



弹性解决方案提供商

ELASTIC SOLUTIONS PROVIDER



江苏三众弹性技术股份有限公司

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WeChat Official Account



微信视频号
WeChat Video Account



江苏三众弹性技术股份有限公司

JIANGSU SUNZO SPRING ELASTICITY TECHNOLOGY CO.,LTD.



公司简介 Company Profile

江苏三众弹性技术股份有限公司是中核集团参股设立的混合所有制企业，专业研发、制造碟形弹簧、波形弹簧、螺旋弹簧、碟形垫圈等高端弹性元件。研发中心设于南京，生产基地位于泗洪，占地 100 余亩，拥有从原材料到成品制造的完整产业链。

公司深度参与国际 ISO 碟形弹簧标准及多项国家标准制定，建有现代化检测中心，累计取得 70 余项专利，与多所重点高校开展产学研合作，自主研发多条专用生产线，具备非标定制与进口替代快速响应能力。

产品涵盖标准及非标碟形弹簧、波形弹簧、螺旋弹簧、碟形垫圈四大系列，广泛应用于核电、氢能、航空航天、军工、特高压、风电、船舶、汽车、工程机械、轨道交通、石化、冶金等高端领域，是众多行业标杆企业的核心供应商。公司通过 ISO 9001、IATF 16949、ISO 14001、ISO 45001 等体系认证，产品性能对标国际一流品牌，致力于为客户提供最佳弹性技术解决方案。

Jiangsu Sunzo Spring Elasticity Technology Co., Ltd. is a mixed-ownership enterprise established with participation from the China National Nuclear Corporation (CNNC). The company specializes in the research, development, and manufacturing of high-end elastic components, including disc springs, wave springs, helical springs, and disc washers. Its R&D center is located in Nanjing, while its production base is situated in Sihong, covering an area of over 100 mu and featuring a comprehensive industrial chain spanning from raw material sourcing to finished product manufacturing.

The company plays an active role in the development of international ISO standards for disc springs as well as numerous national standards; it operates a modern testing center, has secured more than 70 patents in total, and has established industry-university-research collaboration partnerships with several leading universities. The company has independently developed multiple specialized production lines and possesses a rapid response capability for customized non-standard solutions and import substitution.

Its product portfolio encompasses four major series—standard and non-standard disc springs, wave springs, helical springs, and disc washers—and is widely used in high-end sectors such as nuclear power, hydrogen energy, aerospace, defense, ultra-high voltage power transmission, wind power, marine engineering, automotive, construction machinery, rail transit, petrochemicals, and metallurgy; it serves as a core supplier to numerous industry-leading enterprises. The company holds certifications under various international standards systems, including ISO 9001, IATF 16949, ISO 14001, and ISO 45001. The performance of its products is benchmarked against world-class brands, and the company is committed to providing its customers with optimal elastic technology solutions.

企业资质与产品专利



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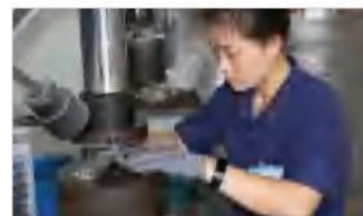
生产设备 Production Equipment



连续模具精密冲压
Progressive Die Punching



线切割
Wire Cutting



强压
Prestressing



数控加工中心
CNC Machining Center



数控磨床
CNC Grinding Machine



自动成型设备
Automatic Forming Machine



等温热处理生产线
Austempering



自动分选
Automatic Sorting Machine



成品仓库
Product Warehouse

检测设备 Testing Equipment



硬度计
Hardmeter



光谱分析仪
Spectroscopy Analyzer



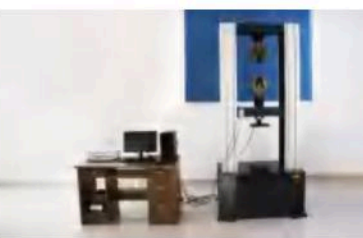
金相显微镜
Metallographic Microscope



疲劳试验机
Fatigue Testing Machine



盐雾试验机
Salt Spray Tester



力学性能测试仪
Mechanical Property Tester

碟形弹簧

特点：

- 刚度大，缓冲吸振能力强，能以小变形承受大载荷，适用于轴向空间较小的场合。
- 这种弹簧具有变刚度特性以及很广泛的非线性特性。
- 用同样的碟形弹簧采用不同的组合方式，能使弹簧特性在很大范围内变化。可采用对合、叠合的组合方式，也可采用复合不同厚度、不同片数等的组合方式。

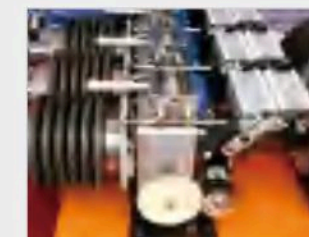
Characteristics and Application

- Own high stiffness and great buffer and shock absorption capacity; be able to undertake huge loads by small deformation and is suitable for the occasions where the axial space is relatively small.
- This type of spring is featured by variable stiffness and broad non-linearity.
- Different combination methods of the same disc springs can lead to different spring characteristics. The combination methods combining the springs with different thicknesses and plate number can also

碟形弹簧的应用 Application of Belleville Spring



碟形弹簧在机床上应用
Machine Tool



碟形弹簧在高压开关上应用
High-voltage Switch Gear



碟形弹簧在阀门上应用
Valves



碟形弹簧在液压锁紧装置上应用
Hydraulic Lock Device



碟形弹簧在风电上应用
Wind Power Industry



碟形弹簧在电机上应用
Motor



碟形弹簧在制动装置上应用
Brake Device



碟形弹簧在化工管道上应用
Petroleum and Chemical Industry



碟簧在汽车转向和车桥系统的应用
Automotive Steering and Axle System

碟簧操作机构的应用 Operation Principle

液压碟簧操作机构原理简介

Principle of Hydraulic Disc Spring Operating Mechanism

1. 基本原理

由弹簧作为储能部件（目的是建立油压），液压油作为传动载体的机构。

2. 主要零部件

储能部件：电机、油泵、碟形弹簧、储能活塞及储能提升杆等。

储能控制部件：行程开关。

控制回路：辅助开关、合分闸阀、切换阀

1. Basic principles

Use the spring as the energy storage part (aiming at establishing the oil pressure) and hydraulic oil as the mechanism of transmission carrier.

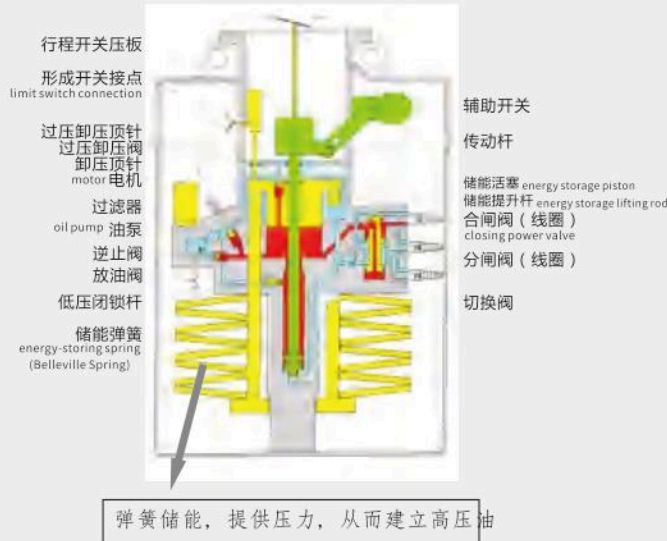
2. Major parts

Energy storage parts: motor, oil pump, disk spring, energy storage piston, energy storage lifting rod, etc.

Controlling parts for energy storage: limit switch.

Controlling circuit: auxiliary switch, closing and opening valve, switching valve.

aling system, the spring is retained in the compression status.



弹簧储能，提供压力，从而建立高压油

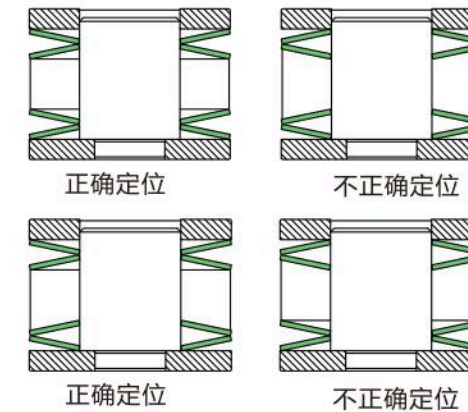
碟形弹簧安装 Installation of Disc Spring

碟形弹簧的安装,以它的底端朝向负荷力量来源为佳。

In view of the installation of disc spring, the source of its bottom-facing load force shall prevail.

碟簧的导向件采用导杆(内导向)或导套(外导向)，导向件与碟簧之间的间隙尺寸推荐表。

The guide bar (internally-guided) or guide bush (externally-guided) shall be adopted as the guiding part of disc spring. Here is the table of recommended size of gaps between guiding parts and disc spring.



内径d或外径D(mm)	建议间隙(mm)
~ 16	0.2
> 16~20	0.3
> 20~26	0.4
> 26~31.5	0.5
> 31.5~50	0.6
> 50~80	0.8
> 80~140	1.0
> 140~250	1.6
> 250~	2.0

碟形弹簧技术要求 Technical Specifications

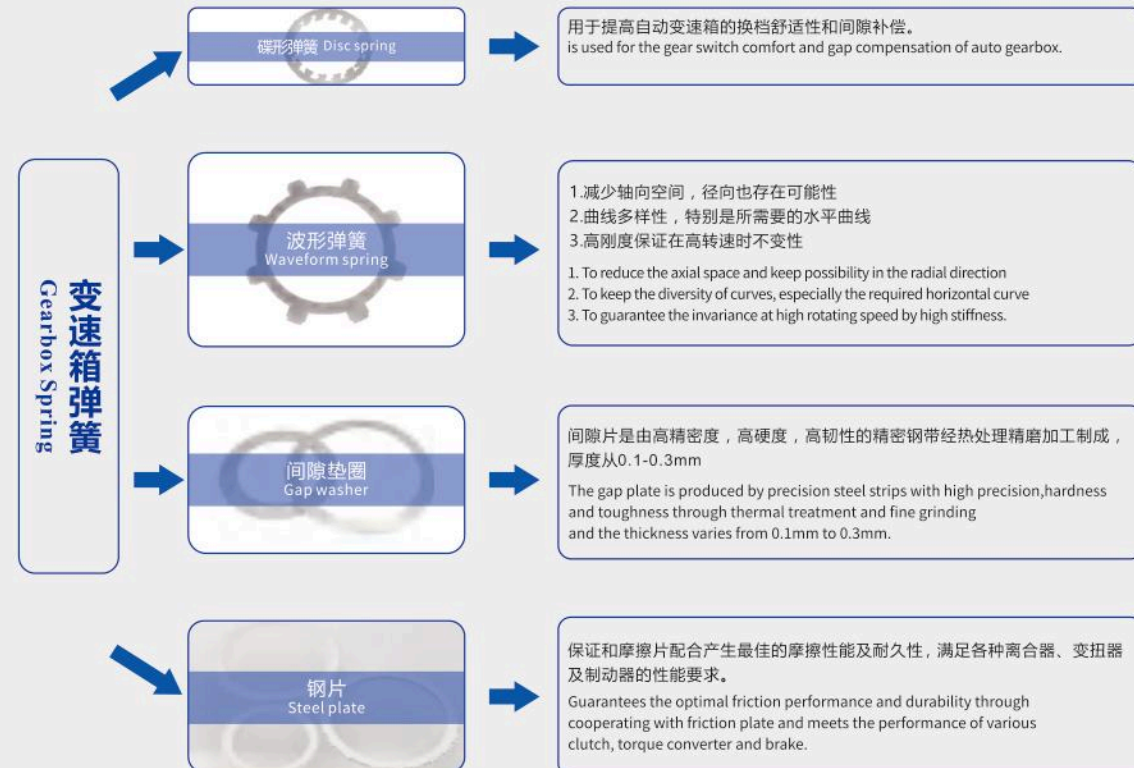
■ 外径D，内径d公差表 Tolerance for outer and inner diameter

外径D/内径d Outer Dia D/Inner Dia.D(mm)	一级精密度 Level1Accuracy		二级精密度 Level 2 Accuracy		一级精密度 Level1Accuracy		二级精密度 Level 2 Accuracy	
	外径D (mm)		内径d(mm)					
8~10	+0	-0.15	+0	-0.22	+0.15	-0	+0.22	-0
>10~18	+0	-0.18	+0	-0.27	+0.18	-0	+0.27	-0
>18~30	+0	-0.21	+0	-0.33	+0.21	-0	+0.33	-0
>30~50	+0	-0.25	+0	-0.39	+0.25	-0	+0.39	-0
>50~80	+0	-0.30	+0	-0.46	+0.30	-0	+0.46	-0
>80~120	+0	-0.35	+0	-0.54	+0.35	-0	+0.54	-0
>120~180	+0	-0.40	+0	-0.63	+0.40	-0	+0.63	-0
>180~250	+0	-0.46	+0	-0.72	+0.46	-0	+0.72	-0
>250~315	+0	-0.52	+0	-0.81	+0.52	-0	+0.81	-0
>315~400	+0	-0.57	+0	-0.89	+0.57	-0	+0.89	-0
>400~500	+0	-0.63	+0	-0.97	+0.63	-0	+0.97	-0

■ 碟形弹簧， H_0 ， $S=0.75h_0$ 公差表 Tolerance for thickness and height (H_0 ， $S=0.75h_0$)

材料厚度t(t') Material thickness t(t') (mm)	材料厚度t公差 Allowable tolerance in Material thickness t (mm)	自由高度H ₀ 公差 Allowable tolerance in free height H ₀ (mm)	s=0.75h ₀ 时，F允许的波动范围(%) Allowable tolerance in spring force F at H ₀ -s During loading with s=0.75h ₀ (%)		硬度 HRC
			一级精密度 Level1Accuracy	二级精密度 Level 2 Accuracy	
0.2~0.6	+0.02 -0.06	+0.10 -0.05	+25 -7.5	+30 -10	42-52
>0.6~1.25	+0.03 -0.09	+0.15 -0.08	+15 -7.5	+20 -10	
1.25					
>1.25~2	+0.04 -0.12	+0.20 -0.10			
>2~3					
>3~3.8	+0.05 -0.15	+0.30 -0.15	+10 -5	+15 -7.5	
>3.8~6					
>6~14	+/- 0.10	+/- 0.30	+/- 5	+/- 10	42-52
>14~16	/		/	/	

变速箱弹簧的应用 Transmission Spring Application



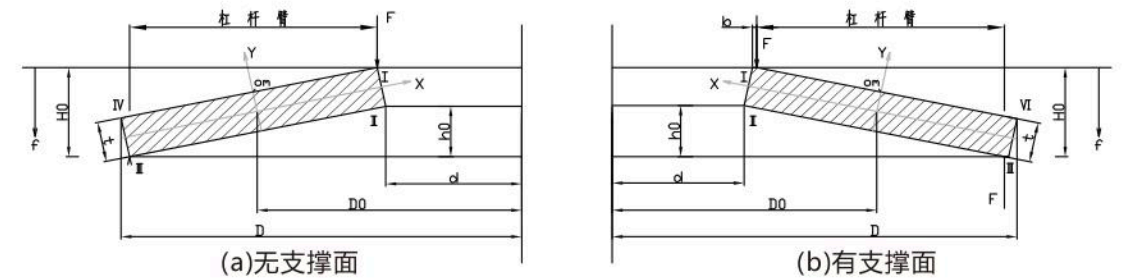
SUNZO DIN2093 标准碟形弹簧 DIN2093 Disc Spring / Belleville Washer



	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 001	6.00	3.20	0.30		0.45	0.15	0.50	0.04	45	0.08	84	0.11	119	0.04
001 002	8.00	3.20	0.20		0.40	0.20	1.00	0.05	12	0.10	21	0.15	26	0.06
001 003	8.00	3.20	0.30		0.55	0.25	0.83	0.06	46	0.13	79	0.19	104	0.10
001 004	8.00	3.20	0.40		0.60	0.20	0.50	0.05	69	0.10	130	0.15	186	0.13
001 005	8.00	3.20	0.50		0.70	0.20	0.40	0.05	128	0.10	246	0.15	357	0.17
001 006C	8.00	4.20	0.20		0.45	0.25	1.25	0.06	21	0.13	33	0.19	39	0.06
001 007B	8.00	4.20	0.30		0.55	0.25	0.83	0.06	52	0.13	89	0.19	118	0.09
001 008A	8.00	4.20	0.40		0.60	0.20	0.50	0.05	78	0.10	147	0.15	210	0.11
001 009	10.00	3.20	0.30		0.65	0.35	1.17	0.09	51	0.18	82	0.26	98	0.17
001 010	10.00	3.20	0.40		0.70	0.30	0.75	0.08	75	0.15	133	0.23	179	0.22
001 011	10.00	3.20	0.50		0.85	0.35	0.70	0.09	165	0.18	296	0.26	404	0.28
001 012	10.00	4.20	0.40		0.70	0.30	0.75	0.08	79	0.15	140	0.23	189	0.20
001 013	10.00	4.20	0.50		0.75	0.25	0.50	0.06	110	0.13	206	0.19	294	0.25
001 014	10.00	4.20	0.60		0.85	0.25	0.42	0.06	182	0.13	347	0.19	502	0.30
001 015C	10.00	5.20	0.25		0.55	0.30	1.20	0.08	30	0.15	48	0.23	58	0.11
001 016B	10.00	5.20	0.40		0.70	0.30	0.75	0.08	88	0.15	155	0.23	209	0.18
001 017A	10.00	5.20	0.50		0.75	0.25	0.50	0.06	122	0.13	228	0.19	325	0.23
001 018	12.00	4.20	0.40		0.80	0.40	1.00	0.10	85	0.20	141	0.30	178	0.31
001 019	12.00	4.20	0.50		0.90	0.40	0.80	0.10	143	0.20	249	0.30	331	0.39
001 020	12.00	4.20	0.60		1.00	0.40	0.67	0.10	224	0.20	405	0.30	557	0.47
001 021	12.00	5.20	0.50		0.90	0.40	0.80	0.10	150	0.20	263	0.30	350	0.36
001 022	12.00	5.20	0.60		0.95	0.35	0.58	0.09	196	0.18	361	0.26	506	0.43
001 023	12.00	6.20	0.50		0.85	0.35	0.70	0.09	134	0.18	239	0.26	326	0.33
001 024	12.00	6.20	0.60		0.95	0.35	0.58	0.09	214	0.18	394	0.26	552	0.39
001 025	12.50	5.20	0.50		0.85	0.35	0.70	0.09	111	0.18	200	0.26	272	0.38
001 026C	12.50	6.20	0.35		0.80	0.45	1.29	0.11	84	0.23	130	0.34	151	0.25
001 027B	12.50	6.20	0.50		0.85	0.35	0.70	0.09	120	0.18	215	0.26	293	0.36

