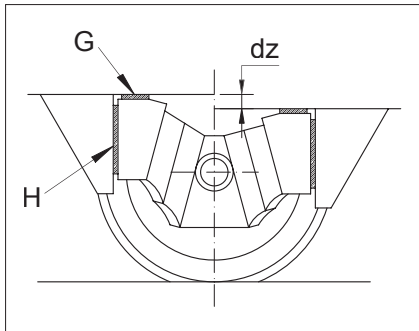
springs is at the journal centre height. If the elastic centre is above or below the centre of the journal, the longitudinal stiffness at the journal will be less than the value quoted. Metalstik® Chevron springs may be fitted to two bearing or single self-aligning bearing axleboxes. For stability with self-aligning bearings, the elastic centre of the Chevron springs in their laden position should not

be above the journal centre height.

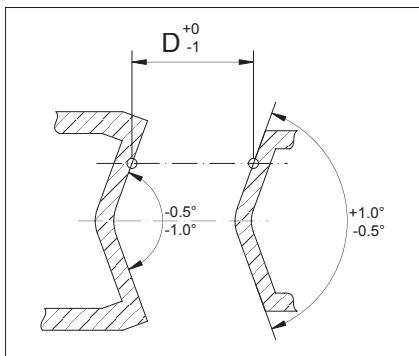
The temperature at the axlebox faces adjoining the Chevron springs should not exceed 60 degrees C.

A typical force diagram is shown above.

Installation



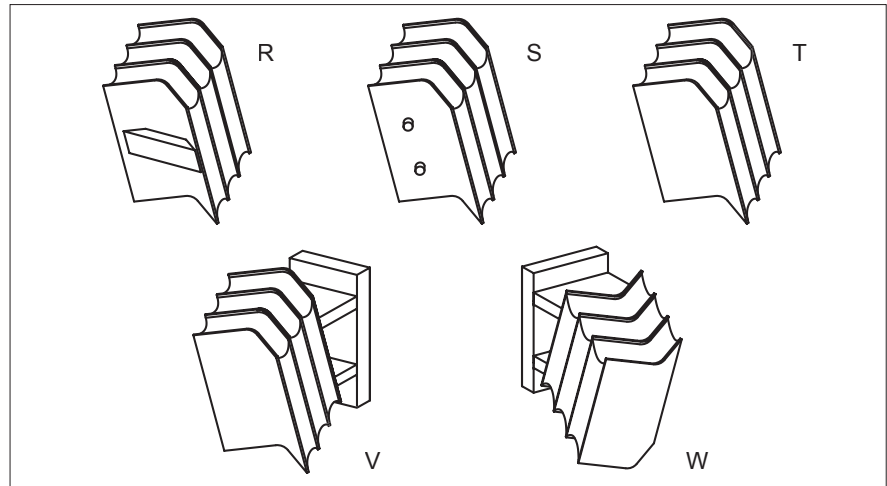
The vertical deflection (dz) may vary due to creep, Joule effect and stiffness tolerances. Shims (G) should be included for height adjustment. Shims (H) are sometimes necessary for accurate alignment of axles.



Tolerances

Tolerances at the adjoining faces should be as shown.

Spring fixings



Springs can be supplied with alternative inner metal methods of location as shown in the diagram, namely with cross bar (R), dowel pins (S), or edge location (T). Location on the bogie frame is normally on the plate edge. Springs can be supplied with brackets for direct and easy fitting to the bogie frame (ref. figs V & W)

