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Characteristics of disc springs in combination (to be used in conjunction with ESDU 78043)

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THE PREPARATION OF THIS DATA ITEM

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CHARACTERISTICS OF DISC SPRINGS IN COMBINATION (TO BE USED IN CONJUNCTION WITH ESDU 78043)

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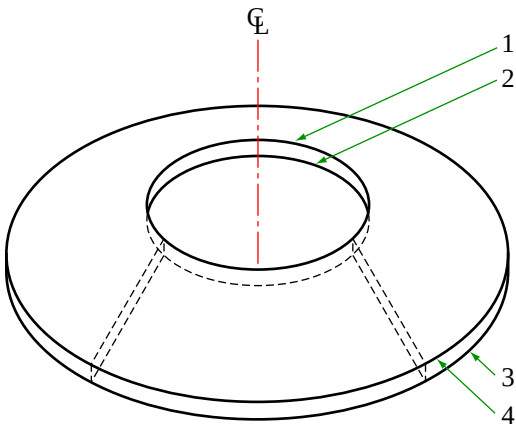
CHARACTERISTICS OF DISC SPRINGS IN COMBINATION (TO BE USED IN CONJUNCTION WITH ESDU 78043)

1. NOTATION

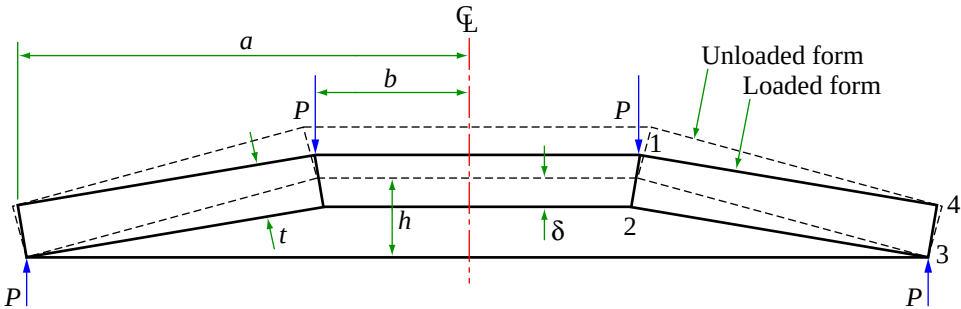
a	external radius of spring (see Sketch 1.2)	m	in
b	internal radius of spring (see Sketch 1.2)	m	in
$f_{1,2,3,4}$	stresses at perimeters 1 to 4, respectively (see Sketch 1.1 and ESDU 78043)	N/m ²	lbf/in ²
h	internal unloaded height of single spring (see Sketch 1.2)	m	in
h_s	maximum possible deflection of spring stack (see Sketch 1.3)	m	in
l	external unloaded height of single spring, $h + t$	m	in
L	external unloaded height of spring stack (see Sketch 1.3)	m	in
m	number of series components in spring stack (see Section 3)		
n	number of springs in parallel in single series component (see Section 3)		
P	total load applied uniformly to perimeters 1 and 3 of single spring	N	lbf
P_N	load applied to nested stack (see Section 1.1)	N	lbf
P_0	load on single spring when $\delta = h$	N	lbf
P_s	load applied to spring stack	N	lbf
R	resilience of single spring	N/m ²	lbf/in ²
R_s	resilience of spring stack	N/m ²	lbf/in ²
S	stiffness (spring rate) of single disc spring	N/m	lbf/in
S_N	stiffness (spring rate) of nested stack	N/m	lbf/in
S_s	stiffness (spring rate) of spring stack	N/m	lbf/in
t	thickness of material of single spring (see Sketch 1.2)	m	in
t_n	thickness of spring equivalent to n springs of thickness t stacked in parallel	m	in
α	ratio of external to internal radii of spring, a/b		
δ	deflection of single disc spring	m	in

δ_N	deflection of nested stack under load P_N	m	in
δ_s	total deflection of spring stack under load P_s	m	in

Both SI and British units are quoted but any coherent system of units may be used.



Sketch 1.1 Initially coned disc spring showing perimeter reference numbers



Sketch 1.2 Section through initially coned disc spring showing basic notation