材质(Material) :
1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

SUNZO DIN2093 标准碟形弹簧 DIN2093 Disc Spring / Belleville Washer



	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 028A	12.50	6.20	0.70		1.00	0.30	0.43	0.08	239	0.15	457	0.23	660	0.51
001 029C	14.00	7.20	0.35		0.80	0.45	1.29	0.11	68	0.23	106	0.34	123	0.31
001 030B	14.00	7.20	0.50		0.90	0.40	0.80	0.10	120	0.20	210	0.30	279	0.44
001 031A	14.00	7.20	0.80		1.10	0.30	0.38	0.08	284	0.15	547	0.23	797	0.71
001 032	15.00	5.20	0.40		0.95	0.55	1.38	0.14	101	0.28	154	0.41	176	0.49
001 033	15.00	5.20	0.50		1.00	0.50	1.00	0.13	133	0.25	221	0.38	278	0.61
001 034	15.00	5.20	0.60		1.05	0.45	0.75	0.11	171	0.23	302	0.34	407	0.73
001 035	15.00	5.20	0.70		1.25	0.55	0.79	0.14	340	0.28	596	0.41	797	0.85
001 036	15.00	6.20	0.50		1.00	0.50	1.00	0.13	138	0.25	229	0.38	289	0.58
001 037	15.00	6.20	0.60		1.05	0.45	0.75	0.11	178	0.23	314	0.34	424	0.69
001 038	15.00	6.20	0.70		1.10	0.40	0.57	0.10	222	0.20	411	0.30	578	0.81
001 039	15.00	8.20	0.70		1.10	0.40	0.57	0.10	256	0.20	474	0.30	666	0.68
001 040	15.00	8.20	0.80		1.20	0.40	0.50	0.10	367	0.20	689	0.30	982	0.78
001 041C	16.00	8.20	0.40		0.90	0.50	1.25	0.13	84	0.25	131	0.38	154	0.47
001 042B	16.00	8.20	0.60		1.05	0.45	0.75	0.11	172	0.23	304	0.34	410	0.70
001 043	16.00	8.20	0.70		1.15	0.45	0.64	0.11	254	0.23	461	0.34	637	1.05
001 044	16.00	8.20	0.80		1.20	0.40	0.50	0.10	308	0.20	579	0.30	825	0.70
001 045A	16.00	8.20	0.90		1.25	0.35	0.39	0.09	363	0.18	697	0.26	1013	1.05
001 046	18.00	6.20	0.40		1.00	0.60	1.50	0.15	85	0.30	126	0.45	139	0.70
001 047	18.00	6.20	0.50		1.10	0.60	1.20	0.15	130	0.30	206	0.45	245	0.88
001 048	18.00	6.20	0.60		1.20	0.60	1.00	0.15	191	0.30	317	0.45	400	1.06
001 049	18.00	6.20	0.70		1.40	0.70	1.00	0.18	354	0.35	588	0.53	742	1.23
001 050	18.00	6.20	0.80		1.50	0.70	0.88	0.18	480	0.35	822	0.53	1072	1.41
001 051	18.00	8.20	0.70		1.25	0.55	0.79	0.14	255	0.28	446	0.41	596	1.11
001 052	18.00	8.20	0.80		1.30	0.50	0.63	0.13	309	0.25	564	0.38	783	1.27
001 053	18.00	8.20	1.00		1.50	0.50	0.50	0.13	559	0.25	1051	0.38	1497	1.58
001 054C	18.00	9.20	0.45		1.05	0.60	1.33	0.15	121	0.30	186	0.45	214	0.66

表面处理(Finish) :
磷化 Phosphating达克罗: Dacromet / 发蓝 Blueing抛光: Polish / 久美特: Geomet钝化: Passivating / 特氟龙 : Teflon

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 055B	18.00	9.20	0.70		1.20	0.50	0.71	0.13	233	0.25	417	0.38	566	1.03
001 056A	18.00	9.20	1.00		1.40	0.40	0.40	0.10	451	0.20	865	0.30	1254	1.48
001 057	20.00	8.20	0.50		1.15	0.65	1.30	0.16	128	0.33	199	0.49	231	1.03
001 058	20.00	8.20	0.60		1.30	0.70	1.17	0.18	214	0.35	342	0.53	412	1.23
001 059	20.00	8.20	0.70		1.35	0.65	0.93	0.16	262	0.33	442	0.49	569	1.44
001 060	20.00	8.20	0.80		1.40	0.60	0.75	0.15	315	0.30	557	0.45	751	1.64
001 061	20.00	8.20	0.90		1.50	0.60	0.67	0.15	423	0.30	765	0.45	1051	1.85
001 062	20.00	8.20	1.00		1.60	0.60	0.60	0.15	556	0.30	1020	0.45	1424	2.05
001 063	20.00	10.20	0.40		0.90	0.50	1.25	0.13	53	0.25	84	0.38	99	0.73
001 064C	20.00	10.20	0.50		1.15	0.65	1.30	0.16	141	0.33	219	0.49	254	0.91
001 065B	20.00	10.20	0.80		1.35	0.55	0.69	0.14	304	0.28	547	0.41	748	1.46
001 066	20.00	10.20	0.90		1.45	0.55	0.61	0.14	412	0.28	754	0.41	1050	1.64
001 067	20.00	10.20	1.00		1.55	0.55	0.55	0.14	544	0.28	1010	0.41	1425	1.82
001 068A	20.00	10.20	1.10		1.55	0.45	0.41	0.11	548	0.23	1050	0.34	1521	2.01
001 069C	22.50	11.20	0.60		1.40	0.80	1.33	0.20	240	0.40	370	0.60	425	1.41
001 070B	22.50	11.20	0.80		1.45	0.65	0.81	0.16	306	0.33	533	0.49	707	1.88
001 071A	22.50	11.20	1.25		1.75	0.50	0.40	0.13	693	0.25	1330	0.38	1929	2.94
001 072	23.00	8.20	0.70		1.50	0.80	1.14	0.20	279	0.40	448	0.60	544	1.99
001 073	23.00	8.20	0.80		1.55	0.75	0.94	0.19	332	0.38	560	0.56	719	2.28
001 074	23.00	8.20	0.90		1.70	0.80	0.89	0.20	486	0.40	829	0.60	1078	2.56
001 075	23.00	8.20	1.00		1.70	0.70	0.70	0.18	507	0.35	909	0.53	1240	2.75
001 076	23.00	10.20	0.90		1.65	0.75	0.83	0.19	463	0.38	802	0.56	1058	2.36
001 077	23.00	10.20	1.00		1.70	0.70	0.70	0.18	538	0.35	964	0.53	1315	2.62
001 078	23.00	10.20	1.25		1.90	0.65	0.52	0.16	870	0.33	1627	0.49	2310	3.17
001 079	23.00	12.20	1.00		1.60	0.60	0.60	0.15	475	0.30	872	0.45	1217	2.34
001 080	23.00	12.20	1.25		1.85	0.60	0.48	0.15	863	0.30	1630	0.45	2331	2.93
001 081	23.00	12.20	1.50		2.10	0.60	0.40	0.15	1432	0.30	2748	0.45	3986	3.51
001 082	25.00	10.20	1.00		1.75	0.75	0.75	0.19	492	0.38	870	0.56	1172	3.11
001 083C	25.00	12.20	0.70		1.60	0.90	1.29	0.23	331	0.45	515	0.68	600	2.06
001 084B	25.00	12.20	0.90		1.60	0.70	0.78	0.18	367	0.35	644	0.53	862	2.64
001 085	25.00	12.20	1.00		1.80	0.80	0.80	0.20	585	0.40	1021	0.60	1359	2.83
001 086	25.00	12.20	1.25		1.95	0.70	0.56	0.18	848	0.35	1573	0.53	2214	3.53
001 087A	25.00	12.20	1.50		2.05	0.55	0.37	0.14	1040	0.28	2007	0.41	2926	4.40
001 088	28.00	10.20	0.80		1.75	0.95	1.19	0.24	348	0.48	553	0.71	662	3.35
001 089	28.00	10.20	1.00		2.00	1.00	1.00	0.25	615	0.50	1022	0.75	1289	4.19
001 090	28.00	10.20	1.25		2.25	1.00	0.80	0.25	1030	0.50	1799	0.75	2394	5.24
001 091	28.00	10.20	1.50		2.20	0.70	0.47	0.18	1003	0.35	1899	0.53	2723	6.29

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

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	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 092	28.00	12.20	1.00		1.95	0.95	0.95	0.24	590	0.48	992	0.71	1268	3.91
001 093	28.00	12.20	1.25		2.10	0.85	0.68	0.21	844	0.43	1519	0.64	2083	4.89
001 094	28.00	12.20	1.50		2.25	0.75	0.50	0.19	1149	0.38	2159	0.56	3077	5.87
001 095C	28.00	14.20	0.80		1.80	1.00	1.25	0.25	435	0.50	681	0.75	801	2.87
001 096B	28.00	14.20	1.00		1.80	0.80	0.80	0.20	476	0.40	832	0.60	1107	3.59
001 097	28.00	14.20	1.25		2.10	0.85	0.68	0.21	907	0.43	1634	0.64	2240	4.49
001 098A	28.00	14.20	1.50		2.15	0.65	0.43	0.16	1033	0.33	1970	0.49	2841	5.39
001 099	31.50	12.20	1.00		2.10	1.10	1.10	0.28	587	0.55	951	0.83	1167	5.04
001 100	31.50	12.20	1.25		2.20	0.95	0.76	0.24	761	0.48	1343	0.71	1805	6.27
001 101	31.50	12.20	1.50		2.35	0.85	0.57	0.21	1033	0.43	1912	0.64	2688	7.50
001 102C	31.50	16.30	0.80		1.85	1.05	1.31	0.26	384	0.53	594	0.79	687	3.58
001 103B	31.50	16.30	1.25		2.15	0.90	0.72	0.23	791	0.45	1409	0.68	1913	5.60
001 104	31.50	16.30	1.50		2.40	0.90	0.60	0.23	1260	0.45	2314	0.68	3230	6.72
001 105A	31.50	16.30	1.75		2.45	0.70	0.40	0.18	1391	0.35	2669	0.53	3871	7.84
001 106	31.50	16.30	2.00		2.75	0.75	0.38	0.19	2199	0.38	4239	0.56	6173	8.96
001 107	34.00	12.30	1.00		2.20	1.20	1.20	0.30	587	0.60	930	0.90	1110	6.19
001 108	34.00	12.30	1.25		2.45	1.20	0.96	0.30	946	0.60	1587	0.90	2024	7.74
001 109	34.00	12.30	1.50		2.70	1.20	0.80	0.30	1447	6.00	2527	0.90	3363	9.28
001 110	34.00	14.30	1.25		2.40	1.15	0.92	0.29	913	0.58	1546	0.86	1993	7.33
001 111	34.00	14.30	1.50		2.55	1.05	0.70	0.26	1224	0.53	2192	0.79	2990	8.80
001 112	34.00	16.30	1.50		2.55	1.05	0.70	0.26	1291	0.53	2313	0.79	3155	8.23
001 113	34.00	16.30	2.00		2.85	0.85	0.43	0.21	2097	0.43	4003	0.64	5783	10.98
001 114C	35.50	18.30	0.90		2.05	1.15	1.28	0.29	458	0.58	712	0.86	832	5.13
001 115B	35.50	18.30	1.25		2.25	1.00	0.80	0.25	731	0.50	1277	0.75	1699	7.13
001 116A	35.50	18.30	2.00		2.80	0.80	0.40	0.20	1864	0.40	3576	0.60	5187	11.41
001 117	40.00	14.30	1.25		2.65	1.40	1.12	0.35	904	0.70	1459	1.05	1780	10.76
001 118	40.00	14.30	1.50		2.80	1.30	0.87	0.33	1188	0.65	2040	0.98	2668	12.91
001 119	40.00	14.30	1.75		3.05	1.30	0.74	0.33	1722	0.65	3051	0.98	4119	15.06
001 120	40.00	14.30	2.00		3.05	1.05	0.53	0.26	1800	0.53	3363	0.79	4769	17.21
001 121	40.00	16.30	1.50		2.80	1.30	0.87	0.33	1224	0.65	2102	0.98	2749	12.34
001 122	40.00	16.30	1.75		3.10	1.35	0.77	0.34	1881	0.68	3309	1.01	4435	14.40
001 123	40.00	16.30	2.00		3.10	1.10	0.55	0.28	1972	0.55	3663	0.83	5169	16.50
001 124	40.00	18.30	2.00		3.15	1.15	0.58	0.29	2182	0.58	4030	0.86	5656	15.60
001 125C	40.00	20.40	1.00		2.30	1.30	1.30	0.33	565	0.65	876	0.98	1017	7.30
001 126B	40.00	20.40	1.50		2.65	1.15	0.77	0.29	1109	0.58	1953	0.86	2621	10.95
001 127	40.00	20.40	2.00		3.10	1.10	0.55	0.28	2175	0.55	4041	0.83	5701	14.59
001 128A	40.00	20.40	2.25		3.15	0.90	0.40	0.23	2336	0.45	4481	0.68	6500	16.42

表面处理(Finish) :

磷化 Phosphating达克罗: Dacromet / 发蓝 Blueing抛光: Polish / 久美特: Geomet钝化: Passivating / 特氟龙 : Teflon

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DIN2093 Disc Spring / Belleville Washer

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	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 129	40.00	20.40	2.50		3.45	0.95	0.38	0.24	3351	0.48	6453	0.71	9390	18.25
001 130C	45.00	22.40	1.25		2.85	1.60	1.28	0.40	1041	0.80	1620	1.20	1891	11.74
001 131B	45.00	22.40	1.75		3.05	1.30	0.74	0.33	1524	0.65	2701	0.98	3646	16.43
001 132A	45.00	22.40	2.50		3.50	1.00	0.40	0.25	2773	0.50	5320	0.75	7716	23.48
001 133	48.00	16.30	1.50		3.00	1.50	1.00	0.38	1048	0.75	1740	1.13	2195	18.85
001 134	50.00	18.40	1.25		2.85	1.60	1.28	0.40	757	0.80	1178	1.20	1375	16.66
001 135	50.00	18.40	1.50		3.15	1.65	1.10	0.41	1166	0.83	1890	1.24	2319	19.99
001 136	50.00	18.40	2.00		3.65	1.65	0.83	0.41	2229	0.83	3868	1.24	5114	26.65
001 137	50.00	18.40	2.50		4.15	1.65	0.66	0.41	3870	0.83	7002	1.24	9643	33.31
001 138	50.00	18.40	3.00		4.20	1.20	0.40	0.30	4179	0.60	8018	0.90	11630	39.98
001 139	50.00	20.40	2.00		3.50	1.50	0.75	0.38	1966	0.75	3478	1.13	4687	25.70
001 140	50.00	20.40	2.50		3.85	1.35	0.54	0.34	3008	0.68	5601	1.01	7919	32.12
001 141	50.00	22.40	2.00		3.60	1.60	0.80	0.40	2247	0.80	3924	1.20	5222	24.64
001 142	50.00	22.40	2.50		3.90	1.40	0.56	0.35	3261	0.70	6044	1.05	8510	30.80
001 143C	50.00	25.40	1.25		2.85	1.60	1.28	0.40	854	0.80	1328	1.20	1550	14.29
001 144	50.00	25.40	1.50		3.10	1.60	1.07	0.40	1242	0.80	2028	1.20	2512	17.15
001 145B	50.00	25.40	2.00		3.40	1.40	0.70	0.35	1949	0.70	3491	1.05	4762	22.87
001 146	50.00	25.40	2.25		3.75	1.50	0.67	0.38	2905	0.75	5249	1.13	7217	25.73
001 147	50.00	25.40	2.50		3.90	1.40	0.56	0.35	3473	0.70	6437	1.05	9063	28.59
001 148A	50.00	25.40	3.00		4.10	1.10	0.37	0.28	4255	0.55	8214	0.83	11976	34.31
001 149C	56.00	28.50	1.50		3.45	1.95	1.30	0.49	1458	0.98	2259	1.46	2622	21.49
001 150B	56.00	28.50	2.00		3.60	1.60	0.80	0.40	1910	0.80	3335	1.20	4438	28.65
001 151	56.00	28.50	2.50		4.20	1.70	0.68	0.43	3638	0.85	6550	1.28	8978	35.82
001 152A	56.00	28.50	3.00		4.30	1.30	0.43	0.33	4142	0.65	7895	0.98	11388	42.98
001 153	60.00	20.50	2.00		4.20	2.20	1.10	0.55	2528	1.10	4097	1.65	5026	39.21
001 154	60.00	20.50	2.50		4.70	2.20	0.88	0.55	4151	1.10	7102	1.65	9255	49.01
001 155	60.00	20.50	3.00		5.20	2.20	0.73	0.55	6434	1.10	11429	1.65	15465	58.81
001 156	60.00	25.50	2.50		4.40	1.90	0.76	0.48	3447	0.95	6081	1.43	8175	45.47
001 157	60.00	25.50	3.00		4.65	1.65	0.55	0.41	4495	0.83	8352	1.24	11784	54.56
001 158	60.00	30.50	2.50		4.50	2.00	0.80	0.50	4059	1.00	7088	1.50	9432	41.15
001 159	60.00	30.50	2.75		4.75	2.00	0.73	0.50	5125	1.00	9117	1.50	12356	45.26
001 160	60.00	30.50	3.00		4.70	1.70	0.57	0.43	5083	0.85	9407	1.28	13226	57.61
001 161	60.00	30.50	3.50		5.00	1.50	0.43	0.38	6591	0.75	12574	1.13	18153	57.61
001 162C	63.00	31.00	1.80		4.15	2.35	1.31	0.59	2364	1.18	3658	1.76	4238	33.38
001 163B	63.00	31.00	2.50		4.25	1.75	0.70	0.44	2942	0.88	5270	1.31	7189	46.36
001 164	63.00	31.00	3.00		4.70	1.70	0.57	0.43	4524	0.85	8373	1.28	11772	56.64
001 165A	63.00	31.00	3.50		4.90	1.40	0.40	0.35	5399	0.70	10359	1.05	15025	64.91