CLASSIFICATION

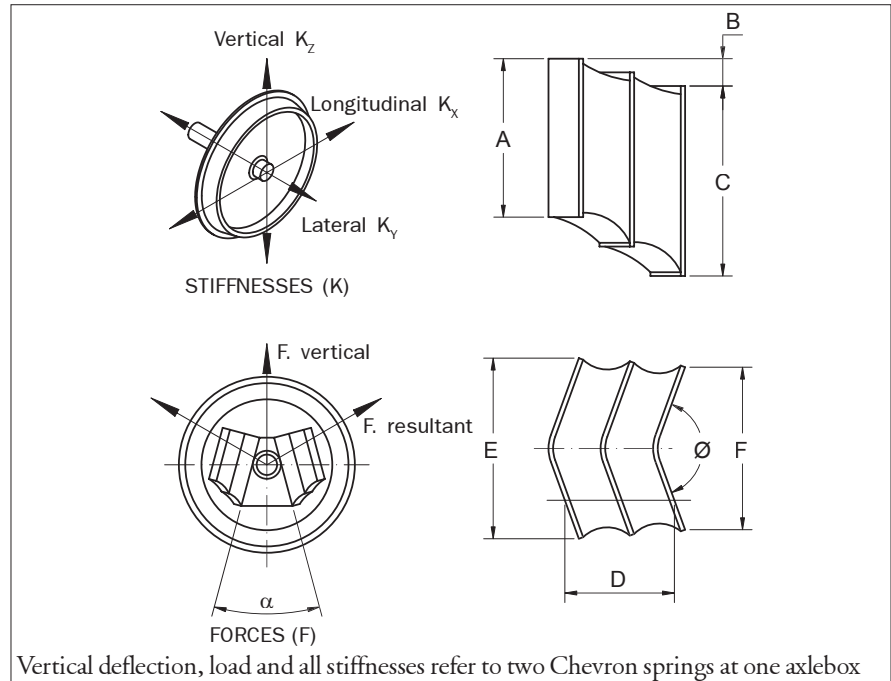
Springs listed on the following pages are classified in the following ranking order :

- 1) Chevron angle - 90° , 106° , 120° and 140° .
- 2) Listings in each of the above groups are then ranked progressively in terms of deflection capacity followed by static load capacity.

Footnote

The Chevron springs listed are a selection from the Metalstik® range. New designs can be produced to suit special requirements, including bracketed versions. Stiffness values quoted are for preferred rubber hardness of 50 deg. shore. Other hardnesses are available. The installation included angles (α) may be varied to suit customer requirements.

Chevron Springs



90° Chevron Angle 11-25 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

Product No		17-1085	17-1084	17-1211	17-0424	17-1344	17-0375
Vertical Load	(kN)	19	24	27	19	27	35
Vertical Deflection	(mm)	11	11	11	19	19	25
Vertical Stiffness	(kN/mm)	1.7	2.1	2.4	1.0	1.4	1.4
Lateral Stiffness	(kN/mm)	2.1	4	5.0	1.1	3.9	2.5
Longitudinal Stiffness	(kN/mm)	8	11	14	3	10	6
Installed angle	(α°)	40	40	40	40	40	40
Dimension A	mm	112	152	190	127	165	200
Dimension B	mm	14.3	14.3	14.3	29	29	32
Dimension C	mm	125	165	203	178	152	216
Dimension D	mm	91	91	91	88	88	113
Dimension E	mm	110	110	110	126	126	209
Dimension F	mm	84	84	84	76	76	121
Mass weight	(kg)	2.5	3.4	4.2	3.6	4.6	7.6

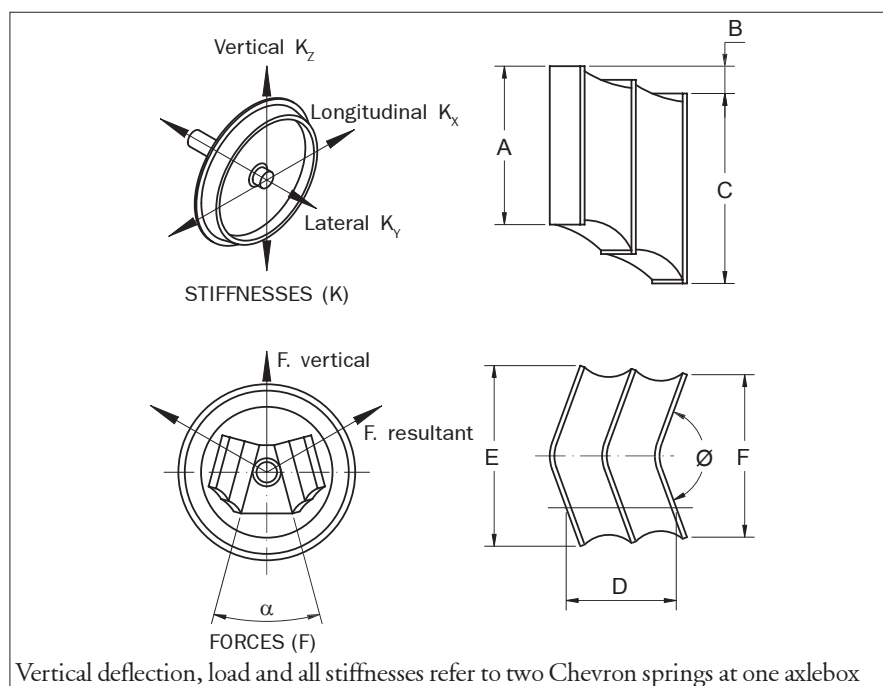
106° Chevron Angle 33-45 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

