



# Chevron Spring



## Chevron Spring

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.

Chevron Springs provide three modes of flexibility for axlebox primary suspensions. The suspension properties are achieved by fitting the springs in a vee formation and with 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.

The included angle of the chevron plates can be varied between 90 deg. and 140 deg. at the design stage thereby allowing stiffness characteristics to be optimized to suit bogie designers.

## About Trelleborg Industrial AVS

Over 100 years of experience as Metalastik and Novibra, today Trelleborg Industrial AVS make improvements people can physically feel. From smoother travel to quieter, more efficient machines, we make life feel better. With quality, testing and compliance built in, we're in it for the long haul, ensuring your solution still works, over an extended and often arduous life-cycle.

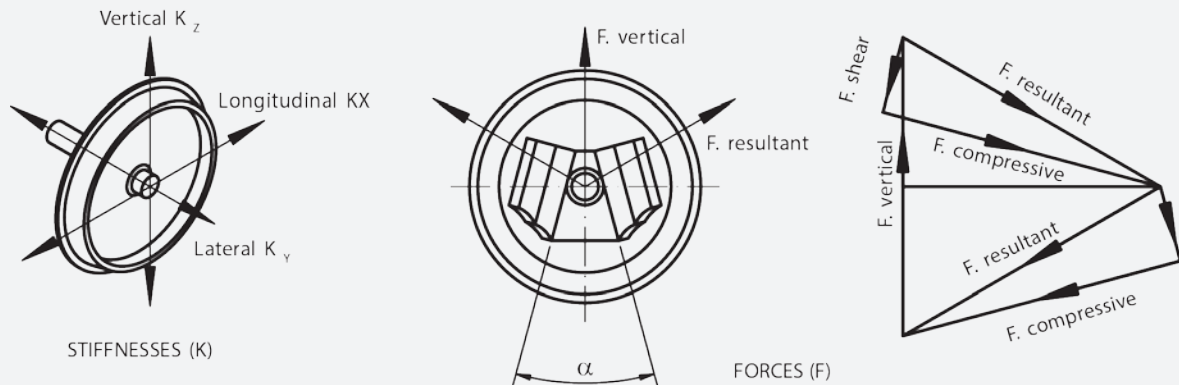
With three state-of-the-art manufacturing plants across the globe, our experience in rubber to metal bonding enhances several industries, including off-highway vehicles, rail and mass transit, marine and energy and general industry.

We offer an end-to-end service, to take you from concept through design, manufacturing and testing to delivery. This reduces the complexity of supply, helping you cut costs, mitigate risk and receive on time, on budget delivery.

Trelleborg IAVS is part of Trelleborg Group, which employs 15,000 people in over 40 countries. Whatever your challenge, whatever your role and wherever you are, we are nearby to offer expert knowledge and quality solutions.

# Chevron Springs

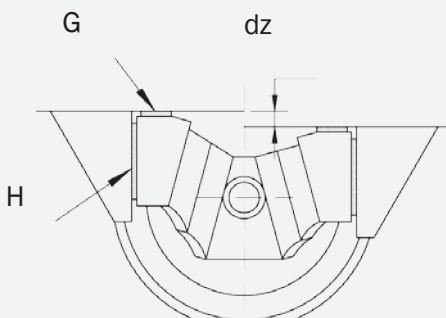
## Spring Characteristics



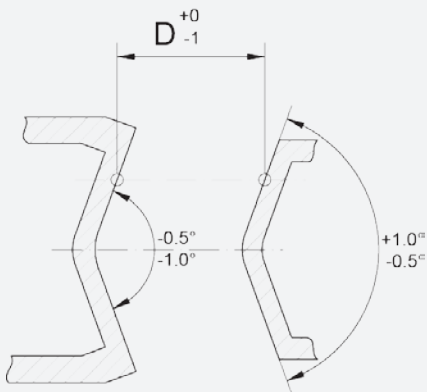
The three modes of flexibility for axlebox suspension are shown here. Springs are fitted inclined at an angle to the vertical axis, loading the rubber layers in shear and compression.