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

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	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 166	70.00	24.50	3.00		5.30	2.30	0.77	0.58	5080	1.15	8948	1.73	12007	79.53
001 167	70.00	24.50	3.50		6.00	2.50	0.71	0.63	8446	1.25	15076	1.88	20495	92.78
001 168	70.00	25.50	2.00		4.50	2.50	1.25	0.63	2408	1.25	3771	1.88	4437	52.40
001 169	70.00	30.50	2.50		4.90	2.40	0.96	0.60	3755	1.20	6297	1.80	8031	61.19
001 170	70.00	30.50	3.00		5.10	2.10	0.70	0.53	4676	1.05	8376	1.58	11426	73.42
001 171	70.00	35.50	3.00		5.10	2.10	0.70	0.53	5028	1.05	9007	1.58	12287	67.32
001 172	70.00	35.50	3.50		5.30	1.80	0.51	0.45	6077	0.90	11384	1.35	16177	78.54
001 173	70.00	35.50	4.00		5.80	1.80	0.45	0.45	8757	0.90	16634	1.35	23923	89.76
001 174	70.00	35.50	4.00	3.75	5.80	1.80	0.45	0.45	9167	0.90	17018	1.35	23923	84.15
001 175	70.00	40.50	4.00		5.70	1.70	0.43	0.43	9025	0.85	17230	1.28	24889	80.39
001 176	70.00	40.50	4.00	3.75	5.70	1.70	0.43	0.43	9423	0.85	17604	1.28	24889	75.36
001 177	70.00	40.50	5.00		6.40	1.40	0.28	0.35	13646	0.70	26719	1.05	39410	100.49
001 178	70.00	40.50	5.00	4.70	6.40	1.40	0.28	0.35	14004	0.70	27059	1.05	39410	94.46
001 179C	71.00	36.00	2.00		4.60	2.60	1.30	0.65	2861	1.30	4432	1.95	5144	46.18
001 180B	71.00	36.00	2.50		4.50	2.00	0.80	0.50	2894	1.00	5054	1.50	6725	57.72
001 181A	71.00	36.00	4.00		5.60	1.60	0.40	0.40	7379	0.80	14157	1.20	20535	92.36
001 182	71.00	36.00	4.00	3.75	5.60	1.60	0.40	0.40	7685	0.80	14445	1.20	20535	86.58
001 183	80.00	30.50	2.50		5.30	2.80	1.12	0.70	3664	1.40	5911	2.10	7211	84.31
001 184	80.00	31.00	3.00		5.50	2.50	0.83	0.63	4531	1.25	7847	1.88	10352	100.60
001 185	80.00	31.00	4.00		6.10	2.10	0.53	0.53	7319	1.05	13677	1.58	19394	134.13
001 186	80.00	31.00	4.00	3.75	6.10	2.10	0.53	0.53	7717	1.05	14049	1.58	19394	125.75
001 187	80.00	35.50	4.00		6.20	2.20	0.55	0.55	8118	1.10	15083	1.65	21280	126.75
001 188	80.00	35.50	4.00	3.75	6.20	2.20	0.55	0.55	8577	1.10	15512	1.65	21280	118.83
001 189	80.00	36.00	3.00		5.70	2.70	0.90	0.68	5401	1.35	9196	2.03	11919	94.40
001 190C	80.00	41.00	2.25		5.20	2.95	1.31	0.74	3698	1.48	5715	2.21	6613	65.46
001 191B	80.00	41.00	3.00		5.30	2.30	0.77	0.58	4450	1.15	7838	1.73	10518	87.28
001 192	80.00	41.00	4.00		6.20	2.20	0.55	0.55	8726	1.10	16213	1.65	22874	116.37
001 193	80.00	41.00	4.00	3.75	6.20	2.20	0.55	0.55	9220	1.10	16674	1.65	22874	109.10
001 194A	80.00	41.00	5.00		6.70	1.70	0.34	0.43	11821	0.85	22928	1.28	33559	145.47
001 195	80.00	41.00	5.00	4.70	6.70	1.70	0.34	0.43	12211	0.85	23296	1.28	33559	136.74
001 196C	90.00	46.00	2.50		5.70	3.20	1.28	0.80	4232	1.60	6585	2.40	7684	92.23
001 197B	90.00	46.00	3.50		6.00	2.50	0.71	0.63	5836	1.25	10416	1.88	14161	129.12
001 198A	90.00	46.00	5.00		7.00	2.00	0.40	0.50	11267	1.00	21617	1.50	31354	184.46
001 199	90.00	46.00	5.00	4.70	7.00	2.00	0.40	0.50	11713	1.00	22035	1.50	31354	173.40
001 200	100.00	41.00	4.00		7.20	3.20	0.80	0.80	8715	1.60	15219	2.40	20251	205.15
001 201	100.00	41.00	4.00	3.80	7.20	3.20	0.80	0.80	9215	1.60	15683	2.40	20251	194.90
001 202	100.00	41.00	5.00		7.75	2.75	0.55	0.69	12345	1.38	22937	2.06	32361	256.44

表面处理(Finish) :

磷化 Phosphating达克罗: Dacromet / 发蓝 Blueing抛光: Polish / 久美特: Geomet钝化: Passivating / 特氟龙 : Teflon

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 203	100.00	41.00	5.00	4.70	7.75	2.75	0.55	0.69	13013	1.38	23561	2.06	32361	241.06
001 204C	100.00	51.00	2.70		6.20	3.50	1.30	0.88	4779	1.75	7410	2.63	8609	123.16
001 205B	100.00	51.00	3.50		6.30	2.80	0.80	0.70	5624	1.40	9823	2.10	13070	159.66
001 206	100.00	51.00	4.00		7.00	3.00	0.75	0.75	8673	1.50	15341	2.25	20674	182.47
001 207	100.00	51.00	4.00	3.80	7.00	3.00	0.75	0.75	9156	1.50	15789	2.25	20674	173.34
001 208	100.00	51.00	5.00		7.80	2.80	0.56	0.70	13924	1.40	25810	2.10	36339	228.08
001 209	100.00	51.00	5.00	4.70	7.80	2.80	0.56	0.70	14689	1.40	26525	2.10	36339	214.40
001 210A	100.00	51.00	6.00		8.20	2.20	0.37	0.55	17061	1.10	32937	1.65	48022	273.70
001 211	100.00	51.00	6.00	5.60	8.20	2.20	0.37	0.55	17753	1.10	33589	1.65	48022	255.45
001 212	100.00	51.00	7.00	6.55	9.20	2.20	0.31	0.55	27374	1.10	52454	1.65	75840	298.79
001 213C	112.00	57.00	3.00	3.75	6.90	3.90	1.30	0.98	5834	1.95	9038	2.93	10489	171.92
001 214B	112.00	57.00	4.00		7.20	3.20	0.80	0.80	7639	1.60	13341	2.40	17752	229.22
001 215	112.00	57.00	4.00		7.20	3.20	0.80	0.80	8192	1.60	13855	2.40	17752	214.90
001 216A	112.00	57.00	6.00		8.50	2.50	0.42	0.63	15800	1.25	30215	1.88	43707	343.83
001 217	112.00	57.00	6.00	5.60	8.50	2.50	0.42	0.63	16536	1.25	30906	1.88	43707	320.91
001 218	125.00	41.00	4.00		8.20	4.20	1.05	1.05	8501	2.10	13943	3.15	17346	338.10
001 219	125.00	51.00	4.00		8.50	4.50	1.13	1.13	10096	2.25	16265	3.38	19817	321.18
001 220	125.00	51.00	4.00	3.80	8.50	4.50	1.13	1.13	10705	2.25	16830	3.38	19817	305.12
001 221	125.00	51.00	5.00		8.90	3.90	0.78	0.98	13063	1.95	22931	2.93	30669	401.48
001 222	125.00	51.00	5.00	4.75	8.90	3.90	0.78	0.98	13804	1.95	23619	2.93	30669	381.40
001 223	125.00	51.00	6.00		9.40	3.40	0.57	0.85	17027	1.70	31514	2.55	44307	481.77
001 224	125.00	51.00	6.00	5.65	9.40	3.40	0.57	0.85	17944	1.70	32369	2.55	44307	453.70
001 225	125.00	61.00	5.00		9.00	4.00	0.80	1.00	14615	2.00	25526	3.00	33965	366.95
001 226	125.00	61.00	5.00	4.75	9.00	4.00	0.80	1.00	15455	2.00	26305	3.00	33965	348.61
001 227	125.00	61.00	6.00		9.60	3.60	0.60	0.90	19789	1.80	36336	2.70	50722	440.34
001 228	125.00	61.00	6.00	5.60	9.60	3.60	0.60	0.90	21079	1.80	37539	2.70	50722	410.99
001 229	125.00	61.00	8.00	7.50	10.90	2.90	0.36	0.73	34434	1.45	65305	2.18	93577	550.43
001 230C	125.00	64.00	3.50		8.00	4.50	1.29	1.13	8514	2.25	13231	3.38	15416	248.78
001 231	125.00	64.00	5.00		8.50	3.50	0.70	0.88	12238	1.75	21924	2.63	29908	355.39
001 232	125.00	64.00	5.00	4.70	8.50	3.50	0.70	0.88	13031	1.75	22661	2.63	29908	334.07
001 233B	125.00	64.00	6.00		9.60	3.60	0.60	0.90	20348	1.80	37362	2.70	52155	426.47
001 234	125.00	64.00	6.00	5.60	9.60	3.60	0.60	0.90	21674	1.80	38599	2.70	52155	398.04
001 235	125.00	64.00	7.00	6.55	10.00	3.00	0.43	0.75	25528	1.50	47615	2.25	67216	465.56
001 236A	125.00	64.00	8.00	7.50	10.60	2.60	0.33	0.65	31118	1.30	59520	1.95	85926	533.04
001 237	125.00	71.00	6.00		9.30	3.30	0.55	0.83	19538	1.65	36302	2.48	51217	391.52
001 238	125.00	71.00	6.00	5.60	9.30	3.30	0.55	0.83	20725	1.65	37411	2.48	51217	365.41
001 239	125.00	71.00	8.00	7.45	10.90	2.90	0.36	0.73	38416	1.45	72705	2.18	103964	486.13

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 240	125.00	71.00	10.00	9.30	11.80	1.80	0.18	0.45	42821	0.90	84082	1.35	124124	606.85
001 241C	140.00	72.00	3.80		8.70	4.90	1.29	1.23	9514	2.45	14773	3.68	17195	337.73
001 242B	140.00	72.00	5.00		9.00	4.00	0.80	1.00	12014	2.00	20982	3.00	27920	444.39
001 243	140.00	72.00	5.00	4.70	9.00	4.00	0.80	1.00	12847	2.00	21756	3.00	27920	417.72
001 244A	140.00	72.00	8.00	7.50	11.20	3.20	0.40	0.80	31903	1.60	59967	2.40	85251	666.58
001 245	150.00	61.00	5.00		10.30	5.30	1.06	1.33	15292	2.65	25021	3.98	31041	578.88
001 246	150.00	61.00	5.00	4.75	10.30	5.30	1.06	1.33	16221	2.65	25883	3.98	31041	549.94
001 247	150.00	61.00	6.00		10.80	4.80	0.80	1.20	19560	2.40	34161	3.60	45456	694.66
001 248	150.00	61.00	6.00	5.70	10.80	4.80	0.80	1.20	20684	2.40	35204	3.60	45456	659.93
001 249	150.00	61.00	7.00	6.55	11.80	4.80	0.69	1.20	30593	2.40	53294	3.60	70442	758.34
001 250	150.00	71.00	6.00		10.85	4.85	0.81	1.21	21067	2.43	36714	3.64	48749	645.83
001 251	150.00	71.00	6.00	5.60	10.85	4.85	0.81	1.21	22703	2.43	38235	3.64	48749	602.77
001 252	150.00	71.00	8.00	7.50	12.05	4.05	0.51	1.01	35885	2.03	65655	3.04	91060	807.24
001 253	150.00	81.00	8.00	7.50	12.00	4.00	0.50	1.00	38230	2.00	70060	3.00	97319	737.00
001 254	150.00	81.00	10.00	9.40	13.40	3.40	0.34	0.85	57601	1.70	109889	2.55	158300	923.71
001 255C	160.00	82.00	4.30		9.90	5.60	1.30	1.40	12162	2.80	18832	4.20	21843	500.41
001 256	160.00	82.00	4.30	4.15	9.90	5.60	1.30	1.40	12653	2.80	19288	4.20	21843	482.95
001 257	160.00	82.00	6.00		10.50	4.50	0.75	1.13	17203	2.25	30431	3.38	41008	698.25
001 258B	160.00	82.00	6.00	5.60	10.50	4.50	0.75	1.13	18496	2.25	31633	3.38	41008	651.70
001 259A	160.00	82.00	10.00	9.40	13.50	3.50	0.35	0.88	50547	1.75	96216	2.63	138331	1094.00
001 260	160.00	82.00	11.00	10.20	14.50	3.50	0.32	0.88	66678	1.75	127338	2.63	183518	1187.00
001 261C	180.00	92.00	4.80		11.00	6.20	1.29	1.55	14646	3.10	22731	4.65	26442	708.34
001 262	180.00	92.00	4.80	4.60	11.00	6.20	1.29	1.55	15352	3.10	23387	4.65	26442	678.82
001 263	180.00	92.00	6.00		11.10	5.10	0.85	1.28	16558	2.55	28552	3.83	37502	885.42
001 264B	180.00	92.00	6.00	5.60	11.10	5.10	0.85	1.28	17866	2.55	29767	3.83	37502	826.39
001 265A	180.00	92.00	10.00	9.40	14.00	4.00	0.40	1.00	46850	2.00	88141	3.00	125417	1387.00
001 266	180.00	92.00	13.00	12.10	16.50	3.50	0.27	0.88	84574	1.75	163392	2.63	237883	1786.00
001 267	200.00	82.00	5.00	4.80	10.50	5.50	1.10	1.38	9700	2.75	15400	4.13	18400	980.00
001 268	200.00	82.00	6.00	5.80	13.00	7.00	1.17	1.75	22300	3.50	35000	5.25	41200	1190.00
001 269	200.00	82.00	8.00	7.50	14.20	6.20	0.78	1.55	35519	3.10	60470	4.65	78034	1539.00
001 270	200.00	82.00	8.50	8.10	14.50	6.00	0.71	1.50	38500	3.00	67200	4.50	89300	1660.00
001 271	200.00	82.00	10.00	9.40	15.50	5.50	0.55	1.38	52053	2.75	94245	4.13	129445	1928.00
001 272	200.00	82.00	12.00	11.25	16.60	4.60	0.38	1.15	67868	2.30	128082	3.45	182737	2308.00
001 273	200.00	82.00	13.00	12.10	16.50	3.50	0.27	0.88	62100	1.75	120000	2.63	174800	2480.00
001 274	200.00	92.00	10.00	9.40	15.60	5.60	0.56	1.40	55657	2.80	100501	4.20	137688	1828.00
001 275	200.00	92.00	12.00	11.25	16.80	4.80	0.40	1.20	74572	2.40	140170	3.60	199269	2187.00
001 276	200.00	92.00	14.00	13.05	18.10	4.10	0.29	1.03	95817	2.05	184267	3.08	267227	2537.00