Product No		17-1964	17-2167	17-1083	17-1593	17-1963	17-1760	17-1453	17-1153
Vertical Load	(kN)	25	58	82	94	32	41	63	90
Vertical Deflection	(mm)	33	34	34	41	43	45	45	45
Vertical Stiffness	(kN/mm)	0.7	1.7	2.4	2.3	0.8	0.9	1.4	2.0
Lateral Stiffness	(kN/mm)	1.25	3.8	7.2	10	1.5	4.2	7.6	7.0
Longitudinal Stiffness	(kN/mm)	13.5	18	33	46	12	10	19	32
Installed angle	(α°)	22	22	22	22	22	22	22	22
Dimension A	mm	185	165	197	227	169	188	227	203
Dimension B	mm	48	48	48	48	38	29	44	64
Dimension C	mm	229	216	248	270	223	282	301	273
Dimension D	mm	104	115	115	130	125	150	150	150
Dimension E	mm	130	231	231	265	176	252	273	252
Dimension F	mm	100	152	152	175	132	152	157	152
Mass weight	(kg)	6	13.3	15.4	17	9	19	22.7	21

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Chevron Springs



120° Chevron Angle 21-32 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

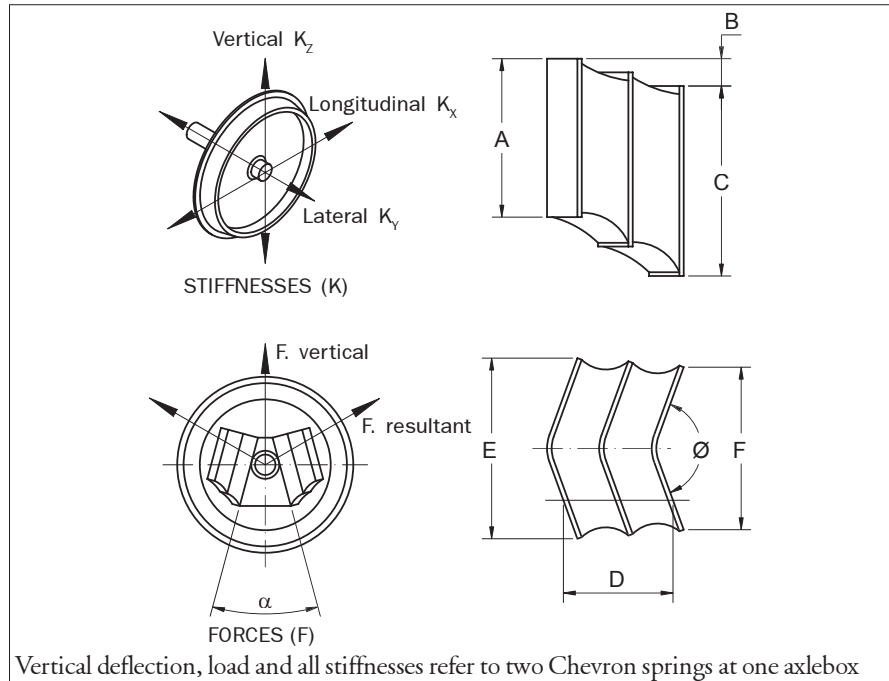
Product No		17-1610	17-1866	17-0888	17-0508	17-2023	17-1747	17-1525
Vertical Load	(kN)	35	33	39	55	35	26	35
Vertical Deflection	(mm)	21	30	30	30	31	32	32
Vertical Stiffness	(kN/mm)	1.7	1.1	1.3	1.8	1.15	0.8	1.2
Lateral Stiffness	(kN/mm)	3.5	3.6	3.1	3.7	2.6	0.7	2.0
Longitudinal Stiffness	(kN/mm)	25	16	25	30	6	0.9	13
Installed angle	(α°)	22	22	22	22	24	22	22
Dimension A		181	176	138	176	260	200	225
Dimension B		23	30	30	30	60	50	62
Dimension C		210	216	178	216	269	213	260
Dimension D		64	88	88	88	110	95	95
Dimension E		159	192	192	192	136	120	140
Dimension F		116	143	143	143	120	115	120
Mass weight	(kg)	4.6	8.3	8.2	10.4	11	5.5	7.0