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. Metalastik® 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



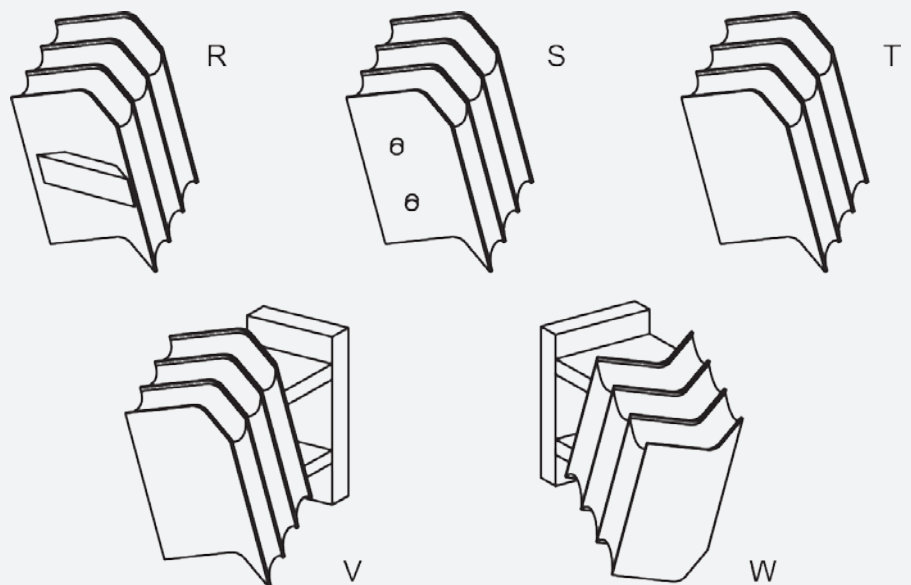
The vertical deflection (dz) may vary due to creep, Joule effect and stiffness tolerances. Shims (G) should be included for height adjustment. Shims (H) are sometimes necessary for accurate alignment of axles.



## Tolerances

Tolerances at the adjoining faces should be as shown

## Spring fixings



Springs can be supplied with alternative 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)

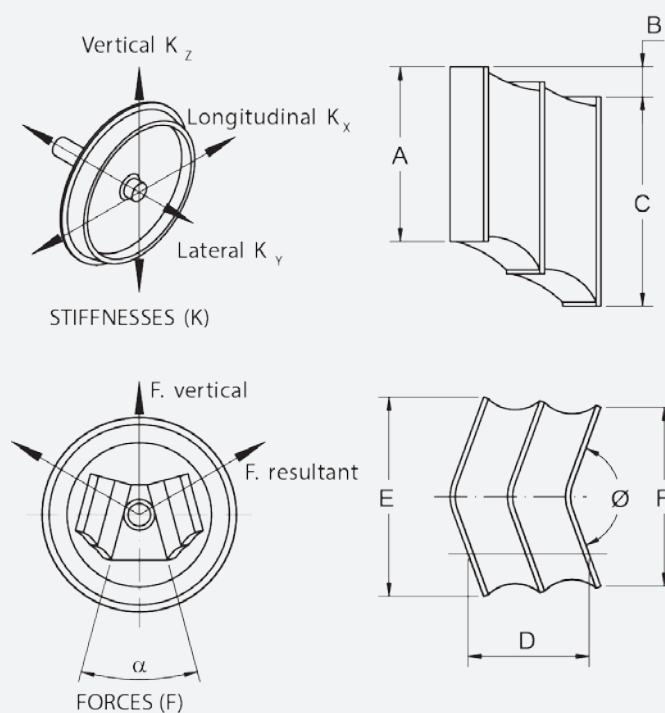
## CLASSIFICATION

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

1) Chevron angle - 90o, 106o, 120o and 140o.

2) Listings in each of the above groups are then ranked progressively in terms of deflection capacity followed by load capacity.