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

商品 编号 Item No.	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 277C	200.00	102.00	5.50		12.50	7.00	1.27	1.75	19817	3.50	30882	5.25	36111	1004.00
001 278	200.00	102.00	5.50	5.30	12.50	7.00	1.27	1.75	20659	3.50	31663	5.25	36111	967.07
001 279B	200.00	102.00	8.00	7.50	13.60	5.60	0.70	1.40	33367	2.80	57955	4.20	76378	1368.00
001 280	200.00	102.00	8.30	7.80	14.30	6.00	0.72	1.50	40500	3.00	70000	4.50	91800	1420.00
001 281	200.00	102.00	9.00	8.60	14.60	5.60	0.62	1.40	44100	2.80	78800	4.20	107100	1570.00
001 282	200.00	102.00	10.00	9.40	15.60	5.60	0.56	1.40	58756	2.80	106099	4.20	145357	1716.00
001 283	200.00	102.00	11.00	10.30	15.00	4.00	0.36	1.00	49500	2.00	93900	3.00	134500	1880.00
001 284A	200.00	102.00	12.00	11.25	16.20	4.20	0.35	1.05	66983	2.10	127401	3.15	183020	2053.00
001 285	200.00	102.00	14.00	13.05	18.20	4.20	0.30	1.05	103986	2.10	199671	3.15	289181	2381.00
001 286	200.00	112.00	6.00	5.80	12.00	6.00	1.00	1.50	19700	3.00	32200	4.50	39700	980.00
001 287	200.00	112.00	12.00	11.25	16.20	4.20	0.35	1.05	71671	2.10	136317	3.15	195830	1904.00
001 288	200.00	112.00	14.00	13.05	17.50	3.50	0.25	0.88	90576	1.75	175719	2.63	256758	2209.00
001 289	200.00	112.00	15.00	14.00	18.00	3.00	0.20	0.75	93500	1.50	183100	2.25	269700	2370.00
001 290	200.00	112.00	16.00	14.80	19.80	3.80	0.24	0.95	146464	1.90	284370	2.85	415725	2505.00
001 291C	225.00	112.00	6.50	6.20	13.60	7.10	1.09	1.78	23582	3.55	37417	5.33	44580	1455.00
001 292B	225.00	112.00	8.00	7.50	14.50	6.50	0.81	1.63	32870	3.25	55412	4.88	70749	1761.00
001 293	225.00	112.00	9.00	8.45	15.50	6.50	0.72	1.63	43600	3.25	75300	4.88	98800	1980.00
001 294	225.00	112.00	10.00	9.40	16.20	6.20	0.62	1.55	52800	3.10	93900	4.65	126700	2200.00
001 295	225.00	112.00	10.80	10.00	16.50	5.70	0.53	1.43	58100	2.85	105200	4.28	144400	2350.00
001 296A	225.00	112.00	12.00	11.25	17.00	5.00	0.42	1.25	64497	2.50	120738	3.75	171016	2641.00
001 297	225.00	112.00	16.00	14.90	20.50	4.50	0.28	1.13	128407	2.25	247489	3.38	359590	3498.00
001 298	250.00	102.00	10.00	9.40	18.00	8.00	0.80	2.00	58157	4.00	98485	6.00	126387	3019.00
001 299	250.00	102.00	12.00	11.25	19.00	7.00	0.58	1.75	75052	3.50	134524	5.25	182962	3613.00
001 300C	250.00	127.00	7.00	6.70	14.80	7.80	1.11	1.95	26895	3.90	42527	5.85	50466	1915.00
001 301	250.00	127.00	7.50	7.00	16.50	9.00	1.20	2.25	41900	4.50	64400	6.75	73500	2000.00
001 302	250.00	127.00	8.00	7.50	16.00	8.00	1.00	2.00	38439	4.00	61836	6.00	74819	2144.00
001 303	250.00	127.00	9.00	8.45	16.60	7.60	0.84	1.90	45900	3.80	76800	5.70	97300	2420.00
001 304	250.00	127.00	9.20	8.60	17.40	8.20	0.89	2.05	55200	4.10	91000	6.15	113400	2460.00
001 305B	250.00	127.00	10.00	9.40	17.00	7.00	0.70	1.75	51871	3.50	90206	5.25	119053	2687.00
001 306	250.00	127.00	10.50	9.90	18.00	7.50	0.71	1.88	64800	3.75	112500	5.63	148100	2830.00
001 307	250.00	127.00	11.00	10.40	18.80	7.80	0.71	1.95	77000	3.90	133900	5.85	176900	2970.00
001 308	250.00	127.00	12.00	11.25	19.30	7.30	0.61	1.83	87633	3.65	156021	5.48	210806	3216.00
001 309	250.00	127.00	13.00	12.20	19.60	6.60	0.51	1.65	93900	3.30	171800	4.95	238300	3490.00
001 310	250.00	127.00	13.50	12.60	19.60	6.10	0.45	1.53	94200	3.05	174400	4.58	244700	3600.00
001 311A	250.00	127.00	14.00	13.10	19.60	5.60	0.40	1.40	93239	2.80	175145	4.20	248828	3745.00
001 312	250.00	127.00	14.50	13.60	20.00	5.50	0.38	1.38	100400	2.75	189700	4.13	270800	3890.00
001 313	250.00	127.00	15.00	14.10	21.00	6.00	0.40	1.50	122500	3.00	230500	4.50	327900	4030.00

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

		尺寸						碟簧压缩量f(mm)与载荷F (N)						重量	
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]	
		D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]		F [N]
001	314	250.00	127.00	16.00	14.90	21.80	5.80	0.36	1.45	141529	2.90	267853	4.35	383017	4260.00
001	315	250.00	127.00	16.80	15.65	22.00	5.20	0.31	1.30	142800	2.60	273500	3.90	395400	4470.00
001	316	250.00	127.00	17.50	16.35	22.00	4.50	0.26	1.13	136000	2.25	263600	3.38	384900	4670.00
001	317	250.00	127.00	18.50	17.30	23.00	4.50	0.24	1.13	159700	2.25	310400	3.38	454300	4950.00
001	318	270.00	127.00	10.65	10.00	18.00	7.35	0.69	1.84	53800	3.68	93700	5.51	123900	3500.00
001	319	270.00	142.00	22.00		26.90	4.90	0.22	1.23	248700	2.45	490700	3.68	728300	7150.00
001	320	280.00	127.00	12.00	11.40	21.40	9.40	0.78	2.35	95400	4.70	163100	7.05	211600	4380.00
001	321	280.00	127.00	19.00	18.00	25.00	6.00	0.32	1.50	178200	3.00	342600	4.50	496800	6910.00
001	322	280.00	142.00	12.00	11.30	21.00	9.00	0.75	2.25	95100	4.50	163400	6.75	212900	4060.00
001	323	280.00	142.00	15.00	14.10	21.40	6.40	0.43	1.60	105700	3.20	197600	4.80	279500	5060.00
001	324	280.00	142.00	16.60	15.60	23.25	6.65	0.40	1.66	146600	3.33	275800	4.99	392300	5600.00
001	325	280.00	142.00	17.45	16.40	23.90	6.45	0.37	1.61	162300	3.23	307600	4.84	440400	5890.00
001	326	280.00	142.00	18.00	16.90	24.00	6.00	0.33	1.50	162600	3.00	310600	4.50	447900	6070.00
001	327	280.00	142.00	18.90	17.80	24.60	5.70	0.30	1.43	175800	2.85	338300	4.28	491000	6390.00
001	328	280.00	142.00	20.30	19.10	25.40	5.10	0.25	1.28	190600	2.55	370300	3.83	542100	6860.00
001	329	280.00	142.00	22.00	20.65	26.35	4.35	0.20	1.09	202800	2.18	397600	3.26	586300	7410.00
001	330	280.00	152.00	12.80	11.90	19.80	7.00	0.55	1.75	82100	3.50	148000	5.25	202500	4060.00
001	331	280.00	152.00	15.00	14.00	21.40	6.40	0.43	1.60	111300	3.20	207500	4.80	292700	4770.00
001	332	280.00	152.00	18.50	17.40	23.60	5.10	0.28	1.28	152700	2.55	295400	3.83	430600	5930.00
001	333	300.00	127.00	12.00	11.30	21.00	9.00	0.75	2.25	76300	4.50	131000	6.75	170700	5150.00
001	334	300.00	127.00	13.00	12.30	20.50	7.50	0.58	1.88	70900	3.75	127800	5.63	174900	5600.00
001	335	300.00	127.00	14.00	13.30	21.00	7.00	0.50	1.75	78300	3.50	144200	5.25	201400	6060.00
001	336	300.00	127.00	15.30		22.80	7.50	0.49	1.88	104600	3.75	197000	5.63	281200	6970.00
001	337	300.00	127.00	16.00	15.20	24.30	8.30	0.52	2.08	140200	4.15	257000	6.23	357400	6920.00
001	338	300.00	127.00	17.00	16.10	23.80	6.80	0.40	1.70	128400	3.40	242200	5.10	345500	7330.00
001	339	300.00	127.00	17.40	16.45	22.65	5.25	0.30	1.31	101100	2.63	194800	3.94	283000	7490.00
001	340	300.00	152.00	8.50	8.25	16.80	8.30	0.98	2.08	31300	4.15	51500	6.23	64100	3400.00
001	341	300.00	152.00	10.00	9.40	20.00	10.00	1.00	2.50	64900	5.00	104500	7.50	126600	3880.00
001	342	300.00	152.00	12.00	11.30	21.00	9.00	0.75	2.25	82800	4.50	142200	6.75	185300	4660.00
001	343	300.00	152.00	13.00	12.20	22.00	9.00	0.69	2.25	101200	4.50	176200	6.75	232800	5030.00
001	344	300.00	152.00	14.00	13.20	22.00	8.00	0.57	2.00	102500	4.00	184700	6.00	252700	5440.00
001	345	300.00	152.00	14.50	13.60	22.00	7.50	0.52	1.88	103400	3.75	188600	5.63	260900	5610.00
001	346	300.00	152.00	15.00	14.10	23.00	8.00	0.53	2.00	123100	4.00	223900	6.00	308900	5820.00
001	347	300.00	152.00	15.50	14.60	23.50	8.00	0.52	2.00	134100	4.00	245200	6.00	339900	6020.00
001	348	300.00	152.00	16.10	15.10	23.70	7.60	0.47	1.90	139200	3.80	257000	5.70	359500	6230.00
001	349	300.00	152.00	16.50		23.00	6.50	0.39	1.63	117500	3.25	225600	4.88	327600	6810.00
001	350	300.00	152.00	17.00	16.00	24.40	7.40	0.44	1.85	155600	3.70	290300	5.55	410000	6600.00

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 351	300.00	152.00	18.00	16.80	25.00	7.00	0.39	1.75	170900	3.50	321700	5.25	457700	6930.00
001 352	300.00	152.00	18.50	17.40	25.00	6.50	0.35	1.63	167900	3.25	319600	4.88	459500	7180.00
001 353	300.00	152.00	19.50	18.30	26.20	6.70	0.34	1.68	202200	3.35	385200	5.03	554200	7550.00
001 354	300.00	152.00	20.00	18.80	25.50	5.50	0.28	1.38	173000	2.75	334500	4.13	487600	7750.00
001 355	300.00	152.00	20.50	19.30	26.50	6.00	0.29	1.50	204700	3.00	394700	4.50	573800	7960.00
001 356	300.00	182.00	12.00	11.10	18.00	6.00	0.50	1.50	54400	3.00	99100	4.50	136900	3890.00
001 357	320.00	172.00	8.10	7.60	16.30	8.20	1.01	2.05	26200	4.10	42000	6.15	50600	3410.00
001 358	320.00	172.00	9.00	8.50	19.00	10.00	1.11	2.50	47000	5.00	73900	7.50	87100	3820.00
001 359	320.00	172.00	13.00	12.20	20.00	7.00	0.54	1.75	64400	3.50	117000	5.25	161000	5480.00
001 360	320.00	172.00	15.00	14.10	21.00	6.00	0.40	1.50	77600	3.00	146100	4.50	207900	6330.00
001 361	340.00	172.00	9.20	8.65	19.40	10.20	1.11	2.55	43700	5.10	68600	7.65	80700	4590.00
001 362	340.00	172.00	9.50	8.90	20.80	11.30	1.19	2.83	57000	5.65	87900	8.48	100800	4720.00
001 363	340.00	172.00	10.50	9.90	22.50	12.00	1.14	3.00	78300	6.00	122200	9.00	142500	5250.00
001 364	340.00	172.00	11.00	10.40	22.40	11.40	1.04	2.85	78300	5.70	125400	8.55	151000	5520.00
001 365	340.00	172.00	11.50	10.80	22.90	11.40	0.99	2.85	87000	5.70	140300	8.55	170400	5730.00
001 366	340.00	172.00	12.50	11.80	23.00	10.50	0.84	2.63	90800	5.25	152500	7.88	194000	6260.00
001 367	340.00	172.00	13.50	12.70	23.50	10.00	0.74	2.50	101300	5.00	174300	7.50	227600	6740.00
001 368	340.00	172.00	13.70	12.90	24.30	10.60	0.77	2.65	115000	5.30	196200	7.95	253900	6840.00
001 369	340.00	172.00	14.20	13.30	24.40	10.20	0.72	2.55	118800	5.10	205200	7.65	268900	7050.00
001 370	340.00	172.00	14.60	13.70	25.10	10.50	0.72	2.63	132700	5.25	229400	7.88	300900	7270.00
001 371	340.00	172.00	15.30	14.40	24.70	9.40	0.61	2.35	126200	4.70	224700	7.05	303700	7640.00
001 372	340.00	172.00	15.80	14.80	25.50	9.70	0.61	2.43	144000	4.85	255900	7.28	345200	7850.00
001 373	340.00	172.00	16.20	15.20	25.60	9.40	0.58	2.35	146700	4.70	263200	7.05	358400	8060.00
001 374	340.00	172.00	17.00	16.00	25.30	8.30	0.49	2.08	140300	4.15	258300	6.23	360400	8490.00
001 375	340.00	172.00	17.30	16.30	26.10	8.80	0.51	2.20	158700	4.40	290800	6.60	403900	8640.00
001 376	340.00	172.00	18.00	16.90	26.00	8.00	0.44	2.00	156400	4.00	291000	6.00	409800	8960.00
001 377	340.00	172.00	20.00	18.70	28.00	8.00	0.40	2.00	209500	4.00	393500	6.00	558900	9920.00
001 378	340.00	172.00	22.00	20.60	28.00	6.00	0.27	1.50	195500	3.00	377900	4.50	550600	10900.00
001 379	360.00	182.00	15.50	14.60	23.50	8.00	0.52	2.00	93000	4.00	170000	6.00	235700	8680.00
001 380	360.00	182.00	20.00	18.80	28.30	8.30	0.42	2.08	194800	4.15	365200	6.23	518000	11200.00
001 381	360.00	182.00	21.00	19.70	28.00	7.00	0.33	1.75	182000	3.50	347500	5.25	501000	11700.00
001 382	360.00	182.00	21.50	20.20	29.50	8.00	0.37	2.00	227700	4.00	431200	6.00	617000	12000.00
001 383	360.00	182.00	23.00	21.60	30.20	7.20	0.31	1.80	243300	3.60	466700	5.40	675700	12800.00
001 384	370.00	202.00	25.00	23.20	31.40	6.40	0.26	1.60	271200	3.20	525000	4.80	765700	13700.00
001 385	370.00	202.00	26.00	24.20	32.80	6.80	0.26	1.70	324500	3.40	628000	5.10	915500	14300.00
001 386	380.00	152.00	19.00	18.00	29.00	10.00	0.53	2.50	174600	5.00	319100	7.50	442400	13500.00
001 387	380.00	192.00	13.50	12.70	26.20	12.70	0.94	3.18	120300	6.35	196600	9.53	242400	8420.00