120° Chevron Angle 35-40 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

Product No		17-2057	17-2085	17-1676	17-1371	17-0885	17-1727	17-1376
Vertical Load	(kN)	40	47	24	32	40	40	48
Vertical Deflection	(mm)	35	36	40	40	40	40	40
Vertical Stiffness	(kN/mm)	1.1	1.3	0.6	0.8	1.0	1.0	1.2
Lateral Stiffness	(kN/mm)	2.6	3.2	1.0	3.0	2.0	1.5	1.8
Longitudinal Stiffness	(kN/mm)	1.2	16	6	10	17	20	26
Installed angle	(α°)	30	24	22	22	22	22	22
Dimension A		262	225	251	146	127	169	194
Dimension B		68	50	65	40	40	38	38
Dimension C		262	255	260	197	178	223	248
Dimension D		147	93	109	115	115	116	116
Dimension E		202	150	130	203	203	181	181
Dimension F		130	145	138	143	143	132	132
Mass weight	(kg)	12	8	8	12.3	8.3	8.6	9.8

Chevron Springs



120° Chevron Angle 40-56 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

Product No		17-1331	17-1467	17-1001	17-1574	17-1457	17-1151	17-1786
Vertical Load	(kN)	56	56	84	31	56	61	56
Vertical Deflection	(mm)	40	40	40	51	51	51	56
Vertical Stiffness	(kN/mm)	1.4	1.4	2.1	0.6	1.1	1.2	1.0
Lateral Stiffness	(kN/mm)	3.0	4.6	3.6	1.8	3.0	1.6	3.7
Longitudinal Stiffness	(kN/mm)	27	24	37	7	13	23	13
Installed angle	(α°)	22	22	22	22	22	22	22
Dimension A		165	200	191	178	253	178	240
Dimension B		40	40	40	57	90	57	82
Dimension C		216	255	241	241	318	241	266
Dimension D		116	116	116	149	149	149	162
Dimension E		223	223	203	202	202	202	244
Dimension F		165	165	143	116	116	116	160
Mass weight	(kg)	10.5	13.5	127	11.1	16	11.8	18.6

140° Chevron Angle 59-78 mm Vertical Deflection

Parts listed are a selection of a wider range, details of which are available on request.

Product No		17-2003	17-2185	17-1621
Vertical Load	(kN)	47	32	62
Vertical Deflection	(mm)	69	71	78
Vertical Stiffness	(kN/mm)	0.6	0.45	0.8
Lateral Stiffness	(kN/mm)	0.25	0.35	0.4
Longitudinal Stiffness	(kN/mm)	3.2	1.7	6.5
Installed angle	(α°)	26	26	22
Dimension A		280	280	280
Dimension B		114	114	123
Dimension C		271	271	230
Dimension D		200	200	198
Dimension E		208	208	230
Dimension F		204	204	226
Mass weight	(kg)	21	21	25.5



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