## Chevron Spring



Vertical deflection, load and all stiffnesses refer to two Chevron springs at one axlebox

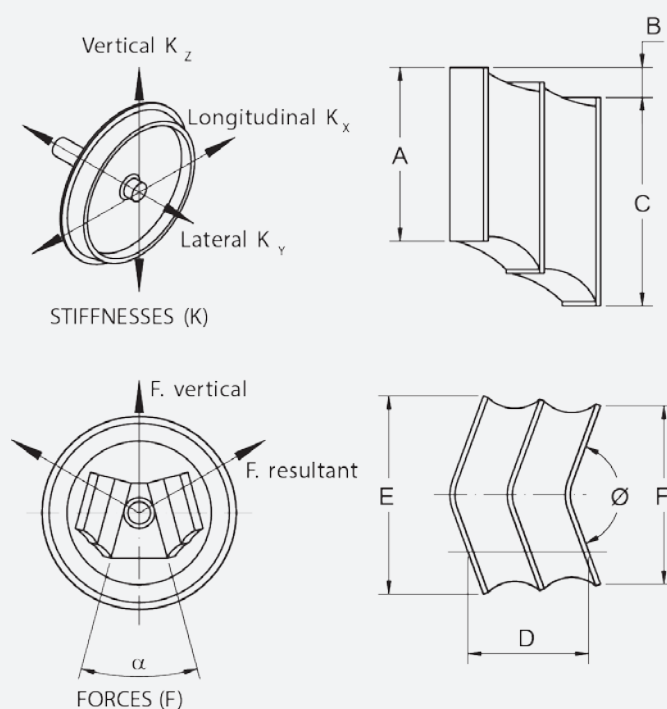
### 90° Chevron Angle 11-25 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-1085	112	14.3	125	91	110	84	19	11	1.7	2.1	8	40	2.5
17-1084	152	14.3	165	91	110	84	24	11	2.1	4	11	40	3.4
17-1211	190	14.3	203	91	110	84	27	11	2.4	5	14	40	4.2
17-0424	127	29	152	88	126	76	19	19	1	1.1	3	40	3.6
17-1344	165	29	190	88	126	76	27	19	1.4	3.9	10	40	4.6
17-0375	200	32	216	113	209	121	35	25	1.4	2.5	6	40	7.6

### 106° Chevron Angle 33-45 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2167	165	48	216	115	231	152	58	34	1.7	3.8	18	22	13.3
17-1083	197	48	248	115	231	152	82	34	2.4	7.2	33	22	15.4
17-1964	185	48	229	104	130	100	29	41	0.7	1.25	11	22	8.9
17-1593	227	48	270	130	265	175	94	41	2.3	10	46	22	17
17-1453	227	44	301	150	273	157	63	45	1.4	7.6	19	22	22.7
17-1153	203	64	273	150	252	152	90	45	2	7	32	22	21
17-1963	169	38	223	125	176	132	39	49	0.8	1.5	12	22	8.7
17-1760	188	29	282	150	252	152	53	59	0.9	4.2	10	22	19

## Chevron Springs



Vertical deflection, load and all stiffnesses refer to two Chevron springs at one axlebox

