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WHITE PAPER

The Difference Between Disc Springs and Belleville Washers

by Ken Hagan - Division President
SPIROL International Corporation

Disc Springs and Belleville Washers are both conically-shaped spring washers typically made from spring steels and designed to be loaded axially. Both can provide a higher degree of force in a relatively compact area as compared to coil springs or wave springs. While the terms “Disc Springs” and “Belleville Washers” are often used interchangeably, there are some technical, design, and application differences between the two products:

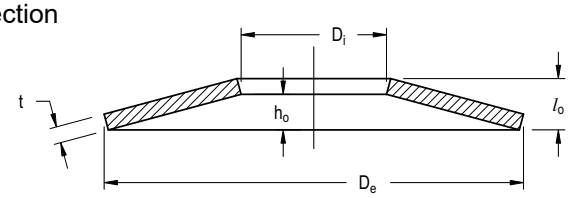
TECHNICAL DISTINCTIONS BETWEEN DISC SPRINGS AND BELLEVILLE WASHERS

	Disc Springs	Belleville Washers
Typical Applications	Preloading, dynamic loading / cycling, predictable fatigue life important	Static Applications (Bolt fastening primarily)
Typical Materials	High carbon steel < 1.25mm, Alloy steel >= 1.25mm	High carbon steel
Thickness	0.2mm - 14mm	Tend to be thicker for a given OD
Standard Units	Metric	Imperial / Metric
Force Requirements	Force / deflection curves specified and calculated	Static force / torque can be specified or no force specification
Governed by International Standards	DIN EN 16983 & 16984 (previously DIN 2093 & 2092)	DIN 6796

Belleville Washers are primarily used in heavy duty applications fastened together with a bolt where the load is considered static. Disc Springs can be statically loaded either continuously or intermittently, or dynamically subjected to continuous load cycling. Unlike Belleville Washers, Disc Springs are designed specifically to provide a repeatable force-travel relationship, and have a long and predictable fatigue life in dynamic or cycling applications. Disc Springs are commonly found in a variety of applications including pressure controls and regulators, vehicle braking systems, valves, shock absorbers, clutches, friction assemblies, and joints where thermal / weight cycling occurs. Disc Springs can be used as a single piece, or combined together into different configurations in stacks to achieve the desired force-deflection performance.

A defined list of standard Disc Spring sizes and associated load and deflection characteristics is available in DIN EN 16983 (formerly DIN 2093).

Selecting the most appropriate Disc Spring or Disc Stack configuration can be challenging. It is recommended that designers partner with experts in **Disc Spring Application Engineering** to determine the optimum Disc Spring for a particular application.



For information about fatigue life of Disc Springs, read the SPIROL White Paper:

How to Calculate the Estimated Fatigue Life of Disc Springs

Originally written by : Nicholas Bunt

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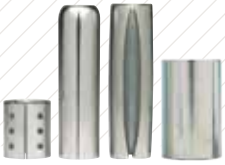
Coiled Spring Pins

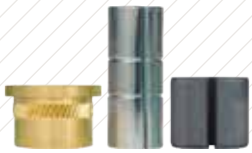
Slotted Spring Pins

Solid Pins

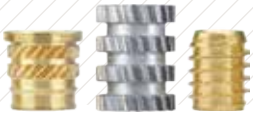
Alignment Dowels / Bushings



Spacers & Rolled Tubular Components



Compression Limiters



Threaded Inserts for Plastics

Railroad Nuts

Disc Springs

Precision Shims & Thin Metal Stampings

Precision Washers

Parts Feeding Technology

Pin Installation Technology

Insert Installation Technology

Compression Limiter Installation Technology

*Please refer to **www.SPIROL.com** for current specifications and standard product offerings.*

SPIROL offers complimentary Application Engineering support! We will assist on new designs as well as help resolve issues, and recommend cost savings on existing designs. Let us help by visiting **Application Engineering Services** on **SPIROL.com**.

Technical Centers

Americas

SPIROL International Corporation
30 Rock Avenue
Danielson, Connecticut 06239 U.S.A.
Tel. +1 860 774 8571
Fax. +1 860 774 2048

SPIROL Shim Division
321 Remington Road
Stow, Ohio 44224 U.S.A.
Tel. +1 330 920 3655
Fax. +1 330 920 3659

SPIROL Canada
3103 St. Etienne Boulevard
Windsor, Ontario N8W 5B1 Canada
Tel. +1 519 974 3334
Fax. +1 519 974 6550

SPIROL Mexico
Avenida Avante #250
Parque Industrial Avante Apodaca
Apodaca, N.L. 66607 Mexico
Tel. +52 81 8385 4390
Fax. +52 81 8385 4391

SPIROL Brazil
Rua Mafalda Barnabé Soliane, 134
Comercial Vitória Martini, Distrito Industrial
CEP 13347-610, Indaiatuba, SP, Brazil
Tel. +55 19 3936 2701
Fax. +55 19 3936 7121

Europe

SPIROL United Kingdom
17 Princewood Road
Corby, Northants
NN17 4ET United Kingdom
Tel: +44 (0) 1536 444800
Fax: +44 (0) 1536 203415

SPIROL France
Cité de l'Automobile ZAC Croix Blandin
18 Rue Léna Bernstein
51100 Reims, France
Tel: +33 (0) 3 26 36 31 42
Fax: +33 (0) 3 26 09 19 76

SPIROL Germany
Ottostr. 4
80333 Munich, Germany
Tel: +49 (0) 89 4 111 905 71
Fax: +49 (0) 89 4 111 905 72

SPIROL Spain
Plantes 3 i 4
Gran Via de Carles III, 84
08028, Barcelona, Spain
Tel/Fax: +34 932 71 64 28

SPIROL Czech Republic
Evropská 2588 / 33a
160 00 Prague 6-Dejvice
Czech Republic
Tel: +420 226 218 935

SPIROL Poland
ul. Solec 38 lok. 10
00-394, Warsaw, Poland
Tel. +48 510 039 345

Asia Pacific

SPIROL Asia Headquarters
1st Floor, Building 22, Plot D9, District D
No. 122 HeDan Road
Wai Gao Qiao Free Trade Zone
Shanghai, China 200131
Tel: +86 (0) 21 5046-1451
Fax: +86 (0) 21 5046-1540

SPIROL Korea
16th Floor, 396 Seocho-daero,
Seocho-gu, Seoul, 06619, South Korea
Tel: +82 (0) 10 9429 1451

e-mail: info@spirol.com

SPIROL.com