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

SUNZO DIN2093 标准碟形弹簧
DIN2093 Disc Spring / Belleville Washer

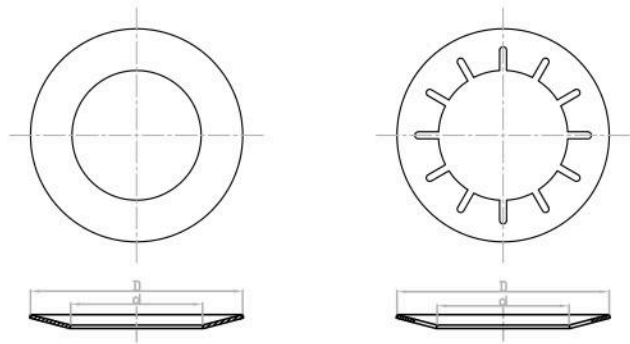
	尺寸							碟簧压缩量f(mm)与载荷F (N)						重量
商品 编号 Item No.								压缩25%		压缩50%		压缩75%		每1000 片 [kg]
	D [mm]	d [mm]	t [mm]	t' [mm]	H ₀ [mm]	h ₀ [mm]	h ₀ /t	f [mm]	F [N]	f [mm]	F [N]	f [mm]	F [N]	
001 388	380.00	192.00	25.00	23.40	33.00	8.00	0.32	2.00	313100	4.00	599300	6.00	865600	15500.00
001 389	380.00	202.00	12.00	11.50	25.00	13.00	1.08	3.25	98100	6.50	156300	9.75	187300	7350.00
001 390	380.00	202.00	15.00	14.10	27.00	12.00	0.80	3.00	144400	6.00	244600	9.00	313900	9000.00
001 391	380.00	212.00	18.00	16.70	27.00	9.00	0.50	2.25	158000	4.50	288300	6.75	398700	10200.00
001 392	400.00	202.00	10.00	9.60	22.00	12.00	1.20	3.00	50100	6.00	77900	9.00	90400	7050.00
001 393	400.00	202.00	12.00	11.30	26.50	14.50	1.21	3.63	107500	7.25	165400	10.88	189200	8300.00
001 394	400.00	202.00	14.00	13.20	27.00	13.00	0.93	3.25	122400	6.50	200800	9.75	248900	9700.00
001 395	400.00	202.00	16.00	15.10	28.00	12.00	0.75	3.00	146600	6.00	252100	9.00	328800	11100.00
001 396	400.00	202.00	19.00	17.90	30.00	11.00	0.58	2.75	198900	5.50	357700	8.25	488200	13200.00
001 397	400.00	202.00	20.30	19.10	31.10	10.80	0.53	2.70	230900	5.40	420300	8.10	580100	14000.00
001 398	400.00	202.00	21.20	19.90	31.40	10.20	0.48	2.55	240700	5.10	443500	7.65	619200	14600.00
001 399	400.00	202.00	22.50	21.20	32.50	10.00	0.44	2.50	274900	5.00	512000	7.50	722000	15600.00
001 400	400.00	202.00	30.00	28.20	37.20	7.20	0.24	1.80	422500	3.60	822700	5.40	1206000	20700.00
001 401	440.00	212.00	18.50		32.00	13.50	0.73	3.38	190400	6.75	338500	10.13	458400	17000.00
001 402	440.00	252.00	25.00	23.20	33.00	8.00	0.32	2.00	257500	4.00	491700	6.00	708500	18600.00
001 403	450.00	202.00	25.50	24.00	34.10	8.60	0.34	2.15	241500	4.30	461200	6.45	665000	23900.00
001 404	450.00	252.00	21.00	19.50	33.00	12.00	0.57	3.00	251200	6.00	449800	9.00	610900	16700.00
001 405	450.00	252.00	25.00	23.30	33.80	8.80	0.35	2.20	269500	4.40	511400	6.60	733000	20000.00
001 406	470.00	237.00	33.00	31.00	42.00	9.00	0.27	2.25	516100	4.50	999000	6.75	1456000	31500.00
001 407	480.00	252.00	20.30	19.00	33.00	12.70	0.63	3.18	207400	6.35	367200	9.53	493500	19600.00
001 408	480.00	252.00	20.70		36.60	15.90	0.77	3.98	285500	7.95	502600	11.93	674300	21300.00
001 409	500.00	202.00	37.00	35.00	44.40	7.40	0.20	1.85	466200	3.70	914900	5.55	1350000	45100.00
001 410	500.00	242.00	32.00	30.00	41.00	9.00	0.28	2.25	408400	4.50	788400	6.75	1147000	35400.00
001 411	500.00	252.00	19.00		34.50	15.50	0.82	3.88	200100	7.75	348100	11.63	461300	21900.00
001 412	600.00	282.00	22.00		44.00	22.00	1.00	5.50	340100	11.00	564800	16.50	712400	38000.00
001 413	600.00	282.00	24.00		46.00	22.00	0.92	5.50	413600	11.00	701300	16.50	905000	41500.00

表面处理(Finish) :

磷化 Phosphating达克罗: Dacromet / 发蓝 Blueing抛光: Polish / 久美特: Geomet钝化: Passivating / 特氟龙 : Teflon

SUNZO

轴承预紧用碟形弹簧
Bearing Preload Disc Spring



(a)无槽轴承预紧用碟形弹簧

(b)有槽轴承预紧用碟形弹簧

轴承预紧用碟形弹簧分“无槽”系列和“有槽”系列两种，通过简单的环状设计，多片并联时载荷受力均匀，同样的位移量，载荷倍数增加。

As for pre-tightening of bearing, there are two types, grooveless and grooved, in disc spring. Through the simple ring design, the load force becomes uniform when multiple plates are connected in parallel. With the same displacement volume, the load multiple increases.

	尺寸						碟簧压缩量f(mm)与载荷F (N)				重量	
商品 编号 Item No.	预紧弹簧类型			D [mm]	d [mm]	t [mm]	H ₀ [mm]	压缩50%		压缩75%		每1000 片 [kg]
								f [mm]	F [N]	f [mm]	F [N]	
002 001		623		9.8	6.2	0.15	0.60	0.23	9	0.35	13	0.050
002 002				9.8	6.2	0.20	0.40	0.10	19	0.15	24	0.072
002 003		624		12.8	7.2	0.20	0.65	0.23	16	0.35	18	0.130
002 004				12.8	7.2	0.25	0.50	0.12	24	0.19	29	0.173
002 005		625	634	15.8	8.2	0.25	0.75	0.25	17	0.40	20	0.280
002 006				15.8	8.2	0.25	0.55	0.15	20	0.22	23	0.281
002 007		626	635	18.8	9.2	0.25	1.00	0.38	17	0.55	20	0.34
002 008				18.8	9.2	0.30	0.65	0.17	26	0.26	31	0.50
002 009		607		18.8	10.2	0.25	1.05	0.40	19	0.60	24	0.35
002 010				18.8	10.2	0.35	0.70	0.17	40	0.26	51	0.54
002 011		608	627	21.8	12.3	0.25	1.25	0.50	19	0.75	24	0.42
002 012				21.8	12.3	0.35	0.75	0.20	38	0.30	46	0.70
002 013		609		23.7	14.3	0.30	1.30	0.50	21	0.75	25	0.66
002 014				23.7	14.3	0.40	0.90	0.25	69	0.37	80	0.88
002 015	6000		629	25.7	14.3	0.30	1.40	0.55	24	0.80	28	0.70
002 016				25.7	14.3	0.40	0.90	0.25	54	0.37	64	1.13
002 017	6001			27.7	17.3	0.35	1.45	0.55	25	0.80	31	0.79
002 018				27.7	17.3	0.40	1.00	0.30	73	0.45	80	1.17
002 019		6200		29.7	17.3	0.35	1.55	0.60	26	0.90	32	1.20
002 020				29.7	17.3	0.40	1.10	0.35	80	0.52	82	1.43
002 021	6002	6201		31.7	20.4	0.35	1.55	0.60	27	0.90	33	1.02
002 022				31.7	20.4	0.40	1.10	0.35	79	0.52	81	1.47
002 023		6300		34.6	20.4	0.40	1.65	0.65	27	1.00	32	1.65
002 024				34.6	20.4	0.40	1.10	0.35	60	0.52	61	1.93
002 025	6003	6202		34.6	22.4	0.35	1.55	0.60	27	0.90	32	1.20
002 026				34.6	22.4	0.50	1.20	0.35	106	0.52	119	2.14
002 027		6301		36.6	20.4	0.40	1.90	0.75	31	1.10	35	2.28
002 028				36.6	20.4	0.50	1.30	0.40	103	0.60	111	2.85
002 029		6203		39.6	25.5	0.40	1.90	0.75	33	1.10	37	1.92

SUNZO

轴承预紧用碟形弹簧
Bearing Preload Disc Spring



	尺寸					碟簧压缩量f(mm)与载荷F (N)				重量		
商品 编号 Item No.	预紧弹簧类型		D [mm]	d [mm]	t [mm]	H ₀ [mm]	压缩50%		压缩75%		每1000 片 [kg]	
							f [mm]	F [N]	f [mm]	F [N]		
002 030	6204		39.6	25.5	0.50	1.30	0.40	103	0.60	111	2.82	
002 031	6004	6302	41.6	25.5	0.45	2.05	0.80	34	1.20	39	2.50	
002 032		6025	41.6	25.5	0.50	1.40	0.45	113	0.67	114	3.34	
002 033	6005		6303	46.5	30.5	0.45	2.05	0.80	39	1.20	44	2.84
002 034			46.5	30.5	0.60	1.50	0.45	140	0.67	155	4.54	
002 035	6304		51.5	35.5	0.45	2.10	0.85	42	1.25	47	3.07	
002 036		6206	51.5	35.5	0.60	1.50	0.45	124	0.67	135	5.15	
002 037	6006			54.5	40.5	0.45	2.15	0.85	48	1.30	53	3.20
002 038			54.5	40.5	0.60	1.50	0.45	127	0.67	140	4.92	
002 039	6007	6305	61.5	40.5	0.55	2.55	1.00	49	1.50	54	5.84	
002 040			61.5	40.5	0.70	1.80	0.55	164	0.82	186	9.25	
002 041	6008			67.5	50.5	0.55	2.60	1.05	76	1.60	78	5.50
002 042	6207		67.5	50.5	0.70	1.70	0.50	143	0.75	160	8.65	
002 043	6306		71.5	45.5	0.60	2.90	1.15	71	1.70	74	9.60	
002 044			71.5	45.5	0.70	2.10	0.70	190	1.05	185	13.12	
002 045			71.5	50.5	0.60	2.90	1.15	127	1.70	127	8.20	
002 046			71.5	50.5	0.70	2.10	0.70	223	1.05	217	11.05	
002 047	6009		74.5	55.5	0.60	2.90	1.15	88	1.70	91	7.58	
002 048		6208	74.5	55.5	0.80	1.90	0.55	186	0.82	212	12.17	
002 049			6307	79.5	50.5	0.70	3.10	1.20	78	1.80	83	13.50
002 050	6209		79.5	50.5	0.80	2.30	0.75	228	1.12	228	18.58	
002 051	6010		79.5	55.5	0.70	2.90	1.10	127	1.65	127	14.50	
002 052			79.5	55.5	0.80	2.30	0.75	264	1.12	264	15.97	
002 053			84.5	60.5	0.75	3.15	1.20	66	1.80	78	13.0	
002 054	6210		84.5	60.5	0.90	2.50	0.80	352	1.20	357	19.2	
002 055	6308		89.5	60.5	0.80	3.30	1.25	90	1.90	104	18.1	
002 056			89.5	60.5	0.90	2.50	0.80	284	1.20	288	24.2	
002 057	6011		89.5	65.5	0.80	3.40	1.30	180	1.95	189	16.0	

SUNZO 轴承预紧用碟形弹簧
Bearing Preload Disc Spring

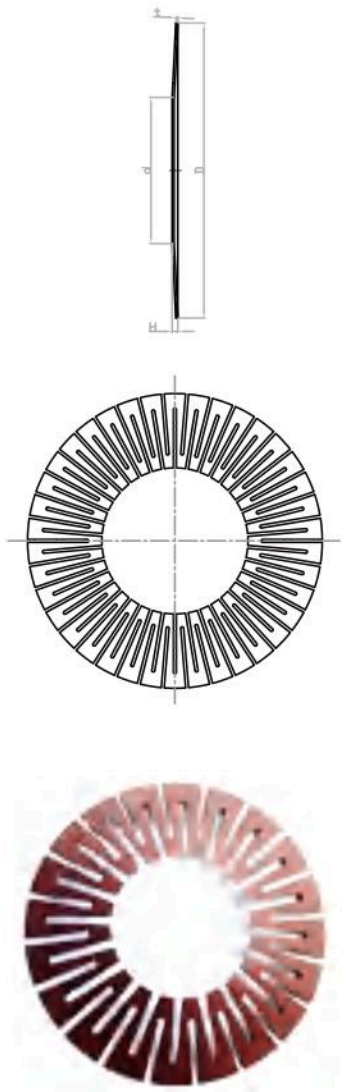
	尺 寸						碟簧压缩量f(mm)与载荷F (N)				重量	
商品 编号 Item No.	予紧弹簧类型			D [mm]	d [mm]	t [mm]	H ₀ [mm]	压缩50%		压缩75%		每1000 片 [kg]
								f [mm]	F [N]	f [mm]	F [N]	
002 058	6012			89.5	65.5	0.90	2.50	0.80	330	1.20	333	20.7
002 059				94.5	75.5	0.80	3.45	1.35	191	2.00	206	13.3
002 060				94.5	75.5	1.00	2.20	0.60	272	0.90	325	19.9
002 061			6309	99.0	65.5	1.00	2.60	0.80	274	1.20	293	34.0
002 062	6013	6211		99.0	70.5	1.00	2.60	0.80	312	1.20	333	29.80
002 063			6310	109.0	70.5	1.25	2.70	0.73	294	1.09	356	53.20
002 064	6014	6212		109.0	75.5	1.25	2.70	0.73	327	1.09	394	47.60
002 065	6015			114.0	90.5	1.25	2.45	0.60	311	0.90	396	37.00
002 066	6311			119.0	75.5	1.25	2.80	0.78	270	1.16	319	65.20
002 067				6213	119.0	85.5	1.25	2.80	0.78	331	1.16	391
002 068	6016	6214		124.0	90.5	1.25	3.00	0.88	392	1.31	441	55.30
002 069			6312	129	85.5	1.25	3.20	0.98	375	1.46	402	71.90
002 070	6017	6215		129	95.5	1.25	3.20	0.98	462	1.46	500	58.00
002 071			6313	139	90.5	1.25	3.25	1.00	329	1.50	353	85.70
002 072	6018	6216		139	101	1.25	3.25	1.00	398	1.50	427	70.20
002 073			6314	149	95.5	1.50	3.20	0.85	312	1.28	380	120.90
002 074	6020	6217		149	106	1.50	3.20	0.85	368	1.28	448	101.30
002 075			6315	159	101	1.50	3.50	1.00	356	1.50	409	139.40
002 076	6021	6218		159	111	1.50	3.50	1.00	415	1.50	477	119.80
002 077			6316	169	111	1.50	3.80	1.15	432	1.73	472	150.10
002 078	6022	6219		169	121	1.50	3.80	1.15	497	1.73	542	128.70
002 079			6317	179	121	2.00	4.20	1.10	702	1.65	861	214.40
002 080	6024	6220		179	126	2.00	4.20	1.10	761	1.65	934	199.20
002 081			6318	189	121	2.00	4.30	1.15	628	1.73	760	259.80
002 082	6221			189	131	2.00	4.30	1.15	702	1.73	849	228.70
002 083				6319	198	131	2.00	4.50	1.25	691	1.88	813
002 084	6026	6222		198	141	2.00	4.50	1.25	779	1.88	917	238.10
002 085		6224	6320	213	151	2.25	4.50	1.12	746	1.69	941	313
002 086	6030		6321	223	161	2.25	4.60	1.17	747	1.76	933	330
002 087		6226		228	161	2.25	4.95	1.35	864	2.02	1030	362
002 088	6032		6322	238	161	2.25	5.25	1.50	886	2.25	1020	426
002 089		6228		248	171	2.50	5.00	1.25	795	1.88	1000	497
002 090	6034		6324	258	171	2.50	5.50	1.50	928	2.25	1108	575
002 091		6230		268	181	2.50	5.70	1.60	990	2.40	1160	602
002 092	6036		6326	278	181	2.50	6.00	1.75	1020	2.63	1160	686
002 093	6038	6232		288	191	2.75	5.75	1.50	931	2.25	1150	788
002 094			6328	298	191	2.75	6.35	1.80	1130	2.70	1310	887
002 095	6040	6234		308	202	3.00	6.10	1.55	1050	2.33	1300	1000
002 096		6236	6330	318	212	3.00	6.20	1.60	1060	2.40	1300	1040
002 097	6044	6238	6332	338	232	3.00	6.60	1.80	1180	2.70	1410	1120
002 098	6048	6240	6334	358	242	3.00	7.20	2.10	1350	3.15	1530	1290

SUNZO 双槽型碟形弹簧
Double Slotted Disc Spring

商品编号 Item No.	D [mm]	d [mm]	t [mm]	h ₀ [mm]	Allow transfer wheelbase/kgf.cm	Axial pressure F/N
010 001	14	3	0.5	1.4	0.6	80
010 002	14	4	0.5	1.3	1.5	140
010 003	14	5	0.5	1.2	2.6	210
010 004	18	6	0.5	1.5	3.2	180
010 005	18	7	0.5	1.4	5.0	250
010 006	18	8	0.5	1.3	7.1	310
010 007	22	9	0.6	1.6	9.5	370
010 008	22	10	0.6	1.6	12.5	430
010 009	22	11	0.6	1.5	15.1	500
010 010	27	12	0.65	1.8	19.4	520
010 011	27	13	0.65	1.8	23	590
010 012	27	14	0.65	1.7	27	680
010 013	27	15	0.65	1.6	31	770
010 014	37	16	0.9	2.6	50	1030
010 015	37	17	0.9	2.5	57	1150
010 016	37	18	0.9	2.4	67	1270
010 017	37	20	0.9	2.3	85	1540
010 018	42	22	0.9	2.5	98	1490
010 019	42	24	0.9	2.3	120	1760
010 020	42	25	0.9	2.3	133	1900
010 021	52	28	1.15	3.1	208	2550
010 022	52	30	1.15	3	248	2900
010 023	52	32	1.15	2.7	283	3300
010 024	52	35	1.15	2.5	331	3750
010 025	62	38	1.15	3.1	402	3600
010 026	62	40	1.15	3.0	453	4000
010 027	62	42	1.15	2.8	506	4450
010 028	62	45	1.15	2.5	597	5200
010 029	70	48	1.15	3.0	678	5000
010 030	70	50	1.15	2.7	746	5500
010 031	70	55	1.15	2.4	928	7000
010 032	80	60	1.15	2.7	1116	6800
010 033	90	65	1.15	3.1	1308	6700
010 034	90	70	1.15	2.7	1538	8000
010 035	100	75	1.15	3.1	1758	7800
010 036	100	80	1.15	2.7	2045	9300
010 037	110	85	1.15	3.1	2288	9000
010 038	110	90	1.15	2.7	2590	10600
010 039	120	100	1.15	2.7	3241	11900

双槽形碟形弹簧是一种特殊的碟形弹簧，其内外径两侧都做径向开槽的产品。

The double-groove disc spring is a special disc spring where there are radial grooves at both internal and external radial sides.