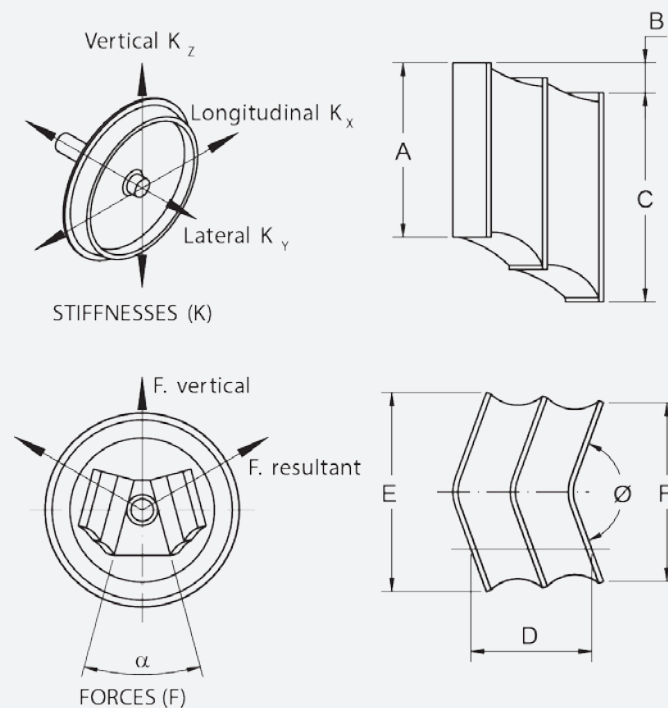
### 120° Chevron Angle 21-32 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (KG)
	A	B	C	D	E	F							
17-1610	181	23	210	64	159	116	35	21	1.7	3.5	25	22	4.6
17-1866	176	30	216	88	192	143	33	30	1.1	3.6	16	22	8.3
17-0888	138	30	178	88	192	143	39	30	1.3	3.1	25	22	8.2
17-0508	176	30	216	88	192	143	55	30	1.8	3.7	30	22	10.4
17-1747	200	50	213	95	120	115	26	32	0.8	0.7	0.9	22	5.5
17-1525	225	62	260	95	140	120	35	32	1.2	1.5	13	22	7
17-2085	225	50	255	93	150	145	47	36	1.3	3.2	16	24	8

### 120° Chevron Angle 35-40 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2023	260	60	269	110	136	120	31	38	0.8	1.9	5	24	11
17-1676	251	65	260	109	130	138	24	40	0.6	1	6	22	8
17-1371	146	40	197	115	203	143	32	40	0.8	3	10	22	8.7
17-0885	127	40	178	115	203	143	40	40	1	2	17	22	8.3
17-1727	169	38	223	116	181	132	40	40	1	1.5	20	22	8.6
17-1376	194	38	248	116	181	132	48	40	1.2	1.8	26	22	9.8
17-2057	262	68	262	147	201	117	56	43	1.3	3	11	30	12

## Chevron Springs



Vertical deflection, load and all stiffnesses refer to two Chevron springs at one axlebox

### 120° Chevron Angle 40-56 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-1331	165	40	216	116	223	165	56	40	1.4	3	27	22	10.5
17-1467	200	40	255	116	223	165	56	40	1.4	4.6	24	22	13.5
17-1001	191	40	241	116	203	143	84	40	2.1	3.6	37	22	12.7
17-1574	178	57	241	149	202	116	31	51	0.6	1.8	7	22	11.1
17-1457	253	90	318	149	202	116	56	51	1.1	3	13	22	16
17-1151	178	57	241	149	202	116	61	51	1.2	1.6	23	22	11.8
17-1786	240	82	266	162	244	160	56	56	1	3.7	13	22	18.6

### 140° Chevron Angle 59-78 mm Vertical Deflection

DRAWING No.	DIMENSIONS (mm)						NOMINAL VERTICAL LOAD (kN)	VERTICAL DEFLECTION (mm)	VERTICAL STIFFNESS (kN/mm)	LATERAL STIFFNESS (kN/mm)	LONGITUDINAL STIFFNESS (kN/mm)	INSTALLED ANGLE (degrees)	WEIGHT (kg)
	A	B	C	D	E	F							
17-2003	280	114	271	200	208	204	48	73	0.66	0.3	6	26	21
17-2185	280	114	271	203	208	204	38	74	0.52	0.5	4.7	26	21
17-1621	280	123	280	198	230	226	62	78	0.8	0.4	6.5	22	24.8



[WWW.TRELLEBORG.COM/ANTI-VIBRATION-SOLUTIONS](http://WWW.TRELLEBORG.COM/ANTI-VIBRATION-SOLUTIONS)

For further information visit our website or e-mail [industrialavs@trelleborg.com](mailto:industrialavs@trelleborg.com)

The content in this datasheet was correct at the time of printing, but is subject to change without notice.