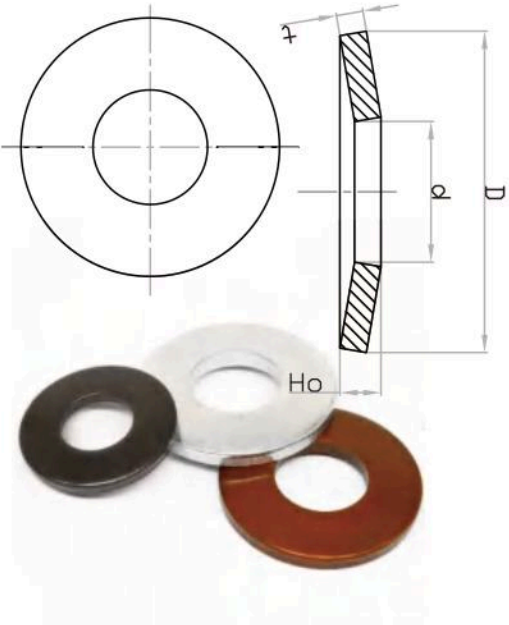
SUNZO DIN6796 标准碟形弹簧垫圈 DIN6796 Disc Spring Washer

SUNZO DIN6796 标准碟形弹簧垫圈 DIN6796 Disc Spring Washer

商品 编号 Item No.		尺寸						重量
		公称 尺寸	D [mm]	d [mm]	t [mm]	H _{0max} [mm]	H _{0min} [mm]	
004 001	M2	5	2.2	0.40	0.60	0.50	630	0.05
004 002	M2.5	6	2.7	0.50	0.72	0.61	950	0.09
004 003	M3	7	3.2	0.60	0.85	0.72	1320	0.14
004 004	M3.5	8	3.7	0.80	1.06	0.92	2400	0.25
004 005	M4	9	4.3	1.00	1.30	1.12	3800	0.38
004 006	M5	11	5.3	1.20	1.55	1.35	5500	0.68
004 007	M6	14	6.4	1.50	2.00	1.70	8600	1.42
004 008	M7	17	7.4	1.75	2.30	2.00	11300	2.51
004 009	M8	18	8.4	2.00	2.60	2.24	14900	3.10
004 010	M10	23	10.5	2.50	3.20	2.80	22100	5.13
004 011	M12	29	13.0	3.00	3.95	3.43	34100	12.35
004 012	M14	35	15.0	3.50	4.65	4.14	46000	21.44
004 013	M16	39	17.0	4.00	5.25	4.58	59700	30.19
004 014	M18	42	19.0	4.50	5.80	5.08	74400	38.68
004 015	M20	45	21.0	5.00	6.40	5.60	93200	48.52
004 016	M22	49	23.0	5.50	7.05	6.15	114000	63.07
004 017	M24	56	25.0	6.00	7.75	6.77	131000	92.30
004 018	M27	60	28.0	6.50	8.35	7.30	154000	112.13
004 019	M30	70	31.0	7.00	9.20	8.00	172000	168.92
004 020	M33	76	34.0	7.50	10.00	8.50	226000	213.52
004 021	M36	83	37.2	8.00	10.50	9.20	276000	271.39
004 022	M42	96	43.5	8.50	12.00	10.50	290000	383.61
004 023	M48	110	49.5	9.00	12.50	11.00	261000	535.18
004 024	M56	128	58.0	9.50	13.50	12.00	260000	762.21
004 025	M64	136	66.0	10.00	14.00	12.80	277000	871.34
004 026	M72	145	74.0	10.50	15.00	13.00	327000	1006.08
004 027	M90	160	92.5	11.00	16.00	14.00	378000	1155.31
004 028	M100	180	102.5	11.50	17.00	15.00	370000	1551.52
004 029	M125	220	128.0	12.00	19.00	16.50	365000	2367.49

DIN 6796是专为中等及高强度螺栓连接设计的主动型防松元件，又称锥形弹性垫圈、重载螺栓连接垫圈。产品依托碟形结构的轴向变形特性，在螺栓预紧时储存弹性势能，可持续为连接副提供稳定预紧力，有效补偿振动、磨损、蠕变、热胀冷缩等导致的夹紧力损失，是传统“平垫+普通弹垫”组合的升级替代方案。

DIN 6796 is an active anti-loosening element specifically designed for medium-and high-strength bolted connections; it is also known as a conical elastic washer or heavy-duty bolt connection washer. Leveraging the axial deformation characteristics of its disc-shaped structure, this product stores elastic potential energy during bolt pre-tensioning, thereby continuously providing a stable pre-tension force to the joint pair. It effectively compensates for losses in clamping force caused by vibration, wear, creep, and thermal expansion and contraction, making it an upgraded alternative to the conventional combination of "flat washer + standard elastic washer".



材质(Material):
1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

核心优势 Core Advantage

防松性能卓越：夹紧力保持率约3/4，是传统方案1.5倍以上
Exceptional anti-loosening performance: clamping force retention rate reaches approximately 3/4, over 1.5 times that of conventional solutions.

弹性预紧保持：补偿蠕变、温度波动、密封压缩衰减
Elastic preloading ensures compensation for creep, temperature fluctuations, and seal compression degradation.

重载匹配设计：适配8 级以上、10 级以上高强度螺栓连接
Heavy-duty matching design, compatible with Grade 8+ and Grade 10+ high-strength bolt connections.

弹性稳定可靠：硬度约 400 - 500HV，长期不松弛、不断裂
Elastic, stable, and reliable; hardness: approximately 400 - 500 HV; no relaxation or cracking over extended periods of use.

多元表面处理：发黑/电镀/磷化/达克罗/机械镀锌
Diverse surface treatments: blackening / electroplating / phosphating / Dacromet / mechanical galvanizing.



应用领域 Application Area

应用行业 Application Industries	典型应用部位 Typical Application Sites	核心功能与作用 Core Features and Functions
风电/新能源 Wind Power and New Energy	塔筒法兰螺栓、光伏支架紧固、储能柜体连接 Tower flange bolts, photovoltaic mounting bracket fastening, and energy storage cabinet connection	抵御户外风震与温度交变，维持螺栓长效预紧，减少高空运维 Resists outdoor wind loads and temperature fluctuations, maintains long-term bolt preload, and reduces the need for high-altitude maintenance operations.
汽车制造 Automobile Making	动力系统螺栓、底盘连接副、线控制动热管理系统 Powertrain bolts, chassis connection pairs, wire-based brake/thermal management system	应对行驶振动与热胀冷缩，保障关键连接可靠性，提升整车安全 Mitigate driving vibrations and thermal expansion/contraction to ensure the reliability of critical connections and enhance overall vehicle safety.
轨道交通 Rail Transit	轨道扣件、车棚悬挂系统、车辆结构紧固 Track fasteners, car suspension systems, and vehicle structural fastening	承受长期交变振动与冲击，防止螺栓松动脱落，保障行车安全 Withstand prolonged alternating vibration and impact, prevent bolt loosening or detachment, and ensure operational safety.
工程机械 Construction Machinery	挖掘机、起重机构连接、动力设备螺栓 Excavator and crane structural connections, power equipment bolts	适配重载冲击工况，避免关键部位螺栓失效，降低故障停机率 Designed to withstand heavy-duty impact conditions, preventing bolt failure in critical components and reducing the failure-induced downtime rate.
船舶制造 Shipbuilding	船体结构螺栓、发动机基座、管道法兰连接 Hull structural bolts, engine mounts, and pipeline flange connections	抵御海洋高湿高盐腐蚀环境与航行振动，保障结构连接安全 Resist the corrosive effects of high humidity and high salinity in marine environments, as well as navigation-induced vibrations, thereby ensuring the structural integrity and connection safety of the system.
电力电网 Power Grid	输电铁塔螺栓、变电站设备连接、发电机组紧固 Bolting of transmission tower supports, connection of substation equipment to mitigate prolonged wind-induced vibration and temperature fluctuations in outdoor environments, maintain long-term pre-tensioning of bolts in power facilities.	应对户外长期风振与温差变化，维持电力设施螺栓长效预紧
建筑桥梁 Construction of Bridges	钢结构节点、桥梁大型工程紧固 Fastening of steel structure joints and large-scale bridge engineering works	为大型重载结构提供持续预紧力，应对温度变化与荷载波动 Provide sustained pre-tensioning force for large, heavy-duty structures to mitigate the effects of temperature variations and load fluctuations.
航空航天 Aerospace	飞行器发动机、机身结构螺栓连接 Aircraft engine and fuselage structural bolt connections	应对极端温度变化与高强度振动，降低连接松动安全风险 Mitigate the risks of connection loosening caused by extreme temperature fluctuations and high-intensity vibrations.



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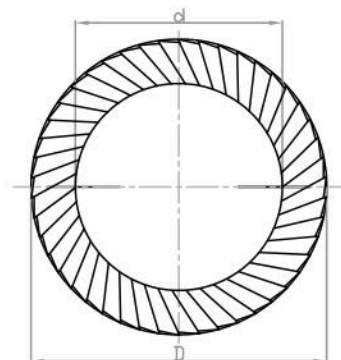
DIN9250 齿面碟形防松垫圈 DIN9250 Serrated Safety Washer

商品 编号 Item No.	"S" 标准载荷规格					
	Size	d [mm]	D [mm]	t [mm]	H _{o max} [mm]	kgs/1000pcs
006 001	M1.6	1.7	3.2	0.35	0.6	0.013
006 002	M2	2.2	4	0.35	0.6	0.021
006 003	M2.5	2.7	4.8	0.45	0.9	0.039
006 004	M3	3.2	5.5	0.45	0.9	0.049
006 005	M3.5	3.7	6	0.45	0.9	0.055
006 006	M4	4.3	7	0.5	1.0	0.085
006 007	M5	5.3	9	0.6	1.1	0.167
006 008	M6	6.4	10	0.7	1.2	0.200
006 009	M6.35	6.7	9.5	0.7	1.2	0.150
006 010	M7	7.4	12	0.7	1.3	0.355
006 011	M8	8.4	13	0.8	1.4	0.392
006 012	M10	10.5	16	1	1.6	0.750
006 013	M11.1	11.6	15.9	1	1.6	0.595
006 014	M12	13	18	1.1	1.7	0.879
006 015	M12.7	13.7	19	1.1	1.8	0.976
006 016	M14	15	22	1.2	2.0	1.641
006 017	M16	17	24	1.3	2.1	1.984
006 018	M18	19	27	1.5	2.3	2.970
006 019	M19	20	30	1.5	2.5	4.100
006 020	M20	21	30	1.5	2.5	3.742
006 021	M22	23	33	1.5	2.7	4.507
006 022	M24	25.6	36	1.8	2.9	5.910
006 023	M25.4	27	38	2	3.1	7.449
006 024	M27	28.6	39	2	3.1	7.369
006 025	M30	31.6	45	2	3.6	10.78
006 026	M36	38	54	2.5	4.2	21.28

商品 编号 Item No.	"VS" 标准载荷规格					
	Size	d [mm]	D [mm]	t [mm]	H _{o max} [mm]	kgs/1000pcs
006 021	5	5.3	9	1	1.3	0.273
006 022	6	6.4	10	1	1.4	0.300
006 023	8	8.4	13	1.2	1.7	0.615
006 024	10	10.5	16	1.5	2.0	0.167
006 025	12	13	18	1.5	2.1	1.223
006 026	14	15	22	1.5	2.2	2.089
006 027	16	17	24	2	2.6	3.142
006 028	18	19	27	2	2.7	4.041
006 029	20	21	30	2	2.8	5.066
006 030	22	23	33	2	3.0	6.117
006 031	24	25.6	36	2.5	3.4	8.865
006 032	27	28.6	39	2.5	3.5	9.731
006 033	30	31.6	45	2.5	3.8	14.380

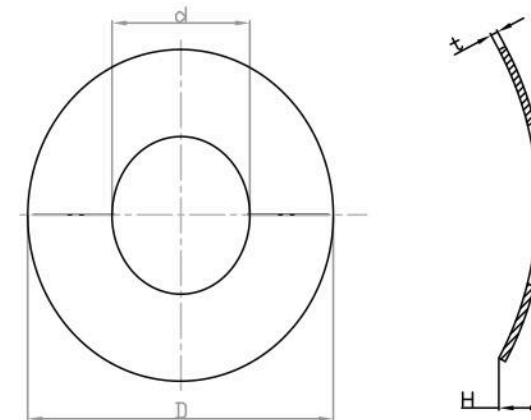
齿面防松垫圈设计结合了摩擦力和机械锁紧的安全性，齿形设计有效的防止了震动松脱。

The design of lock washer on gear surface combines the friction force and security of mechanical lock while the design of gear profile effectively prevents the vibration and loosening.



SUNZO

DIN137B 马鞍形弹簧垫圈 DIN137B Curved Spring Washer



也称“鞍形弹簧垫圈”，鞍形弹簧就是通常所说的“张力垫圈”，从侧面看像马鞍形，故而得名。

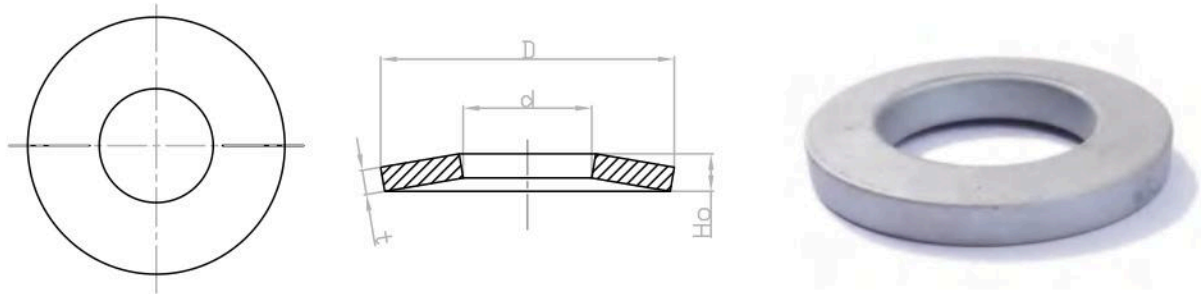
It is also named as saddle spring washer. The saddle spring is commonly referred to as tension washer and is so named because it looks like a saddle from the side.

公称 直径	d H14	dc js16	S		H		每1000件钢制品 的质量≈kg
			公称	公差	min	max	
M1	1.1	2.5	0.2		0.35	0.7	0.008
M1.2	1.3	3	0.2		0.35	0.7	0.009
M1.4	1.5	3	0.25	±0.02	0.4	0.8	0.01
M1.6	1.8	4	0.25		0.45	0.9	0.02
M1.7	1.9	4	0.25		0.45	0.9	0.02
M2	2.2	4.5	0.3		0.5	1	0.028
M2.3	2.5	5	0.3	±0.03	0.5	1	0.035
M2.6	2.8	5.5	0.3		0.55	1.1	0.041
M3	3.2	6	0.4		0.65	1.3	0.063
M3.5	3.7	7	0.4		0.7	1.4	0.088
M4	4.3	8	0.5		0.8	1.6	0.14
M5	5.3	10	0.5	±0.05	0.9	1.8	0.222
M6	6.4	11	0.5		1.1	2.2	0.247
M7	7.4	12	0.5		1.2	2.4	0.265
M8	8.4	15	0.5		1.7	3.4	0.476
M10	10.5	18	0.8		2	4	1.05
M12	12.5	20	0.9	±0.06	2	4	1.2

材质(Material) :

1074,51CrV4, 60Si2Mn,65Mn,SUS302 , SUS304 , SUS316,,17-7,Inconel718,InconelX-750,etc..

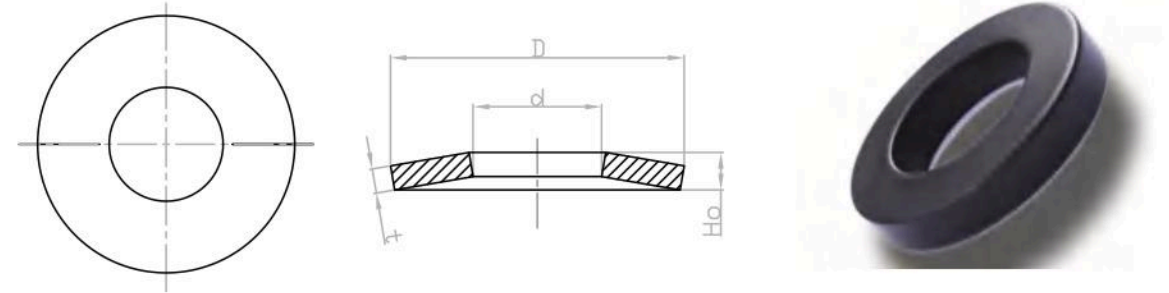
SUNZO 高扭矩 High Torque



商品编号 Item No.	螺栓规格	D [mm]	d [mm]	t [mm]	ho [mm]	建议使用 压平载荷 (N)	理论压平载荷 (N)
008 1001	M8	14.7	8.4	1.27	1.75	4437	/
008 1002	M10	18.2	10.4	2.10	2.29	9468	12456
008 1003	M12	21.7	12.4	2.41	2.65	11070	16459
008 1004	M14	25.3	14.4	2.41	2.72	12582	16236
008 1005	M16	29.1	16.6	3.17	3.48	23328	28915
008 1006	M18	32.6	18.6	3.42	3.78	17676	33585
008 1007	M20	36.4	20.8	3.95	4.34	28962	43594
008 1008	M22	40.4	22.9	3.95	4.44	26928	43372
008 1009	M24	43.4	24.8	3.95	4.49	35901	42927
008 1010	M27	48.7	27.8	3.95	4.62	34461	42260
008 1011	M30	53.9	30.8	4.88	5.55	65880	66726
008 1012	M32	57.4	32.8	4.88	5.65	69093	/
008 1013	M33	59.1	33.5	4.90	5.69	60003	88964
008 1014	M36	64.4	36.8	4.90	5.87	60759	64947
008 1015	M38	68	38.8	6.50	7.32	76347	115658
008 1016	M39	69.7	39.8	6.50	7.35	84501	117682
008 1017	M42	74.9	42.8	6.50	7.27	89244	122331
008 1018	M48	86.1	49.2	8.00	9.05	135270	181272
008 1019	M52	93.1	53.2	8.00	9.20	101493	180160
008 1020	M64	113.5	65.1	10.01	11.29	182637	275790
008 1021	M72	127	72.9	12.70	14.22	/	451494

表面处理(Finish):
磷化 Phosphating 达克罗: Dacromet / 发蓝 Blueing 抛光: Polish / 久美特: Geomet 钝化: Passivating / 特氟龙: Teflon

SUNZO 超高扭矩 Ultra-high Torque



商品编号 Item No.	螺栓规格	D [mm]	d [mm]	t [mm]	ho [mm]	建议使用 压平载荷 (N)	理论压平载荷 (N)
008 2001	M10	18.24	10.41	3.02	3.20	30959	21633
008 2002	M12	21.69	12.40	3.66	3.86	31121	31544
008 2003	M14	25.27	14.40	4.27	4.50	32153	43319
008 2004	M16	29.16	16.36	5.11	5.38	50656	60320
008 2005	M18	32.64	18.39	5.89	6.17	72011	/
008 2006	M20	36.96	20.60	6.15	6.45	62083	93149
008 2007	M22	40.39	22.89	7.42	7.80	90914	123310
008 2008	M24	43.41	24.82	7.52	7.90	115834	134253
008 2009	M27	48.69	27.81	8.38	8.81	136696	176690
008 2010	M30	53.92	30.81	9.50	9.98	143136	214591
008 2011	M32	58.67	32.54	10.72	11.25	192324	266893
008 2012	M33	59.18	33.53	10.62	11.13	213379	267705
008 2013	M36	65.53	36.80	11.46	12.04	207630	314119
008 2014	M38	68.07	39.62	12.95	13.54	254144	398221
008 2015	M39	68.07	39.62	12.95	13.54	254144	398221
008 2016	M42	74.93	42.85	14.58	15.21	299047	475979
008 2017	M48	86.08	48.23	14.76	15.60	360627	509231
008 2018	M52	91.44	52.81	15.80	16.66	355185	585298
008 2019	M56	102.61	57.94	17.88	18.84	446165	/
008 2020	M64	113.87	64.29	19.96	21.03	536156	938927
008 2021	M70	124.97	70.64	22.07	23.24	592529	1148282
008 2022	M90	155.57	90.75	21.36	22.89	652223	1069147
008 2023	M100	181.23	102.97	18.14	20.55	/	1114804

波形弹簧 Waved Spring

特点与应用 Characteristics and Application

描述

波形弹簧简称波簧，具备良好的弹性及抗冲击等性能，是在金属圆环上加工出有若干峰谷的弹性元件。

SUNZO可生产标准单层闭口波形弹簧，也可接受非标定制，可以提供弹性元件的设计，技术服务。

应用领域

通常应用于载荷和变形量均不大，要求弹簧刚度较小需施加轴向预压力的场合。

典型使用领域包括：航空航天、精密机械、液压密封和高端电机等。

材料

1074, 65Mn, 60Si2MnA, 50CrVA, SUS302, SUS304, SUS316, Inconel 718, Inconel X-750 etc..

表面处理

本色上油，磷化，机械镀锌，达克罗

Description

A wave spring, also known as scrowave spring, it is the elastic element which has several peak valleys on the metal ring.

SUNZO can produce different standard closed single layer wave springs or customize according to your request.

Application

It is usually applied to applications where the load and deformation are not large and need small spring stiffness and axial preload. For example: Aerospace, Precision Machinery, Hydraulic Seals and High-end motors.

Material

1074, 65Mn, 60Si2MnA, 50CrVA, SUS302, SUS304, SUS316, Inconel 718, Inconel X-750 etc..

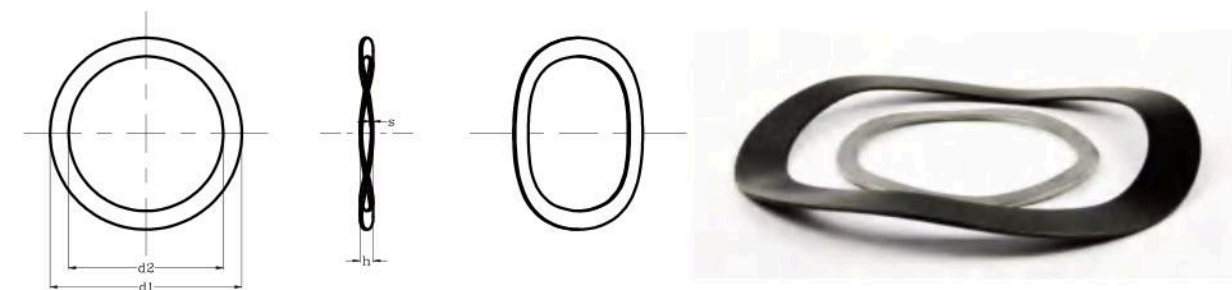
Finish

Plain, Phosphating, Black, mechanical zinc, Dacromet etc..



表面处理(Finish):
磷化 Phosphating 达克罗: Dacromet / 发蓝 Blueing 抛光: Polish / 久美特: Geomet 钝化: Passivating / 特氟龙: Teflon

SUNZO GB955/DIN137B-1987 机械用波形垫圈 Wave Spring Washers for Mechanical Industry



商品编号 Item No.	规格 Used for	内径 d2 [mm]		外径 d1 [mm]		厚度 thickness		建议使用 压平载荷 (N)	
		Min	Max	Min	Max	s	tolerance	h min	h max
011 1001	M3	3.2	3.5	8	8.45	0.5	±0.05	0.8	1.6
011 1002	M3.5	3.7	4	8	8.45	0.5	±0.05	0.9	1.8
011 1003	M4	4.3	4.6	9	9.45	0.5	±0.05	1	2
011 1004	M5	5.3	5.6	11	11.55	0.5	±0.05	1.1	2.2
011 1005	M6	6.4	6.76	12	12.55	0.5	±0.05	1.3	2.6
011 1006	M7	7.4	7.76	14	14.55	0.8	±0.06	1.5	3
011 1007	M8	8.4	8.76	15	15.55	0.8	±0.06	1.5	3
011 1008	M10	10.5	10.93	21	21.65	1	±0.07	2.1	4.2
011 1009	M12	13	13.43	24	24.65	1.2	±0.07	2.5	5
011 1010	M14	15	15.43	28	28.65	1.6	±0.08	3	6
011 1011	M16	17	17.43	30	30.65	1.6	±0.08	3.2	6.4
011 1012	M18	19	19.52	34	34.8	1.6	±0.08	3.3	6.6
011 1013	M20	21	21.52	36	36.8	1.6	±0.08	3.7	7.4
011 1014	M22	23	23.52	40	40.8	1.8	±0.1	3.9	7.8
011 1015	M24	25	25.52	44	44.8	1.8	±0.1	4.1	8.2
011 1016	M27	28	28.52	50	50.8	2	±0.1	4.7	9.4
011 1017	M30	31	31.62	56	56.95	2.2	±0.1	5	10
011 1018	M33	34	34.62	60	60.95	2.2	±0.1	5.3	10.6
011 1019	M36	37	37.62	68	68.95	2.2	±0.15	5.8	11.6
011 1020	M39	40	40.62	72	72.95	2.2	±0.15	6.4	12.8
011 1021	M42	43	43.62	78	78.95	3	±0.2	6.8	13.6
011 1022	M45	46	46.62	85	86.1	3	±0.2	7.1	14.2
011 1023	M48	50	50.62	92	93.1	3.5	±0.2	7.8	15.6
011 1024	M52	54	54.72	98	99.1	3.5	±0.2	8.2	16.4

SUNZO

DIN137 电机标准波形垫圈
DIN137 Wave Washers



商品编号	配轴承	外径 d1	内径 d2	厚度 s	自由高度 h	工作高度 h1	h1点 载荷力值	轴承 型号参考
Item No.	Bearing outer Diameter	outer diameter	inner diameter	thickness	height	working height	working load	Bearing References
011 4001	10	9.5	4.5	0.2	1.2	1	15	623
011 4002	13	12.5	7.5	0.2	1.5	1	19	624
011 4003	16	15.5	10.5	0.15	1.5	1	19	625 634
011 4004		15.5	10.5	0.15	1.6	1	23	
011 4005	17	16.5	11.5	0.2	1.4	1	29	
011 4006	19	18.5	13	0.2	1.5	1	29	607 626 635
011 4007	21	20.5	15	0.2	1.8	1	29	
011 4008	22	21.5	16	0.2	2.1	1	34	608 627
011 4009		21.5	16	0.2	1.4	1	35	
011 4010	24	23.5	17	0.2	2.2	1.5	35	609
011 4011	26	25.5	19	0.3	2	1.5	39	600 629
011 4012		25.5	19	0.3	2.1	1.5	44	6000 629
011 4013		25.5	19	0.3	1.9	1.5	88	
011 4014	28	27.5	21	0.3	2.2	1.5	39	6001
011 4015		27.5	21	0.3	2.5	1.5	54	
011 4016		27.5	21	0.3	2.1	1.5	108	
011 4017	30	29.5	23	0.3	2.5	1.5	44	6200
011 4018	32	31.5	23	0.3	2.8	1.5	46	6002 6201
011 4019		31.5	23	0.3	3.1	1.5	54	
011 4020		31.5	23	0.3	2.5	1.5	108	
011 4021		31.5	23	0.3	3.5	1.5	67	
011 4022	35	34.5	28	0.4	2.7	1.5	68	6003 6202 6300
011 4023		34.5	28	0.4	2.3	1.5	137	
011 4024		34.5	28	0.4	2.9	1.5	78	

SUNZO

DIN137 电机标准波形垫圈
DIN137 Wave Washers

商品编号	配轴承	外径 d1	内径 d2	厚度 s	自由高度 h	工作高度 h1	h1点 载荷力值	轴承 型号参考
Item No.	Bearing outer Diameter	outer diameter	inner diameter	thickness	height	working height	working load	Bearing References
011 4025	37	36.5	30	0.4	2.7	1.5	55	6301
011 4026		36.5	30	0.4	2.9	1.5	66	
011 4027	38	37.5	31	0.4	3.2	1.5	73	
011 4028	40	39.5	33	0.4	3.6	1.5	77	6203
011 4029		39.5	33	0.4	2.8	1.5	147	
011 4030	42	41.5	33.5	0.4	3.2	1.5	70	6004 6302
011 4031		41.5	33.5	0.4	2.9	1.5	176	
011 4032		41.5	33.5	0.4	3.6	1.5	87	
011 4033	44	43.5	33.5	0.4	3.7	1.5	77	
011 4034	47	46.5	38.5	0.5	3	1.5	80	6005 6204 6303
011 4035	47	46.5	38.5	0.5	3.1	1.5	87	
011 4036	47	46.5	38.5	0.5	3	1.5	236	
011 4037	47	46.5	38.5	0.5	3.5	1.5	112	
011 4038	52	51.5	42	0.5	3.3	1.5	87	
011 4039	52	51.5	42	0.5	3.8	1.5	112	6205 6304
011 4040	52	51.5	42	0.5	3.5	1.5	332	
011 4041	55	54.5	43.5	0.5	4.1	1.5	132	6006
011 4042	62	61.5	50.5	0.5	4	1.5	75	
011 4043	62	61.5	50.5	0.5	4.9	1.5	111	
011 4044	62	61.5	50.5	0.6	3.9	1.5	132	6007 6206 6305 6403
011 4045	62	61.5	50.5	0.6	3.7	1.5	392	
011 4046	62	61.5	50.5	0.6	4.4	1.5	165	
011 4047	68	67.5	55	0.6	5	1.5	175	6008
011 4048	70	69.5	57	0.6	5	1.5	155	
011 4049	72	71.5	59	0.6	4.8	1.5	133	6207 6306 6404
011 4050	72	71.5	59	0.6	5.2	1.5	155	
011 4051	72	71.5	59	0.6	4.7	1.5	412	
011 4052	75	74.5	62	0.6	7.1	1.5	203	6009
011 4053	80	79.5	63.5	0.6	5.2	1.5	156	6010 6208 6307 6405
011 4054	80	79.5	63.5	0.6	5.8	1.5	176	
011 4055	80	79.5	63.5	0.6	5.6	1.5	540	
011 4056	85	84.5	67	0.6	6.8	1.5	201	6209
011 4057	85	84.5	67	0.6	5.7	1.5	500	

SUNZO DIN137 电机标准波形垫圈
DIN137 Wave Washers

商品编号	配轴承	外径 d1	内径 d2	厚度 s	自由高度 h	工作高度 h1	h1点 载荷力值	轴承 型号参考
Item No.	Bearing outer Diameter	outer diameter	inner diameter	thickness	height	working height	working load	Bearing References
011 4058	90	89.5	72	0.6	6	1.5	135	6011 6210 6308 6406
011 4059	90	89.5	72	0.6	7	1.5	175	
011 4060	90	89.5	72	0.7	5.3	1.5	590	
011 4061	90	89.5	72	0.7	6.4	1.5	243	
011 4062	95	94.5	75.5	0.7	7.2	1.5	266	6012
011 4063	100	99.5	80.5	0.7	6.9	1.5	203	6013 6211 6309 6407
011 4064	100	99.5	80.5	0.7	6.5	1.5	605	
011 4065	105	104.5	84.5	0.8	6.6	1.5	266	6014 6212 6310 6408
011 4066	110	109.5	90.5	0.8	7	1.5	224	
011 4067	110	109.5	90.5	0.8	6.8	1.5	687	
011 4068	115	114.5	95.5	0.8	10	1.5	280	6015
011 4069	117	116.5	97.5	0.8	9	1.5	248	6213 6311
011 4070	120	119.5	100.5	0.8	10	1.5	248	
011 4071	125	124.5	105.5	0.8	13	1.5	312	6016 6214
011 4072	127	126.5	107.5	0.8	14	1.5	312	6017 6215 6312 6410
011 4073	130	129.5	110.5	0.8	13	1.5	264	
011 4074	130	129.5	110.5	1	9.5	2.5	906	6018 6216 6313 6411
011 4075	130	129.5	110.5	1	11	2.5	330	
011 4076	135	134.5	114	1	11.7	2.5	361	6019
011 4077	137	136.5	116	1	10.3	2.5	285	
011 4078	140	139.5	119.0	1.00	10.8	2.5	285	6020 6217 6314 6412
011 4079	140	139.5	119.0	1.00	7.5	2.5	495	
011 4080	145	144.5	124.0	1.00	15.5	2.5	418	6021 6218 6315 6413
011 4081	150	149.5	129.0	1.00	12.0	2.5	266	
011 4082	150	149.5	129.0	1.00	9.1	2.5	547	6022 6219 6316
011 4083	157	156.5	136.0	1.00	16.5	2.5	336	
011 4084	160	159.5	139.0	1.00	17.0	2.5	336	6024 6220 6317 6414
011 4085	160	159.5	139.0	1.00	9.0	2.5	501	
011 4086	170	169.5	149.0	1.00	18.0	2.5	297	6024 6220 6317 6414
011 4087	170	169.5	149.0	1.20	12.0	2.5	546	
011 4088	180	179.5	159.0	1.00	22.5	2.5	314	6024 6220 6317 6414
011 4089	180	179.5	159.0	1.00	12.1	2.5	455	

SUNZO 多层波形弹簧
Multi-layer Waveform Spring

核心优势 Core Advantage

极致空间节省:轴向高度仅为螺旋弹簧1/3-1/2, 节省50%空间
Optimal space savings,axial height is only 1/3-1/2 of that of a helical spring, reducing the required space by 50%
多层叠加设计:2-5层及以上定制, 载荷10N-20000N精准可控
Multi-layer stacked design,customizable from 2-5 or more layers, with precisely controllable loads ranging from 10 N to 20,000 N.
精密绕制成型:材料纤维连续完整, 波峰受力均匀, 避免偏磨
Precision winding and forming ensures continuous and intact material fibers, uniform stress distribution across the wave crests, and prevents uneven wear.
长疲劳寿命:百万次疲劳测试验证, 长期运行预紧力稳定
Extended fatigue life, validated by millions of fatigue tests; stable pre-tension force during long-term operation.
低噪音运行:无金属碰撞摩擦, 端面平整, 安装便捷
Low-noise operation; no metal contact or friction; flat end faces; easy installation

应用领域 Application Area

行业	典型应用与功能
工业机器人	关节减速机、伺服电机轴承预紧, 提升运转精度
伺服电机	电机前后轴承、齿轮轴定位, 补偿磨损热胀
液压泵阀	阀芯复位、机械密封补偿、溢流阀调压
航空航天	航空仪表、精密传动机构, 轻量化小体积
医疗器械	手术机器人、精密诊疗设备、呼吸阀
半导体	晶圆传送、真空密封、精密工作台
汽车零部件	变速箱、双离合模块、电子驻车系统

技术参数 Technical Parameter

参数类别	技术规格范围
内径范围	8 mm - 300 mm (可定制)
外径范围	12 mm - 320 mm
层数可选	2层、3层、4层、5层及以上定制
自由高度	2.0 mm - 50 mm
工作行程	0.5 mm - 20 mm (推荐20%-80%)
工作载荷	10 N - 20000 N
波数可选	3波、4波、5波、6波、多波定制

Trade	Typical Applications and Features
Industrial Robot	Pre-tightening of joint reducers and servo motor bearings to enhance operational precision
Servo Motor	Positioning of the motor's front and rear bearings and the gear shaft, and compensation for wear and thermal expansion
Hydraulic Pump and Valve	Valve spool reset, mechanical seal compensation, relief valve pressure regulation
Aerospace	Aircraft instrumentation, precision transmission mechanisms, lightweight and compact design
Medical Apparatus and Instruments	Surgical robots, precision diagnostic and therapeutic equipment, respiratory valves
Semiconductor	Wafer transfer, vacuum sealing, precision worktable
Auto Parts	Transmission, dual-clutch module, electronic parking brake system

Parameter Category	Technical Specifications
Inner Diameter Range	8 mm - 300 mm (customizable)
Outer Diameter Range	12 mm - 320 mm
Number of Layers is Selectable	Customization available for floors 2, 3, 4, 5, and above
Free Height	2.0 mm - 50 mm
Work itinerary	0.5 mm - 20 mm (recommended range: 20%-80%)
Service Load	10 N - 20000 N
Wave Number is Selectable	Customizable 3-wave, 4-wave, 5-wave, 6-wave, and multi-wave configurations



SUNZO 多层波形弹簧
Multi-layer Waveform Spring

材质与精度 Material and Precision

常用材质	50CrVA、65Mn、301/304不锈钢、17-7PH、Inconel合金
工作温度	弹簧钢-40~120℃ / 不锈钢-60~250℃ / 高温合金600℃+
组合方式	叠合增加弹簧力 / 对合增加变形量，可精准定制载荷曲线
精度指标	内径±0.1mm，自由高度±0.05mm，载荷±8%
表面处理	发黑、镀锌、钝化、达克罗、锌铝涂层
定制服务	一对一选型设计，常规样品10-15天交付

Common Materials	50CrVA, 65Mn, 301/304 stainless steel, 17-7PH, Inconel alloy
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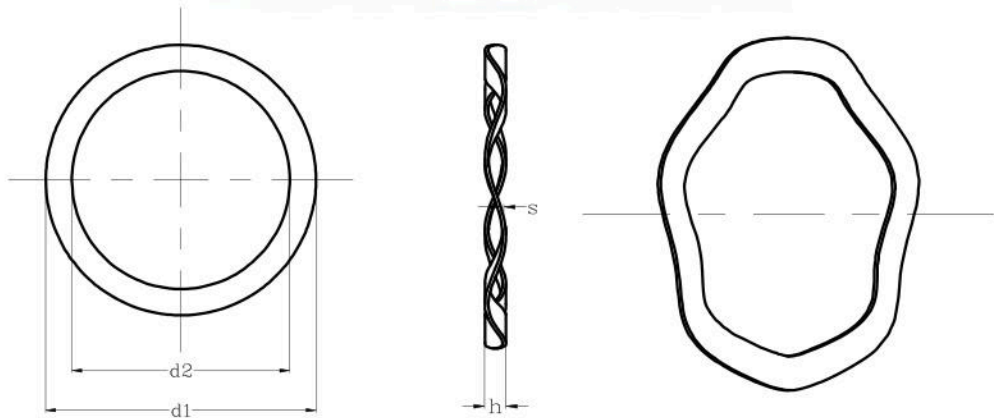
Working Temperature	Spring steel – 40–120°C / Stainless steel – 60–250°C / High-temperature alloy – 600°C+
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Compound Mode	Increasing the number of overlapping layers increases the spring force, while increasing the number of mating interfaces increases the deformation amount, enabling precise customization of the load curve.
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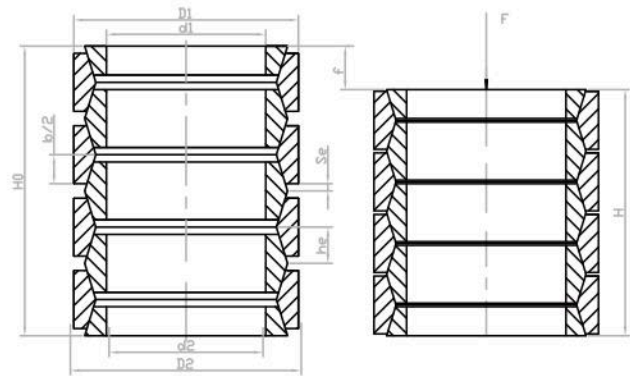
Accuracy Metrics	Inner diameter: ±0.1 mm; free height: ±0.05 mm; load: ±8%
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Surface Preparation	Blackening, galvanizing, passivation, Dacromet, zinc-aluminum coating
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Customized Service	One-on-one product selection and design; standard sample delivery time: 10–15 days
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SUNZO 环形弹簧
Ring Spring



商品 编号 Item No.	基本尺寸					外导向与内导向尺寸		载荷	消耗功	重量
	D1 [mm]	d1 [mm]	Se [mm]	he [mm]	b/2 [mm]	D2 [mm]	d2 [mm]	F [kN]	We [J]	Ge [kg]
012 001	18.1	14.4	0.4	2.2	1.8	18.7	13.9	5	1.0	0.002
012 002	25.0	20.8	0.6	3.1	2.5	25.9	20.1	9	2.7	0.004
012 003	32.0	27.0	0.8	4.0	3.2	33.1	26.1	14	5.6	0.007
012 004	38.0	31.7	0.9	4.7	3.8	39.3	30.6	20	9.0	0.012
012 005	42.2	34.6	1.0	5.2	4.2	43.6	33.4	26	13.0	0.018
012 006	48.2	39.4	1.1	5.9	4.8	49.8	38.1	34	18.7	0.026
012 007	55.0	46.0	1.3	6.8	5.5	56.7	44.5	40	26.0	0.035
012 008	63.0	51.9	1.4	7.7	6.3	64.9	50.3	54	37.8	0.056
012 009	70.0	58.2	1.6	8.6	7.0	72.1	56.4	65	52.0	0.074
012 010	80.0	67.0	1.8	9.8	8.0	83.0	64.0	83	75.0	0.105
012 011	90.0	75.5	2.0	11.0	9.0	93.0	73.0	100	100	0.145
012 012	100.0	84.0	2.2	12.2	10.0	103.0	81.0	125	138	0.203
012 014	124.0	102.0	2.6	15.0	12.4	128.0	98.0	200	260	0.408
012 013	130.0	111.5	2.6	15.0	12.4	134.0	108.0	160	208	0.376
012 015	140.0	116.0	3.0	17.0	14.0	144.0	112.0	250	375	0.568
012 016	166.0	134.0	3.7	20.0	16.0	170.0	130.0	350	648	0.869
012 017	198.0	162.0	3.9	22.4	18.5	203.0	157.0	510	995	1.570
012 018	194.0	155.0	4.4	23.4	19.0	199.0	150.0	600	1320	1.676
012 019	220.0	174.0	4.4	26.4	22.0	225.0	169.0	720	1584	2.573
012 020	262.0	208.0	4.8	25.8	21.0	268.0	202.0	860	2064	3.415
012 021	300.0	250.0	5.8	35.8	30.0	306.0	245.0	1000	2900	5.510
012 022	320.0	263.0	6.2	38.2	32.0	326.0	258.0	1200	3720	7.060
012 023	350.0	288.0	6.6	41.6	35.0	356.0	283.0	1400	4620	9.180
012 024	400.0	330.0	7.6	47.6	40.0	407.0	324.0	1800	6840	13.56

精密螺旋弹簧

Precision Helical Spring

压缩 · 拉伸 · 扭转 三大品类全场景覆盖

描述

工业领域应用最广泛的弹性基础元件，通过螺旋线结构弹性变形实现力的储存与释放。采用高精度成型工艺与严格品控，具备弹力精准、寿命持久、工况适应性强等特点。

Description

The most widely used elastic foundation component in industrial applications, it achieves force storage and release through elastic deformation of a helical structure. Utilizing high-precision molding processes and rigorous quality control, it features precise elastic performance, extended service life, and strong adaptability to diverse operating conditions.

核心优势 Core Advantage

微米级精度 线径0.03-25mm，尺寸精度±0.01mm，载荷公差±5%
Micron-level precision: wire diameter 0.03-25 mm, dimensional accuracy ±0.01 mm, load tolerance ±5%

长疲劳寿命: 百万次疲劳测试稳定，大幅减少更换与运维成本
Extended fatigue life: stable performance across millions of fatigue tests, significantly reducing replacement and operational maintenance costs.

全工况材料: 弹簧钢/不锈钢/镍基合金，适配常规到极端工况
Materials for all operating conditions: spring steel, stainless steel, and nickel-based alloys—suitable for both conventional and extreme operating conditions.

材料源头管控: 严格IQC检验，优选高纯净度钢材，保障疲劳性能
Material source control: Implement rigorous IQC inspections, select high-purity steel materials, and ensure fatigue performance.

快速定制: 全品类定制，常规样品3-7天交付，稳定量产
Rapid Customization: Full-range customization, with standard sample delivery within 3-7 days and reliable mass production.



应用领域 Application Area

压缩弹簧应用行业	典型应用部位	核心功能与作用
工业自动化	气缸、电磁阀、机械手抓取机构	提供复位弹力与缓冲力，保障机构动作精准顺畅
汽车制造	刹车系统回位、气门弹簧、座椅调节	实现部件精准复位，承受交变载荷，保障行车安全
阀门泵类	安全阀、减压阀、液压泵阀芯	控制阀门启闭压力，提供稳定复位力，保障介质压力稳定
能源电力	风电减震、核电阀门、储能缓冲机构	吸收冲击振动，提供弹性支撑，适配高低温工况

Compression SpringIndustry	Typical Application Locations	Core Functions
Industrial Automation	Pneumatic cylinders, solenoid valves, robotic grippers	Provides return force and cushioning for precise, smooth mechanism operation
Automotive Manufacturing	Brake system return, valve springs, seat adjustment	Enables precise component return, withstands cyclic loads, ensures driving safety
Valves & Pumps	Safety valves, pressure-reducing valves, hydraulic pump spools	Controls valve opening/closing pressure, provides stable return force, ensures consistent medium pressure
Energy & Power	Wind power damping, nuclear power valves, energy-storage buffer mechanisms	Absorbs shock and vibration, provides elastic support, adapts to high/low temperature conditions

SUNZO

精密螺旋弹簧
Precition Helical Spring

拉伸弹簧应用行业	典型应用部位	核心功能与作用
工程机械	车门铰链、抓斗机构、升降装置	提供张紧拉力，实现部件自动回位，承受交变拉伸载荷
电子电器	开关拉钩、连接器锁扣、继电器机构	提供稳定张紧力，保障接触可靠、动作复位精准
农业机械	播种机构、收割装置、张紧轮	适应户外复杂工况，提供持续拉力，保障设备稳定运行

Extension SpringIndustry	Typical Application Locations	Core Functions
Construction Machinery	Door hinges, grab mechanisms, lifting devices	Provides tension for automatic return, withstands cyclic tensile loads
Electronics & Electrical	Switch hooks, connector latches, relay mechanisms	Provides stable tension for reliable contact and precise return
Agricultural Machinery	Seeding mechanisms, harvesting devices, tension pulleys	Adapts to harsh outdoor conditions, provides sustained tension for stable equipment operation

扭转弹簧应用行业	典型应用部位	核心功能与作用
五金工具	钳子、扳手、门锁合页	提供扭转复位力矩，实现工具自动张开、门锁自动回弹
汽车零部件	雨刮器、座椅调角器、油箱盖铰链	提供精准扭转弹力，保障部件翻转、旋转动作顺畅
精密仪器	测试夹具、光学仪器、开关旋钮	提供微小精准扭矩，保障精密机构动作稳定可靠

Torsion SpringIndustry	Typical Application Locations	Core Functions
Hardware Tools	Pliers, wrenches, door-lock hinges	Provides torsional return torque for automatic tool opening and door-lock rebound
Automotive Components	Windshield wipers, seat angle adjusters, fuel-cap hinges	Provides precise torsional force for smooth flipping and rotation
Precision Instruments	Test fixtures, optical instruments, switch knobs	Provides small, precise torque for stable and reliable precision operation

压缩弹簧 参数	规格范围
线材直径	0.03 mm - 25 mm
自由高度	1.0 mm - 5000 mm
载荷范围	0.1 N - 20000 N
外径/线径比	4倍 - 40倍
精度等级	外径±0.05mm, 载荷±5%
常用材质	65Mn/60Si2MnA/50CrVA/ 不锈钢/琴钢线/Inconel

拉伸弹簧 参数	规格范围
线材直径	0.08 mm - 20 mm
自由长度	5.0 mm - 800 mm (含钩)
初拉力范围	0.05 N - 30000 N
钩型可选	圆钩/侧钩/德式钩/英式钩/异形钩
常用材质	油淬火线/碳钢/304/301/316/631 不锈钢
表面处理	镀锌/发黑/镀镍/达克罗/抛光

扭转弹簧 参数	规格范围
线材直径	0.08 mm - 16 mm
扭转角度	最大360° (单扭)，可定制多圈
扭矩范围	0.1 N·mm - 2000 N·m
结构形式	单扭/双扭/异形扭臂，扭臂可定制
常用材质	油淬火线/碳钢/304/301/316/631 不锈钢
表面处理	发黑/镀锌/喷塑/电泳/锌镍合金/达克罗

Compression SpringParameter	Specification Range
Wire Diameter	0.03 mm - 25 mm
Free Height	1.0 mm - 5000 mm
Load Range	0.1 N - 20000 N
Outer Dia. / Wire Dia. Ratio	4 × - 40 ×
Precision Grade	Outer dia. ±0.05 mm, Load ±5%
Common Materials	65Mn / 60Si2MnA / 50CrVA / Stainless steel / Music wire / Inconel

Extension SpringParameter	Specification Range
Wire Diameter	0.08 mm - 20 mm
Free Length	5.0 mm - 800 mm (incl. hooks)
Initial Tension Range	0.05 N - 30000 N
Hook Types Available	Round hook / Side hook / German hook / English hook / Special hook
Common Materials	Oil-tempered wire / Carbon steel / 304 / 301 / 316 / 631 stainless steel
Surface Treatment	Zinc plating / Black oxide / Nickel plating / Dacromet / Polishing

Torsion SpringParameter	Specification Range
Wire Diameter	0.08 mm - 16 mm
Torsion Angle	Up to 360° (single torsion); multi-coil custom available
Torque Range	0.1 N·mm - 2000 N·m
Structure Type	Single torsion / Double torsion / Special arms; arms customizable
Common Materials	Oil-tempered wire / Carbon steel / 304 / 301 / 316 / 631 stainless steel
Surface Treatment	Black oxide / Zinc plating / Powder coating / Electrophoresis / Zn-Ni alloy / Dacromet

SUNZO 中外钢号对照表

Comparison Sheet Forinternational Standard Materials

中国 GB,YB	日本 JIS	德国 DIN(W-Nr.)	美国			英国 BS	法国 NF	俄罗斯 ГОСТ
			ASTM	AISI	SAE/UNS			
65	-	C67(1.0761) CK67(1.1231)	1064, 1065	1064, 1065	1064, 1065	080A67	Xc65	65
75	-	C75(1.0773)	1074	1074	1074	070A78	XC70,XC80	75
65Mn	-	-	1566	1566	1566	-	-	65Г
60Si2Mn	SUP6	60Si7(1.0906)	9260	9260	9260	250A58, 250A61	61S7	60C2
60Si2CrA	SUP12	-	9254	-	-	-	-	60C2XA
50CrVA	SUP10	50CrV4(1.8159)	6150	6150	6150	735A50	50CV4	50XΦA
30W4Cr2VA	-	30WCrV17.9(1. 2243)	-	-	-	-	-	-
12Cr7Ni7	SUS301	X10CrNi18- 8(1.431)	-	301	S30100	301S21	Z12CN17-07	-
0Cr18Ni9	SUS304	X5CrNi18- 10(1.4301)	-	304	S30400	304S15	Z6CND18-09	08X18H10
06Cr17Ni12Mo2	SUS316	X5CrNiMo17- 12-2(1.4401)	-	316	S31600	316S16	Z6CND17-12	-
022Cr17Ni12Mo2	SUS316L	X2CrNiMo17- 12-2(1.4435)	-	316L	S31603	316S12	Z2CND17-12	03X17H14M2
2Cr13	SUS 420J1	X20Cr13 (1.4021)	-	420	S4200	420S37, 420S29	Z20C13	20X13
3Cr13	SUS 420J2	-	-	-	-	420S45	Z30C13	30X13
4Cr13	-	X40Cr13 (1.4034)	-	-	-	-	Z40C14	40X13
0Cr17Ni4Cu4Nb	SUS 630	X5CrNiCuNb1 6-4	630	-	-	-	-	-
0Cr17Ni7Al (17-7PH)	SUS 631	X7CrNiAl17-7 (1.4568)	631	-	-	-	Z8CNMI17-7	09X17H7Ю
0Cr15Ni7Mo2Al (15-7PHMo)	-	X8CrNiMoAl 15-7-2	632	-	-	-	Z10CNMAI1 5-07	-
Gh4169	-	NiCr19NbMo (2.4668)	-	Inconel 718	-	-	-	-
Gh4145	NCF750 B	NiCr15Fe7TiAl (2.4669)	-	Inconel X-750	-	-	-	Эп974
Gh90	-	NiCr20Co18Ti (2.4969)	-	-	HEV6	Nimonic90	ATG NC20KTA	Эп617